Medieval Latin Christian Texts on the Jewish Calendar

Time, Astronomy, and Calendars

TEXTS AND STUDIES

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Medieval Latin Christian Texts on the Jewish Calendar

A Study with Five Editions and Translations

By

C. Philipp E. Nothaft

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Preface

In my previous monograph for this Brill series (*Dating the Passion*, published in October 2011), I sketched certain lines of development in the history of chronological scholarship, which revolved around pre-modern attempts to date the life of Jesus Christ on the basis of calendrical and astronomical arguments. One recurrent theme in the medieval sources I studied for this project was the calendar used by the Jews at Jesus's time and its possible use in reconstructing the date of the crucifixion. As a result of working with these texts, I started to develop a special interest in the amount of knowledge Christian scholars during the Middle Ages could claim with regard to various aspects of Jewish time reckoning. It quickly transpired that Latin authors from medieval Western Europe were in fact capable of exploiting a considerable range of data about the Jewish calendar when discussing issues such as the date of Christ's crucifixion or the reform of the ecclesiastical calendar. A handful among them, however, went even further and produced entire treatises dedicated specifically to the subject of the Jewish calendar. The existence of a medieval 'genre' of Christian texts on this exotic topic, however small and heterogeneous it may have been, struck me as a phenomenon worthy of further investigation—and as one that should be made accessible to a wider audience through critical editions and translations.

The foundations for the present volume were laid in early 2010, when I had the extraordinarily good fortune of meeting Sacha Stern at a conference in Jerusalem. I was happy to discover that Prof. Stern not only shared my enthusiasm for studying the cross-cultural reception of the Jewish calendar, but was planning to set up a research project dedicated to this subject. Thanks to Prof. Stern's commitment to the idea and a generous grant from the Leverhulme Trust, I was able to participate in a two-year project entitled *Medieval Christian and Jewish Calendar Texts*, based at UCL's Department of Hebrew and Jewish Studies, which gave me the opportunity to pursue the necessary research free from most obligations during the academic years 2011/12 and 2012/13. The principal outcomes of this research are assembled in the present volume in the form of critical editions, English translations, and in-depth studies of five Latin texts dealing with the Jewish calendar as well as two appendices on further material. For three of these five texts, this will be the first time they are made available in print in any shape or form; two others (the *Liber erarum* and Hermann Zoest's *Calendarium Hebraicum novum*) have previously existed only in deficient editions from the early modern period. Each text will be accompanied by introductory chapters dealing with their contents, sources, manuscript transmission, and intellectual context.

As one will be able to tell from a glance at the index, preparations for this book involved the consultation of a sizeable number of manuscripts from libraries across Europe. In a large number of cases, I was able to use microfilm reproductions from a collection of medieval mathematical manuscripts assembled in the late 1970s by Prof. Menso Folkerts (University of Munich) and now stored at the *Monumenta Germaniae Historica*. I am grateful to the MGH librarian Arno Mentzel-Reuters and his assistant Ruth Neeser for granting me full access to these treasures and thereby greatly facilitating my research. Many other libraries and institutions in ten different countries responded positively to my requests for manuscript reproductions and I thank them all for their contributions. Among the libraries I frequented in person, I am particularly grateful to the staff at the British Library (London), the Warburg Institute Library (London), the Bodleian Library (Oxford), and Merton College Library (Oxford) for their competent and friendly assistance.

During my work on this project, I received the generous help of a large number of individuals. Pride of place must go to Sacha Stern, without whose unflinching support none of this could have seen the light of day as quickly or as completely as it did. I thank him very much for his expertly advice and invaluable input during all stages of research and writing. I am also especially indebted to his co-editor Charles Burnett, who supported this project in numerous ways and whose keen eye for typos and transcription errors saved me from countless embarrassments during final revisions. As a full-term research associate for the project *Medieval Christian and Jewish Calendar Texts*, I had the privilege of working alongside Justine Isserles, who has been studying the presence of Christian calendrical material in medieval Hebrew manuscripts. I thank both her and all the other research associates working on calendar-related projects under Prof. Stern's auspices—François de Blois, Israel Sandman, Kineret Sittig, and Ilana Wartenberg—, who were generous in sharing their knowledge with me. Throughout my two years at the Department of Hebrew and Jewish Studies, I have been witness to an outstanding atmosphere of collegiality, mutual support, and general good cheer that made me proud to be a member. I thank the entire faculty and staff for welcoming me in their midst, in particular Michael Berkowitz and François Guesnet, who contributed to my well-being through Fish & Chips and pleasant conversations. Thanks are also due to Lia Kahn-Zajtmann, Kerry Ellis, and Belinda Stojanovic for their friendly and efficient administrative help.

In addition to my collaborators at UCL, a great number of benefactors, friends, and colleagues have left their mark on this book by providing help, advice, inspiration, or encouragement over the past two years. My thanks go to Michael Allen, Elisheva Baumgarten, Ann Blair, Elisheva Carlebach, Matthew

Champion, Simcha Emanuel, Leofranc Holford-Strevens, David Juste, Danny Lasker, Magnus Quirin Löfflmann, Alfred Lohr, Dáibhí Ó Cróinín, Anthony Ossa-Richardson, Miri Rubin, Daniel Stökl Ben Ezra, Ryan Szpiech, and Joanna Weinberg; to my parents and to everyone else who should appear on this list, but has been omitted through my forgetfulness. Very special thanks are due to my two PhD advisors, Helmut Zedelmaier and Anthony Grafton, whose continuing support is one of the greatest blessings in my professional life. Finally, I thank Immo Warntjes, a preeminent scholar and friend, whose presence in London during the summer of 2012 I will fondly remember when thinking back about this book's formation.

List of Plates

1 MS Oxford, Bodleian Library, Digby 212, fol. 3^{r} (Robert of Leicester, *De compoto Hebreorum*, tables 2 and 3). Courtesy of Bodleian Library, Oxford 627

2 MS Uppsala, Universitetsbibliotek, C 655, fol. 14^{v} (*Computus Judaicus*, metrical prologue and commentary). Courtesy of Universitetsbibliotek, Uppsala 628

3 MS Uppsala, Universitetsbibliotek, C 655, fol. 20^{v} (*Computus Judaicus*, table of months). Courtesy of Universitetsbibliotek, Uppsala 629

4 MS Wolfenbüttel, Herzog-August-Bibliothek, Cod. Guelf. 206.1 Gud. lat., p. 115 (Hermann Zoest, *Calendarium Hebraicum novum*, calendar page for Nisan). Courtesy of Herzog-August-Bibliothek, Wolfenbüttel 630

Abbreviations

AASS	*Acta Sanctorum*. 68 vols. Antwerp/Brussels: Société des Bollandistes, 1643–1940.
CCCM	*Corpus Christianorum: Continuatio Mediaevalis*
CCSL	*Corpus Christianorum: Series Latina*
CDSB	*Complete Dictionary of Scientific Biography*. 27 vols. Detroit: Charles Scribner's Sons, 2008.
CSEL	*Corpus Scriptorum Ecclesiasticorum Latinorum*
DLM	*Die deutsche Literatur des Mittelalters: Verfasserlexikon*. Edited by Wolfgang Stammler and others. 2nd ed. 14 vols. Berlin: de Gruyter, 1978–2008.
DNB	*Dictionary of National Biography*. Edited by George Smith, Leslie Stephen, and Sidney Lee. 63 vols. London: Smith, Elder & Co, 1885–1903.
DTC	*Dictionnaire de Théologie Catholique*. 16 vols. Paris: Letouzey et Ané, 1909–1972.
EJ	*Encyclopaedia Judaica*. Edited by Michael Berenbaum and Fred Skolnik. 2nd ed. 22 vols. Detroit: Macmillan, 2007.
MGH	Monumenta Germaniae Historica
PG	*Patrologiae cursus completus, series Graeca*. Edited by Jacques Paul Migne. 161 vols. Paris, 1857–1866.
PL	*Patrologiae cursus completus, series Latina*. Edited by Jacques Paul Migne. 221 vols. Paris, 1844–1865.
ODNB	*Oxford Dictionary of National Biography* [http://www.oxforddnb.com]
TK	Lynn Thorndike and Pearl Kibre. *A Catalogue of Incipits of Mediaeval Scientific Writings in Latin*. Rev. ed. The Mediaeval Academy of America Publication no. 29. London: The Mediaeval Academy of America, 1963.
Weber	*Biblia Sacra Iuxta Vulgatam Versionem*. Edited by Robert Weber. 2 vols. Stuttgart: Württembergische Bibelanstalt, 1969.

Note

Online sources cited in this study were last accessed on 08 November 2013. Translations of scriptural passages generally follow the Douay-Rheims version [http://www.drbo.org].

Signs Used in the Critical Apparatus

[X	text in manuscript *X* begins
X]	text in manuscript *X* ends
a.c.	*ante correcturam* (state of text before correction)
add.	*addidit* (text added)
del.	*delevit* (text cancelled or erased)
ins.	*inseruit* (text secondarily inserted)
iter.	*iteravit* (text repeated)
mg.	*in margine* (written in the margin)
n.l.	not legible because of damage
p.c.	*post correcturam* (state of text after correction)
s.l.	*sub vel supra lineam* (written above or below the line)
om.	*omisit* (text missing)

Introduction

Among the many groundbreaking publications in Hebrew type that left Basel's printing presses during the sixteenth century was a small volume entitled *Kalendarium Hebraicum* (1527), which had been put together by the Hebraist and cosmographer Sebastian Münster (1488–1552), a man influential enough in his fields to later have the epithet "Ezra and Strabo of the Germans" engraved on his tombstone. On roughly 200 pages, the *Kalendarium Hebraicum* offered a colourful potpourri of Jewish texts on time reckoning, which, to quote the blurb on the title page, had been "newly brought to light from the inner sanctuaries of the Hebrews" with the intention of serving "not so much students of the Hebrew language as historiographers and those experienced in astronomy."[1] In a dedicatory epistle addressed to Bernardo Clesio, the bishop of Trent (dated 20 September 1526), Münster indicated that his project had initially developed out of his own puzzlement over the fact that the Jews counted their years from the creation of the world, using an era that started in 3761/60 BCE and thus ca. 1500 years later than many Latin chronicles, despite the fact that Jews and Christians both claimed to base themselves on the same Old Testament chronology.[2] Eager to find out the reasons for this startling discrepancy, Münster decided to embark on a study of Hebrew chronicles, two of which—the *Seder olam zutta* and Abraham Ibn Daud's *Sefer ha-Kabbalah*—he presented with a parallel Latin translation at the beginning of his book. To these, he attached a whole series of further texts and treatises dealing with the complicated rules of the Jewish calendar, its astronomical foundations, and its

1 Sebastian Münster, *Kalendarium Hebraicum, opera Sebastiani Munsteri ex Hebraeorum penetralibus iam recens in lucem aeditum: quod non tam Hebraice studiosis quam Historiographis & Astronomiae peritis subservire poterit* (Basel: Froben, 1527). For a description, see Viktor Hantzsch, *Sebastian Münster* (Leipzig: Hirzel, 1898), 168–169; Joseph Prijs, *Die Basler hebräischen Drucke* (*1492–1866*) (Olten: Graf, 1964), 45–48; Joanna Weinberg, "Invention and Convention: Jewish and Christian Critique of the Jewish Fixed Calendar," *Jewish History* 14 (2000): 317–330. On Münster, see further Karl Heinz Burmeister, *Sebastian Münster* (Basel: Helbig & Lichtenhahn, 1963); Jerome Friedman, *The Most Ancient Testimony: Sixteenth-Century Christian-Hebraica in the Age of Renaissance Nostalgia* (Athens, GA: Ohio University Press, 1983), 44–48, 165–168, 212–251; Matthew McLean, *The* Cosmographia *of Sebastian Münster* (Aldershot: Ashgate, 2007). On the importance of Basel as a centre for Hebrew printing, see Thomas Willi, "Hebraica Veritas in Basel: Christliche Hebraistik aus jüdischen Quellen," in *Congress Volume Basel 2001*, ed. A. Lemaire (Leiden: Brill, 2002), 375–397.

2 See the preface in Münster, *Kalendarium*, sigs. a2^{r}–4^{r}.

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feast-day cycle, which were in turn supplemented by Münster's own Latin disquisitions on these subjects as well as by various charts and tables, including astronomical diagrams of eclipses. In an age when Hebrew printing was still in its infancy and Western European Jews were used to read about their calendar in the form of handwritten *sifrei evronot*, Münster's book, although intended for a Christian audience, thus effectively became the very first example of an *ibbur* or Hebrew calendrical compendium to make the transition from manuscript to print.[3]

In his decision to amass and publish a whole range of source material relevant to the time-reckoning system of an often-reviled group of religious 'others', Sebastian Münster gave powerful expression to the significance that calendars in general possessed for the lives of early-sixteenth-century scholars and their audiences. Conditioned by the liturgical year of the Roman Church, with its exuberant cycle of feast days and observances, many among his contemporaries would have been acutely aware of the calendar's role as a societal pacemaker and marker of cultural identity, which went far beyond its ordinary function as a scheme of counting days. Unlike any other device known to man, calendars had the capacity of merging personal with communal, sacred with profane time, in ways that connected these various human measures to the motions of the celestial bodies and thus to the unchanging laws of the cosmos, which were presumed to be divine.[4] After centuries of living side by side with Jews, who represented the only significant religious minority in pre-Reformation Europe, Christians were also able to appreciate the calendar as one of the elements that most visibly separated Jews from the surrounding Christian society, as both groups were regularly called to work, rest, feast, fast,

3 The early modern *sifrei evronot* received an excellent in-depth study by Elisheva Carlebach, *Palaces of Time: Jewish Calendar and Culture in Early Modern Europe* (Cambridge, MA: Harvard University Press, 2011). For Münster's role, see ibid., 49–50. On the iconography of these manuscripts, see also Carlebach, "Palaces of Time: Illustrations of *Sifre Evronot*," *Images* 2 (2008): 21–44. Note that a brief Hebrew piece on the Jewish calendrical postponement rules known as *deḥiyyot* (on which see pp. 27–30 below) already appeared in Paul of Middelburg's *Epistola apologetica* (1488). See Adri K. Offenberg, "The First Use of Hebrew in a Book Printed in the Netherlands," *Quaerendo* 4 (1974): 44–54. On Paul of Middelburg, see also n. 38 in this introduction and n. 67 in Appendix I below.

4 See, in general, Eviatar Zerubavel, *Hidden Rhythms: Schedules and Calendars in Social Life* (Berkeley: University of California Press, 1985); Jörg Rüpke, *Zeit und Fest: Eine Kulturgeschichte des Kalenders* (Munich: Beck, 2006); Eliezer Segal, *In Those Days, At This Time: Holiness and History in the Jewish Calendar* (Calgary: University of Calgary Press, 2008).

and pray on different days and at different times. As the first printed book of its kind, Münster's *Kalendarium Hebraicum* put Christian onlookers in a position to accurately predict the occurrence of many of their Jewish neighbours' religious practices, provided that they learned how to wield the instructions and tables in the back of the book, which explained the 14 different year types known to the Jewish calendar, each with its own individual configuration of weekdays and feast dates.

In approaching this oftentimes difficult material, Münster's audience was aided by the fact that not each and every aspect of Jewish ritual life was entirely alien or exotic. Thanks to a shared corpus of religious scriptures, which included the Pentateuch, no literate Christian would have been particularly surprised by the fact that Jews convened once a year on Passover to commemorate their liberation from Egyptian slavery (Exodus 12) or that they were called to celebrate a week-long Festival of Tabernacles, known in Hebrew as Sukkot, during which they slept in booths in reminiscence of the Israelites' 40-year sojourn in the desert (Leviticus 23:33–43). Familiarity of this kind was no doubt increased by the fact that several Jewish feasts were mentioned in the New Testament, which had Jesus go down to Jerusalem to celebrate the Festival of Tabernacles (John 7:2–10), and where the annual Passover meal or *Pesaḥ seder* provided the setting for the Last Supper recounted in all four Gospels.[5] Even some post-biblical festivities such as Purim and Ḥanukkah remained accessible to Christian observers, at least as far as their origin stories were concerned, thanks to the fact that the Catholic Church had retained the books of Esther and Maccabees as part of its canon. More unusual, and more delicate, was information about Jewish calendrical traditions of a much later date. One example mentioned in the *Kalendarium Hebraicum* is the custom—now extinct, but widespread during the Middle Ages and the early modern period—of not drinking water at the turning points of the four seasons (equinoxes and solstices), known in Hebrew as *tekufot*. In a sternly disapproving tone, Münster wrote of the "Jewish hallucinations" according to which each of the four seasons was ruled by a guardian angel, whose change of guard at each *tekufah* exposed this moment to the harmful influence of demons (*shedim*). Fearing

5 Münster, who located the origins of the present-day Jewish calendar in the early days of the Second Temple, noted how some scholars in his time had used its rules to harmonize these Gospel accounts, which famously differed on whether or not Jesus had eaten the Passover lamb on the same evening as the other Jews. See Münster, *Kalendarium*, sig. a3^{v}, and C.P.E. Nothaft, *Dating the Passion: The Life of Jesus and the Emergence of Scientific Chronology (200–1600)* (Leiden: Brill, 2012), 212–222, 230–231.

this influence, Jews refused to drink water when the *tekufah* was expected, so as to avoid the danger of becoming ill with dropsy.[6]

Münster's engagement with the Jewish calendar, which ranged from the technical to the anecdotal and from the factual to the polemical, can be seen as the result of the confluence of three intellectual currents, which together transformed the way Judaism was represented in Christian sources during the Renaissance and Reformation era. The most obvious of these is the general expansion of Christian Hebraism, which brought the study of Hebrew to universities and into printing shops, with the consequence that scholars willing to learn the language were no longer completely dependent on Jewish tutors. While reading the Bible in its original language continued to be the principal justification for pursuits of these kinds, early modern Hebraists such as Johannes Reuchlin (1455–1522) and the celebrated Johann Buxtorf (1564–1629)—not to forget Sebastian Münster himself—soon moved beyond the narrow confines of biblical exegesis and paved the way for a much more comprehensive encounter with Hebrew and rabbinic literature, which is also hinted at in *Kalendarium Hebraicum*.[7] In parallel to the philological groundwork laid by the Hebraists, there was a sprawling new fashion of 'ethnographic' accounts of Judaism, many of them written by Jewish converts and in the German vernacular, which greatly heightened the presence of Jewish themes on Christian bookshelves. Although usually viciously polemical in their intent, entries in this genre managed to truthfully convey little-known aspects of Jewish ritual

6 Münster, *Kalendarium*, 48: "Atque hic egregie delyrant Iudaei, fabulantes quod per singulas tkuphas soli specialis deputetur angelus & director: & in illo momento quo sol ipse priorem complevit tkupham & sequentem inchoat, priusquam unus director alteri locum cesserit, שדים id est, daemones, omnem possunt in aqua exercere tyrannidem. … Unde dicunt quod si quis in illo momento vel tantillum biberet aquae, hydropisim vel aliam gravem infirmitatem evadere non posset." On this custom, see Israel M. Ta-Shma, "The Danger of Drinking Water during the Tequfa—The History of an Idea" [in Hebrew], *Jerusalem Studies in Jewish Folklore* 17 (1995): 21–32; Elisheva Carlebach, "Water into Blood: Custom, Calendar, and an Unknown Yiddish Book for Women," in *Gender and Jewish History*, ed. Marion A. Kaplan and Deborah Dash Moore (Bloomington: Indiana University Press, 2011), 59–71; Carlebach, *Palaces*, 160–188; Elisheva Baumgarten, "'Remember that Glorious Girl': Jephtah's Daughter in Medieval Jewish Culture," *Jewish Quarterly Review* 97 (2007): 180–209; Ilana Wartenberg, "The Hebrew Calendrical Bookshelf in the Early Twelfth Century: The Cases of Abraham Bar Ḥiyya and Jacob Bar Samson," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 97–111 (105–107).

7 See most recently Stephen G. Burnett, *Christian Hebraism in the Reformation Era (1500–1660): Authors, Books, and the Transmission of Jewish Learning* (Leiden: Brill, 2012), with ample references to further literature.

and ceremonial life to a wide audience of lay readers.[8] Due to its function as a timer of feasts and fasts, the Jewish calendar naturally played a very visible role in these ethnographies *avant la lettre*, although the authors generally shunned the kind of technical details that were expounded at length in the *Kalendarium Hebraicum*.[9]

The third intellectual trajectory Münster falls into, at least as far as his influence on later authors is concerned, is that of a heightened interest in historical chronology, which during the sixteenth century came to be regarded as a discipline in its own right. Much of this development is reflected in the towering figure of Joseph Justus Scaliger (1540–1609), early modern Europe's most famous philologist, whose *Opus de emendatione temporum* (1583) has often been hailed as a founding document of scientific chronology.[10] In their quest for a coherent account of world history, which would not just reconstruct the temporal minutiae of the biblical narrative, but also harmonize holy writ with pagan sources, chronology's practitioners considered a basic acquaintance with the Jewish calendar to be an essential requirement of their trade. While it is rare to find publications from this genre that do not address the subject in at least some shape or form,[11] Sebastian Münster was certainly one of the more valuable additions to the chronologer's bookshelf, as witnessed by Joseph Scaliger own writings.[12] The intensity with which the calendar of the Jews was stud-

8 See now Yaacov Deutsch, *Judaism in Christian Eyes: Ethnographic Descriptions of Jews and Judaism in Early Modern Europe* (Oxford: Oxford University Press, 2012).

9 See, e.g., Jacob Niger (Schwartz), *Kalendarium cum vanae, Iudaeorum expectationis refutatione, et ad bellum in omne genus infidelium gerendum exhortatione annexa* (Vienna: Vietor, 1529), who focuses on the feasts and fasts of the Jewish year and transliterates all Hebrew terminology and quotes into Latin.

10 The best study on Scaliger and the history of this discipline is Anthony Grafton, *Joseph Scaliger: A Study in the History of Classical Scholarship*, vol. 2, *Historical Chronology* (Oxford: Clarendon Press, 1993). See now also Nicholas Popper, *Walter Ralegh's* History of the World *and the Historical Culture of the Late Renaissance* (Chicago: The University of Chicago Press, 2012), 77–121.

11 To cite just two typical examples, published in the same year by the same printer: Pietro Pitati, *Paschales atque noviluniorum mensurni canones* (Venice: Giunti, 1537), fols. 14^{r}–16^{r}; Johannes Lucidus Samotheus, *Opusculum de emendationibus temporum* (Venice: Giunti, 1537), fols. 148^{v}–150^{r}.

12 Scaliger owned two copies of the *Kalendarium Hebraicum*, which are both preserved in Leiden's University Library. See Arnoud Vrolijk and Kasper van Ommen, eds., *"All My Books in Foreign Tongues": Scaliger's Oriental Legacy in Leiden 1609–2009* (Leiden: Leiden University Library, 2009), 83. On Scaliger's use of Münster, see Grafton, *Joseph Scaliger*, 178–179, 181, 328–329.

ied by the late Renaissance is well exemplified by the work of the Heidelberg orientalist Jacob Christmann (1554–1613), who felt the need to embark on a fully-fledged pamphlet war against Joseph Scaliger, once he realized that the latter had misconstrued certain aspects of Jewish chronology—and with them the historical date of Jesus's death.[13]

If one were to remain at this level of contextualization, there would be little apparent reason to reach back beyond the sixteenth century in search of medieval precedents for Sebastian Münster's printed presentation of the Jewish calendar and the sophisticated scholarship that went with it. And yet, it would be a mistake to suppose that Christian interest in the subject had to wait until the Renaissance for it to emerge in written form. A different story, one that will be told in the present volume, can be glimpsed from a medieval manuscript in the possession of the University of Leiden, to whose library Joseph Scaliger bequeathed most of his manuscripts. Codex no. 66 of the Scaliger collection, a small parchment volume of 84 leaves, written in the early fourteenth century, contains a *Compotus novus* put together in 1297 by the now-forgotten John of Pulchro Rivo, a native of Brunswick in Northern Germany.[14] Although primarily a compilation on the Christian ecclesiastical calendar and its astronomical foundations, the *Compotus novus* contained enough information, much of it in tabular form, to enable its more perceptive readers to competently operate within the framework of the contemporary Jewish calendar—to predict its new moons (*moladot*) and to determine the initial weekday not just for each year, but also for each month and feast contained in it. John was able to supplement this technical information with various bits of trivia about Jewish calendrical

13 For a detailed case study, see C.P.E. Nothaft, "A Sixteenth-Century Debate on the Jewish Calendar: Jacob Christmann and Joseph Justus Scaliger," *Jewish Quarterly Review* 103 (2013): 47–73. On the chronology of Jesus's last days and its importance for early modern Hebraists, see now also Anthony Grafton and Joanna Weinberg, *"I Have Always Loved the Holy Tongue": Isaac Casaubon, the Jews, and a Forgotten Chapter in Renaissance Scholarship* (Cambridge, MA: Harvard University Press, 2011), 214–230.

14 For a description of the MS, see P.C. Molhuysen, *Codices Scaligerani* (*praeter Orientales*) (Leiden: Brill, 1910), 26; Petrus Philomena de Dacia and Petrus de S. Audomaro, *Opera quadrivialia*, ed. Fritz S. Pedersen, 2 vols. (Copenhagen: Gad, 1983–1984), 1:234–235. The manuscript was classified in the eighteenth century as *ex legato illustri viri Josephi Scalgeri*, but the lack of annotations that can safely be attributed to Scaliger's hand make it less than certain that the famous chronologer ever owned or read the texts contained therein. On Scaliger's bequest, see Kasper van Ommen, "'*Je suis pauvre en tout, mesmement en livres*': Reconstructing the Legatum Scaligeri in Leiden University Library," in *Writings and Writing from Another World and Another Era*, ed. Robert M. Kerr and Thomas Milo (Cambridge: Archetype, 2010), 293–329.

practices and customs, most of which he included in a commentary on his own *Compotus* completed in the following year (1298). The insights preserved in this commentary are sometimes surprising. More than two centuries prior to Sebastian Münster, John already reports that the Jews in his time are wont to

> find the exact hour of the *tekufot*, at which they observe certain erroneous customs. For it is worth knowing that the Jews claim that any given thing has its guardian or angel. And accordingly, as they say, every quarter of the parts of time [also] has its guardian: when one quarter of the year ends, it receives a new guardian, and during this change of guards there will be a short moment without a guardian. And because of this, they pour out all the water they have left in their houses at this particular hour. For they say that if anybody drank from it, he would become dropsical or die. And they conclude that it is for this reason that many Christians are dropsical, but few or no Jews become dropsical. But they do not pour away wine or beer, even though it would seem that the same reasoning applies here. And this, I believe, they take from their Talmud, which contains many similar stipulations. The Talmud is a book of the Jews as large as four Bibles, and whoever knows it is [regarded as] a master.[15]

John's false guess concerning the Talmudic origins of these beliefs reflects the fact that he was dealing with hearsay, picked up during conversations he had with Jews in his native Saxony, but also in Paris, where he seems to have spent some time during the late 1280s as a student at the Arts faculty.[16] And while he may have disapproved of most of the beliefs he encountered in the course of this research, his work nevertheless reflects a surprisingly open and wide-ranging engagement with the Jewish calendar and the customs attached to it, which seems to have been motivated by intellectual curiosity far more so than it was led by any polemical intent. John's dispassionate, quasi-ethnographic attitude becomes all the more remarkable when compared to the strong atmosphere of anti-Jewish hostility that pervaded Church and society in his time. The eleventh to thirteenth centuries had seen the development of an elaborate popular mythology, which depicted Jews as diabolical enemies of Christ who conspired to harm Christians in every conceivable way, even by ritually

15 MS Vatican City, BAV, lat. 3112, fol. 42$^{ra–b}$. For the Latin text, see n. 52 in Appendix I below. Carlebach, *Palaces*, 179, traces the Christian reception of this custom as far back as the *Tegernsee Haggadah* (ca. 1478–1492). John predates this by almost two centuries.

16 For full details, see pp. 601–604 below.

murdering their children or by poisoning their wells.[17] On legal grounds, the discrimination of Jews was increased in multifarious ways, as can be seen from the decrees of the Fourth Lateran Council of 1215, which famously demanded that Jews must distinguish themselves by special clothing. Secular rulers, who had once increased the Jewish population in their domains by setting economic incentives, often complied with this new policy, leading to the wholesale expulsion of the Jews from England (1290) and France (1306 and 1394). While many of the worst acts of anti-Jewish violence and discrimination only date from the late Middle Ages, the hardening attitudes towards Jews and Judaism are already transparent in the polemical literature that was produced during the twelfth century.[18] In their efforts to respond to Jewish challenges to their theology, Christian scholars of this period availed themselves of a Stoic concept of 'reason', which argued that the truth of Christian dogmas could be demonstrated not just by faith or Scripture, but by philosophical arguments. The frustrating experience that these arguments failed to convince Jewish listeners contributed to a view of the Jews as carnal and sub-human creatures, who lacked the essential capacity of reason with which Christians were supposedly endowed. One early representative of this new and acerbic thrust of anti-Jewish polemic was Peter the Venerable (ca. 1092–1156), the abbot of Cluny, who even likened Jews to animals, writing: "I dare not say you are a man lest perhaps I lie, because I know that reason is extinguished in you, yea buried, reason that separates man from other animals and puts him in charge of them."[19]

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17 A classic monograph on this subject is Joshua Trachtenberg, *The Devil and the Jews* (New Haven, CT: Yale University Press, 1943). For useful recent introductions to the situation of Jews in medieval Christian Europe, see Leonard B. Glick, *Abraham's Heirs* (Syracuse, NY: Syracuse University Press, 1999); Robert Chazan, *The Jews of Medieval Western Christendom, 1000–1500* (Cambridge: Cambridge University Press, 2006); Chazan, *Reassessing Jewish Life in Medieval Europe* (Cambridge: Cambridge University Press, 2010); Anna Sapir Abulafia, *Christian-Jewish Relations 1000–1300* (Harlow: Longman/Pearson, 2011).

18 See in general Gilbert Dahan, *Les intellectuels chrétiens et les juifs au Moyen Âge* (Paris: Les Éditions du Cerf, 1990); Dahan, *La polémique chrétienne contre le judaïsme au Moyen Âge* (Paris: Albin Michel, 1991); Jeremy Cohen, *Living Letters of the Law: Ideas of the Jew in Medieval Christianity* (Berkeley: University of California Press, 1999); Ryan Szpiech, *Conversion and Narrative: Reading and Religious Authority in Medieval Polemic* (Philadelphia: University of Pennsylvania Press, 2013).

19 Peter the Venerable, *Adversus Iudeorum inveteratam duritiem* 5 (CCCM 58, 125): "Hominem enim te profiteri ne forte mentiar, non audeo, quia in te extinctam, immo sepultam quae hominem a caeteris animalibus vel bestiis separat eisque praefert rationem agnosco." See Anna Sapir Abulafia, *Christians and Jews in the Twelfth-Century Renaissance* (London: Routledge, 1995), where the translation of the cited passage is found on p. 116, and the

Another major development in the field of inter-religious polemic was the turn towards post-biblical Jewish literature, which gained particular momentum in the thirteenth century. During this period, a number of Christian writers, most of them mendicant friars, made serious efforts to familiarize themselves with the Talmud and the Midrashim in order to improve their prospects of missionizing among Jews, if not to refute Judaism 'from within'.[20] As their engagement with rabbinic sources became stronger, the image of the Jewish religion in the Christian eye began to transform. Not only did this post-biblical literature show a Judaism that was markedly different from the Hebrew followers of the old Mosaic Law that Christian theologians had habitually pictured, but it contained passages that could be construed as dangerously heretical, blasphemous, or even downright hostile towards Christianity. According to a thesis advanced most forcefully by Jeremy Cohen, the 'shock' generated by this mental discovery of rabbinic Judaism was one of the underlying causes for the worsening Jewish plight in many parts of medieval Europe from the thirteenth century onwards.[21] Among the contemporary events that best illustrate this changed situation is the staged trial and condemnation of the Talmud in Paris in 1240, which resulted in repeated burnings of Jewish books by the Church authorities.[22]

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essays assembled in Abulafia, *Christians and Jews in Dispute* (Aldershot: Ashgate, 1998). Further important articles on these issues include Amos Funkenstein, "Changes in the Patterns of Christian Anti-Jewish Polemics in the Twelfth Century" [in Hebrew], *Zion* 33 (1968): 124–144; Funkenstein, "Basic Types of Christian anti-Jewish Polemics in the Later Middle Ages," *Viator* 2 (1971): 373–382; David Berger, "Mission to the Jews and Jewish-Christian Contacts in the Polemical Literature of the High Middle Ages," *American Historical Review* 91 (1986): 576–591; Jeremy Cohen, "The Jews as the Killers of Christ in the Latin Tradition, from Augustine to the Friars," *Traditio* 39 (1983): 1–27; Cohen, "Scholarship and Intolerance in the Medieval Academy: The Study and Evaluation of Judaism in European Christendom," *American Historical Review* 91 (1986): 592–613; David E. Timmer, "Biblical Exegesis and the Jewish-Christian Controversy in the Early Twelfth Century," *Church History* 58 (1989): 309–321.

20 Robert Chazan, *Daggers of Faith: Thirteenth-Century Christian Missionizing and Jewish Response* (Berkeley: University of California Press, 1989).

21 Jeremy Cohen, *The Friars and the Jews: The Evolution of Medieval Anti-Judaism* (Ithaca, NY: Cornell University Press, 1982). See further Cohen, *Living Letters*, 317–363; Alexander Patschovsky, "Der 'Talmudjude': Vom mittelalterlichen Ursprung eines neuzeitlichen Themas," in *Juden in der christlichen Umwelt während des späten Mittelalters*, ed. Alfred Haverkamp and Franz-Josef Ziwes (Berlin: Duncker & Humblot, 1992), 13–27; Glick, *Abraham's Heirs*, 193–302.

22 Robert Chazan, "The Condemnation of the Talmud Reconsidered (1239–1248)," *Proceedings of the American Academy for Jewish Research* 55 (1988): 11–30; Gilbert Dahan, *Le*

Such dire consequences aside, an attempt to retrieve the medieval roots of Sebastian Münster's *Kalendarium Hebraicum* reveals some noteworthy connections between the medieval 'discovery' of post-biblical Judaism and the way the Jewish calendar began to appear on the radar screens of Christian scholars from the twelfth century onward.[23] For the first time since Late Antiquity, Latin authors showed an awareness that the Jews dated their festivities and organized their lives according to a calendar that deviated considerably from what they had heretofore suspected on the basis of their own practice. Not only did the calendar of contemporary Judaism fail to correspond to the lunisolar cycles that Christians themselves had been using for centuries to date the movable feast days—and which they naturally assumed to have Old Testament roots—, but it turned out to be vastly superior as an instrument of astronomical calculation. Where the moon in the Christian calendar followed a simple day-based arithmetic and neatly returned to the same calendar date after every 19 years, the Jews determined the exact time of the *molad* or mean conjunction according to a system that took 689,472 years to reach full circle. As a consequence of its relative simplicity, the ecclesiastical calendar lost track of the observable lunar phases at an alarming rate, whereas the Jewish system continued to successfully predict the approximate time of conjunction on a monthly basis. During the later Middle Ages, Christian scholars mindful of the deficits of their own calendar were typically also aware that their much-loathed Jewish neighbours possessed a reckoning device that closely resembled the kind of 'natural' calendar that they themselves for were looking for. As in the case of the Talmud, the intellectual confrontation with the Jewish *molad*-based calendar could thus be a disconcerting experience, and it is no accident that the horror in the face of Jewish 'laughter' about Christian incompetence in calendrical matters became a commonplace to be repeated *ad nauseam* in the rich literature on calendar reform that was produced between the twelfth and sixteenth centuries.[24]

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brûlement du Talmud à Paris: 1242–1244 (Paris: Les Éditions du Cerf, 1999); Paul Lawrence Rose, "When Was the Talmud Burnt at Paris? A Critical Examination of the Christian and Jewish Sources and a New Dating: June 1241," *Journal of Jewish Studies* 62 (2011): 324–339.

23 For a first attempt at summarizing this phenomenon, see C.P.E. Nothaft, "Between Crucifixion and Calendar Reform: Medieval Christian Perceptions of the Jewish Lunisolar Calendar," in *Living the Lunar Calendar*, ed. Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele (Oxford: Oxbow Books, 2012), 259–267. See also Nothaft, *Dating*, 113–146. Further details will be presented in Chapter One below.

24 See C.P.E. Nothaft, "Duking it out in the Arena of Time: Chronology and the Christian-Jewish Encounter (1100–1600)," in *Religious Criticism and the Growth of Knowledge*, ed. Harvey Hames = *Medieval Encounters* Special Volume (forthcoming).

Whether or not this laughter was an acute reality, it is undeniable that a working knowledge of the ecclesiastical calendar, whose numerous saint's days and major feasts governed the rhythms of public life, would have been indispensable for Jews living as a minority within a Christian society. On this knowledge depended the ability to interact with Christians on an economic and mercantile plain—to negotiate and observe contracts, to pay back or receive loans, or to find buyers for one's goods at markets and fairs, which usually took place on fixed dates. It is therefore not fully surprising to find that, by the sixteenth century, "Jewish calendar literature included so much detailed and nuanced information about the Christian calendar that it could have served Christians quite well in translation."[25] Needless to say, no immediate practical need of this kind existed for medieval Christians, some of whom nevertheless took up the quill to write about the calendar of the Jews. In order to fully understand their motives, it is necessary to focus on the shared historical ground that continued to unite both religions, even as one group persecuted the other. The foremost *raison d'être* for the use of a lunar cycle in the Christian Church was the annual calculation of the date of Easter, which was historically derived from the Jewish Passover, celebrated during the full moon of the first spring month (Nisan). Only an understanding of the rules by which the Jews in biblical times defined this month could thus ensure that the Church determined Easter in full accordance with the Mosaic precepts laid down in the Pentateuch, which were thought to underlie the Christian *pascha* no less than they governed the Jewish *pesaḥ*. As heirs to the ancient Israelites and their ritual practices, the Jews of medieval Europe seemed to possess the calendar that best represented these precepts and on whose rules the calculation of Easter should hence be modelled.

25 Carlebach, *Palaces*, 116. For the role of the Christian calendar in the life of early modern Jews and its presence in their *sifrei evronot*, see ibid., 115–159. See further Justine Isserles, "Some Hygiene and Dietary Calendars in Hebrew Manuscripts from Medieval Ashkenaz," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 273–326; Sacha Stern, "Christian Calendars in Hebrew in Medieval Jewish Manuscripts," in *Religious Criticism and the Growth of Knowledge*, ed. Harvey Hames = *Medieval Encounters* Special Volume (forthcoming); C.P.E. Nothaft and Justine Isserles, "Calendars beyond Borders: Exchange of Calendrical Knowledge between Jews and Christians in Medieval Europe (12th–15th cent.)," *Medieval Encounters* 20 (2014): 1–37. On the polemical perception of the Christian liturgical calendar in the *Toledot Yeshu*, see now Daniel Stökl Ben Ezra, "An Ancient List of Christian Festivals in *Toledot Yeshu*: Polemics as Indication for Interaction," *Harvard Theological Review* 102 (2009): 481–496.

Christians who followed this line of reasoning felt that the study of the Jewish calendar brought them into contact with a system of ordering time that was positively 'biblical'. The Jewish calendar, to adopt Beryl Smalley's happy turn of phrase, functioned "as a kind of telephone to the Old Testament,"[26] which was relevant not just for Easter reckoning, but for an understanding of the time-specifications found in the Bible as a whole. Given these circumstances, the Jewish calendar was clearly too valuable a tool to be simply ignored, notwithstanding the feeling of humiliation it may have caused to some observers. Starting with the *Compotus emendatus* (1171) of Reinher of Paderborn, a cathedral canon and skilled mathematician from Westphalia, a series of mostly forgotten Christian scholars took it upon themselves to master the intricate rules of the Jewish calendar and divulge their newly acquired knowledge in Latin treatises that took on a variety of outlooks and forms. Many of them, Reinher included, were careful to identify the calendar they expounded as a product of the biblical 'Hebrews' (*Hebraei*) rather than the contemporary 'Jews' (*Judaei*). In doing so, they underlined the supposed Mosaic or Old Testament roots of the system they described, whilst making sure that it remained untainted by the theological odium accorded to the Jews of their time.[27] Thanks to this historical construct, anachronistic as it may have been, the Jewish calendar could be adopted as the legitimate model for a reformed Christian calendar, which would be able to calculate the date of the Easter full moon in accordance with the rules codified in the Pentateuch—and in accordance with astronomical reality.[28] Yet for all their attempts to distance themselves from the Jews of their own time and surroundings, it remains the case that Christian authors such as Reinher could not have acquired their knowledge without either the assistance of Jewish informants or the use of Hebrew source texts. One such source text was translated into Latin at the end of the twelfth century (1188/91) and is published in the present volume—for the first time since the sixteenth century—under the title *Liber erarum*. Although at its core a concise and straightforward manual on the Jewish calendar, the Latin version of the *Liber erarum*, which may have been a product of Gerard of Cremona's Toledan 'school', also incorporates material of a more general chronological interest, added perhaps to bring the original text closer to the reading tastes of a Christian audience.[29]

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26 Beryl Smalley, *The Study of the Bible in the Middle Ages*, 3rd ed. (Oxford: Blackwell, 1983), 362.

27 A significant exception is John of Pulchro Rivo, concerning whom see Appendix I, pp. 604–607.

28 For more on Reinher's work, see Nothaft, *Dating*, 128–146, and pp. 63–65 below.

29 The origin and authorship of the *Liber erarum* is discussed in Chapter Two below.

Together with its varied and complex manuscript tradition, the *Liber erarum* is a valuable witness to the kind of cross-cultural transmission, adaptation, and modification of knowledge that the Jewish calendar could engender. At the same time, however, the information it presented was hardly sufficient to provide a full understanding of every aspect of Jewish time reckoning. Scholars with the desire to go deeper were still dependent on oral instruction, unless they were willing to increase their knowledge on the basis of written Hebrew sources. The study of Hebrew, although never a particularly widespread pursuit among medieval Christians, reached a temporary high point in thirteenth-century England, which—not coincidentally—gave rise to Robert of Leicester's *De compoto Hebreorum aptato ad kalendarium* ("On the *computus* of the Hebrews, adapted to [our] calendar"), the lengthiest and most sophisticated Latin treatise on Jewish calendation to be extant from the Middle Ages. Robert's work, which was composed in 1294 and thus only four years after the expulsion of 1290, is an impressive testimony to its author's arithmetical prowess and his enthusiasm for his subject. The latter is reflected by the occasional use of Hebrew terminology, the repeated references to rabbinic sources, and the painstaking construction of elaborate calendrical-chronological tables. Although he assembled enough information to clearly highlight the differences between the Jewish and Christian calendars—and convert the dates of one into the other—, his work was not advertised as a treatise on calendar reform in any specific sense. Instead, Robert was drawn in by the problems of biblical chronology, which he hoped to solve by recourse to the calendar used by the ancient Hebrews. Like his predecessor Reinher of Paderborn, Robert invested particular ingenuity in the chronological details of the life of Jesus Christ, especially the problematic date of his crucifixion, which has kept awake many scholar over the years, both in Robert's time and the present. As we shall see, his deliberations on this and other chronological subjects show some conspicuous parallels to the work of a fellow member of the Order of Friars Minor, the famous Roger Bacon, whose interest in the Jewish calendar is a matter of record.[30]

30 A detailed analysis of Robert's work is provided in Chapter Three below. See also C.P.E. Nothaft, "Robert of Leicester's Treatise on the Hebrew *Computus* and the Study of Jewish Knowledge in Medieval England," *Jewish Historical Studies* 45 (2013): 63–78. On the chronology of Jesus, see Nothaft, *Dating*, and the overview in Alexandra Smith, "Computerised Resources for Historical Research: Calendars, Chronology and the Life of Jesus Christ," in *Bridging the Gaps: Sources, Methodology and Approaches to Religion in History*, ed. Joaquim Carvalho (Pisa: Plus—Pisa University Press, 2008), 29–56.

Only a few years after Robert of Leicester, another scholar from England, the Dominican historian and theologian Nicholas Trevet, took the occasion to make the calendar of the Jews more widely known among his peers. His *Computus Hebreorum*, written in 1310, is preserved in only a single manuscript, where it functions as an appendix to a commentary on the book of Leviticus, which Trevet had produced at the request of his order's Master General. In Trevet's view, it was essential for biblical exegetes to understand at least the basic structure of the Jewish calendar, if only to be able to tell apart the many feasts of the Hebrews that were mentioned in the Pentateuch. Given this narrow exegetical interest, Trevet's treatment of the calendar remained fairly basic, avoiding the many pitfalls of the *molad*-system and the trouble of calendrical conversions. Even so, his text was centred on an elaborate set of tables, the models for which could be found in Hebrew sources. They enabled his readers to find the corresponding weekday for every Jewish feast within a 247-year cycle. From the accompanying text they could learn about significance not just of the Mosaic festivals, but also of Purim and Ḥanukkah, and even of annual fasts such as Tisha B'Av, Gedaliah, 10 Tevet, and 17 Tammuz.[31]

The use of the Hebrew calendar as a reading aid for the Bible was also the main objective of a *Calendarium Hebraicum novum* drawn up in 1436 by the Cistercian monk Hermann Zoest (ca. 1380/90–1445), who spent most of the 1430s at the Council of Basel, where he lobbied for a reform of the ecclesiastical calendar. In Hermann's *Calendarium*, the Jewish calendar was adapted, in an unabashedly playful manner, to the format of a Latin *kalendarium* or martyrology, whose entries mingled historical events from the Old and New Testament with commemorative dates from the Christian liturgical year. In contrast to Nicholas Trevet, Hermann was a technically adept user of the Jewish calendar, who could perform calendrical conversions between Jewish and Julian dates with reasonable (albeit not flawless) accuracy. His knowledge was due in part to the groundbreaking work of his Westphalian compatriot Reinher of Paderborn, but there is also evidence of personal contacts to Jews.[32]

In addition, Hermann was familiar with a mid-fourteenth century *Computus Judaicus* (ca. 1342), which circulated widely in German-speaking Central and Eastern Europe and approached the subject of the Jewish calendar from a completely different angle. Modelled after various didactic works in the Christian computistical tradition, it taught how to calculate the time of the mean conjunction of sun and moon according to the principles of the Jewish *molad-*

31 For more information, see Chapter Four below.

32 Hermann's work will be the subject of Chapter Six.

system, using a series of brief instructions, supplemented by mnemonic verses and tables. Its rhymed preface is noteworthy for its polemical tone, which matches the fact that the *Computus Judaicus* showed itself unconcerned with the aforementioned differentiation between contemporary 'Jews' and biblical 'Hebrews'. Half a century after John of Pulchro Rivo's and Robert of Leicester's enthusiastic efforts to collect information about the Jewish calendar, the perface to the *Computus Judaicus* treated this calendar as little more than a source of grief and embarrassment, which enabled the Satanic 'Jew' to know things about lunisolar computation that the average clergyman remained ignorant of. In contrast to John's and Robert's much more sophisticated writings, however, the *Computus Judaicus* became remarkably popular during the late Middle Ages, as witnessed by a minimum of 59 extant copies. In the course of its manuscript transmission, the work underwent numerous changes, which resulted in a textual history of baffling complexity. This complexity is further highlighted by the existence of several learned commentaries on the text, which reached several times its original length and occasionally reinforced the anti-Jewish thrust of the preface.[33]

Whatever the precise concerns that motivated their production, the existence of a whole tradition of Latin texts dealing specifically with the Hebrew or Jewish *computus* is a remarkable fact, worthy of close scrutiny. With the present book, I undertake the first study of this literary phenomenon, based around critical editions and translations of five of the aforementioned works, which approach the same subject from a variety of formal and conceptual vantage points: the *Liber erarum* (Chapter Two), Robert of Leicester's *De compoto Hebreorum* (Chapter Three), Nicholas Trevet's *Compotus Hebreorum* (Chapter Four), the *Computus Judaicus* (Chapter Five), and Hermann Zoest's *Calendarium Hebraicum novum* (Chapter Six).[34] In the course of investigating these five

33 I previously dealt with this text in C.P.E. Nothaft, "*Me pudet audire Iudeum talia scire*: A Late Medieval Latin School Text on the Jewish Calendar," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 327–365. Parts of this article were reworked into Chapter Five below.

34 I should take this opportunity to point out that the present study will focus on the Jewish calendar as a means of time reckoning. No attempt will be made to investigate Christian knowledge of more mundane aspects of this calendar such as the Hebrew names of the months. With regard to the Latin tradition of the Hebrew month names, which were widely known even in the early Middle Ages thanks to the Venerable Bede and the works of Jerome, a fairly satisfactory account was provided by Matthias Thiel, *Grundlagen und Gestalt der Hebräischkenntnisse des frühen Mittelalters* (Spoleto: Centro Italiano di Studi Sull'Alto Medioevo, 1973), 127–138. The information provided there is augmented

texts, I also had the occasion to collect notes on several further tables and pieces of text related to the Jewish calendar, found in Latin manuscripts from the thirteenth, fourteenth, and fifteenth centuries. These notes will be presented summarily in Appendix II, with references to the available secondary literature. Appendix I is mainly dedicated to John of Pulchro Rivo's *Compotus novus* and John's commentary on the same text, which, though not strictly-speaking treatises on the Jewish calendar *per se*, contain some of the most in-depth and unusual information on this subject known from Latin medieval writings. In addition, this appendix will deal with an earlier *Compotus philosophicus* (ca. 1273), attributed to a certain 'Friar John', which was the source for the Jewish calendrical tables and related passages contained in the *Compotus novus*.

The five editions that make up the main part of this book are each preceded by detailed introductions, which cover pertinent aspects such as date, authorship, technical content, textual history, and manuscript transmission. In order to keep these introductions within reasonable bounds, I have in each case presupposed that the reader is acquainted with the basics of the Jewish calendar and the Christian Easter *computus* as well as with some of the historical context relevant to both of them. The necessary historical and technical background has not been omitted, but will instead be delivered in Chapter One below, where it is arranged around three separate complexes of ideas: (1) 'The Jewish calendar: history and structure', (2) 'The Easter *computus* and the challenge of calendar reform', and (3) 'The Christian encounter with the Jewish calendar: Antiquity to twelfth century'. The historical survey contained in the third section also functions as a more extended introduction to the book as a whole, as it recounts information that is crucial for a full understanding of the intellectual roots of these texts. Since all of the edited texts deal with the same subject (albeit in strikingly different ways), this naturally means that there will be a fair amount of repetition between them. I have therefore refrained from providing a detailed section-by-section commentary for each edition. Instead, the introductions have each been supplemented with a chapter entitled 'structure and contents', which will address difficulties within the text, explain the purpose behind various parts, analyse chronological arguments, identify sources,

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by Maura Walsh and Dáibhí Ó Cróinín, *Cummian's Letter* De controversia paschali *and the* De ratione conputandi (Toronto: Pontifical Institute of Mediaeval Studies, 1988), 150; Dáibhí Ó Cróinín, "A Seventh-Century Irish Computus from the Circle of Cummianus," *Proceedings of the Royal Irish Academy* 82C (1982): 405–430 (410–411); Daniel McCarthy and Aidan Breen, *The Ante-Nicene Christian Pasch* (Dublin: Four Courts Press, 2003), 95–97.

and address historical contexts.[35] A slight exception was made for Hermann Zoest's *Calendarium Hebraicum novum*, where a separate chronological commentary was deemed necessary in order to shed light on the individual dates that adorn the pages of this biblical calendar.

In contrast to the *Compotus emendatus* of Reinher of Paderborn, which received its *editio princeps* in 1951 and was re-edited in 2011,[36] none of the texts presented here has thus far been easily available in a modern edition. The best-known (or, rather, least obscure) among them is perhaps the *Liber erarum*, which was printed in Nuremberg in 1549 on the basis of a lost manuscript under the fictitious title *Scriptum cuiusdam Hebraei de Eris seu intervallis regnorum, ac diversis gentium annis*. A manuscript containing three works of Hermann Zoest, including the *Calendarium Hebraicum novum*, was put into print in 1701, but this edition is now hard to come by, whilst Zoest's extensive corpus of writings remains a seriously neglected aspect of fifteenth-century intellectual history. An *editio princeps* is offered here for Nicholas Trevet's *Compotus Hebreorum* as well as for Robert of Leicester's chronological *tour de force*, which have been sporadically mentioned in the scholarly literature, but never studied to any serious extent. The same holds true for the influential *Computus Judaicus* of 1342, whose existence has been virtually forgotten, despite the fact that it is encountered in dozens of manuscripts. John of Pulchro Rivo's texts are equally shrouded in obscurity.

Although the present survey stops at the middle of the fifteenth century, this should not be taken to imply the existence of a significant historical rift (beyond the invention of the printing press). Substantive references to the Jewish calendar continue to appear in various Latin sources from subsequent decades, including from regions that are not covered by the texts assembled in this book. One case in point is Castile, where Pedro Martínez de Osma (ca. 1424–1480), a theologian at the University of Salamanca, authored a *Disputatio de anno in quo possimus dicere Dominum fuisse passum et de quibusdam erratis in kalendario* (1468), in which he applied his knowledge of Jewish calendation to both the question of the date of Jesus's death and the reform of the ecclesiastical calendar.[37] Two decades later, in 1488/92, the Dutch astrologer-physician Paul

35 In the case of Nicholas Trevet's *Compotus Hebreorum* (Chapter Four), the pertinent section is entitled 'Context, contents, and sources'.

36 Walter Émile van Wijk, ed., *Le comput emendé de Reinherus de Paderborn (1171)* (Amsterdam: North-Holland, 1951); Werner Herold, ed., *Reinher von Paderborn: Computus Emendatus; Die verbesserte Osterfestberechnung von 1171* (Paderborn: Bonifatius, 2011).

37 An edition of this text, based on MS Vatican City, BAV, lat. 6301, fols. 46^{r}–56^{v} (395^{r}–404^{v}), was published in José Labajos Alonso, *Escritos académicos de Pedro de Osma* (Salamanca:

of Middelburg and his rival Peter of Rivo, a noted philosopher and lecturer in theology at the University of Louvain, fought a protracted dispute about the chronology of Jesus, in the course of which both showed a remarkable acquaintance with the calendar of the Jews, which in Paul's case was even undergirded by Hebrew source texts.[38] In addition, the Jewish calendar could crop up in altogether unexpected places such as the famous *Treviso Arithmetic* of 1478, which is considered to be the first mathematical textbook ever printed. One of the exercises contained in this slender volume involved a calculation of the first new moon of 1479, which, it turned out, was going to fall on 23 January, 9 hours and 914 'puncti' after sunset. Both the results and the parameters used in this reckoning exercise were entirely dependent on the Jewish method of finding the *molad*, even though nothing in the *Treviso Arithmetic* made this clear.[39]

In spite of such examples, which could easily be increased,[40] it remains true that no further Latin texts dedicated specifically to the Jewish calendar

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Universidad Pontificia de Salamanca, 2010), 354–383. For textual emendations and a re-edition of the second half of the text, see C.P.E. Nothaft, "Reforming the Calendar at the University of Salamanca ca. 1468: Pedro Martínez de Osma and His *Disputatio de anno* …," *eHumanista* 23 (2013): 522–556 (544–549). A second copy can be found in MS Vatican City, BAV, lat. 6198, fols. 149^{r}–162^{r}. Pedro de Osma was a student of Alfonso Fernández de Madrigal ("el Tostado"), whose views on these issues are summarized in Nothaft, *Dating*, 203–212.

38 See Nothaft, *Dating*, 222–240 and n. 3 above. Paul of Middelburg's contribution to the study of the Jewish calendar was also acknowledged by Sebastian Münster, in his preface to the *Kalendarium Hebraicum*. See Münster, *Kalendarium*, sig. a4^{r}.

39 *Larte de labbacho* (Treviso, 1478), not paginated. The book can be read online at http://www.republicaveneta.com/doc/abaco.pdf. See also the English translation in Frank J. Swetz, *Capitalism and Arithmetic: The New Math of the 15th Century* (La Salle, IL: Open Court, 1987), 165–168. Swetz completely misses the significance of this passage and is accordingly puzzled by the occurrence of the time-unit *puncto*, which he surmises was of "regional and extremely limited" use (ibid., 334n46). In reality, the *puncto* is simply a Latin adaptation of the Hebrew *ḥelek*. See p. 26 below.

40 In the nineteenth century, the *Treviso Arithmetic* was the object of an extremely detailed bibliographical 'dissertation' by Baldassarre Boncompagni, entitled "Intorno ad un tratatto d'arithmetica stampato nel 1478," *Atti dell'Accademia Pontificia de' Nuovi Lincei* 16 (1862–1863): 1–64, 101–228, 301–364, 389–452, 503–630, 683–842, 909–1044. Boncompagni used the mentioned reckoning example as an occasion to catalogue a great number of references to the division of the hour into 1080 parts or 'points' and the Jewish length of the month (29d 12h 793p) in both medieval manuscripts and (early) modern printed works, from the thirteenth to the nineteenth century. See ibid., 689–842, 909–1044. Some of the manuscripts he recorded belong to texts discussed in the present volume. See below, ch. 2, n. 8; ch. 3, n. 76; ch. 5, n. 10; Appendix I, n. 2 and Appendix II, n. 4.

seem to have been written between Hermann Zoest's *Kalendarium Hebraicum novum* and the publication of Sebastian Münster's *Kalendarium Hebraicum*. While there is little point in denying that Hebraistic activity, engagement with the Jewish calendar included, reached a new quality during the early modern era, the similarity between the two titles should be enough to remind us that medieval scholars, although often enough forgotten or ignored by their early modern descendants, were able to set important precedents for many avenues of science and scholarship. It is my hope that the texts studied and presented in this volume will be appreciated as a testimony to this fact.

CHAPTER 1

Contexts and Pretexts

1 The Jewish Calendar: History and Structure

The calendar used by Jews in medieval Europe from about the tenth century onwards differed in several key aspects from the Jewish calendar(s) of Late Antiquity or earlier biblical times—a fact that was bound to confuse Christian onlookers when they first took serious notice of this calendar in the twelfth century. Even to the modern historian, the history of the Jewish calendar is one of baffling complexity, aggravated by a very lacunose state of the historical record.[1] Setting aside the presence of a—sectarian or perhaps merely theoretical—364-day calendar in the Dead Sea Scrolls and a few other sources from the Second Temple period (1 Enoch, Jubilees),[2] the available evidence indicates that the calendar of ancient Israel was lunisolar and thus followed a general trend in the ancient world before 500 BCE. In practice, this meant that months were based on the phases of the moon, their beginnings being fixed by recourse to the visibility of the new crescent, whilst a scheme of intercalation kept the calendar aligned to the annual course of the sun. This way, it was ensured that the Passover festival in the first month of the Hebrew calendar would coincide with the time of the ripening (אביב) of barley, as indicated in the book of Exodus (9:31; 13:4; 23:15; 34:18; see also Deuteronomy 16:1).

1 For general orientation, see Sacha Stern, "The Origins of the Jewish Calendar," *Le'ela* 44 (October 1997): 2–6; Stern, *Calendar and Community: A History of the Jewish Calendar, Second Century BCE–Tenth Century CE* (Oxford: Oxford University Press, 2001); Stern, *Calendars in Antiquity: Empires, States, & Societies* (Oxford: Oxford University Press, 2012); Lawrence H. Schiffman, "From Observation to Calculation: The Development of the Rabbinic Lunar Calendar," in *Living the Lunar Calendar*, ed. Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele (Oxford: Oxbow Books, 2012), 231–243; Moshe David Herr, "The Calendar," in *The Jewish People in the First Century: Historical Geography, Political History, Social, Cultural and Religious Life and Institutions*, ed. S. Safrai and M. Stern, 2 vols. (Assen: Van Gorcum, 1974–1976), 834–864, with references to earlier literature.

2 On this phenomenon, see now Stern, *Calendars in Antiquity*, 193–203, 360–377. See also Jonathan Ben-Dov and Stéphane Saulnier, "Qumran Calendars: A Survey of Scholarship 1980–2007," *Currents in Biblical Scholarship* 7 (2008): 124–168, with ample references to further literature.

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The earliest sources to deal with this calendar in any detail are the Mishnah and Tosefta (tractate *Rosh Hashanah*) of the early third century CE, which approach the subject from a juridical standpoint. According to the procedure outlined in these texts, it was the special prerogative of a rabbinic court to declare the beginning of a month, following an interrogation of witnesses, who had to testify that the new moon had been sighted. Depending on whether or not this sighting already occurred on the 29th evening of the month, this would fix the length of the previous month, which could be either 29 or 30 days. If the report of the sighting was deemed reliable, the new moon was 'sanctified' in a ceremony called *kiddush ha-ḥodesh*, which was to be become the title of Moses Maimonides's famous treatise on the Jewish calendar, completed in 1178.[3] Once a decision had been made, messengers were sent out to declare the beginning of the new month to the Jews in Palestine and Babylonia. The uncertainty whether the messenger would arrive in time to report the sighting of the new moon before important feasts has been used to explain why Jewish communities in the Diaspora began to observe two feast days in a row, in order to make sure that the correct date would be among them. Second days of this kind are currently still celebrated in the case of Sukkot (15/16 Tishri), Shemini Atzeret (22/23 Tishri), the first and last days of Passover (15/16 and 21/22 Nisan) and Shavuot (6/7 Sivan).[4] A related precaution concerns the celebration of the new moon day (*Rosh ḥodesh*), which applies not just to the first day of each month, but also to the last day of the preceding month, if the latter is 30 (rather than just 29) days in length. Users of an observational calendar could thus make sure that *Rosh ḥodesh* coincided with the actual new moon even in cases where the latter already occurred on the 30th day of the outgoing month (which was possible due to the fact that one full lunation lasts only ca. 29.53059d on average).[5] For earlier times, the Mishnah also relates the existence of a chain of

3 Maimonides, *Sanctification of the New Moon* (*The Code of Maimonides 3.8*), trans. Solomon Gandz (New Haven, CT: Yale University Press, 1956).

4 See the detailed discussion in Leo Depuydt, "Ancient and Medieval Sources and Mechanism of the Calendrical Practice of *Yom Tov Sheni Shel Galuyyot*," in *Life and Culture in the Ancient Near East*, ed. Richard E. Averbeck, Mark W. Chavalas, and David B. Weisberg (Bethesda, MD: CDL Press, 2003), 435–470. A more critical stance is taken by Stern, *Calendar and Community*, 241–244.

5 A very early trace of this practice might be found in the Old Testament in 1 Samuel 20:18–34, as was already noted in the thirteenth century by Roger Bacon, *Opus tertium*, in *Opera quaedam hactenus inedita*, vol. 1, ed. J.S. Brewer (London: Longman, Green, Longman, and Roberts, 1859), 217–218; Bacon, *Opus majus*, ed. John Henry Bridges, 3 vols. (Oxford: Clarendon Press, 1897–1900), 1:198. See further Solomon Gandz, "Studies in the Hebrew Calendar II: The Origins of the Two New Moon Days," *Jewish Quarterly Review*, n.s., 40 (1949–1950): 157–172, 251–277.

beacons that reportedly stretched from the Mount of Olives to Samaria, Galilee, and other neighbouring territories (M. *Rosh Hashanah* 2:3–4). This curious detail was first relayed to a Christian readership by Roger Bacon, who mentions these fire-signals in his *Opus majus* (ca. 1267) addressed to Pope Clement IV (1265–1268), and whose knowledge of Hebrew and the Jewish calendar shall concern us in Chapter Three below (esp. pp. 132–140).[6]

Explanations of current calendrical customs based on the ancient rabbinic new moon procedure are bound to be compromised by the historical difficulties that surround these early rabbinic sources. Aside from the problem of discerning exactly when and for how long the *modus operandi* described in the Mishnah and Tosefta was actually observed, it is also questionable how much light the normative, juridical character of these sources can shed on actual Jewish practice in Palestine and elsewhere during the first three centuries of the Common Era. Given what is known about calendrical practice in Antiquity, it would appear more likely that the regulation of the calendar after the destruction of the Second Temple (70 CE) remained in the hands of political rulers or ruling bodies, such as city councils, rather than having been passed on immediately from the high priesthood to the rabbinate. From this perspective, the new moon procedure found in tannaitic sources appears like an idealized fiction, designed to assert rather than to accurately reflect rabbinic authority over the calendar. Convincing arguments for such a revisionist view have been recently laid out by Sacha Stern, who emphasizes that the true state of the Jewish calendar during Late Antiquity was one of considerable local variation, which must be seen as the natural result of "the dispersion and general lack of cohesiveness of Jews in the ancient world, together with the practical difficulties of communicating an identical calendar to widespread, far-flung communities."[7]

Starting in the fourth century, the rabbinic calendar underwent a process towards fixation, which affected both the length of its individual months and its rules of intercalation. Important innovations included a shift of the beginning of the month from the evening of first visibility to the day of conjunction

6 Bacon, *Opus majus*, 1:196: "Et ideo Hebraei antiquitus per astronomiam certificaverunt primationem lunae, et cum non fuerat in visione novae lunae, nec potuit per visum cognosci, accenderunt faces in Jerusalem in monte alto, ut sciretur quod tunc fuit tempus primationis, quatenus homines essent parati facere solemnitates et festa quae habebant expedire."

7 Stern, *Calendars in Antiquity*, 333. See further ibid., 341–353, and Sacha Stern, "The Rabbinic New Moon Procedure: Context and Significance," in *Living the Lunar Calendar*, ed. Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele (Oxford: Oxbow Books, 2012), 211–230.

as well as the adoption of a 'rule of the equinox', which precluded the first spring month of Nisan from falling too early in the year.[8] In addition, first steps seem to have been taken towards the introduction of 'postponement rules' (*deḥiyyot*), which prohibited the year from beginning on certain weekdays (see p. 27 below). Signs of this process are already visible in the Talmud, but it would take centuries of further development in the post-Talmudic (Gaonic) period for the present-day calendar to emerge. Following a suggestion made by Sacha Stern, it is probable that the general process towards standardization and fixation was influenced, however subtly, by the parallel establishment of fixed lunisolar cycles for the calculation of Easter among Christian communities, to which we shall turn in the following section.[9] At the same time, however, the adoption of a calculated calendar can be seen as the outcome of a push towards greater unity within the late antique rabbinic communities in Palestine and Babylonia, which affected Jewish calendar practice as a whole.[10]

Based on a remark of R. Hai Gaon (early eleventh century), transmitted by Abraham bar Ḥiyya, it has often been assumed that the present-day fixed calendar goes back all the way to Hillel II, who was the rabbinic leader of Palestinian Jewry in the middle of the fourth century.[11] Yet while it is not unlikely that some significant steps towards a fixed calendar (such as the institution of an intercalation cycle) were already taken in the fourth century, the view that the whole calendar, as known today, dates back to this period is clearly anachronistic. A letter written by the exilarch of Babylonia in 835/36 CE to his community, which was discovered in the Cairo Genizah, shows that Passover in 836 CE was celebrated two days earlier than it should have fallen according to the present-day calendar (on Tuesday instead of Thursday).[12] A slightly earlier text (ca. 823/24), written in Arabic by the mathematician al-Khwārizmī, describes a calendar already very similar to the one in use today, except that its

8 In what follows, the term 'Jewish' or 'Hebrew calendar' will always mean the rabbinic calendar, as opposed to, say, the calendar used by Karaite Jews, which retained the first visibility approach.

9 Stern, *Calendars in Antiquity*, 335, 352.

10 Stern, *Calendar and Community*, 232–275.

11 Abraham bar Ḥiyya, *Sefer ha-Ibbur*, ed. Herschell Filipowski (London: Longman, Brown, Green, and Longmans, 1851), 97. English translation in Stern, *Calendar and Community*, 176: "… until the days of Hillel b. R. Yehuda in the year 670 of the Seleucid era (358/9 CE), from when they did not bring forth or postpone, but kept to this cycle which was at hand."

12 The text is edited in Stern, *Calendar and Community*, 277–283.

conjunction times are implied to fall two hours earlier than in the present system.[13] Calendrical diversity is still evident for the tenth century, when a minor difference in calendrical rules led the Jews in Palestine to celebrate the Passover of 922 CE on Sunday, whereas the communities in Babylonia postponed it to Tuesday (in accordance with the present system), causing a major controversy fought out by the Rabbis Aaron ben Me'ir (representing the Land of Israel) and Sa'adya ben Yosef al-Fayyūmī (representing the Babylonian party).[14] While Sa'adya's calendar did not differ from the one in use today, the months determined by Jews in mid-century Southern Italy could still diverge from the latter by a complete month, as can be seen from an astronomical table by Shabbetai Donnolo, dated to 946 CE.[15] The first complete description of the Jewish calendar in its present-day form to be fully preserved is the one found in al-Bīrūnī's magisterial work on the *Chronology of Ancient Nations*, which he wrote in Arabic in 1000 CE.[16] Two decades years later, the Nestorian Christian author Elias of Nisibis explained and critiqued aspects of this calendar in another great compendium on *Chronology* (1019 CE), written both in Syriac and Arabic, as well as in a lost treatise dedicated specifically to Jewish chronology.[17] Little is known about the circumstances under which the present-day calendar travelled from the Near East to the Jewish communities of Spain and Western Europe, although an Arabic source indicates that its importer into Andalu-

13 On this text, see now François de Blois, "Some Early Islamic and Christian Sources Regarding the Jewish Calendar (9th–11th Centuries)," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 65–78 (65–69), who is preparing a critical edition and translation. See also Raymond Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," ibid., 155–207 (161–164).

14 Stern, *Calendar and Community*, 264–275; Marina Rustow and Sacha Stern, "The Jewish Calendar Controversy of 921–922: Reconstructing the Manuscripts and Their Transmission History," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 79–95; de Blois, "Some Early Islamic and Christian Sources," 76–77.

15 See Sacha Stern and Piergabriele Mancuso, "An Astronomical Table by Shabbetai Donnolo and the Jewish Calendar in Tenth-Century Italy," *Aleph* 7 (2007): 13–41 (36–40), with corrigenda in *Aleph* 8 (2008): 343–344.

16 al-Bīrūnī, *The Chronology of Ancient Nations*, trans. C. Edward Sachau (London: Allen, 1879), 141–173. See de Blois, "Some Early Islamic and Christian Sources," 71–72. Another brief manual on the Jewish calendar, found in an eleventh-century Arabic astronomical manuscript, is edited and translated in Juan Vernet, "Un antiguo tratado sobre el calendario judío en las *Tabulae Probatae*," *Sefarad* 14 (1954): 59–78.

17 de Blois, "Some Early Islamic and Christian Sources," 73–77.

sia may have been Ḥasdai ibn Shaprut (d. ca. 970).[18] Our earliest preserved calendrical texts from these regions, however, only date from the first half of the twelfth century, when Hebrew treatises describing the present-day system (both entitled *Sefer ha-Ibbur*) were authored by Abraham bar Ḥiyya (1122/23) and Abraham Ibn Ezra (1146/47). Both authors were born on the Iberian peninsula, although bar Ḥiyya wrote his work in France, while the preserved version of Ibn Ezra's *Sefer ha-Ibbur* was composed in Verona. In addition to these works, we still have a fragmentary copy of a calendrical treatise by the Northern French Talmudic scholar Jacob bar Samson (ca. 1070–ca. 1140), which is contemporaneous with Abraham bar Ḥiyya's.[19]

Although the specifics of the fixed Jewish calendar will be dealt with in some detail by the medieval Latin texts to be discussed and edited below, it may nevertheless be worthwhile to provide a brief summary for readers unfamiliar with the subject.[20] The astronomical and computational basis for this calendar is the *molad* (מולד), which literally denotes the 'place of birth' of the moon, meaning the time of the mean conjunction of sun and moon. The latter is always reckoned from 6 pm on the preceding day, since the Jewish day is meant to commence at sunset. Two successive *moladot* are separated by the mean lunation, whose length is taken to be uniformly 29d 12h 44 m 3 1/3s = 29;31,50,8,20d

18 S. Munk, *Philosophy and Philosophical Authors of the Jews*, trans. Isidor Kalisch (Cincinnati, OH: Bloch, 1881), 41.

19 All these works will become the subject of critical editions and English translations by Ilana Wartenberg and Israel Sandman. See now also Abraham Ibn Ezra, *Sefer Haʿibbur: A Treatise on the Calendar*, ed. and trans. Mordechai S. Goodman (Jersey City, NJ: Ktav, 2011). See further Shlomo Sela, *Abraham Ibn Ezra and the Rise of Medieval Hebrew Science* (Leiden: Brill, 2003), 39–57; Carlebach, *Palaces*, 14–24; Wartenberg, "The Hebrew Calendrical Bookshelf."

20 For some useful introductions to the Jewish calendar, see Sherrard Beaumont Burnaby, *Elements of the Jewish and Muhammadan Calendars* (London: Bell, 1901), 21–364; Friedrich Karl Ginzel, *Handbuch der mathematischen und technischen Chronologie*, 3 vols. (Leipzig: Hinrichs, 1906–1914), 2:83–115; Michael Friedländer, "Calendar," in *The Jewish Encyclopedia*, 12 vols. (New York: Funk and Wagnalls, 1901–1906), 3:501–508; Eduard Mahler, *Handbuch der jüdischen Chronologie* (Leipzig, 1916; repr. Hildesheim: Olms, 1967), 479–521; William Moses Feldman, *Rabbinical Mathematics and Astronomy*, 3rd ed. (New York: Hermon Press, 1978), 185–210; Arthur Spier, *The Comprehensive Hebrew Calendar*, 3rd rev. ed. (Jerusalem: Feldheim, 1986), 3–22; Nathan Bushwick, *Understanding the Jewish Calendar* (New York: Moznaim Publishing, 1989); Arnold A. Lasker and Daniel J. Lasker, "Behold, A Moon is Born! How the Jewish Calendar Works," *Conservative Judaism* 41, no. 4 (Summer 1989): 5–19; Ephraim Jehudah Wiesenberg, "Calendar," *EJ*, 4:354–358.

(sexagesimal notation) = 29.530594d (decimal notation).[21] This value is remarkably close to astronomical reality (within less than a second), meaning that the calendar will remain reasonably accurate for several millennia as far as the lunar phases are concerned. The 44 minutes and 3 1/3 seconds by which the length of the lunation exceeds 29.5 days are expressed in rabbinic tradition as 793 'parts' or *ḥalakim* (חלקים), where one *ḥelek* is equivalent to 1/1080 of an hour or 3 1/3 seconds. We thus get 29d 12h 793p as the mean duration of the lunar month in the fixed Jewish calendar. The fact that the same parameter is also present in Claudius Ptolemy's *Almagest* (4.2), who ultimately inherited it from Babylonian astronomers, raises the possibility that the present *molad*-system of the fixed Jewish calendar was only finalized after the Muslim conquest of Mesopotamia and the subsequent translation of the *Almagest* into Arabic in the early ninth century.[22] In any case, the *molad* times predicted by this calendar, although frequently alleged to correspond to the coordinates of Jerusalem, are consistent with a meridian of reference in Babylonia.[23]

As is the case with the Christian Easter cycle, the fixed Jewish calendar intercalates seven additional months over the course of 19 years in order to achieve a harmonization between the solar and the lunar year. In practice, this means that some years will comprise thirteen instead of the habitual twelve lunations. A year of this kind is referred to as an embolismic or 'pregnant year' (שנה מעוברת, *shanah meuberet* as opposed to the common year, which is שנה פשוטה or *shanah peshutah*). Intercalation of a thirteenth month always takes place in years 3, 6, 8, 11, 14, 17, and 19 of a 19-year cycle, whose beginning is tied to the Jewish world era, the first year of which is 3761/60 BCE. For this year, the

21 Here and elsewhere in this book, sexagesimal (base 60) fractions are represented with a semicolon separating the whole number from the fraction and commas separating the individual sexagesimal 'digits'.

22 See Stern, *Calendar and Community*, 207–210, and the remarks by Julian Obermann in Maimonides, *Sanctification*, trans. Gandz, xlvii–xlviii. For further information, see Leo Depuydt, "History of the *ḥeleq*," in *Under One Sky*, ed. John Steele and Annette Imhausen (Münster: Ugarit-Verlag, 2002), 79–107; Bernard R. Goldstein, "Ancient and Medieval Values for the Mean Synodic Month," *Journal for the History of Astronomy* 34 (2003): 65–74.

23 See the analysis in Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," 157–160, who determines the meridian to be about 42° 36′ East. As Robert of Leicester already realized at the end of the thirteenth century (see p. 157 below), the time difference between the astronomical tables computed for the meridian of Toledo (late-eleventh century) and the Jewish *molad*-system amounts to ca. 52° geographical longitude. This is only about 2° more than the difference between Toledo (4° 1′ West) and the city of Ur in Babylonia (46° 06′ East). The meridian found by Robert is thus ca. 48° East, whereas the longitude of Jerusalem is 35° 13′ East.

molad of the first month (Tishri) fell on a Monday (7 October), 5h and 204p (reckoned from 6 pm). Transcribing the numerical value of the 2nd weekday, 5 hours and 204 'parts' (2.5.204) into Hebrew notation yields the word בהר״ד, which is why the epoch date of the Jewish calendar is also known as *molad baharad*.

Although the length of the lunation is uniformly reckoned as 29d 12h 793p, an individual lunar month must obviously consist of a whole number of days, which in the Jewish calendar has the effect that the months generally alternate between 'full' (מלא, *male*) months of 30 days and 'defective' (חסר, *ḥaser*) months of 29 days. The sequence is normally counted from Nisan, which is regarded as the first month of the year (as stated in Exodus 12:2), even though the beginning of the year itself (*Rosh Hashanah*) falls on 1 Tishri, the seventh month from Nisan (counting inclusively). Both months will always be 'full' or 30 days in length. In common years, the twelfth and final month of the whole sequence, named Adar, will be 'defective', but in intercalary years another 'full' month of 30 days is inserted after the penultimate month of Shevat. Since this month, too, is called 'Adar', the original Adar of 29 days, which follows as the thirteenth month, is renamed as Adar II (אדר שני) or *VeAdar* (ואדר).[24] Marḥeshvan, being the eighth month from Nisan and the second from Tishri, is normally 'defective', but it can become 'full' in certain years, whereas the following month of Kislev can turn from 'full' into 'defective'. The various combinations thus permitted lead to a year length that is variable between the 'defective' year (שנה חסרה, *shanah ḥaserah*) of 353 days (when Marḥeshvan and Kislev are both rendered 'defective') and the 'complete' or 'perfect' year (שנה שלימה, *shanah shelemah*) of 355 days (when both months are 'full'). The same applies to 'pregnant' or embolismic years, which vary between 383 and 385 days. Obviously, this means that 'regular' or 'orderly' year (שנה כסדרה, *shanah kesidrah*) will have 354 days when common, and 384 days when 'pregnant' or embolismic. Table 1 below will elucidate this principle.

The justification for these variations is partly found in the *deḥiyyot* (דחיות) or postponements, which prescribe that New Year or Rosh Hashanah (1 Tishri) has to be delayed by up to two days in certain years. The precise rationale behind these postponements has been a matter of debate, even among Jewish authorities on the calendar. An astronomical reason may be lurking behind the rule sometimes known as *Jaḥ*, meaning '18' (י = 10 + ח = 8). According to this rule, all conjunctions of Tishri falling on or later than 18 hours have to be postponed to the next day. Due to the aforementioned fact that the Jewish calendar uses an evening epoch, starting with 6 pm, a *molad* at 18 hours actually corresponds to a

24 On this point, see Burnaby, *Elements*, 30–32.

TABLE 1

	Common years			Embolismic years		
	Regular	**Defective**	**Perfect**	**Regular**	**Defective**	**Perfect**
Tishri	30	30	30	30	30	30
Marḥeshvan	29	29	30	29	29	30
Kislev	30	29	30	30	29	30
Tevet	29	29	29	29	29	29
Shevat	30	30	30	30	30	30
Adar	29	29	29	30	30	30
Adar II	–	–	–	29	29	29
Nisan	30	30	30	30	30	30
Iyyar	29	29	29	29	29	29
Sivan	30	30	30	30	30	30
Tammuz	29	29	29	29	29	29
Av	30	30	30	30	30	30
Elul	29	29	29	29	29	29
Total	354	353	355	384	383	385

conjunction at noon. A *molad* falling between noon and sunset is also referred to as *molad zaken* (מולד זקן), i.e. 'old' or 'late conjunction', which term is also used to designate the rule as a whole.[25]

While the exact purpose of this postponement of the 'late *molad*' is a matter of dispute, we are on somewhat firmer ground in the case of rule *lo ADU*

25 The Talmud (B. *Rosh Hashanah*, 20a) cites R. Zeira (third century) as saying that a conjunction has to fall before noon to make sure that the crescent becomes visible in the same evening, which might point to a rationale for rule *Jaḥ*. Feldman, *Rabbinical Mathematics*, 192, points out, however, that this statement refers to the true conjunction and is therefore not immediately related to the fixed calendar of late. As it happens, the distance between conjunction and first visibility tends to be greater than the mere six hours presupposed by this reading of *Jaḥ*. Maimonides, by contrast, speculated that the *deḥiyyot* in general (*Jaḥ* combined with ADU) were supposed to bring the *moladot* closer in line with the time of first visibility. See Maimonides, *Sanctification* (7.8), 33; Ernest Wiesenberg, "Appendix: Addenda and Corrigenda to Treatise VIII," in *The Code of Maimonides, Book Three: The Book of Seasons*, trans. Solomon Gandz and Hyman Klein (New Haven, CT: Yale University Press, 1961), 587–592.

Rosh (לא אדו ראש), which prevents the day of Rosh Hashanah or 1 Tishri from falling on Sunday (1), Wednesday (4) or Friday (6)—hence *ADU*, from א = 1, ד = 4, ו = 6. It would seem that the latter part of this rule, pertaining to Wednesday and Friday, was specially designed to prevent Yom Kippur, the highest Jewish feast day, from falling next to (i.e. before or after) a Sabbath. To have these two days of strict religious rest occur in a row would have caused difficulties with regard to the preparation of food and the burial of the dead. We find these reasons cited in the Babylonian Talmud (B. *Rosh Hashanah*, 20a), where they are ascribed to ʿUlla and R. Aḥa ben Ḥanina, who are both roughly datable to the late third, early fourth century. The postponement of Wednesday and Friday is also mentioned in the Talmud *Yerushalmi* (*Avodah Zarah* 1:1 [39b] and *Megillah* 1:2 [70b]), albeit without explaining the reasons behind it. By contrast, the rule preventing Rosh Hashanah from falling on a Sunday is explained with reference to Hoshana Rabbah on 21 Tishri. According to Jewish custom, willow branches are carried around the altar and beaten on this particularly day. Since this custom collided with the command of Sabbatical rest, it was deemed necessary to prevent any coincidence of Hashana Rabbah and the Sabbath. In the Talmud (Y. *Sukkah* 4:1 [54b]; B. *Sukkah* 43b), the formulation of this prohibition is ascribed to R. Simon, another third-generation Amora from the late third, early fourth entury. As a result of it, 1 Tishri cannot fall on a Sunday. Moreoever, since there is a constant interval of 177 days (or 25 weeks + 2 days) between Nisan and Tishri in the fixed calendar, rule *lo ADU Rosh* leads to an important corollary known as *lo BaDU Pesaḥ* (לא בדו פסח). According to this rule, 1 Nisan and Passover (15 Nisan) can never fall on Monday, Wednesday or Friday (ב = 2, ד = 4, ו = 6).

The *deḥiyyot* considerably disturb the calendrical order, because every postponement of 1 Tishri prolongs the previous year by one or even two days (in cases where both types of postponements apply simultaneously), whilst shortening the present one. In order to prevent the year from exceeding or falling below the aforementioned limits of 353–355 and 383–385 days, the creators of the fixed calendar had to devise two further rules, which were necessary to forestall anomalies. The first of these rules applies to any first conjunction or *molad* of Tishri that falls on a Tuesday on or after 9h 204p (and before 18h) in a common year. In such a scenario, the *molad* Tishri of the following year would fall later than 18h on a Saturday (3.9.204 + 4.8.876 = 7.18.0), which would trigger a double postponement *Jaḥ* + *ADU*, leading to the unwelcome result of an intervening year with 356 days. This case is pre-empted by an exception known as *GaTRaD* (3.9.204 = גטרד), which demands that any *molad* Tishri in a common year falling on or later than 3.9.204 should be postponed by two days to the following Thursday (a simple postponement to Wednesday would be impossible due to *ADU*). The second problematic scenario concerns

common years that follow upon an embolismic year and whose *moladot* Tishri are calculated to fall on a Monday on or after 15h 589p (and before 18h). In such a case, the *molad* Tishri of the preceding year would fall later than 18h on a Tuesday (2.15.589 + 5.21.589 = 3.18.0), which would again necessitate a two-day postponement, making the intervening year only 382 days in length. The rule *BeTuTaKPaT* (2.15.589 = בטותקפט), which commands that a *molad* Tishri falling on or after 2.15.589, if it belongs to the common year after an embolismic year, must be postponed to the following Tuesday, was designed to prevent this predicament.

As a result of these provisions, 1 Tishri is identical with the actual day of mean conjunction in only a minority of cases, but more often tends to approach the day of the moon's first visibility.[26] A further consequence of the postponements is that they prevent certain combinations of initial weekdays and year lengths from ever occurring. Out of the 6 × 4 = 24 scenarios that would be imaginable based on six different year lengths ('defective', 'regular', and 'perfect' for both common and embolismic years) and four permissible weekdays (Monday, Tuesday, Thursday, and Saturday), only 14 are in fact possible occurrences in calendrical practice. This can be demonstrated using table 2 below, where the weekdays in the top line belong to the first day of a given year, while the lines below show the weekday of the subsequent year in dependence on the intervening year length. The resulting fourteen year types are also known as *keviyyot* ('fixtures' or 'settings', קביעות); together, they regulate any possible combination of weekdays and calendar dates throughout the Jewish year.

TABLE 2

	Monday (2)	**Tuesday (3)**	**Thursday (5)**	**Saturday (7)**
353	Thursday	–	–	Tuesday
354	–	Sunday	Monday	–
355	Sunday	–	Tuesday	Thursday
383	Sunday	–	Tuesday	Thursday
384	–	Monday	–	–
385	Monday	–[27]	Thursday	Saturday

26 According to Moïse Sibony, "Le calendrier juif et ses problèmes," *Revue des études juives* 136 (1977): 139–154 (153), in 6000 years 61% of all *moladot* Tishri are postponed.

27 Due to rule *Betutakpat*, an abundant embolismic year starting on a Tuesday is technically impossible, because the *molad* of the following year can never go beyond the limit of

Due to the fact that one month is calculated as 29d 12h 793p, the time of the *molad* is only fully cyclical after 689,472 years or 36,288 consecutive 19-year cycles.[28] In practice this means that the calendar cannot rely on a fully cyclical table that would be akin to the 532-year Easter tables used by the Christian churches in the Middle Ages.[29] There is, however, an approximation available: a 247-year table can be constructed, which, with a handful of exceptions, will contain largely the same order of *kevi̇yyot* as the previous sequence of 13×19 = 247 years. According to tradition, a table or cycle (*'iggul*) of this kind was constructed by R. Naḥshon ben Zadok, the Gaon of Sura (871–79 CE), hence the common designation as *'iggul d'Rav Naḥshon* (עיגול דרב נחשון). Despite its failure to be truly perpetual, the 247-year table became a frequently encountered element of Jewish calendrical texts, both in medieval Ashkenaz (Germany and Northern France) and in more remote places such as Yemen.[30] The first Latin Christian author to mention its existence seems to have been Roger Bacon, who sent a Hebrew manuscript containing such a 247-year table to Pope Clement IV.[31] Latin transcriptions or adaptations of such a table were later also incorporated into the works of Robert of Leicester, John of Pulchro Rivo, and Nicholas Trevet, who respectively wrote in 1294, 1297, and 1310.[32]

The Jewish 19-year intercalation cycle comprises 235 lunations and thus implies that 235 lunar months are equivalent in length to 19 solar years. Following the standard *molad*-value (29d 12h 793p), 235 lunations amount to 6939d 16h 595p or 6939d 16h 33m 3 1/3s. This can be divided by 19 to arrive at a mean solar year of 365d 5h 55m 25 25/57s, which is in turn equivalent to 365d 5h 997p + 48/76 of one 'part' or *ḥelek*.[33] In Jewish calendrical literature since

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2.15.589. This would be necessary to warrant its postponement *Jaḥ* to Tuesday, 385 days later.

28 For details, see p. 97 below.

29 A perpetual calendar can still be constructed, however, based on the 61 different possible forms of the 19-year cycle and their respective *molad* limits. This is explained in detail in Burnaby, *Elements*, 146–174. See also the table ibid., 294–295, and p. 623 below.

30 On the history of the 247-year cycle and its use among Yemenite communities, see Yosef Tobi, *The Jews of Yemen: Studies in Their History and Culture* (Leiden: Brill, 1999), 211–226. See also Salo W. Baron, *A Social and Religious History of the Jews*, 2nd ed., 18 vols. (New York: Columbia University Press, 1952–1983), 8:192; Stern, *Calendar and Community*, 193.

31 Bacon, *Opus tertium*, 214–215, 220; Bacon, *Opus majus*, 1:198; Nothaft, *Dating*, 183–184.

32 See Chapters Three and Four and Appendix I below.

33 Due to the fact that a 19-year cycle always encompasses a complete number of days, which number depends on the current distribution of 'defective', 'regular', and 'perfect' years, the length of the solar year in the Jewish calendar can be understood to be fluctuating around this mean value. See Sibony, "Le calendrier," 148.

the twelfth century, the latter fraction is expressed as 48 *regaim* (רגעים) or 'moments', with 76r (*regaim*) equalling 1p. Converted into decimal notation, the resulting solar year contains 365.2468d and thus 0.0046d more than a tropical solar year as presently measured (365.2422d). In practice, this means that the astronomical equinoxes will recede towards the beginning of the Jewish calendar year at a rate of approximately one day in 217 years. Although astronomically speaking the four seasons are of unequal length, in rabbinic tradition it is customary to simply divide the solar year into four equal parts to arrive at the times of the equinoxes and solstices and the lengths of their respective seasons, which are all designated by the same term, *tekufah* ('circle', pl. *tekufot*). According to the fixed Jewish calendar, the length of one season is thus 91d 7h 519p 31r, i.e. one fourth of the implied solar year of 365d 5h 997p 48r. This value is the basis for the calculation of the *tekufot*, as attributed to Rav Ada bar Ahavah in the twelfth-century calendrical compendia of Abraham bar Ḥiyya and Abraham Ibn Ezra.[34] The ascription to Rav Ada, a second-generation Amora from the third century, is clearly dubious, since the system carrying his name depends on the fixed Jewish calendar, whose development was completed only in the tenth century. The starting point for the calculation of the *tekufot* according to Rav Ada is the *tekufat* Nisan that follows upon the aforementioned *molad baharad*, i.e. the spring equinox of 3760 BCE, which is here taken to be the time of the creation of the world. In this year, the *molad* Nisan fell on a Wednesday (2 April) at 9h 642p, which matches the scriptural information that the sun and the moon were created on the fourth day of the week (Genesis 1:14–19). The first equinox or *tekufat* Nisan is thought to have occurred exactly 9h 642p earlier and hence at the beginning of Wednesday.

In addition to the system of *tekufot* just outlined, there is also an older scheme, whose roots can be traced back to the Talmud (B. *Eruvin* 56a), where it is ascribed to the Babylonian sage Samuel of Nehardea, who was active in the first half of the third century. It is based on the average length of the solar year in the Julian calendar, i.e. 365.25d. In contrast to the ancient Roman convention, where the length of the individual seasons varies between 90 and 92 days,[35] the

34 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), ed. Filipowski, 87–91; Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 78–81, pp. מג–מה.

35 The vernal equinox takes place on 25 March and is followed 91 days later by the summer solstice on 24 June; followed 92 days later by the autumnal equinox on 24 September; followed 92 days later by the winter solstice on 25 December; followed 90 days later (or 91 days in a leap-year) by the vernal equinox on 25 March. See Ginzel, *Handbuch*, 2:281–285.

reckoning of Samuel assumes that the interval between two *tekufot* is always a constant of 91d 7.5h. During a four-year period, which corresponds to the Julian leap-year cycle, the exact time of each *tekufah* will hence oscillate between two adjacent days of the Julian calendar. After 28 years, the *tekufot* will return not only to the same day-time, but also to the same weekday, in accordance with the principle of the 4×7 = 28-year 'solar cycle' of the Julian calendar. The starting point for this cycle in the case of the *tekufot* of Samuel is the year of creation with an assumed *tekufat* Nisan on Wednesday at sunset (oh), but one week earlier than the first *tekufat* Nisan according to Rav Ada's system. In the proleptic Julian calendar, Samuel's starting date corresponds to 25 March, 6 pm, which is in line with the old Roman date of the vernal equinox; over the three subsequent years, the time of the *tekufat* Nisan will move further to midnight, followed by 6 am and noon on 26 March, before returning to 6 pm of the previous day in the fifth year. Due to this reliance on the Julian year of 365.25d, there is a difference of 1h 485p between 19 years in the fixed Jewish calendar and 19 years according to Samuel's scheme. This means that the *tekufot* according to Samuel will not return to the exact same point in the Jewish calendar after each 19-year cycle.[36] Despite the fact that only the *tekufot* of Rav Ada are fully in harmony with the parameters of the fixed calendar, it is the older scheme attributed to Samuel that continues to play a role in Jewish religious life until this day: not only is the date of the annual prayer for rain in the Diaspora (on the 60th day after the *tekufat* Tishri) still regulated in accordance with Samuel's *tekufah*,[37] but the Julian 'solar' cycle it is based on also indicates the time of the 'Blessing of the Sun' (*Birkat Haḥammah*). The latter takes place only once in every 28 years, when the *tekufat Samuel* of Nisan returns to the aforementioned weekday and hour of its creation, i.e. the beginning of Wednesday, oh.[38]

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36 For a useful recent summary of the systems attributed to Samuel and Ada, see Abraham Ibn Ezra, *The Sabbath Epistle* (*'iggeret haShabbat*), ed. and trans. Mordechai S. Goodman (Jersey City, NJ: Ktav, 2009), 47–77; Abraham Ibn Ezra, *Sefer Ha'ibbur*, ed. Goodman, 153–181. See also Sacha Stern, "Fictitious Calendars: Early Rabbinic Notions of Time, Astronomy and Reality," *Jewish Quarterly Review*, n.s., 87 (1996–1997): 103–129 (105–111).

37 B. *Ta'anit* 10a; Arnold A. Lasker and Daniel J. Lasker, "The Jewish Prayer for Rain in the Post-Talmudic Era," *AJS Review* 9 (1984): 141–174; Lasker and Lasker, "The Strange Case of December 4: A Liturgical Problem," *Conservative Judaism* 38, no. 1 (Fall 1985): 91–99.

38 B. *Berakhot* 59b; Arnold A. Lasker and Daniel J. Lasker, "*Birkat Haḥammah*: The Blessing of the Sun," *Conservative Judaism* 34, no. 3 (January/February 1981): 17–28. See also Solomon Gandz, "The Benediction over the Luminaries and the Stars," *Jewish Quarterly Review*, n.s., 44 (1953–1954): 305–325.

2 The Easter Computus and the Challenge of Calendar Reform

It is a matter of general agreement among scholars of liturgy that Easter (or *Pascha*, as it is called in Greek and Latin sources) is the earliest annual festival of the Christian Church. Its origins are rooted in the Jewish Passover, which continued to be celebrated by the early Jewish followers of Christ and whose original contents and setting were gradually overwritten by the commemoration of his death and resurrection. The original Christian *Pascha* was hence initially celebrated on the eve of 14/15 Nisan, regardless of the weekday, whereas a later custom, which was perhaps only fully developed in the second century, but which was to become universal, tied the termination of the paschal fast to the first Sunday after Passover.[39] This emphasis on Sunday, the weekday on which Jesus rose from the dead, highlighted the resurrection as the feast's central theme, whereas the Jewish calendar date 14/15 Nisan naturally tended to put a greater emphasis on the dates of the Last Supper and crucifixion, as they emerge from the four Gospel accounts.[40]

The dependency of Passover, and—by extension—of Easter, on the Jewish lunisolar calendar created a special challenge for those many inhabitants of the Roman Empire whose everyday affairs were governed by the Julian calendar, established in 46/45 BCE, or one of its many Eastern adaptations.[41] In times and places where the Jewish calendar followed no fixed scheme and depended on the *ad hoc* stipulations of the local community, Christians, especially those

39 On the historical relationship between Passover and Easter, see now Clemens Leonhard, *The Jewish Pesach and the Origins of the Christian Easter: Open Questions in Current Research* (Berlin: de Gruyter, 2006), with references to further literature. See also Thomas J. Talley, "Liturgical Time in the Ancient Church: The State of Research," *Studia Liturgica* 14 (1982): 34–51; Karl Gerlach, *The Antenicene Pascha: A Rhetorical History* (Louvain: Peeters, 1998); Paul F. Bradshaw and Lawrence A. Hoffman, eds., *Passover and Easter*, 2 vols. (Notre Dame, IN: University of Notre Dame Press, 1999).

40 There is a well-known discrepancy between John and the synoptic Gospels with regard to the precise Jewish date of the crucifixion (14 or 15 Nisan). Out of the vast literature on this subject, see most recently Stéphane Saulnier, *Calendrical Variations in Second Temple Judaism: New Perspectives on the 'Date of the Last Supper' Debate* (Leiden: Brill, 2012). See also the useful overviews in George Ogg, *The Chronology of the Public Ministry of Jesus* (Cambridge: Cambridge University Press, 1940), 208–242; Raymond E. Brown, *The Death of the Messiah*, 2 vols. (New York: Doubleday, 1994), 1350–1378; Jack Finegan, *Handbook of Biblical Chronology*, rev. ed. (Peabody, MA: Hendrickson, 1998), 353–369. I shall return to the problem below, on pp. 55–56 and 190–198.

41 On the Julian calendar and its Eastern offshoots, see now Stern, *Calendars in Antiquity*, 204–227, 259–294.

who did not dwell in close vicinity to Jews, were met with the difficulty of how to decide upon the right date of their annual celebration.[42] One tempting solution to this problem was to abandon the Jewish calendar and its dependency on the moon and simply observe the 14th day of the first spring month in the local solar calendar, which thus replaced 14 Nisan. While individual groups, like the Montanists of Asia Minor and certain communities in Cappadocia, followed this practice at least for a while,[43] the leaders of the major Churches in Rome and Alexandria strove to end their dependence on the Jewish calendar in a different, and more sophisticated, manner. The problem was solved by distributing lunar months over the years of the Julian calendar in such a way that the age of the moon on a particular date would repeat cyclically after a certain number of years. Although the basic astronomical parameters involved—the Julian year (365.25d) and the mean synodic month (29.53059d)—are incommensurable in mathematical terms, a good approximation could be reached by counting 235 lunar months over a span of 19 solar years. This 19-year cycle, known to Greek astronomers as the *enneakaidecaëteris*, originated in Babylonia in the fifth century BCE and stands as the most exact type of lunisolar period used in Antiquity.[44]

According to Eusebius of Caesarea, the first person to devise an Easter cycle based on the *enneakaidecaëteris* was Anatolius, bishop of Laodicea, who published his work in the 270s. Some open questions remain as to the precise form and rules of this cycle, despite the fact that there exists a Latin work

42 Timothy C.G. Thornton, "Problematical Passovers: Difficulties for Diaspora Jews and Early Christians in Determining Passover Dates During the First Three Centuries A.D.," *Studia Patristica* 20 (1989): 402–408.

43 See Thomas J. Talley, "Further Light on the Quartodeciman Pascha and the Date of the Annunciation," *Studia Liturgica* 33 (2003): 151–158; Jill Burnett Comings, *Aspects of the Liturgical Year in Cappadocia* (*325–430*) (New York: Lang, 2005), 22–25; Roger T. Beckwith, *Calendar, Chronology, and Worship* (Leiden: Brill, 2005), 99–102.

44 The best available account of the history and development of Christian lunar cycles in both East and West is Alden Mosshammer, *The Easter Computus and the Origins of the Christian Era* (Oxford: Oxford University Press, 2008), 59–316. On the technical aspects of these cycles, see Kenneth Harrison, "Luni-Solar Cycles: Their Accuracy and Some Types of Usage", in *Saints, Scholars and Heroes*, ed. Margot H. King and Wesley M. Stevens, 2 vols. (Collegeville, MN: Hill Monastic Manuscript Library, 1979), 2:65–78; Leofranc Holford-Strevens, "Paschal Lunar Calendars up to Bede," *Peritia* 20 (2008): 165–208. See now also Stern, *Calendars in Antiquity*, 313–330, who raises the important point that these early Easter cycles can be seen as offshoots of a pre-existing Latin tradition of lunar calendar reckoning, which survived the introduction of the Julian calendar.

TABLE 3

Year	Epact	Easter full moon	Year	Epact	Easter full moon
1	0	5 April	11	20	15 April
2	11	25 March	12	1	4 April
3	22	13 April	13	12	24 March
4	3	2 April	14	23	12 April
5	14	22 March	15	4	1 April
6	25	10 April	16	15	21 March
7	6	30 March	17	26	9 April
8	17	18 April	18	7	29 March
9	28	7 April	19	18	17 April
10	9	27 March			

purporting to be a translation of Anatolius's original treatise.[45] It appears that Anatolius's cycle was initially adopted by the Alexandrian Church, but soon discarded or modified in favour of a different 19-year cycle, which equated 235 lunar months with 19 Julian years, yielding a mean length of 6393.75 days per cycle. This Alexandrian 19-year cycle was also characterized by an influential 'rule of the equinox', which stated that the paschal full moon (*luna* 14), on whose date Easter Sunday depended, could not fall earlier than 21 March, the assumed date of the vernal equinox.[46] Spreading from Alexandria to churches in both the Eastern and Western half of the Roman Empire, it became the sole basis for Easter reckoning in nearly the entire Christian *oikumene* during the European Middle Ages. Its basic structure is outlined in table 3.

Besides the respective year of the cycle and the corresponding date of the Easter full moon, the table also notes the value of the 'epact', which marks the age of the moon on 22 March or any equivalent date. The annual change of the epact reflects the difference in length between the solar and lunar years (365d vs. 354d), which makes the lunar age on a given date rise by 11 with

45 The Latin text is edited and studied in McCarthy and Breen, *The Ante-Nicene Christian Pasch*. See also Leofranc Holford-Strevens's review in *Peritia* 19 (2005): 359–371; David Howlett, "On the New Edition of Anatolius' *De Ratione Paschali*," *Peritia* 20 (2008): 135–153; Mosshammer, *The Easter Computus*, 131–161; Stern, *Calendars in Antiquity*, 391–395.

46 At what point in the fourth century this cycle was finalized in its present form is a matter of dispute. See most recently Mosshammer, *The Easter Computus*, 162–203, and the caveats expressed in Stern, *Calendars in Antiquity*, 402–404.

each common year. In intercalary or embolismic years, an additional lunar month of 30 days is inserted, which increases the length of the lunar year to 384 days and thus effects a decrease of the epact by 19. As is the case in the Jewish calendar (whose cycle begins three years later), such intercalary months are inserted in years 3, 6, 8, 11, 14, 17, and 19. It has already been noted that this 19-year cycle is predicated on the equation of 6939.75 days with 235 lunations, which comprise 19 lunar years of twelve months each + seven intercalary or 'embolismic' months. Counting 354d for each lunar year, 30d for each embolismic month, and 4.75d for the Julian leap-days that intervene in 19 years will yield $19 \times 354 + 7 \times 30 + 4.75 = 6940.75$d. This means that 235 lunar months (6940.75d) are actually one day in excess over 19 solar years (6939.75d). In order to safeguard congruence, the Alexandrian 19-year cycle reduces one of the 'full' months in the final year to 29 days. This obligatory omission of a lunar day, which became known in the West as the *saltus lunae* ('leap of the moon'), explains why the epact drops by only 18, as opposed to 19, between the final and first year of the cycle. During Late Antiquity, Christian calculators continued to experiment with various other cycles, but by the sixth century most churches, with the notable exception of the Celts on the British Isles, had settled with some version of the 19-year scheme just outlined. The scholar whose name is most strongly associated with its establishment in the Latin West is Dionysius Exiguus, a monk working in Rome, where, in 525, he published a continuation of a 95-year Easter table ascribed to the Alexandrian patriarch Cyril (412–444). Dionysius's version of this table, which covered the years 532 to 626, is notable for its use of an era 'from the incarnation of our Lord Jesus Christ', which, as a result of the contingencies of history, is now the standard system of year-counting throughout the world.[47]

Even after the acceptance of Dionysius's table in the West, the calculation of Easter by means of lunisolar cycles continued to pose a variety of mathematical-astronomical, historical-chronological, and theological-exegetical questions, which fostered the development of a specific genre of treatises and textbooks on calendrical reckoning. These medieval scientific texts, whose prototypes were created in seventh-century Ireland, are often referred to by the name of the subject they describe: *computus*.[48] For more than half a millennium, between the sixth century and the astronomical 'Renaissance' of the

47 See Mosshammer, *The Easter Computus*, 319–437, and Georges Declercq, *Anno Domini: The Origins of the Christian Era* (Turnhout: Brepols, 2000).

48 Useful introductions to the history of Western computistics include Eduard Schwartz, *Christliche und jüdische Ostertafeln* (Berlin: Weidmann, 1905); Charles W. Jones, *Bedae*

twelfth century, the art of *computus* provided the disciplinary foundation for astronomical and mathematical thought in the Latin West.[49] The most influential work to stem from this tradition was *De temporum ratione*, written in 725 by the Northumbrian monk Bede of Jarrow (the Venerable Bede), who based his calculations on an expanded 532-year version of the Dionysiac Easter table.[50] The rationale for this number lies in the fact that 532 is a multiple of the standard 19-year cycle and the 28-year 'solar' cycle, which marks the recurrence of the dates in the Julian calendar on the same weekdays. A cycle of 532 years therefore comprises the full sequence of Easter Sundays, which will return

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Opera de Temporibus (Cambridge, MA: The Mediaeval Academy of America, 1943), 3–122; Olaf Pedersen, "The Ecclesiastical Calendar and the Life of the Church," in *Gregorian Reform of the Calendar*, ed. George V. Coyne, Michael A. Hoskin, and Olaf Pedersen (Vatican City: Specola Vaticana, 1983), 17–74; Joachim Wiesenbach, *Sigebert von Gembloux: Liber decennalis* (Weimar: Böhlau, 1986), 31–112; Max Lejbowicz, "*Computus*: le nombre et le temps altimédiévaux," in *Le temps, sa mesure et sa perception au Moyen Âge*, ed. Bernard Ribémont (Caen: Paradigme, 1992), 151–195; Lejbowicz, "Des tables pascales aux tables astronomiques et retour," *Methodos: Savoirs et textes* 6 (2006), doi:10.4000/methodos.538; Faith Wallis, trans., *Bede: The Reckoning of Time* (Liverpool: Liverpool University Press, 1999), xxxiv–lxiii; Warntjes, *The Munich Computus* (Stuttgart: Steiner, 2010), xxx–li.

49 For recent literature elucidating this aspect, see John J. Contreni, "Counting, Calendars, and Cosmology: Numeracy in the Early Middle Ages," in *Word, Image, Number*, ed. John J. Contreni and Santa Casciani (Florence: SISMEL, 2002), 43–83; Contreni, "Bede's Scientific Works in the Carolingian Age," in *Bède le Vénérable*, ed. Stéphane Lebecq, Michel Perrin, and Olivier Szerwiniack (Lille: Ceges, 2005), 247–259; Bruce S. Eastwood, *Ordering the Heavens* (Leiden: Brill, 2007); John North, *Cosmos* (Chicago: University of Chicago Press, 2008), 237–240; Stephen C. McCluskey, "Martianus and the Traditions of Early Medieval Astronomies," in *Carolingian Scholarship and Martianus Capella*, ed. Mariken Teeuwen and Sinéad O'Sullivan (Turnhout: Brepols, 2011), 221–244; Daniel McCarthy, "The Study and Use of Numbers in Early Irish Monasteries," in *Glendalough: City of God*, ed. Charles Doherty, Linda Doran, and Mary Kelly (Dublin: Four Courts Press, 2011), 219–233; Immo Warntjes, "Irische Komputistik zwischen Isidor von Sevilla und Beda Venerabilis," *Viator* 42 Multilingual (2011): 1–31; Warntjes, "Köln als naturwissenschaftliches Zentrum in der Karolingerzeit," in *Mittelalterliche Handschriften der Kölner Dombibliothek*, ed. Heinz Finger and Harald Horst (Cologne: Erzbischöfliche Diözesan- und Dombibliothek, 2012), 41–96.

50 Edited in CCSL 123B and Jones, *Bedae Opera*, 241–544 (ch. 1–65 only). On Bede's computistical works and their transmission, see ibid., 125–172. For an English translation of *De temporum ratione*, see Wallis, *Bede*, 3–249; For commentaries, see ibid., 253–375, and Roland-Pierre Pillonel-Wyrsch, *Le calcul de la date de Pâques au Moyen Âge* (Fribourg: Academic Press, 2004).

to the same exact order after its completion. Another important innovation, which had Carolingian roots, but became a steady element of Christian calendars only from the twelfth century onwards, was the so-called 'Golden Number' (*numerus aureus*). Numbering from I to XIX, it could be inscribed next to certain dates in the Julian calendar, indicating that this day would be the new moon in a particular year of the 19-year cycle. In this fashion, the Golden Number added an easy to use 'lunar' component to the otherwise exclusively 'solar' Julian calendar, which thus displayed all the possible combinations of Julian and lunar dates at a single glance.[51]

The ecclesiastical calendar that was thus developed out of the 19-year cycle of the Alexandrians remained a standard tool of lunar and solar time reckoning until it was rendered obsolete by the Gregorian reform of the calendar, promulgated in 1582. This reform, named after its patron Pope Gregory XIII, put an end to two technical deficits that the earlier calendar had laboured under since Late Antiquity.[52] One of these deficits consisted in the fact that the cycle's length of 6939.75d implied an average lunation of 29.530851d, whereas the actual mean synodic month is presently closer to 29.530589d. Although the difference does not seem dramatic, it was enough to make the tabulated moons lag behind the observable ones at a rate of roughly one day in every 308.5 years. Six centuries after the calendar's institution, the resulting error had accrued to about two days, making the discrepancy between the astronomical new and full moons and the dates predicted by the calendar visible to the naked eye, especially

51 On the history of the 'Golden Number', see Walter Émile van Wijk, *Le Nombre d'Or* (The Hague: Nijhoff, 1936); André van de Vyver, "Hucbald de Saint-Armand, écolâtre, et l'invention de Nombre d'or," in *Mélanges Auguste Pelzer* (Louvain: Bibliothèque de l'Université, 1947), 61–79; Jennifer Moreton, "Before Grosseteste: Roger of Hereford and Calendar Reform in Eleventh- and Twelfth-Century England," *Isis* 86 (1995): 562–586 (569–571); Arno Borst, *Die karolingische Kalenderreform* (Hannover: Hahn, 1998), 702–708. Previous to the 'Golden Number', there already existed a system of 'lunar letters'. See ibid., 405–411; Theodor Sickel, "Die Lunarbuchstaben in den Kalendarien des Mittelalters," *Sitzungsberichte der philosophisch-historischen Classe der kaiserlichen Akademie der Wissenschaften* [Vienna] 38 (1861): 153–201.

52 A new and comprehensive history of Western calendar reform is a pressing *desideratum* of current research. At present, the two most useful titles are still Ferdinand Kaltenbrunner, "Die Vorgeschichte der gregorianischen Kalenderreform," *Sitzungsberichte der philosophisch-historischen Classe der kaiserlichen Akademie der Wissenschaften* [Vienna] 82 (1876): 289–414, and John North, "The Western Calendar—'Intolerabilis, Horribilis, et Derisibilis': Four Centuries of Discontent," in *Gregorian Reform of the Calendar* ed. George V. Coyne, Michael A. Hoskin, and Olaf Pedersen (Vatican City: Specola Vaticana, 1983), 75–113.

during eclipses.[53] Not as immediately noticeable, but larger in scale, was the error of the solar calendar, which made the vernal equinox, originally assigned to 21 March, steadily drift towards the beginning of the calendrical year at a rate of one day in approximately 128.5 years. This time lag was caused by the excessive duration of the average Julian calendar year (365.25d), which was about 11 minutes longer than a tropical solar year of 365.2422d. Medieval astronomers from the twelfth century onwards worked with slightly different values, but these led to basically the same insights. For the mean lunar month, they could rely on the length preserved in Ptolemy's *Almagest* (4.2), which corresponded to about 29.530594d and implied what they often took to be a discrepancy of one day in 304 years. As we have seen, the same value also provided the foundation for the fixed Jewish calendar—a fact that was known and admired by several would-be calendar reformers. Things were slightly less straightforward in the case of the solar year, for which ancient and medieval authorities transmitted diverging estimates. The alternatives here ranged from an error of one day in 300 years to one day per century. From the fourteenth century onwards, the Alfonsine Tables, a set of astronomical tables named after their sponsor King Alfonso X of Castile (1252–1284), were frequently used to derive a fairly accurate error rate of one day in 134 years.[54]

The resulting secular drift of the equinoxes and lunar phases through the Julian calendar had dire consequences from the point of view of those who wanted Easter Sunday to remain tied to astronomical criteria: by the first half of the fifteenth century, the feast was celebrated on the technically wrong date in roughly 1/3 of all cases.[55] Among the first to openly demand a reform of the Easter *computus* was the Westphalian cathedral canon Reinher of Paderborn,

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53 For a speculative argument that this problem was already known to Bede, see Jennifer Moreton, "Doubts about the Calendar: Bede and the Eclipse of 664," *Isis* 89 (1998): 50–65.

54 A variant of the latter estimate also underlies the Gregorian calendar, which omits 3 days in every 400 years to compensate for the difference between the Alfonsine and the Julian solar year. This corresponds to one day in 133.3y. See Noel M. Swerdlow, "The Length of the Year in the Original Proposal for the Gregorian Calendar," *Journal for the History of Astronomy* 17 (1986): 109–118. For more on the Gregorian calendar, see Walter Émile van Wijk, *De Gregoriaansche kalender* (Maastricht: Stols, 1932); August Ziggelaar, "The Papal Bull of 1582 Promulgating a Reform of the Calendar," in *Gregorian Reform of the Calendar*, ed. George V. Coyne, Michael A. Hoskin, and Olaf Pedersen (Vatican City: Specola Vaticana, 1983), 201–239; Dirk Steinmetz, *Die Gregorianische Kalenderreform von 1582* (Oftersheim: Steinmetz, 2011).

55 According to the estimate of Tom Müller, *"Ut reiecto paschali errore veritati insistamus": Nikolaus von Kues und seine Konzilsschrift* De reparatione kalendarii (Münster: Aschendorff, 2010), 117.

who, in 1171, insisted that his Church should abandon its old lunisolar scheme in favour of the more sophisticated *molad*-reckoning used by the Jews.[56] Better known are some of the critical writings that were produced during the thirteenth century by scholars such as John of Sacrobosco,[57] Robert Grosseteste,[58] Roger Bacon,[59] and Campanus of Novara.[60] Roger Bacon's calendrical call to arms, composed in 1267, is noteworthy for being addressed directly to Pope Clement IV (1265–1268), whom he asked to "relieve the church from this monster,"[61] complaining that "infidel philosophers—Arabs, Hebrews, Greeks," had long begun to "shudder at the stupidity they perceive in the way Christians time their religious observances."[62] This charge would continue to reverberate down the ages, as many of the numerous authors who commented on the necessity of a calendar reform during the following centuries found it necessary to refer to the laughter of the 'infidels', but most especially the Jews, at the Church's expense as one of the main reason the cure could no longer be withheld.[63] John of Murs, one of the most competent Latin astronomers of the fourteenth century, told Pope Clement VI in 1345 that he considered this kind of derision "not undeserved," given the Church's slowness in abandoning its erroneous reckoning.[64] Bacon's words and opinions were also echoed by the learned cardinal Pierre d'Ailly (1350/51–1420), who wrote an influential *Exhortatio super*

56 See p. 63 below.

57 John of Sacrobosco, *De anni ratione*, in *Libellus de Sphaera*, ed. Philipp Melanchthon (Wittenberg: Clug, 1538), sigs. Br–H3^{r}.

58 Robert Grosseteste, *Compotus correctorius*, ed. in Robert Steele, *Opera hactenus inedita Rogeri Baconi*, vol. 6 (Oxford: Clarendon Press, 1926), 212–267.

59 Bacon, *Opus majus*, 1:269–285; Bacon, *Opus tertium*, 272–295.

60 Campanus of Novara, "Computus maior," in *Sphera mundi noviter recognita cum commentariis* (Venice: Giunti, 1518), fols. 159^{r}–177^{r}.

61 Bacon, *Opus tertium*, 273: "Sed illa sedes beatissima deberet hoc monstrum tollere de ecclesia."

62 Ibid., 295: "Atque philosophi infideles, Arabes, Hebraei, et Graeci … abhorrent stultitiam quam conspiciunt in ordinatione temporum quibus utuntur Christiani in suis solemnitatibus." = Bacon, *Opus majus*, 1:285.

63 Further examples are discussed in Nothaft, "Duking it Out."

64 John of Murs, *Epistola super reformatione antiqui kalendarii*, ed. Christine Gack-Scheiding (Hannover: Hahn, 1995), 127: "Cum ergo propter defectum aurei numeri contigit nobis pascha nostrum celebrare, Iudei et gentiles hanc Veteris et Novi Testamenti discordiam percipentes de nobis tamquam remedium adhibere nescientibus non immerito deriderent." See also Chris Schabel, "John of Murs and Firmin of Beauval's Letter and Treatise on Calendar Reform for Clement VI," *Cahiers de l'Institut du Moyen-Âge Grec et Latin* 66 (1996): 187–215, for another edition of this text.

correctione kalendarii (1411) and later unsuccessfully tried to intervene on the calendar's behalf at the Council of Constance (1414–1418).[65]

Despite insistent warnings and occasional papal initiatives, it would take until the Council of Basel (1431–1449) for a realistic legislative option to emerge. On 2 September 1437, a specially created calendar commission, led by the famous Nicholas of Cusa, submitted to the council the draft for an official decree, which foresaw the omission of seven days from October 1439 as well as a change in the Golden Number.[66] The Cistercian monk Hermann Zoest explained and justified these measures in a treatise entitled *Phaselexis* (1437), which is still extant in at least 17 manuscripts. His disquisitions are noteworthy for their occasional references to the Jewish calendar—a special interest of his that also led him to compose the *Calendarium Hebraicum novum* to be discussed and edited in Chapter Six below. As can be seen from the ceremonious tone that pervades the *Phaselexis*, Hermann Zoest expected the decree of 1437 to become effective and hence treated the reform of the calendar as a *fait accompli*.[67] Unfortunately for him, the reform project attempted at Basel eventually collapsed under the adverse political conditions that were created by the council's increasingly bitter power struggle with Pope Eugene IV and it would take another 145 years until the reform was finally brought about under the auspices of Pope Gregory XIII (1582). By this time, Europe was already split in halves by the Protestant Reformation, making sure that large parts of Europe

65 Pierre d'Ailly, "Exhortatio super correctione calendarii," in *Sacrorum conciliorum nova et amplissima collectio*, vol. 28, ed. Giovanni Domenico Mansi (Venice, 1785; repr. Paris: Welter, 1903), 370–381. First printed in Pierre d'Ailly, *Tractatus de imagine mundi et varia ejusdem auctoris et Joannis Gersonis opuscula* (Louvain: de Westphalia, 1477–1483), sigs. $g5^{r}$–$h2^{r}$. Concerning d'Ailly, see also pp. 89 and 172 below.

66 Nicholas of Cusa, *Die Kalenderverbesserung* (*De correctione kalendarii*), ed. Viktor Stegemann (Heidelberg: Kerle, 1955). See further Kaltenbrunner, "Die Vorgeschichte," 336–354; Martin Honecker, "Die Entstehung der Kalenderreformschrift des Nikolaus von Cues," *Historisches Jahrbuch* 60 (1940): 581–592; Stefan Sudmann, *Das Basler Konzil* (Frankfurt: Lang, 2005), 260–272; Müller, "*ut reiecto*", 166–175.

67 Hermann Zoest, *Phaselexis* (c. 9), MS Oxford, Bodleian Library, Lyell 63, fol. 311^{vb}: "Gaude nunc, christiana plebs, et exulta, mater ecclesia, quia is qui pascha tuum fieri dignatus est prospexit de excelso sancto suo liberans te de laqueo venantium et a verbo aspero infidelium te deridentium. Redemit enim te de opprobrio et a despectione superborum. Non te Iudeus amplius irridebit, quia obstructa sunt ora loquentium iniqua, recesserunt scandala et contentiones quieverunt." For more on Hermann Zoest, see chapter VI below, and C.P.E. Nothaft, "A Tool for Many Purposes: Hermann Zoest (d. 1445) and the Medieval Christian Appropriation of the Jewish Calendar," *Journal of Jewish Studies* (forthcoming 2014).

refused to follow the papal decision.[68] In Catholic countries, however, the technical demands of Easter reckoning, especially with regard to the exact length of the solar year, continued to be an important base for Church-funded astronomical research until the eighteenth century.[69]

3 The Christian Encounter with the Jewish Calendar: Antiquity to Twelfth Century

References to the Jewish calendar in Christian sources from Antiquity are often tied up with inner-Christian controversies about the correct celebration of Easter and tend to be negatively charged. One target of early writers in this regard was the custom of celebrating Easter on the evening 14 Nisan, when the Jews convened for the Passover meal.[70] The treatise *Adversus Omnes Haereses*, written in Rome in the late 210s or early 220s and later falsely ascribed to Tertullian, already brands this custom as a stealth attempt to introduce traces of Judaism into Christianity, here imputed to a certain Blastus.[71] Christians who tied their celebration too closely to the date of Passover were perceived to "walk in blindness and stupidity behind the Jews," as it was put by the anonymous North African author of the *De pascha computus* (243), the earliest preserved treatise on Easter reckoning.[72] In addition to the opposition to Judaism, there were inner-Christian theological concerns, including the question of whether Christ's Passion or his resurrection from the dead should be regarded as the

68 See Edith Koller, "Die Suche nach der richtigen Zeit—Die Auseinandersetzung um die Autorisierung der Gregorianischen Kalenderreform im Alten Reich," in *Die Autorität der Zeit in der Frühen Neuzeit*, ed. Arndt Brendecke, Ralf-Peter Fuchs, and Edith Koller (Berlin: LIT, 2007), 233–255, with references to further literature.

69 John L. Heilbron, *The Sun in the Church: Cathedrals as Solar Observatories* (Cambridge, MA: Harvard University Press, 1999).

70 On this custom, see, e.g., Alister Stewart-Sykes, *The Lamb's High Feast: Melito*, Peri Pascha *and the Quartodeciman Paschal Liturgy at Sardis* (Leiden: Brill, 1998); Ulrich Huttner, "Kalender und religiöse Identität: Ostern in Hierapolis," *Zeitschrift für antikes Christentum* 15 (2011): 272–290.

71 pseudo-Tertullian, *Adversus omnes haereses* 8.1 (CCSL 2, 1410). See further Hippolytus, *Refutatio omnium haeresium* (8.18), ed. Miroslav Marcovich (Berlin: de Gruyter, 1986), 337–338; pseudo-Cyprian, *Adversus Iudaeos*, ed. Dirk van Damme (Fribourg: Universitätsverlag, 1969), 59, 157.

72 *De pascha computus* (1), CSEL 3.3:248–249: "Deo inspirati volumus amantibus et adpetentibus studia divina ostendere numquam posse Christianos a via veritatis errare et tanquam ignorantes quae sit dies Paschae, post Iudaeos caecos et hebetes ambulare."

central theme of Easter. An emphasis on the resurrection is reflected in the restriction of only celebrating on Sunday, which gained the upper hand in the course of the second to third centuries and reduced the practice of feasting simultaneously with the Jews to the status of a heresy, later known as 'quartodecimanism'. By the fourth century, the charge of 'judaizing' had extended to those who habitually held Easter Sunday in the week after the beginning of Passover and thus followed the determination of 14 Nisan in the Jewish calendar rather using the Easter cycles developed by the Roman and Alexandrian Churches.[73]

In the wake of the Council of Nicaea in 325, where their practices were explicitly condemned, Christians who mimicked the Jews in calendrical affairs became a frequent target of criticism in the literature. Controversies most easily came to a head in years for which the accepted calendar cycles predicted unusually early or late Easter dates or in cases where the existing cycles failed to offer satisfactory solutions, which induced some Christian communities to time their festival in unorthodox ways. A case in point is the year 387 CE, in which both John Chrysostom in Antioch and an anonymous homilist in Anatolia found reason to inveigh against the 'judaizing' dissenters in their proximity, who celebrated on 21 March when the Alexandrian Church prescribed Easter Sunday on 25 April.[74] In this case, dissent was principally fostered by the Alexandrian 'rule of the equinox', which set the vernal equinox on 21 March as the lower boundary for the Easter full moon, meaning that Easter Sunday could not fall earlier than 22 March. An analysis of preserved Passover dates and other calendrical evidence suggests that Jewish communities in the third and fourth centuries tended to celebrate their feast in March rather than April and thus often ahead of the equinox.[75] From the viewpoint of 'orthodox' Chris-

73 On the general context, see Gerlach, *The Antenicene Pascha*, 257–317, and the excellent new account in Stern, *Calendars in Antiquity*, 381–424, who discusses all the relevant sources. The charge of 'quartodecimanism' and 'judaizing' was revived during the Easter controversies of the early Middle Ages, when it was levelled against the Irish Easter calculation. See Olive M. Cullen, "A Question of Time or a Question of Theology: A Study of the Easter Controversy in the Insular Church" (PhD diss., St. Patrick's College, Maynooth, 2007), 187–249.

74 John Chrysostom, *Adversus Judaeos* 3 (PG 48, 861–872); Fernand Floëri and Pierre Nautin, eds., *Homélies pascales*, vol. 3, *Une Homélie Anatolienne sur la date de Paques en l'an 387* (Paris: Éditions du Cerf, 1957), 120–125.

75 Stern, *Calendar and Community*, 55–98, 124–132; Stern, *Calendars in Antiquity*, 337–339, 409–411. See also Venance Grumel, "Le problème de la date pascale aux III^{e} et IV^{e} siècles," *Revue des études Byzantines* 18 (1960): 163–178.

tians, who followed the stipulations of the Alexandrian Church, the Jews thus acquired a reputation as calendrical 'deceivers', who led other Christians astray with their erroneously timed feasts. Snide remarks against the 'Jewish error' attained an almost topical character in late antique discussions, for example when the Alexandrian patriarch Proterius, eager to assert his authority over the pope in computistical matters, linked the deviating Easter cycle of the Roman Church to the Jews' ineptitude in calculating the Passover according to God's precepts.[76] In doing so, he followed in the footsteps of his predecessor Peter, patriarch of Alexandria from ca. 300–310, whose statements are only preserved in the seventh-century *Chronicon Paschale*. As Peter saw it, his own Church was the one to preserve the legitimate reckoning once established by Moses and followed by the biblical Hebrews, whereas the Jews had corrupted these rules in the wake of the destruction of the Second Temple.[77] A largely confrontational attitude towards the Jewish calendar is also maintained in an Armenian text on Easter reckoning, attributed to the seventh-century astronomer Ananias of Shirak (610–685). While the author acknowledges that Christians learned to celebrate Easter "from Moses and from the Exodus of Israel out of Egypt" and goes on to discuss the chronology of creation according to the "Doctors of the Hebrews,"[78] he also emphasizes that the "holy fathers" anathematized anyone

76 Proterius of Alexandria, *Epistola ad Leonem papam* (7), ed. Bruno Krusch, *Studien zur christlich-mittelalterlichen Chronologie: Der 84-jährige Osterzyklus und seine Quellen* (Leipzig: Von Veit, 1880), 275–276: "Sed nonnulli subtilitatem paschalis conpoti fortisan ignorantes, Judaicis seducti fabulis, estimabunt, non in secundum mensem recedere, si festivitatem eatenus exigamus. … Judaei namque ignorantes deum, tempus quoque paschae ignoraverunt. Unde sepius a primo mense recedunt et in secundo decimo mense pascha caelebrare se aliquatenus arbitrantur. Sed beatissimi patris nostri cyclum decennovenalem certius affigentes, quem violari inpossibilie est, velut crepidinem ac fundamentum et regulam hunc eundem decennovenalem conpotum statuerunt, non iuxta Iudeorum nunc indoctas atque ineptissimas actiones … sed per gratiam spiritus sancti instituti, in revolutione sepe memorati decennovenalis circuli XIIII. paschales lunas diligentius annotaverunt." On the conflict between Rome and Alexandria in the fifth century, see Leofranc Holford-Strevens, "Church Politics and the Computus: From Milan to the Ends of the Earth," in *The Easter Controversy of Late Antiquity and the Early Middle Ages*, ed. Immo Warntjes and Dáibhí Ó Cróinín (Turnhout: Brepols, 2011), 1–20.

77 *Chronicon Paschale* (PG 92, 69–76). On this fragment, see Gerlach, *Antenicene Pascha*, 295–299; Nothaft, *Dating*, 30–32.

78 As translated by Frederick C. Conybeare, "Ananias of Shirak (A.D. 600–650 c.), II: His Tract on Easter," *Byzantinische Zeitschrift* 6 (1897): 574–584 (574, 576). A German translation and extensive discussion of this text can be found in August Strobel, *Texte zur Geschichte des frühchristlichen Osterkalenders* (Münster: Aschendorff, 1984), 124–145.

> who keeps Zadik [sc. Easter] after the manner of the Jews, who slew the Lord, or of the Samaritans or of the Pauliani … unto which end we Armenians go so far as to truly name it, 'the Lord's Zadik', so separating it from all heathen and Jewish feasts.[79]

Although some Alexandrian documents on Easter, like Proterius's aforementioned letter to Pope Leo, were quite well known in the Latin Middle Ages, it is fair to say that, generally speaking, such polemics against the present-day Jewish calendar were centred in the Greek East and thus stayed outside the purview of Western computists. What the latter maintained, however, was a tendency to imagine themselves as heirs to a Mosaic tradition, setting up their own 19-year Easter cycle, courtesy of the Church of Alexandria, as the direct successor to the biblical calendar of the ancient Hebrews. This trend towards an identification of the two calendar schemes is already exhibited in a short treatise by the North African bishop Quintus Julius Hilarianus, written at the end of the fourth century, where it is assumed that the "method of counting the months of the year according to the course of the moon" under discussion, which was based on an 8-year cycle, had been transmitted to Moses directly from God.[80] The idea was expressed even more clearly in 444 CE by bishop Paschasinus of Lilybaeum, who, in an attempt to convince Pope Leo of the advantages of switching to the Alexandrian style of computation, referred to the latter as the "legal calculation of the Hebrews."[81] The same sentiment, which directed the focus towards the biblical *Hebraei* rather than the contemporary *Iudaei*, is also reflected in a spurious Latin version of Cyril of Alexandria's letter to the Council of Carthage, which was probably written no later than the sixth century.[82] Dionysius Exiguus, who popularized the Alexandrian reckoning in the Latin West with his Easter table, likewise associated the 19-year cycle that had allegedly been adopted at the Council of Nicaea with a tradition stemming

79 Conybeare, "Ananias," 580–581.

80 Quintus Julius Hilarianus, *Expositum de die Paschae et mensis* 3 (PL 13, 1108): "Eo quippe tempore, quo a Domino Deo nostro legem Moysi datam esse cognoscimus propter Pascha celebrandum, mensium annorumque rationem per lunae cursum ei tradidit, ut ex neomenia mensem primum seu alios habere potuisset."

81 Paschasinus of Lilybaeum, *Epistola ad Leonem papam* (1), ed. Krusch, *Studien*, 248: "… in hoc ambiguo fluctuantes, ad Hebreorum, hoc est legalem supputationem, nos convertimus, quae cum a Romanis ignoratur, facile errorem incurrunt."

82 *Epistola Cyrilli* (4), ibid., 346: "… ut numereus XII tantum lunas iuxta supputationem legalem Hebreorum in anno communi et XIII in embolismo secundum supputationem dierum."

from Moses himself.[83] Medieval computists reading these passages were bound to misconstrue them as evidence for a strong continuity between the Easter *computus* and the Hebrew calendar tradition. Isidore of Seville, the seventh-century author of the highly influential *Etymologies*, probably aggravated this confusion by writing as if the only calendrical hallmark that had ever differentiated the Christian from the Jewish *Pascha* was the dependence on the weekday:

> In Antiquity, the Church used to celebrate the Pasch together with the Jews, regardless of the day of the week. The holy fathers of the Council of Nicaea prohibited this custom and decreed that not only the paschal full moon and months should be observed, but also the day of the Lord's resurrection. And for this reason they extended the Pasch from *luna* 14 to *luna* 21, lest the Sunday be left out.[84]

Elsewhere, in a passage reminiscent of Hilarianus, he alleged that Moses had received from on high not only God's commandments for the chosen people, but also some computistical knowledge in form of the embolismic month.[85] This idea of calendrical revelation was taken a step further in the anonymous tenth-century *De argumentis lunae*, where the entire 19-year cycle, as used in the Easter tables, is said to have been bestowed by God upon his prophet Moses.[86] A remarkable, but isolated, instance of an early medieval Latin writer

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83 Dionysius Exiguus, Libellus de cyclo magno paschae DCCCII annorum, ed. Bruno Krusch, *Studien zur christlich-mittelalterlichen Chronologie: Die Entstehung unserer heutigen Zeitrechnung* (Berlin: de Gruyter, 1938), 65: "Sed quia menses hic, unde sumat exordium vel ubi terminetur, evidenter ibi non legitur, praefati venerabiles CCCXVIII pontifices antiqui moris observantiam et exinde a sancto Moyse traditam … sollertius investigantes, ab VIII. Idus Martii usque in diem Nonarum Aprilis natam lunam facere dixerunt primi menses exordium."

84 Isidore of Seville, *Etymologiae*, ed. W.M. Lindsay, 2 vols. (Oxford: Clarendon Press, 1911), 6.17.10: "Antiquitus Ecclesia pascha quarta decima luna cum Iudaeis celebrabat, quocumque die occurreret. Quem ritum sancti Patres in Nicaena synodo prohibuerunt, constituentes non solum lunam paschalem et mensem inquirere, sed etiam et diem resurrectionis Dominicae observare; et ob hoc pascha a quarta decima luna usque ad vicesimam primam extenderunt, ut dies Dominicus non omitteretur."

85 Ibid. 6.17.22: "Embolismus annus est qui tredecim menses lunares, id est CCCLXXXIV dies habere monstratur. Ipse est annus sancto Moysi divinitus revelatus, in quo iubentur hi, qui longius habitabant, in secundo mense pascha celebrare." This passage was also copied in Rabanus Maurus, *De universo* 5.8 (PL 111, 127).

86 pseudo-Bede, *De argumentis lunae* (PL 90, 723): "Cyclus decemnovennalis a sancto Moyse divinitus revelatus est, jubente Domino, ut hi qui longe habitabant, in secundo mense

acknowledging calendrical diversity as far as the Jews were concerned is the Irish author of the treatise *De ratione conputandi*, which has been regarded as a seventh-century composition, but must probably be dated to ca. 719–727. The latter combined several of the aforementioned sources, such as Proterius and Dionysius Exiguus, to argue that the Jews had strayed from the correct Mosaic reckoning, due to the fact that the sequence of embolisms and the limits for the new and full moons were not clearly noted in the sacred scriptures.[87] This Irish voice was to be drowned, however, by the authority of a contemporary writer, the Venerable Bede from Northumbria, whose *De temporum ratione* (725) became the standard handbook on time and Easter reckoning in the Latin Middle Ages. Standing under the spell of his late antique sources, Bede continued to associate the Alexandrian 19-year cycle that his own treatise advocated with the injunctions of the Mosaic Law and the practice of the ancient Israelites, thereby influencing generations of computists. In one of the less ambiguous passages, he pointed out that the Easter full moon of the Christian *computus* was simply the fourteenth day of the first month mentioned in the Hebrew Scriptures and that no discrepancy to the legal Passover would arise, were the Saturday before Easter to fall on *luna* 14 in each and every year.[88]

Pascha scirent celebrare." See also *Comp. Col.* 4.3A and 5.11B, in Arno Borst, *Schriften zur Komputistik im Frankenreich von 721 bis 818*, 3 vols. (Hannover: Hahn, 2006), 2:921, 941–942, and Warntjes, *The Munich Computus*, 242–243 (with further references).

87 *De ratione conputandi* (c. 94), ed. Dáibhí Ó Cróinin, in Walsh and Ó Cróinín, *Cummian's Letter*, 199–200: "Sciendum nobis utrum hic ordo fuit in .xiiii. luna primi menses et in commonibus et in embolismis apud Ebreos primitus. Nec mirum si esset apud Moysen et apud alios doctos uiros sequentes exemplum illius. Postea Iudei in errorem incederunt in .xiiii. luna primi menses, nescientes differentiam commonium et embolesmorum annorum, ut Proterius dicit: 'Iudei, ignorantes dominum, tempus quoque pasche ignorauerunt. Unde sepius a primo mense recedunt et in duodecimo mense pascha celebrare aliquatinus arbitrantur.' Et haec causa erroris Iudeis, quia non manifeste in libris legis ostenditur principium eiusdem primi mensis, ut Dionisius dicit: 'Sed quod mensis hic, unde sumat exordium vel ubi terminetur, evidenter ibi non collegitur, praefati venerabiles .ccc. .x. et .viii. pontifices, antiqui moris obseruantiam et exinde a sancto Moysi traditam, sicut in .vii. libro ecclesiasticae referetur historiae, solertius inuestigantes, ab .viii. Idibus Martii usque in Nonarum Aprelium natam lunam facere dixerunt primi mensis initium; et a .xii. Kl Aprelis usque in .xiiii. Kl Maii lunam .xiiii. solertius inquirendum.'" On the dating of this work, see Warntjes, *The Munich Computus*, cxci–cci.

88 Beda Venerabilis, *De temporum ratione* 59 (CCSL 123B, 447): "Et si fieri posset ut eadem omnibus annis sabbat die luna quarta decima contigisset, nihil nostrae paschalis observantiae tempus a legali discreparet." Ibid. (CCSL 123B, 448): "Non tamen umquam contingat ut non nostra solemnitas paschalis aliquem legalium paschae dierum, saepe autem

By the early ninth century, the wholesale identification of present Christian with past 'Hebrew' methods of lunisolar computation could even inspire new directions of scholarly research, as is evidenced by the world chronicle written in 814 by Claudius, the later bishop of Turin. As a chronographer, Claudius took a special interest in the calendar dates that occasionally appeared in the Old Testament and happily pursued the cumbersome task of finding their weekday and equivalent date in the Julian calendar, based on the reckoning rules of the Easter *computus*. Thanks to his meticulous calculations, readers of his *Chronica* could learn that Noah left the ark on Sunday, 3 May, that the Ten Commandments were received by the Israelites in the desert on Monday, 31 May, and that Jerusalem was sacked by the Babylonians on Saturday, 23 June.[89] Yet the theory that the Christian Easter full moon and the Jewish date of 14 Nisan were one and the same also gave rise to chronological problems, which could cause serious consternation in medieval scriptoria. According to patristic tradition, the crucifixion of Jesus had taken place on 25 March, the ancient Roman date of the vernal equinox. In the relevant time-period, this date fell on a Friday only in 29 and 35 CE. Since the Gospels indicated that the Christ's Passion took place at the time of Passover, medieval computists naturally also expected the right calendar date would have to coincide with the 14th or 15th day of the Easter lunation. Quite disturbingly, however, the 19-year lunisolar cycle refused to offer anything close to the desired combination of data for the relevant range of years. Between Claudius's time and the twelfth century, several attempts were made to solve this chronological problem, often by radically shifting the dates of Jesus's life backwards or

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omnes intra se complectatur." Ibid. 61 (CCSL 123B, 451): "Quoties ergo diem dominicum mox aduentante quinta decima luna habemus, nil nostrum tempus paschale a legali dissonat, quamuis aliis sacramentorum generibus eiusdem paschae solemnia colimus." See also Ibid. 9, 11, 13, 45 (CCSL 123B, 309, 312–315, 326–327, 420–422). The Dionysiac *luna* 14 is also equated with the *pascha Hebreorum* in a unique addition to Isidore's *Chronica maiora*, datable to 800 CE and edited by Theodor Mommsen, ed., *Chronica minora saec. IV.V. VI. VII*, vol. 2 (Berlin: Weidmann, 1894), 491. I owe this reference to Richard Landes. See further the references to the 'Hebrews' in G.G. Meerssemann and E. Adda, eds., *Manuale di Computo con ritmo mnemotecnico dell'arcidiacono Pacifico di Verona (†844)* (Padua: Editrice Antenore, 1966), 79, 87–88, 94, 97, 119–120; Arno Borst, *Der karolingische Reichskalender und seine Überlieferung bis ins 12. Jahrhundert*, 3 vols. (Hannover: Hahn, 2001), 1:653, 656, 659, 662, 696, 738; 2:763; Borst, *Kalenderreform*, 664–669.

89 For details, see C.P.E. Nothaft, "Chronologically Confused: Claudius of Turin and the Date of Christ's Passion," in *Proceedings of the 3rd Galway Computus Conference*, ed. Immo Warntjes and Dáibhí Ó Cróinín (Turnhout: Brepols, forthcoming 2014); Nothaft, *Dating*, 94–102.

forwards by several years or decades. A pioneering role in this respect was played by Abbo of Fleury (d. 1004), who, towards the end of his life, concluded that Jesus must have died in 12 CE, 22 years earlier than previously assumed. In order to make such a correction plausible, the chronicler Marianus Scottus (d. 1082) completely revised the chronology of ancient Roman history, arguing that the reigns of some Roman emperors had taken longer than traditionally recorded.[90]

The first computist to once again introduce something like a distinction between the two calendars was Heimo of Bamberg (d. 1139), a chronicler chiefly known for his decision to move the dates of Christ's birth and death back by 33 years. In fixing the crucifixion on 25 March 1 CE, which was *luna* 14 according to the usual reckoning, Heimo followed the assumption that the Christian and the Hebrew lunisolar calendars had opposing sequences of 'full' and 'hollow' months. This theory, which was founded on a very subtle understanding of some passage in Bede rather than any new information about Jewish calendrical practice, necessarily implied that the Jewish 14 Nisan had taken place one day earlier than its Christian equivalent, meaning that the computistical *luna* 14 was equivalent to 15 Nisan, the synoptic date of the Passion.[91] As Heimo's example shows, the transition towards a fuller understanding of the Jewish calendar was a slow one. This impression is confirmed by Heimo's contemporary Sigebert of Gembloux (d. 1112), of whom Godescalc of Gembloux, in his continuation of Sigebert's *Gesta Abbatum Gemblacensium*, reports that he was "most dear [*carissimus*] to the Jews," because he was an expert in distinguishing the "Hebrew truth [*Hebraica veritas*]" from other editions of the Bible and he "agreed with the Jews' opinions, in regard to what they spoke according to the Hebrew truth."[92] In his chronological writings, however, Sigebert perpetuated

90 See Peter Verbist, *Duelling with the Past: Medieval Authors and the Problem of the Christian Era, c. 990–1135* (Turnhout, 2010); C.P.E. Nothaft, "An Eleventh-Century Chronologer at Work: Marianus Scottus and the Quest for the Missing 22 Years," *Speculum* 88 (2013); Nothaft, *Dating*, 103–112. See now also the edition, translation and commentary on ch. I. 24–26 and supplement 'T' in Alfred Lohr, *Der Computus Gerlandi* (Stuttgart: Steiner, 2013). On Marianus and Gerland, see also pp. 184–185 below.

91 Nothaft, *Dating*, 109–111.

92 Sigebert and Godescalc of Gembloux, "Gesta Abbatum Gemblacensium," in *MGH Scriptores*, vol. 8, ed. Georg Heinrich Pertz (Hannover: Hahn, 1848), 550: "Nec solummodo christianis, sed et Iudeis in eadem urbe commanentibus erat carissimus, pro eo quod Hebraicam veritatem a caeteris editionibus secernere erat peritus, et in his quae secundum Hebraicam veritatem dicebant, Iudeorum erat consentiens assertionibus." = PL 160, 641.

the notion that the dates of the creation of the world and the life of Jesus could all be reliably calculated on the basis of the 19-year cycle.[93]

That said, Christians were not completely alone in their tendency to assume an exaggerated similarity between their own chronological customs and those of their cognate religion. Evidence for the Jewish side comes from a portion of a *piyyut* (liturgical poem) commentary, written in 1099/1100 by R. Shemaiah of Troyes, a student of Rashi.[94] R. Shemaiah mentions how a Christian informed him that Jesus was born in a year in which the 532-year cycle 'was completed'. He then notes that two further 532-year cycles had passed since this time, the second one having reached completion in the year 4827 of the Jewish era, which is 1066/67 CE. His statement implies that Jesus was born in 3763 JE = 2/3 CE or 65 years before 3838 JE = 67/68 CE, which rabbinical writers widely regarded as the year of the destruction of the Second Temple. In R. Shemaiah's eyes, this interval of 65 years was significant, because it could be linked to Isaiah 7:8 ("and in another sixty-five years Ephraim shall be broken as a people"). He likewise speculated that the imminent 1100th anniversary Jesus's birth, i.e. 4863 JE = 1102/3 CE, would be invested with eschatological significance.[95] Yet

93 See the *Liber decennalis*, edited in Wiesenbach, *Sigebert*, 177–297. In his *Passio Sanctorum Thebeorum*, Sigebert states that the saint day of the Thebean martyrs, 22 September, coincided with the Jewish New Year. See Ernst Dümmler, "Sigebert's von Gembloux Passio sanctae Luciae virginis und Passio sanctorum Thebeorum," *Philosophische und historische Abhandungen der königlichen Akademie der Wissenschaften zu Berlin* (1893): 1–125 (119). According to Eva Haverkamp, "Martryrs in Rivalry: The 1096 Jewish Martyrs and the Thebean Legion," *Jewish History* 23 (2009): 319–342 (328), his statement accurately reflects the date of Rosh Hashanah in 1072, but in that year 1 Tishri fell on 15 September. Since 22 September is not the seat of any Golden Number in the ecclesiastical calendar either, his claim remains unexplained.

94 See Simcha Emanuel, "Chronology and Eschatology: A Jewish-Christian Debate, France 1100," *Journal of Jewish Studies* 64 (2013): 264–282. An earlier version of this article was published in Hebrew as Emanuel, "A Jewish-Christian Debate—France, 1110," *Zion* 63 (1998): 143–155. On R. Shemaiah, see Abraham Epstein, "R. Schemaja, der Schüler und Sekretär Raschi's," *Monatsschrift für Geschichte und Wissenschaft des Judenthums* 41 (1896–1897): 257–263, 296–312.

95 R. Shemaiah's preoccupation with the 532-year cycle in relation to Messianic expectations and eschatology is also exhibited by later Jewish sources, mostly from the thirteenth century, albeit here the end of the cycle is associated with the crucifixion rather than the birth of Jesus. See Sarit Shalev-Eyni, "Cosmological Signs in Calculating the Time of Redemption: The Christian Crucifixion and the Jewish New Moon of Nissan," *Viator* 35 (2004): 265–287 (271–276); Israel Jacob Yuval, *Two Nations in Your Womb*, trans. Barbara Harshav and Jonathan Chipman (Berkeley: University of California Press, 2006), 264–266, 291–295; Emanuel, "Chronology," 272–275.

there is a misunderstanding lurking behind R. Shemaiah's statements, which consists in a conflation of the 532- and 19-year cycles, as used by Christians, with their equivalents in the Jewish calendar. While it is true that 3763 JE = 2/3 CE is the beginning of a new 19-year cycle in the Jewish system, the Dionysiac 19-year cycle used by the Church already starts with the year 1 BCE, i.e. two full years and ca. nine months earlier. As a result of this discrepancy, there are two Jewish embolismic years (6/19 and 17/19) that are common in the Christian calendar, while, conversely, two embolismic years in the Dionysiac 19-year cycle (8/19 and 19/19) will always be common for the Jews. While his Christian informant may well have associated the birth of Jesus with the beginning of the 19-year cycle, R. Shemaiah evidently mistook this beginning for 3763 JE = 2/3 CE.[96]

Another Jewish scholar from this period who evidently talked to Christians about the chronology of Jesus's life, but also about the computation of Passover and Easter more generally, was Abraham bar Ḥiyya (1070–1136/45), whose *Sefer ha-Ibbur* dates from 1122/23.[97] In this important book on the Jewish calendar, Abraham proudly recounts how he was able to dumbfound a Christian priest, who had tried to demonstrate that the Jews intercalate the thirteenth lunar month in the wrong years. The dispute, which revolved around the year of the Exodus from Egypt, rested once again on the differing beginnings of the lunisolar cycles used by Christians and Jews. As Abraham observed, Christian computists "imagine, regarding their Passover [i.e. Easter], that they calculate it according to our calculation."[98] This, of course, was an incorrect conceit on the part of the Christians, as the comparison of both 19-cycles showed: when Jews counted the 5th and 16th year of their cycle, which were both common, Christians were already in years 8 and 19, in which embolismic months were inserted. The result was that, in these two years of the cycle, Easter habitually fell at least one month later than Passover. There is a noteworthy parallel between Abraham bar Ḥiyya's polemical interlocution with a Christian priest and a remark in Roger Bacon's *Opus tertium*, written in ca. 1267, which points to similar encounters still taking place in the thirteenth century. Bacon notes how some Christians tried to reproach the Jews for their deviating order of intercalation, ignoring once more the different starting points of the two cycles. These attempts at criticism or ridicule seem to have backfired for them no less than for Abraham bar Ḥiyya's opponent, as Bacon regretfully reports to have

96 See my brief appendix to Emanuel, "Chronology," 281–282.

97 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (2.5; 3.10), ed. Filipowski, 44–45, 109–110.

98 Ibid. (2.5), 45: "כי אתם יודעים שהגוים הטזעים מדמים בפסח שלהם לחשוב על חשבוננז"

"seen knowledgeable and very illustrious men err in disgrace and get vilely derided by the Jews."[99]

The remarks by R. Shemaiah and Abraham bar Ḥiyya suggest that the first half of the twelfth century saw the beginning of a time of heightened interreligious exchange about calendrical matters, in the course of which Christians were confronted with new and accurate information about the Jewish calendar. This impression is confirmed by the Benedictine abbot Rupert of Deutz (ca. 1075–1129), who is known to have engaged in person with the Jews of his own environment in Cologne and the neighbouring Rhineland area.[100] In his most famous work, the *De sancta Trinitate et operibus eius* (1112/16), Rupert commented on the postponement rules (*deḥiyyot*) of the Jewish calendar, which prevented Rosh Hashanah from falling on a Sunday, Wednesday, or Friday (rule of *lo ADU Rosh*) and—by corollary—Passover from falling on a Monday, Wednesday, or Friday (*lo BaDU Pesaḥ*). Previous to Rupert, the only Latin author to discuss these rules at any length had been Petrus Alfonsi, an Aragonese Jew who converted to Christianity in 1106 and later visited England, bringing with him the fruits of Arabic and Hebrew learning. In his influential *Dialogue against the Jews* (ca. 1109), written as a conversation between his former Jewish ('Moses') and present Christian ('Petrus') self, he developed a highly negative view of Jews, who according to him had fallen into error and unreason by the standards of their own religion. One of the most innovative and pernicious aspects of this polemic was Alfonsi's insistence on the idea that Jewish religious leaders, both past and present, systematically misled their communities.

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99 Bacon, *Opus tertium*, 219: "Sed tamen considerandum quod cyclus Hebraeorum, ut praedixi, incipit quarto anno cycli Latinorum. Sed quia astronomi et computistae non advertunt hanc differentiam, ideo saepe inaniter, et cum confusione, contendunt cum Judaeis, reprobantes eos de festo Paschali, quando multum, ut per mensem vel circiter, a nobis discordant in hoc festo. Nam si cyclus noster et eorum simul inciperent, tunc redarguendi essent. Sed non est ita; et ideo habent embolismum, quum nos non habemus, et e converso. Et ideo ille mensis addendus aliquando additur apud eos, vel subtrahitur, quum nos nec addimus nec subtrahimus. Vidi autem peritos viros et famosissimos turpiter errare, et a Judaeis viliter derideri."

100 On the background, see Maria Lodovica Arduini, *Ruperto di Deutz e la controversia tra Cristiani ed Ebrei nel secolo XII* (Rome: Istituto storico italiano per il medio evo, 1979). See further Arduini, *Neue Studien Über Rupert von Deutz* (Siegburg: Respublica-Verlag, 1985), 117–169; John H. Van Engen, *Rupert of Deutz* (Berkeley: University of California Press, 1983), 241–248; Anna Sapir Abulafia, "The Ideology of Reform and Changing Ideas Concerning Jews in the Works of Rupert of Deutz and Hermannus Quondam Iudeus," *Jewish History* 7 (1993): 43–63.

This charge weighed particularly heavy in the case of Christ's crucifixion, which according to 'Petrus' was premeditated by the Jewish priests, who were aware of Jesus's true identity, but manipulated others into believing that he was a magician and prostitute's son. The notion of Jewish sages as schemers is also faintly alluded to in a passage that marks the earliest occurrence of the *deḥiyyot* in a Latin text. In the context of a prolonged exchange about the legitimacy of Christian vs. Jewish festivals and forms of worship, Petrus inquires as to the reason why Moses and his coreligionists sometimes postpone the Passover:

> Petrus: In reality, sometimes you even change the day of the Passover and defer it until the day following, because you never celebrate it on Monday, or Wednesday, or Friday. I want you to explain to me why you do this.
> Moses: I do not know why, other than that our sages ordained it so, and Gamaliel above all.
> Petrus: And do you know why Gamaliel did so?
> Moses: No.
> Petrus: Indeed, Gamaliel was a holy man and a faithful Christian. And because he knew that on Monday the Jews initiated a plan by which Christ could be condemned, and, moreover, on Wednesday the silver was given for the betrayal of Christ, and that on Friday Christ was fixed to the Cross, because, I say, he knew this and did not want any joy to be expressed on those days, for this reason he forbade them from celebrating the Passover on those days and enjoined that it be deferred until the day following. He did not want to reveal this secret, however, to everyone.[101]

As we have already seen, the actual reason for the postponements, as given in rabbinic literature, was to avoid constellations in which two Sabbatical days of rest would fall next to each other and thus prohibit the preparation of food or the burial of the dead for two days in a row.[102] It was Rupert of Deutz, who first drew the attention of Christian readers to these arguments:

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101 Petrus Alfonsi, *Dialogue against the Jews*, trans. Irven M. Resnick (Washington: The Catholic University of America Press, 2006), 263–264. On the background, see John Tolan, *Petrus Alfonsi and His Medieval Readers* (Gainesville: University Press of Florida, 1993), 12–41; Manfried Kniewasser, "Die antijüdische Polemik des Petrus Alphonsi (getauft 1106) und des Abtes Petrus Venerabilis von Cluny († 1156)," *Kairos*, n.s., 22 (1980): 34–76; Cohen, *Living Letters*, 201–218. On the name Gamaliel in association with the Jewish calendar, see pp. 605–607 below.

102 See above, pp. 27–30, and Stern, *Calendar and Community*, pp. 166–167, 194–195.

> The Jews also make other postponements of the same feast, on which one would have to write abundantly, but I will not pass over what I have learned from them. For they not only avoid celebrating the Lord's Passover on the sixth, but also on the second, and the fourth day of the week. For if they celebrated on the second day, the Day of Atonement, i.e. the tenth day of the seventh month or the 173th day from Passover, would fall on the sixth day of the week, in which case they could not work at all on these days. If Passover was celebrated on the fourth day, they would have the Day of Atonement on a Sunday and they would again have two Sabbatical days in a row, i.e. two continuous feast days, on which they would suffer the aforementioned inconveniences. But if you ask them the authentic reason for all that has just been said, they are unable to cite any scriptural proof and instead admit that these traditions are not from God or Moses, but from their masters, scribes and Pharisees.[103]

For a Christian observer interested in the events surrounding the death and resurrection of Jesus Christ, the question of whether these postponement rules were of Mosaic origin or a late 'Pharisaic' invention was obviously more than just an exercise in pointless scholarly minutiae. As Rupert and any other observer well-versed in the New Testament knew, the Gospels provided two diverging accounts of the chronology of the Last Supper: according to the narrative found in the synoptic Gospels, Jesus and his followers convened on that fateful evening to partake in a Passover meal (14/15 Nisan), meaning that the crucifixion would have taken place on the afternoon of 15 Nisan, the high feast day of Passover, also known as the first day of the Feast of Unleavened Bread. According to the Gospel of John, however, the crucifixion preceded this feast by one day, suggesting that the Last Supper took place on the evening of 13/14 Nisan

103 Rupert of Deutz, *De sancta Trinitate et operibus eius* 15, In Lev. 2.36 (CCCM 22, 901): "Sunt et aliae Iudaeis transpositiones eiusdem diei festi quas licet ex abundanti sit scribere, non praeterimus, sicut accepimus ab illis. Non solum enim sexta sed et secunda et quarta feria, dominica quoque, diem paschae celebrare fugiunt. Nam, si secunda feria pascha celebrarent, dies propitiationis, id est decimus dies mensis septimi, qui a die pascha centesimus septuagesimus tertius est, in sextam feriam illis eueniret, quo nihil omnino illis operari licet. Si quarta feria pascha celebrarent, dominicam diem propitiationis haberent, et utrobique duo sabbata, id est duos dies festos continuos habentes praedictis incommodis laborarent. Verumtamen horum omnium quae dicta sunt, si ab eis authenticam quaeras rationem, nullam omnino de Scripturis proferre possunt, fatenturque has traditiones non Dei esse aut Moysi, sed magistrorum suorum scribarum et Phariseorum."

instead.[104] Clearly, both accounts had to be harmonized in some way, lest it be admitted that either John or the synoptic writers were in error. In this latter regard, the postponement rules could be seen to play a decisive role, as rule *lo BaDU Pesaḥ* prohibited 15 Nisan from falling on a Friday, the weekday of the crucifixion: if this calendrical rule had already been operating at the time of Jesus, as many observers were bound to assume, this would have meant that the testimony of the Jewish calendar directly refuted the synoptic chronology of the Last Supper, whose validity had been vouchsafed by an authority as eminent as the Venerable Bede.[105] Rupert tried to turn this problem into a virtue by showing how the postponement effect could be used to bring the four Gospels into agreement. In his somewhat skewed understanding of the matter, the postponement of 15 Nisan in the year of the Passion only affected the calendrical date of the first day of unleavened bread, which was shifted from Friday to Saturday, but left the Passover meal in its place, meaning that it still coincided with the Last Supper on Thursday. This way, Rupert could reconcile the notion of Jesus celebrating Passover on the evening before his trial with all the hectic activity on the day of the crucifixion, which violated the Jewish commandment of rest on a high feast day.[106] His attempt at harmonization was successful, in so far as it could explain why John referred to the day of the crucifixion as the *parasceve* or "day of Preparation" for the feast (19:14, 31), but it failed to address another passage in the same Gospel (18:28), which had the Jews refrain from entering the Roman praetorium "that they might not be defiled, but that they might eat the pasch," thus implying that Jesus and the Jewish society around him held their Passover meals on different evenings. Later authors, such as Reinher of Paderborn or Paul of Burgos accordingly either attempted different explanations or ignored the *deḥiyyot* and their irreconcilability with the synoptic chronology altogether.[107]

From Rupert's example, it would appear that information about the fixed Jewish calendar was at first transmitted to Christian readers in a piecemeal fashion, with different aspects circulating independently of each other and in

104 See n. 40 above.

105 Bede, *De temporum ratione* 47; 61 (CCSL 123B, 432, 452).

106 Rupert of Deutz, *De sancta Trinitate et operibus eius* 15 (CCCM 22, 900–901); *De gloria et honore filii hominis super Mattheum* 10.69–91 (CCCM 29, 300–301). On Rupert's other chronological studies regarding the life of Christ, see Hubert Silvestre, "Le jour et l'heure de la nativité et de la résurrection pour Rupert de Deutz," in *Pascua Mediaevalia: Studies voor Prof. Dr. J.M. de Smet*, ed. R. Lievens, E. van Mingroot, and W. Verbeke (Leuven: University Press, 1983), 619–630.

107 See Nothaft, *Dating*, 136–146, 152, 189–194, 212–222, and below, pp. 482–485.

different contexts. While theologians and exegetes such as Rupert of Deutz may have taken a special interest in the postponement rules, computists and astronomers would have been eager to learn more about the way the Jews calculated their *moladot* or conjunction times. By the middle of the twelfth century, their appetites had already been whetted by the impact of translated Arabic texts and tables, which trickled from Spain into the rest of Western Europe at an astounding rate and brought in their wake a revolution in numeracy and astronomical understanding.[108] Given this twelfth-century preponderance of Arabic astronomy, whose practitioners on the Iberian peninsula also included many Jews, it is perhaps not too surprising to find that the earliest known traces of the *molad*-system in Latin manuscripts were transmitted in close connection with the Islamic (henceforth: Arabic) lunar calendar, which initially came to Europe as part of astronomical tables.[109] One example of the joint reception of both calendars comes from MS Leipzig, Universitätsbibliothek, 328 (Parchment, 151 fols., 260×180 mm), which contains a late-twelfth-century southern German copy of Hermann of Reichenau's *Abbreviatio compoti* (fols. 139^{v}–148^{r}).[110] Hermann's lunar tables at the end have been updated by replacing the original Roman numerals with the recently imported

108 See Raymond Mercier, "Astronomical Tables in the Twelfth Century," in *Adelard of Bath*, ed. Charles Burnett (London: The Warburg Institute, 1987), 87–118; Stephen C. McCluskey, *Astronomies and Cultures in Early Medieval Europe* (Cambridge: Cambridge University Press, 1998), 165–208, and the literature cited in what follows.

109 C.P.E. Nothaft, "The Reception and Application of Arabic Science in Twelfth-Century Computistics: New Evidence from Bavaria," *Journal for the History of Astronomy* 45 (2014): 35–60. See also Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," 185–199, who describes an extensive set of tables relating to the calculation of *moladot* and *tekufot* in the Latin MS Cambridge, UL, Hh.6.8, fols. 7^{r}–12^{r}, where they precede a collection of astronomical tables attributed to *Sevasortha* (= Abraham Bar Ḥiyya), starting in 1110 CE. The latter are based on the Jewish *molad*-system, but with values recomputed for the meridian of Toulouse. Mercier (ibid., 186) is inclined to think that these Latin tables were composed within the Jewish community of Toulouse, without there being a Hebrew original. The astronomical tables are arranged for the Julian calendar and include a table for the Christian movable feast days (ibid., 196–197). Mercier (ibid., 165) dates the manuscript to the twelfth century, but a slightly later date (s. $XIII^{1/4}$) seems possible. Cf. Paul Binski and Patrick Zutshi, *Western Illuminated Manuscripts* (Cambridge: Cambridge University Press, 2011), 278.

110 See Rudolf Helssig, *Die lateinischen und deutschen Handschriften der Universitätsbibliothek Leipzig*, vol. 1, *Die theologischen Handschriften, Teil 1* (*Ms 1–500*) (Leipzig, 1926; repr. Wiesbaden: Harrassowitz, 1995), 478–480. I am very grateful to Immo Warntjes for bringing this MS to my attention and discussing its contents with me.

Hindu-Arabic ones (fols. 147^{v}–148^{r}), whose use is explained in an attached arithmetical text (fols. 149^{r}–150^{v}). These instructions are flanked by two peculiar sets of calendrical tables. The first of these (fol. 148^{v}) consists of three connected parts that track the time difference between the Julian and the Arabic calendar for months (from 1 to 12), years (from 1 to 30), and collected groups of 30 years (from 1160 to 1640 CE). As was the norm in Arabic astronomical tables, which used a fixed rather than an empirical calendar, the lunar months and years are here reckoned as 29;31,50d and 354;22d respectively, which results in a 30-year cycle comprising exactly 10,631d. The second set of tables, which follows the arithmetical text on fol. 151^{r}, uses the very same structure, including the 30-year 'cycle', but the length of the lunar months has here been adapted to the 29d 12h 793p of the Jewish calendar. Curiously, however, the 1080 Hebrew parts of an hour (or *ḥalakim*) are here replaced by two sub-units: 1 hour = 30 *momenta* = 30 × 36 *momentula* (30 × 36 = 1080).[111] It would seem that the two tables, which were probably constructed in ca. 1170 CE,[112] reflect burgeoning attempts among Christian computists to provide a corrective to their increasingly inaccurate ecclesiastical lunar calendar. The same concern is indeed reflected in a *Compotus* composed in 1176 by the astronomer Roger of Hereford,[113] in which he

111 The table is preceded by the following canon: "Tabula ad inveniendam etatem lune per annos domini secundum tabulas planetarum et conpotum Hebreorum conscripta. Si quidem Hebrei XX novem dies, XII horas et septingenta nonaginta tria minuta, ex quibus mille octoginta unam horam faciunt, singulis suis lunacionibus [*mg*. naturaliter] attribuunt, in tabulis vero astronomie quamvis per minucias alterius generis hora dividatur, si quis recte quesierit ab una coniunctione solis et lune usque ad alteram tantundem reperiet. Intrabis itaque in tabulas per annos domini collectos, deinde per planos, postremo per menses, que omnia preterierunt, et quisque eis adinventum fuerit in unam summam rediges de [*del*.] XXXVI momentulis unum faciens momentum de XXX vero momentis unam horam, scilicet vicesimam quartam partem unius diei constituens. Que summa si integrum mensem lune, id est XX novem dies superavit, ipsius mensis quantitatem semel aut bis proicies et quod remanserit etatem lune satis exquisitam ostendet" (MS Leipzig, UB, 328, fol. 150^{v}). In the tables of MS Cambridge, UL, Hh.6.8, fols. 7^{r}–11^{v} (see n. 109 above), the *ḥalakim*-values are expressed using sexagesimal *puncta* and *secunda*. See Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," 189–196.

112 Judging from an instruction of how to calculate the year in the indicitional cycle, found on MS Leipzig, UB, 328, fol. 148va.

113 On Roger of Hereford and his *Compotus*, see Charles Homer Haskins, *Studies in the History of Mediaeval Science* (Cambridge, MA: Harvard University Press, 1924), 124–126; Steele, ed., *Opera hactenus inedita*, xix–xx; Josiah C. Russell, "Hereford and Arabic Science in England about 1175–1200," *Isis* 18 (1932): 14–25; Roger French, "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century," *Isis* 87 (1996): 453–480 (459–465).

included a table for the systematic comparison of the Arabic ('Chaldaean'), Jewish ('Hebrew'), and Christian ('Latin') estimates of the mean lunation.[114] Roger's discussion of the 19-year cycle in another chapter of his treatise shows him well-informed about the basics of the Jewish calendar, including the division of the hour into 1080 *puncti* and the differing starting point of its intercalation sequence, which meant that Easter and Passover were sometimes celebrated a month apart. As he noted, the Jews currently reckoned the 15th year of the 260th lunar cycle since Creation (4936 JE = 1175/76 CE), while their value for the mean lunation implied that a full lunisolar cycle was in fact 1h 485p shorter than 19 Julian years.[115] More remarkably even, he was able to accurately state that the *molad* Tishri in 1176 fell on Sunday, 5 September, at 774 *puncti* in the 24th hour of the day (1.23.774).[116]

A similar case to the Leipzig MS, where information on the Jewish calendar is transmitted in conjunction with Arabic science, is the so-called *Liber ysagogarum Alchorismi*, which was once held to contain the earliest exposition of Hindu-Arabic numerals and algorithmic calculation available in the Latin West.[117] While modern scholarship has abandoned this position, its passages dealing with the *molad*-based Jewish calendar, which have been preserved in three twelfth-century manuscripts, may well constitute this calendar's earliest known appearance in a Latin text, written before 1143.[118] In their preserved

114 MS Cambridge, UL, Kk.1.1, fol. 238^{r}. An excerpt from this table appears in the *Compotus* of the otherwise unknown Conrad of Strasbourg, uniquely preserved in MS Bruges, Bibliothèque Municipale, 528, fols. 1^{r}–6^{v} (s. XIII^{ex}), on fol. 6^{r}.

115 MS Cambridge, UL, Kk.1.1, fol. 229^{v}. See also ibid., fols. 226^{r}, 229^{r}.

116 Ibid., fol. 239^{r}. See further the discussion in Jennifer Moreton, "Before Grosseteste," 581–584. I have found no evidence for her claim that knowledge of the Jewish calendar had been available in the English West Country since the eleventh century (ibid., 566, 584).

117 On the general background, see André Allard, "The Arabic Origins and Development of Latin Algorisms in the Twelfth Century," *Arabic Sciences and Philosophy* 1 (1991): 233–283; Allard, *Muhammad Ibn Mūsā Al-Khwārizmī: Le calcul indien* (*Algorismus*) (Paris: Blanchard, 1992); Menso Folkerts, "Die frühesten lateinischen Texte über das Rechnen mit indisch-arabischen Ziffern," in *Brückenschläge*, ed. Hans-Werner Schütt and Burghard Weiss (Berlin: Verlag für Wissenschafts- und Regionalgeschichte, 1995), 157–174; Folkerts, "Early Texts on Hindu-Arabic Calculation," *Science in Context* 14 (2001): 13–38.

118 MSS Paris, BnF, lat. 16208, fol. 70va; MS Munich, BSB, Clm 13021, fol. 30^{vb}; Milan, Biblioteca Ambrosiana, A.3.sup, fol. 18^{r}. The *terminus ad quem* can probably be derived from MS Vienna, ÖNB, 275, which contains excerpts of the *Liber ysagogarum* on fol. 27^{r}, followed by a *computus* text (fols. 27^{v}–45^{v}) in which 1143 is stated as *annus praesens* (fol. 29^{r}). See Alfred Nagl, "Ueber eine Algorismus-Schrift des XII. Jahrhunderts und über die Verbreitung der indisch-arabischen Rechenkunst und Zahlzeichen im christl. Abendlande," *Zeitschrift für*

form, these passages are frustratingly concise, to the point of being incomprehensible, and mostly consist of instructions on how to convert dates from the Arabic into the Jewish calendar and vice versa. These instructions are followed by Latin transcriptions of the Jewish month names and a short introduction to the numerical values of the letters of the Hebrew alphabet.[119] In one of the preserved manuscripts, copied in the final quarter of the twelfth century, the latter passage was written by a different hand than the rest of the text. It would seem that the scribe initially responsible for copying the work was daunted by the confrontation with exotic Hebrew letters in this section and left its completion to a more experienced colleague.[120] A similar situation seems to have occurred in the case of another manuscript, which was written around the same time at the monastery of Prüfening near Regensburg. Here the scribe omitted the passage on the Hebrew Alphabet altogether, but left a blank space of several lines in its place, indicating that he intended the passage to be inserted by someone else at a later stage.[121]

Naturally, it would be interesting to know more about the author of the *Liber ysagogarum* and the exact date and place when it was compiled. One possible hint is the presence of a table of chronological eras, which directly follows the passage on the Jewish and Arabic calendars. The eight year-counts contained in this table are displayed according to the interval between their starting date and 1 October 1116 CE.[122] An identical table can already be found

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Mathematik und Physik, hist.-lit. Abt., 34 (1889): 129–146, 161–170; Otto Mazal and István Németh, *Wissenschaft im Mittelalter* (Vienna: Österreichische Nationalbibliothek, 1975), 190–191. This dating is disputed by Heinrich von Fichtenau, "Wolfger von Prüfening," *Mitteilungen des österreichischen Instituts für Geschichtsforschung* 51 (1937): 313–357 (320), who regards the *computus* as a student's copy of an earlier text. But see Nothaft, "The Reception," 52, where I show that an Arabic calendar table incorporated into the text and probably connected to the *Liber ysagogarum* must have been excerpted before 1146.

119 See the critical edition in Bruce George Dickey, "Adelard of Bath: An Examination Based on heretofore Unexamined Manuscripts" (PhD Diss., University of Toronto, 1982), 251A–328.

120 MS Paris, lat. 16208, fol. 70va. See Fritz S. Pedersen, *The Toledan Tables*, 4 vols. (Copenhagen: Reitzel, 2002), 1:165–166, for a description.

121 MS Munich, Clm 13021, fol. 30va. A description of this MS along with an edition of books I–III (fols. 27^{r}–29^{r}) is provided by Maximilian Curtze, "Ueber eine Algorismus-Schrift des XII. Jahrhunderts," *Abhandlungen zur Geschichte der Mathematik* 8 (1898): 1–27. See also Hans-Georg Schmitz, *Kloster Prüfening im 12. Jahrhundert* (Munich: Stadtarchiv, 1975), 117–121; Pedersen, *The Toledan Tables*, 1:135–136, who both correct Curtze on the date.

122 Dickey, "Adelard," 318. A reproduction of this table, as included in the Paris MS, can be found in Charles Burnett, "*Algorismi vel helcep decentior est diligentia*: The Arithmetic of Adelard of Bath and His Circle," in *Mathematische Probleme im Mittelalter*, ed. Menso

in a Latin redaction of al-Khwārizmī's astronomical tables (*zīj al-Sindhind*), which was probably produced by Petrus Alfonsi.[123] This coincidence has led some scholars to suppose that the mysterious *Magister A.*, to whom the *Liber ysagogarum* is ascribed in one manuscript, may have been none other than Petrus Alfonsi himself.[124] This identification has not been universally accepted, however, as others have suggested names such as Adelard of Bath, Abraham Ibn Daud, or Abraham Ibn Ezra.[125] While none of these hypotheses has proven conclusive, it is worth observing that several of Abraham Ibn Ezra's astronomical and astrological works exist in Latin versions, which were intended for a Christian readership and seem to have been produced with the author's own participation.[126] Moreover, Ibn Ezra followed the lead of Abraham bar Ḥiyya in

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Folkerts (Wiesbaden: Harrassowitz, 1996), 221–331 (315). Another copy of the table was excerpted into the twelfth-century MS Vienna, ÖNB, 2453, fol. 7^{v}, followed by dating clauses for 1158/59. See Nothaft, "The Reception," 41–42. I am grateful to Immo Warntjes for bringing this MS to my attention.

123 Preserved in MSS Oxford, Corpus Christi College, 283, fol. 114^{r} and London, Lambeth Palace, 67, fol. 64^{r}. See Otto Neugebauer, *The Astronomical Tables of Al-Khwārizmī* (Copenhagen: Munksgaard, 1962), 137, 143–145; Dorothee Metlitzki, *The Matter of Araby in Medieval England* (New Haven, CT: Yale University Press, 1977), 24–25; Dickey, "Adelard," 96–97; Mercier, "Astronomical Tables in the Twelfth Century," 95–96; Tolan, *Petrus Alfonsi*, 55–61; Josep Casulleras, "Las tablas astronómicas de Pedro Alfonso," in *Estudios sobre Pedro Alfonso de Huesca*, ed. María Jesús Lacarra (Huesca: Instituto de Estudios Altoaragonenses, 1996), 349–366; Charles Burnett, "The Works of Petrus Alfonsi: Questions of Authenticity," *Medium Aevum* 66 (1997): 42–79 (46, 52–54).

124 MS Paris, lat. 16208, fol. 67ra: "Incipit liber ysagogarum alchorismi in artem astronomicam a Magistro A compositus." See Haskins, *Studies*, 24; Richard Lemay, "The Hispanic Origin of our Present Numeral Forms," *Viator* 8 (1977): 435–462 (446n46); Dickey, "Adelard," 110–111.

125 See the remarks in Guy Beaujouan, "The Transformation of the Quadrivium," in *Renaissance and Renewal in the Twelfth Century*, ed. Robert L. Benson and Giles Constable (Cambridge, MA: Harvard University Press, 1982), 463–487 (468); Allard, *Muhammad*, viii–xxi; Allard, "The Arabic Origins," 242–249; Menso Folkerts, "Adelard's Version of Euclid's *Elements*," in *Adelard of Bath*, ed. Charles Burnett (London: The Warburg Institute, 1987), 55–68 (63); Burnett, "Catalogue: The Writings of Adelard of Bath and Closely Associated Works, together with the Manuscripts in Which They Occur," ibid., 163–196 (173–174); Burnett, "The Works," 51–52; Burnett, "*Algorismi vel helcep*," 236–237, 240–242, 254; Louise Cochrane, *Adelard of Bath: The First English Scientist* (London: British Museum Press, 1994), 81, 84n32; Sela, *Abraham Ibn Ezra*, 21n15.

126 Shlomo Sela, "Contactos científicos entre judíos y cristianos en el siglo XII: el caso del *Libro de las Tablas Astronómicas* de Abraham Ibn Ezra en su versión latina y hebrea," *Miscelánea de Estudios Árabes y Hebraicos*, Sección de Hebreo, 45 (1996): 185–222; Sela, "Algunos puntos de contacto entre el *Libro de las tablas astronómicas* en su versión latina

dedicating a whole treatise named *Sefer ha-Ibbur* (1146/47) to the subject of the Jewish calendar. Certain sections of this work commented upon the calendar of the 'Gentiles', declaring that Easter was in principle dependent on Passover, but also pointing out how the Christians often deviated from the Jewish date by a whole month. This was due to their adherence to the 'rule of the equinox', which was based on an inaccurate estimate of the solar year and an equinoctial date (21 March) that fell seven days too late.[127] Some more hints regarding the lively Jewish-Christian exchange on calendrical matters that was going on at the time comes from Ibn Ezra's 'Sabbath epistle' (*Iggeret haShabbath*, dated 14 Tevet 4919 = 13 December 1158), where he writes:

> There are those of our generation who calculate the Hebrew calendar. Because they know the calculation based on 1:12:793, they think that they have discovered the principle of the calendar. They then examine the interval between the *molad* and the beginning of the night, and they tell the uncircumcised [i.e. Christians] when the moon will be visible.[128]

Ibn Ezra goes on to criticize these fellow Jews for mistaking the time of the *molad* for that of the true conjunction on their local meridian, as opposed to the mean conjunction calculated relative to the meridian of Jerusalem. As a result, he writes, their observed time of first visibility will not match the predictions they make on the basis of the *molad*—an error they illegitimately impute to the calendar instead of their own ignorance.[129]

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y las obras literarias hebreas de Abraham Ibn Ezra," *Miscelánea de Estudios Árabes y Hebraicos*, Sección de Hebreo, 46 (1997): 37–56; Julio Samsó, "El procés de la transmissió científica al nord-est de la península Ibèrica al segle XII: els textos llatins," *La ciència en la història dels països Catalans*, ed. Joan Vernet and Ramon Parés, 3 vols. (Valencia: Institut d'Estudis Catalans, 2004–2009), 1:269–296 (286–293); Renate Smithuis, "Science in Normandy and England under the Angevins: The Creation of Abraham Ibn Ezra's Latin Works on Astronomy and Astrology," in *Hebrew to Latin, Latin to Hebrew*, ed. Giulio Busi (Turin: Aragno, 2006), 23–60; Smithuis, "Abraham Ibn Ezra's Astrological Works in Hebrew and Latin: New Discoveries and Exhaustive Listing," *Aleph* 6 (2006): 239–338.

127 Abraham Ibn Ezra, *Sefer Haʿibbur* (II), ed. Goodman, 81–85, 110–114, pp. סג–סד,מז–מה. See also José María Millás Vallicrosa, ed., *El libro de los fundamentos de las Tablas astronómicas de R. Abraham Ibn Ezra* (Madrid: Casa Provincial de Caridad, 1947), 99–100.

128 Translation slightly modified from Abraham Ibn Ezra, *The Sabbath Epistle*, ed. Goodman, 33. On this work, see also Anne C. Kineret Sittig, "The Sabbath Epistle by Abraham Ibn Ezra: Its Purpose and Novelty," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 209–219.

129 Abraham Ibn Ezra, *The Sabbath Epistle*, ed. Goodman, 33–34. Although rabbinic tradition

By 1171, the mentioned interactions between Jews and Christians had equipped one Christian author with enough knowledge to compose a reformist computistical treatise in which the conjunction-based Jewish calendar played a central role. This author was Reinher of Paderborn, an otherwise unknown canon and dean (*decanus*) at Paderborn cathedral as well as a school master (*magister*) at the local cathedral school. Reinher's *Compotus emendatus* (the 'improved *computus*'), his only known work, is still found in six manuscripts, the oldest ones of which quite rightly hail him as a *perspicacissimus calculator*, a "most astute" or "most perspicacious" reckoner.[130] One of his chief innovations was to employ Hindu-Arabic numerals (in their Western form) "for the sake of economy in writing and calculating."[131] While algorithmic textbooks and Latin translations of Arabic works using these numerals had already started to circulate in the first half of the twelfth century, Reinher is among the first known cases of a Latin author adapting them for a scientific work from his own pen.[132] More importantly (for the present discussion), the *Compotus emendatus* is also the first proper description of the medieval Jewish calendar by a Christian author. Reinher's stated purpose was to provide a remedy for the increasingly inaccurate Alexandrian 19-year lunisolar cycle, which brought the

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holds the *molad* times to be based on the meridian of Jerusalem (at the time of the equinox), the actual data point to a reference meridian in Babylonia. See n. 23 on p. 26 above.

130 Reinher of Paderborn, *Compotus emendatus*, ed. van Wijk, 10: "Incipit praefatio magistri Reinheri decani Patherbornensis, perspicacissimi calculatoris, in compotum emendatum." For details and further literature, see Nothaft, *Dating*, 128–146. See also the re-edition by Herold, *Reinher von Paderborn*, who edits all the documents pertaining to Reinher's life. In addition to the five MSS mentioned in Nothaft, *Dating*, 129nn35–36, Herold draws attention to a further copy of the text, found in Vatican City, BAV, lat. 3124, fols. 33^{ra}–43^{ra} [s. XIII/XIV]. I shall here give the treatise's title as *Compotus emendatus* rather than *Computus emendatus*, in line with the fact that *compotus* was the more common spelling in the High Middle Ages. A jocular allusion to this convention is found in Michael Scot, *Liber particularis*, MS Oxford, Bodleian Library, Can. Misc. 555, fol. 10^{vb}: "dicitur compotus a compoto, vel a compotando, non quia in compoto agatur disputationibus, sed quia compotationes necessarie sunt ad doctrinam eorum qui in compoto edocentur."

131 Reinher, *Compotus emendatus*, ed. van Wijk, *Le comput*, 10: "In designatione numerorum, figuris plerumque utimur aliis quam latinis, propter scribendi et computandi compendium."

132 An even earlier use of Hindu-Arabic numerals occurs in two southern German *computus* texts in MS Vienna, ÖNB, 275, fols. 27^{v}–34^{v}, compiled in ca. 1143 (see n. 118 above), and in MS Vienna, ÖNB, 2453, fol. $7^{r–v}$ (see n. 122 above), datable to 1155–1159. For more information, see Nothaft, "The Reception."

date of Easter out of tune with the astronomical phenomena and thus exposed the Christian Church to the ridicule of unbelievers. As he was quick to stress, however, his intention was not to introduce a completely new calendar, but instead to suggest a return to the wisdom of the ancient Hebrews, which had once been at the root of Christian Easter reckoning. The bulk of Reinher's *Compotus emendatus* was thus dedicated to a concise introduction to the Jewish calculation of the *molad*, which he regarded to be the original lunar reckoning introduced by Moses at Mt. Sinai.[133] In order to demonstrate the admirable accuracy of this reckoning, Reinher furnished his *Compotus* with an innovative set of conversion tables and instructions for their use.[134] They were supplemented by a tabular listing of 'Hebrew' lunations plotted against the months of the Julian calendar, stretching from 1171 to 1270.

The only element of the Jewish reckoning that Reinher showed serious dissatisfaction with was its epoch or starting point, the *molad baharad* in the first year of the Jewish world era, which fell on Monday, 7 October 3761 BCE, 5h 204p. In Reinher's opinion, this epoch could not be reconciled with the Genesis text, where it was implied that Creation had begun on a Sunday in spring, while the first lunar month should have started with the creation of the moon on the following Wednesday. He was thus apparently unaware of the fact that the *molad baharad* was not meant to denote the first day of Creation, but a fictitious point in time that fell one year (minus six days) earlier (see p. 74 below). This oversight gives us some idea of the limits of Reinher's understanding of the subject, which was strong on the technical aspects of the *molad*-system, but does not seem to have included any deeper familiarity with the rabbinic traditions and interpretations attached it. How this technical knowledge reached him, is an open question that may never be completely solved. If he relied on oral instruction, it is certainly more economical to suppose that he found his teachers among the Jews of his native Westphalia or the neighbouring Rhineland area, rather than in Muslim Spain, as Honselmann speculated in his 1962-article.[135] Also, since there are no hints that Reinher

133 See Reinher, *Compotus emendatus* (1.1, 12; 2.4), ed. van Wijk, *Le comput*, 16, 28, 50.

134 These tables and instructions also circulated separately in three thirteenth-century MSS: Paris, Bibliothèque de l'Arsenal, 877, fols. 3^{r-v}; Paris, BnF, lat. 7434, fols. 104^{r}–105^{r}; Florence, BML, San Marco 185, fols. 84^{v}–85^{r} (tables only). See pp. 612–615 below for details.

135 Klemens Honselmann, "Magister Reinher: Schrittmacher für die Kalenderreform und die moderne Rechenkunst," in *Von der Domschule zum Gymnasium Theodorianum in Paderborn*, ed. Klemens Honselmann (Paderborn: Verein für Geschichte und Altertumskunde Westfalens, 1962), 107–126. On the phenomenon of Christian scholars seeking instruction from Jews, see Thomas F. Glick, "'My Master, the Jew': Observations on Interfaith Schol-

was able to read Hebrew, it is unlikely that he could rely on written sources, unless there was some previous Latin text that has been lost in the mists of time.

In any case, Reinher of Paderborn's *Compotus emendatus* is clear testimony to the fact that Christian interest in the Jewish calendar was chiefly guided by two practical concerns. The first concern was the reform of the calendar, which some would-be reformers such as Reinher himself tried to achieve by turning to the Jewish *molad*-system. Thanks to its impressive degree of astronomical accuracy and precision and thanks to its 19-year intercalation cycle, which made it seem cognate to the Alexandrian Easter cycle, the Jewish calendar could appear to be an ideal template for an improved Easter reckoning. The second principal concern were the difficulties posed by biblical chronology, in particular the dating of Christ's crucifixion. It is the latter problem to which Reinher dedicated the final eight chapters and hence by far the largest part of his work. As noted above (pp. 49–50), computists and chronographers up to the twelfth century often reacted to the problem by abandoning the traditional birth-year according to the Christian era and shifting the life of Jesus by several years or even decades. Reinher was perhaps the first to point out clearly why this method was mistaken, namely because it unquestioningly equated the Jewish date of 14 Nisan with the Easter full moons tabulated by the ecclesiastical 19-year cycle. In contrast to this naïve approach, Reinher's acquaintance with the Jewish *molad*-calculation made him susceptible to the idea that the latter should be applied to answer the vexed question of the crucifixion date. Unfortunately, his calculation tables and methods were not so fine-grained as to lead to the correct result in every instance. In the case of the crucifixion date, a slight miscalculation led him to conclude that the month of Nisan in 34 CE had begun on 11 March, which was two days too late. As a result of this error, Reinher thought that the crucifixion, which he dated to Friday, 26 March 34 CE, had taken place on 16 Nisan, forcing him to develop an ingenious reinterpretation of the Gospel accounts of the Last Supper, which made it seemingly plausible that all four evangelists had intended it to have taken place on the evening of 15/16 Nisan rather than one (synoptic Gospels) or two nights earlier (John).[136]

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arly Interaction in the Middle Ages," in *Jews, Muslims and Christians in and around the Crown of Aragon: Essays in Honour of Professor Elena Lourie*, ed. Harvey J. Hames (Leiden: Brill, 2004), 157–182. See now also Simone Haeberli, *Der jüdische Gelehrte im Mittelalter: Christliche Imaginationen zwischen Idealisierung und Dämonisierung* (Ostfildern: Thorbecke, 2010), 67–124.

136 Reinher, *Compotus emendatus* (2.8–15), ed. van Wijk, *Le comput*, 57–70.

In 1175, only a few years after Reinher, an English computist known by the name of 'Constabularius' composed another innovative treatise on chronology and Easter reckoning, which is now uniquely preserved in a codex of the British Library's Cotton Collection (Vitellius A.XII).[137] Although the author mentions the Jewish calendar only sporadically, it appears that he was well-informed about certain details of its operation. Some of his remarks on the Jewish 19-year cycle were based on Abraham Ibn Ezra's *Liber de rationibus tabularum*, but in other cases he seems to have received his information orally from Jews in his own environment, as suggested by the following passage:

> For in every lunar cycle, be it the Roman one (as witnessed by Bede) or the Easter [cycle] (as witnessed by Dionysius) or that of the Jews, having asked those [sc. the Jews] whom the Egyptians [sc. the Alexandrian Church] imitated in the computation of their own cycle—according to all of these the 17th year is embolismic. Moreover, according to the Jews the embolismic month, which they call Veadar, precedes the Easter lunation in every embolismic year.[138]

Comparing the Jewish and Christian versions of this cycle, he correctly notes that the months in the Jewish calendar can start up to three days earlier than the equivalent lunation in the ecclesiastical calendar and that, due to differing patterns of intercalation, Passover is occasionally celebrated in the month before Easter.[139] Other examples for his acquaintance with the present-day

137 See Nothaft, *Dating*, 146–154; Jennifer Moreton, "The *Compotus* of 'Constabularius' (1175): A Preliminary Study," in *Langage, Sciences, Philosophie au XII^e siècle*, ed. Joël Biard (Paris: Vrin, 1999), 61–82; Moreton, "Before Grosseteste," 585.

138 MS London, BL, Cotton Vitellius A.XII, fol. 91va: "In omni enim ciclo lune, sive Romano teste Beda, sive pascali teste Dionisio, sive Iudeorum, ipsos interrogate quos Egiptii in sui cicli computatione imitati sunt, secundum omnes XVII annus embolismalis est. Preterea secundum Iudeos in omni embolismo lunatio embolismalis, quam ipsi vocant Vaabar [sic!], precedit lunationem paschalem."

139 Ibid., fol. 90^{rb}: "Omnis enim lunatio que nobis incipit post VI kl. Septembris et ante V kl. Octobris primus mensis est anni lunaris secundum modernos Iudeos. Ideo autem diximus 'que nobis incipit' etc., plerumque enim luna prima nobis dicitur quando ipsa est secunda vel tertia vel etiam quarta secundum Iudeos. Unde et quedam lunatio que nobis inchoat post VI kl. Septembris ipsis vel tunc vel citius incipit. Attamen Iudei pascha celebrant semper in eodem mense in quo et nos, nisi in duobus annis cicli, quando scilicet lunatio paschalis incipit secundum ecclesiam in nonis Aprilis et pridie nonas. Tunc enim Iudei pascha celebrant in mense priori. Ipsi enim ciclum suum incipiunt in IIII annno cicli Egiptiorum. Faciunt tamen sicut omnes tertium annum embolismalem et VI et VIII

Jewish calendar include his mention of the *annus praesens* as 4935 according to the Jewish era (= 1174/75 CE)[140] as well as a brief hint at the fact that the beginnings of the Jewish months can sometimes fall two days after the calculated new moon (as a result of postponements).[141] More impressive still are the author's repeated references to the *tekufot* according to Samuel, which, as we have seen (p. 32), were closely related to the original dates of the equinoxes and solstices in the Julian calendar. The Constabularius is in all likelihood the first Latin writer to mention these *tekufot*,[142] whose oscillation between two adjacent Julian dates he seized upon in an effort to explain why the Church Fathers had dated the crucifixion to 25 March, even though his own chronological considerations had shown that only 26 March 34 CE could have been the historically correct date.[143] While his result was hence identical to that of Reinher of Paderborn, the Constabularius differed from his Westphalian predecessor in that he correctly dated the beginning of Nisan in 34 CE—as valid if the fixed Jewish calendar had already existed in the first century—to 9 March. According to this result, 26 March was equivalent to 18 Nisan, which would have completely disqualified it as a feasible candidate for the historical crucifixion date. Unwilling to draw this conclusion, the Constabularius felt motivated to abandon the notion that the present-day Jewish calendar had already been in use in Antiquity.[144] Implicit in this rejection was the important insight that

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et XI et XIIII et XVII et XIX. Quapropter V annus eorum et XVI, qui nobis sunt VIII et XIX, secundum eos communes sunt, secundum nos embolismales. Lunatioque Aprilis, que ab eis Nizan dicitur, citius quam nobis illis incipit et nostra solempnitas ab eorum solempnitate prevenitur."

140 Ibid., fol. 94^{rb}.

141 Ibid., fol. 97ra: "Secundum legem namque tardare promittimur, pravenire prohibemur, quod et moderni Iudei semper observant. Preinvento namque ascensionis lune secundum naturalem compotum eorum numquam dicunt lunam primam citius, interdum autem secundum artificialem compotum dicunt primam duobus diebus tardius."

142 Ibid., fol. 95ra: "Secundum Samuelem Iudeum in omni anno bisextili equinoctium vernum est VIII kl. Aprilis in meridie, in tribus annis sequentibus vespere, media nocte, mane que sequitur dies VII kl. Aprilis. Reliquie III differentie subsequuntur singule equaliter distantes a precedentibus, scilicet IIII parte anni solaris, que est dies XCI hore VII semis. Hic Samuel cathedram magistralem ascendit quartus ab Ekiva, qui fuit presens Tito destruente templum."

143 Ibid., fol. 96^{rb}–97va.

144 Ibid., fol. 96va: "Quaero etiam unde hoc habeant quod Iudei tunc etatem lune quesiverint per compotum lune quem nos habemus, potius quam per eum quem ipsi habent. Utique interdum luna invenitur etiam IIII secundum eos quando ipsa est prima secundum nos. Attamen quod Iudei tunc non habuerint illum compotum quem nunc habent ex hoc

the Jewish calendar was subject to historical change and thus could not be simply projected back into the very distant past. With the important thirteenth-century exceptions of Giles of Lessines (p. 199 below) and John of Pulchro Rivo (pp. 604–607), this insight was only rarely followed by the Christian authors who wrote on the Jewish calendar during the following three centuries.

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elicio quod tunc pascha Iudeorum teste evangelio fuit VI feria, nunc autem secundum compotum eorum hoc numquam potest accidere." Ibid., 97$^{ra–b}$: "Attamen quid prohibet Iudeos tunc temporis habuisse compotum secundum quem luna diceretur prima IIII idus, ut dicit Dionisius, scilicet uno solo die tardius quam videretur?"

CHAPTER 2

The Anonymous *Liber erarum*

1 Structure and Contents

Aside from Reinher's *Compotus emendatus*, the earliest fully-fledged manual on the Jewish calendar to be extant in Latin is a short anonymous treatise that begins with the words *Prima erarum est a creatione mundi* … ("The first era is from the creation of the world"). It is perhaps simply on account of this incipit, which is followed by an introductory portion mentioning several eras associated with Jewish chronology, that the treatise received the title *Liber erarum* from the fourteenth-century copyist of MS C (for manuscript sigla see p. 87 below).[1] Together with the earliest manuscript, here designated as R, which originated in northern Italy in the early thirteenth century, and the fifteenth-century cognate copy V, this manuscript preserves what appears to be the most complete and authentic version of the text. All three mentioned copies (out of seven in total) parse the main text into four parts of unequal length. While the first and lengthiest part carries no specific heading, parts two and four are each preceded by the laconic term *Capitulum*. Only the heading of part three informs us about the subject of the chapter in question, which deals with the method of extracting conjunctions (*Capitulum in magisterio extrahendi coniunctiones*). All this naturally leaves wide open the question how the text may have been structured in its original version.

As just mentioned, the first part or 'chapter' begins with an introductory portion that specifies the most important eras used in rabbinic chronology. Pride of place among these is taken by the commonly used Jewish 'era of the world', starting in 3761/60 BCE, which is here said to be 'like a root' (*sicut radix*). This choice of words is in line with the fact that the Hebrew word for 'epoch' is *iqqar* (עקר), which can also mean 'stump' or 'root'. As we shall see below (p. 84),

1 MS C, fol. 100^{r}: "Incipit liber erarum et si alibi plane satis vis videre de dictis eris, habeas librum Campani qui incipit 'annus solaris etc.' et ibi pulcra et magna poteris notare." The reference matches the tenth chapter in Campanus of Novara's *Computus maior*, which starts "Est autem annus solaris" and closes with a discussion of the epochs of eras used by different nations. See the printed edition of the *Computus maior* in *Sphera mundi*, fol. 164^{v}. This chapter was copied separately into MS Florence, BNC, Conv. Soppr. J.X.40 [s. XV], fols. 28^{v}–46^{r}. See Axel Anton Björnbo, *Die mathematischen S. Marcohandschriften in Florenz*, 2nd ed. (Pisa: Domus Galilaeana, 1976), 69–71.

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the *Liber erarum* probably goes back to a Hebrew original, written by a Jewish author. The text's Jewish origin would explain why the author never bothers to spell out the chronological relation between the Jewish world era and the Christian era according to Dionysius Exiguus, which begins 3760 years and ca. three months later. This omission is everything but trivial, for without a precise understanding of the starting year of the Jewish calendar, it is impossible to calculate the current date of the *molad* based on the tables contained in the present treatise, let alone convert Jewish into Julian dates. Christian readers intent on giving the present text a practical application would not have been able to do so without additional information from outside sources. In the case of MSS D and P, this information was in fact provided in adjacent texts in the same codex,[2] but it remains remarkable that the *Liber erarum* was copied as often as it was, given this obvious limitation.

The other eras mentioned in the introduction are that of the Flood (starting in *Annus mundi* or AM 1656 = 2016/5 BCE), the era of the Exodus (AM 2448 = 1314/3 BCE), the era of the destruction of the First Temple (AM 3338 = 424/3 BCE), the 'era of Alexander the Great', which is actually the Seleucid era (AM 3449 = 313/2 BCE), and the era of the destruction of the Second Temple (AM 3828 = 67/68 CE). These dates, very common in Jewish tradition, are ultimately derived from the *Seder Olam*, the principal work of early rabbinic chronography, which in its present form goes back to the second century of the common era.[3] The only slight deviation is the date for the beginning of the 'era of Alexander the Great', which is here further specified as "the one they use to sign their charters" (*qua scribunt chartas suas*) in acknowledgment of the fact that the Seleucid era is also known as *minyan shetarot* (מנין שטרות) or 'era of contracts'.[4] Jewish sources normally start this 'era of contracts' in year 3450 from Creation (= 312/11 BCE), whereas the present text assigns it to AM 3449. This may indicate that the author of the *Liber erarum* was here influenced by a source that used a world era based on the *molad vayad* (see p. 75 below), which counted one year less since Creation.[5]

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2 In MS D, the text is embedded in Robert of Leicester's treatise on the Hebrew *compotus* (see Chapter Three below), while in MS P, it is immediately followed by material that originally belonged to Reinher of Paderborn's *Compotus emendatus* (see Appendix II, p. 612 below).

3 Chaim Milikowsky, *Seder Olam: Critical Edition with Introduction and Commentary* [in Hebrew], 3 vols. (Jerusalem: Israel Academy of Sciences, forthcoming).

4 See Abraham M. Fuss, "Shetar," *EJ*, 18:467–471; Edgar Frank, *Talmudic and Rabbinical Chronology: The Systems of Counting Years in Jewish Literature* (Jerusalem: Feldheim, 1956), 30–36; Mosshammer, *The Easter Computus*, 25–26.

5 As Sacha Stern informs me, this may have been a source from the East, e.g. Babylonia, where

The same introduction pays particular attention to the weekday of the Exodus from Egypt, whose number can be inferred from a strict chronological reading of the story of the descent of manna. According to Exodus 16:1, the Israelites arrived at the wilderness of Sin on the 15th day of the second month since their departure from Egypt. It is subsequently stated that they collected the manna for six consecutive days, before it ceased to come down on the seventh day, which was a Sabbath (16:23–30). Assuming that the manna first appeared during the night after the arrival in Sin, readers of this story could infer that the 15th day of the second month was a Sabbath. This was exactly 30 days after the 15th day of the first month, which is the day on which the Israelites left Egypt. Since 30 days comprise 4 full weeks and two days, this 15th day of the first month turns out to have been a Thursday. This chronological argument is relatively ancient, as can be seen from the fact that it already appears in the pseudo-Augustinian *Questions on the Old and New Testament*, written in the fourth century by the enigmatic Ambrosiaster, who has been hypothesized to have been a converted Jew.[6] It is also widely encountered in rabbinic sources, including the *Mekhilta de-Rabbi Ishmael*, which may even precede Ambrosiaster's text.[7] The anonymous Jewish author behind the *Liber erarum* probably meant the sum of these rabbinic authorities when he generically stated that "they went back by counting backwards" (*Redierunt ergo computando retro*).

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the Seleucid era was still in use at the time. Alternatively, he may have relied on the Western medieval rabbinic commentary tradition on the chronological passage in B. *Avodah Zarah* 9a–10a, which also presupposes the *molad vayad*. A similar problem is encountered in a sixteenth-century calendrical text by Uri ben Simeon, on which see Nothaft, "A Sixteenth-Century Debate," 55.

6 pseudo-Augustine (Ambrosiaster), *Quaestiones veteris et novi testamenti*, q. 95.4–5 (CSEL 50, 169–170). On the contentious issue of identification, see Germain Morin, "L'Ambrosiaster et le juif converti Isaac, contemporain du pape Damase," *Révue d'histoire et de littérature religieuses* 4 (1899): 97–121; Alexander Souter, *A Study of Ambrosiaster* (Cambridge: University Press, 1905); Michaela Zelzer, "Zur Sprache des Ambrosiaster," *Wiener Studien*, n.s., 4 (1970): 196–213; Lydia Speller, "Ambrosiaster and the Jews," *Studia Patristica* 17 (1982): 72–78; Sophie Lunn-Rockliffe, *Ambrosiaster's Political Theology* (Oxford: Oxford University Press, 2007), 35–44.

7 B. *Shabbath* 86a; *Mechilta d'Rabbi Ismael*, Tractate Vayassa (Ex. 15:27–16:3), ed. Saul Horovitz and Israel Abraham Rabin, 2nd ed. (Jerusalem: Bamberger & Wahrmann, 1960), 159. See also the edition with English translation by Jacob Z. Lauterbach, 3 vols. (Philadelphia: The Jewish Publication Society of America, 1933–1935), 2:99. In contrast to this, the *Seder Olam* puts the Exodus on a Friday. See Frank, *Talmudic and Rabbinical Chronology*, 50–55.

Following the chronological prologue, the *Liber erarum* offers a succinct outline of the time units used by the Jewish calendar (one hour being composed of 1080 *minuta*) and introduces its most basic parameter 29d 12h 793p for the mean month or interval between two conjunctions. This value is traced back to "a certain man, who said he received it from some ancient [sage], who belonged to the house of David" (*quodam qui dicebat se hoc recepisse a quodam antiquo, qui fuit de domo David*).[8] The original passage on which this remark is based can be found in the Babylonian Talmud (B. *Rosh Hashanah* 25a), where R. Gamaliel II, to whom medieval rabbinic tradition ascribed a Davidic ancestry, is quoted as saying: "I have received as a tradition from my father's father's [i.e. grandfather's] house, that the renewal of the moon does not occur after less than 29 days and a half, two-thirds of an hour, and 73 parts."[9] Why the *Liber erarum* chose to suppress Gamaliel's name in this fashion remains unclear. It is worth noting, however, that an explicit Latin reference to Gamaliel and his month length appears in the explanatory canons to the so-called *Kalendarium Lincolniensis*, an improved version of the ecclesiastical lunar calendar first constructed in the eleventh century and later wrongly attributed to Robert Grosseteste. Nothing is known about the authorship of the canons, although a reference to the year 1292 found in several manuscripts points to them being composed in England during the final decades of the thirteenth century. Since their author explicitly speaks of "two parts of an hour and 73 minutes of an hour" rather than 793 minutes, there can be little doubt that his knowledge of Gamaliel's name was ultimately derived from the just-cited passage in the Talmud.[10] Remarkably, this writer's knowledge even extended to the Hebrew

8 This passage is also present as a marginal gloss in the fourteenth-century MS Vatican City, BAV, Ottob. lat. 2252, fol. 8^{r}: "Et sciendum quod unum minutum est una pars de 1080 et hora est 1080 minutorum. Et dies est 24 horarum et mensis lunaris est 29 dierum et 12 horarum et 793 minutorum secundum quod receptum est a quodam antiquo qui fuit de domo David." Cited according to Boncompagni, "Intorno ad un tratatto," 788. Notice of this MS, through Boncompagni's work, reached me too late to consult the manuscript myself.

9 See Stern, *Calendar and Community*, 201–202, from where the above quote is taken. See also p. 26 above and Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 38–39, p. בו. On the claim of Davidic ancestry for Gamaliel II and other patriarchs, see David Goodblatt, *The Monarchic Principle: Studies in Jewish Self-Government in Antiquity* (Tübingen: Mohr Siebeck, 1994), 142–175; Martin Jacobs, *Die Institution des jüdischen Patriarchen* (Tübingen: Mohr Siebeck, 1995), 212–224. See further Sacha Stern, "Rabbi and the Origins of the Patriarchate," *Journal of Jewish Studies* 54 (2003): 193–215.

10 MS London, BL, Harley 3735, fol. 5^{v}: "Et hec convenit cum positione Ebreorum secundum doctrinam Gamalielis et aliorum antiquorum Hebreorum, secundum quos mensis lunaris,

designation of the aforementioned value, which he quite correctly says sounds something like *quatiab tassessag*. This is recognizable as the vocalized Latin transcription of כט.יב.תשצג, the Hebrew numeric equivalent to 29.12.793.[11]

To return to the *Liber erarum*: after having introduced the names and sequence of the Hebrew months as well as the three different year types produced by the variable lengths of Marḥeshvan and Kislev, the author spells out the *molad*-based values for both the common and the embolismic year, which are 354d 8h 476p (or 4.8.476 modulo 7, i.e. after the elimination of full weeks) and 383d 21h 589p (5.21.589). Next, the 19-year cycle is explained and its duration given as 6939d 16h 595p (2.16.595). This very brief discussion of the parameters of the lunar year is supplemented by some remarks on the length of the solar year, as implied by the Jewish calendar. The latter is taken to be the average year in the 19-year cycle, which is 365d 5h 997p and 12/19 of one 'part' or *ḥelek*.[12] This year length is first attested in Abraham bar Ḥiyya's *Sefer ha-Ibbur* (and also in Ibn Ezra's work of the same name), where it is spuriously attributed to the

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hoc est tempus medie lunationis, est 29 dies, 12 hore et due partes unius hore et 73 minuta hore." Viewable online at http://www.bl.uk/manuscripts/FullDisplay.aspx?ref=Harley_MS_3735. See further Arvid Lindhagen, "Die Neumondtafel des Robertus Lincolniensis," *Arkiv för Matematik, Astronomi och Fysik* 11, no. 2 (1916): 1–41 (15–19), where the canons are transcribed from three different MSS, two of which (Stockholm, KB, A.XII and Vienna, ÖNB, 2367) contain the passage in question. Lindhagen's transcriptions (ibid., 16, 18) have *72 minuta* instead of the correct *73 minuta*. As he demonstrates (ibid., 11), the use of the year 1292 (as being evenly divisible by 76) locates these canons in the 76-year cycle from 1284–1359, while the manuscripts mentioned all still date from the late thirteenth century. Another copy of this passage (with *72* instead of *73 minuta*) can be found in MS Florence, BML, Plut. 30.24 [s. XIV$^{2/2}$], fol. 14^{rb}, where the actual *Kalendarium Lincolniensis* is replaced by a set of wheel diagrams for the movable feast days. The true origins of the *Kalendarium Lincolniensis* can be found in ch. II.17 of the *Computus Gerlandi*, as will be demonstrated in Lohr, *Der Computus Gerlandi*. Cf. Moreton, "Before Grosseteste," 580–581, who is unduly sceptical about Gerland's authorship of the tables, but accepts Grosseteste as the possible author of the canons. For Latin references to Gamaliel, see also p. 54 above and pp. 340, 605–607 below.

11 MS London, BL, Harley 3735, fol. 5^{v}: "Hora autem secundum eos continet 1080 minuta hore et hec quantitas mensis lunaris, scilicet 29 dies, 12 hore et due partes hore et 73 minuta, Hebreice [sic!] vocatur *quariab tassessag*, quod est dictu 29 dies, 12 hore et 793 minuta hore." Obviously, *quariab* must be emended to *quatiab*. Lindhagen, "Die Neumondtafel," 16, 18, reads *quantiab tessassas*.

12 In this same form, the value is also occurs in Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 78, p. מד. Normally, fractions of the *ḥelek* are expressed as *regaim* (lit. 'moments'), where one *rega* = 1/76 *ḥelek* and 12/19 of a *ḥelek* would be equivalent to 48 *regaim*.

Amoraic sage Rav Ada bar Ahavah.[13] The ascription to Ada was evidently also known to the author of the *Liber erarum*, the present Latin version of which renders his name as *Rabada filius Hahaha*. His estimate of the solar year is contrasted with the value traditionally ascribed to Samuel, which is identical to the 365.25d of the Julian calendar, leading to an average solar month of 30 days and 10 ½ hours and a difference of 10d 12h 204p between the solar year and the average lunar year. On the basis of the latter numerical value, the author next elucidates the structure of the 19-year intercalation cycle, which makes up by far the lengthiest section of this short treatise. After three years, the difference between solar and lunar years has accrued to 32d 15h 612p, calling for the insertion of an additional embolismic month in year 3. The latter has a length of 29d 12h 793p, leaving a remainder of 1d 15h 152p. All remaining steps, up until the seventh embolism in year 19, are explained in accordance with this principle.

Chapter Two deals with the starting date of the Jewish calendar, which is rooted in the chronology of Creation. The implied year of Adam's creation in the *Seder Olam* is 3760 BCE, which also served as the basis for fixing the beginning of the conjunction-based Jewish calendar. According to the system still in use, the *molad Tishri* of that year had the value 6.14.0 and fell on Friday, 26 September 3760 BCE in the proleptic Julian calendar. In rabbinic tradition, this was often interpreted as the time of Adam's creation on the sixth day of the divine hexaëmeron.[14] If this day is regarded as the beginning of a new year (1 Tishri), the previous Sunday, on which the creation of the world began, can be inferred to have fallen on the 25th day of Elul, which is also noted by the *Liber erarum*.[15] Yet this in turn entails that the first six days of the world were the final six days of a proleptic year, whose starting point would have been the autumn of 3761 BCE. To simply ignore these six days in one's count of the years of the world would have meant to violate a rule already set out in the *Seder Olam* and in the Talmud, according to which "part of the month is like the entire month and part of the year is like the entire year."[16] The author of

13 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), ed. Filipowski, 87–91; Abraham Ibn Ezra, *Sefer Haʿibbur* (II), ed. Goodman, 78–81, pp. מג–מה.

14 Frank, *Talmudic and Rabbinical Chronology*, 16–17.

15 This argument evidently ignores the rule *lo ADU Rosh*, which would have shifted 1 Tishri to the Sabbath following Adam's creation, meaning that creation already began on 24 Elul. See p. 76 below.

16 *Seder Olam* (4), trans. Heinrich W. Guggenheimer, *Seder Olam: The Rabbinic View of Biblical Chronology* (Northvale, NJ: Aronson, 1998), 53. See further B. *Rosh Hashanah* 2b, 10a–11a; Y. *Rosh Hashanah* 1:1 (56b); Y. *Avodah Zarah* 1:2 (39c).

the *Liber erarum* already mentioned this important precept at the beginning of the treatise and returns to it in this second chapter. It is essentially rooted in an ancient practice of counting the regnal era of a king from the beginning of the calendar year in which his accession to the throne took place, even if he effectively only ruled for the last few days of this year (or, in an extreme case, for a single day before the start of the next calendar year). Applied to the beginning of the Jewish calendar, it meant that the first year had to be counted not from 26 September 3760 BCE, but from the previous *molad Tishri* on 7 October 3761 BCE, which has the value 2.5.204 (the famous *molad baharad*). For this reason, the normative beginning of the Jewish calendar is recognized as a fictitious date, belonging to an imaginary stretch of the time before Creation, when the earth was still 'empty and waste' (*tohuvabohu* according to Genesis 1:2, which is why *molad baharad* is also known as *molad tohu*).[17] In treating the 6.14.0-value (also known as the *molad vayad*) as the authentic epoch of the *molad* calculation, from which the *molad baharad* was later derived, the author of the *Liber erarum* is much closer to Abraham Ibn Ezra, who took the same stance in his *Sefer ha-Ibbur*, than to Abraham bar Ḥiyya, who placed the first *molad* ever in the spring of 1 JE (on Wednesday, the fourth day of Creation, at 9h 642p).[18]

Given a particular *molad Tishri*, it is possible to extrapolate any and all subsequent *moladot*—a method to which the Latin text of the *Liber erarum* refers as the 'art of extracting' (*magisterium extrahendi*). In case of a common lunar year, the standard way of getting from one *molad Tishri* to the next is to add 4d 8h 876p. Similarly, one can calculate back to the previous *molad*, either by subtracting the same numbers, or by adding the complementary value 2.15.204 (= 6.23.1080 – 4.8.876), as is done by our author. His preference for addition over subtraction was obviously motivated by a desire to avoid results containing negative numbers, which posed conceptual problems to medieval mathematicians. As he goes on to explain, the 'art of extracting' can also be applied to the times of the *tekufot*, which are here referred to as *circuli*. This leads to a rather confusing equivocation between the 'cycle' of 19 years (*circulus decemnovenalis*) and the appropriate word for the equinoxes and solstices in the Jewish calendar, which must have left medieval readers puzzled. It can be explained by the fact that both *maḥzor* (which is applied to the 19-year cycle) and *tekufah* carry the literal meaning of 'circle' or 'circuit', showing us how close

17 See Sylvie Anne Goldberg, *La Clepsydre* (Paris: Michel, 2000), 246–247; Stern, *Calendar and Community*, 192, 272–273; Frank, *Talmud and Rabbinical Chronology*, 15–16.

18 Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 47–48, p. כח; Abraham bar Ḥiyya, *Sefer ha-Ibbur* (2.6), ed. Filipowski, 46.

to the original Hebrew terminology the Latin translator of the *Liber erarum* tended to stick (see p. 85 below).

According to the system ascribed to Samuel, the *tekufah* of Tishri that belongs to the *molad baharad* can be found to have occurred on Tuesday, 17 Elul, at 9 hours after sunset. The interval between two *tekufot* is 2×91d 7 ½ h = 182d 15h. In calculating the date of the following *tekufat Nisan*, which is the reference point for all other *tekufot*, it is necessary to take into account the fact that the first year of the Jewish world era was a 'perfect' year of 355 days, in which Marḥeshvan was 30 days in length. This prolongation of the year is due to the value of the *molad* Tishri of the second year, which fell on a Friday (6.14.0), meaning that the beginning of the corresponding year must be shifted to the following Sabbath. Counting an additional day for Marḥeshvan leads to an interval of 178d between 17 Elul and 17 Adar (29 + 30 + 30 + 30 + 29 + 30 = 178). Subtracting these 178d from 182d 15h leaves us with 4d 15h. Since the first *tekufat Tishri* occurred at 9h, adding 182d 15h thus leads us to the beginning of Wednesday, 22 Adar, as the author correctly states. Curiously, the text goes on to commit a slight error in calculating the date of the subsequent *tekufat Tishri*, which pertains to the world's creation. As before, it should be found 182d 15h later, in the month of Elul. Since 182d comprise a full number of weeks, the *tekufat Tishri* in question must again fall on a Wednesday. The interval between Adar and Elul in a common year is always 177d, meaning that another 5d 15h have to be added to 22 Elul to arrive at the *tekufat Tishri* of year two, which thus should have been Wednesday, 27 Elul rather than Wednesday, 28 Elul, as stated by the text. This mistake is most easily explained by the fact that in a previous passage, the text dates the Sunday on which Creation began to 25 Elul. Naturally, this would imply that the following Wednesday, on which the celestial luminaries were created, was the 28th of Elul. In both cases, the text commits the obvious error of ignoring the postponement of the *molad* Tishri according to rule *lo ADU Rosh*. This oversight is all the more startling given that the previous calculation of the interval between the *tekufot* of Tishri and Nisan takes this postponement into account. Perhaps the error is not due to the original author of the text, but to a later Latin translator or scribe, who got confused by the fact that the *molad* Tishri in year two was supposed to coincide with the Friday of Adam's creation, mistaking the latter for 1 Tishri.

Chapter Three extends the *magisterium extrahendi* to individual months and whole cycles, albeit without offering any substantially new information. We are then informed that the text originally contained an additional chapter of reckoning examples for "many conjunctions of many revolutions [of the cycle]" (*multas coniunctiones multarum revolutionum*), which the narrator of the present text decided to omit, "because we did not require them" (*quia nos*

non indigebamus). It is impossible to tell whether this additional section of examples was contained only in the original, presumably Hebrew, version and then omitted by the Latin translator (who in this case would be the narrator in question) or whether the chapter was still present in some earlier Latin version, now lost, and then edited out by a later redactor. Chapter Four (what would have been Five in the original version) starts with a brief passage on the cyclical features of the Jewish *molad*-system, which shall be analyzed below (p. 97), when we turn to the additions to this passage found in MS D. After a brief description of the tables that are meant to accompany this text, we get an extremely succinct account of the *deḥiyyot*. Interestingly, the postponement rules are here associated with 'four gates' (*4 portae*), which is obviously derived from the Hebrew *arba'a she'earim* (ארבעה שערים), but not further explained. In medieval Hebrew calendar texts, the calendar is frequently summarized in a 'four parts' or 'four gates table' (לוח ארבעה שערים), where the 'four gates' refer to the four possible weekdays on which Rosh Hashanah and Passover can respectively fall—and which thus function as 'gateways' to the year.[19]

Previous to this passage, the author states that he constructed tables to find the value of the *moladot* not only for months and years, but also for cycles and groups of cycles, which are represented by four tables counting from 1 to 10, 10 to 100, 100 to 1000, and 1000 to 10,000. Considering that by the present year 2013 CE = 5773/74 JE only 303 complete cycles have gone by since the beginning of the Jewish world era, the plan of providing tables counting thousands of such cycles seems astonishingly ambitious. In any case, it suggests that the author expected his calendar to remain valid for a very long time. The preserved manuscripts of the treatise unanimously declare that the tables were originally supposed to follow immediately upon their introduction in the text. Instead of abiding by this principle, however, MSS CPRV and the printed version H place the tables at the very end of the main text, whereas DM omit them altogether. In MS D (fol. 8^{r}), the scribe further notes that the tables in question can be found "above, at the end of part one" (*Tabule hic interserende scribuntur supra in fine prime partis*).[20] This is a reference to Robert of Leicester's *De compoto Hebreorum*, which precedes our text in this manuscript (see p. 141 below for details). At the end of part one of this treatise, we indeed find a set of tables ('table 3' in the edition) that happens to match exactly the description in the *Liber erarum*. What is confusing is that the tables in Robert of Leicester's treatise are in fact

19 See Stern, *Calendar and Community*, 268–270.

20 MS D, fol. 8^{r}: "Et hoc sunt tabule. Tabule hic interserende scribuntur supra in fine primo partis."

closer to what is promised in the text itself than the tables that actually appear as an appendix to the *Liber erarum*. Here, the hyperbolic table for cycles from 1000 to 10,000 is missing, while—with the exception of MS P—the other five tables occur in a different order than noted in the text, starting with the table for cycles from 100 to 1000 and ending with the one for individual years of the 19-year cycle.

As a coda to the transmitted block of text, MSS CHRV contain a short note that records the exact time of the entry of the sun into Aries in 1191 CE for the coordinates of Cremona, Italy, whose longitude is here reckoned from the meridian of Arin (Ujjain in India), which was the standard reference point used by Arabic geographers and astronomers.[21] The precise time of the entry is said to have been 15h 31m 40s, counted from noon, while the date is given as Saturday, 23 March 1191 BCE, both for the Julian and Arabic calendars.[22] As the text expressly notes, the same date also serves as the basis for the ensuing table of eras, which lends further justification for calling the present treatise a *Liber erarum*. It descends from a family of chronological tables that circulated as part of Arabic collections of astronomical tables, known as *zīj* (pl. *zījat*), since at least the ninth century.[23] These tables contain dates that are ultimately derived from Claudius Ptolemy's *Almagest* and *Handy Tables*.[24] The list appended to

21 See Gerald R. Tibbetts, "The Beginnings of a Cartographic Tradition," in *The History of Cartography*, vol. 2.1, *Cartography in the Traditional Islamic and South Asian Societies*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 90–107 (103). In texts related to the Toledan Tables, the distance of Toledo from Arin is generally given as 61;30°. See Pedersen, *The Toledan Tables*, 2:431, 514, 4:1516 Since Cremona lies ca. 14° to the east of Toledo, the distance from Arin should be ca. 57;30° rather than 59°, as given in the present note. For the latitude of Cremona (45°), see ibid., 3:1004, 1109.

22 The text has the 25th day of the month of Safar and *annis Arabum 586*. These 586 years must obviously be understood as completed years since the Hijra, hence 25 Safar 587 AH (= *Anno Hegirae*). A calculation based on Ptolemaic parameters, carried out with the program Kairos 4.0 (developed by Raymond Mercier), indicates the mean sun's entry into Aries for 22 March around midnight.

23 See Otto Neugebauer, "'Years' in Royal Canons," in *A Locust's Leg: Studies in Honour of S.H. Taqizadeh* (London: Lund, Humphries & Co, 1962), 209–212; José Chabás and Bernard R. Goldstein, *A Survey of European Astronomical Tables in the Late Middle Ages* (Leiden: Brill, 2012), 13–16. For further examples, see, e.g., al-Bīrūnī, *The Chronology*, trans. Sachau, 27–36; Heinrich Suter, ed., *Die astronomischen Tafeln des Muḥammed ibn Mūsā al-Khwārizmī* (Copenhagen: Høst & Søn, 1914), 109; Neugebauer, *The Astronomical Tables*, 82–84, 137, 143–145; Pedersen, *The Toledan Tables*, 3:896–901.

24 On year-counts in Ptolemaic astronomy, see Claudius Ptolemy, *Almagest*, trans. G.J. Toomer (New York: Springer, 1984), 9–14; Olaf Pedersen, *A Survey of the Almagest* (Odense:

the *Liber erarum* differs from other chronological tables in the *zīj*-tradition in the way it indicates the epochs of all eras not by listing their differences relative to each other, but through their common distance from a date close to the present, in this case 23 March 1191 CE. The only other known table to follow this principle is one with the base date 1 October 1116 CE, which—as has been mentioned in the previous chapter (p. 60 above)—appears both in the *Liber ysagogarum Alchorismi* and a Latin version of the *zīj* of al-Khwārizmī attributed to Petrus Alfonsi. Aside from the different date, this table also diverges from the present one by omitting the eras of Philippus Arrhidaeus, Augustus, and Hadrian, and by listing the eras in strict chronological order, which the one appended to the *Liber erarum* does not.[25] The striking affinity between the tables in the *Liber erarum* and that in the *Liber ysagogarum* is further highlighted by the fact that the latter text also contains some information on the Jewish calendar.[26] Whether this points to a more substantial connection between both works, however, must remain a matter of speculation. The full list of eras presented by the *Liber erarum* runs as follows:

1) Era of the 'Era' (*Era ere*): Sunday, 1228y (Julian) 82d = 448,609d. Reckoned from 23 March 1191, this correspond to Sunday, 1 January 38 BCE, the starting point of the so-called 'Spanish Era'.
2) Era of the Horned One (*Anni cornuti*). Monday, 1501y (Julian) 173d 3q = 548,414d. This corresponds to Monday, 1 October 312 BCE, the epoch of the Seleucid era. The association of this era with the 'Horned One' (*cornutus*), i.e. with Alexander the Great, is a common historical mistake found in Arabic tables.
3) Persian Era (*Anni Persarum*). Tuesday, 559y (Egyptian) 55d = 204,090d. This corresponds to Tuesday, 16 June 632 CE, the start of the regnal era of Yazdegerd III, the last ruler of the Sasanian Empire.
4) Era of Diocletian or Egyptian Era (*Anni Diocletiani vel Egyptiorum*). Friday, 906y (Egyptian) 206d 2q = 331,123d. This corresponds to Friday, 29 August

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Odense University Press, 1974), 124–128; Leo Depuydt, "'More Valuable than All Gold': Ptolemy's Royal Canon and Babylonian Chronology," *Journal of Cuneiform Studies* 47 (1995): 97–117; Otto Neugebauer, *A History of Ancient Mathematical Astronomy*, 3 vols. (Berlin: Springer, 1975), 3:1071–1073; James Evans, *The History and Practice of Ancient Astronomy* (New York: Oxford University Press, 1998), 176–182.

25 The non-chronological order in the present table was also noted in a gloss from a later hand in MS C, fol. 103^{v}: "Ista tabula non ponit eras secundum ordinem suorum temporum."

26 See p. 59 above.

284 CE, the epoch of the era of Diocletian, used in the Coptic Church (hence 'Egyptian Era').

5) Era of the Flood (*Anni*). 4295y (Egyptian), 12d = 1,567,687 days. This corresponds to Thursday, 17 February 3012 BCE, the flood era commonly used in Arabic astronomical tables. The latter is not based on biblical chronology, but derived from the date of the *kaliyuga* in Indian astrology.[27] This conflict with the biblical flood date perhaps explains why *Anni diluvii* was shortened to *Anni* and why most of the data (except for the sum of days) were omitted in the corresponding line in MSS CR and the exemplar of H (see below, p. 100).

6) Era of Nabonassar (*Anni Nabucodonosor*). Wednesday, 1938y (Egyptian), 145d = 707,515d. This corresponds to Wednesday, 26 February 747 BCE, the era of Nabonassar in the *Almagest*. In the *Almagest's* Latin translation, this name was corrupted to *Nabugodonosor*, the rendering of Nebuchadnezzar in the Vulgate.[28]

7) Era of Philippus (*Anni Philippi*). Sunday, 1514y (Egyptian) 145d = 552,755d. This corresponds to Sunday, 12 November 324 BCE, the epoch of the regnal era of Philippus Arrhidaeus, Alexander the Great's half-brother. In the *Almagest*, it is instead referred to as the 'era of Alexander's death', as a line heading in the present table expressly notes (*Ptolomeus nominat hanc eram esse in almagesti in 8 capitulo tertii libri a morte Alexandri*).

8) Era of Augustus (*Anni Augusti*). Sunday, 1220y (Egyptian) 145d = 445,445d. This corresponds to Sunday, 31 August 30 BCE, which is the epoch of Ptolemy's version of the regnal era of Augustus, reckoned from the beginning of his reign in Egypt.

9) Era of Hadrian (*Anni Hadriani*). Friday, 1075y (Egyptian) 145d = 392,520d. This corresponds to Friday, 25 July 116 CE, Ptolemy's starting point for Hadrian's regnal era.

10) Christian era (*Anni Christi*). Saturday. 1,190y (Julian) 81d 2q = 434,729d. This corresponds to Saturday, 1 January 1 CE.

11) Era of the Arabs (*Dies arabum*). Thursday, 207,714d. This corresponds to Thursday, 15 July 622 CE, the epoch of the Hijra, as used in astronomical tables.

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27 See David Pingree, *The Thousands of Abū Maʿshar* (London: The Warburg Institute, 1968), 27–45.

28 See Grafton, *Joseph Scaliger*, 124–126.

A further addendum to the calendrical tables, which only appears in MSS R and V as well as in the 1549-printed edition (H), is a calendrical *rota* or wheel diagram that compares the Jewish and Christian versions of the 19-year cycle.[29] The Christian years (on the inner circle) and the Jewish years (on the outer circle, designated *anni mundi*) are correlated in such a manner that year 1 (Christian) compares to year 17 (Jewish). An accompanying gloss exhorts us to take notice that the "era of Christ begins in the 17th year of the 19-year cycle" (*Nota quod in anno 17 cycli decemnovenalis incepit era Christi*).[30] This is slightly misleading, since the *Anno Domini* era takes its starting point only with the second year of the Dionysiac 19-year cycle (1 CE), whilst the corresponding 17th year of the Jewish cycle would have started in 2 BCE and ended in 1 BCE. Thanks to an inscription at the centre, the archetype of this wheel diagram can be safely dated to the twelfth century: *Anni mundi perfecti 4948. Anni Christi perfecti 1188*. Since year 4948 of the Jewish world era started in 1187 CE and ended in 1188 CE, this dating clause would technically—if both years are taken to be completely finished (*perfecti*)—lead to some date after 1 January 1189 CE and before 1 Tishri 4950 JE (= 1189/90 CE). This is hence just two years earlier than the astronomical note for Cremona, which follows upon the wheel diagram in all transmitted cases.

2 Origin and Date

Despite being only tenuously related to the subject of the main text, the appended materials found in several MSS of the *Liber erarum* seem to provide valuable information regarding its date and geographic place of origin. As seen, the table of eras and the preceding astronomical note for 1191 constitute a relatively consistent part of the transmission, which accompanies the main treatise in the three best witnesses to the text (CRV) as well as in a printed edition of 1549 (H), whose exemplar has been lost. Except for MS C, these witnesses also include the aforementioned wheel diagram, whose inscribed dates suggest that it was drawn up in 1189. The only two MSS to omit all of these additions (D and M) also leave out the attached tables for the Jewish calendar and can therefore hardly qualify as witnesses against the authenticity of the arrangement found

29 A tabular version of this diagram is also found in MS P, fol. 2^{v}. See p. 95 below.

30 The gloss in MSS R (fol. 102^{r}) and V (fol. 145^{vb}) adds that all years of the Christian era are counted from December (i.e. the nativity on 25 December): "Ita quod omnes incipiant a Decembri."

in CHRV. Aside from the copies mentioned, the note and the table also appear independently in a fifteenth-century manuscript now in Berlin (Staatsbibliothek Preußischer Kulturbesitz, lat. fol. 753, fol. 236^{v}), where it follows upon a copy of Ptolemy's *Almagest*.[31] Given its late date, however, this MS on its own cannot support the conclusion that note and table already circulated independently before the *Liber erarum*. Assuming that the text as found in CHRV can be taken to represent an integral unit, the appendix would make it possible to assign to the *Liber erarum* not only a precise date (1191), but also a location, since the entry of the sun into Aries is explicitly recorded for the coordinates of Cremona. This receives additional support from the fact that the earliest two MSS (R and P, both s. XIII), and perhaps also MS C (s. XIV), all originated in Italy.[32] We can therefore conclude that the *Liber erarum* was either composed or went through an important redactional stage close to the year 1191 in northern Italy, and more specifically in or near Cremona. The appearance of this place name is of course evocative of the towering figure of Gerard of Cremona, the most productive among the translators from Arabic into Latin who operated in Toledo in the second half of the twelfth century.[33] Can the *Liber erarum* in any way be linked to Gerard? Paul Kunitzsch, commenting on the aforementioned Berlin MS of the *Almagest*, rejected this based on the fact that Gerard died in Toledo in 1187 and hence some years before the astronomical note of 1191.[34] This is certainly correct, but it is also worth noting that Gerard's body and personal library are said to have been

31 The note is edited in Paul Kunitzsch, *Claudius Ptolemäus: Der Sternkatalog des Almagest*, vol. 2, *Die lateinischen Übersetzung Gerhards von Cremona* (Wiesbaden: Harrassowitz, 1990), 19n69: "In nomine domini. Ingressus solis in formam arietis fuit annis [Ms. ānus] arabum 586 et uno mense et 24 diebus et 15 horis et 31 minutis et 40 secundis transactis post meridiem ciuitatis cremone cuius latitudo est 45 graduum et longitudo ab arin 59 graduum in tribus .s. decimis decime hore noctis 25 diei mensis safar que fuit nox diei sabati 23 martij anni christi 1191. Et alie ere fuerunt secundum quod hic ponuntur in predicta die sabati."

32 See p. 89 below.

33 See Richard Lemay, s.v. "Gerard of Cremona," *CDSB*, 15:173–192; Pierluigi Pizzamiglio, *Gerardo da Cremona nella tradizione amanuense e tipografica* (Cremona: Biblioteca Statale, 1988). Astronomical references to Cremona are also found in some canons and tables that belong to the Toledan Tables. See Pedersen, *The Toledan Tables*, 2:335–339; 3:750, 759, 1004, 1109, 1213.

34 Kunitzsch, *Sternkatalog*, 19n69: "Die Herkunft dieser … Notiz bleibt im Dunklen. Mit Gerhard von Cremona selbst darf man sie wohl nicht in Verbindung bringen, da allgemein angenommen wird, er sei (wie in der etwas späteren Vita angegeben) 1187 in Toledo im Alter von 73 Jahren gestorben."

returned to Cremona after his death and that there is indeed good evidence that the manuscripts of his translations were first disseminated from northern Italy.[35]

The connection to Gerard of Cremona, his school, or his wider milieu, is strengthened by the fact that the *Liber erarum* is transmitted in the context of other translations attributable to him. Aside from the Latin *Almagest*—Gerard's best-known scientific translation—in the Berlin MS, this is also the case with the two astronomical works that were printed alongside our text under the aegis of Joachim Heller in Nuremberg in 1549 (H). The printed edition begins with Gerard's translation of Māshā'allāh's *De elementis et orbibus coelestibus*, which is then followed by the *Liber erarum*, designated as *Scriptum cuiusdam Hebraei* ("The text of of a certain Jew"), as well as a *Scriptum cuiusdam Saraceni* ("The text of a certain Muslim"). As Hermann Hermelink was the first to notice, the latter text is in fact Gerard's otherwise lost Latin translation of the canons to Ibn Muʿadh al-Jāihanī's *Tables of Jaén*.[36] Moreover, it is noteworthy that the three best witnesses to the text, namely CRV, all append the *Liber erarum* to the *De magnis coniunctionibus* of Abū Maʿshar (Albumazar), an influential astrological handbook that was translated in twelfth-century Toledo and exists in a second, revised version, which may have been edited by Gerard of Cremona.[37] That Gerard also translated the *Liber erarum*, as has already been

35 Lemay, "Gerard" (n. 33 above), 173; Marika Leino and Charles Burnett, "Myth and Astronomy in the Frescoes at Sant'Abbondio in Cremona," *Journal of the Warburg and Courtauld Institutes* 66 (2003): 273–288 (282–288); Abū Maʿshar, *On Historical Astrology*, ed. Yamamoto and Burnett, 2, xxiii–xxiv; al-Qabīṣī, *The Introduction to Astrology*, ed. Burnett, Yamamoto, and Yano, 218–219. On the earliest manuscripts of Gerard's translations, see Pierluigi Pizzamiglio, "Le traduzioni matematiche Gerardiane e la tradizione matematica Cremonese," *Annali della Biblioteca statale e libreria civica di Cremona* 41 (1991): 85–112 (101); Danielle Jacquart, "Les manuscrits des traductions de Gérard de Crémone: quelques caractéristiques formelles," in *Les traducteurs au travail*, ed. Jacqueline Hamesse (Turnhout: Brepols, 2002), 207–220 (209–215).

36 Heinrich Hermelink, "Tabulae Jahen," *Archive for History of Exact Sciences* 2 (1963): 108–112. See also Francis J. Carmody, *Arabic Astronomical and Astrological Sciences in Latin Translation* (Berkeley: University of California Press, 1956), 173, who erroneously regards the *Scriptum cuiusdam Hebraei* and the *Scriptum cuiusdam Saraceni* as parts of a single continuous text, translated by Gerard of Cremona. He notes that the work "has been attributed to Campanus" without giving a source. This might be related to the incipit of MS C (see n. 1 above).

37 See Charles Burnett, "The Strategy of Revision in the Arabic-Latin Translations from Toledo: The Case of Abū Maʿshar's *On the Great Conjunctions*," in *Les traducteurs au travail*, ed. Jacqueline Hamesse (Turnhout: Brepols, 2002), 51–113. See also Abū Maʿshar, *On*

briefly suggested by Charles Burnett, is therefore—in spite of all uncertainty—a thought worth entertaining.[38]

As far as the text underlying this translation is concerned, however, it emerges quite clearly that the original author was Jewish and wrote for a Jewish audience, as was also intuited by the redactor of the printed version in H (persumably Heller himself), who designated the text as *Scriptum cuiusdam Hebraei de Eris seu intervallis regnorum ac diversis gentium annis* ("The text of a certain Jew on the eras or intervals between reigns and the years of various nations"). This conclusion is most easily drawn from the fact that the narrator speaks of "our sages" (*sapientes nostri*) when he means the rabbinic authorities behind the Jewish calendar. Another hint comes from his way of referring to the estimate of the solar year "according to the intention of the gentiles" (*secundum intentionem gentium et est scitum apud gentes*) when the Julian year length is discussed.[39] It is also striking to find that the wheel diagram that is appended to the main text in some manuscripts tells the reader how to find the beginning of the Christian era in the Jewish cycle (*Nota quod in anno 17 cycli decemnovenalis incepit era Christi*) and erroneously equates this beginning with the starting point of the Dionysiac 19-year cycle. A Christian author would have likely avoided this error, while reversing the description of the cycles, informing his readers that the Jewish era begins in year three of the 19-year cycle. That a Jewish original underlay the whole composition is also noticeable from some of the technical vocabulary employed, which remains semantically close to the terms used in Hebrew calendrical texts:

Historical Astrology, ed. Keiji Yamamoto and Charles Burnett, 2 vols. (Leiden: Brill, 2000), 2, xxiii.

38 Charles Burnett, "The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century," *Science in Context* 14 (2001): 249–288 (253): "Gerard of Cremona himself probably kept in contact with Italian centers; one report states that his books were returned to Cremona after his death, and to three manuscripts of a translation of a work on the calendar, probably made by him, is added a horoscope cast in Cremona on 23 March 1191."

39 See the present edition of the *Liber erarum*, c. 1, § 1: "Et dixerunt sapientes nostri … et non remanserunt de eo apud nos nisi 6 dies …" Ibid., c. 1, § 4: "Et minuuntur 28 minuta et 7 partes decemnovenas minuti ab anno solari scito a gentibus, qui est 365 dierum et quarte secundum intentionem Samuelis. … Et annus solaris scitus apud gentes est 365 dierum et quarte." Ibid., c. 1, § 6: "… et remanebunt nobis semper in omnibus 19 annis inter solares et lunares una hora et 485 minuta secundum intentionem gentium et est scitus apud gentes. Sed secundum intentionem certam, que est apud nos …" Ibid., c. 2, § 7: "… de quo non habemus nisi 6 dies, sicut dixerunt nostri antiqui …"

Designated concept	Hebrew term	Literal meaning	Latin rendering
conjunction	מולד (*molad*)	birth	*nativitas*[40]
equinox/solstice	תקופה (*tekufah*)	circuit	*circulus*
embolismic year	מעוברת (*meuberet*)	pregnant	*pregnatus*
Year of 355/385d	שלימה (*shelemah*)	complete	*integer*
Year of 354/384d	כסדרה (*kesidrah*)	in order	*ordinatus*
Year of 353/383d	חסרה (*ḥaserah*)	defective	*diminutus*
Four possible weekdays of New Year/or Passover	ארבעה שערים (*arba'a she'arim*)	four gates	*4 portae*
'Modulo 7'	שבעה שבעה (*shiv'a shiv'a*)	seven by seven	*7 et 7*

The likelihood of a Hebrew exemplar sheds some doubt on the thesis of Gerard of Cremona's involvement, since the latter is only known to have worked with Arabic texts. Maintaining it would therefore essentially mean to suggest that the text was translated into Latin not from Hebrew, but from Arabic, as was already conjectured by Moritz Steinschneider.[41] Although less likely than a Hebrew original, this scenario is not wholly implausible, since the Jews living in and around Toledo, where Gerard would have come across the text, used Arabic as their daily language. A Spanish origin would be especially attractive given the geographic link to the earliest two fully preserved Hebrew monographs on the Jewish calendar: Abraham bar Ḥiyya's *Sefer ha-Ibbur* (1122/23) and a work

40 This word is used only twice, in *Liber erarum*, c. 2, § 8. In all other instances, the text has *coniunctio*. The term *nativitas* for *molad* is also used in the Latin redaction of the astronomical tables of Abraham bar Ḥiyya found in MS Cambridge, UL, Hh.6.8, fols. 7^{r}–11^{r}. See Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," 189–193, and n. 109 in Chapter One above.

41 Moritz Steinschneider, *Mathematik bei den Juden* (Berlin, 1893–1899; repr. Hildesheim: Olms 1964), 97. See also Steinschneider, *Catalogus librorum Hebraeorum in Bibliotheca Bodleiana*, 2 vols. (Berlin: Friedlaender, 1852–1860), 1:653.

of the same name by Abraham Ibn Ezra (1146/47). Both men grew up on the Iberian peninsula and would have doubtlessly acquired their calendrical expertise there, although the two *Sifrei ha-Ibbur* are known to have been written abroad—Abraham bar Ḥiyya penned his work in France, whilst Ibn Ezra wrote in Verona. The strongest connection to Spain is perhaps provided by the *Liber erarum*'s reference to the solar year according to Rav Ada bar Ahavah (*annus solaris secundum intentionem Rabada filii Hahaha*). As mentioned above (p. 74), bar Ḥiyya's work contains the first known attestation of both this year length and its association with Rav Ada. The same attestation is repeated in Abraham Ibn Ezra's *Sefer ha-Ibbur*, whilst there is no evidence that the system of Rav Ada was known in Ashkenaz or Italy during the twelfth century.[42]

Other than that, however, the lore presented in the *Liber erarum* is so common to descriptions of the Jewish calendar that it is very difficult to establish any relationship to earlier texts. In its terseness, the present treatise bears little resemblance to the aforementioned *Sifrei ha-Ibbur*, which confront the reader with a whole variety of sophisticated reckoning techniques and control methods, and where learned disquisitions on the astronomical, scriptural and legal foundations of the Jewish calendar are found next to information on the calendars used by other nations and polemical excursuses directed against the Karaites, who rejected the rabbinic calendar. The fact that the text, in its preserved form, refrained from any allusions to sources or authors used, only contributes to its opacity. A good deal of uncertainty also surrounds the extent to which its original format may have been changed in the transition from Hebrew to Latin. Two suspicious features in this regard—the laconic chapter headings (see p. 69) and the omission of a whole section of reckoning examples (p. 76)—have already been mentioned. Another puzzling element is the first chapter, which, together with the chronological table in the appendix, must have inspired the title *Liber erarum* found in MS C. To begin a treatise on the Jewish calendar with an account of eras is by no means typical of other Hebrew books of the subject. The position of this chapter at the beginning of the *Liber erarum* seems to respond to the interests of a Christian rather than a Jewish readership. While the importance of the calendar would have been self-evident to Jews, a Latin translator or redactor may well have used the subject of biblical and historical chronology to attract the attention of a Christian audience.[43] It

42 The Northern French treatise by Jacob bar Samson, which is roughly contemporary to bar Ḥiyya's, does not mention Rav Ada's *tekufah*. See Wartenberg, "The Hebrew Calendrical Bookshelf," 102.

43 I owe this observation to Sacha Stern.

is therefore perhaps apposite to regard the *Liber erarum* as a 'hybrid' kind of text, which is neither completely Jewish nor properly 'Christian', but a unique product of the kind of transfer of knowledge across cultures and languages, for which the Iberian peninsula in the twelfth century is justly famous.

3 The Manuscripts

The foregoing discussion and the following edition of the *Liber erarum* are based on seven witnesses to the text, to which will be assigned the following sigla:

C Cambrai, Bibliothèque Municipale, 168 (163), fols. 100^{v}–104^{r}; s. XIV. Part of a parchment codex (111 fols., 315×205 mm), formerly at the Cathedral of Cambrai. The codex is composed of two separate units, the larger of which is a collection of astrological texts (fols. 2^{r}–106^{v}), copied in Italy (?) before 1391. To this was added a fragment of a ninth-century Carolingian *computus* manuscript (fols. 107^{r}–111^{r}).[44]

D Oxford, Bodleian Library, Digby 212, fols. 7^{v}–8^{v}; s. $XIV^{1/2}$. This manuscript will be discussed more fully in Chapter Four (p. 141) below.

H *De elementis et orbibus coelestibus, liber antiquus ac eruditus Messahalae laudatissimi inter Arabes astrologi*, ed. Joachim Heller (Nuremberg: Berg & Neuber, 1549), sigs. $K4^{v}$–$M4^{v}$.[45]

M Munich, Bayerische Staatsbibliothek, Clm 10661, fols. 33^{r}–35^{r}; s. $XV^{2/2}$. Part of a paper codex (187 fols., 275×205 mm), containing a collection of astrological and astronomical texts.[46]

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44 André Le Glay, *Catalogue descriptif et raisonné des manuscrits de la bibliothèque de Cambrai* (Cambrai: Hurez, 1831), 23–24; Auguste Molinier, *Catalogue général de manuscrits des bibliothèques publiques en France: Departments*, vol. 17, *Cambrai* (Paris: Plon, 1891), 47–48; Denis Muzerelle, *Manuscrits datés des bibliothèques de France*, vol. 1, *Cambrai* (Paris: CNRS Éditions, 2000), 35.

45 The book was digitized by the Bavarian National Library and can be read online at http://reader.digitale-sammlungen.de/resolve/display/bsb10152131.html.

46 David Juste, *Catalogus codicum astrologorum latinorum*, vol. 1, *Manuscrits astrologiques latins conservés àla Bayerische Staatsbibliothek de Munich* (Paris: CNRS Éditions, 2011), 125–126.

P Paris, Bibliothèque de l'Arsenal, 877, fols. 1^{r}–2^{v}, s. XIII$^{2/2}$. Part of a parchment codex (77 fols., 230×166 mm) of Italian provenance, containing the Toledan Tables. The codex was formerly in the possession of the Aldobrandini family. The original first leaf of text has gone missing, while most of the script on the first page has faded and is no longer legible.[47]

R Vatican City, Biblioteca Apostolica Vaticana, Reg. lat. 1285, fols. 99^{v}–102^{v}; s. XIII$^{1/2}$. Part of a parchment codex in folio (164 fols.) of Italian provenance, containing a collection of astrological, astronomical, and mathematical texts.[48]

V Vienna, Österreichische Nationalbibliothek, 5463, fols. 143^{vb}–46^{r}; s. XV$^{2/2}$. Part of a paper codex in 4° (222 fols.), formerly at the Augustinian monastery St. Roch and Sebastian (Vienna), containing a collection of astrological texts. The copy of the *Liber erarum* is dated 1470 (fol. 146^{r}).[49]

As stated before, the earliest witness to the *Liber erarum* is the thirteenth-century codex Vaticanus Reginensis latinus 1285 (R), once part of the library of the French lawyer and classical scholar Jean Bourdelot (d. 1638), whose manuscript collection was acquired in 1654 by Queen Christina of Sweden.[50] The text of the *Liber erarum* (fols. 99^{v}–102^{v}) here follows without introduc-

47 Henry Martin, *Catalogue des manuscrits de la Bibliothèque de l'Arsenal*, 9 vols. (Paris: Plon, 1885–1896), 2:148; Pedersen, *The Toledan Tables*, 1:154.

48 See the description by Henri Narducci, "Sur un manuscit du Vatican, du XIV siècle, contenant un traité de calcul emprunté à la méthode 'Gôbari'," *Bulletin de sciences mathématiques et astronomiques*, 2nd ser., 7 (1883): 247–256 (248–250). Narducci dates the MS to the second half of the fourteenth century, but see Charles Burnett, "Scientific Translations from Arabic: The Question of Revision," in *Science Translated: Latin and Vernacular Translations of Scientific Treatises in Medieval Europe*, ed. Michèle Goyens, Pieter de Leemans, and An Smets (Leuven: Leuven University Press, 2008), 11–34 (19); al-Qabīṣī (Alcabitius), *The Introduction to Astrology*, ed. Charles Burnett, Keiji Yamamoto, and Michio Yano (London: The Warburg Institute, 2004), 188, 216–220.

49 *Tabulae codicum manu scriptorum praeter graecos et orientales in Bibliotheca Palatina Vindobonensi asservatorum* (Vienna: Gerold, 1864–1899), 4:129.

50 Henri Omont, "Catalogue des manuscrits de Jean et Pierre Bourdelot, médecins parisiens," *Revue des bibliothèques* 1 (1891): 81–103 (95); Elisabeth Pellegrin, "Catalogue des manuscrits de Jean et Pierre Bourdelot," *Scriptorium* 40 (1986): 202–232 (218); Eva Nilsson Nylander, *The Mild Boredom of Order: A Study in the History of the Manuscript Collection of Queen Christine of Sweden* (Lund: Institute of ALM and Book History, Lund University, 2011), 59–60.

tion upon Albumazar's *De magnis coniunctionibus* (fols. 43^{r}–99^{v}) and is later followed the *Liber introductorius* of Alcabitius/al-Qabīṣī (fols. 139ra–151^{vb}). One distinctive feature of MS R is the frequent appearance of marginal glosses. In the case of the *Liber erarum*, these occasionally contain parts of the text that seem to have been forgotten by the scribe and were subsequently added with an indication of their proper location in the text. In all subsequent copies, these are duly inserted into the main text, but the content and context suggest that they have belonged there all along.

The pattern of having the *Liber erarum* follow directly after Albumazar's work on the great conjunctions is repeated in MS C from the Bibliothèque municipale de Cambrai (now known as the *Médiathèque de Cambrai*), a fourteenth-century manuscript of likely southern European origin, to which a small fragment from a Carolingian *computus* codex was joined at a later date.[51] Charles Burnett, who used MS C for his edition of *De magnis coniunctionibus* suggests that the manuscript's original provenance is northern Italy, since the scribe at one place mistakenly wrote *Bononia* (Bologna) for *Babilonia*.[52] If this is indeed its place of origin, it must have travelled up to northern France at some point in the second half of the fourteenth century, where it made its way into the personal book collection of Pierre d'Ailly (1350–1420), the famous cardinal and bishop of Cambrai, who is known for his strong interest in the kind of historical astrology that was at the core of *De magnis coniunctionibus*.[53] That C was once in d'Ailly's possession can be concluded from the fact that one of the hands responsible for the marginal annotations contained throughout is identifiable as that of his nephew Raoul Le Prestre (d. 1443). The latter is known to have been involved in the correction and publication of several of his uncle's

51 Among the known texts in this fragment (fols. 107^{r}–111*bis*v) are recension B of the pseudo-Theophilan *Acts of the Council of Caesarea*, here designated as the *Epistola Philippi* (fols. 108$^{r–v}$); the *Epistola ad Bonifatium et Bonum* of Dionysius Exiguus (fols. 108^{v}–109^{v}); and the beginning of Alcuin's *De rhetorica* (fols. 110^{v}–111*bis*^{v}). Bischoff dates the two hands of this MS to the first and second quarters of the ninth century and locates them in "möglicherweise Südwestdeutschland." See Bernhard Bischoff, *Katalog der festländischen Handschriften des neunten Jahrhunderts* (*mit Ausnahme der wisigotischen*), vol. 1, *Aachen–Lambach* (Wiesbaden: Harrassowitz, 1998), 170. A dating clause for 814 CE is found on fol. 107^{r}. I very am grateful to Immo Warntjes for sharing his description of the contents with me.

52 Burnett, "The Strategy," 100n113; Abū Maʿshar, *On Historical Astrology*, ed. Yamamoto and Burnett, 2, xxiii.

53 Laura Ackerman Smoller, *History, Prophecy, and the Stars: The Christian Astrology of Pierre d'Ailly, 1350–1420* (Princeton, NJ: Princeton University Press, 1994).

scientific works. He also served as the executor of d'Ailly's will, which expressly specified that the cardinal's books were to be distributed among his blood relatives and servants. One of the beneficiaries was Raoul himself, who became a member of the cathedral chapter at Cambrai, where his books remained after his death.[54]

The discovery that Pierre d'Ailly once owned MS C should make it possible to identify the *Liber erarum* as one of the sources behind the cardinal's appreciation of the Jewish calendar and its astronomical precision, which comes to the fore in his treatise on calendar reform (*Exhortatio super correctione calendarii*), written in 1411, where he states that "from the beginning, the Hebrews were great experts in the science of the stars and all nations have this and other sciences from them."[55] Another noteworthy gloss that accompanies the *Liber erarum* in MS C, and which can be assigned to neither Raoul Le Prestre's nor to Pierre d'Ailly's hand, is a list of the Jewish month names on the bottom of fol. 100^{v}.[56] This list is probably the only known case where the month names

54 Muzerelle, *Manuscrits*, xiii–xviii; Jean-Patrice Boudet, "Un prélat et son équipe de travail à la fin du Moyen Âge: remarques sur l'oeuvre scientifique de Pierre d'Ailly," in *Humanisme et culture géographique à l'époque du Concile de Constance*, ed. Didier Marcotte (Turnhout: Brepols, 2002), 127–150 (130–132). On the glosses in MS C, see ibid., 132n17; Burnett, "The Strategy," 55n13. One of these glosses concerns the Spanish era listed in the chronological table that accompanies the *Liber erarum* (fol. 103^{v}): "Hec era precessit eram Christi 38 annis, circa quod tempus incepit imperium Romanum." Further notes from Raoul's hand in C appear on fols. 28^{r}, 44^{v} (dated 1391), 46^{r}, 48$^{r–v}$, 51^{v}, and 107^{r}.

55 Pierre d'Ailly, *Tractatus de imagine mundi*, sig. hr2: "Nam a principio Hebrei fuerunt peritissimi in scientia astrorum. Et omnes nationes habuerunt hanc scientiam et alias ab eisdem." This version of the passage is also found in MS London, BL, Harley 637, fol. 49ra. A different ending ("… et alias absque eis") is attested in MS London, BL, Add. 29969, fol. 85^{r}. The ending also differs in MS London, BL, Harley 3742, fol. 209^{v} ("… ab illis"), which in addition replaces "astrorum" with "astronomorum". The latter variant is also found in Mansi's edition: Pierre d'Ailly, "Exhortatio," 380. On the MSS cited, see Lynn Thorndike, "Four British Manuscripts of Scientific Works by Pierre d'Ailly," *Imago Mundi* 16 (1962): 157–160. A truncated version of the *Exhortatio* can be found in MS Copenhagen, Kongelige Bibliotek, Thott 825 4°, fols. 217^{r}–219^{v}, listed below as "Co" among the sigla of the *Computus Judaicus* (p. 381). In this MS, the text follows directly upon the *Phaselexis* of Hermann Zoest, which quotes the same passage on fol. 203^{r}. Elsewhere, in his *Elucidarium astronomice concordie cum theologica et historica veritate* (1414), d'Ailly remarks on the Hebrew estimates of the date of creation, in an extended passage that is partly copied from Robert of Leicester's *De compoto Hebreorum*. See p. 172 below.

56 For comparison, see the specimens of both hands in MS Cambrai, Bibliothèque municipale, 97, fol. 340^{v}, reproduced in Muzerelle, *Manuscrits*, 240 (pl. 100). See also Gilbert

appear in fully vocalized Hebrew script in a Latin manuscript on the Jewish calendar. The added Latin transliterations (e.g. *Quisseuleue*, *Marhesseuon*) are likewise very peculiar and seem to reflect a French pronunciation. They strongly differ from those found in the Text of the *Liber erarum* and were clearly not added by the scribe of the main text. The months are written in two lines from right to left, in precisely the following order:

Marcius	**Februarius**	**Ianuarius**	**December**	**November**	**October**	**September**
Vaezar	Ezar	Sevat	Theves	Quis-seuleve	Marhesseuon	Thisseri
וָאֵזָר	אֵזָר	שְׁבָט	טֵיבֵת	כִּישְׁלֵיו	מָרְחֶשְׁבוֹן	תִּישְׁרִי
	–	**Augustus**	**Iulius**	**Iunius**	**Maius**	**Aprilis**
	Helul	Ab	Tammuze	Siuan	Yiar	Nissan
	אֱלוּל	אָבּ	תָּמוּז	שִׁיבָּן	אִיָּר	נִיסָן

The text in MS C is generally close to that of MS R, retaining its marginal and interlineary glosses (except for the aforementioned passages that were incorporated into the main text) and omitting only the wheel diagram for 1188. Nothing, therefore, precludes the assumption that R served as C's exemplar, although it is noteworthy that C is the only copy to designate the present treatise as *Liber erarum*. This title, however, was written by a different hand across the line ruling of the bottom of the page that precedes the main text and therefore must be regarded as a secondary accretion. A third copy closely related to R and C is MS V, a late-fifteenth-century codex that was once at the Augustinian monastery St. Roch and St. Sebastian in Vienna. Like the previous two cases, this manuscript attaches our text to Albumazar's *De magnis coniunctionibus* (fols. 93^{r}–143va). It also contains several other texts of an astrological nature, including Albumazar's *Liber introductorius* (fols. 1^{r}–82), a *Tractatus de signis coelestibus eorumque effectibus* attributed to John of Seville (fols. 148^{r}–179^{r}, inc.: "Cinctura firmamenti in duodecim equales distribuitur partes …"), and Firmin de Beauvalle's *De mutatione aeris* (fols. 183^{r}–222^{r}).

Ouy, ed., *Le recueil épistolaire autographe de Pierre d'Ailly et les notes d'Italie de Jean de Montreuil: Cambrai 940, Vat. Reg. lat. 689A, Vat. Reg. lat. 1653* (Amsterdam: North-Holland, 1966).

In 1549, the text of the *Liber erarum* was added as a companion piece to a printed version of Māshā'allāh's *De elementis et orbibus coelestibus* (H), whose editor Joachim Heller (ca. 1518–ca. 1590) was a schoolmaster and professor of mathematics at the Aegidianum in Nuremberg, but also an industrious composer, printer and calendar maker.[57] Unfortunately, Heller does not provide any information on the manuscript(s) from which he took the texts contained in his edition, other than claiming that they were "dug up through my labour from very old archetypes."[58] It may be suspected, however, that he used a codex from the famous library of the Hungarian king Matthias Corvinus, which he had bought in Nuremberg after the Turkish invasion of Hungary (1541) had led to the dispersion of the *Bibliotheca Corviniana*. Although this codex is now apparently lost as well, it is known to have contained astrological works by Albohali and Māshā'allāh, which were printed with Heller's participation in 1546 and 1549.[59]

While the 1549-edition of the *Liber erarum* contains the same appendices as MSS R and V and is in this sense close to the oldest preserved version, the main text itself was subjected to a significant amount of redactional revision, ranging from simple changes in word order to more substantial re-writing of certain passages. These revisions, however, never alter the content of what is being said,

57 This edition of the *Liber erarum* was used by the sixteenth-century orientalist Jacob Christmann, *Muhamedis Alfragani Arabis chronologica et astronomica elementa* (Frankfurt: Wechel, 1590), 239; Christmann, *Disputatio de anno, mense et die passionis Dominicae* (Frankfurt: Wechel, 1593), 3, 7. On Heller, see Irmgard Bezzel, "Joachim Heller (ca. 1520–1580) als Drucker in Nürnberg und Eisleben," *Archiv für Geschichte des Buchwesens* 37 (1992): 295–330.

58 H, sig. *1r: "Haec ipsa opuscula ex vetustissimis Archetypis meo labore eruta."

59 *Albohali, Arabis astrologi antiquissimi ac clarissimi, De iudiciis nativitatum liber unus, antehac non editus*, ed. Johannes Schöner and Joachim Heller (Nuremberg: Berg & Neuber, 1546 [²1549]), sig. a2r: "Incidit in manus meas Archetypum aliquot commentariorum de rebus coelestibus, admirande vetustatis, olim ex Bibliotheca magnanimi & inclyti Herois, Matthiae regis Ungariae, non minus fato foelici elapsum, quam a singulari (ut ego quidem interpretor) nostrae urbis genio, qui constantissime favet huic pulcherrimae parti Philosophiae, & conservatum hactenus, & tandem venale ad me delatum. In eo tum alii veterum Astrologorum libelli extant, tum vero is, qui nunc primum sub celeberrimi nomini tui auspicio in publicum prodit, Arabicus Astrologus." *Messahalae, antiquissimi ac laudatissimi inter Arabes astrologis, Libri tres*, ed. Joachim Heller (Nuremberg: Berg & Neuber, 1549), sig. A4r. See further Lynn Thorndike, *A History of Magic and Experimental Science*, 8 vols. (New York: Columbia University Press, 1923–1958), 5:395; Klaus Matthäus, "Zur Geschichte des Nürnberger Kalenderwesens," *Archiv für Geschichte des Buchwesens* 9 (1969): 965–1396 (1027–1028); Bezzel, "Joachim Heller," 298.

but instead seem to have been aimed at improving the extremely dry prose of the original in favour of a more verbose style that may have been more suited to sixteenth-century reading tastes. It is therefore likely that these changes do not actually belong to the text's manuscript transmission, but were made by Heller himself or one of his collaborators in the transition from manuscript to print. The following comparison of § 10 in H and R shall suffice to exemplify the nature and extent of these editorial interventions:

R, fol. 102^{r}	**H, sig. L4^{v}**
Quando volueris extrahere coniunctionem prime revolutionis circuli decemnovenalis vel cuiusque alterius circuli decemnovenalis volueris, scias quot revolutiones circuli decemnovenalis transierunt a principio mundi preter illam coniunctionem, cuius principium volueris, et accipies notam cuiusque revolutionis et est 2 dies et 16 hore et 595 minuta, et aggregabis eas omnes et addes super aggregationem earum 2 dies et 5 hore et 204 minuta. Et facies ex minutis horas et ex horis dies et prohicies dies 7 et 7, et quod remanserit ex diebus minus 7 et ex horis minus die et ex minutis minus hora in simile illius erit principium quesite revolutionis. Et sic facies usque ad infinitum, vel si aggregaveris 2 dies et 16 hore et 595 minuta summe aggregationis precedentium revolutionum exibit tibi sequens.	Quando volueris extrahere coniunctionem primae revolutionis circuli decemnovenalis, vel cuiuscunque alterius circuli decemnovenalis coniunctionem investigare volueris, scias quot revolutiones decemnovalis circuli transierunt a principio mundi praeter illam coniunctionem, cuius principium cupis cognoscere, et accipies notam cuiusque revolutionis quae est duorum dierum, sedecim horarum, 595 minutorum, et agregabis eas omnes simul, et addes supra aggregationem eorum 2 dies, quinque horas, 204 minuta. Et facies ex minutis horas, et ex horis dies, et proiicies septem et septem. Quidquid vero remanserit, ex diebus minus septem, et ex horis minus una die, et ex minutis una hora in similitudinem illius, erit principium quaesitae revolutionis. Et sic facies usque ad in infinitum, vel si aggregaveris duos dies sedecim horas, et 595 minuta summa aggregationis praecedentium revolutionum: exibit tibi sequens.

Such additional editorial input also gave rise to new chapter headings, which cannot be found elsewhere. In H, the four sections are identified as:[60]

1) *De Eris seu intervallis regnorum & gentium, ac de diversis annis & mensibus deque cyclo decemnovenali lune* ("On the eras or intervals between reigns and nations and on various years and months as well as on the 19-year lunar cycle")
2) *De radicibus seu principiis coniunctionum solarium lunariumque constitutendis* ("On how to fix the epochs or beginnings of the conjunctions of sun and moon")
3) *De ratione investigandi coniunctiones luminarium* ("On the method of investigating the conjunctions of the luminaries")
4) *De reditu coniunctionum ad eadem circulorum puncta* ("On the return of the conjunctions to the same point of the cycles")

Finally, Heller also furnished the text with a new title, calling it *Scriptum cuiusdam Hebraei de Eris seu intervallis regnorum, ac diversis gentium annis* ("The text of a certain Jew on the eras or intervals between reigns and the years of various nations"). The reference to "reigns and years of various nations" is obviously inspired by the table of eras that is appended to the astronomical note for 1191 rather than by the main text. While this table and the accompanying note are one of the most salient features of the MSS just described (CHRV), they are missing from three further copies (DMP), which together form a separate branch in the transmission of the *Liber erarum*. This branch takes its beginnings already in the thirteenth century, as witnessed by MS P, where the text is found at the very start of a collection of astronomical tables that belong to the 'Toledan Tables' tradition, whose manuscript transmission has been subjected to close study by Fritz S. Pedersen.[61] The text was copied in virtually the same southern script type ('semitextualis') as MS R, thus confirming its Italian origin. In its preserved form, the text of the *Liber erarum* sets in abruptly with paragraph 6 of the first chapter (*Postquam ergo aggregabuntur* …). If the complete treatise was originally copied, as would seem likely, this means that the first leaf of the present codex has gone missing. The main text of the *Liber erarum* finishes on fol. 2ra, but not before adding a final line that is not found in the copies described thus far (CHRV). It briefly mentions the fact that the

60 Following the wording in the table of contents on H, sig *2^{r}.

61 For further material relevant to the Jewish calendar in these manuscripts, see Pedersen, *The Toledan Tables*, 3:928–929, 943, and Appendix II below (p. 612).

Jewish calendar is based on an evening epoch (*Et dies incipit a vespere et nox precedens est de die sequenti*). For Christian readers, who were used to counting days from noon or midnight, this was indeed a crucial reminder, whereas the Jewish audience for whom the text was originally conceived would have regarded it as perfectly obvious. It is therefore safe to conclude that the final line in MS P, which also appears in the cognate copies D and M, was originally absent.

Signs of modification in MS P are also visible when it comes to the appended calendrical tables. The three tables that normally feature the values for collected numbers of cycles in ten lines each (from 1 to 10, from 10 to 100, and from 100 to 1000) are here fused together into a single vertical list of 28 lines (rather than 30 lines, since the entries for '10' and '100' were not duplicated), which thus reaches from 1 to 1000 (fol. 2^{rb}). These 28 lines are preceded by an additional line signalling the *radix* or epoch-value of the Jewish calendar (2d 5h 204p), which in MS CHRV appears tacked on to a separate table for the individual years of the 19-year cycle. In MS P, this 19-year table, now with the *radix*-line missing, appears on the following page (fol. 2^{v}), as does the table with the values for 13 months. An additional 19-year table on the right margin of the same page turns out to be a tabular adaptation of the aforementioned wheel diagram comparing the Jewish and Christian versions of the 19-year cycle. An almost identical set of tables, without the *Liber erarum* itself, can be found at the end of MS Paris, BnF, lat. 7434, fol. 105^{r}, which also dates from the thirteenth century. Here, the table comparing the two cycles is even overwritten with *Principium annorum mundi*, just like the wheel diagram in MSS R and V, whereas MS P replaces this with separate headings for its four columns (*Aureus numerous Hebreorum*, *Aureus numerus Latinorum*, *embolismi Hebreorum*, and *embolismi Latinorum*).[62] Its redactor obviously found it easier to offer this kind of comparison in a vertical table of parallel columns than in concentric circles. The difficulty of carrying out such a wheel diagram probably also explains its complete absence from MS C.

As mentioned before, MS P has two cognate copies in MSS D and M, which share a number of scribal variants with P and feature the same extended ending concerning the evening epoch of the Jewish calendar. At the same time, however, these copies differ from P and all other MSS in two noteworthy aspects: (1) they reduce the *Liber erarum* to its textual core, omitting all calendrical tables

62 Other differences in MS lat. 7434, fol. 105^{r}, compared to MS P consist in the omission of the *radix* from the table of cycles and in slight changes to the order of columns in all four tables. For more on this manuscript and its relation to MS P, see p. 613 below.

and other appended items; (2) the text is not presented as a stand-alone unit, but appears as an insert or excursus within an alien text. In MS D, the *Liber erarum* is entitled *Compotus Hebreorum purus* and is sandwiched between two textual units that clearly belong together: Robert of Leicester's *De compoto Hebreorum* and the commentary (*commentariolus*) on the table contained in this work.[63] The greatest deviation of the text of the *Liber erarum* in MS D consists in the insertion of two passages not found elsewhere. One introduces the term '*baharad*' used for the *molad* Tishri in the first year of the world. As the author of this addition accurately explains, the term derives from the phonetic values of the Hebrew letters that are used to express the time of the first *molad* on Monday, at 5h 204p (בהר׳ד = 2.5.204 = *b.h.r'd*):

> Duo dies signant feriam in qua accidit coniunctio, scilicet diem lune etc. Et istud tenent Iudei una dictione 4 litterarum, que sonat *bahe rade*. Licet enim in nostra scriptura oporteat plures esse litteras, in hec tamen ratione punctorum 4 sufficiunt, scilicet *Ba*, quod signat 'duo' et ponitur ad designandum feriam secundam. *He* est 5 littera et representat '5' et designat 5 horas. *Res* vero, sive *R*, Hebraice representat '200' et *daleth*, sive *D*, est 4 littera [et] representat '4'. Unde quidem dicitur *Rade*, Hebraice scripta 2 litteris, scilicet *R* et *D*, designat 204 minuta.[64]

63 Due to this arrangement, the *Compotus Hebreorum purus* in D has been falsely catalogued as another work of Robert of Leicester. See TK 1091; Andrew G. Little, *Initia operum Latinorum quae saeculis xiii., xiv., xv. attribuuntur* (Manchester: University Press, 1904), 173; John North, "Astronomy and Mathematics," in *The History of the University of Oxford*, vol. 2, *Late Medieval Oxford*, ed. J.I. Catto and Ralph Evans (Oxford: Clarendon Press, 1992), 103–174 (132–133); Richard Sharpe, *A Handlist of the Latin Writers of Great Britain and Ireland before 1540* (Turnhout: Brepols, 1997), 565 (no. 1484). Robert of Leicester's work and its relation to our present text will be addressed more fully in Chapter Three below (especially p. 203). A lost manuscript from St. Augustine's Abbey, Canterbury, which contained a copy of this work, may have also been host to yet another copy of the *Liber erarum*. See pp. 143–144 below.

64 MS D, fol. 8r. Translation: "'Two days' signals the weekday on which the conjunction fell, i.e. Monday etc. And the Jews preserve this [in mind] using a four-letter word that sounds like *bahe rade*. In our script one would of course have to write more letters, but in [their] method four elements are sufficient, namely *Ba*, which means 'two' and is used to designate the second day of the week; *He*, which is the fifth letter and stands for '5' and designates 5 hours; and finally there are *Resh* or *R*, which in Hebrew stands for '200', and *Dalet* or *D*, which is the fourth letter and stands for '4'. When one says *Rade*, written in Hebrew with [only] two letters, i.e. *R* and *D*, it designates 204 minutes."

The second change consists in a major revision of a passage towards the end (ch. 4, § 13), which specifies the number of years it takes for the *molad* times in the Jewish calendar to return in the exact same order. It is reproduced below in the form found in MS D, with the parts also included in CMRV highlighted in italics:

> *Scias quod post 36288 revolutiones a creatione mundi revertitur coniunctio Thisseri ymaginata ad primam revolutionem, propriam* [sic!] *ad punctum quo incepit, et illud est 2 dies et 5 hore et 204 minuta. Et sunt inter istas revolutiones de annis 689472 anni. Et etiam convenit in uno annorum ex annis revolutionum fuerit coniunctio in 5 horis et 204 minutis diei Lune, in uno mensium anni. Et istud non convenit nisi post* lunationes 181440, in quibus sunt revolutiones 772 et ultra hoc 20 lunationes, scilicet unus annus et 8 lunationes. Sunt autem in dicto tempore 15120 anni Arabici vel simplices lunares. Secundum quantitatem Hebreorum sunt etiam anni solares in eodem tempore 14669 et 7 lunationes integre et 8a imperfectam, cui deficiunt de integritate 10 dies, 12 hore et 204 puncta. Post revolutiones 5184 redeunt omnia preter ferias ad suum principium, scilicet cicli integri et dies et hore et puncta. Sed precise *alicui revolucionum* [sic!] *non convenit illud umquam, nisi usque ad tempus quod diximus.*[65]

The first sentence of the passage, which appears in all preserved copies, accurately summarizes the fact that a full cyclical recurrence of all *molad* times only occurs after 36,288 19-year cycles or 689,472 years. To see this we have to take into account that a 19-year cycle consisting of 235 × 29d 12h 793p = 6939d 16h 595p produces an excess of 2d 16h 595p over and above a complete number of

65 MS D, fol. 8^{r}. Translation: "Know that after 36,288 revolutions since the creation of the world the imaginary conjunction of Tishri returns to the particular point at which it began, this being 2 days and 5 hours and 204 minutes. And between these two revolutions there are 689,472 years. And already before this it happens that in one of the years of this cycle, in one of the months of the year, there was a conjunction at 5 hours and 204 minutes on a Monday. And this only happens after 181,440 lunations, which contain 772 revolutions plus 20 lunations, i.e. one year and 8 lunations. This time span contains 15,120 Arabic or simple lunar years. Moreover, according to the Hebrew year length this time span contains 14,669 solar years and seven complete lunations, the eighth being incomplete, as it lacks 10 days, 12 hours, and 204 points until completion. After 5184 cycles everything except for the weekdays will return to its starting point, i.e. complete cycles and days and hours and points. But in more precise terms this will not happen for any revolution until the aforementioned time."

weeks (7×991 = 6937). These 2d 16h 595p are equivalent to 69,715 ch. By contrast, a whole week contains 7×24×1080 = 181,440p. Since 69,715 and 181,440 both divide by 5, the smallest number of cycles until everything repeats itself will be 181,440/5 = 36,288, which is equivalent to 689,472 years.[66] As it happens, MS D is the only copy—aside from Heller's 1549-edition (H)—where the latter number is displayed correctly. By contrast, CMPRV all read 6,890,472[67] and reduce the rest of the passage to this:

> Et iam convenit quod in uno annorum ex annis revolutionum fuerit coniunctio in 5 horis et 204 minutis diei Lune, et in uno mensium anni. Et istud non convenit nisi post 1544 revolutiones a creatione mundi. Scilicet proprie in principio alicuius revolutionis non convenit illud umquam nisi usque ad tempus quod diximus.[68]

What is being claimed here is that it takes 1544 'revolutions' or 19-year cycles (= 29,336 years or 362,840 lunations) for the *baharad* value (2.5.204) to recur anywhere among the conjunctions of any given year or month. This is clearly erroneous, as the foregoing calculation should have shown: in reality, an identical *molad* to any given previous one can already be found after 7×24×1080 = 181,440 lunations. The correct number is only provided in MS D, where these 181,440 lunations are moreover converted into 772 19-year cycles and 20 additional lunations, which are in turn accurately stated to be equivalent to 15,120 Arabic lunar years of 12 months each (181,440/12 = 15,120) and to 14,669 years in the Hebrew calendar (+ 8 lunations – 10d 12h 204p). In addition, the text in D states that a cyclical recurrence of the hours and *ḥalakim* of each *molad*, but not of the weekdays, can already be had after 5184 cycles. That this is accurate can be seen from the fact that 5184 is 1/7th of the aforementioned 36,288 cycles—the time it takes for a full cyclical repetition.[69] It therefore seems likely

66 This fact was already stated in 1000 CE by al-Bīrūnī, *The Chronology*, trans. Sachau, 153–154.

67 In MS V, fol. 145ra, this was later corrected by erasing the 'o'-digit.

68 Here cited after MS C, fol. 102^{r}. Translation: "And already before this it happens that in one of the years of this cycle, in one of the months of the year, there was a conjunction at 5 hours and 204 minutes on a Monday. And this only happens after 1544 revolutions since the creation of the world. A full return to the beginning of a revolution of course only ever happens after the aforementioned time."

69 5184 can also be taken to refer to the smallest number of cycles that comprises a full sum of days, without any additional excess of hours and *chalakim*. This can be seen from the fact that a single day contains 25,920p, whereas any given 19-year cycle contains an excess of 17,875p (16h × 1080 + 595p = 17,875). The fraction 17,875/25,920 reduces to 3375/5184. This

that the number 1544 found in CMPRV (and H) is a corruption of 5184.[70] This would mean that the shorter version of the passage applied the correct number (5184) to the wrong kind of cyclical phenomenon: simple recurrence of the 2.5.204-value rather than the general repetition of the sequence of hours and *ḥalakim*. By contrast, the longer version in MS D not only judiciously emends this error, but also presents accurate additional information about the number of lunations, cycles and years it takes for the former phenomenon to occur. Like the previous interpolation regarding the *baharad* value, this second addition to the *Liber erarum* in D thus reflects a degree of insight into the inner workings of the Jewish calendar that is not easily matched by any other medieval Latin text on the subject.

The question remains whether the two major additions in D have some value as witnesses to the original text of the *Liber erarum*. This can be easily denied for the first passage, which clearly comes from a non-Jewish voice different from the original author. Not only does the redactor speak of the *Iudei* in the third person, but he explains basic facts about the Hebrew alphabet that would have been new to a Christian reader, but not to the Jewish audience for which the text underlying the Latin translation was originally written. The additional fact that he refers to the Latin alphabet as *nostra scriptura* settles the question.

Things are slightly ambiguous for the second passage, which was not necessarily written by the same redactor. Given that it makes greater mathematical sense than the shorter version in MSS CMRV, it would at first glance seem tempting to regard D as the sole remaining witness to the original form of the passage. Such a conclusion is prevented, however, by the occurrence of the expression *secundum quantitatem Hebreorum* in the passage exclusive to D, which once again betrays the hand of a Christian interpolator, rather than the original author, who always uses the second person (*nostri*) to refer to the Jews. Taken together with the many smaller textual variants found in D, which offer no improvement over the readings in CRV, this should lead us to conclude that both passages are later additions by an unusually well-informed scribe.

A far inferior testimony to the text is offered by MS M, where our *Liber erarum* was slipped inside an otherwise unknown treatise on the quadrant,

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effectively means that it will take 5184 cycles or 98,496 years for the pattern of cycles to repeat with the same amount of days in each cycle.

70 In MS R, fol. 102^{r}, the first '4' in 1544 looks suspiciously like an '8', thus presenting the same digits in a different order.

which is here claimed to have been composed by Thābit ibn Qurra.[71] This text begins on fol. 32^{v} with the words: "Nota quod quadrans est specie plane quarta lineis …"[72] It is interrupted on fol. 33^{r} by the *Liber erarum*, which begins on fol. 33^{r} and continues until fol. 35^{r}, after which text on the quadrant resumes ("In primis collige centrum …"), stopping once again at fol. 37^{r} to be followed by a copy of al-Qabīṣī's *Liber ysagogarum ad iudicia astronomie* (37^{r}–50^{r}), which is dated to the year 1471. The text on the quadrant and the *Liber erarum* are preceded by al-Farghānī's *Liber de aggregationibus scientie stellarum* (9^{r}–32^{v}), which was copied by the same hand. One feature of MS M that sets it apart from all other copies is its consistent use of the term *punctum* in place of *minuta* as the Latin rendering of the Hebrew time unit *ḥelek*.

Leaving aside the text of H, whose heavy signs of editorial revision make it unsuitable for a reconstruction of the text, the foregoing discussion should have made clear that the remaining five manuscripts of the *Liber erarum* can be straightforwardly parsed into two groups, represented by CRV and DMP. The most important common feature of CRV is the context (*Liber erarum* as an appendix to Albumazar's *De magnis coniunctionibus*) and the inclusion of certain appended material (the astronomical note for 1191, followed by a table of eras). Although they come from three different centuries, there is little textual variation between these three MSS, indicating a relatively close relation to a shared archetype α. One major issue is the inclusion of marginal and interlineary glosses, which feature prominently in C and R, but are completely absent from V. At first glance, the most economical explanation for this would be that they were simply left out by the scribe. One might object that the table of eras in CRH omits most of the chronological information on the Era of the Flood, leaving only the truncated designation *Anni* and the total sum of days (1,567,687), whereas MS V supplies the missing data: n.b. (for non *bissextus*), 4295 years, 12 days, and 0 quarter-days.[73] Together with the absence of glosses, this might indicate that V derives from a sub-archetype that was independent

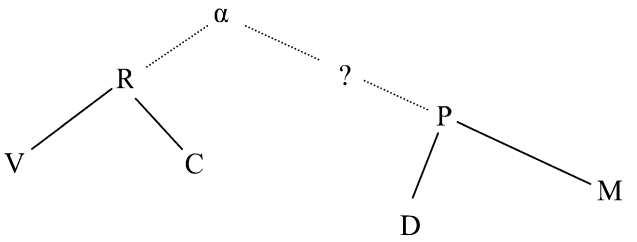
71 MS M, fol. 32^{v}: "Tractatus de compositione quadrantis compositum, ut creditur, a Thabit." On Thābit, see George Sarton, *Introduction to the History of Science*, 3 vols. (Baltimore: Williams & Wilkins, 1927–1948), 1:599–600; B.A. Rosenfeld and A.T. Grigorian, s.v. "Thābit ibn Qurra," *CDSB*, 13:288–295.

72 See TK, 938.

73 A later hand crossed out '4295' in the box for years and wrote '4292' above it, showing that the scribe misunderstood the years in question to be Julian rather than Egyptian years. Dividing 1,567,687 days by 365.25 instead of 365 would indeed yield 4292 complete years. See MS V, fol. 146^{v}.

of R. One reason to reject this hypothesis is that V does not supply the weekday number, but instead leaves an '*n*' as a placeholder in the appropriate box. This is unlikely to represent the original state of the table in the archetype, given that the weekday of the deluge is indicated in other chronological tables of the twelfth century.[74] The best conclusion seems to be that the flood data were interpolated by V's scribe, who wanted to fill the half-empty line in his exemplar, but was unable to work out the weekday, and that V and C both descend from R, whether directly or indirectly.

MS P is the sub-archetype that underlies both D and M, as is borne out not only by a considerable number of shared variants (documented in the apparatus),[75] but also by the fact that all three add the same sentence on the evening epoch of the Jewish day at the end of the treatise (*Et dies incipit a vespere, nox precedens est de die sequenti*). The number of intermediary stages, however, that may have separated P from D and M, which both omit P's calendrical tables, is difficult to establish. Given the brevity of the text and the limited number of manuscripts, the following attempt at a stemma for the *Liber erarum* must naturally remain highly schematic and conjectural.



4 The Edition

The following edition closely follows the text of MS R, which is here treated as *codex optimus*. Only in a few select cases, where R is obviously in error, have readings from other MSS been chosen or conjectural emendations been

74 Suter, *Die astronomischen Tafeln*, 109; Neugebauer, *The Astronomical Tables*, 137, 143, 145; Pedersen, *The Toledan Tables*, 3:899.

75 Due to the fact that the original first leaf of MS P is no longer extant, while most of the ink on fol. 1^{r} has faded away or been erased, variants could only be compared for roughly the second half of the text, but the ones that are noted in the apparatus should be sufficient to prove the case.

applied. Variants found in MSS CDMPV are extensively documented in the apparatus. Exceptions were made for minor variations in spelling and changes in word order (e.g. *secundi templi* for *templi secundi*, *lunarem annum* for *annum lunarem* etc.) as well as for changes from Hindu-Arabic to Latin numerals. For the reasons noted above (p. 92), the text of Heller's edition (H) is generally absent from the apparatus (aside from chapter headings). The tables are a close reproduction of what is found on fols. 101^{v} to 102^{v} of MS R, except for the wheel diagram, which was been omitted for technical reasons. In the table of eras, the chronological information for the 'Era of the Flood', which is largely missing from R, has been restored.

Liber erarum

Incipit Liber erarum

99^{vb} [1] Prima erarum est a creatione mundi, que est sicut radix. Et primus annus creationis est ille in postremo die cuius creatus fuit Adam. Et dixerunt sapientes nostri quod unus dies anni est sicut annus totus.[1] Ergo iste annus intrabit in computationem et est primus ere et non remanserunt de eo apud nos nisi 6 dies, scilicet illi 6 qui fuerunt a die Dominica in qua incepit Deus operari usque ad diem Veneris. Et est sciendum quod in anno 1656 a creatione fuit diluvium. Et in anno 2448 exiverunt filii Israel de Egipto. Et in anno 16 circuli decemnovenalis 129 revolutionis accidit quod exiverunt de Egipto in die Iovis in 15 die mensis lunaris. Et hoc totum est scitum ex istoria ab hora qua descendit manna, principium descensionis cuius fuit in die Dominica. Redierunt ergo computando retro et invenerunt quod exitus illorum fuit in 15a die mensis Nisan in die Iovis. Et in anno 3338 a creatione fuit destructio primi templi. Et in anno 3449 a creatione fuit era Alexandri,
100ra scilicet | qua scribunt cartas suas. Et in anno 3828 a creatione fuit destructio templi secundi.

[2] Et est sciendum quod minutum unum est una pars de 1080, et hora 1080, et dies est 24 horarum. Et mensis lunaris est 29 dierum et 12 horarum et 793 minutorum, secundum quod receptum est a quodam qui dicebat se hoc recepisse a quodam antiquo, qui fuit de domo David.[2] Quando ergo

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2 Incipit … erarum] *add.* et si alibi plane satis vis videre de dictis eris, habeas librum Campani qui incipit 'annus solaris etc' et ibi pulcra et magna poteris notare *C* Incipit compotus Hebreorum purus *D* De heris *M* Scriptum cuiusdam Hebraei de Eris seu intervallis regnorum, ac diversis gentium annis *H om. RV* **5** nostri] *add. s.l.* scilicet Hebrei *CR* ‖ est] *add.* vel computatur *C* (*s.l.*), *R* (*mg.*) **6** in … ere] et principium here *M* **7** 6] *add.* dies *M* ‖ Dominica] Dominico *M* **8** est] *om. D* ‖ 1656] 1756 *CMRV ins. mg.* vel 1656 *C* **9** 2448] 1448 *M* ‖ exiverunt] exierunt *DM* ‖ Et] *om. DM* **10** 16] 18 *D* ‖ circuli] cicli *CDM* ‖ accidit] et accidit *D* ‖ quod] qui *C* **11** die Iovis] *om. D* ‖ lunaris] *add.* die Iouis *D* **12** istoria] hystoria *C* historia *DV* ‖ hora] *add. s.l.* vel ex *CR* ‖ principium] principio *M* **13** Dominica] Dominico *M* **14** Nisan] Nisam *C* **15** primi] prima *V* ‖ 3449] 3447 *M* ‖ a creatione] *om. M add.* mundi *C* ‖ era] hero *M* **18–19** Et … 1080] Et hora est 1080 minutorum *D* Et hora est 1080 punctorum *M* **18** unum] *om. D* 1 *R* ‖ pars] *add.* vel punctum *M* **19** est] *om. C* **20** minutorum] punctorum *M*

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[1] cf. *Seder Olam Rabbah* 4 (trans. Guggenheimer, 53); B. *Rosh Hashanah* 10a–11a; Y. *Rosh Hashanah* 1:1 (56b).

[2] B. *Rosh Hashanah* 25a

The Book of Eras

Here Begins the Book of Eras

[1] The first era is from the creation of the world, which is like a root [to all others]. And the first year of Creation is the one on whose last day Adam was made. And our sages said that one day of the year is like a complete year. Therefore, this year will enter the calculation and be the first of the era, [although] in our [count] there have remained of it only six days, namely those six days that took place from the Sunday on which God began his work until Friday. And it must be known that the Flood took place in the 1656th year from Creation. And in the 2448th year the sons of Israel went out of Egypt. And in the 16th year of the 129th revolution of the 19-year cycle it happened that they went out of Egypt on a Thursday, the 15th day of the lunar month. And all this is known from history, from the hour in which the manna came down, the beginning of whose descent took place on a Sunday. So they went back by counting backwards and found that their departure was on the 15th day of the month of Nisan, on a Thursday. And in the 3338th year from Creation, the destruction of the first temple took place. And in the 3449th year from Creation, the era of Alexander [began], namely the one they use to sign their charters. And in the 3828th year from Creation, the destruction of the Second Temple took place.

[2] And know that one minute is one part of 1080, and the hour [consists of] 1080 [minutes], and the day of 24 hours. And the lunar month consists of 29 days and 12 hours and 793 minutes, according to what has been received from a certain man, who said that he had received this from some ancient [sage], who belonged to the house of David. When, therefore, multiples of

prohiciuntur dies mensis 7 et 7 remanet dies unus et 12 hore et 793 minuta. Et annus simplex est 12 mensium, quorum hec sunt nomina: primus eorum est Tisrin, et secundus Marhesuan, et tertius Kislef, et quartus Thebet, et quintus Ssabat, et sextus Adar primus, et est etiam Adar secundus, et septimus Nisan, et octavus Iar, et nonus Vuan, et decimus Tamuz, et undecimus Ab, et duodecimus Elul. Et eorum ordinatio est melior et altior omni ordinatione, preter Marhesuan et Kislef, quoniam aliquando accidit ut sint 30 et 30 dierum, et tunc dicetur ille annus 'integer'. Et alia vice erunt 29 et 29, et erit ille annus 'diminutus'. Et quando fuerit unus 30 dierum et alius 29, tunc erit ille annus ordinatus. Et alii menses currunt secundum ordinem suum, ita quod non mutantur. Et quando fuerit annus additus ex duobus Adar, primus Adar, qui est additus, erit semper 30 dierum et alius 29.

[3] Et annus simplex est 354 dierum et 8 horarum et 876 minutorum et hoc fit ex ductu unius mensis lunaris in 12. Et quando proiecerimus ex diebus anni lunaris 7 et 7, remanebunt 4 dies et 8 hore et 876 minuta. Et quando evenerit quod annus sit additus, aggregabimus huic tempori dies unius mensis lunaris, et aggregabuntur inde 383 dies et 21 hore et 589 minuta. Et dicemus quod hoc est tempus anni additi. Et cum proiecerimus istos dies 7 et 7 remanent 5 dies et 21 hore et 589 minuta. Et circulus decemnovenalis est 19 annorum lunarium et 7 mensium. Et duodecim anni sunt simplices et 7 sunt additi. Et partiemur hos 7 menses super 19 annos secundum hunc ordinem, scilicet dando primum ipsorum tertio, et secundum 6°, et tertium 8°, et quartum 11°, et quintum 14°, et sextum 17°, et septimum 19°. Et in istis
100rb decemnovem annis sunt 6939 | dies et 16 hore et 595 minuta. Et hic numerus dierum accidit ex ductu dierum unius mensis lunaris in 235, qui est numerus

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1 prohiciuntur] proiciuntur *CV* prohiciunt *M* ‖ mensis] *add.* et *R* ‖ minuta] puncta *M* **2–6** primus … Elul] Thisseri, Mareheseuan, Casleui, Thebeth, Sabat, Adar, Nisan, Ijar, Syuan, Tammuz, Ab, Elul *D* Primus 30 Trisiri, Secundus 29 Marchuesuan, Tertius 30 Kisleu, Quartus 29 Thebeth, Quintus 30 Saceuath, Sextus 30 Aldar, Primus et Septimus 29 Adar, Secundus Octavus 30 Nisan, Nonus 29 Iiar, Decimus 30 Siuan, 29 Tamuz, Duodecimus 30 Ab, Tertius decimus 29 Elul *M* **3** Tisrin] Tisirim *CV* ‖ et] *om. C* **6** melior et] *om. V* **7** Marhesuan … Kislef] Mareheseuan et Caseb *D* Maresuna et Kislef *M* Marhesuam et Lerusleph *H* ‖ quoniam] quando *M* **8** erunt] erit *DMV* **9** dierum] *om. M* ‖ 29] ex *D* **11–12** primus … additus] unus, uidelicet primus Adar *D* **13** 354] *del.* 345 *mg.* 354 *C* ‖ minutorum] punctorum *M* **15** et] *om. M* **16** evenerit] venerit *D* ‖ dies] *iter. C* **17** 21] 12 *M* ‖ hore] hora *CR* ‖ minuta] puncta *M* **18–19** Et dicemus … minuta] *mg. R om. M* **18** hoc] *om. D* ‖ anni] annis *D* ‖ additi] *add. s.l.* sive bisexti *CR* **19** remanent] remanent nobis *D* **21** 7] et *R* ‖ menses] *om. M* ‖ 19] 10 *M* **22–23** et tertium 8°] *om. M* **23** 11°] 20 *M* ‖ 14°] in quarto *add. mg.* decimo *R* **24** 6939] 6292 *R* ‖ minuta] puncta *M* **25** accidit] *add.* vel provenit *C* (*s.l.*), *R* (*mg.*) ‖ dierum] *om. D*

7 are cast off, there remain one day and 12 hours and 793 minutes. And the simple year consists of 12 months, whose names are these: their first is Tishri, and the second is Marḥeshvan, and the third is Kislev, and the fourth is Tevet, and the fifth is Shevat, and the sixth is Adar, and the seventh is Nisan, and the eighth is Iyyar, and the ninth is Sivan, and the tenth is Tammuz, and the eleventh is Av, and the twelfth is Elul. And their ordering is better and nobler than all other orderings, except for Marḥeshvan and Kislev, because it sometimes happens that they both have 30 days, and then this year will be called 'complete'; and at other times both will have 29 days and this year will be 'diminished'; and when one has 30 days and the other 29, then this year will be 'regular'. And the other months run according to their order, such that they are not changed. And when the year will be 'added-to' by [having] two Adars, the first Adar, which is the added one, will always have 30 days and the other 29.

[3] And a simple year has 354 days and 8 hours and 876 minutes and this accrues from 12 times the length of one lunar month. And when we cast off multiples of 7 from the days of the year, there will remain 4 days and 8 hours and 876 minutes. And when it happens that a year is added-to, we will attach to this time one lunar month and this will come out as 383 days and 21 hours and 589 minutes; and we will say that this is the time of the added-to year. And when we cast off multiples of 7, we are left with 5 days and 21 hours and 589 minutes. And the 19-year cycle consists of 19 lunar years and 7 months; and 12 [of these] years are simple and 7 are added-to. And we will distribute these 7 months over 19 years according to this order, namely by giving the first of these to the third, the second to the 6th, the third to the 8th, the fourth to the 11th, the fifth to the 14th, the sixth to the 17th, and the seventh to the 19th. And in these 19 years there are 6939 days and 16 hours and 595 minutes. And this number of days derives from 235 times the length of one lunar

mensium 19 annorum. Quando ergo prohiciemus istos dies 7 et 7, remanebunt 2 dies et 16 hore et 595 minuta.

[4] Et quando diviserimus predictos dies 19 annorum per 19, qui est numerus annorum, provenient cuique 365 dies et 5 hore et 997 minuta, et 12 partes decemnovenas minuti. Diximus quod istud est tempus anni solaris verum secundum intentionem Rabada filii Hahaha. Et minuuntur 28 minuta et 7 partes decemnouenas minuti ab anno solari scito a gentibus, qui est 365 dierum et quarte secundum intentionem Samuelis. Et mensis solaris secundum hanc intentionem est 30 dies et 10 hore et medietas, et est una pars 12 anni solaris, et est inter ipsum et mensem lunarem 21 hore et 827 minuta. Et annus solaris scitus apud gentes est 365 dierum et quarte et superfluitas inter hunc annum solarem et annum lunarem est 10 dies et 12 hore et 204 minuta.

[5] Et aggregabuntur ex hac superfluitate in primo et secundo et tertio anno solari 32 dies et 15 hore et 612 minuta. Et quando proiciemus inde quantitatem mensis lunaris, qui est 29 dies et 12 hore et 793 minuta, et faciemus ex ea mensem unum et ipsum intercalabimus in tertio anno et nominabimus ipsum annum pregnatum, et erit duorum Adar, remanebunt nobis 3 dies et due hore et 899 minuta. Et quando iterum nos aggregabimus ei 32 dies et 15 horas et 612 minuta, que aggregantur ex superfluitate in tribus aliis sequentibus, et proiciemus inde unum mensem lunarem et intercalabimus ipsum in 60 anno solari et dicemus ipsum annum pregnatum, remanebunt nobis 6 dies et 5 hore et 718 minuta. Et iterum quando nos aggregabimus ei 21 dies et 18 horas et 408 minuta, que aggregantur ex superfluitate in duobus annis, et provenient inde 28 dies et 46 minuta. Et minuemus a mense lunari unum

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1 ergo] igitur *M* ‖ prohiciemus] proiecerimus *C* proiciemus *MV* **2** minuta] puncta *M* **3** 19] 16 *M* **4** cuique] unicuique *DM* ‖ minuta] puncta *M* **5** decemnovenas] decemnovene *D* ‖ minuti] unius minuti *D* ‖ Diximus] Et dicimus *D* **6** Rabada] Rabadi *C* ‖ minuuntur] minuunt *DM* ‖ 28] 82 *CDRV* **8** et … solaris] *om. V* ‖ quarte] dies et quarta *D* ‖ solaris] solis lunaris *M* **9** secundum] secundam *C* ‖ dies] dierum *M* **10** 21] 12 *M a.c.* 12 *R* ‖ hore] hora *CR* **11** minuta] puncta *M* ‖ gentes] sanctos *D* ‖ quarte] *om. DM* **13** hore] hora *R* ‖ minuta] puncta *M* **14–15** Et … minuta] *mg. R* **14** hac] in hac *M* **15** minuta] puncta *M* ‖ proiciemus] proiecerimus *C* prohiciemus *D* **15–16** quantitatem] inquantitate *M* **16** est] *om. M* ‖ dies] *iter. C* dierum *M* ‖ hore] horarum *M* ‖ minuta] puncta *M* **17** unum] lunarem unum *D* ‖ intercalabimus] interscalabimus *CD* interschalabimus *M* **18** Adar] Azar *C* ‖ remanebunt] manebunt *D* et remanebunt *M* **19** minuta] puncta *M* **20** minuta] puncta *M* **20–21** sequentibus] tres alios sequentes *M* **21** proiciemus] prohiciemus *DM* ‖ unum] ~~unum~~ inde unum *R* ‖ intercalabimus] interscalabimus *CDM* **22** solari] *om. M* ‖ 6] VI *R* **23** minuta] puncta *M* **24** et] *om. D* ‖ minuta] 21. diem et 18 hore et 408 puncta *M* **25** 46] 48 *D* ‖ minuta] puncta *M*

month. When we therefore cast off multiples of 7, there will remain 2 days and 16 hours, and 595 minutes.

[4] And once we have divided these aforementioned days of 19 years by 19, which is the number of years, each of them will have 365 days and 5 hours and 997 minutes, as well as 12/19 parts of one minute. We said that this is the true length of the solar year according to the opinion of Rav Ada the Son of Ahava. And this is 28 minutes and 7/19 parts less compared to the solar year known to the Gentiles, which has 365 days and a quarter according to the opinion of Samuel. And the solar month according to this opinion has 30 days and 10 hours and a half, and this is one 12th part of the solar year, and between this and the lunar month there are 21 hours and 827 minutes. And the solar year known among the Gentiles has 365 days and a quarter and the excess between this solar year and the lunar year is 10 days and 21 hours and 204 minutes.

[5] And from this excess in the first, and second, and third solar year there are joined together 32 days and 15 hours and 612 minutes. And when we cast off the length of the lunar month, which is 29 days and 12 hours and 793 hours, and we make out of this one lunar month and intercalate it in the third year and call this year 'pregnant', and it will have two Adars, we will be left with 3 days and 2 hours and 899 minutes. And when we once again add to it 32 days and 15 hours and 612 minutes, which are joined together from the excess in the three following years, and then cast off one lunar month and intercalate it in the sixth solar year, calling this year 'pregnant', we will be left with 6 days and 5 hours and 718 minutes. And when we once again add to it 21 days and 18 hours and 408 minutes, which are joined together from the excess of 2 years, there will come forth 28 days and 46 minutes. And we will

diem et 12 horas et 747 minuta, et licet sit diminutus, tamen intercalabimus
100va ipsum in 8 anno solari et dicetur annus pregnatus. | Et hoc semper contingit
in 8 anno 19 annorum.

[6] Postquam ergo aggregabuntur ex superfluitate in tribus annis sequentibus solaribus 32 dies et 15 hore et 612 minuta, restituemus quod remanserat diminutum, et est unus dies et 12 hore et 747 minuta. Remanebunt nobis 31 dies et 2 hore et 945 minuta et prohiciemus inde unum mensem lunarem et intercalabimus ipsum in 11 anno solari et dicetur annus ille 'pregnatus' et remanebit nobis 1 dies et 14 hore et 152 minuta. Et quando nos aggregabimus ei illud quod aggregatur ex superfluitate in tribus annis solaribus, scilicet 32 dies et 15 horas et 612 minuta et prohiciemus inde unum mensem lunarem et intercalabimus ipsum in 14 anno solari et dicetur annus 'pregnatus', remanebunt 4 dies et 16 hore et 1051 minuta. Et item aggregabimus ei quod aggregatur ex superfluitate in tribus annis, scilicet 32 dies et 15 horas et 612 minuta, et proiciemus tempus unius mensis lunaris et intercalabimus ipsum in 17 anno et dicetur annus 'pregnatus', remanebunt nobis 7 dies et 19 hore et 870 minuta. Et aggregabimus ei 21 dies et 18 hore et 408 minuta, que aggregabuntur ex superfluitate in duobus annis qui restant ex 19 annis et prohiciemus inde tempus unius mensis lunaris et intercalabimus ipsum in 190 anno et dicetur annus pregnatus et remanebunt nobis semper in omnibus 19 annis inter solares et lunares una hora et 485 minuta secundum intentionem gentium et est scitum apud gentes. Sed secundum intentionem certam, que est apud nos, inter annos solares et annos lunares in 19 annis nulla est differentia, sed semper redeunt ad idem et revertitur computatio ad primum

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1 minuta] puncta *M* ‖ intercalabimus] interscalabimus *CDM* **2** dicetur … pregnatus] dicemus annum pregnatum *M* ‖ hoc] *om. M* **4** Postquam] [*P* **5** minuta] puncta *M* **6** minuta] puncta *M* **7** minuta] puncta *M* ‖ prohiciemus] proiciemus *CMV* **8** intercalabimus] interscalabimus *DM* ‖ pregnatus] annus pregnatus *DMV* **9** remanebit] remanebunt *DM* ‖ minuta] puncta *M* **10** annis] annis sequentibus *D* **11** minuta] puncta *M* ‖ prohiciemus] proiecerimus *C* proiciemus *MV* **12** intercalabimus] interscalabimus *CDM* ‖ ipsum] *om. M* ‖ annus] ille annus *DP* annus ille *M* **12–13** pregnatus] annus pregnatus *DM* **13** remanebunt] et remanebunt *M* ‖ 1051] 105 *DMP* ‖ minuta] puncta *M* ‖ item] iterum *C* **14** aggregatur] aggregatur ei *D* **15** proiciemus] prohiciemus *D* ‖ intercalabimus] interscalabimus *CDM* **16** in] *om. M* ‖ remanebunt] et remanebunt *M* ‖ nobis] nobis semper in omnibus *M* **17** minuta] puncta *M* ‖ dies] diem *CM* ‖ et 18 hore] *om. V* ‖ minuta] puncta *M* **18** aggregabuntur] aggregantur *CDMV* **18–19** prohiciemus] proiciemus *CV* **19** intercalabimus] interscalabimus *CDM* **21** annis] annus *DM* ‖ minuta] puncta *M* **22** Sed] *om. M* **23** que] quod *D* ‖ annos] *om. DM* ‖ in] inter *CRV* **24** semper redeunt] redeunt semper *D*

take away from the lunar month one day and 12 hours and 747 minutes, and although it is diminished, we will nevertheless intercalate it in the eighth solar year and call this year 'pregnant'. And this always happens in the eighth out of 19 years.

[6] Afterwards, then, 32 days and 15 hours and 612 will be joined together from the excess of the three following solar years, and we restitute what had been taken away, this being one day and 12 hours and 747 minutes. We will be left with 31 days and 2 hours and 945 minutes and we then cast off one lunar month and intercalate it in the 11th year and call this year 'pregnant' and we will be left with one day and 14 hours and 152 minutes. And when we add to it that which is joined together from the excess in the three following solar years, namely 32 days and 15 hours and 612 minutes, and then cast off one lunar month and intercalate it in the 14th solar year and call this year 'pregnant', we will be left with 4 days and 16 hours and 1051 minutes. And likewise, we will add to it that which is joined together from the excess in three years, namely 32 days and 15 hours and 612 minutes, and cast off the time of one lunar month and intercalate it in the 17th year and call the year 'pregnant', and we will be left with 7 days and 19 hours and 870 minutes. And we will add to it 21 days and 18 hours and 408 minutes, which will be joined together from the excess in the two years that are left from 19 years, and we will then cast off the length of one lunar month and intercalate it in the 19th year and call this year 'pregnant', and we will always be left with, after every 19 years, with one hour and 485 minutes difference between solar and lunar years, according to the opinion of the Gentiles and what is known among the nations. But according to the reliable opinion that is [held] among ourselves, there is no difference between solar and lunar years after 19 years, but they always return to the same [point] and the calculation reverts to its

principium. Et hec est causa intercalationis vel sparsionis 7 mensium excrescentium inter 19 annos et qualitatis ordinationis eorum inter eos.

Capitulum [secundum]

[7] Prima coniunctio super quam componuntur computationes ad extra-
100^{vb} hendum omnes coniunctiones est coniunctio | anni imaginati, de quo non habemus nisi 6 dies, sicut dixerunt nostri antiqui quod in 25 die Elul creatus fuit mundus. Et iam diximus quod unus dies anni est computatus pro anno. Necessitas ergo perduxit nos ad extrahendum coniunctionem Tisrin anni ymaginai, que sit nobis radix ad omnes coniunctiones futuras inveniendas. Postquam ergo extraximus eam, inveniemus eam in 204 minutis, hora 6 noctis, diei lune, et illa est que dicitur 'duo dies et 5 hore et 204 minuta' et ponimus eam radicem ad omnes coniunctiones annorum mundi.

[8] Sed qualitas appropinquationis ad sciendum eam est quod nativitas vel coniunctio anni creationis, accidit in 14 hora diei Veneris, qui fuit posterior 6 dierum primorum. Et in illa hora creatus fuit Adam primo et in nocte Sabbati apparuit luna. Et ex hac nativitate inventa extraxerunt ymaginatam cum magisterio redeundi retro. Volo autem dicere magisterium extrahendi, illud quod fuit per illud quod est nunc. Et modus operationis in eo est quod accipiamus superfluitatem anni lunaris que remansit post proiectionem 7 et

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1 est] *om. M* ‖ intercalationis] interscalationis *CDM* intercallationis *V* **3** Capitulum] *om. D* Capitulum ex computo Iudeorum *M* De radicibus seu principiis coniunctionum Solarium, Lunariumque constituendis *H* **5** imaginati] ymaginati *CDV* inmaginati *M* **6–7** quod … mundus] quorum primus est qui in 25 die Elul creatus fuit *D* qui in 25 die Elul creatus fuit *M* **8** coniunctionem] *mg. C* ‖ Tisrin] Tisirim *CMV* Tisserim *D* **9** anni] *om. R* ‖ coniunctiones] *om. DM* **10** extraximus] extraxerimus *M* ‖ eam] *om. M* **10–11** minutis … diei] punctis hore noctis die *M* **11** minuta] puncta *M* **12** mundi] *add. D* Duo dies signant feriam in qua accidit coniunctio, scilicet diem lune etc. Et istud tenent Iudei una dictione 4 litterarum, que sonat *bahe rade*. Licet enim in nostra scriptura oporteat plures esse litteras, in hec tamen ratione punctorum 4 sufficiunt, scilicet *Ba*, quod signat 'duo' et ponitur ad designandum feriam secundam. *He* est 5 littera et representat '5' et designat 5 horas. *Res* vero, sive *R*, Hebraice respresentat '200' et *daleth*, sive *D*, est 4 littera, representat '4'. Unde quidem dicitur *Rade*, Hebraice scripta 2 litteris, scilicet *R* et *D*, designat 204 minuta. **14** accidit] videlicet prima coniunctio, realiter accidit *D* ‖ hora] horis *C* horas *M* **15** Et] *om. D* **16** Et] *om. D* ‖ nativitate] *add. s.l.* vel coniunctione *CR add.* vel coniunctione *DM* ‖ inventa] inventa est *D* ‖ extraxerunt] extrasserunt *M* **17** magisterio] *add. s.l.* vel modo *C* ‖ magisterium] *add. s.l.* vel modum *CR add.* vel modum *DM* **18** per] ymaginatum per *D* ‖ illud] id *CM* ‖ nunc] tunc *D*

beginning. And this is the reason behind the intercalation or distribution of 7 months that accrue from 19 years and their ordering among them.

[Second] Chapter

[7] The first conjunction, on which the computations to extract all other conjunctions are based, is the conjunction of the imaginary year, of which there are only 6 days, as our ancients said that the world was created on the 25th of Elul. And we have already said that one day is calculated for a year. Necessity therefore leads us to extract the conjunction of Tishri of the imaginary year, which shall be our root to find all future conjunctions. After we have extracted it, we will accordingly find that it falls at 204 minutes in the 6th hour of the night, on Monday, and this is the one that is called '2 days and 5 hours and 204 minutes', and we put it at the root of all other conjunctions of the years of the world.

[8] But the basis for this knowledge is that the 'birth' or conjunction of the year of Creation occurred on the 14th hour of the Friday that came at the end of the six first days. And in this hour Adam was first created and in the night of the Sabbath the moon appeared. And from having found this 'birth', they extracted the imaginary one by the art of going backwards. I, however, wish to explain the art of extracting that which was from that which is now. And the mode of operation is that we take the excess of the lunar year that remains after casting off multiples of seven days, and it is 4 days and 8 hours

7 dierum, et ipsa est 4 dies et 8 hore et 876 minuta. Et minuemus eam de 7 diebus et remanebunt nobis 2 dies et 15 horae et 204 minuta. Et addemus eam super coniunctionem primam inventam, scilicet super 6 dies et 14 horas, et exibit nobis coniunctio ymaginata scilicet introitus solis in libram.

[9] Circulus primus ymaginatus convenit quod fuit in 9 horis noctis Martis in 17 die Elul et circulus Nisan post ipsum in principio noctis diei Mercurii in 22 die Adar. Et super istum circulum, scilicet Nisan, componuntur computationes ad extrahendos circulos annorum mundi. Et modus magisterii extrahendi eum retro ad circulum primum inventum est quod nos inveniemus circulum Tisirin primo in 15 horis diei Mercurii, qui est unus ex 6 primis diebus et est 28 dies Elul. Quando ergo acceperimus superfluitatem anni solaris post proiectionem eius 7 et 7, et illud est unus dies et 4a, et minuemus
101ra ipsum ex 7 diebus ebdomade remanebunt 5 dies et 18 hore. Et addemus | eos super 4 dies et 15 horas, scilicet quod est nota circuli inventi, exibit nobis dies Martis et 9 hore eius et 17 dies Elul. Et hoc est quod explanare voluimus.

Capitulum [tertium]: in magisterio extrahendi coniunctiones

[10] Quando volueris extrahere coniunctionem prime revolutionis circuli decemnovenalis vel cuiusque alterius circuli decemnovenalis volueris, scias quot revolutiones circuli decemnovenalis transierunt a principio mundi preter illam coniunctionem, cuius principium volueris. Et accipies notam cuiusque revolutionis et est 2 dies et 16 hore et 595 minuta. Et aggregabis eas omnes et addes super aggregationem earum 2 dies et 5 hore et 204 minuta. Et facies ex minutis horas et ex horis dies et prohicies dies 7 et 7 et quod remanserit ex diebus minus 7 et ex horis minus die et ex minutis

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1 minuta] puncta *M* **2** et] *om. D* ‖ minuta] puncta *M* **4** horas] hore *CM* ‖ scilicet … libram] *DM* **5** primus] autem primus *D* ‖ convenit] *add. s.l.* vel accidit *CR* ‖ quod] *om. M* ‖ horis] hore *M* **5–6** Martis … noctis] *mg. R* **6** 17] 7 *V* ‖ die] *om. MP* ‖ Nisan] *add. s.l.* scilicet introitus solis in Arietem *CR* **7** 22] 29 *D add.* in secundo die *V* ‖ scilicet] *om. D* ‖ Nisan] Nisam *CR* **10** Tisirin] Tisirim *CMV* Tisseri *D* ‖ horis] hore *M* ‖ 6] VII *D* **11** 28] 22 *C* 27 *RV* ‖ acceperimus] accipimus *M* **12** unus] *om. D* **14** horas] hore *M* ‖ quod] *add.* nota *P* **15** et … Elul] *mg. C* ‖ et] *om. DM* ‖ 17] 12 *C* **16** Capitulum] *om. D* ‖ coniunctiones] *add.* Ex computo Iudeorum *M* De ratione investigandi coniunctiones luminarium *H* **17** coniunctionem] coniunctiones *MP* **18** cuiusque] cuiuslibet *D* cuiuscumque *MP* ‖ volueris] nolueris *D om. M* **21** minuta] puncta *M* **22** earum] *om. DMP* **23** minuta] puncta *M* ‖ minutis] punctis *M* ‖ prohicies] proicies *MV* **24** minutis] punctis *M*

and 876 minutes. And we will subtract this from seven days and we will we be left with 2 days and 15 hours and 204 minutes. And we will add this on top of the first-found conjunction, namely on top of 6 days and 14 hours, and we will come out with the imaginary conjunction, at the entry of the sun into Libra.

[9] The first imaginary 'circle' turns out to have fallen on the 9th hour of the night of Tuesday, on the 17th day of Elul, and the 'circle' of Nisan after this was at the beginning of the night of Wednesday, on the 22nd day of Adar. And on this 'circle', i.e. [the 'circle' of] Nisan, [all] computations to extract the 'circles' of the years of the world are based. And the method of the art of extrapolating it back to the first-found 'circle' is such that we first find the 'circle' of Tishri at 15 hours on a Wednesday, which is one of the first six days, and it is the 28th day of Elul. When we thus accept the excess of the solar year after having cast off multiples of 7, which is one day and a quarter, and we subtract it from the 7 days of the week, we will be left with 5 days and 18 hours. And [when] we add these on top of the 4 days and 15 hours, i.e. to the value of the given 'circle', we will come out with Tuesday and 9 hours and the 17th day of Elul. And this is what we wanted to explain.

[Third] Chapter: On the Method of Extracting Conjunctions

[10] If you want to extract the conjunction of the first revolution of the 19-year cycle or of any other 19-year cycle, you need to know how many revolutions of the 19 year-cycle have gone by since the beginning of the world, except for that conjunction whose beginning you want. And you will take the value of each revolution, which is 2 days and 16 hours and 595 minutes, and you will join them all together and add to their total 2 days and 5 hours and 204 minutes. And you will make hours from minutes and days from hours and cast off multiples of 7 days, and whatever will remain of the day after the subtraction of 7, and of the hours after the subtraction of a day,

minus hora in simile illius erit principium quesite revolutionis. Et sic facies usque ad infinitum, vel si aggregaveris 2 dies et 16 hore et 595 minuta summe aggregationis precedentium revolutionum, exibit tibi sequens.

[11] Et quando sciveris primam coniunctionem cuiuscumque revolutionis decemnovenalis et volueris primam coniunctionem alicuius anni ipsius, scias quot anni sint a principio revolutionis illius usque ad ipsum preter ipsum, id est quotus sit a principio revolutionis extra ipsum. Et accipies pro unoquoque anno simplici 4 dies et 8 horas et 876 minuta et pro uno anno pregnato 5 dies et 21 horas et 589 minuta et aggregabis omnia note principii illius revolutionis, faciendo ex minutis horas et ex horis dies et prohiciendo dies 7 et 7, in simile illius quod remanserit ex diebus et horis et minutis erit principium illius anni, scilicet prima coniunctio. Et si addideris super coniunctionem primam alicuius anni notam mensis unius, scilicet unum diem et 12 hore et 793 minuta, exibit tibi principium secundi mensis. Et sic facies de tertio et quarto et deinceps cum nota primi mensis eam sibi aggregando bis vel ter et cetera.

101[rb]

Capitulum [quartum]

[12] Sciatis in hoc loco posuerat autor multas coniunctiones multarum revolutionum, gratia exempli. Sed quia nos non indigebamus eis pretermisimus.

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1 simile] insimile *M* ‖ principium] principio *M* **2–3** vel … sequens] *om. D* **2** minuta] puncta *M* **3** precedentium] precedentis *M* ‖ revolutionum] revolutionis *P* **4** coniunctionem] *om. D* **5** decemnovenalis] *add.* volueris *CPRV* ‖ volueris] voluerit *M* ‖ primam] *om. M* ‖ ipsius] *om. M* **6** illius] ipsius *DMP* **6–7** illius … revolutionis] *om. V* **8** minuta] puncta *M* ‖ et] *om. D* ‖ uno] uno vero *D* uno quoque *M* **9** horas] hora *CMR* ‖ minuta] puncta *M* **10** minutis horas] punctas hore *M* ‖ prohiciendo] proiciendo *CMV* **11** in simile] insimilem *M* ‖ minutis] punctis *M* **14** hore] horas *C* horis *P* ‖ minuta] puncta *M* ‖ principium] *add. s.l.* vel revolutio *R* **15** sibi] sic *M* **16** cetera] *om. M* **19** Sciatis] Sciendum est quod *P* **20** exempli] *add.* regule supradicte *P* ‖ pretermisimus] *om. DH* hic deficiunt exempla *M*

and of the minutes after the subtraction of an hour, will be the beginning of the wanted revolution, similar to the one before. And you can do so unto infinity, or if you join 2 days and 16 hours and 595 minutes to the sum of the addition of the preceding revolutions, you will come out with the following one.

[11] And once you know the first conjunction of any given revolution of 19 years and you want the first conjunction of any of its other years, you need to know how many years there are since the beginning of the revolution until the one in question, excepting itself, i.e. what year it is since the beginning of the revolution, itself excepted. And for any ordinary year you will take 4 days and 8 hours and 876 minutes, for any pregnant year, however, 5 days and 21 hours and 589 minutes, and you will join everything together with the value at the beginning of this revolution, making hours out of minutes and days out of hours and casting off multiples of 7 days, [and] that which will remain from the days and hours and minutes will be the beginning of this year, namely the first conjunction, similar to the one before. And if you add on top of the first conjunction of any year the value of one month, namely one day and 12 hours and 793 minutes, you will come out with the beginning of the second month. And you can do the same with the third and fourth and so on, joining it to the value of the first month two times or three times and so on.

[Fourth] Chapter

[12] Know that in this space the author put many conjunctions of many revolutions in order to provide an example. But since we did not need them, we omitted them.

Capitulum [quintum]

[13] Scias quod post 36288 revolutiones a creatione mundi revertitur coniunctio Tisirin ymaginata ad primam revolutionem proprie ad punctum quo incepit et illud est 2 dies et 5 hore et 204 minuta. Et sunt inter istas revolutiones de annis 689472 anni. Et iam convenit quod in uno annorum ex annis revolutionum fuerit coniunctio in 5 horis et 204 minutis diei Lune, et in uno mensium anni. Et istud non convenit nisi post 5184 revolutiones a creatione mundi. Scilicet proprie in principio alicuius revolutionis non convenit illud umquam nisi usque ad tempus quod diximus.

[14] Et nos faciemus tabulas, scilicet primo tabulas mensium, postea tabulas annorum expansorum, postea tabulas annorum revolutionum decennorum, postea ex centum, postea revolutionum millenorum, et postea tabulas ex mille decennorum et erunt in illis 3 gradus. Postea loquemur si deo placuerit super 4 portas et super diffinitiones notarum annorum. Et hic debent esse tabule.

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1 Capitulum] *om. D* Capitulum ex computo Iudeorum *M* De reditu coniunctionum ad eadem circulorum puncta *H* **3** Tisirin] Thisseri *D* Tisirim *CMV* ‖ proprie] propriam *D* ‖ quo] quod *CMV* **4** illud] istud *C* ‖ minuta] puncta *M* **5** 689472] 6890472 *CMPRV* ‖ iam] etiam *D* ‖ convenit] constitit *M* ‖ quod] *om. D* **6** fuerit] fuit *P* ‖ minutis] punctis *M* ‖ et] *om. M* **7** post] prius *R* ‖ 5184] 1544 *CHMPV* 1584 *R* **7–8** 5184 … revolutionis] lunationes 181440, in quibus sunt revolutiones 772 et ultra hoc 20 lunationes, scilicet unus annus et 8 lunationes. Sunt autem in dicto tempore 15120 anni Arabici vel simplices lunares. Secundum quantitatem Hebreorum sunt etiam anni solares in eodem tempore 14669 et 7 lunationes integre et 8a imperfectam, cui deficiunt de integritate 10 dies, 12 hore et 204 puncta. Post revolutiones 5184 redeunt omnia preter ferias ad suum principium, scilicet cicli integri et dies et hore et puncta. Sed precise alicui revolucionum *D* **7** revolutiones] revolutionis *P* **8** in] a *M* ‖ revolutionis] revolutionum *CPRV* **10** nos] *add.* iam *DMP* ‖ faciemus] *add. s.l.* scilicet scribemus *CR* ‖ postea] et postea *D* **10–11** postea … expansorum] *om. MP* ‖ postea … revolutionum] postea revolutionum postea *D* **11–12** decennorum] *add. mg.* ab uno usque ad 10 *CR* **12** centum] centennis *D* 100 *MP add. mg.* scilicet a 10 usque ad 100 *C add. mg.* scilicet decem usque ad 100 *R* ‖ postea] preterea *M* ‖ revolutionum] revolutionem *CV* ‖ millenorum] *add. mg.* a 100 usque ad mille *C add. mg.* scilicet a 100 usque ad 1000 *R* **13** mille decennorum] milledenorum *M* decem millenis *D add. s.l.* scilicet ad 10000 *C add. mg* scilicet usque ad 10000 *R* ‖ erunt] erint *M* erit *D* ‖ Postea] Et postea *DMP* ‖ loquemur] loquamur *C* **14** super] in *CRV* ‖ et super] *om. M* ‖ Et] *om. RV* **14–15** Et … tabule] Et hoc sunt tabule. Tabule hic interserende scribuntur supra in fine prime partis *D* Et hoc sunt tabule. Quere in alio loco qui notatur ubi est tale signum S *M* Et hoc sunt tabule *P*

[Fifth] Chapter

[13] Know that after 36,288 revolutions since the creation of the world the imaginary conjunction of Tishri returns to the particular point at which it began, this being 2 days and 5 hours and 204 minutes. And between these two revolutions there are 689,472 years. And it already happens that in one of the years of this cycle, in one of the months of the year, there was a conjunction at 5 hours and 204 minutes on a Monday. And this only happens after 5184 revolutions since the creation of the world. Yet a full return to the beginning of a revolution of course only ever happens after the aforementioned time.

[14] And we will make tables: first tables for the months, then tables for single years, afterwards tables for ten revolutions, then for one hundred, then for a thousand revolutions, and then tables for ten thousand; and they will contain three 'degrees'. If it pleases God, we will afterwards speak about the four gates and about the definitions of the characters of the years. And this is where the tables need to be.

101v TABULA 1

Numerus annorum	Dies	Hore	Minuta	Numerus annorum	Dies	Hore	Minuta	
100	2	23	100	1	2	16	595	19
200	5	22	200	2	5	9	110	38
300	1	21	300	3	1	1	705	
400	4	20	400	4	3	18	220	
500	0	19	500	5	6	10	815	
600	3	18	600	6	2	3	330	
700	6	17	700	7	4	19	925	
800	2	16	800	8	0	12	440	
900	5	15	900	9	3	4	1035	
1000	1	14	1000	10	5	21	550	

Numerus annorum	Dies	Hore	Minuta
10	5	21	550
20	4	19	20
30	3	16	570
40	2	14	40
50	1	11	590
60	0	9	60
70	6	6	610
80	5	4	80
90	4	1	630
100	2	23	100

Numerus mensium	Dies	Hore	Minuta	Menses anni simplicis	Menses anni pregnati
1	1	12	793	Tisirin[a]	Tisirin[b]
2	3	1	506	Marhesuan[c]	Marhesuan

Tisirin[a]] Tisirim *C* ‖ Tisirin[b]] Tisirim *R* ‖ Marhesuan[c]] Marheuan *RV*

TABLE 1

Number of years	Days	Hours	Minutes	Number of years	Days	Hours	Minutes	
100	2	23	100	1	2	16	595	19
200	5	22	200	2	5	9	110	38
300	1	21	300	3	1	1	705	
400	4	20	400	4	3	18	220	
500	0	19	500	5	6	10	815	
600	3	18	600	6	2	3	330	
700	6	17	700	7	4	19	925	
800	2	16	800	8	0	12	440	
900	5	15	900	9	3	4	1035	
1000	1	14	1000	10	5	21	550	

Number of years	Days	Hours	Minutes
10	5	21	550
20	4	19	20
30	3	16	570
40	2	14	40
50	1	11	590
60	0	9	60
70	6	6	610
80	5	4	80
90	4	1	630
100	2	23	100

Number of months	Days	Hours	Minutes	Months in common year	Months in pregnant year
1	1	12	793	Tishri	Tishri
2	3	1	506	Marḥeshvan	Marḥeshvan

TABULA 1 (*cont.*)

Numerus mensium	**Dies**	**Hore**	**Minuta**	**Menses anni simplicis**	**Menses anni pregnati**
3	4	14	219	Kislef	Kislef
4	6	2	1012	Thebet[a]	Thebet[b]
5	0	15	725	Ssabat	Ssabat
6	2	4	438	Adar	Adar
7	3	17	151	Nisan	Adar
8	5	5	944	Iar	Nisan
9	6	18	657	Vuan	Iar
10	1	7	370	Tamuz	Vuan
11	2	20	83	Hab	Tamuz
12	4	8	876	Helul	Hab
13	5	21	589		Elul

102[r] TABULA 2

	Numerus annorum	**Dies**	**Hore**	**Minuta**
Comm.	1	4	8	876
Comm.	2	1	17	672
Embo.	3	0	15	181
Comm.	4	4	23	1057
Comm.	5	2	8	853
Embo.	6	1	6	362
Comm.	7	5	15	158
Embo.	8	4	12	747
Comm.	9	1	21	543
Comm.	10	6	6	339
Embo.	11	5	3	928
Comm.	12	2	12	728
Comm.	13	6	21	520
Embo.	14	5	19	29
Comm.	15	3	3	905

Thebet[a]] Thebeth *CR* ‖ Thebet[b]] Thebeth *CV*

TABLE 1 (*cont.*)

Number of months	Days	Hours	Minutes	Months in common year	Months in pregnant year
3	4	14	219	Kislev	Kislev
4	6	2	1012	Tevet	Tevet
5	0	15	725	Shevat	Shevat
6	2	4	438	Adar	Adar
7	3	17	151	Nisan	Adar II
8	5	5	944	Iyyar	Nisan
9	6	18	657	Sivan	Iyyar
10	1	7	370	Tammuz	Sivan
11	2	20	83	Av	Tammuz
12	4	8	876	Elul	Av
13	5	21	589		Elul

TABLE 2

	Number of years	Days	Hours	Minutes
Comm.	1	4	8	876
Comm.	2	1	17	672
Embo.	3	0	15	181
Comm.	4	4	23	1057
Comm.	5	2	8	853
Embo.	6	1	6	362
Comm.	7	5	15	158
Embo.	8	4	12	747
Comm.	9	1	21	543
Comm.	10	6	6	339
Embo.	11	5	3	928
Comm.	12	2	12	728
Comm.	13	6	21	520
Embo.	14	5	19	29
Comm.	15	3	3	905

TABULA 2 (*cont.*)

	Numerus annorum	Dies	Hore	Minuta
Comm.	16	0	12	701
Embo.	17	6	10	210
Comm.	18	3	19	6
Embo.	19	2	16	595
	2	5	204	

[15] Quoniam locuti sumus super extractionem annorum, dicamus in qua die debeat esse principium anni et exibit istud ex 4 portis, et est quod non debet esse in die Dominica, neque in die Mercurii, nec in die Veneris caput anni, nec in die in qua sit coniunctio 18 hore aut magis, neque si exibit coniunctio in anno simplici in 9 horis et 204 minutis diei Martis, neque si fuerit coniunctio in anno simplici post annum pregnatum in 15 horis et 589 minutis diei Lune.

102v

[Appendix]

In nomine Domini: ingressus solis in formam Arietis fuit annis Arabum 586 et uno mense et 24 diebus et 15 horis et 31 minutis et 40 secundis transactis post meridiem civitatis Cremone, cuius latitudo est 45 graduum et longitudo ab Arin 59 graduum in tribus scilicet decimis decime hore noctis 25 diei mensis Safar, que fuit nox diei Sabbati, 23 diei Martii anni Christi 1191. Et alie ere fuerunt secundum quod hic ponuntur in predicta die Sabbati.

1 dicamus] diximus *CHMPRV* **2** debeat] debat *D* ‖ istud] illud *DMP* ‖ ex ... portis] in 4 portas *D* in 4 portis *MP* ‖ est] *add.* una *CDHMPV* ‖ quod] que *M* **3** nec] neque *CDMPV* **4** nec] neque *CV* ‖ 18 hore] in 18 horis *DM* ‖ magis] mavis *P* **5** minutis] punctis *M* ‖ diei] die *D* **6** coniunctio] *om. DMP* **7** Lune] *add.* Et dies incipit a vespere, nox precedens est de die sequenti *DM add.* Et dies incipit a vespere et nox precedens est die sequentis *P DMP*] **10** minutis] minuto *CRV* **11** Cremone] Cernicen *H* **13** Sabbati] Sabati *CV* **14** ere] here *C* ‖ Sabbati] Sabati *CV*

TABLE 2 (*cont.*)

	Number of years	Days	Hours	Minutes
Comm.	16	0	12	701
Embo.	17	6	10	210
Comm.	18	3	19	6
Embo.	19	2	16	595
	2	5	204	

[15] Since we have spoken about the extraction of years, we should say on which day the year must have its beginning, and this is determined by the four 'gates', such that it cannot be on Sunday, Wednesday, or Friday, nor on a day whose conjunction occurs at 18 hours or later, nor if the conjunction in a simple year comes out at 9 hours and 204 minutes on a Tuesday, nor if it falls in a simple year after a pregnant year at 15 hours and 589 minutes on a Monday.

[Appendix]

In the name of the Lord: the entry of the sun into the sign of Aries took places [after the completion of] 586 years of the Arabs and one month and 24 days and 15 hours and 31 minutes and 40 seconds after noon in the city of Cremona, which is situated at 45 degrees latitude and 59 degrees longitude from Arin, at three tenth of the tenth hour of the night of the 25th day of the month of Safar, which was the night of the Sabbath, the 23rd day of March of the 1191th year of Christ. And the other eras, on the aforementioned Sabbath, were according to what is put down here.

102[v] TABULA 3

	Ferie		Anni	Dies	Quarte	Dies omnium annorum	
Era ere	1	bi	1228	82[a]	0	448609	
Anni cornuti	2	bi	1501	173	3	548414	
Anni Persarum	3	n.bi	559	55	0	204090	
Anni Diocliciani vel Egyptiorum	6	bi	906	206	2	331123	
Anni diluvii[b]	5[c]	n.bi[d]	4292[e]	12[f]	0[g]	1567687	Dies a die diluvii
Anni Nabucodonosor	4	n.bi	1938	145	0	707515	
Anni Phylippi	1	n.bi	1514	145	0	552755	
Ptolomeus nominat hanc eram esse in Almagesti in 8 capitulo tercii libri a morte Alexandri							
Anni Augusti	1	n.bi	1220	145	0	445445	
Anni Adriani	6	n.bi	1075	145	0	392520	
Anni Christi	7	bi	1190	81	2	434729	
						207714	Dies arabum

82[a]] 42 *R* ‖ Anni diluvii[b]] Anni *CRV* ‖ 5[c]] *om. CR* n *V* ‖ n.bi[d]] *om. CR* ‖ 4292[e]] *a.c.* 4291 *V* *om. CR* ‖ 12[f]] *om. CR* ‖ 0[g]] *om. CR*

TABLE 3

	Weekdays		Years	Days	Quarter-days	Total no. of days	
Spanish era	1	bi	1228	82	0	448609	
Era of the 'Horned One'	2	bi	1501	173	3	548414	
Era of the Persians	3	n.bi	559	55	0	204090	
Era of Diocletian (or the Egyptians)	6	bi	906	206	2	331123	
Era of the Flood	5	n.bi	4292	12	0	1567687	Days from the Flood
Era of Nabonassar	4	n.bi	1938	145	0	707515	
Era of Philippus	1	n.bi	1514	145	0	552755	
Ptolemy (*Almagest* bk. 3, ch. 8) refers to this era as 'from the death of Alexander'							
Era of Augustus	1	n.bi	1220	145	0	445445	
Era of Hadrian	6	n.bi	1075	145	0	392520	
Christian era	7	bi	1190	81	2	434729	
						207714	Days [from the era of the] Arabs

CHAPTER 3

Robert of Leicester's Treatise on the Hebrew Calendar (1294)

1 Franciscan Hebraism and the Challenge of Biblical Chronology

Aided by the newly founded mendicant orders, the thirteenth-century Church developed a policy of proselytization towards the Jews that differed from that of previous centuries both in quantitative and qualitative terms. Instead of complacently awaiting their conversion in the end times, Jews were now increasingly forced to attend Christian sermons or to take part in public disputations, the most famous such incident being the historical confrontation in Barcelona in 1263, which saw the Jewish side represented by Moses ben Naḥman (Naḥmanides), the rabbi of Gerona.[1] In the aftermath of this disputation, the Catalan Dominican friar Ramón Martí published the *Capistrum Iudaeorum* (1267) and the *Pugio fidei* (1278), two massive compendia of religious polemic, which show that their author had acquired an impressive knowledge of Hebrew and even Aramaic in his efforts to draw evidence for the truth of Christianity from Talmudic and Midrashic passages.[2] While Dominicans like Martí valued the study of Hebrew primarily for polemical and missionary purposes, others turned to the Jews' sacred language because they sought to improve their understanding of Scripture. Although Hebraistic knowledge was not completely unheard of in the early Middle Ages, the real foundations for this type of study were

1 Robert Chazan, *Barcelona and Beyond: The Disputation of 1263 and Its Aftermath* (Berkeley: University of California Press, 1992).

2 André Berthier, "Un maître orientaliste du XIIIe siècle: Raymond Martin, O.P.," *Archivum Fratrum Praedicatorum* 6 (1936): 267–311; Ina Willi-Plein and Thomas Willi, *Glaubensdolch und Messiasbeweis: Die Begegnung von Judentum, Christentum und Islam im 13. Jahrhundert in Spanien* (Neukirchen-Vluyn: Neukirchener Verlag, 1980); Ryan Szpiech, "Translation, Transcription, and Transliteration in the Polemics of Raymond Martini, O.P.," in *Translating the Middle Ages*, ed. Karen L. Fresco and Charles D. Wright (Aldershot: Ashgate, 2012), 171–187. On the wider context, see Berthold Altaner, "Die fremdsprachliche Ausbildung der Dominikanermissionare während des 13. und 14. Jahrhunderts," *Zeitschrift für Missionswissenschaft* 23 (1933): 233–241; Angel Cortabarría Beitia, "Los 'Studia linguarum' de los Dominicos en los siglos XIII y XIV," in *La controversia judeocristiana en España* (*desde los orígenes hasta el siglo XIII*), ed. Carlos del Valle Rodríguez (Madrid: CSIC, Instituto de Filología, 1998), 255–276.

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only laid during the twelfth century, when an interest in the literal-historical interpretation of the biblical text, spearheaded by the school of the Abbey of St. Victor near Paris, gained new importance.[3] A pioneering role in this respect was played by the famous Victorine exegete Hugh (d. 1141), who repeatedly sought the advice of neighbouring rabbis and incorporated their scriptural interpretations into his own writings.[4] The gravitation towards Jewish biblical scholarship was even stronger in the work of one of Hugh's students, the Englishman Andrew of St. Victor (ca. 1110–1175),[5] whose predilections were also shared by his

3 On the general background, see Berthold Altaner, "Zur Kenntnis des Hebräischen im Mittelalter," *Biblische Zeitschrift* 21 (1933): 288–308; Aryeh Grabois, "The *Hebraica veritas* and Jewish-Christian Intellectual Relations in the Twelfth Century," *Speculum* 50 (1975): 613–634; Gilbert Dahan, "Juifs et Chrétiens en Occident médiéval: la rencontre autour de la Bible (XIIe–XIVe siècles)," *Revue de Synthèse* 110 (1989): 3–31; Dahan, "Les interprétations juives dans les commentaires du pentateuqe de Pierre le Chantre," in *The Bible in the Medieval World: Essays in Memory of Beryl Smalley*, ed. Katherine Walsh and Diana Wood (Oxford: Blackwell, 1985), 131–155; Dahan, *Les intellectuels*, 239–307; Raphael Loewe, "The Mediaeval Christian Hebraists of England: Herbert of Bosham and Earlier Scholars," *Transactions of the Jewish Historical Society of England* 17 (1953): 225–249; Michael A. Signer, "Polemic and Exegesis: The Varieties of Twelfth-Century Hebraism," in *Hebraica Veritas? Christian Hebraists and the Study of Judaism in Early Modern Europe*, ed. Allison P. Coudert and Jeffrey S. Shoulson (Philadelphia: University of Pennsylvania Press, 2004), 21–32; Nicholas de Lange, "Hebrew and Jewish Studies in Great Britain," in *Jewish Studies and the European Academic World*, ed. Albert van der Heide and Irene E. Zwiep (Paris: Peeters, 2005), 127–151; Constant J. Mews and Micha J. Perry, "Peter Abelard, Heloise and Jewish Biblical Exegesis in the Twelfth Century," *Journal of Ecclesiastical History* 62 (2011): 3–19; Anna Sapir Abulafia, "The Bible in Jewish-Christian Dialogue," in *The New Cambridge History of the Bible*, vol. 2, *From 600 to 1450*, ed. Richard Marsden and E. Ann Matter (Cambridge: Cambridge University Press, 2012), 616–637 (629–633); Paul Saenger, "The Twelfth-Century Reception of Oriental Languages and the Graphic *Mise en page* of Latin Vulgate Bibles Copied in England," in *Form and Function in the Late Medieval Bible*, ed. Eyal Poleg and Laura Light (Leiden: Brill, 2013), 31–66.

4 Rebecca Moore, *Jews and Christians in the Life and Thought of Hugh of St. Victor* (Atlanta, GA: Scholars Press, 1998). On the 'Victorine' school, see further Smalley, *The Study*, 83–195; Michael A. Signer, "*Peshat, Sensus Litteralis*, and Sequential Narrative: Jewish Exegesis and the School of St. Victor in the Twelfth Century," in *The Frank Talmage Memorial Volume*, ed. Barry Walfish, 2 vols. (Haifa: Haifa University Press, 1992–1993), 1:203–216; Grover A. Zinn, "History and Interpretation: 'Hebrew Truth', Judaism, and the Victorine Exegetical Tradition," in *Jews and Christians: Exploring the Past, Present, and Future*, ed. James H. Charlesworth (New York: Crossroad, 1990), 100–122.

5 Wiliam McKane, *Selected Christian Hebraists* (Cambridge: Cambridge University Press, 1989), 42–75; Rainer Berndt, *André de Saint-Victor (†1175)* (Paris: Brepols, 1991); Berndt, "La pratique exégétique d'André de Saint-Victor: tradition Victorine et influence rabbinique," in *L'Abbaye parisienne de Saint-Victor au Moyen Âge*, ed. Jean Longère (Paris: Brepols, 1991),

compatriot Herbert of Bosham (ca. 1120–ca. 1194), a member of Thomas Becket's episcopal household and perhaps the most accomplished Christian Hebraist of his time.[6]

Despite exceptional cases like Hebert of Bosham, however, only few twelfth-century Christian scholars knew the Hebrew language well enough to access the requisite literature by themselves. This situation changed in the thirteenth century, when knowledge of Hebrew became more widespread among Christians. From pre-expulsion England, we still have more than two dozen Hebrew and bilingual Hebrew-Latin manuscripts that served Christian scholars in their studies, some of them produced with the assistance of Jewish scribes.[7] These

271–290; Frans van Liere, "Andrew of St. Victor, Jerome, and the Jews: Biblical Scholarship in the Twelfth-Century Renaissance," in *Scripture and Pluralism*, ed. Thomas J. Hefferman and Thomas E. Burman (Leiden: Brill, 2005), 59–75; Michael A. Signer, "Introduction" to Andrew of St. Victor, *Expositio in Ezechielem* (CCCM 53E), ix–xxxvii.

6 Deborah L. Goodwin, "*Take Hold of the Robe of a Jew*" (Leiden: Brill, 2006); Eva de Visscher, "The Jewish-Christian Dialogue in Twelfth-Century Western Europe: The Hebrew and Latin Sources of Herbert of Bosham's *Commentary on the Psalms*" (PhD Diss., University of Leeds, 2003); de Visscher, "'Closer to the Hebrew': Herbert of Bosham's Interpretation of Literal Exegesis," in *The Multiple Meaning of Scripture*, ed. Ineke van 't Spijker (Leiden: Brill, 2009), 249–272; de Visscher, "Cross-Religious Learning and Teaching: Hebraism in the Works of Hebrew of Bosham and Contemporaries," in *Crossing Borders*, ed. Piet van Boxel and Sabine Arndt (Oxford: Bodleian Library, 2009), 123–132; de Visscher, "Putting Theory into Practice? Hugh of Saint Victor's Influence on Herbert of Bosham's 'Psalterium cum commento'," in *Bibel und Exegese in der Abtei Saint-Victor zu Paris*, ed. Rainer Berndt (Münster: Aschendorff, 2009), 491–502; de Visscher, *Reading the Rabbis* (Leiden: Brill, 2014).

7 See the important work of Judith Olszowy-Schlanger, "The Knowledge and Practice of Hebrew Grammar among Christian Scholars in Pre-Expulsion England: The Evidence of 'bilingual' Hebrew-Latin Manuscripts," in *Hebrew Scholarship and the Medieval World*, ed. Nicholas de Lange (Cambridge: Cambridge University Press, 2001), 107–128; Olszowy-Schlanger, *Les manuscrits hébreux dans l'Angleterre médiévale* (Paris: Peeters, 2003); Olszowy-Schlanger, "A Christian Tradition of Hebrew Vocalization in Medieval England," in *Semitic Studies in Honour of Edward Ullendorff*, ed. Geoffrey Khan (Leiden: Brill, 2005), 126–146; Olszowy-Schlanger, "Robert Wakefield and the Medieval Background of Hebrew Scholarship in Renaissance England," in *Hebrew to Latin, Latin to Hebrew*, ed. Giulio Busi (Turin: Aragno, 2006), 61–87. See further Smalley, *The Study*, 338–355; *Catalogue of an Exhibition of Anglo-Jewish Art and History* (London: East and West Library, 1956), 88–90; Raphael Loewe, "Latin *Superscriptio* Manuscripts on Portions of the Hebrew Bible other than the Psalter," *Journal of Jewish Studies* 9 (1958): 63–71; Loewe, "Jewish Scholarship in England," in *Three Centuries of Anglo-Jewish History*, ed. V.D. Lipman (Cambridge: Heffer, 1961), 125–148; Loewe, "Hebrew Books and 'Judaica' in Mediaeval Oxford and Cambridge," in *Remember the Days*, ed. John M. Shaftesley (London: The Jewish Historical Society of England, 1966), 23–48; Michael A. Signer, "Thirteenth Century

include Hebrew Psalters with Latin 'superscriptions' (i.e. word-for-word interlinear translations), the prototype for which is known as the *Superscriptio Lincolniensis*, because it was once thought to have been commissioned by Robert Grosseteste (d. 1253), the famed bishop of Lincoln.[8] Together these manuscripts attest to a remarkable familiarity with the Hebrew language and rabbinic sources within a largely anonymous elite of Christian scholars in thirteenth-century England, some of them located at Ramsey Abbey in East Anglia. The crowning achievement of the latter group is a trilingual biblical dictionary encompassing 3682 separate entries, which translated Hebrew terms into both Latin and Old French, supplemented by illustrative quotes from the biblical source texts and references to rabbinic literature.[9] Where names can be attached to Hebraistic efforts undertaken in this period, they often belong to

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Christian Hebraism: The *Expositio* on Canticles in MS. Vat. Lat. 1053," in *Approaches to Judaism in the Middle Ages*, ed. David R. Blumenthal, 3 vols. (Chico, CA: Scholars Press, 1984–1988), 3:89–100; Malachi Beit-Arié, "The Valmadonna Pentateuch and the Problem of Pre-Expulsion Anglo-Hebrew Manuscripts—MS London, Valmadonna Trust Library 1: England [?], 1189," in *The Makings of the Medieval Hebrew Book* (Jerusalem: Magnes Press, 1993), 129–151; Gilbert Dahan, "La connaissance de l'hébreu dans les correctoires de la Bible du XIIIe siècle: notes preliminaires," *Revue théologique de Louvain* 23 (1992): 178–190; Dahan, "L'enseignement de l'hébreu en Occident médiéval (XIIe–XIVe siècles)," *Histoire de l'éducation* 57 (1993): 3–22; Dahan, "Lexiques hébreu/latin? Les recueils d'interprétations des noms hébraïques," in *Les manuscrits des lexiques et glossaires de l'Antiquité tardife à la fin du Moyen Âge*, ed. Jacqueline Hamesse (Louvain-la-Neuve: Fédération Internationale des Instituts d'Études Médiévales, 1996), 481–526; Dahan, "La critique textuelle dans les correctoires de la Bible du XIIIe siècle," in *Langages et philosophie: Hommage à Jean Jolivet*, ed. Alain de Libera, Abdelali Elamrani-Jamal, and Alain Galonnier (Paris: Vrin, 1997), 365–392; Dahan, "Deux psautiers hébraïques glosés en latin," *Revue des études juives* 158 (1999): 61–87; Dahan, *L'exégèse chrétienne de la Bible en Occident médiéval, XIIe–XIVe siècle* (Paris: Les Éditions du Cerf, 1999), 200–204, 376–387.

8 Beryl Smalley, *Hebrew Scholarship among Christians in XIIIth century England* (London: Shapiro, Vallentine & Co, 1939); Raphael Loewe, "The Mediaeval Christian Hebraists of England: The Superscriptio Lincolniensis," *Hebrew Union College Annual* 28 (1957): 205–252; David J. Wasserstein, "Grosseteste, the Jews and Mediaeval Christian Hebraism," in *Robert Grosseteste: New Perspectives on His Thought and Scholarship*, ed. James McEvoy (Turnhout: Brepols, 1995), 357–376; James McEvoy, *Robert Grosseteste* (Oxford: Oxford University Press, 2000), 120–121. Convincing arguments against this traditional ascription are offered by Olszowy-Schlanger, *Les manuscrits*, 54–55.

9 Judith Olszowy-Schlanger, "A School of Christian Hebraists in Thirteenth-Century England: A Unique Hebrew-Latin-French and English Dictionary and Its Sources," *European Journal of Jewish Studies* 1 (2007): 249–277; Olszowy-Schlanger, ed., *Dictionnaire hébreu-latin-français de la Bible hébraïque de l'Abbaye de Ramsey* (*XIIIe s.*) (Turnhout: Brepols, 2008).

members of the Franciscan order, which produced luminaries such as William de la Mare (fl. 1272–1279) and Roger Bacon (d. after 1292). The Franciscan dominance in Hebrew studies during this period is also noticeable in France, where Nicholas of Lyra (ca. 1270–1349) drew heavily on Rashi, the Masoretic text of the Bible, the Targum, the Talmud, and other Jewish sources in the elaboration of his highly influential *Postilla litteralis super Bibliam* (1322–1332).[10]

Perhaps the most impressive testimony to thirteenth-century Christian engagement with the Hebrew language is a collection of linguistic and exegetical notes, which is found adjoined to William de la Mare's biblical *correctorium* in two manuscripts from Toulouse and Florence (s. XIII^{ex}/XIV^{in}). Besides an etymological lexicon or glossary for Greek and Hebrew terms in the Bible, this collection also contains a remarkable series of excerpts from an epistolary correspondence, in which an unnamed Christian Hebraist replies to queries from his students, whom he refers to as "brothers" (*fratres*), suggesting that they were members of a monastic order.[11] The respondent was evidently acquainted with the works of Rashi and maintained personal contacts to Jews. At one point he claims that a learned Jew in Germany sent him Hebrew books on astronomical and calendrical matters that he had been requesting for a long time:

10 See now Deborah Copeland Klepper, "Nicholas of Lyra and Franciscan Interest in Hebrew Scholarship," in *Nicholas of Lyra*, ed. Philip D.W. Krey and Lesley Smith (Leiden: Brill, 2000), 289–311; Klepper, *The Insight of Unbelievers: Nicholas of Lyra and Christian Reading of Jewish Text in the Later Middle Ages* (Philadelphia: University of Pennsylvania Press, 2007); Ari Geiger, "A Student and an Opponent: Nicholas of Lyra and His Jewish Sources," in *Nicolas de Lyre*, ed. Gilbert Dahan (Paris: Institut d'Études Augustiniennes, 2011), 167–203.

11 MSS Toulouse, Bibliothèque municipale, 402, fols. 233ra–78^{vb}; Florence, BML, Plut. 25 sin. 4, fols. 182ra–213^{vb}. The glossary, without the correspondence, is also preserved in MS Einsiedeln, Stiftsbibliothek, 28, fol. 488^{r}–495^{r}. See Samuel Berger, *Quam notitiam linguae Hebraicae habuerint Christiani medii aevi in Gallia* (Paris: Hachette, 1893), 37–45; Samuel A. Hirsch, "Presidential Address," *Transactions of the Jewish Historical Society of England* 7 (1915): 1–18 (13–18); H.H.E. Craster, "A Hebrew Psalter," *Bodleian Quarterly Record* 3 (1920–1922): 68–70; Dahan, *Les intellectuels*, 255; Étienne Anheim, Benoît Grévin, and Martin Morard, "Exégèse judéo-chrétienne, magie et linguistique: un recueil de *Notes* inédites attribuées à Roger Bacon," *Archives d'histoire doctrinale et littéraire du Moyen Âge* 68 (2001): 95–154; Benoît Grévin, "L'hébreu des franciscains: nouveaux éléments sur la conaissance de l'hébreu en milieu chrétien au XIIIe siècle," *Médiévales* 41 (2001): 65–82; Grévin, "Systèmes d'écriture, sémiotique et langage chez Roger Bacon," *Histoire—Épistémologie—Langage* 24 (2002): 75–111 (106–108).

You ask me if I have seen the book entitled *On the canons of the Hebrews*, in which the length of the year is determined. I respond: I possess Hebrew books on this subject matter, particularly on the new moon, which has been investigated far more reliably by the Hebrews than it has been by the Arabs or Latins. And know that certain Hebrew books have been sent to me from Germany by a most ingenious Jew, who knew me only from reputation and who already wrote to me a number of times in Hebrew and I [wrote back] to him. These books, however, were composed by Abraham and they contain more words than the *Priscian major*, not counting the many tables that are placed in the various parts of the book, just like we can see among our [books] in Ptolemy's *Almagest*. And these astronomical books are extraordinarily subtle and beautiful and more useful than others I have seen and they treat both theoretical and judicial astronomy and contain many astonishing things. I had for a long time struggled to get my hands on these books, because I had known from other Jewish writings that they had been published and I had written several times to a Jew known to me, who lives in the city of Toledo in Spain, so that he would search for these books for me; and he already once replied that he could not find them in Toledo, except for a few chapters. But now, God be praised, I have them complete and I intend to translate them when I have the time. Farewell![12]

12 MS Florence, BML, Plut. 25 sin. 4, fol. 205$^{rb–va}$: "Queritis a me utrum viderim librum qui intitulatur 'de canonibus Hebreorum', in quo certificatur quantitas anni. Respondeo: habeo libros Hebraicos de hac materia, potissime de primatione lune, que certius longe excogitata est ab Hebreis quam ab Arabibus vel a Latinis. Et sciatis quod missi sunt michi quidam libri Hebraici de Alemannia a quodam Iudeo ingeniosissimo qui me novit ex fama tantum et iam aliquotiens scripsit michi in Hebreo et ego sibi. Illos autem libros composuit Abraham, et est in eis plus de littera quam in 'Prisciano maiori', exceptis [tabulis] multis que site sunt in diversis partibus libri, sicut apud nos videmus factum in 'Almagesti' Ptholomei. Et sunt illi libri astronomici subtilissimi et pulcherrimi et utiliores quam alias viderim, et loquntur de theorica astronomie et de iudiciis astronomicis, et sunt ibi multa mirabilia. Et diu laboraveram ad habendum aliquid de libris illis, quia per alia scripta Iudeorum noveram eos esse editos, et pluries scripseram cuidam Iudeo noto meo, qui moratur in civitate Tholetana in Hyspania, ut quereret michi libros illos, et iam semel rescripserat quod non inveniebantur Toleti nisi pauca capitula ex eis. Modo habeo eos perfecte, benedictus Deus, et intendo eos tranferre cum tempus habuero. Valete." The same passage, as found MS Toulouse, Bibliothèque municipale, 402, fol. 267^{v}, was previously edited in Berger, *Quam notitiam*, 39; Anheim, Grévin, and Morard, "Exégèse," 118–119n58.

Scholars have repeatedly speculated on the identity of this Hebraist and his correspondents, most of them settling for Roger Bacon or a member of his exegetical 'school'.[13] In 2001, Étienne Anheim, Benoît Grévin, and Martin Morard published a detailed study comparing the collection with Bacon's known works. According to their conclusion, the scholar replying in these letters was most likely Bacon himself, while the excerpts in question were later compiled by William de la Mare, who belonged to the circle of his students.[14] Roger Bacon, who also wrote a fragmentarily preserved Hebrew grammar, has indeed long been known for his linguistic and philological leanings.[15] Throughout his great compendia on science and learning, the *Opera majus*, *minus*, and *tertium* (1266/68) and his *Compendium studii philosophiae* (1271/72), there is a marked emphasis on the study of languages, in particular Greek and Hebrew, and their necessity for the advancement of biblical interpretation. In the *Compendium*, he claims that Jews willing to teach Hebrew to Christians were found "everywhere," especially in Paris and France, thus indicating where he picked up his own knowledge of the language.[16] Among the numerous points of con-

13 Hirsch, "Presidential Address," 15, thinks of Bacon or, rather, a "product of Roger Bacon's school." Slightly more circumspect is the statement in Berger, *Quam notitiam*, 44–45: "Non audeam ipsum Rogerum Baconem nominare, quamvis in multis cum magno viro verbo tenus concordet et quamquam eadem orationis redundantia laboret quae Baconis vitium est. Sed si non ipse Baco fuit, saltem cum illo conjunctissimus fuit et qui tam prope ad eum accederet, ut cum eo confundi posset." See also Dahan, *Les intellectuels*, 255; Olszowy-Schlanger, *Les manuscrits*, 6: "… qui émane d'un hébraïsant chrétien appartenant probablement au cercle de Roger Bacon."

14 Anheim, Grévin, and Morard, "Exégèse," 118–139; Grévin, "L'hébreu," 67–68.

15 Edmond Nolan and Samuel A. Hirsch, *The Greek Grammar of Roger Bacon and a Fragment of His Hebrew Grammar* (Cambridge: Cambridge University Press, 1902), 199–208. See further Samuel A. Hirsch, "Early English Hebraists: Roger Bacon and His Predecessors," *Jewish Quarterly Review* 12 (1899–1900): 34–88; Hirsch, "Roger Bacon and Philology," in *Roger Bacon*, ed. Andrew G. Little (Oxford: Clarendon Press, 1914), 101–151; Hans H. Wellisch, *The Conversion of Scripts: Its Nature, History, and Utilization* (New York: Wiley, 1978), 154–161; Horst Weinstock, "Roger Bacon und das 'hebräische' Alphabet," *Aschkenas* 2 (1992): 15–48; Smalley, *The Study*, 329–336; Olszowy-Schlanger, "The Knowledge," 108–111, 120, 124. On Bacon's career more generally, see now Amanda Power, "Seeking Remedies for Great Danger: Contemporary Appraisals of Roger Bacon's Expertise," in *Knowledge, Discipline, and Power in the Middle Ages*, ed. Joseph Canning, Edmund King, and Martial Staub (Leiden: Brill, 2011), 63–78; Power, *Roger Bacon and the Defence of Christendom* (Cambridge: Cambridge University Press, 2013), with ample references to further literature.

16 Roger Bacon, *Compendium studii philosophiae*, in *Opera quaedam hactenus inedita*, ed. Brewer, 434: "Doctores autem non desunt; quia ubique sunt Hebraei … Suntque homines Parisius, et in Francia, et ulterius in omnibus regionibus, qui de his sciunt quantum

vergence that exist between the anonymous correspondence and Bacon's own works is the shared interest in biblical chronology and the structure of the Hebrew calendar.[17] In the learned notes in question, this interest is reflected, for instance, in passages that deal with the names of the months in relation to the season of the Flood,[18] with various chronological problems relating to the lives of the patriarchs Abraham and Caleb, and with the reigns of the Kings of Israel and Juda.[19] Other examples include a discussion of the date of the giving of the Law at Sinai based on the length of the Hebrew months, which resulted from a question posed to the master by one of his students.[20]

To a degree, such interest in biblical chronology was a general hallmark of the historical writing practiced among the mendicant orders during the thirteenth and fourteenth centuries.[21] One particularly noteworthy author in this regard is the Dominican Giles (Aegidius) of Lessines, whose historical-chronological views seem to have had some influence on Bacon's writings. Giles was the author of a massive *Summa de temporibus* (also known as *De concordia temporum*), comprised of three books, which appear to have been written in stages between 1260 and 1264.[22] The first of these (*De temporibus*)

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necesse fuerit in hac parte." Cf. Wasserstein, "Grosseteste," 362, who agrees that "We may suppose, though it cannot be proven, that a large part of the Hebrew learning acquired by English Christian scholars came, not from English Jews, literally on the their doorstep, but from Jews in northern France, virtually all in Paris."

17 On this point, see Anheim, Grévin, and Morard, "Exégèse," 119–120, 152.

18 MS Florence, BML, Plut. 25 sin. 4, fol. 188^{rb}. See also the discussion of Hebrew month names and their order ibid., fol. 213$^{rb–vb}$.

19 Ibid., fols. 188^{rb}–88va, 191va, 192va. See also n. 37 below.

20 Ibid., fols. 207^{vb}, 209$^{ra–b}$. Cf. Bacon, *Opus majus*, 1:200–201; Bacon, *Opus tertium*, 216–217. Further examples are mentioned in Anheim, Grévin, and Morard, "Exégèse," 152n149.

21 Bert Roest, "Later Medieval Institutional History," in *Historiography in the Middle Ages*, ed. Deborah Mauskopf Deliyannis (Leiden: Brill, 2003), 277–315 (308–314).

22 For details, see Ferdinand M. Delorme, "De auctore Compoti sub nomine Rogeri Baconis recenter editi," *Antonianum* 14 (1939): 313–322. In what follows, I shall cite the text according to MS Bologna, Biblioteca Universitaria, 1845 (957), fols. 1^{r}–88^{vb}. A different recension of the text, which includes a heavily reworked version of book II, but omits all of book III, is found in MSS Arras, Bibliothèque municipale, 674 (722), fols. 3^{r}–123^{r}; Paris, BnF, lat. 15268, fols. 211^{r}–229^{r}. Some brief excerpts from the Paris MS are quoted in Jacques Quétif and Jacques Échard, *Scriptores ordinis Praedicatorum recensiti*, 2 vols. (Paris: Ballard & Simart, 1719–1721), 1:371–372. On the author, see also William A. Wallace, s.v. "Giles (Aegidius) of Lessines," *CDSB* 5:401–402; Martin Grabmann, *Mittelalterliches Geistesleben*, 3 vols. (Munich: Hueber, 1926–1956), 2:512–530; Lynn Thorndike, "Aegidius of Lessines on Comets," in *Studies and Essays in the History of Science and Learning*, ed. M.F. Ashley

is a systematic run through the chronology of the Old Testament and the subsequent profane history leading up to Christ, with individual chapters being dedicated to the solution of chronological problems and the careful collation of different ways of reckoning. Aside from the Bible, in both its Vulgate and Septuagint recensions, Giles also makes strong use of chronographic and astronomical sources, most importantly Ptolemy's *Almagest*, from which he derived the idea that ancient chronology could be reconstructed or rectified on the basis of astronomical calculations. The second book (*De termino paschali*) mainly revolves around the year of Christ's incarnation and the date of his death, which are once again determined by astronomical means. In the third book, which has been falsely edited as a *Compotus* by Roger Bacon, Giles deals with both the astronomical basis of time reckoning and the minutiae of the ecclesiastical calendar.[23] Among the most striking aspects of this part of the *Summa* is the systematic and detailed way in which Giles engages with the Islamic lunar calendar (in the calculated form used by Arabic astronomers), for which he offers a series of elaborate tables. These enable his readers to adapt the Arabic lunar reckoning to the Julian calendar and use it as a possible template for correcting the data produced by the Easter *computus*.[24]

Although Roger Bacon was likewise well informed about the Arabic calendar, his greatest sympathies seem to have been reserved for that of the Jews.[25] When he sent his *Opus majus* to the papal curia in Viterbo in ca. 1267, he made sure that it was accompanied by a Hebrew calendar manuscript, hoping

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Montagu (New York: Schuman, 1946), 405–414; Olga Weijers, *Le travail intellectuel à la Faculté des arts de Paris: textes et maîtres* (*ca. 1200–1500*), 9 vols. (Turnhout: Brepols, 1994–2012), 2:62–64.

23 Edited as *Compotus Fratris Rogeri* in Steele, ed., *Opera hactenus inedita*, 1–211. Giles's authorship of this *Compotus* and its influence on Bacon are conclusively demonstrated by Delorme, "De auctore Compoti." See also Ferdinand M. Delorme, "Manuscrit du 'Computus' de Roger Bacon annoté par Guillaume de Saint-Cloud," *Antonianum* 11 (1936): 554–562. In Nothaft, *Dating*, 157–160, 165–171, 173, 198, I unfortunately perpetuated the mistaken ascription of this material to Roger Bacon, which still pervades most scholarship on the matter.

24 Giles of Lessines, *Summa de temporibus* (III.1.18; III.3.1–3, 3.6), MS Bologna, BU, 1845, fols. 57^{vb}–58^{vb}, 79^{ra}–81^{rb}, 83^{va}–87^{rb} = Steele, ed., *Opera hactenus inedita*, 73–76, 151–159, 167–179.

25 Nothaft, *Dating*, 178–196. See also Jacob Guttmann, "Ueber einige Theologen des Franziskanerordens und ihre Beziehungen zum Judenthum," *Monatsschrift für Geschichte und Wissenschaft des Judenthums* 40 (1895–1896): 314–329 (323–325); Guttmann, *Die Scholastik des dreizehnten Jahrhunderts in ihren Beziehungen zum Judenthum und zur jüdischen Literatur* (Breslau: Marcus, 1902), 147–148.

perhaps that it would convince his sponsor Pope Clement IV to lend financial support to this sort of chronological study. He keenly praised the Jewish calendar as an "extraordinary work of astronomical art," adding that its knowledge could be useful in the Church's ongoing efforts to "convince," i.e. to convert, the Jews.[26] In his *Opus tertium*, written as a supplement to the *Opus majus*, Bacon reinforced the importance of the Jewish calendar for Christians by stating that "our Lord and the Apostles were Hebrews, as were the Patriarchs and Prophets."[27] The context for this striking reminder was Bacon's discussion of various chronological problems in Scripture, pride of place among which was taken by the date of Christ's Passion. Like Reinher of Paderborn one century earlier, he endorsed a solution of this vexed chronological problem that bypassed the ecclesiastical Easter cycles and instead tried to reconstruct the historical Passover dates as celebrated by the Jews at the time of Jesus. Using astronomical tables, he reached the conclusion that Jesus's crucifixion had taken place on 3 April 33 CE, a date that had never been proposed before (see pp. 198–199).

Yet Bacon's concern for biblical chronology was by no means restricted to the life of Jesus. As he explained to the pope in the *Opus tertium*, he considered "the course of history through all the ages and generations, from the beginning of the world to the time of Christ" to be the most important aspect of all of Sacred Scripture.[28] In order to underscore this point, he offered a whole list of chronological conundrums that awaited solution at the hands of Christian exegetes. One of the most pressing problems concerned the precise age of the world, for which divergent estimates were current throughout the Middle Ages.[29] The highly influential chronicle of Eusebius, written at the beginning of the fourth century and translated into Latin by Jerome of Stridon, counted 5198

26 Bacon, *Opus tertium*, 220: "Et in hac tabula est mirum artificium astronomiae, et summa legis intelligendae utilitas, et omnium festorum legalium, quam qui nescit numquam potest scire intellectum legis, ut oportet, nec cum Judaeis conferre de talibus, nec eis persuadere utiliter." See also ibid., 214–215; Bacon, *Opus minus*, in *Opera quaedam hactenus inedita*, ed. Brewer, 320.

27 Bacon, *Opus tertium*, 213: "Nam Dominus noster et apostoli fuerunt Hebraei, sicut patriarchae et prophetae."

28 Bacon, *Opus tertium*, 204: "Nam maxima inter omnes considerationes Scripturae Sacrae est de cursu historiae a principio mundi usque ad Christum, per omnes aetates et saecula."

29 See, e.g., Vincent of Beauvais, *Speculum historiale* (2.115; 6.88), ed. in *Speculum quadruplex*, 4 vols. (Douai, 1624; repr. Graz: Akademische Druck- u. Verlagsanstalt, 1964–1965), 4:84, 203–204. On the background, see John D. North, "Chronology and the Age of the World," in *Cosmology, History, and Theology*, ed. Wolfgang Yourgrau and Allen D. Breck (New York: Plenum Press, 1977), 307–333.

years from Adam to the incarnation of Christ.[30] Orosius, in his *History against the Pagans*, closely followed Eusebius in positing 3184 + 2015 = 5199 years from Adam to Christ,[31] whereas according to the era advocated by the Venerable Bede in the eighth century, the same period only encompassed 3952 years.[32] Roger Bacon added to this already bewildering variety the observation that the Jews used an estimate that turned out to be even more conservative than Bede's, counting merely 3760 complete years between Creation and Christ.[33] These differences were partly rooted in the fact that the ages of the patriarchs at fathering their first-born sons, as recounted in the books of Genesis, are considerably higher in the Septuagint than they are in the original Hebrew text. For the time between the creation of the world and Noah's Flood, the sums of these ages lead to diverging tallies of 2242 vs. 1656 years.[34] Bacon was aware that such textual variants also afflicted Noah's grandson Arpachshad, who lived 403 years after fathering his son according the Hebrew text, whereas Jerome's Latin Vulgate reduced this number to 303 years. Even more confusingly, the Septuagint gave to Arpachshad a son named Kenan (cf. Luke 3:36), who is completely absent in the Hebrew version, and thus added another 130 years to the postdiluvian chronology.[35]

Many further contradictions could be detected not just between different Bible versions, but also within the text itself. One noteworthy case, for which Bacon again alluded to the Jewish take on things, was the problem of Abraham's age when he left Haran. According to the sacred text (Genesis 12:4), this age should have been 75 years, but it is also implied that he embarked on his migration only after his father Terah's death (cf. Acts 7:2–4). The latter is said to

30 Eusebius, *Die Chronik des Hieronymus*, ed. Rudolf Helm (Berlin: Akademie-Verlag, 1956), 173–174, 250.

31 Orosius, *Historia adversum paganos* 1.1 (CSEL 5, 6).

32 See now Daniel McCarthy, "Bede's Primary Source for the Vulgate Chronology in His Chronicles in *De Temporibus* and *De Temporum Ratione*," in *Computus and its Cultural Context in the Latin West, AD 300–1200*, ed. Immo Warntjes and Dáibhí Ó Cróinín (Turnhout: Brepols, 2010), 159–189.

33 Roger Bacon, *Opus tertium*, 205–206. Giles of Lessines discusses no less than nine different estimates on the basis of the Hebrew version alone and nine further ones for the Septuagint. See Giles of Lessines, *Summa de temporibus* (I.1.1; 1.7; 1.9), MS Bologna, BU, 1845, fols. $1^{r–v}$, $7^{va–b}$, 9^{ra}.

34 See Jeremy Hughes, *Secrets of the Times: Myth and History in Biblical Chronology* (Sheffield: JSOT Press, 1990).

35 Bacon, *Opus tertium*, 206. Eusebius disregarded this addition in his own Septuagint-based chronology, which explains why his chronicle only counts 942 instead of 1072 years for the period from the Flood to Abraham.

have lived for 205 years, begetting Abraham at the age of 70 (Genesis 11:26–32). Based on these numbers, Abraham should have already been 135 years when he left his father's house. Bacon briefly mentioned that both "Augustine, Jerome, and the Hebrews" had tried their hands at solutions of this problem, but that there were insurmountable objections to each of them.[36] By the 'Hebrews' he may well have intended the argument recounted in the aforementioned anonymous collection of Hebraistic notes, where reference is made to the *glosa Hebraica*. This argument, which occurs in somewhat similar form in Rashi's commentary and the *Midrash Rabbah* on Genesis, essentially goes that Abraham left his father 60 years before his death, because Terah was an idolater. But "out of respect for his son Abraham," Scripture wisely chose to call Terah 'dead', thus reflecting the spiritual death of the idolatrous sinner.[37]

Before we turn to the work of Robert of Leicester, whose work shows a number of striking affinities to that of Roger Bacon, it will be worth pointing to one

36 Ibid.: "Augustinus nititur hoc solvere, et Hieronymus, et Hebrei; sed valida et insolubilia adhuc fiunt argumenta contra quamlibet solutionem." See Augustine, *Quaestiones in Heptateuchum*, Quaest. Gen. 25 (CCSL 33, 8–10); Augustine, *De civitate dei* 16.15 (CCSL 48, 518–520); Jerome, *Quaestiones Hebraicae in Genesim* 12.4 (CCSL 72, 15–16). Jerome cites a 'Jewish' tradition according to which Abraham's years are counted not from his actual birth, but from his exit from Ur in Chaldaea. This opinion is also briefy reported by Augustine. See the commentary in C.T.R. Hayward, trans., *Saint Jerome's* Hebrew Questions on Genesis (Oxford: Clarendon Press, 1995), 148–149. A third explanation, offered only by Augustine, is that Terah began to beget his three sons at the age of 70, but was already 130 when he finally begat Abraham. This is the solution followed by Giles of Lessines, *Summa de temporibus* (I.1.3), MS Bologna, BU, 1845, fol. 2$^{rb–va}$.

37 MS Florence, BML, Plut. 25 sin. 4, fol. 188va: "Et dicit Glosa quod ideo Abraham exivit de Haram et recessit a patre suo 60 annis ante mortem eius, quia tum Thare esset ydolator. Abraham volebat ab eo recedere et noluit exspectare senium patris, sed recessit ab eo cum adhuc Thare esset fortis et robustus, ne si in senio recessisset ab eo reputaretur inhumanus, quod patrem debilem senio reliquisset. Postea ponit aliam solutionem dicte questionis et dicit quod olim circa solvebatur hec quomodo quod Thare dicit esse 205 annorum ante egressum Abrahe, hec dicit per anticipationem, ut dictum est. Sed de Thare mortuus tempore egressus Abrahae de Haram, hec non est anticipatio, quia licet adhuc victurus est Thare 60 annis, tunc dicitur mortuus, quia erat ydolator. Vita enim peccatorum dicitur mors, sicut est mors iustorum vita. Et precipue inter peccatores omnis ydolator dicitur mortuus, quia ydola debent esse mortua seu vitam non habere. Aures habent, non audient etc. … Et ideo scriptura, cum dicit hic de Thare quod mortuus est cum egressus est Abraham de Haran, signat nobis quod Thare ydolator erat. Sed propter reverentiam Abrahe filii sui noluit eum expresse appellare ydolator." Cf. Rashi on Genesis 11:32; *Genesis Rabbah* 39.7. For the use of Rashi in these Hebraistic notes and by Bacon, see Anheim, Grévin, and Morard, "Exégèse," 108, 133–135.

further example of rabbinic sources being studied for chronological purposes in mid-thirteenth-century England. The evidence comes form MS Oxford, Corpus Christi College 6, which contains the Hebrew text of Rashi's commentaries on the Prophets and Hagiographa. It was later furnished with corrections and vowel points by a Christian scholar, who also added Latin *superscriptio* translations and marginal glosses. One of the more elaborate of these glosses dealt with a chronological discrepancy of 14 years that existed between Jacob's own statement to the Pharaoh that he was 130 years old (Genesis 47:9) and the 116 years that can be attained by adding up the individual numbers found in Genesis. The gloss suggests, in line with a commonly found rabbinic solution, that the missing 14 years were spent at the house of Sem and Heber, where Jacob had stayed after Ismael's death (at the age of 63).[38] As Judith Olszowy-Schlanger has shown, the Latin gloss is in fact a literal translation of a Hebrew chronological text found on the flyleaves of MS Oxford, Bodleian Library, Or. 62, which was annotated by the same Latin commentator as Corpus Christi College 6.[39] The two codices jointly confirm that the confluence of Hebraistic and chronological interests in thirteenth-century England, which is clearly detectable in Roger Bacon's work, was by no means restricted to the quirks of this legendary *doctor mirabilis*. Robert of Leicester's treatise, to be discussed next, is a further impressive testimony to this fact.

2 Manuscripts, Date, and Authorship

The programme of rectifying biblical chronology on the basis of the Hebrew calendar, which is already hinted at in Roger Bacon's writings, was put into full practice at the end of the century by the Franciscan Robert of Leicester,

38 MS Oxford, Corpus Christi College 6, fol. 1^{r} (bottom of page), cited in Judith Olszowy-Schlanger, "Rachi en latin: les gloses latines dans un manuscrit du commentaire de Rachi et les études hébraïques parmi des chrétiens dans l'Angleterre médiévale," in *Héritages de Rachi*, ed. René-Samuel Sirat (Paris: Éditions de l'Éclat, 2006), 137–150 (143). On the MS see also Olszowy-Schlanger, *Les manuscrits*, 283–288. For rabbinic sources, see *Seder Olam* 2 (trans. Guggenheimer, 23); B. *Megillah* 17a; *Genesis Rabbah* 68.5; *Exodus Rabbah* 1.1; Rashi on Genesis 28:9 and Genesis 35:29.

39 Olszowy-Schlanger, "Rachi en latin," 144–147. For images of the relevant manuscript pages, see Olszowy-Schlanger, "Christian Hebraism in Thirteenth-Century England: The Evidence of Hebrew-Latin Manuscripts," *Crossing Borders*, ed. Piet van Boxel and Sabine Arndt (Oxford: Bodleian Library, 2009), 115–122 (118–119). See also Olszowy-Schlanger, *Les manuscrits*, 229–233.

author of the lengthiest and most sophisticated medieval Latin treatise on the Jewish calendar that has come down to us. Robert's as yet unpublished text was written in 1294 and presented to Richard Swinfield (or Swinefield), who was then bishop of Hereford (1282–1317). Its technical depth and quality are clearly reflected by the inclusion of ten lavish and innovative tables, which facilitate calculations and shed light on various aspects of the Jewish calendar—its relation to the solar year (*tekufot*), its conversion into the Julian calendar, and its application to biblical chronology. The work is today still found in two fourteenth-century manuscripts:[40]

D Oxford, Bodleian Library, Digby 212, fols. 2^{r}–7^{v}, 8^{v}–10^{v}; s. $XIV^{1/2}$. Part of a parchment codex in folio (72 fols.). Provenance: Merton College, later owned by Thomas Allen. The first three items, which encompass *De compoto Hebreorum* (2^{r}–7^{v}), the *Liber erarum* (7^{v}–8^{v}), and a *Commentariolus* on the tables in the first text (8^{v}–10^{v}), were once part of a separate MS. They are followed by three blank leaves. The rest of the codex contains a collection of astrological texts, consisting of the *Liber de astrologia* of Julius Firmicus Maternus (11^{r}–29^{v}) and the Latin translations of seven astrological works by Abraham Ibn Ezra.[41]

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40 For previous references to the text and its MSS, see TK, 57, 1009, 1091; Little, *Initia*, 10, 161, 173; Gaudens E. Mohan, *Initia operum Franciscalium* (St. Bonaventre, NY: The Franciscan Institute, 1957), 16, 268, 293; Christopher Wordsworth, *The Ancient Kalendar of the University of Oxford* (Oxford: Clarendon Press, 1904), 144; Friedrich Stegmüller, *Repertorium Biblicum Medii Aevi*, 11 vols. (Madrid: CSIC, 1950–1980), 5:156 (no. 7461); Lynn Thorndike, "Computus," *Speculum* 29 (1954): 223–238 (225); Loewe, "Hebrew Books," 42; Palémon Glorieux, *La faculté des arts et ses maîtres au XIIIe siècle* (Paris: Vrin, 1971), 337; Dahan, *Les intellectuels*, 328; John D. North, *Chaucer's Universe* (Oxford: Clarendon Press, 1988), 158n27; North, "Astronomy and Mathematics," 132–133; Patrick Wyse Jackson, *The Chronologers' Quest: Episodes in the Search for the Age of the Earth* (Cambridge: Cambridge University Press, 2006), 29.

41 William D. Macray, *Catalogi Codium Manuscriptorum Bibliothecae Bodleianae*, vol. 9, *Codices a viro clarissimo Kenelm Digby, Eq. Aur., Anno 1634 donatos, complectens* (Oxford, 1883; repr. Oxford: Bodleian Library, 1999), 226. See also p. 93 of R.W. Hunt's and Andrew G. Watson's Notes contained in the 1999-reprint. On the provenance, see further Andrew G. Watson, "Thomas Allen of Oxford and His Manuscripts," in *Medieval Scribes, Manuscripts & Libraries: Essays Presented to N.R. Ker*, ed. M.B. Parkes and Andrew G. Watson (London: Scolar Press, 1978), 279–314 (284n23, 311). With regard to Ibn Ezra's texts in this MS, see Smithuis, "Abraham Ibn Ezra's Astrological Works," 250, 288.

E Erfurt, Universitäts- und Forschungsbibliothek, Bibliotheca Amploniana, qu. 361, fols. 80^{rb}–85^{rb} (95^{rb}–100^{rb}); s. XIV (med.). Part of a parchment codex in 4° of likely English provenance (156 fols.), which contains 55 items of an astrological, astronomical, and mathematical nature, e.g. Campanus of Novara, *Theorica planetarum* (fols. 1^{r}–22^{r}). The text of our treatise starts without title and runs in two columns. It ends with the words *Explicit tractatus Leycester* (fol. 85^{rb}).[42]

The superior witness between these two is MS D, where the text is entitled *De compoto Hebreorum aptato ad kalendarium*, but also referred to as *De ratione temporum* and *Compotus Leycester*.[43] In its complete version, which is only preserved in this manuscript, the work consists of two main parts, the treatise proper and an extensive commentary (referred to as *Commentariolus*), which teaches how to operate the tables included with the first part.[44] In addition, the text in MS D comes with a dedicatory prologue (*prologus*) as well as a postscript (*conclusio finalis*), which both address Bishop Richard Swinfield and indicate that the text was written at the latter's behest.[45] From the postscript, it becomes apparent that the author based the present work on his own translation or transcription of a pre-existing text, possibly Hebrew, which he then adapted for a Christian audience by supplementing it with additional material.[46] The treatise proper is divided into four parts, which are each further parsed into five to eight chapters, whose contents are summarily listed at the beginning of each part. As an additional curiosity, the capital letters of the individual chapters (including prologue and postscript) form an acrostic: *O Iesu pie minorum*

42 Wilhelm Schum, *Beschreibendes Verzeichnis der amplonianischen Handschriften-Sammlung zu Erfurt* (Berlin: Weidmann, 1887), 601–606.

43 MS D, fol. 2^{r} "Prologus sequentis operis et cetera: compotus Leycester … Incipit tractatus de compoto Hebreorum aptato ad kalendarium." Ibid., 7^{v}: "Explicit opusculum de ratione temporum." Ibid., 10^{v}: "Explicit compotus Hebreorum."

44 Ibid., fol. 8^{v}: "Ad planiorem et pleniorem prescripti tractatus intelligentiam … proinde curavit disponere presenti commentariolo."

45 In the postscript, the author states that he wrote the present work "vestra sancta benedictione ac monitis animatus" (ibid., fol. 7^{v}). Technically, the dedicatee is only referred to as *magister R., antistes Herfordensis ecclesie* (ibid., fol. 2^{r}), but since the text was written in 1294, during Swinfield's tenure as bishop, the identity is more than clear. See Philippa Hoskin, s.v. "Swinfield, Richard," *ODNB*, doi:10.1093/ref:odnb/26843.

46 MS D, fol. 7^{v}: "Ecce … Hebreorum compotum, quem prius ab alio translatum habui, sed tamen fere inutilem nostris sine augmento fore perspexi, per certas, ut puto, regulas kalendario Latinorum pro mee tenuitatis modulo coaptavi." See p. 203 below.

mentes posside ("O Sweet Jesus, may you take hold of the minds of the Friars Minor").[47] Confusingly, the treatise's postscript is not immediately followed by the *Commentariolus*, but by yet another short treatise on the Hebrew calendar, entitled *Compotus Hebreorum purus*, which turns out to be none other than the *Liber erarum*, albeit without its tables and appendices.

While no earlier known copy than MS D has come down to us, the late medieval library catalogue of St. Augustine's Abbey, Canterbury, first printed by M.R. James and recently subjected to a massive three-volume edition by B.C. Barker-Benfield, testifies to the one-time existence of a further manuscript, which may well have contained D's lost exemplar.[48] The manuscript in question was donated to the library by one of the local monks named John of London (fl. 1290–1330) and contained a collection of astronomical texts that started off with Gerard of Cremona's translation of al-Farghānī's *Elements of Astronomy* (*Liber de aggregationibus stellarum*), a text also referenced in Robert of Leicester's treatise (see p. 157). This is followed by a series of writings attributed to Roger Bacon, including a *tractatus de commendacione mathamaice* [sic!], which is probably identical to the fourth book of his *Opus majus*, which contains the passages on historical chronology and the Jewish calendar that have been remarked upon above. Aside from a number of further treatises, such as Robert Grosseteste on optics (*De iride*) and Giles of Lessines on comets (*De essentia, motu et significatione cometarum*), the catalogue summary also notes a *Compotus hebreorum* and *Canones Astronomie eorundem*, which Barker-Benfield associates with Robert's *De compoto Hebreorum* and the attached *Commentariolus* found in Digby 212.[49] The preserved list finishes with entries for:

47 This is expressly stated at the bottom of the opening page of MS D, fol. 2r: "Istud opus composuit frater Robertus de Leycestria ordinis fratrum minorum. In literis autem capitalibus huius operis scribitur sic, 'O Iesu pie minorum mentes posside'."

48 Montague Rhodes James, *The Ancient Libraries of Canterbury and Dover* (Cambridge: University Press, 1903), 324 (no. 1142); B.C. Barker-Benfield, *St. Augustine's Abbey, Canterbury*, 3 vols. (London: The British Library, 2008), 2:1146–1149. Another unidentified manuscript containing a *Computus Hebraeorum* was in the private library of the antiquary Jaspar Gryffyth (d. 1614). See Richard Ovenden, "Jaspar Gryffyth and His Books," *British Library Journal* 22 (1994): 107–139 (111–112, 125).

49 Barker-Benfield, *St. Augustine's Abbey*, 2:1148. On the donor John of London, his problematic identity, and his sizeable collection of astronomical manuscripts, see ibid., 3:1841–1844; Wilbur R. Knorr, "Two Medieval Monks and Their Astronomy Books: Mss. Bodley 464 and Rawlinson C.117," *Bodleian Library Record* 14, no. 4 (April 1993): 269–284; Knorr, "London, John of," *ODNB*, doi:10.1093/ref:odnb/59922.

> (l) Rogerus Bacon de Canon hebreorum. (m) pars lecture super alfraganum et (n) fundamenta compoti hebreorum.[50]

While no text by Roger Bacon that would match the description of item (l) has come to down to us, the *Fundamenta Compoti Hebreorum* may, as Barker-Benfield rightly suggests, have been identical to the *Compotus Hebreorum purus*, i.e. to the *Liber erarum*, which intervenes between both parts of Robert's treatise in MS D. This leads to the attractive conjecture that the scribe of D found all three textual components in the lost Canterbury manuscript, but decided to have the 'basic' or 'pure' Hebrew *computus* of the *Liber erarum* follow directly upon the main part of Robert's *De compoto Hebreorum*, thus breaking up the unity of the latter text.

The second extant manuscript to contain the treatise belongs to the Bibliotheca Amploniana in Erfurt (E) and offers only the treatise proper, without any trace of the *Commentariolus*, prologue, or postscript. It is written in an idiosyncratic cursive book hand, squarish and heavily abbreviated, which, like most of the rest of the codex, is probably of English provenance, while following a bi-columnar layout both for the text and the tables. In spite of its unappealing appearance and the omission of all parts aside from the treatise itself, some of the textual variants in the Erfurt manuscript seem to be of genuine value for a reconstruction of the text. The most striking example occurs in the final chapter of the main part (IV.6), where MS E augments and improves a passage through an additional string of words that may well have been overread by the scribe of MS D:

> Et ecce tabula, in qua patet quod sola opinio Mariani salvat Passionem Domini 25 die Martii, id est 8 kl. Aprilis, feria 6 [MS E: et resurrectionem 6 kl. Sed cum coniunctio paschalis fuit feria 6] ultra 20 horas et, per consequens, plenilunium 26 die Martii vel fuit Christus passus in vigilia pasche Iudeorum vel fuit pascha ante plenilunium celebratum.[51]

While the exact relationship of the two manuscripts to each other remains a matter of uncertainty, the text itself can be very securely and precisely dated thanks to the fact that the *annus praesens* is repeatedly used as an example in the chronological calculations. It turns out that Robert wrote his trea-

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50 Barker-Benfield, *St. Augustine's Abbey*, 2:1147.

51 See MS D, fol. 7^{r}, and MS E, fol. 85ra. The edition below features the addition in MS E as part of the main text.

tise in 1294 CE, but before the *molad* Tishri of the year 5055 JE, which fell on 21 September and preceded the calendrical beginning of the Jewish year (1 Tishri = 23 September) by two days. At one point, Robert remarks that this date was "now impending" (*que nunc futura est*) suggesting that it was only a few months or weeks away. It would therefore seem that the treatise was written during the summer of 1294, but hardly much earlier than spring.[52]

Unfortunately, our knowledge of the author, who is identified as "Robert of Leicester of the Order of Friars Minor" (*Robertus de Leycestria ordinis fratrum minorum*) in the Digby manuscript,[53] is much less precise and to some degree shrouded in confusion. Andrew George Little, the great historian of English Franciscan history, identified him with the Robert of Leicester who much later, in ca. 1321/22, became the 48th Franciscan regent master at Oxford.[54] The latter Robert's presence in Oxford is also secured for July 1325, where a *Robertus de Leycestria de ordine fratrum minorum sacre pagine professor* ("Robert of Leicester of the Order of Friars Minor, professor of the Sacred Page") is mentioned as one of two external masters at Balliol College, responsible for determining whether the college statutes permitted members to attend lectures in faculties other than the Arts. The two *magistri* ordained that this was not permissible.[55] John Bale, in his sixteenth-century catalogue of British writers, claimed that this Robert of Leicester died and was buried at the Franciscan convent in Lichfield in 1348,[56] but Little later published a list of Franciscan friars deceased after 1327 and before 1334, which includes a Robert of Leicester who died at Bury St. Edmunds.[57] A further document, which may or may not be relevant, mentions

52 MS D, fol. 3^{r}: "Exordium vero 267 revolutionis, que nunc futura est Anno Domini 1294 erit feria 3 post horas 15 et partes 794 et est hoc 21 die Septembris sicut poterit per sequentia fieri manifestum." Ibid., fol. 5^{v}: "Notandum est ergo quod Hebrei ponunt iam anno isto Dominice incarnationis secundum Dionisium 1294 22 diem Septembris feria quarta futurum fore ultimum diem 266 revolutionis a principio mundi."

53 See n. 47 above.

54 Andrew G. Little, "Leicester, Robert of (fl. 1320)," *DNB*, 32:426; Little, *The Grey Friars in Oxford* (Oxford: Clarendon Press, 1892), 168–169. See also É. Amann, "Robert de Leicester," *DTC* 13:2750–2751.

55 See H.E. Salter, ed., *The Oxford Deeds of Balliol College* (Oxford: Clarendon Press, 1913), 285–286 (no. 570); Little, *Grey Friars*, 168. See already Anthony Wood, *Historia et antiquitates universitatis Oxoniensis*, 2 vols. (Oxford: Sheldon, 1674), 2:70.

56 John Bale, *Scriptorum Illustrium maioris Brytanniae, quam nunc Angliam et Scotiam vocant: Catalogus*, 2 vols. (Basel: Oporinus, 1557–1559), 1:428. See also John Pitts (Pitseus), *Relationum Historicarum de Rebus Anglicis*, vol. 1 (Paris: Thierry & Cramoisy, 1619), 461.

57 Andrew G. Little, "Records of the Franciscan Province of England," in *Collectanea Fran-*

a Robert of Leicester among the friars from the Northampton convent who, on the 9th of August 1300, applied for licence to hear confessions in the diocese of Lincoln (unsuccessfully, in Robert's case).[58]

There is also a lack of clarity concerning the works that can be ascribed to the Robert of Leicester who was active in Oxford in the 1320s. The Dominican Robert Holcot, who was himself an Oxford regent master in ca. 1332/34, quotes from a lecture on the Apocalypse by *frater Robertus de Leycestria*, but the question remains if he heard that lecture himself as a student or whether it was indeed published at the time.[59] Aside from the chronological texts found in MS D, the lists published by John Bale and John Leland in the sixteenth century also mention (a) four books of commentaries on Peter Lombard's *Sentences* (*Commentarii in Longobardum*); (b) one book of *Quodlibeta varia*; (c) one book *De pauperitate Christi*; (d) one book of *Lecturae scripturarum*. According to Bale, there were also "many other little works," which he alleged to have found, together with the aforementioned ones, in a catalogue of works by Franciscan writers at the Oxford convent's library, also referenced by Leland.[60] This catalogue appears to have been lost, while the only listed work to have surfaced is the treatise on the poverty of Christ, which was discovered by Conrad Walmsley in MS Cambridge, University Library, Add. 3571, fols. 246ra–57va (where it is entitled *Super egenum et pauperem Christum*). Walmsley showed that Robert of Leicester wrote this treatise in Avignon in ca. 1322/23, to where he had been delegated by the General Chapter of his order to defend the Spiritual Franciscan doctrine on evangelical poverty at the papal curia. This doctrine was declared

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ciscana, vol. 1, ed. A.G. Little, M.R. James, and H.M. Bannister (Aberdeen: University Press, 1914), 141–153 (149). See also Wood, *Historia*, 1:75, who already conjectured an earlier death, based on the date of the computistical treatise (1294).

58 Andrew G. Little, *Franciscan Papers, Lists, and Documents* (Manchester: Manchester University Press, 1943), 237.

59 Beryl Smalley, "Robert Holcot O.P.," *Archivum Fratrum Praedicatorum* 26 (1956): 5–97 (52–53).

60 Bale, *Scriptorum Illustrium … Catalogus*, 1:428: "Atque alia longe plura congeßit opuscula, ut habet series Catalogi de scriptoribus Franciscanis." John Leland, *De viris illustribus: On Famous Men*, ed. James P. Carley (Toronto: Pontifical Institute of Mediaeval Studies, 2010), 510; Thomas Tanner, *Bibliotheca Britannico-Hibernica* (London: Bowyer, 1748), 636. Little, *Grey Friars*, 169, also ascribes to Robert an *Enchiridion paenitentiale*, found in a manuscript at Pembroke College, Oxford, but this is rejected by Conrad Walmsley, "Two Long Lost Works of William Woodford and Robert of Leicester," *Archivum Franciscanum Historicum* 46 (1953): 458–470 (469–470). Cf. Pitts, *Relationum*, 461, who already mentions this text and MS among Robert's works.

heretical on 12 November 1323 by the papal bull *Cum inter nonnullos*, making the latter date a probable *terminus ad quem* for the composition of the treatise.[61]

Walmsley also tried to reconstruct the friar's career based on the documents mentioned above, arguing that Robert must have been born before 1266, ordained before 1291, and appointed to a lectureship in Hereford in ca. 1294, before returning to his convent in Northampton previous to 9 August 1300.[62] The problem with this approach is that Robert of Leicester (which, in this case, simply designates the place of origin rather than a family name) is a common enough name, making it well-nigh impossible to establish whether the Robert who wrote on the Jewish calendar in 1294 was the same Robert who went to Avignon some thirty years later. Emden, in his *Biographical Register* of Oxford University, found it probable that the Oxford theologian of the 1320 was a different individual from both the chronologer and the man who applied for licence to hear confessions in 1300.[63] A cautious stance is also taken in the new *ODNB*-article by Andrew Jotischky, who, however, adds that "there seems little reason why the same Franciscan should not have written in youth on mathematics and in maturity on theology."[64]

Although the question remains moot in the absence of further evidence, the case for an identification is slightly strengthened by some hints that the Robert of Leicester who wrote to bishop Swinfield in 1294 had ties to the University of Oxford, just like the Robert of Leicester of the 1320s. From Richard Swinfield's preserved household accounts for the years 1289 and 1290 it is known that he financially supported the studies of two poor 'boys at Oxford' (*pueri Oxon. studentes*).[65] Judging from the way Robert addressed the bishop as a father and benefactor (*pater meritis insignissme*),[66] it is worth speculating whether

61 Walmsley, "Two Long Lost Works," 466–468.

62 Ibid., 464–467.

63 Alfred B. Emden, *A Biographical Register of the University of Oxford to A.D. 1500*, 3 vols. (Oxford: Clarendon Press, 1957–1959), 2:1142. See also Sharpe, *A Handlist*, 565 (no. 1484 and 1485); Josiah C. Russell, *Dictionary of Writers of Thirteenth Century England* (London: Longmans, Green, 1936), 139: "The problem of his identity is complicated by the fact that Robert of Leicester was a common name and it is not certain that he was a Franciscan at the time that he wrote [the treatise on the Jewish calendar]."

64 Andrew Jotischky, "Leicester, Robert," *ODNB*, doi:10.1093/ref:odnb/16370.

65 John Webb, ed., *A Roll of the Household Expenses of Richard de Swinfield, Bishop of Hereford, during Part of the Years 1289 and 1290*, 2 vols. (London: Printed for the Camden Society, 1854–1855), 1:116–119; John R.H. Moorman, *Church Life in England in the Thirteenth Century* (Cambridge: University Press, 1946), 205.

66 See the prologue in MS D, fol. 2^{r}.

he may have been one such student. More reliable evidence can be discerned in the fact that the only manuscript containing the complete version of the text comes from Oxford's Merton College, where it was still seen by John Bale in the middle of the sixteenth century, before its later move to the Bodleian Library as part of the Digby collection.[67] Its presence at Merton College can be traced back to the first half of the fourteenth century, judging from the fact that parts of the treatise resurface in the *Summa astrologiae iudicialis de accidentibus mundi*, written in 1347/48 by the Merton astrologer John Ashenden.[68] The first part of this massive compendium opens with an extended discussion of the date of Creation and the age of the world, which incorporates several extended excerpts from the fourth part of Robert's *Compotus*, including nearly the entirety of chapter IV.1.[69]

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67 See John Bale, *Index Britannae Scriptorum*, ed. Reginald Lane Poole and Mary Bateson (Oxford: Clarendon Press, 1902), 384, whose entry indicates that the MS once was at Merton College. Note that Bale mentions the same succession of incipits as found in MS D (including the *Liber erarum*). See also F.M. Powicke, *The Medieval Books of Merton College* (Oxford: Clarendon Press, 1931), 256–257, and Hunt and Watson's *Notes* in Macray, *Catalogus*, 93. John Leland (d. 1552) claimed to have seen what seems to be a copy of the text at Oriel College Library, but he may have been misremembering. See Leland, *De viris illustribus*, ed. Carley, 458: "Denique memini me aliquando incidisse, dum forulos bibliothecae Regalis colegii apud Isiacos excuterem, cuiusdam Legrocastrensis mathematici libelli Computus titulo editum."

68 John Ashenden [Eschuid], *Summa astrologiae iudicialis de accidentibus mundi* (Venice: Santritter, 1489). See Thorndike, *A History*, 3:325–346, 717–720; John D. North, *Richard of Wallingford*, 3 vols. (Oxford: Clarendon Press, 1976), 2:86–89, 92; 3:260–262; North, "Astrology and the Fortunes of Churches," *Centaurus* 24 (1980): 181–211 (192–197); North, "Chronology," 317–319; Hilary M. Carey, *Courting Disaster* (Houndmills: Macmillan, 1992), 21–22, 58, 73–76, 85–91, 189–191 (with a list of manuscripts); Laura Smoller, "The Alfonsine Tables and the End of the World: Astrology and Apocalyptic Calculation in the Later Middle Ages," in *The Devil, Heresy and Witchcraft in the Middle Ages*, ed. Alberto Ferreiro (Leiden: Brill, 1998), 211–239 (220–221); Keith Voltaire Snedegar, "John Ashenden and the *Scientia Astrorum Mertonensis*, with an Edition of Ashenden's *Pronosticationes*" (PhD Diss., University of Oxford, 1988); Snedegar, s.v. "Ashenden, John," *ODNB*, doi:10.1093/ref:odnb/39190.

69 Ashenden, *Summa astrologiae*, fols. 3^{rb}, $3^{rb–va}$, $3^{vb}–4^{ra}$, $5^{rb–va}$, $6^{vb}–7^{va}$, $8^{ra–b}$, $8^{va–b}$, 9^{va}, $10^{ra–b}$. Other references are to I.3 and II.2. Ashenden's chronological disquisitions are treated in some detail by Snedegar, "John Ashenden," 78–98. See also ibid., 112, where Snedegar confirms that Ashenden most likely used MS D for both Robert of Leicester and the astrological texts of Firmicus Maternus and Abraham Ibn Ezra.

Besides Robert of Leicester, Ashenden also frequently cites the *Opus majus* of Roger Bacon.[70] As we have already seen (p. 134), Bacon entertained a strong interest in the Jewish calendar and is also a likely candidate for the anonymous Christian Hebraist responsible for the correspondence and notes found in two manuscripts from Toulouse and Florence. This would mean that Bacon had a circle of students with whom he communicated on Hebraistic questions, including such pertaining to chronology. Although there are no direct quotations from the *Opus majus* or *tertium* in Robert of Leicester's work, the affinities between his and Roger Bacon's pursuits are strong enough to suggest some kind of connection between the two men. The most striking case is the final chapter of *De compoto Hebreorum*, which deals with the date of Christ's crucifixion, concerning which Robert defends several of the same specific arguments and quotes several of the same sources as Bacon does in the aforementioned works (see pp. 192–198 below).[71] Such similarities suggest, at the very least, a common intellectual milieu, which would not be surprising given that Roger and Robert were both Franciscans with ties to Oxford. A more daring conclusion would be to regard Robert as a late student of Bacon, which is not at all impossible from a chronological perspective: Bacon only died in 1292/94, close to the time when *De compoto Hebreorum* was composed.

While the nature of Robert of Leicester's relation to the famous Franciscan polymath must remain a matter of speculation, it is known that Bacon instructed at least one of his students in the details of the Jewish calendar. This student was the lad John (*puer Johannes*), whom Bacon sent as a personal emissary to the papal curia in Viterbo, where Pope Clement IV waited for the promised books to arrive. As briefly mentioned above, these books included a Hebrew calendar text, which consisted of a 247-year table and explanatory canons, "teaching the art of how to find, for any of our own years, when the beginning of the years according to the Hebrews must be." According to Bacon's testimony, he instructed John "in the use of this table and its canons," such that he would have been able to explain the Hebrew manuscript to the pontiff, if necessary.[72] The identity of this Friar John, who appears to have been

70 See, e.g., Ashenden, *Summa astrologiae*, fols. $4^{va–b}$, 5^{vb}, 6^{va}, 7^{va}–8^{ra}, 8^{va}.

71 For further details, see the *apparatus fontium* of the present edition as well as pp. 156, 158, 161–162, 177.

72 Bacon, *Opus tertium*, 220–221: "Et ideo totam posui Hebraicis literis in Opere Majori, cum omnibus canonibus, id est regulis suis ex expositione, docens artem inveniendi singulis annis nostris quando debet esse principium anni secundum Hebraeos; et docui Johannem hanc tabulam cum suis canonibus." Further references to John are found ibid., 61–63, 111, 135, 225–226, 230, 270; Bacon, *Opus majus*, 1:10, 2:170–171, 3:23–24; *Opus minus*, 315–316;

a man of considerable abilities, remains unknown, although this has not kept scholars from making informed guesses in the past.[73] One interesting lead was proposed by Lynn Thorndike, who noticed a *Summa astrologiae* preserved in the fifteenth-century MS Paris, BnF, lat. 7293A, fols. 48^{r}–69^{r}.[74] According to the incipit, the author of this *Summa* was "Friar John of the Order of Friars Minor," whose "brief and useful" treatise was divided into three parts. The first of these is chronological in nature and deals with the relation and conversion (*concordia et adequatione*) of the calendars and years of the Christians, Jews, and Arabs. This is followed by a primer to astronomy and an equally basic introduction to astrology.[75] The topic of the Jewish calendar is discussed in three consecutive chapters (ch. 3 to 5), which culminate in six tables for the calculation of the *molad*, one of which allowed readers to infer equivalent dates in the Julian calendar.[76] From indications in the text, it appears that Friar John wrote this text

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Andrew G. Little, ed., *Part of the Opus tertium of Roger Bacon* (Aberdeen: The University Press, 1912), 61, 82. See further Stewart C. Easton, *Roger Bacon and His Search for a Universal Science* (Oxford: Blackwell, 1952), 33n4, 116–117, 150–151, 154–155, 164–165; Pierre Duhem, *Le système du monde*, 10 vols. (Paris: Hermann, 1913–1959), 3:500–502; Power, *Roger Bacon*, 52, 73, 93, 206.

73 Thomas A. Orlando, "Roger Bacon and the 'Testimonia gentilium de secta christiana'," *Recherches de théologie ancienne et médiévale* 43 (1976): 202–218 (215–218).

74 Thorndike, *A History*, 3:219n24. The manuscript is available online at http://gallica.bnf.fr/ark:/12148/btv1b9078032p. For descriptions, see Lynn Thorndike, "Notes on Some Astronomical, Astrological, and Mathematical Manuscripts of the Bibliothèque Nationale, Paris," *Journal of the Warburg and Courtauld Institutes* 20 (1957): 112–172 (125–127); Francis S. Benjamin Jr. and G.J. Toomer, *Campanus of Novara and Medieval Planetary Theory* (Madison: The University of Wisconsin Press, 1971), 86. Besides the *Summa astrologiae* (fols. 48^{r}–69^{r}), the MS contains a treatise on the construction and use of the astrolabe (fols. 1^{r}–25^{v}), ascribed to John of Seville (Inc.: "Dixit Iohannes: cum volueris facere astrolabium accipe auricalcum optimum …" TK 353), and the *Theorica planetarum* of Campanus of Novara (fols. 26^{r}–46^{v}). Another copy of the *Summa astrologiae* can be found in MS Vienna, ÖNB, 5309, fols. 127ra–55va (s. XV$^{1/2}$), where the text is entitled *Summa Alberti*, which was probably intended as an attribution to Albertus Magnus. Part of the astrolabe treatise is printed in José María Millás Vallicrosa, *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo* (Madrid: CSIC, 1942), 322–327.

75 MS Paris, BnF, lat. 7293A, fol. 48^{r}: "In nomine Domini Amen. In hoc tractatu brevi et utili dicetur primo de concordia et adequatione annorum Christi et Ebreorum et Arabum et aliorum. Secundo de dispositione et motibus orbium celestium. Tertio de inventione et adequatione planetarum et locorum suorum et in eodem de effectu et influentia eorum." Ibid., fol. 69^{r}: "Explicit summa astrologie edita per fratrem Iohannem de ordine minorum."

76 Ibid., fols. 48^{v}–50^{v}. The existence of Hebrew calendrical material in this manuscript was first noted by Boncompagni, "Intorno ad un tratatto," 771–773.

when 5035 Jewish years and 1275 Christian years had elapsed and thus presumably in the year 1276 (see p. 617 below for further discussion). Apart from some sparse and basic instructions for calendrical conversion, the text contains little that could not already be found in the *Liber erarum* and there is no trace of the 247-year table mentioned by Bacon. Nevertheless, the *Summa astrologiae* is valuable testimony to the ongoing Franciscan interest in the Jewish calendar during the final quarter of the thirteenth century and thus sheds further light on the context of Robert of Leicester's far more extensive work of 1294. Whether this "Friar John" was in any way related to Roger Bacon's most gifted student remains impossible to tell, especially given the ubiquity of the name John, both in- and outside the Franciscan order.[77]

Apart from Bacon's possible influence, Robert of Leicester's treatment of exegetical and chronological questions referenced, relied on or critically discussed a broad range of patristic and medieval authorities, ranging from Augustine and Jerome to Peter Comestor.[78] In addition, there are palpable influences from Hebrew sources, which are partly implied, partly mentioned by name, most notably 'Abraham' (bar Ḥiyya?), Rashi (referred to as the *Glosator Hebreus*) and the *Seder Olam*. The fairly pervasive use made of rabbinic exegesis in the final chapters of Robert's work makes it seem possible that he was able to read such sources in their original language. That said, the only direct traces of Hebraistic competence in the present treatise consist in the occasional use of technical terms such as *tekufat/tekufot* (in ch. I.6) or *rosh hashanah* (in ch. III.6 and the commentary on table 2).[79]

3 Structure and Contents

Prologue and Introduction

In the version preserved in MS D, Robert of Leicester's treatise on the Hebrew *compotus* starts out with a short dedicatory prologue, addressed to Bishop Richard Swinfield, who appears to have commissioned the present treatise.

77 As will become apparent in Appendix I below, there were at least two Francisan friars named John who wrote on the Jewish calendar during the 1270s, the other being the author of a *Compotus philosophicus*.

78 The full list includes Eusebius, Ambrose, Basil, Jerome, Augustine, Cassiodorus, John Damascene, Bede, Rabanus Maurus, (pseudo-)Remigius of Auxerre, Marianus Scottus, Gerland the Computist, the *Glossa ordinaria*, Peter Comestor, and Matthew of Aquasparta.

79 For the possibility that Robert translated a calendrical treatise from Hebrew into Latin, see p. 203 below.

Hereford, the seat of Richard's bishopric, is noteworthy for having been a centre of computistical and astronomical activity during previous centuries.[80] One of Richard's predecessors, Robert Losinga (d. 1095), composed an abridged version of the chronicle of Marianus Scottus, which dealt with computistical and chronological matters.[81] More importantly, an author named Roger of Hereford was responsible for one of the most sophisticated *computus* treatises of the twelfth century, datable to 1176.[82] For the thirteenth century, one can point to Robert Grosseteste, who spent some of his formative years in the Hereford diocese, in the household of Bishop William de Vere (1186–1198), where he may have met the aforementioned computist Roger.[83] It is therefore perhaps not entirely surprising if a bishop of Hereford would still show an interest in a treatise of time reckoning at the end of the century.[84] In adulatory fashion, Robert of Leicester calls his patron *pater meritis*, which could be an allusion to a passage in Quintilian's *Lesser Declamations*,[85] and immediately goes on to apologize

80 On the general background, see Haskins, *Studies*, 82–140; Josiah C. Russell, "Hereford and Arabic Science in England about 1175–1200," *Isis* 18 (1932): 14–25; Charles Burnett, "Mathematics and Astronomy in Hereford and Its Region in the Twelfth Century," in *Medieval Art, Architecture and Archaeology at Hereford*, ed. David Whitehead (Leeds: British Archaeological Association, 1995), 50–59.

81 Alfred Cordoliani, "L'activité computistique de Robert, évêque de Hereford," in *Mélanges offerts à Réné Crozet*, ed. Pierre Gallais and Yves-Jean Riou, 2 vols. (Poitiers: Société d'études médiévales, 1966), 1:333–340.

82 See n. 113 in Chapter One above.

83 Julia Barrow, "A Twelfth-Century Bishop and Literary Patron: William de Vere," *Viator* 18 (1987): 175–189 (184–185); R.W. Southern, *Robert Grosseteste: The Growth of an English Mind in Medieval Europe* (Oxford: Clarendon Press, 1986), 65–69. Grosseteste's astronomical and computistical works and the significance of his 'Hereford years' are discussed in detail in Matthew F. Dowd, "Astronomy and Computus at Oxford University in the Early Thirteenth Century: The Works of Robert Grosseteste" (PhD diss., University of Notre Dame, 2003). See further the observations in Jennifer Moreton, "On *Not* Editing Grosseteste," in *Editing Robert Grosseteste*, ed. Evelyn A. Mackie and Joseph Goering (Toronto: University of Toronto Press, 2003), 167–184 (172–179); Cecilia Panti, *Moti, virtù e motori celesti nella cosmologia di Roberto Grossatesta* (Florence: SISMEL, 2001), 18–24.

84 North, *Richard of Wallingford*, 3:140, cites a fourteenth-century Middle English list of "wise men in the arte of Calculacioun or of acountinge", which includes "Mayster Robart Grostet, Bischop of Lyncolne, and Richard, Bischop of Herford." The latter might be Swinfield, although North (ibid.) treats it as a garbled reference to Roger of Hereford.

85 Quintilian, *The Lesser Declamations* (372), ed. D.R. Shackleton Bailey, 2 vols. (Cambridge, MA: Harvard University Press, 2006), 2:378: "Sed meritis pater eram, sed tu tamquam patrem cecideras."

for the novelty of his work, which he fears could be construed as an attempt to subvert the traditional ecclesiastical *computus*. These fears were perhaps not completely unfounded, given that his exposition of the Jewish calendar effectively lays bare the astronomical design flaws in the ecclesiastical calendar and hence implicitly points to problems in the current method of calculating Easter. In order to dispel any such accusations, Robert openly rejects the idea that Bede or other ecclesiastical authorities of time reckoning would have been completely ignorant of the Jewish calendar or of the true length of the solar year. Instead, he claims, they shunned Jewish teachings and 'astrological' intricacies on purpose, busy as they were with matters pertaining to the Church. As an additional means of exculpation, Robert portrays himself as a humble servant to the bishop, who merely carried out his master's order, whilst expressing his hope that the *computus* as a subject is too immaterial to cause any offence. It is an open question what kind of request Robert was responding to when he penned the present treatise for Swinfield and how far the result corresponded to the work originally envisaged by the patron. Given Robert's submissive and reticent tone, it is conceivable that the finished treatise took certain liberties with the original request. For instance, Swinfield may have merely wished for a treatise on biblical chronology, not asking for a complete description of the Jewish calendar. As so often, however, it is equally likely that the entire prologue is merely a formal *captatio benevolentiae*, rather than a serious attempt at self-indemnification.

The stated purpose of the entire work, as mentioned at the beginning of the introduction that follows the preface, was to provide a more reliable way of dating events in the Old and New Testament, or what Robert labels the "bygone ages" (*ad decursorum seculorum notitiam promptius et … certius optinendam*). The application of this method, however, only takes place in the fourth and final part of his treatise, where Robert tackles at length six historical topics, which range from the creation of the world to the crucifixion of Jesus. It would therefore seem that the whole treatise developed out of a historical-chronological concern, but since Robert had decided that the Jewish calendar provided the best foundation for solving these biblical problems, he first needed to equip his readers with a solid understanding of its principles of operation. This, then, is the purpose served by the first three parts, and especially by the tables contained therein, which fulfil a preparatory function with regard to the treatise's main goal. At the same time, however, they could (and can) be used separately, as a thorough introduction to the Jewish calendar and its adaptation to the Julian calendar. This entailed the skills necessary to convert the Jewish calendar and its world era into dates in the Julian calendar and the Christian *Anno Domini* era, which explains the work's full title: *De compoto Hebreorum aptato*

ad kalendarium ("Treatise on the *computus* of the Hebrews, adapted to [our] calendar").

The first two parts are reserved for the Jewish method of time reckoning, without any reference to the ecclesiastical calendar. Robert dedicates each of these two parts to a different principle operating within the Jewish calendar. The first of these principles is what Robert calls the "natural computus" (*compotus naturalis*), which essentially designates the astronomical basis of the calendar, i.e. the *molad*-system and the calculation of the *tekufot* (in particular those ascribed to R. Ada). Only in the second part does he go on to describe how these astronomical foundations give rise to an ordered calendar, whose months and years comprise a whole number of days rather than the precise fractions of time used in the calculation of the *molad*. Because of this, but also due to the frequent use of postponements (*deḥiyyot*), the beginning of the months in the Jewish calendar often deviates to some degree from the actual time of the *molad*. Likewise, whereas the length of the mean lunation in the 'natural' *compotus* is always the same (29d 12h 793p), the actual calendrical month will vary between 29 and 30 days, while the common and embolismic years come in three different lengths each. Robert refers to this second principle as the "usual *computus*" (ch. II.5: *compotus usualis*) or "vulgar *computus*" (ch. II.1: *compotus vulgaris*) and at one point associates it with the "common folk" among the Jews (ch. II.2: *vulgus Hebreorum*). At first glance, this ascription seems puzzling, given that the Jewish calendar is always founded upon both these principles, regardless of whether it is used by common people or by scholars. It should be noted, however, that Christian computists were used to making a similar distinction with regard to their own trade, where the traditional *computus usalis, artificialis* or *vulgaris* of the ecclesisastical calendar, with its strictly day-based arithmetic, was often contrasted with an astronomically more precise type of *computus naturalis* or *philosophicus*. In projecting this distinction onto the Jewish calendar, Robert could have relied on a wide variety of sources, including the aforementioned *Compotus* of Roger of Hereford (1176), who divided his work into parts based on a distinction between the 'vulgar' and 'natural' forms of *compotus*. His explanation in the preface happens to be quite in line with how Robert uses these terms:

> The natural [*compotus*] is the one which adheres more closely to nature … and follows its traces by investigating the most minute particles of time, using constant values [*equaliter*], such that the sun is said to stay in each sign for 30 days and 10 ½ hours. The vulgar [*compotus*], on the other hand, uses whole units of time, lest the common people [*vulgares*] should rebel against too much exactness. And what the natural [*compotus*] scrutinizes

> in a most subtle way using small parts, this one accounts for in a rough fashion, through variable values [*inequaliter*] and complete numbers of days or years or months.[86]

Part I: The Astronomical Basics of Jewish Time Reckoning

As would seem appropriate, Robert begins his survey of the 'natural *computus*' with an introduction to the astronomical basics of time reckoning. The fundamental unit for any calendar is the natural day (*dies naturalis*), which is defined—in geocentric terms—by the diurnal revolution of the firmament about the earth. Robert contrasts this with the natural period of daylight, which in the terminology current in his time was known—somewhat paradoxically perhaps—as the 'artificial day' (*dies artificialis*).[87] Based on this distinction, the hour could be interpreted either as an 'equal' or 'equinoctial' hour, which is 1/24th of a natural day, or a 'temporal' hour, which is 1/12th of an artificial day. While length of the 'temporal' hour obviously varies with the seasons, Robert

86 MS Cambridge, UL, Kk.1.1, fols. 223^{r}: "Huius vero due sunt species: compotus naturalis et compotus vulgaris. Est autem naturalis, qui vicinius nature adherens eius vestigia, licet astronomia inequaliter, ut fit verissime, ista tamen equaliter minutissimas temporum particulas investigando exsequitur, ut solem dicat morari in signo quolibet 30 diebus et 30 horis et dimidia. Vulgaris vero per quasdam temporum integritates, ne ex subtilitate vulgares deficiant, quicquid naturalis subtilissime per portiunculas temporum inquirit, in quadam grossitudine inequaliter comprehendit, ut per dies integros vel annos vel menses." See Moreton, "Before Grosseteste," 573–574, 582–583. The same idea is expressed differently in the *Compotus Constabularii*, found in MS London, BL, Cotton Vitellius A.XII, fol. 87^{rb}: "Compotus est scientia commensurandi tempora mediis motibus solis et lune. Hic partim naturalis dicitur, partim artificialis. Naturalis equis motibus equas temporum portiones distribuit, cuius rei gratia secatur tempus in minimas particulas. Artificialis solummodo dies integros computat et inequalitatem obseruat. Facit enim et annos et menses tam solis quam lune nunc plurium, nunc pauciorum dierum." See further Alexander of Villedieu, *Massa compoti*, ed. van Wijk, *Le Nombre*, 52; Guillaume Durand, *Rationale divinorum officiorum* 8.1.1 (CCCM 140B, 131).

87 See Emma Montanos Ferrín, "'Dies naturalis' y 'dies artificialis'," in *Proceedings of the Eleventh International Congress of Medieval Canon Law*, ed. Manlio Bellomo and Orazio Condorelli (Vatican City: Biblioteca Apostolica Vaticana, 2006), 401–408. For other thirteenth-century texts using these definitions, see John of Sacrobosco, *De sphaera*, ed. Lynn Thorndike, *The* Sphere *of Sacrobosco and Its Commentators* (Chicago: The University of Chicago Press, 1949), 86, 92, 104; John of Sacrobosco, *De anni ratione*, in *Libellus de Sphaera*, ed. Melanchthon, sig. B2^{v}; Giles of Lessines, *Summa de temporibus* (III.1.7), fol. 48ra = Steele, ed., *Opera hactenus inedita*, 41; Vincent of Beauvais, *Speculum naturale* (15.76–77), ed. in *Speculum quadruplex*, 1:1139–1140; Guillaume Durand, *Rationale divinorum officiorum* 8.6.1 (CCCM 140B, 156).

does not omit to point out that, contrary to common belief, the 'natural' day and the 'equal' hour derived from it do not have a perfectly constant length either. This variability, however, could not be perceived by the senses, but only by rational reflection (*non sensu, sed ratione percipitur*, as Robert correctly says in ch. I.1). What Robert is alluding to here is the fact that the sun does not only share the diurnal motion of the entire firmament, but also performs its own annual motion through the zodiac, at one degree per day in the opposite direction. The latter motion had an influence on the length of the natural day, which could differ over the course of a year for three reasons, mentioned by John of Sacrobosco in his highly influential astronomical textbook *De sphaera*: the obliquity of the zodiac, the oblique horizon, and the eccentricity of the solar orbit.[88]

In contrast to the conventional usage of dividing the hour into sexagesimal fractions (minutes, seconds, thirds etc.), the Jews count 1080 'parts' (Robert usually calls them *partes*, but occasionally also uses *puncta*) for every hour. If necessary, one 'part' can be broken down into 76 *momenta* or *minuta*, which are Robert's terms for the time-unit *regaim* ('moments'). The times of all *moladot* are calculated from the beginning of the Jewish day, whose epoch is the time of sunset at one of the equinoxes. While this is standard lore, Robert shows himself exceptionally well-informed when commenting on the time difference between the Jewish *moladot* and the conjunctions calculated on the basis of the Toledan Tables. Like Roger Bacon, Robert refers to these tables as those of Arzachel or Azarquiel (ibn al-Zarqālī), to whom the accompanying *canons* or commentaries were attributed in many of the manuscripts.[89] From the average difference of 3 hours and 504 parts, Robert correctly infers that the meridian of reference for the Jewish calendar must lie 52° further to the East (3h 504p/24h = 0.14444 … = 52/360).[90] This distance, he says, corresponds to

88 John of Sacrobosco, *De sphaera* (3), ed. Thorndike, *The* Sphere, 101. A more elaborate explanation of these three causes is found in Robert Grosseteste, *De sphaera* (3–4), ed. Ludwig Baur, *Die philosophischen Werke des Robert Grosseteste, Bischofs von Lincoln* (Münster: Aschendorff, 1912), 20–23. See also Giles of Lessines, *Summa de temporibus* (III.1.7), MS Bologna, BU, 1845, fol. 48va–49ra = Steele, ed., *Opera hactenus inedita*, 43–45; Campanus of Novara, "De sphera" (c. 35), in *Sphera mundi*, fols. 156^{v}.

89 Azarquiel was almost certainly involved in the production of the Toledan Tables, although the precise circumstances of their assembly are no longer known. See Pedersen, *The Toledan Tables*, 1:14.

90 Syzygy tables for mean conjunctions based on the Toledan Tables have a starting point 28d 22h 23m after the beginning of the Islamic calendar, which was on 14 July 622 CE at noon. This implies a conjunction date on Thursday, 12 August, 16h 414p after sunset, whereas

2946 2/3 miles, showing that he presupposed a circumference of the earth of 20,400 miles (2946 2/3 × 360 / 52 = 20,400). The ultimate source for this estimate was al-Farghānī, whose *Liber de aggregationibus stellarum* could also be lurking behind Robert's assertion that "all nations measuring their years according to the course of the moon begin the following day from the preceding sunset" (ch. I.1: *omnes nationes annos suos secundum cursum lune mensurantes diem sequentem incipiunt a precedenti solis occasu*). It seems more likely, however, that Robert was in both cases dependent on Roger Bacon, whose works contain references to the relevent passages in al-Farghānī's text.[91]

The entire system of the Jewish calendar is based on the mean lunation, which is estimated as 29d 12h 793p, as explained in chapter 2. The same value was also used by the syzygy tables that formed part of the Toledan Tables, where it was expressed sexagesimally as 29;31,50,8,20d. This month-length could in turn be compared with that implied by the calculated lunar calendar used by Arabic astronomers. Here, 30 lunar years were equated with 10,631 days, which led to a rounded down value of 29;31,50d.[92] Robert contrasts both of these with what he considered to be the most accurate value: 29;31,50,8,9,20d, as found in the medieval Latin version of Ptolemy's *Almagest* (4.2), translated in 1175 by Gerhard of Cremona.[93] He notes that the Jewish value exceeds

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the *molad* of Elul for that year (= 4382 JE) can be calculated to have fallen on Thursday, 19h 905p. The difference is 3h 491p, which Robert appears to have rounded up to 3h 504p in order to get an exact equivalent to 52°. For the root value in the Toledan Tables, see G.J. Toomer, "A Survey of the Toledan Tables," *Osiris* 15 (1968): 5–174 (81); Pedersen, *The Toledan Tables*, 4:1332.

91 al-Farghānī, *Il "Libro dell'aggregazione delle stelle"* (1), ed. Romeo Campani (Città di Castello: Lapi, 1910), 57: "Et arabes quidem non posuerunt initium cuiusque diei cum nocte sua ab occasu solis nisi propterea quod ipsi numerant initium mensis ab hora visionis novae lunae. Visio autem novae lunae est apud occasum solis. Apud romanos autem et alios qui non utuntur in mensibus visione novae lunae dies est ante noctem et principium cuiusque diei cum nocte sua est ab hora ortus solis usque ad horam ortus in mane secundo." Ibid. (8), 89: "Cum ergo multiplicaverimus portionem unius gradus in rotunditate orbis quae est 360 gradus erit illud quod inde aggregabitur rotunditas terrae et est 20 milia et quadringenta millaria." Roger Bacon, *Opus tertium*, 211; Bacon, *Communia Naturalium, liber secundus: De celestibus*, ed. Robert Steele (Oxford: Clarendon Press, 1913), 415, 417.

92 See Pedersen, *The Toledan Tables*, 4:1327–1350; al-Farghānī, *Il Libro* (1), Campani, 56–57; and p. 58 above.

93 This value was not present in the original version of the *Almagest*, where the same 29;31,50,8,20d that underlie the Jewish calendar and the Toledan Tables are used instead. The more precise value was later interpolated on the grounds that Ptolemy, in the same

Ptolemy's by only 0;0,0,4,16d while the Arabic value is too small by 0;0,8,9,20d, which is more than 45 times the Jewish rate of deviation. The same point had previously been made by Roger Bacon in the *Opus majus*, who likewise championed 29;31,50,8,9,20d as the best value available. Bacon even went as far as claiming that the ancient Jewish astronomers had already been aware of the cited deviation and that their value had been rounded up in order to produce a whole number of *ḥalakim*. This would have been preferable to rounding down to 29d 12h 792p, which is in fact equivalent to the Arabic 29;31,50d.[94]

Chapters 3 to 5 use the knowledge gained thus far to analyze the difference in time between the lunar year and the solar year, as defined by the fixed Jewish calendar. This difference is compensated by inserting seven embolismic months over a span of 19 years. Robert regards one solar year according to the Jews as being exactly 1/19th of this 19-year cycle, which corresponds to the definition sometimes associated with Rav Ada bar Ahavah (see p. 32). Robert does not mention this name, but it is nevertheless likely that he knew it from the *Liber erarum* (see p. 74), which is found in MS D and which he himself used elsewhere in his text (see p. 204 below). In parallel to the *Liber erarum*, Robert also deals with an alternative way of reckoning the *tekufot*, attributed to Samuel, which is based on the mean year length of the Julian calendar (365.25). This makes Robert already the second English scholar after the Constabularius of 1175 to show some familiarity with Samuel and his *tekufot*.[95]

As he correctly notes in chapter 5 and also elucidates with table 1, 19 Julian years exceed a Jewish 19-year cycle by 1h 485p, which means that the *tekufot* of Samuel will fall further and further behind as time progresses. Although Samuel's *tekufot* were based on a relatively simple value for the solar year, this drift effectively meant that Ada's system was easier to employ for users of the Jewish *molad*-calendar. Since the year length corresponding to Ada's *tekufot* is derived from that calendar's 19-year cycle, the *tekufot* are bound to return to the exact same position in relation to the *molad* times after every 19 years. Given the time of one *tekufah* in this system, the times of all subsequent and previous *tekufot* can be calculated in a straightforward manner, using the annual

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chapter of the *Almagest*, equated 126007 1/24d with 4267 lunations, which implied 29;31,50,8,9,20 … d. See Goldstein, "Ancient and Medieval Values," 67–68; Depuydt, "History of the *ḥeleq*," 92–94; Dennis Rawlins, "Aristarchos and the 'Babylonian' Month," in *Under One Sky*, ed. John Steele and Annette Imhausen (Münster: Ugarit-Verlag, 2002), 295–296; José Luis Mancha, "A Note on Copernicus' 'Correction' of Ptolemy's Mean Synodic Month," *Suhayl* 3 (2002–2003): 221–229.

94 Bacon, *Opus majus*, 1:196–197.

95 See p. 67 above.

difference between the solar and lunar years. The principles of this calculation are elucidated in table 2, which is appended to chapter 6 and gives the time differences between the *tekufot* for Tishri and Nisan and their corresponding *moladot* for a full cycle of 19 years. Since the solar year according to Rav Ada is greater than the common year by 10d 21h 121p 48r but smaller than the embolismic year by 18d 15h 671p 28r, the equinoxes will sometimes fall several days after and sometimes before the conjunction. The table accordingly distinguishes between values that have to be added (*adde*) and values that have to be subtracted (*deme*) from the time of conjunction to arrive at the appropriate *tekufah*. In a common year, the preceding value is always augmented by 10.21.121.48, whereas in an embolismic year it is diminished by 18.15.671.28, as indicated in the table. One should note that the numbers in years marked '*deme*' are negative values and must hence be subtracted (rather than added) from the difference in question. This mix of added and subtracted values makes for a major difference between Robert's tables and a related set found at the end of ch. 3.4 of Abraham bar Ḥiyya's *Sefer ha-Ibbur*. While Abraham offers not two, but four tables, which display the dates of all four *tekufot*, these tables eschew subtraction altogether and instead discern between years where a value has to be added to the *molad* Nisan and others where the point of reference is the previous Adar or Adar II. The latter cases correspond to Robert's *deme*-years.[96]

The same chapter also showcases Robert's familiarity with Hebrew terminology, which made him use '*thequfath*' as the term for the equinoxes and solstices in the Jewish calendar, even distinguishing between the plural (*thequfoth*) and a singular form (*thequfath*). The usual starting point for the calculation of the *tekufot* is Nisan of the year 1 JE, a convention that reflects the alternative view in rabbinic tradition according to which the world was created in spring rather than autumn. Based on the authority of a certain Abraham, Robert states that the time of the first *tekufat* fell at the very beginning of the day and hence 9 hours and 642 parts before the *molad Nisan* of that year, which had the value 4.9.642. It is difficult to decide whether this source was Abraham bar Ḥiyya,[97] Abraham Ibn Ezra[98] or some other as yet unidentified

96 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), ed. Filipowski, 90–91. On the layout and transmission of these particular tables, see Israel M. Sandman, "Scribal Prerogative in Modifying Calendrical Tables," in *Time, Astronomy, and Calendars in the Jewish Tradition*, ed. Sacha Stern and Charles Burnett (Leiden: Brill, 2014), 113–153 (126–127). A Latin redaction appears in MS Cambridge, UL, Hh.6.8, fols. 9^{v}–11^{r}. See Mercier, "Astronomical Tables of Abraham Bar Ḥiyya," 193–194.

97 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), 88.

98 Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 79, p. מד

Abraham. On balance, Abraham bar Ḥiyya seems the most probable candidate, if only because Robert's table 2 may be regarded as a modified version of those found in ch. 3.4 his *Sefer ha-Ibbur*. One may further note that Robert's reference to an authority on the Jewish calendar named Abraham (also mentioned in ch. III.6) is reminiscent of the above-cited occurrence of the same name in the thirteenth-century Hebraistic correspondence that modern scholars have attributed to Roger Bacon.[99]

The final two chapters of the first part prepare and explicate table 3, which is actually a conglomeration of 6 individual tables that serve the calculation of any given *molad*, provided the Jewish calendar's epoch value (2.5.204) is known. Just like the set of tables mentioned towards the end of the *Liber erarum*, these encompass tables for months, years of the cycle, and the first *molad* of each cycle in groups from 1 to 10, 10 to 100, 100 to 1000, and 1000 to 10,000.[100] The final table would seem almost gratuitous given that the *annus praesens* 1294 saw the beginning of only the 267th lunisolar cycle since Creation (as expressly stated at the end of ch. I.7). No wonder, then, that Robert expressed his expectation that his set of tables "will suffice for all times, both past and future" (I.8: … *et sufficient ad totum tempus, ut estimo, tam preteritum quam futurum*).

Part II: Mastering the Jewish Calendar

Having established the theoretical foundations of *molad*-reckoning, the second part of Robert's treatise proceeds to explain how the Jews calculate the individual lengths of their months and years, based on three individual tables (4 to 6). The general pattern of having 30-day 'full' months followed by 29-year 'defective' months is interrupted not only by 30-day embolismic months in seven out of 19 years, but also by the *deḥiyyot*, which are briefly listed in chapter 2.[101] Because of the postponement of 1 Tishri, the Jewish calendar

99 See n. 12 above.

100 See p. 77 above. A similar set of computational tables, without the final sub-table for thousands of cycles, is found in the *Summa astrologiae* of Friar John (ca. 1276). See p. 617 below for details.

101 Robert is much less verbose on this specific point than Bacon, *Opus tertium*, 219–220: "Et majus hoc exemplum accidit in observatione legali. Nam propter praecepta legis non possunt incipere annum in Dominica, nec in die Veneris, nec in die Mercurii. Quoniam si in die Dominica inciperet annus, tunc in lunatione Octobris, quando incipit annus secundum seriem temporis naturalem, quintadecima dies illius mensis erit in Dominica; et in vigilia illius festi colliguntur rami de arboribus, propter festum scenopegiae, quod non licet facere in Sabbato. Similiter nec in die Mercurii, quia tunc decima dies illius mensis esset in die Veneris. Sed in illa die nihil licet fieri, nam est par Sabbato; quapropter non

knows six different years lengths, three for common (353, 354, and 355) and three for embolismic years (383, 384, and 385). In contrast to the standard Hebrew terminology—*ḥaserah* ('defective'), *kesidrah* ('in order'), and *shelemah* ('perfect')—, which was closely followed by the *Liber erarum*, Robert translates the names of the three basic year forms as 'diminished' (*diminutus*), 'perfect' (*perfectus*), and 'abundant' or 'superfluous' (*superfluus*). Due to this variety of years, the length of the 19-year cycles can vary between 6939, 6940, and 6941 days, as is explained in chapter 3.

If all four possible weekdays of Rosh Hashanah (Monday, Tuesday, Thursday, Sabbath) are taken into account, the six possible year lengths produce 14 possible 'types' of year, whose initial parameters determine the date and weekday of every Jewish feast. The information necessary to determine the type of the current year can be found in table 4, which covers 13 consecutive 19-year cycles or 247 years. In medieval Jewish calendar texts, 247-year tables of this type are known as the 'circle' or *'iggul* of R. Naḥshon (עיגול דרב נחשון).[102] What seems to have been a specimen of this table was also present in the Hebrew calendar manuscript that Roger Bacon had procured for the papal curia and attached to his *Opus majus* (see pp. 136 and 149). Bacon likened the 247-year table of the Hebrews to the 532-year Easter cycle used by Christians, which marks the recurrence of the movable feast days on the same dates in the Julian calendar.[103] Robert hints at this comparison in his description of table 4 (ch. II.3: *sicut nos in magna paschali tabula comprehendimus omnes diversitates*). The length of the 247-year period is determined by the fact that 13 cycles contain 13×6939d 16h 595p, which is equivalent to 12,887 complete weeks, 6 days, 23 hours, and

facerent cibaria in illa die, sed oporteret in die Jovis illa fieri, quod esset grave propter putrefactionem, et maxime in calida regione et in calido tempore. Item, si aliquis esset mortuus in die Jovis, non sepeliretur usque ad diem Dominicam, quod non esset tolerabile in terra illa. Nec potest die Veneris annus incipere, quia tunc decima esset in Dominica, et ita acciderent inconvenientia nunc dicta; quia idem est sive decima dies sequatur Sabbatum, sive praecedat immediate. Et ideo de necessitate legis divinae oportet quod Hebraei incipiant annum suum die Lunae, et die Martis, et die Iovis, et die Sabbati, et non aliter. Et quia sic est, ideo sancti patriarchae et prophetae posuerunt unum annum communem, qui habet trecentos quinquaginta quatuor dies, sicut astronomi omnes considerant annum lunarem; et alium annum posuerunt diminutum, scilicet trecentorum quinquaginta trium dierum; et alium superfluum, scilicet trecentorum quinquaginta quinque dierum, propter hoc quod non potuerunt incipere annum tribus diebus praedictis." See also Bacon, *Opus majus*, 1:201.

102 See p. 31 above.

103 Bacon, *Opus tertium*, 214–215: "Et posuerunt unam tabulam ex tredecim cyclis talibus, qua revoluta complentur omnes, et omnia redeunt ad idem temporis principium. Et hic cyclus,

175 parts. As Robert demonstrates with table 6, this is just 905 parts short of a complete number of weeks and hence makes for a nearly cyclical repetition of all year types. Although the remaining discrepancy seems minute, it will still accrue to 23d 500p and hence nearly a full day after 28 consecutive periods or 6916 years. Although Robert was evidently aware of this fact and refers to it in ch. II.5, he seems to have been strangely oblivious to its most important consequence, namely that the sequence of year types does not repeat exactly after 247 years, but will often break down for a handful of years from one 'cycle' to the next. In any case, Robert repeatedly relied on table 4 for the chronological calculations that he presents in the fourth and final part of his treatise. Since table 4 is strictly valid only for the 247-year period from 1181 to 1427 CE,[104] whereas these calculations concern events in the distant past, such as the biblical Flood and the Exodus, Robert's approach led to a number of errors, which will be addressed in the analysis of part IV below.

The results derived from table 4 can be applied to table 5, which lists the initial weekday of every month for each of the 14 possible year types. Its entries thus coincide with the new moon feast of *Rosh ḥodesh*, on which, according to Robert, there are "special legal offerings and meals" (*speciales oblations legales et epulas*). For cases where the new moon comes at the end of a 'full' month of 30 days, the table lists two consecutive days of *Rosh ḥodesh*, one for the last day of the previous month and one for the first day of the present one. Robert explains this as a precaution for the case that the new moon, as astronomically calculated, already falls on the 30th day of the preceding month. His main source for this passage may have been Roger Bacon, who offers a more detailed explanation of this Jewish custom based on an exposition of 1 Samuel 20:18–34.[105]

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cum canonibus suis et expositionibus, est apud eos loco computi, et kalendarii apus nos, quantum ad multa. Et hanc tabulam literis Hebraicis misi in Opere Majori, cum ejus expositione et canonibus suis, secundum quod pertinet ad computum eorum." See also Bacon, *Opus majus*, 1:198.

104 For more on the date-range of this table, which appears in similar form in Nicholas Trevet's treatise, see p. 350 below.

105 Bacon, *Opus majus*, 1:198: "Nam neomeniae et calendae, in quibus est festum sacrificiorum, et epularum solemnium, de quibus dicitur primo Regum xx 'Cras calendae erunt, et requiretur sessio tua', exigunt ut sciamus quod mensis lunaris vulgaris incipiat ab occasu solis. Sed lunatio ipsa non habet principium determinatum. Quare si contingat luna prima in occasu vel ante in aliqua hora diei naturalis praecedentis computabitur in vespera sequente novilunium, et neomenia et calendae et novus mensis, quia iam est luna prima. Si vero post occasum solis venerit, ut in secunda hora diei et ultra, non dicetur

Part III: Converting Jewish into Julian Dates

Bede, in a famous passage later copied by Rabanus Maurus, claimed that there was no major difference between the Christian Easter full moon and the Jewish 14th of Nisan, meaning that Easter Sunday was bound to coincide with Passover whenever it fell on *luna* 15.[106] As Robert made clear in the first three chapters of part three, this claim was a hopeless over-simplification that ignored some core differences between the underlying calendars. Compared to the Jewish calendar, the structure of the Julian year and the lunisolar calendar based on it is relatively simple: instead of two different systems of *tekufot*, the Julian calendar only knows its own length of 365.25 days; instead of six different lengths for the lunar year, the ecclesiastical lunar calendar confines itself to a 354-day common year and a 384-year embolismic year, which is reduced to 383 days in the last year of each 19-year cycle, when the 'leap of the moon' (*saltus lunae*) is applied. As Robert explains in chapter 2, the 19-year cycle is slightly defective in the sense that it does not comprise a multiple of the Julian calendar's 4-year long leap-year cycle. The number of days contained in an average 19-year cycle is 6939.75d, meaning that one out of four 19-year cycles will contain 6939 days, while the other three will have 6940 days. The pattern only repeats after 76 years, which is thus strictly speaking the actual lunisolar cycle underlying the ecclesiastical calendar. The average length of the month

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illa die naturali novilunium nec neomenia nec calendae, quantum ad initium calendae. Considerandum tamen quod mensis primus durat ab occasu solis primae diei usque ad occasum solis tricesimae diei, et tamen lunatio non durat nisi a principio noctis usque ad mane tricesimae diei quantum ad dies integros, licet aliquae fractiones sint ultra. Non igitur incipit secundus mensis ante occasum solis tricesimae diei, sed lunatio eius incipit in mane tricesimae diei, et ideo duae calendae attribuuntur secundo mensi, in quibus fiebant epulae et sacrificia, scilicet in die artificiali tricesimae diei mensis primi et in die naturali prima et tricesima, quia isti duo dies sunt de lunatione secundi mensis, licet secundus eorum tantum sit pars mensis secundi. Propter quod primo Regum xx dicitur, quod sedes David die secunda post calendas vacua apparuit. Unde accidit quod menses pares habent semper duos dies epularum, sed menses impares habent unum tantum." See the parallel passage in Bacon, *Opus tertium*, 217–218.

106 Bede, *De temporum ratione* 61 (CCSL 123B, 451): "Quoties ergo diem dominicum mox adventante quinta decima luna habemus, nil nostrum tempus paschale a legali dissonat, quamvis aliis sacramentorum generibus eiusdem paschae solemnia colimus. Quoties vero secundo, vel tertio, vel quarto, vel quinto, vel sexto, vel septimo abhinc die idem Dominicus occurrerit, nec sic quidem legem aut prophetas solvimus sed evangelicae potius gratiae sacramentis adimplemus." See also Rabanus Maurus, *Enarrationes in Librum Numerorum* 2.1, Cap. 9 (PL 108, 640). In ch. III.3, Robert mistakenly quotes this passage as coming from Rabanus's commentary on Leviticus 23, found in the *glossa ordinaria*.

in this cycle turns out to be 29d 12h 799p + 50 'minutes' or *regaim* (1m = 1/76p) and another 30/235 of one minute (= 29.530851d). This value thus exceeds the lunation of the Jewish calendar (29d 12h 793p) by no less than 6p + 50m + 30/235m. Although Robert does not pursue this issue in any detail, he was clearly aware of the fact that the Christian calendar was in error, as revealed by his remark that "our lunations exceed their due quantity" (ch. III.3: *lunationes nostre excedunt debitam eis quantitatem*). Yet at the same time, his treatise was not meant to be a discussion on the necessity of calendar reform, which is why he states that "on this matter nothing more, I suppose, needs to be said at present" (ch. III.2: *sed de hoc ad presens non plus reor esse dicendum*).

In addition to the different estimates for the mean lunation, the Jewish and Christian lunar months also diverge in other aspects. Besides the different beginnings of the year (January vs. September/October), there was a three-year difference between the 19-year cycles of both calendar. This led to a major discrepancy in each 8th and 19th year of the Dionysiac cycle, when the Christians inserted an embolism, whereas the Jews did not. Robert complains that this latter kind of diversity "would not have happened if the Church had not abandoned the ancient lunar cycle in favour of the Golden Number" (ch. III.3: *Et hoc non evenisset nobis nisi pro aureo nostro numero ecclesia antiquum lunarem ciclum abiecisset*). This shows that he supposed that the original scheme of Easter reckoning, used by the earliest Christians, still followed the Jewish cycle and order of intercalation. Perhaps, however, his remark was also inspired by the so-called 'circle of the moon' (*lunae circulus*), which was included as a separate column in many Christian Easter tables. The latter was a count of the 19 years of the lunar cycle that started three years later than the Dionysiac cycle. It thus effectively shared the same beginning as the Jewish cycle, which is why it has been regarded as a relic of the latter.[107]

In the second half of part three, Robert explains how to quickly transfer dates of the Jewish calendar into the Julian one in spite their puzzling differences. The key to a successful conversion is the time difference between the 76-year cycle of the ecclesiastical calendar and the same number of years in the Jewish calendar, which happens to be 5 hours and 860 parts. This effectively means that the *molad* times as well as the *tekufot* according to Ada's system will recede by this rate in the Julian calendar after every 76 years (ch. III.4). In addition, there will be a difference of three weekdays and also of eight years in the 28-year solar cycle (ch. III.5). Once these rates of change are known, it suffices to have a table of the times of the *molad* Tishri in the first 76 years of the

107 See Mosshammer, *The Easter Computus*, 85–95, for details.

Jewish calendar together with the corresponding dates in the Julian calendar. The corresponding times and dates in all further years can then be calculated based on the aforementioned discrepancy of 3 weekdays, 5 hours, and 860 parts. For ease of calculation, Robert offers table 7, which tabulates multiples of this value in two blocks of ten lines each, from 1 to 10 and from 10 to 100. Next, he lists the full 76-year series of *molad* data in table 8, which encompasses the conjunctions for both Tishri and Nisan, reflecting the two different beginnings of the year in Jewish tradition. As one would expect, the table starts in year 1 JE, with the *molad baharad* on Monday, 7 October, 5h 204p. Together with tables 4 and 5, which provide the year types and initial weekdays of the months in the Jewish calendar, these two tables enabled any attentive reader of Robert's treatise to predict the Julian equivalent of any given Jewish date, both past and future.

In order to demonstrate the efficiency and accuracy of Robert's method, we can use a random contemporary example: on what date will Sukkot begin in 2016 CE? The first step in solving this question is to convert the year into the Jewish world era, by adding 3761 years: 2016 + 3761 = 5777 JE. Next, it is necessary to determine the time difference that has accrued between both calendars since the beginning. Looking up these 5777 years in the right half of table 7, we find that the next smallest number is 5320, which corresponds to 70 cycles of 76 years and a difference of:

Solar cycle	Days	Weekdays	Hours	Parts
0	16	2	21	800

This leaves us with 5777 − 5320 = 457 years, to be looked up in the left half of table 7. The next smallest number here is 456, corresponding to six 76-year cycles and a difference of:

Solar cycle	Days	Weekdays	Hours	Parts
20	1	5	10	840

If both strings of numbers are combined, we get the appropriate difference for 76 × 76 = 5776 years, namely:

Solar cycle	Days	Weekdays	Hours	Parts
20	18	1	8	560

Subtracting 456 from 457, we are left with one year. This means that the next step is to look for the first year in table 8, which lists the *molad* times of Tishri and Nisan for the first 76 years of the Jewish world era. The relevant data for the very first *molad* Tishri in this series are:

Solar cycle	Month	Day	Weekdays	Hours	Parts
1	October	7	2	5	204

From this, the corresponding data for 2016 CE = 5777 JE can be securely derived by subtracting the previously calculated surplus for 5776 years:

	Solar cycle	Month	Day	Weekdays	Hours	Parts
	1	October	7	2	5	204
–	20		18	1	8	560
	9	September	18	7	20	724

The *molad* Tishri in 2016 CE will thus fall on the 18th of September, but this only holds true for the Julian calendar, which currently lags 13 days behind the Gregorian calendar. We must therefore add another 13 days, leading us to Saturday, 1 October, 20h 724p after sunset. Since this combination of data will trigger a double-postponement according to rules *molad zaken* (because the *molad* falls after 18h) and *lo ADU Rosh* (because the first postponement would make the year begin on a Sunday), we can infer that the date of 1 Tishri in 2016 CE will be 3 October. Sukkot will begin 14 days later, on Monday, the 17th of October. The correctness of this result can be confirmed by a look into any current Jewish calendar, printed or electronic.

Part IV: Biblical Chronology

Chapter 1

The late John North, who very briefly remarked on the treatise *De compoto Hebreorum* in his magisterial survey of astronomical and mathematical studies at the University of Oxford in the later Middle Ages, found that Robert's "reasons for admiring [the Jewish calendar] were not in the ordinary sense 'scientific'. In the last analysis it seems that he liked the idea of a rational and comprehensive biblical chronology."[108] While it may still be legitimate to apply to Robert's remarkable text the attribute 'scientific', if applied in a loose enough sense, it certainly holds true that the first three parts of *De compoto Hebreorum* played a preliminary function with regard to the fourth, in which the author went on to apply the knowledge and reckoning techniques thus far presented to solve a number of long-standing chronological problems in the Bible. Since Robert tackled these problems in chronological order, the first chapter unsurprisingly deals with the date of the creation of the world. As he admits at the outset, the Genesis account gives no clear indication of the date or season when God began the hexaëmeron, leaving lots of room for debate. A telling passage in this regard, which is briefly alluded to in Robert's chapter, is found in Peter Comestor's *Historia scholastica*:

> Some say that the world was made in spring, because it is a time of strength and fructification. Others, because they read about "the tree that beareth fruit" [Genesis 1:12], to which is added that the herb was seeding, instead say that it was made in August under the sign of Leo. Yet the Church authoritatively teaches that it was in March.[109]

Among patristic authors, there was indeed a widespread consensus in favour of a Creation in spring.[110] As proponents to this view, Robert specifically mentions

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108 North, "Astronomy and Mathematics," 132–133.

109 Peter Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 5 (PL 198, 1059): "Quidam dicunt mundum in vere factum, quia viror illius temporis est, et fructificatio. Alii quia legunt *lignum faciens fructum*, et additum herbam habentem semen, factum dicunt in Augusto sub leone. Sed in Martio factum dogmatizat Ecclesia." See also Vincent of Beauvais, *Speculum naturale* (2.30; 15.34), ed. in *Speculum quadruplex*, 1:97–98, 1113; Giles of Lessines, *Summa de temporibus* (I.3.7), MS Bologna, BU, 1845, fol. 17$^{ra–vb}$; Roger Bacon, *Opus tertium*, 209–210.

110 See the still-useful account in Ferdinand Piper, "Der erste Tag der Welt," in *Königlich Preussischer Staats-Kalender für das Jahr 1856* (Berlin: Verlag der Königlichen Geheimen Ober-Hofbuchdruckerei, 1856), 6–35.

Jerome, Ambrose, Basil, John Damascene, and Bede.[111] The six days of Creation were also often associated with the vernal equinox, i.e. the time in spring when night and day were equal in length, since this seemed to fit best the use of night and day as markers of time in the biblical narrative. As an example of this view, Robert cites Rabanus Maurus, who in turn followed the opinions of Bede. The latter associated the equinox with the fourth day, described in Genesis 1:14, which saw the creation of both sun and moon.[112] Since God would never make anything in an imperfect state, as Bede stated in *De temporum ratione*, some authors furthermore thought that the moon must have been created full on the fourth day.[113] These included John Damascene, whose *De fide orthodoxa*, which had been translated into Latin in the twelfth century by Burgundio of Pisa and again in the thirteenth century by Robert Grosseteste, is referenced by Robert in this regard.[114]

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111 It is not clear what passage in Basil's work Robert had in mind here; to my knowledge, the former nowhere clearly states the season of creation. Perhaps he is simply referencing the brief mention of spring as a time of growth and generation in Basil's sixth homily on the Hexaëmeron. See Eustathius, *In Hexaemeron Basilii Caesareae Cappadociae Episcopi latina translatio* (6.8.4), ed. Emmanuel Amand de Mendieta and Stig Y. Rudberg (Berlin: Akademie-Verlag, 1958), 81: "… per quam ver procedit, cuius beneficio frutices arboresque frondescunt, et animalia cuncta terrena vel aquaria, genitali calore stimulata, propaginationem generis successione prolis extendunt." In addition to the other works referred to in the *apparatus fontium* of the edition below, see also Robert Grosseteste, *Hexaëmeron* (Particula prima, 10.2), ed. Richard C. Dales and Servus Gieben (London: The British Academy, 1982), 65–66.

112 Rabanus Maurus ap. *Glossa ordinaria*, Lib. Exod. 12.2–4 (PL 113, 217): "Hunc Hebraei primum habent, quia XV Kalendarum ejus prima dies saeculi fuit: quarta decima vero, dies secunda; tertia decima, tertia: dudecima, quarta: qua sol et luna condita sunt, et tunc primum aequinoctium fuit; sol enim in oriente, luna in occidente, sphaeram mundi ex aequo dividebant." Bede, *De temporum ratione* 6 (CCSL 123B, 290–295).

113 Bede, *De temporum ratione* 6 (CCSL 123B, 291): "Luna e contrario vespere plenissima, neque enim quid imperfectum creator aequissimus instituerat."

114 John Damascene, *De fide orthodoxa* (21.16), ed. Eligius M. Buytaert (St. Bonaventure, NY: The Franciscan Institute, 1955), 94: "Oportet autem scire quoniam perfecte creata est luna a conditore, scilicet decima quinta: decebat enim completam generari. Quarta autem die, ut diximus, creatus est sol; anticipavit igitur solem undecim diebus: a quarta enim die usque decimam quintam, dies undecim sunt." No critical edition of Grosseteste's version, which is essentially a revision of Burgundio's, exists and since Robert of Leicester offers no direct quotations, it remains unclear which of the two he used, although Burgundio's translation was generally the more popular one. For more on these translations, see Irena Backus, "John of Damascus, *De fide orthodoxa*: Translations by Burgundio (1153/4), Grosseteste (1235/40) and Lefèvre d' Etaples (1507)," *Journal of the Warburg and Courtauld Institutes* 49 (1986): 211–217.

Rabbinic views on the time and season of Creation were more variegated, as can already be seen from the fact that the Jewish calendar year ordinarily begins with Tishri at the beginning of autumn, whereas the order of months and *tekufot* starts with Nisan. This is essentially a compromise between the schools of R. Eliezer and R. Josua, whose divergent positions on the season of Creation and Flood are noted in the Talmud. Rabbi Eliezer argued that the trees were fruit-bearing at Creation, which pointed to autumn. Rabbi Joshua held against this that the fruits were only beginning to grow, using Genesis 1:12 as his proof-text (B. *Rosh Hashanah* 10b–11a).[115] Robert's treatment of the rabbinic position is somewhat less subtle, as he simply classifies the Hebrews, together with the Greeks and Peter Comestor, among those who consider the world to have begun in autumn. He apparently based this assumption on the respective beginnings of the year in the Jewish calendar and among Greek Orthodox Christians.[116] It is indeed the case that the calendar year in Byzantium was counted from 1 September, the beginning of the indictional year, and that this also affected the way the Byzantine world era (starting in 5509 BCE) was reckoned. Contrary to what Robert may have believed, however, no deeper commitment as to the historical beginning of the world lay behind this practice.[117]

After this general overview, Robert turns to the specific position advocated by Bede and Rabanus Maurus, according to which the fourth day of Creation coincided with a full moon and the vernal equinox on 21 March. The previous Sunday hence fell on 18 March, to which, as Robert briefly notes, the beginning of world's creation was assigned in numerous medieval calendars.[118] Since 18

115 See also *Seder Olam* 4 (trans. Guggenheimer, 46).

116 For the notion that the Jews date the Creation to autumn, see also John of Sacrobosco, *De anni ratione*, in *Libellus de Sphaera*, ed. Melanchthon, sig. C8^{v}: "Quidam autem annum incipiunt a Septembri, iuxta aequinoctium autumnale, quemadmodum Iudaei, propter illud Genesis, Protulit terra herbam virentem, facientem fructum iuxta genus suum, sed autumnus est tempus fructuosum, unde ibi volunt annum incipere, cum a fructibus suis annum veterem spoliaverunt."

117 Anthony Bryer, "Chronology and Dating," in *The Oxford Handbook of Byzantine Studies*, ed. Elizabeth Jeffreys, John Haldon, and Robin Cormack (Oxford: Oxford University Press, 2008), 31–37 (33); Mosshammer, *The Easter Computus*, 311–316.

118 Examples: R.T. Hampson, *Medii Aevi Kalendarium*, 2 vols., (London: Causton and Co., 1841), 1:437; Ferdinand Piper, *Die Kalendarien und Martyrologien der Angelsachsen* (Berlin: Verlag der Königlichen Geheimen Ober-Hofbuchdruckerei, 1862), 3–7, 86–87; Piper, "Der erste Tag," 23–28; Francis Wormald, "A Liturgical Calendar from Guisborough Priory, with some Obits," *Yorkshire Archaeological Journal* 31 (1932): 5–35 (15); Wormald, *English Kalendars before A.D. 1100* (London: Harrison and Sons, 1934; repr. Woodbridge: The Boydell Press,

March has the weekday letter G, it follows that the year in question would also have to have G as its Sunday letter and hence be the 6th, 12th, 17th, or 23rd year of the solar cycle.[119] While this does in fact match the year of Creation according to Bede (3952 BCE), which was the 6th year,[120] Robert ends up rejecting this chronology, because it was constructed on the mistaken idea that the vernal equinox would always remain fixed on 21 March, the very same date it had received in Late Antiquity for the purposes of Easter reckoning. As Robert's own treatise demonstrates, the Julian calendar and the 19-year lunar cycle were not nearly precise enough to retain either the astronomical new moon or the equinoxes and the solstices in the same positions for any extended period of time, let alone for all the millennia that had gone by since Creation. He is careful enough, however, not to accuse his predecessors of error, but instead suggests that the saintly Church Fathers knowingly chose the simple reckoning device of the Easter cycle as a form of compromise, so as to not get entangled in astronomical problems (*nolentes reverendi expositores se abisso difficultatum immergere*). From Robert's discussion of these issues, it becomes clear that he regarded the *tekufat* Nisan according to R. Ada as a reliable indicator of the date of the vernal equinox, which in turn meant that he accepted the average length of the solar year implied by the Jewish calendar as astronomically accurate.[121] Using table 2 of his treatise, he concludes that the only year in the Jewish 19-year cycle that has the equinox roughly coincide with the opposition of sun and moon is the 16th year (corresponding to the 19th year of the Dionysiac cycle), when more than 15 days have to be added to the *molad* Nisan to get to the corresponding *tekufah*. This constellation simultaneously designates the

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1988), 46, 60, 88, 116, 130, 172, 186, 200, 228, 256; Wormald, *English Benedictine Kalendars after A.D. 1100*, 2 vols. (London: Harrison and Sons, 1939–1946), 1:53, 70, 102, 170; 2:10; Emmanuel Munding, *Die Kalendarien von St. Gallen: Aus 21 Handschriften, neuntes bis elftes Jahrhundert*, 2 vols. (Beuron in Hohenzollern: Beuroner Kunstverlag, 1948), 1:45; 2:44; Borst, *Reichskalender*, 1:687; Borst, *Kalenderreform*, 263.

119 The 'dominical' or 'Sunday letter' (*littera dominicalis*) was a commonly used calendrical device, which indicated the weekday in the Julian calendar based on the 28-year 'solar' cycle. For details see Ginzel, *Handbuch*, 3:125–134; Borst, *Kalenderreform*, 402–405.

120 See Nothaft, *Dating*, 83–84.

121 In reality, the solar year of 365d 5h 997p 48r = 365.2468d that is implicit in the Jewish *molad*-calendar falls 0.0046d short of the actual tropical year of 365.2422d. This implies a discrepancy of roughly 1 day every 217 years. The 'Jewish' value is relatively close to that used by Ptolemy in the *Almagest* (3.1), which is 365;14,48 = 365.246667d. More accurate estimates were available in thirteenth-century Latin scholarship. See, for instance, Bacon, *Opus tertium*, 275, where the discrepancy between the Julian calendar and the true solar year is given as 1 day in 130 years. This amounts to 365.2423d.

earliest possible date for the *molad*. Yet a comparison with table 8 shows that the *tekufat* Nisan at the time when the Hebrews assumed the world to have begun fell on 2 April, while the earliest *molad* Nisan (in year 16/19) was found on 17 March. Such data are impossible to square with the opinion that the full moon was on 21 March when the world was created.[122]

Bede's chronology having failed, Robert next turns to the Jewish position on the date of Creation, in whose credibility he was evidently willing to invest greater trust. Like his fellow Franciscan *frater Iohannes*, who wrote about the Jewish calendar in a *Summa astrologiae* of ca. 1276, he thus accepted, at least for the purposes of his discussion, the relatively short chronology of the world implied by the Jewish world era, which only counted 3760 complete years between Creation and the beginning of the Christian era.[123] As has been noted above with regard to the *Liber erarum* (p. 74), the standard rabbinic take on the chronology of Creation was to identify the divine hexaëmeron with the last six days of the first year of the Jewish world era, meaning that most of that year actually belonged to a fictitious time of *tohuvabohu* or 'emptiness' (*vanitas*, as Robert accurately translates it). The sixth day, on which Adam was created, coincided with the *molad* Tishri of the following year, which fell exactly 14 hours after sunset. From this it could be inferred that Adam saw the first new moon crescent of his life in the evening of that day, which was simultaneously the beginning of the first Sabbath and the start of the second year of the first 19-year cycle (due to rule *lo ADU Rosh*, the Friday of the *molad* could not be 1 Tishri). Not only was Robert aware of these rabbinic stipulations, but he even referred to the Talmudic rule according to which one day and a year in the reign of a king were counted as two full years, which explained why the Jewish calendar began almost a year before Creation. Using table 8, he was able to infer that the *molad* Tishri of 3760 BCE, which saw Adam's creation (6.14.0), corresponded to 26 September in the Julian calendar. The previous Sunday and first day of Creation had thus fallen on 21 September (with ferial letter E), which in the liturgical year was the feast of St. Matthew the Evangelist.

122 Robert's critique of the traditional ecclesiastical date world's creation was approvingly cited by the astrologer John Ashenden (n. 68 above), who wrote in 1347. See Ashenden, *Summa astrologiae*, fol. 4$^{rb–va}$.

123 See John's remarks in the opening chapter of his *Summa astrologiae* in MS Paris, BnF, lat. 7293A, fol. 48^{r}: "Et secundum traditionem Iudeorum et compoti sive kalendarii eorum quantitatem ab initio seculi fuerunt usque ad Christum [anni] 3760."

It is worth noting that the last few paragraphs of this chapter re-appear almost *verbatim* in chapter 14 of Pierre d'Ailly's *Elucidarium astronomice concordie cum theologica et historica veritate*, completed in 1414, which deals specifically with the date of Creation. Since the *Elucidarium* was heavily influenced by the *Summa astrologiae iudicialis* of John Ashenden, where the same block of text is quoted, it is almost certain that d'Ailly did not rely directly on Robert's treatise. Nonetheless, since d'Ailly adds a number of further observations, which shed some interesting light on the discussion of the date at hand, I have decided to reproduce the passage from the *Elucidarium* in full, using MS London, British Library, Add. 29969, a fifteenth-century codex completely dedicated to Pierre d'Ailly's astrological and calendrical writings. Direct citations from Robert's treatise, as well as from Roger Bacon's *Opus tertium* and the *Speculum historiale* of Vincent of Beauvais, appear in italics.[124]

> Licet etiam Hebrei incipiant annum equinoctio vernali: non tamen est concors Hebreorum opinio quod ibi mundi fuerit initium. Pro cuius declaratione notandum est quod, ut quidam dicunt, aliqui doctores Hebrei, quos communiter moderni Iudei insecuntur, posuerunt quod anno dominice *incarnationis 1294 secundum dyonisium fuit 22 Septembris feria quarta* fuit *ultimus dies 266 revolutionis a principio mundi et illum annum primum revolutionis prime ponunt* solum *fuisse in ymaginatione exceptis 6 diebus ultimis*. Ideo *istum annum vocant annum vanitatis sive ymaginatum. Et ultimum diem* illius *dicunt fuisse diem sexte ferie et ibi fuisse creatum Adam et in eodem fuisse primam coniunctionem mundi realem post horas 14 Ita quod* Adam *in ipso die creationis sue in vespere vidit primam novam Lunam et in sequenti sabbato* et *in crastino incepit secundus annus prime revolutionis sive primi cicli lunaris*. Hoc *autem quod pro 6 diebus ultimis totum unum annum ymaginantur notabile est, quoniam pro regula habent quod in computando annos, quos semper a certo mense incipiunt, pro uno tantum die* alterius *anni totum annum ponunt in numero, ut si quis regnaverit die alicuius anni, sequenti anno dicatur duobus annis regnasse*. Isti ergo ponunt quod luna fuit creata soli coniuncta et quod prima mundi creatio fuerit in Septembri, videlicet 21 die huius mensis, ubi scribimus

124 Pierre d'Ailly *Elucidarium astronomice concordie cum theologica et hystorica veritate* (c. 14), MS London, BL, Add. 29969, fol. 43^{r}. See also MSS London, BL, Harley 637, fol. 99$^{rb–va}$; London, BL, Harley 3742, fol. 189$^{r–v}$, and Pierre d'Ailly, *Tractatus de imagine mundi*, sig. ee8$^{r–v}$. A brief reference to this passage occurs in Piper, "Der erste Tag," 10. On d'Ailly's use of John Ashenden, see Smoller, *History*, 69, 175n54.

festum sancti Mathei. Sed etiam Vincentius in speculo parte prima, in principio, dicit quod *Arabes et Egiptii incipiunt* annum *a Septembri quia in creatione mundi leguntur arbores fructum habuisse*.[125] Alii autem ponunt mundum incepisse in Octobri. Et hoc probare nititur Bacon in Epistola ad Clementem papam, ubi loquitur de principio mundi inducens textum scripture Exodi 23 et 24 capitulo, unde concludit quod *non est dubium quin secundum ordinem temporum naturalem principium mundi fuerit in lunatione Octobris. Et hoc ut dicit astronomi orientales, Egiptii, Greci, et Perse, et quasi omnes considerant, qui a patriarchis et prophetis habuerunt astronomiam. Et licet Moyses constituerit anni principium in Aprili quantum ad inicia solempnitatum, ut dicit Iosephus, tamen in* aliis observavit principium mundi et anni in Octobri.[126] Alii autem dicunt principium mundi fuisse in Aprili, videlicet in equinoctio vernali; et hec est communior opinio, ut statim dicetur.

Translation:

Although the Hebrews begin the year at the vernal equinox, there is no consensus among the Hebrews that this was the time of the world's beginning. In order to make this clear, it should be noted that, as some say, certain Hebrew doctors, whom the modern Jews follow in general, postulate that Wednesday, 22 September in the year 1294 since the Lord's incarnation according to Dionysius was the last day of the 266th revolution since the beginning of the world; and the first year of the first revolution they regard as having only existed in the imagination, with the exception of the final six days, which is why they refer to this year as being 'of emptiness' or 'imaginary'. And they say that the last day was the sixth day of the week and that Adam was created then and that on it the first real conjunction of the world took place after 14 hours, such that Adam saw the first new moon on the evening of his creation and that on the following Sabbath, [i.e.] on the next day, the second year of the first revolution or lunar cycle began. It is noteworthy, however, that they imagine a whole year on the basis of the six last days, because they have a rule that—in calculating the years, which they always begin from a certain month—they reckon a whole year for only one day of another year, such that if someone ruled for

125 Vincent of Beauvais, *Speculum historiale* (1.25), ed. in *Speculum quadruplex*, 4:10: "Hunc Arabes & Aegyptii incipiunt a Septembre, quia in creatione mundi leguntur arbores fructum habuisse."

126 Bacon, *Opus tertium*, 209–210.

one day of any year, in the following year it shall be said that he ruled for two years. Thus they postulate that the moon was created in conjunction with the sun and that the world's creation began in September, namely on the 21st day of this month, on which we inscribe the feast of St. Matthew. Yet Vincent, in the first part of his *Speculum*, also says that the Arabs and the Egyptians begin the year in September, because one can read that the trees bore fruit at the time of Creation. Others, however, postulate that the world began in October. And Bacon tries to prove this in his letter to Pope Clement, where he speaks about the world's beginning, adducing the text of Scripture in Exodus, chapter 23 and 24, from which he concludes that there is no doubt that, according to the natural order of time, the beginning of the world was in the lunation of October. And this belief was held, he says, by the oriental astronomers—Egyptians, Greeks, and Persians—and by virtually all who received their astronomy from the Patriarchs and Prophets. And while it is true that Moses constituted the beginning of the year in April, as far as the beginnings of feasts are concerned, as Josephus says, in other matters he still observed the beginning of the world and the year in October. Others, however, say that the world's beginning was in April, namely at the vernal equinox, and this is the more common opinion, as will be said at once.

Chapter 2

After the Creation, the next major date in the Genesis account is that of Noah's Flood. This story, recounted in Genesis 7:11 to 8:14, has exerted a long-standing fascination on students of biblical chronology, seeing how it is the first instance in the Bible where events are dated according to months and days, raising questions about the calendar used by the narrator.[127] For Robert of Leicester, it was a foregone conclusion that the calendar in question was the same one the Jews still used today. He therefore began his analysis by determining the position of the flood year in the 19-year cycle of the Jewish calendar. Although he briefly acknowledged the fact that the Septuagint counted 2242 years between Creation and the Flood, Robert immediately reverted to the 1656 years found in the Masoretic text (and the Latin Vulgate), which were also upheld by all rabbinic authorities. Dividing this number by 19 yields 87 full 19-year cycles with a remainder of three. These 87 cycles can be further divided into groups of 13,

127 For details, see C.P.E. Nothaft, "Noah's Calendar: The Chronology of the Flood Narrative and the History of Astronomy in Sixteenth- and Seventeenth-Century Scholarship," *Journal of the Warburg and Courtauld Institutes* 74 (2011): 191–211.

according to the principle of the 247-year period (87 / 13 = 6 R 9) displayed in table 4. This shows that 1656 JE was the third year of the tenth cycle, which according to table 4 was a defective embolismic year (of 383 days), starting on a Sabbath. Entering this combination into table 5, one finds that the corresponding first day of Nisan would fall on Tuesday. As we shall see in a moment, however, this was not the correct result for 1656 JE.

Whether or not the year of the Flood was common or embolismic was an important question when it came to determining its internal chronology. According to Genesis 7.11 and 8.14 the Flood started on the 17th day of the second month (17/II) and ended on 27/II of the following year. As both Bede and a number of rabbinic sources such as Rashi had noted, this time-span could be interpreted as twelve lunar months plus eleven days, which amounted to more or less exactly one solar year—but only if there was no additional embolismic month in between.[128] Rashi's treatment of the flood chronology as that of a common year was also known to Robert, who—similar to many medieval Hebrew sources—did not refer to the great rabbi of Troyes by name, but instead identified him as the *glosator* or the *glosa Hebraica* on Genesis. The contradiction could be resolved in one of two ways: the first was to interpret the 'second month' in question not as Marḥeshvan, but as Iyyar, the second month from Nisan. This accorded not only to the view of Peter Comestor, expressed in the *Historia scholastica*,[129] but also to the aforementioned position of R. Josua, who was recorded in the Talmud as having upheld spring as the season of Creation and of the beginning of the Flood. R. Josua's opponent Eliezer instead dated both events to autumn (B. *Rosh Hashanah*, 11b–12a). The latter position was also maintained by Rashi, who is once again cited as the *glosator Hebreus* in Robert's analysis.[130] Since the *glosator* treated the flood year as a common

128 Bede, *De temporum ratione* 11 (CCSL 123B, 315); Rashi on Genesis 8:14; *Seder Olam* 4 (trans. Guggenheimer, 54–55); *Genesis Rabbah* 33.7.

129 Peter Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 33 (PL 198, 1084): "… mense secundo die decima septima qui ab Hebraeis Nisan dicitur, a Latinis Maius, a Macedonibus Dion. Moyses autem in legitimis Nisan, id est Aprilem, primum mensem constituit, secundum Josephum. In contractibus vero, id est in mercibus faciendis, et in alia gubernatione saeculi temporum decreta, et usualem ordinem mensium servavit."

130 The gist of this information also occurs in the anonymous correspondence attributed to Roger Bacon: MS Florence, Plut. 25 sin. 4, fol. 188^{rb}: "Genesis 7: 'anno 600 vite Noe mense secundo'. Quis fuit iste mensis? Varie sunt opiniones et sententie apud sapientes Hebreorum. Unde dicit Glosa Hebraica quod secundum opinionem Rabi Eliezer mensis iste fuit Marehissevan, id est October; secundum opinionem vero Rabi Josue mensis fuit Iiar, id est Aprilis."

year, it was clear that this second stance could only be maintained if the 1656 years since Creation were counted in a slightly different way, namely by treating them as 1656 completed years, meaning that the Flood fell in 1657 JE, which was the fourth year of the 19-year cycle and hence a common year. If one took into account, as Robert evidently did, that the first year of the Jewish world era belonged to the *tohuvabohu* before Creation, this reckoning was in fact still consistent with the view that the Flood occurred in the 1656th year since Adam.

With these preliminaries in place, Robert was now faced with two divergent variants of the flood chronology, which he decided to pursue one after the other. Applying his method of converting Jewish into Julian dates, laid out in part three of his treatise, Robert concludes that the *molad* Nisan in 1656 JE would have fallen on Tuesday, 4 April, at 15h 952p. Subtracting the value for seven months (3.17.151), we find that the initial *molad* of that year fell on 6.22.801, necessitating a postponement from Friday to Sabbath. Since 1656 JE was an embolismic year, 5.21.589 must be added to arrive at the following *molad* Tishri, which turns out to be 5.20.310. Here, the double postponement *Jaḥ + ADU* applied, meaning that 1657 JE likewise began on a Sabbath. The intervening year thus comprised a full number of weeks, which is only the case in a perfect embolismic year of 385d. For Nisan, this would have meant in turn that its beginning in the year in question fell on a Thursday. Instead of making the calculation just outlined, however, Robert preferred to extract the dates via tables 4 and 5. Unfortunately for his result, the unreliable character of the 247-year table caused Robert to misinterpret 1656 JE as a defective embolismic year of 383d: 1 Nisan thus remained on Tuesday, 4 April, whilst the following 1 Tishri became a Thursday, both two days too early. The same problem occurred for the year 1657 JE, which Robert interpreted as common and perfect (355d), when common and defective (353d) would have been correct.

Extrapolating from his erroneous result of 1 Nisan = 4 April, Robert found that the following 17th day of Iyyar, which was the beginning of the Flood according to the first approach outlined above, would have fallen on 20 May. In the second scenario, by contrast, the year in question would have been 1657 JE, starting on Thursday, 28 September. The 17th day of the second month would thus have been 17 Marḥeshvan = Monday, 13 November. Robert clearly considered this second scenario to be the more likely one. For one thing, he refers to the discussion in the following chapter, which deals with the date and year of the Exodus. His calculation in this chapter shows the Exodus to have taken place two years later than normally supposed, suggesting that the Flood, too, had to be postponed to 1657 JE (see below). The other piece of evidence he mentions is etymological: in 1 Kings 6:38, the name used for the eighth month

(counted from Nisan) was 'Bul', which in rabbinic tradition was interpreted as being related to 'Mabul', the term used in the Old Testament for the Genesis Flood. Rashi explained the meaning of 'Bul' as being the month in which grass 'withers' (*baleh*) and grain is 'mixed' (*bolelin*) into the food given to animals.[131] Robert's own interpretation of 'Bul' as *mixtio* and *confusio* seems to reflect this view. As a matter of fact, he goes on to regard 'Mabul' as meaning 'that which mixes and mingles matter' (*materiam mistens et confudens*). In addition, Robert may have been influenced by Roger Bacon's teachings in the *Compendium studii philosophiae*, where Peter Comestor's opinion that the Flood began in May is subjected to a lengthy and piercing critique. For one thing, Bacon pointed out that the *magister historiarum* had wrongly handled Flavius Josephus's statement that the Flood began in the Macedonian month of Dios. Contrary to what Comestor thought, this month was actually equivalent to Marḥeshvan/November, the second month from autumn, rather than Iyyar/May. That the calendar of the Flood was based on an autumnal epoch was also confirmed by Josephus's remark (*Ant*. 1.81) that Moses designated Nisan as the start of the ceremonial year, whilst keeping the previous order for the purposes of commerce and administration.[132]

One of the great chronological problems about the Flood concerned the date of the landing of Noah's ark on Mt. Ararat. According to Genesis 8:4, this event took place on the 17th day of the seventh month, exactly five months after the beginning of the Flood. In a regular year, with an orderly sequence of 'full' and 'hollow' months, these five months should have lasted 147 days (29 + 30 + 29 + 30 + 29) in total. At the same time, however, Genesis 7:24 stated that the waters of the Flood 'prevailed' on earth for a full 150 days before starting to decrease. If taken literally, Genesis 8:4 would thus have implied that the ark

131 Rashi on 1Kings 6:38. Cf. MS Florence, Plut. 25 sin. 4, fol. 213^{rb}: "Item in fine eiusdem capituli: 'mense Bul'. Ipse est mensis 8us, Bul secundum Glosa idem est quam Marehesuan, qui est 8us inter menses anni."

132 Flavius Josephus, *Antiquitates Judaice* (1.3.3), ed. Franz Blatt, *The Latin Josephus I* (Copenhagen: Munksgaard, 1958), 133: "Contigit autem haec passio sexcentesimo anno nativitatis Noe mense secundo, qui a Macedonibus Dios nuncupatur, ab Hebraeis autem Marehaseuan; sic enim in Aegypto annum constituerunt. Moyses autem Nisan mensem, qui est Xanticus, primum in festivitatibus definivit, in quo ex Aegypto Hebraeos eduxit. hic autem apud eum etiam in cunctis muneribus divinis valde pollebat, in venditionibus autem et emptionibus et alia gubernatione prioris saeculi decreta servavit." Roger Bacon, *Compendium studii philosophiae*, 489–495. For shorter versions of this discussion, see Bacon, *Opus majus*, 1:194; Bacon, *Opus tertium*, 211. For Comestor's remark, see n. 129 above.

already hit the ground ca. three days before the water level started to diminish. One rabbinic solution to the problem, which can already be found in the *Seder Olam*, was to assign different points of reference to the months mentioned in the flood narrative. Rashi argued that the seventh month in Genesis 8:4 had to be counted from the end of the 40 days of rain, meaning that it was not identical to Nisan, but to Sivan, the ninth month of the year. According to this analysis, the rain stopped on 27 Kislev and was followed by a 150-day period of prevailing waters, which encompassed the final three days of Kislev as well as the totality of Tevet, Shevat, Adar, Nisan, and Iyyar (3 + 29 + 30 + 29 + 30 + 29 = 150). The first day of Sivan was thus also the day on which the water first began to decrease.[133] In trying to follow this chronology, Robert of Leicester encountered the slight difficulty that 1657 JE was a 'perfect' year, in which Marḥeshvan had 30 rather than 29 days. Rashi, by contrast, had counted Marḥeshvan as a 'hollow' month and therefore stated that the Flood, which started on the 17th, took up the 13 last days of this month (i.e. from the 17th to the 29th). Robert's reaction was to claim that the *glosator* counted the Flood only from the 18th day of the second month.

As has been mentioned, the Masoretic text dates Noah's exit from the ark to 27/II of the following year, implying that they had stayed inside for an entire solar year. Robert's interpretation of the flood chronology ignored this point, because he dated the end of the Flood to 17/II, despite being also aware that "in our text" (*nostra littera*), meaning the Latin Vulgate, the date was 27/II. From Robert's words it would seem that he mistakenly assumed that the original Hebrew text read 17/II for this date and that this was corroborated by Jerome's commentary on Ezekiel. As a matter of fact, the variant readings discussed by Jerome did not apply to the month when Noah left the ark, but to the ark's landing on Ararat, which was indeed dated to 17/VII in the Masoretic text, but to 27/VII in Jerome's translation.[134]

The strong influence of Rashi's Pentateuch commentary on Robert's chronological analysis again comes to the fore in the final paragraph, which deals with the flotation depth of the ark.[135] Rashi's argument proceeded as follows: in Genesis 7:20 it is stated that the waters, at their height, stood 15 cubits above the highest mountains. From the calculation outlined above, it followed that the decrease of water had begun on 1 Sivan, which was the ninth month of the year,

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133 Rashi on Genesis 8.3–5. See also *Seder Olam* 4 (trans. Guggenheimer, 50); *Genesis Rabbah* 33.7.

134 Jerome, *In Hiezechielem* 9.29.17/21 (CCSL 75, 417).

135 This final paragraph was moved to the upper margin in MS E, fol. 84^{r}, its first line having been deleted due to page trimming.

but the seventh month from the end of rainfall. According to Genesis 8:4, the ark hit ground on the seventeenth day of the seventh month, while the next verse (8:5) stated that the mountain peaks became visible on the first day of the tenth month. It could thus be inferred that it took exactly 60 days, from 1/VII to 1/X, for the waters to recede far enough to reveal the tops of the highest mountains, which had previously been covered by 15 cubits of water. The implied rate of decrease is one cubit per every 4 days. Since the ark hit ground on 17/VII, at which time 4 cubits of water had dried away, it followed that the ark itself had a draught of 11 cubits.[136] The flotation depth of Noah's ark is a topic that is also breached in the Hebraistic correspondence from Toulouse and Florence, attributed to Bacon. Here, the learned respondent essentially skirts the issue by telling his students that the subject is too complex to be touched upon in the present letter and that "the proof does not readily occur to me at the moment."[137]

Chapter 3

Having established that Noah's Flood took place in 1657 JE, it was next in line to determine the time interval between the Flood and the beginning of the Exodus from Egypt. The attempt to extract this number from Scripture led straight into another chronological problem, which Robert briefly addresses at the beginning of the third chapter: in Genesis 15:13, it was prophesied to Abraham before the birth of his son Isaac that his descendants were to spend 400 years in servitude. In contrast to this, Exodus 12:40, followed by Galatians 3:17 and Acts 7:6, gave the period the Israelites spent in Egypt as 430 years. One straightforward way out of this quandary was to count these 430 years from the first revelation made to Abraham immediately before his emigration from Haran (Gen 12:1–4), when he was 75 years old. This was 25 years before the birth of Isaac (Gen 21:5), when Abraham was 100 years old. Once this was taken as the point of reference for the 400 years of servitude, there was only a 5-year discrepancy (430 – 25 = 405) left to take care of. One option was to assert that Scripture posited 400 instead of 405 years out of a preference for round numbers. This strategy, which is briefly alluded to by Robert, was chosen by Augustine in *On the City of God*.[138] The *Seder Olam* takes a slightly different

136 Rashi on Genesis 8:4. See also *Seder Olam* 4 (trans. Guggenheimer, 50–51); *Genesis Rabbah* 33.7.

137 MS Florence, Plut. 25 sin. 4, fols. 188^{vb}–89ra: "Quantum archa Noe se profundaverit infra aquas diluvii non paucis possit explicari nec michi nunc prompte occurrit probatio."

138 Augustine, *De civitate Die* 16.24 (CCSL 48, 528). For a contemporary discussion of the problem, see Giles of Lessines, *Summa de temporibus* (I.1.4), MS Bologna, BU, 1845, fols. 2^{vb},

route: here, the "covenant of the pieces" (Genesis 15) is itself taken as the point of departure for the 430 years and is hence situated five years before Abraham's emigration from Haran at the age of 75 (Genesis 12). The 400 years are then counted once again from Isaac's birth 25 years later.[139] Robert seems to have been unaware of this rabbinic explanation and since his main Hebrew source Rashi offered no opinion on the matter, he could only speculate that "perhaps the Hebrews count these 430 years from a different starting point" (*fortasse Hebrei illos 400 et 30 annos computant ab alio termino*).

In the end, he was willing to simply follow rabbinic chronology in adding 400 years to Isaac's birth 392 years after the Flood, thus arriving at an interval of 1656 + 400 + 392 = 2448 years between Creation and the Exodus. As in the case of the date of Creation, this approach reveals a remarkable trust in the veracity of the Jewish interpretation of chronological issues in the Bible. Using his calendrical tables, Robert goes on to calculate the date of 1 Nisan in 2448 JE, which is the 16th year of the 129th lunar cycle since creation. The *molad* Tishri for this year has the value 6.15.589, whereas 2449 JE would have started with a *molad* on 4.0.385. Since both thus fell on a taboo weekday according to rule *lo ADU Rosh*, the respective New Year days had to be postponed to Sabbath and Thursday. In a common year, such a distance of five weekdays points to a perfect common year of 355 days. We can infer that Nisan in 2448 JE fell on a Tuesday, which would indeed have been the correct result. As in the previous case of the Flood, however, Robert was once again led astray by his 247-year table, which suggested to him that the 16th year of the 129th cycle was defective. He consequently thought that 1 Nisan fell two days earlier, on Sunday, 9 March. Neither result, Sunday or Tuesday, could be reconciled with the weekday of the Exodus that pseudo-Augustine and Rashi had both inferred on the basis of the descent of manna. According to their chronological argument, 1/15 Nisan should have been a Thursday, 15 Nisan.[140]

Robert's way out of this conundrum was to propose that the historical Exodus really occurred two years later, in 2450 JE, which was the 18th year of the

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who falsely attributed to Augustine the position that the 400 years only began 5 years after Isaac's birth.

139 *Seder Olam* 1 (trans. Guggenheimer, 8). See Günter Stemberger, "Genesis in Rabbinic and Patristic Interpretation," in *The Exegetical Encounter between Jews and Christians in Late Antiquity*, ed. Emmanouela Grypeou and Helen Spurling (Leiden: Brill, 2009), 143–162 (143–149).

140 See p. 71 above, for details.

129th lunar cycle. According to his 247-year table, this was a perfect common year of 355 days, starting on a Monday. The correct result would have been regular common year of 354 days, starting on a Tuesday (2.21.974 with subsequent postponement due to *molad zaken*), but both scenarios converged on having the following Nisan begin on a Thursday. On the basis of tables 7 and 8, this was identifiable as 18 March, leading to an Exodus two weeks later on 1 April. In order to make this result acceptable, Robert had to conclude that the 1656 years from Creation to the Flood did not include the flood year itself,[141] which was instead 1657 JE—in confirmation of the chronology he had worked out in the previous chapter. In a similar vein, he excluded the year of the Exodus from the 792 years counted since the Flood and was thus able to justify a postponement of this event by two years.

This kind of twisting and turning was necessary in part because Robert assumed that the first year in the chronology of the *Seder Olam* coincided with the first year of the Jewish calendar, which started with the *molad baharad* or *molad tohu* one year before creation. This was a natural assumption, but nevertheless a mistaken one: in reality, the *Seder Olam* followed a scheme of counting the years since the beginning that fell short by two years compared to the *baharad era*. Its years of the world thus effectively represented completed years of Adam's life, meaning that the year 2448 in the *Seder Olam* is in fact identical to 2450 JE, with the required beginning of Nisan on Thursday.[142] That said, Robert of Leicester was far from being the only scholar to labour under this misapprehension. Even an expert on Jewish chronology of the stature of Abraham bar Ḥiyya interpreted the year of the Exodus as 2448 JE and hence as the 16th year of the 19-year cycle.[143]

Chapter 4

In order to compensate for the two-year postponement in the previous chapter, Robert decided that the next major interval had to be reckoned inclusively: he thus included both the Exodus from Egypt and the building of Solomon's Temple in the 480-year interval that separated both events according to 1 Kings 6:1. According to the chronology of the *Seder Olam*, a title which Robert here references explicitly and translates as "order of the world" (*ordo seculi*), the First

141 This position argument is already attested in early rabbinic sources: Y. *Rosh Hashanah* 1:1 [56b]; *Genesis Rabbah* 32.6. Thanks to Sacha Stern for the pointer.

142 On this distinction, see Frank, *Talmudic and Rabbinical Chronology*, 14–24.

143 Abraham bar Ḥiyya, *Sefer ha-Ibbur* (2.5), ed. Filipowski, 42. Elsewhere, however, in ch. 3.8, Abraham states that the Seleucid Era started in 3450, exactly 1000 years after the Exodus. I am grateful to Sacha Stern for pointing this contradiction out to me.

Temple stood for 410 years.[144] He counts this second period inclusively as well, concluding that the destruction of the First Temple occurred in 2449 + 480 + 409 = 3338 JE. As in all previous cases, Robert puts his trust in the rabbinic interpretation of this chronology, which was challenged by patristic authorities. Eusebius counted 442 years from the laying of the Temple's foundation stone to its destruction, whilst Bede estimated a duration of 430 years.[145] Jerome, in his commentary on Hosea, reckoned the duration of the kingdom of Israel, from the reign of Jeroboam to its end, as 250 years.[146] Robert shows that this leads to a total duration of both ancient Hebrew kingdoms of only 418 years, but in the end, he goes with the even more conservative estimate of the *Seder Olam*, leading him to identify the year 3338 JE = 423 BCE as the year of destruction. This was the 13th year of the 276th 19-year cycle since creation, which was a perfect common year of 355 days, starting on a Sabbath. As in the previously mentioned cases, Robert's use of the 247-year table led him to misconstrue the year in question as defective, with the result that his date for 1 Nisan (10 March) and the resultant date for 10 Av (15 July) are both two days too early. As Robert does not omit to mention, the preceding day, the ninth of Av (*Tisha B'Av*), is a major fast day in the Jewish calendar, which commemorates the destruction of both the First and the Second Temple with "fasting, mourning and walking barefooted" (*ieiunant, lugent et nudis incedunt pedibus*).

144 *Seder Olam* 28 (trans. Guggenheimer, 242). See Hughes, *Secrets*, 256. The Hebraistic expert who has been identified as Roger Bacon, instead gives the title as *Liber de serie mundi*. See MS Florence, Plut. 25 sin. 4, fol. 192va: "Et dicit Glosa quod hoc modo solvitur dicta contrarietas in libro qui dicitur *Liber de serie mundi*."

145 Eusebius, *Die Chronik*, ed. Helm, 100a; Bede, *De temporum ratione* 66 (CCSL 123B, 481).

146 Jerome, *In Osee* 1.1.1 (CCSL 76, 7). For an in-depth discussion of the chronology of this period, see Giles of Lessines, *Summa de temporibus* (I.1.5), MS Bologna, BU, 1845, fols. 3^{vb}–4va. The fact that the Jews only count 410 years is acknowledged in a gloss on fol. 4^{rb}. The chronology of the Israelite and Judean kings already occupied the minds of two twelfth-century scholars from the Victorine school of literal exegesis. See Andrew of St. Victor, *De concordia annorum regum Israel et Iuda* (CCCM 53A, 137–144) and Richard of St. Victor, *De concordia temporum regum conregnantium super Judam et super Israel* (PL 196, 241–256). Richard might have been thinking of the *Seder Olam* when he wrote: "Unde et antequam de his juxta petitionem tuam aliquid scriberem, per Judaeos Judaeorum scripta consului, et tam eorum scripta quam nostra in unam sententiam concurrere didici. Constat itaque apud me quod in his nulla contrarietas sit quamvis et ipsis hucusque veritas ipsa latuerit" (ibid., 241). See further Peter Comestor, *Historia scholastica*, Historia Libri IV Regum cap. 47 (PL 198, 1427–1432).

Chapter 5

Having completed his discussion of Old Testament chronology, Robert next deals with the chronological circumstances of the incarnation of both John the Baptist and Jesus Christ, as indicated in the first chapter of the Gospel of Luke. According to the latter's account (1:5–23), John's father, the priest Zechariah, entered the temple to burn incense on the very day he received the promise that his wife Elizabeth would bear a son. This took place six months before the Virgin Mary became pregnant as well (1:24–38). In order to make both conceptions datable, medieval Christian authors occasionally took recourse to the mistaken notion that Zechariah was the High Priest and that the annunciation scene took place in the Holy of Holies, which the High Priest entered only once a year, on the Day of Atonement (Yom Kippur). The latter fell on the tenth day of Tishri, meaning that the earliest possible date for Zechariah to return home and get his wife pregnant was 11 Tishri.[147]

From Robert's point of view, it was possible to convert this into a date in the Julian calendar, provided it was known in which year(s) these events had taken place. In order to discern truth from supposition in this matter, his first step consisted in a comparison of all the different estimates for the interval between Creation (according to JE) and the incarnation of Jesus that were current in his time. The most straightforward case was of course the incarnation according to Dionysius Exiguus, which provided the basis for the *Anno Domini* era. This era began with AD 1 or 1 CE, but this could be understood to mean that Jesus was born at the end of this year, as Robert evidently did when he wrote that the incarnation according to Dionysius took place 3760 completed years after the world's creation, as counted by the Jews. Since the incarnation was traditionally dated to 25 March, this points to the year 3761 JE = 1 BCE/1 CE and hence to a conception in the spring of 1 CE and a nativity in the following December.

A different date was implicit in the chronicle of Eusebius of Caesarea, who had written some two centuries before Dionysius Exiguus and had therefore been unaware of the Dionysiac incarnation era. Instead, he followed a widespread consensus among patristic authors in assigning the birth of Jesus to the

147 Zechariah's High Priesthood is *inter alia* endorsed by Ambrose, *Expositio Evangelii secundum Lucam* 1.22 (CCSL 14, 17). On this chronological argument, see Daniel Stökl Ben Ezra, *The Impact of Yom Kippur on Early Christianity* (Tübingen: Mohr Siebeck, 2003), 250–257; Jean Lempire, "Les dates hébraïques dans le *Computus ecclesiasticus* de Saint Maxime le Confesseur," *Les études classiques* 75 (2007): 447–459. See also p. 187 and the commentary on Hermann Zoest's *Calendarium Hebraicum novum*, p. 562 below.

42nd year of the reign of Augustus.[148] The difference between both authors is most easily determined by looking at the regnal era of Diocletian, which Dionysius used to establish his *Annus Domini* era, equating AD 532 with the 248th year of Diocletian.[149] This correlation implies 532 – 247 = AD 285 as the first year of Diocletian. In the Eusebian chronicle, by contrast, the first year of Diocletian is dated to the second year of the 266th Olympiad (Ol. 266.2), while the birth of Jesus is assigned to Ol. 194.3. If the latter is counted as year 1, Diocletian would have begun his rule in year 288. There is thus a discernible three-year difference between Eusebius and Dionysius, as had already been noticed in the tenth century by Abbo of Fleury, the learned abbot of Saint-Benoît-sur-Loire.[150]

The fact that Robert instead speaks of a four-year difference, assigning the incarnation according to Eusebius to 3757 JE (i.e. 3756 completed years since Creation), betrays the influence of the eleventh-century chronicler Marianus Scottus (d. 1082), to whose views he expresses particular allegiance, stating that "all those who think otherwise wish to appear like heretics or schismatics" (*omnes secus sentientes hereticos esse vel scismaticos videri velint*). While Marianus miscalculated the difference between Dionysius and Eusebius and thus increased it to four years (explaining Robert's numbers), his own position entailed a far more dramatic correction of the Dionysiac era: having compared the data of the Easter *computus* with the chronological parameters traditionally associated with the Passion of Christ—the 15th day of the moon on Friday, 25 March—, Marianus found that the only year in which the numbers convened was 12 CE rather than the traditionally accepted 34 CE. As a result, he decided to shift the life of Jesus by 22 years, assigning his birth to the year corresponding to 22 BCE.[151] In line with this shift, Robert assigns the 'incarnation accord-

148 Eusebius, *Die Chronik*, ed. Helm, 169. For details, see Józef Naumowicz, "La date de naissance du Christ d'après Denys le Petit et les auteurs chrétiens antérieurs," *Studia Patristica* 34 (2001), 292–296.

149 Dionysius Exiguus, *Libellus de cyclo magno paschae DCCCII annorum*, ed. Krusch, *Studien* (1938), 64: "Quia vero sanctus Cyrillus primum cyclum ab anno Diocletiani CLIII coepit et ultimum in CCXLVII terminavit, nos a CCXLVIII anno eiusdem tyranni potius quam principis inchoantes, noluimus circulis nostris memoriam impii et persecutoris innectere, sed magis elegimus ab incarnatione domini nostri Iesu Christi annorum tempora praenotare."

150 See Abbo of Fleury, *In circulos beati Cyrilli et Dionysii Romani ac Bedae … praefatio* (PL 90, 823–826 = PL 139, 573–578). For further details, see Verbist, *Duelling*, 35–84.

151 The details of his calculation for the difference between Dionysius and Eusebius can be found in ch. II.18–19 of Marianus's chronicle, which is still unpublished. See MS London, BL, Cotton Nero C.V, fols. 80^{rb}–82va. On his 22-year correction, see also Peter Verbist, "Reconstructing the Past: The Chronicle of Marianus Scottus (d. 1082)," *Peritia* 16 (2002): 284–334; Verbist, *Duelling*, 85–146; Nothaft, "An Eleventh-Century Chronologer at Work."

ing to Marianus' to 3761 – 22 = 3739 JE (3738 completed years). His reliance on Marianus Scottus also explains his startling assignment of the 'incarnation according to the Hebrews' to 3753 JE (3752 completed years), which is eight years earlier than Dionysius Exiguus's estimate. From the *Seder Olam*, Robert knew that rabbinic tradition dated the destruction of the Second Temple by Titus to the year 3828 since the world's creation. Yet Marianus's inflated chronology of the Roman emperors dates the same event to the 76th year since Jesus's incarnation. Counting inclusively, 76 years from 3828 JE lead back to 3753 JE as the year of the incarnation 'according to the Hebrews'.[152]

Another surprising claim on Robert's part is that Bede dated the incarnation eight years later than Dionysius, which would be 9 CE and hence the latest of all the different dates proposed. Needless to say, no such claim can be found in Bede's computistical works, where the Easter table of Dionysius Exiguus, including its era of the incarnation, is everywhere upheld as the gold-standard of chronological reckoning. Similar to the case of Eusebius and Marianus, Robert's claim can be explained by his reliance on Gerland (or Garlandus, d. after 1093), an eleventh-century computist who placed the crucifixion of Jesus in 42 CE. Gerland's rationale for this shift was analogous to that of Marianus Scottus some years before, with the difference that Gerland relied on the testimony of Theophilus of Caesarea, whom Bede had quoted as "an ancient doctor who lived close to the time of the Apostles."[153] The text in question, which was wrongly believed to represent the acts of the second-century Council of Caesarea, put the resurrection of Christ on 25 March, thereby implying that the crucifixion alrady fell on 23 March.[154] In the introduction to the chronicle that was appended to *De temporum ratione*, Bede seemingly accepted this crucifixion date,[155] despite the fact that he nowhere explicitly abandoned the 'canonical' date on 25 March. Convinced that Bede had fully endorsed the Theophilan

152 Marianus Scottus, "Chronicon," ed. Georg Waitz, in *MGH Scriptores*, vol. 5, ed. Georg Heinrich Pertz (Hannover: Hahn, 1844), 500, 509. On the year of the destruction of the Second Temple in rabbinic chronology, see Frank, *Talmudic and Rabbinical Chronology*, 13, 20–24.

153 Bede, *De temporum ratione* 47 (123B, 432): "Quamvis Theophilus caesariensis, antiquus videlicet vicinusque apostolicorum temporum doctor, in epistola synodica quam adversus eos qui decima quarta luna cum Iudeis pascha celebrabant una cum caeteris Palestinae episcopis scripsit, ita dicit."

154 The Caesarean *Acta Synodi* were edited by Krusch, *Studien* (1880), 306–310. See also the German translation and discussion in Strobel, *Texte*, 80–95. On the various recensions of this text, which dates from the fifth or sixth century, see Warntjes, *The Munich Computus*, lxv (n167); Jones, *Bedae Opera*, 87–89.

155 Bede, *De temporum ratione* 66 (CCSL 123B, 464–465).

date on 23 March, Gerland decided that the Passion should be moved from 34 to 42 CE, which was the closest year nearby in which 23 March coincided with Friday and the 15th day of the lunar month.[156] For the year of the incarnation and nativity, he chose 8 CE (3767 completed years in Robert's scheme), basing himself on Bede's doctrine in chapter 47 of *De temporum ratione*, according to which the Saviour had lived for 33½ years, meaning that he died in the 34th year of his life (42 – 34 = 8). Confusingly, however, Bede's remarks also indicated that Christ's birth was found in the first year of the Dionysiac era, while the crucifixion took place in 34 CE, i.e. in the 33rd year of his life.[157] This discrepancy in Bede's own words explains why Robert attributed to the Northumbrian monk a nativity date that fell one year later than Gerland's, leading him to assign the 'incarnation according to Bede' to 3769 JE (3768 completed years).

Having established the JE-year of the incarnation according to these five Christian authorities as well as the Hebrews, Robert went on to calculate the time and the Julian date of the *molad* Tishri for each of the six years in question. The results are displayed in table 9, which also lists the corresponding date and weekday of 11 Tishri, the assumed date of John the Baptist's conception. The latter date ranges from 1 October, in the case of Marianus, to 11 September, in the case of Gerland. In principle, Robert might have tried to calculate the date of Jesus's conception by simply moving six months forward from the conception of John the Baptist. Yet this approach would have meant to produce results that deviated from established ecclesistical tradition, which assigned the Annunciation to the Virgin Mary, and hence Jesus's incarnation/conception, to 25 March. In line with this tradition, the two additional columns in table 9 that are reserved for the *Annuntiatio* always show the weekday and the corresponding Jewish calendar day for the 25th of March in the following year. The Jewish date is simply designated as *luna* and is not always correctly displayed: in the 'Eusebian' nativity year 4 BCE, an embolismic year, the 25th of March would have been the equivalent of 26 Veadar or Adar II. Robert instead puts *luna* 28. This two-day discrepancy is explicable by the fact that 4 BCE = 3757 JE is the 14th year of the 198th 19-year cycle since the beginning. In Robert's 247-year table this belongs to the third column, where year 14 is designated as

156 This consequence is already mentioned in Bede, *De temporum ratione* 61 (CCSL 123B, 452). For Gerland's argument and use Bede's statements, see the edition of ch. I.24 in Lohr, *Der Computus Gerlandi*. See further Verbist, *Duelling*, 147–171, and Alfred Cordoliani, "Abbon de Fleury, Hériger de Lobbes et Gerland de Besançon sur l'ère de l'incarnation de Denys le Petit," *Revue d'histoire ecclésiastique* 44 (1949): 463–487.

157 Bede, *De temporum ratione* 47 (CCSL 123B, 427–433).

'defective', whereas in reality 3757 JE would have been 'perfect' and 385 days long. The same problem recurs four years later in 1 CE, where Robert signals *luna* 13, thinking that 3761 JE was a 'defective' year, whereas the correct conversion shows that 25 March fell on 11 Nisan, the year being 'perfect'. Moreover, in 8 CE, which is an embolismic year in the Jewish calendar (3768 JE), 25 March should have been 28 Adar II, but Robert marks it as *luna* 29. The reason for this could be that he accidentally counted the second Adar as a 'full' month of 30 years, whereas according to the proper rules it should have ended on the 29th. With 1 Nisan falling on 27 March, the penultimate day of the previous Adar II would hence have been the 28th.

Despite the conservative slant of his treatment, which retained 25 March as the date of the Annunciation, Robert of Leicester's table still falsified the established approach of assigning both John the Baptist's and Jesus's conception and birth to the four cardinal points of the solar year. According to this scheme, which made use of the traditional Roman dates, John was conceived on the day of the autumn equinox, 24 September, which was followed six months later by Jesus's conception on 25 March (vernal equinox). Analogously, John's birth was dated to 24 June (summer solstice), which was followed six months later by Jesus's birth on 25 December (winter solstice). One of the most influential sources to advocate this distribution of dates was the Latin treatise *On the solstices and equinoxes of the conception and birth of our Lord Jesus Christ and John the Baptist*, which circulated under the name of John Chrysostom. As the title would suggest, the author of this text, who probably wrote in North Africa or Syria between the third and fifth century, relied heavily upon the symbolism that involved the decrease and increase of sunlight associated with the equinoxes and solstices. According to his interpretation, this symbolism was already hinted at in the Gospel of John (3:30), where John the Baptist is quoted as saying "he [i.e. Jesus] must increase, but I must decrease." The Gospel word is here read as suggesting that the birth of the Baptist happened on the day of the summer solstice, which marks the beginning of decreasing day-length, whereas Jesus—who was conceived six months later than John—was born at the winter solstice, after which the days grow longer again. In addition, the author combined this stance with the aforementioned theory that promoted Zechariah to the position of High Priest and stipulated that he begat his son one day after Yom Kippur, on 11 Tishri.[158]

158 The text of *De solstitiis et aequinoctiis* was edited by Bernard Botte, *Les origines de la Noël et de l'Épiphanie* (Louvain: Abbaye du Mont César, 1932), 93–105, and again in Adalbert-Gauthier Hamman, ed., *Patrologiae Latinae Supplementum*, 5 vols. (Paris: Garnier,

Robert of Leicester took issue with this source, which was cited at length in Bede's commentary on Luke, for no less than three reasons. For one thing, none of the years listed in table 9 showed the kind of correspondence between 24 September and *luna* 11 (= 11 Tishri) that pseudo-Chrysostomus had envisaged. The same problem was encountered in the ecclesiastical lunar calendar, where no corresponding new moon could be found on 14 September. In addition, the author of *On the solstices* mistakenly associated the day in question with the feast of Tabernacles (*Scenopegiae*), better known as Sukkot, which in reality only began on the 15th day of Tishri. Finally, the claim that 24 September was the day of the autumn equinox in the year of John's conception was refuted by the *tekufot* Tishri listed in table 2, which, when applied to the *molad* times in table 9, converged on an equinoctial date on 19 September.[159] In order to safeguard the credibility of John Chrysostom and Bede, Robert hypothesized that the author of this chronology might have envisaged the year 17 BCE, which was the fourth year of the Dionysiac 19-year cycle. For this year, Robert's tables show a *molad* on Wednesday, 14 September, which is consistent with 11 Tishri on 24 September. Yet even in this case, it had to be concluded that Chrysostom did not date the conception of John the Baptist to the true equinox, but only to its date "according to the common opinion of men" (*secundum opinionem vulgarem hominum*). A final rebuke in Robert's discussion is directed at Marianus Scottus, who had shifted the 'real' date of John's conception to Thursday, 30 September, based on the lunar data of the Dionysiac 19-year cycle.[160] Robert's astronomically more reliable Jewish calendar clearly showed the correct date to be 1 October instead.

1958–1974), 1:557–567. On its transmission, see Wolfgang Wenk, *Zur Sammlung der 38 Homilien des Chrysostomus Latinus* (Vienna: Österr. Akad. d. Wiss., 1988); Rosalind Love, "Bede and John Chrysostom," *Journal of Medieval Latin* 17 (2007): 72–86; Thomas N. Hall and Michael Norris, "The Chrysostom Text in Bodley 516," *Journal of Theological Studies*, n.s., 62 (2011): 161–175.

159 For reasons not quite clear, Robert writes 18 September instead. The correct equinoctial date can be easily extracted by adding/subtracting the values indicated in table 2 from the *molad* times in table 9. In the year of the incarnation 'according to Marianus' (3739 JE = 23/22 BCE), for example, the *molad* Tishri was 21 September, at 4h 213p. This was the 17th year of the Dionysiac 19-year cycle and hence the 15th year of the Jewish cycle. For the 15th year, table 2 prescribes the subtraction of 1d 4h 264p and 74 'moments', meaning that the *tekufat* Tishri would have fallen at the end of 19 September.

160 See ch. II.1–2 of Marianus's chronicle in MS London, BL, Cotton Nero C.V, fols. 74^{ra}–75^{ra}; Verbist, "Reconstructing," 301–302; Verbist, *Duelling*, 105–106.

Chapter 6

Robert wisely postponed any decision as to which of the potential six incarnation years discussed in chapter 5 was the historically correct one until he was able to determine the correct date of Jesus's crucifixion. His systematic discussion of this complex chronological question takes up all of chapter 6 and constitutes the culmination point and crowning achievement of his whole treatise. As Robert clearly lays out at the beginning, the various years proposed in chapter 5 yield varying estimates for the year of the Passion, depending on whether Jesus was taken to have died in the 33rd, 34th, or 35th calendar year from his incarnation. All three variants had precedents in earlier Christian literature. As a matter fact, they could all be derived from Bede's *De temporum ratione*. In chapter 47 of this seminal work, Bede remarked that Jesus was 30 years old at his baptism and then preached in public for 3½ years at his death, leading to a total life-span of 33½ years. Assuming that Jesus was born on 25 December 1 CE, this would have implied a crucifixion in 35 CE and hence in the 35th year from his incarnation. While this interpretation was favoured by Marianus Scottus and Gerland, Bede himself seemed to place the Passion in 34 CE and hence implicitly shortened Jesus's life by one year. An even shorter chronology could be encountered in Bede's *Greater Chronicle*, attached to *De temporum ratione*, where he assigned the birth of Jesus to AM 3952 and the crucifixion to AM 3984, i.e. to the 33rd year since the incarnation.[161]

A similar variety existed with regard to the Julian calendar date of the crucifixion, where the three most commonly cited dates in the Latin tradition were 23 March, 25 March, and 26 March.[162] The last of these was featured in the Easter table of Victorius of Aquitaine, but had largely fallen out of use after this table was abandoned in the course of the eighth century, before being briefly revived by Reinher of Paderborn in his *Compotus emendatus*.[163] As we have seen above, the crucifixion on 23 March could be derived from the pseudo-Theophilan *Acts* and was endorsed both by Gerland and—to a lesser degree—by Bede. The majority position, however, as exhibited by countless medieval calendars, was to date the crucifixion to 25 March and the resurrection of Jesus to the following 27 March.[164]

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161 For details on Bede's take on the chronology of Jesus, see Nothaft, *Dating*, 80–88.

162 All three are mentioned in Bede, *De temporum ratione* 61 (CCSL 123B, 452).

163 Victorius of Aquitaine, *Cursus Paschalis* (8–9), ed. Krusch, *Studien* (1938), 23–25; Reinher, *Compotus emendatus* (2.15), ed. van Wijk, *Le comput*, 68–70.

164 *Martyrologium Hieronymianum* (AASS 63, 37; PL 30, 449); Meerssemann and Adda, *Manuale di Computo*, 174; Rabanus Maurus, *Martyrologium* (CCCM 44, 32); Elias A. Loew, *Die ältesten Kalendarien aus Monte Cassino* (Munich: Beck, 1908), 16; Hampson, *Medii Aevi*

With these preliminary points out of the way, Robert goes on to tackle the main exegetical problem involved. The Gospels offer two versions of the chronology of the Last Supper, depending on whether one follows the synoptic account of Matthew, Mark, and Luke, who more or less state that Jesus's dinner with his disciples coincided with the annual Passover meal, which normally took place on the evening of 14/15 Nisan, or the Gospel of John, who instead implies that the same events already happened on 13/14 Nisan.[165] Aside from the obvious problem of contradictory Gospel accounts, there was another good reason why this chronological question occupied the minds of scholars in Robert's day: its implication for the kind of bread Jesus was likely to have eaten on the evening before his death. If the Last Supper had taken place on 14/15 Nisan, when the Jews held their regular Pesaḥ meal, it could be safely assumed that Jesus had eaten *matzot*, because all Jewish houses had by then been purged of fermented bread. The Roman Church accordingly made unfermented bread (Latin: *azyma*) the material basis of its celebration of the Eucharist. In the eleventh century, however, this custom had become the object of a pervasive dispute between Rome and the Greek Churches of the East, where fermented bread was used and the Latin rite was looked at with disdain. This so-called 'azymes controversy' had played an important role in the so-called Great Schism of 1054 and continued to be a point of contention in all subsequent negotiations to restore unity between Eastern and Western Christianity.[166] Given this background, the stakes were obviously high when it came to interpreting the chronology of the Last Supper. Unsurprisingly, the majority

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Kalendarium, 1:402, 437, 451, 463; Piper, *Die Kalendarien*, 17–21, 88; Wormald, "A Liturgical Calendar," 15; Wormald, *English Kalendars*, 4, 18, 46, 60, 74, 88, 102, 116, 130, 144, 172, 186, 200, 214, 228, 242; Wormald, *English Benedictine Kalendars*, 1: 4, 21, 36, 53, 70, 86, 102, 119, 135, 151, 170; 2: 10, 29, 46, 65, 81; Wormald, "The Liturgical Calendar of Glastonbury Abbey," in *Festschrift Bernhard Bischoff*, ed. Johanne Autenrieth and Franz Brunhölzl (Stuttgart: Hierseman, 1971), 326–345 (330); Munding, *Die Kalendarien*, 1:46; 2:46; Rolf Kuithan and Joachim Wollasch, "Der Kalender des Chronisten Bernold," *Deutsches Archiv* 40 (1984): 478–531 (501); Borst, *Reichskalender*, 1:722; Borst, *Kalenderreform*, 264.

165 See n. 40 in Chapter One above.

166 On the background, see Georgij Avvakumov, *Die Entstehung des Unionsgedankens* (Berlin: Akademie Verlag, 2002), 29–159; Henry Chadwick, *East and West: The Making of a Rift in the Church* (Oxford: Oxford University Press, 2003), 200–232; Brett Edward Whalen, "Rethinking the Schism of 1054: Authority, Heresy, and the Latin Rite," *Traditio* 62 (2007): 1–24; Chris Schabel, "The Quarrel over Unleavened Bread in Western Theology, 1234–1439," in *Greeks, Latins, and Intellectual History, 1204–1500*, ed. Martin Hinterberger and Chris Schabel (Louvain: Peeters, 2011), 85–127.

of Latin theologians since the days of the Great Schism had tried to discredit the Greek position by insisting on the veracity of the synoptic chronology.[167] A vivid example of this general attitude is Peter Comestor (d. ca. 1178), who briefly touches upon the issue in his widely disseminated *Historia scholastica*. Unlike others, Peter was at least willing to consider the possibility of Jesus holding the Passover meal one day earlier than the Jews in general, knowing that this scenario was seemingly supported by four hints found in the Gospels:[168]

(1) John 18:28 states that the Jews did not wish to enter the praetorium so "that they might not be defiled, but that they might eat the pasch."
(2) The High Priests explicitly decided to kill Jesus, "But they said: Not on the festival day, lest perhaps there should be a tumult among the people" (Matthew 26:5; Mark 14:2). This would go in favour of a crucifixion on 14 Nisan, provided they went through with this plan.
(3) John 19:14, 31 states that the Sabbath following the crucifixion was a high feast day, thus implying that it coincided with 15 Nisan.
(4) The women prepared spices and ointments for Jesus's body on Friday and rested on the Sabbath "according to the commandment," indicating that it was a high feast day, whereas the preceding Friday was not (Luke 23:56).

Predictably, Peter countered these argument by referring to the various passages in the synoptic Gospels that seemed to date the Last Supper on the "first day of unleavened bread" (Matthew 26:17; Mark 14:12; Luke 22:7). Regarding (1), he argued that the concern over ritual purity would have applied just as well to the seven other days of unleavened bread; accordingly, "eating the pasch" in John 18:28 could be understood as simply referring to *matzot*.[169] In response to passage (4), he hypothesized a scenario according to which the women had already prepared their ointments previous to the day of the crucifixion. He also thought it likely that the prohibition of buying merchandize was handled more

167 For the influence of the 'azymes controversy' on medieval discussions of the Passion date, see Nothaft, *Dating*, 136–146, 152, 189–194, 212–222. See also the chapter on Hermann Zoest, p. 481 below.

168 Peter Comestor, *Historia scholastica*, Historia Evangelica, cap. 169: "De coena Domini" (PL 198, 1615).

169 Ibid., 1616: "Ad comedendum quoque azyma, oportebat eos septem diebus mundos esse. Unde quolibet septimo die non poterant intrare praetorium."

strictly on the Sabbath than on any other day, regardless of the Passover.[170] In addition, Peter alleged computistical reasons for a crucifixion on *luna* 15—a claim that was later attacked by Roger Bacon, who instead held that Jesus died on 14 Nisan.[171]

Similar to Bacon before him, Robert of Leicester cites essentially the same scriptural evidence as Peter Comestor, but comes to quite the opposite conclusion: he follows John and the Greeks in stating that Jesus anticipated the regular Pasch and hence celebrated on the evening of 13/14 Nisan, although he still insists—with Comestor and against the Greeks—that Jesus adhered to the rules of a proper Passover seder and hence broke unleavened bread with his disciples. Robert's defence of this position is not only very likely indebted to Roger Bacon, but also shows some striking similarities to the work of Matthew of Aquasparta (d. 1302), a one-time Minister General of the Franciscan Order (1287 to 1289), who had laid down his opinion on the azymes question in a commentary on Peter Lombard's *Sentences* (begun in ca. 1271–1272).[172] A comparison between the wording of Matthew's arguments and Robert's own remarks on the chronology of the Last Supper makes it seem very likely that the English friar had access to a copy of this *Sentences* commentary. Against the popular argument that *pascha* in John 18:28 was a reference to unleavened bread instead of the paschal lamb, both men marshal the following rejoinder, based on Numbers 9:6:

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170 Ibid.: "Quod autem mulieres dicuntur parasse unguenta in die festo, dicimus quia non erant dies aliqui adeo festivi ut Sabbatum, et licuit eis parare, vel emere, sicut et cibos, quod non liceret Sabbato. Quid si multo ante paraverant, quia audierant a Domino saepe eum in proximo moriturum. Nonne Magdalena videtur jam parasse, et per inspirationem Spiritus sancti praeoccupasse unctionem. Quidam autem dicunt quod tertiadecima luna, quarta scilicet feria coenavit Dominus cum discipulis, et lavit pedes eorum. Quod narrat solus Joannes, et in quarta decima comedit agnum paschalem, et dedit discipulis corpus suum, de quo alii agunt." On the background to these arguments, Nothaft, *Dating*, 143–144, 189–190.

171 Peter Comestor, *Historia scholastica*, Historia Evangelica, cap. 169: "De coena Domini" (PL 198, 1616): "Etiam si tabulam computi diligenter retro percurramus, inveniemus lunam XXII Kalendis Aprilis feria sexta, ergo in praecedenti sexta feria fuit luna quintadecima." Cf. Bacon's criticism of Peter's chronological claim in *Opus majus*, 1:206.

172 The corresponding *quaestio* was recently edited by Christopher D. Schabel, Fritz S. Pedersen, and Russell L. Friedman, "Matthew of Aquasparta and the Greeks," in *Philosophy and Theology in the Long Middle Ages*, ed. Kent Emery, Jr., Russell L. Friedman, and Andreas Speer (Leiden: Brill, 2011), 813–853 (844–853).

Matthew	Robert
Si dicatur quod "Pascha" vocantur azyma quae septem diebus comedebantur, et munditia requirebatur ad comedendum, contra: immunditia non prohibebant azyma, sed Pascha, Numeri 90⟨.6⟩, si post comestionem phase contracta fuisset immunditia. Nam si ante Pascha tetigissent cadaver hominis vel sepelissent, cum tali immunditia non poterant toto illo mense comedere Pascha. Et certum est quod secundum legem azyma comedere tenebantur; si enim fermentatum comedissent, peribant de coetu Israel.[173]	Si dicas quod ibi accipitur pascha per cibo paschali, id est pro azimis, quibus 7 diebus utebantur, et ad edendum ea munditia requirebatur, contra Numerorum 9 inmundi perhibentur commedere pascha, sed non azima, si post commestionem pasche infra 7 dies contracta fuerit inmunditia. Immo si post commestionem pasche infra 7 dies commedent fermentum, peribant de cetu Israel.

Both authors also discuss the "ointments and spices"-passage in Luke 23:56 in a fairly similar fashion:

Matthew	Robert
Item, Lucae 230⟨.56⟩: "Revertentes mulieres paraverunt aromata et sabbato quidem siluerunt secundum mandatum"; si igitur haec praeparatio fuit in die parasceve, quando fuit Dominus crucifixus et viderunt monumentum in quo fuerat positum corpus eius, ergo illo die non fuit dies azymorum, quia tunc non licet	Item Luce 23: '*Et revertentes* mulieres', scilicet in die crucifixionis, '*paraverunt aromata et sabbato quidem siluerunt secundum mandatum*'. Si ergo in die crucifixionis paraverunt aromata non ergo fuit luna 15, sive prima dies azimorum, quia de die prima et ultima dicitur Exod 12: '*nihil operis*

173 Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, qu. 1), ed. Schabel, Pedersen, and Friedman, "Matthew," 844.

aliquid parare. E⟨x⟩odi 120⟨.15⟩: "Septem diebus azyma comedetis", et post ⟨12.16⟩: "Prima dies erit sancta atque sollemnis, et dies septima eadem festivitate venerabilis, nihil operis facietis in eis exceptis his quae ad vescendum pertinent". Sed parare aromata non pertinent ad vescendum; ergo et cetera.[174]

facietis in eis exceptis hiis quae ad vescendum pertinent'. Sed aromata preparata non pertinent ad vescendum; ergo etc.

Further ammunition for those who supported the Greek position could be gleaned the from the pseudo-Augustinian *Questions on the Old and New Testament*, in which the venerated Church Father seemed to uphold a crucifixion on the 14th day of the moon:

Matthew	**Robert**
Item, Augustinus, in *Libro quaestionum novi et veteris testamenti*, quaerit quando Judas retulit 30a argenteos, utrum si ante vel post passionem. Et arguit sic: Non in mane parasceve, quia intenti erant Judaei circa mortem Christi. Nec post horam nonam, quia occupati erant seniores, ut aestimo, et principes sacerdotum. Vespere enim eodem die acturi erant Pascha. Et eodem libro dicit sic "quod 14a luna passus est."[175]	Item Augustinus de questionibus veteris et novi testamenti, questione 94., que incepit 'Tradito salvatore', querit de Iuda quando retulit 30 argenteos, ostendens quod in mane parasceves non, quia intenti erant seniores et principes circa mortem Christi. Nec in templo poterant inveniri, nec post horam nonam, occupati enim erant, sicut estimo (dicit Augustinus), seniores et principes sacerdotum, vespere enim eadem die pascha acturi erant. Et infra eodem libro, questione 106, dicit 14 luna passus est.

174 Ibid., 845.

175 Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, qu. 1), ed. Schabel, Pedersen, and Friedman, "Matthew," 845. Cf. pseudo-Augustine, *Quaestiones veteris et novi testamenti*, q. 94, 106.5 (CSEL 50, 165–166, 238).

This use of pseudo-Augustine is a trait that Matthew and Robert not only share among themselves, but also with their fellow Franciscan Roger Bacon, whose *Opus majus* and *Opus tertium* included a treatment of the chronology of Jesus's last days that anticipated the position later taken by Matthew of Aquasparta.[176] Like his two famous predecessors, Robert of Leicester does not omit to emphasize the typological correspondence between the slaughtering of the paschal lamb on 14 Nisan and the crucifixion of Jesus, the 'true lamb of God', on the same day, which provides further evidence in favour of John's account:

Matthew	**Robert**
Item, veritas debet respondere umbrae et res figurae; sed agnus typicus, qui erat figura istius agni et immolatio immolationis, immolabatur 14a luna, Exodi 120⟨.6⟩; ergo Christus fuit 14a luna crucifixus.[177]	Ad hoc arguitur, quia si figure debet veritas respondere, cum agnus, qui erat figura huius, immolaretur 14 luna, Christum etiam passus fuit 14 luna.

According to Matthew's and Robert's joint version of events, Jesus deliberately anticipated the feast and celebrated the Passover meal one evening earlier than all other Jews, knowing that he would die the very next day. Such an interpretation had previously also been suggested in an obscure commentary on Matthew generally attributed to Remigius of Auxerre (ca. 841–908). His remarks on the Passion date in chapter 351 were later excerpted and circulated independently as an appendix to certain copies of the twelfth-century Gospel harmony of Zachary of Besançon (d. 1155), thus testifying to the considerable interest that the chronology of the Passion and the Last Supper exerted in the eyes of many medieval readers. Robert mentions both names (a trait not found in Matthew of Aquasparta's discussion), indicating that he relied on a manuscript of Zachary's work.[178] The hypothesis that Jesus celebrated Passover

176 Bacon, *Opus majus*, 1:206–208; Bacon, *Opus tertium*, 221–222.

177 Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, qu. 1), ed. Schabel, Pedersen, and Friedman, "Matthew," 846. Cf. Bacon, *Opus tertium*, 222: "Et figura debet respondere veritati. Sed agnus Paschalis fuit occisus in lege quartadecima luna semper."

178 MS Florence, BML, Plut. 20.22 (s. XI), fol. 217^{r}: "Attamen sciendum quod si diligenter et congruenter anni computentur ab initio mundi usque ad passionem domini, invenimus

one day earlier than all other Jews and that it was Jesus's early Passover the three synoptic evangelists were referring to made it possible to demonstrate that the seemingly discordant Gospel accounts were actually in harmony with each other:

Matthew	**Robert**
Quod autem dicunt tres evangelistae quod die azymorum, intelligendum quod Christo et discipulis fuit dies azymorum, qui praeoccupaverunt et anticipaverunt tempus Paschae	Et quod 3 ewangeliste diem illum vocant diem azimorum, quia Christo et ipsius Apostolis erat dies azimorum, set tamen dies crastinus erat communiter Iudeis dies

quum ipso anno quo dominus passus est secundum annos lunares VIII idus Martii fuit neomenia, id est initium nove lune et secundum Hebreos ipsius anni principium, duodecimo kalendarum Aprelium in ipso vernali aequinoctio, feria sexta, fuit luna quartadecima et semis pascha Iudeorum. Evidenter ergo manifestatur quod eo die ille verus agnus qui venerat peccata mundi tollere appensus est in cruce pro humani generis salute, quo die illo tipicus agnus ad liberationem filiorum Israel issus fuerat immolari. Sua itaque morte dividit inter lucem et tenebras, ut illud impleretur quod scriptum est. 'Ecce positus est hic in ruinam et in resurrectionem multorum in Israel' [Lk 2:34]. In ruinam scilicet infidelium et in ressurectionem fidelium. Nox quippe ad condemnationem reproborum, dies vero refertur ad salutem fidelium, unde ipse dies scilicet fideles quod admodo posse cum Apostole clamare dicentes que eripuit nos de potestate tenebrarum etc. Sed forte querit aliquis quare ille preoccupavit comedere agnum. Cui dicendum est, quia non fuit sub lege ipse, voluit comedere agnum ut traderet corporis et sanguis sui misteria discipulis. Videtur enim Iohannes huic oppinionem sentiens esse cum dicit 'Iudei autem non introierunt in pretorium ut non contaminarentur sed manducarent pascha' [18:28], quod enim duodecimo kalendarum crucifixus est, decimo resurrexit, quo die plasmatur legitur primus homo." A slightly shorter version of this passage can also be found separately in MS Graz, UB, 234 (s. XIII), fol. 243^{vb}, the bulk of which contains Zachary's Gospel harmony *In unum ex quatuor* (19^{r}–237^{r}). This is also the context for the excerpt as it appears at the very end of MS Munich, BSB, Clm 4546 (s. XII^{ex}), fol. 268^{vb}. For an (incomplete) list of MSS of both this excerpt and Remigius's commentary on Matthew, see Colette Jeudy, "Remigii autissiodorensis opera (Clavis)," in *L'École Carolingienne d'Auxerre: de Murethach à Remi, 830–908*, ed. Dominique Iogna-Prat, Colette Jeudy, and Guy Lobrichon (Paris: Beauchesne, 1991), 457–500 (467–471). Remigius dates the crucifixion to 21 March and the resurrection to 23 March. This unusual chronology was in all likelihood derived from the chronicle of Claudius of Turin. See Nothaft, "Chronologically Confused."

propter imminentem passionem; tamen Judaeis communiter dies azymorum non fuit, sed crastinus. Et per hoc solvitur controversia apparens inter evangelistas.[179]

azimorum, et illis neccesse erat hoc die occidi pascha non simpliciter.

Robert's discussion also anticipates a potential counter-argument, which seeks to reconcile the synoptic chronology with the mentioned typological correspondence between the symbolic and true lamb by insisting that Jesus's suffering already began with his capture on the previous evening, which still belonged to 14 Nisan, when the Passover lamb was slaughtered.[180] Robert preempts this line of reasoning by pointing out that the Jewish day is counted from evening to evening and that the 15th of Nisan would hence already have begun at sunset on the preceding day. Matthew of Aquasparta had buttressed this point with a reference to al-Farghānī's astronomical *Elementa*,[181] but Robert provides a fuller list of sources, which also includes the *Glossa ordinaria* on Matthew 12:40 and Jerome's commentary on Jonah. In doing so, he most probably followed Roger Bacon, who had already discussed the evening epoch of the

179 Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, qu. 1), ed. Schabel, Pedersen, and Friedman, "Matthew," 851.

180 The claim that Jesus began to suffer on the previous evening is also made by the author of the *Compotus Constabularii* (1175), but here the argument served a different purpose: the author wanted to show that Christ's Passion coincided both with *luna* 15 and with the vernal equinox, even though the latter already occurred during the night before the crucifixion (26 March). See MS London, BL, Cotton Vitellius A.XII, fol. 97va: "Passio autem Domini cum nocte in qua erat equinoctium inchoabatur, in cuius noctis initio incepit verus homo *pavere et tedere* et sudare guttas sanguinis, fuitque *tristis anima* sua *usque ad mortem*, duravitque nocte passio et die, donec emisit spiritum. Ergo passus est Dominus in die verni equinoctii, passus est in die pasche, nihilominus tamen pascha celebratum est post transcensum equinoctii." The italicized words are taken from Mark 14:33–34.

181 al-Farghānī, *Il Libro* (1), ed. Campani, 57; Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, qu. 1), ed. Schabel, Pedersen, and Friedman, "Matthew," 846: "Si tu dicas: semper 14a luna celebravit Pascha, et eodem die fuit immolatio agni inchoata, licet die requiei fuerit terminata, contrarium est manifeste. Constat enim quod dies secundum Hebraeos incipit a vespera, et etiam secundum Alfraganum. Cum enim luna praesit nocti, recte aetas eius in principio noctis incipit computari, ergo 14a luna 14a dies est. Ergo necesse est quod, qua die fuit passio inchoata, quod eadem fuit terminata; ergo, si inchoata fuit 14a luna, 14a luna fuit consummata, nam in vespera sequenti incipit computari 15a luna."

Jewish day in a different context in his *Opus majus* and *tertium*.[182] Robert adds that the consistency with which both the Old and New Testament point to a beginning of the day at sunset refutes the view "that in the Lord's supper and Christ's resurrection the order of things was changed around" (*quod ordo rerum mutatus est in cena Domini et in resurrectione Christi*). This might be a silent jab at the chronicler Alberic of Trois-Fontaines (d. 1252), who advanced such a hypothesis in order to safeguard the traditional view that Jesus died on 25 March, despite the fact that this date could not be found on a Friday in 34 CE.[183]

Another point in favour of the Johannine chronology that is used by Robert of Leicester, but not by Roger Bacon or by Matthew of Aquasparta, concerns the *deḥiyyot* of the Jewish calendar, which categorically prevent 15 Nisan from falling on a Friday—a fact Robert infers from tables 4 and 5. Given his deference to the Jewish calendar in the previous chapters of part IV, one would expect that he believed the present-day fixed calendar to have been in use since Old Testament, but in his discussion he is somewhat more circumspect, admitting that it was a presupposition "that these tables were already in use at this time" (*si tamen tunc istis tabulis usi fuerint*).

Having secured 14 Nisan and the Johannine chronology as the most likely account of the date of Christ's Passion, Robert next had to determine the criteria by which to calculate the corresponding date in the Julian calendar. The most straightforward and simple method would have been to use the Jewish calendar and look for coincidences of 14 Nisan and Friday in the relevant year-range for the Passion. Such a way of proceeding would have naturally presupposed that the present-day calendar used by Jews, with its *deḥiyyot* and other rules, had already been operating in first-century Palestine, at the time of the crucifixion. In his *Opus majus*, Roger Bacon had instead preferred to rely on a table for the years 1–38 CE, which listed the mean opposition times for both March and April (as well as corresponding weekday letters). Although it is not entirely clear how Bacon construed the relation between these dates and the first-century Jewish calendar, it is likely that he assumed that 1 Nisan in Jesus's time had generally

182 Jerome, *In Ionam* 2.1.1 (CCSL 76, 394); *Glossa ordinaria* on Mt 12.40 (PL 114, 128); Bacon, *Opus majus*, 1:195; Bacon, *Opus tertium*, 211–212.

183 Alberic of Trois-Fontaines, "Chronica," ed. Paul Scheffer-Boichorst, in *MGH Scriptores*, vol. 23, ed. Georg Heinrich Pertz (Hannover: Hahn, 1874), 679: "Sed quia in nocte dominice resurrectionis ordo temporum immutatus est, et dies qui secundum primam conditionem noctem precedebat modo subsequitur, recte in hoc anno dominicus dies et secundum Dyonisium et per tot annos invenitur per C et secundum beatum Augustinum potuit esse in B. Item neque conputus paschalis, neque tabula tunc habebatur in ecclesia, et aliter et alio fortisan anno inserebatur tunc bisextum quam modo inseratur."

begun with the evening after conjunction, on which the new moon crescent became first visible in many cases. In such a scenario, the day of opposition would have corresponded to either 14 or 15 Nisan, depending on how late in the day the previous conjunction had fallen. In any case, Bacon's perusal of the aforementioned table led him to the conclusion that Jesus had been crucified on 3 April 33 CE, the 14th day of Nisan, a date that is still widely accepted among New Testament scholars.[184]

It appears that this table was sent to Pope Clement IV as a separate document together with the aforementioned Hebrew calendar (p. 136). As Bacon mentioned in the *Opus tertium*, he had instructed his student and personal emissary John in the use of this table, so that he could explain its principles to the pontiff if necessary.[185] In the *Opus minus*, he alluded to two other scholars who knew about the correct calculation of the Passion date, one of them being "a most wise theologian and excellent person" (*sapientissimus theologus et optimus homo*). Yet due to the "violence of the common folk" (*propter violentiam vulgi*) neither of them had dared to make their conclusions public.[186] Ferdinand Delorme, in an overlooked 1939-article written in Latin, identified this theologian with the Dominican scholar Giles of Lessines, whose *Summa de temporibus* (1260/64) shows many affinities with the chronological portions in Bacon's works for Clement IV.[187] One reason to doubt this identification is that Giles, in the second book of his *Summa*, worked quite hard to maintain the orthodox position, according to which Jesus died on 25 March 34 CE, the latter being the 15th day of the lunar month. Failing to find the desired result via the usual computistical and astronomical means, he made the remarkable step of determining the lunar date of Jesus's crucifixion based on the—historically accurate—assumption that the first-century Jews began their lunar months not on the day of conjunction, but on the evening of the moon's first visibility, "as I have learned from trustworthy persons" (*sicut accepi a fide dignis*).[188] His

184 See Nothaft, *Dating*, 184–188.

185 Bacon, *Opus tertium*, 225–226.

186 Bacon, *Opus minus*, 320: "Sed de illa tabula, quae Latina est, et de ea ordinatur cum quodam sapiente, adolescentem hunc satis instruxi hic ut utramque tabulam intelligeret, quae ambae simul non sciuntur a tribus aliis in hoc mundo. Et hoc quod hic tracto est unum de tribus, in quibus solum Dei vicarius audet certificare; quia veritatem quam duo sciunt hic, quorum unus est sapientissimus theologus et optimus homo, non nisi sunt illi in publicum proferre propter violentiam vulgi."

187 Delorme, "De auctore Compoti," 320–321.

188 The reference to *fide dignis* is only found in the second recension of book II (ch. 12), found in MSS Arras, Bibliothèque municipale, 674 (722), fol. 69^{v} and Paris, BnF, lat. 15268,

calculations showed that the lunar crescent of the first spring month in 34 CE had become visible on 11 March, which confirmed 25 March as the seat of 15 Nisan. Since 25 March was a Thursday, rather than a Friday, in 34 CE, Giles was forced to conjecture that the calendar of the early Church had been tied to a different "order of concurrents" (*ordo concurrentium*), such that the weekday on an individual date in the first century was higher by one compared to the present ecclesiastical calendar. For the coveted Passion date on 25 March this meant that it was possible for it to have fallen on Friday after all.[189]

In line with his deference to the fixed Jewish calendar in the previous chapters, Robert of Leicester chose neither Giles's 'first visibility' approach nor Roger Bacon's opposition table, but instead relied exclusively on the *molad*-system to provide him with the astronomical data necessary for his calculation of the Passion date. Despite this restriction, however, his approach to the problem was far from unsophisticated. Instead of simply setting his sights on 14 Nisan in the present-day Jewish calendar, he offers his readers some very precise deliberations about the possible ways in which the 14th or 15th day of a lunar calendar might be defined. In doing so, he takes issue with Rabanus Maurus, who, in his commentary on the book of Numbers, claimed that the Hebrew Passover on 15 Nisan was always the day of the full moon. As Robert points out, this can hardly be the case if the first day of the lunar month is identified with the day of

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fol. 229ra: "Michi autem inter scriptores nullo et inter recitatores parvo et insufficienti videtur alius modus convenientior ad verificandum veritatem ewangelii et dicta sanctorum: ut dicamus quod Iudei in temporibus illis lunam primam semper dicebant in die sue prime apparitionis, sicut accepi a fide dignis, non utentes neque arte Arabum, que postea inventa est, neque arte nostri kalendarii, que usus ecclesie moderne et Romane tenet." In the only complete copy of the work, MS Bologna, BU, 1845, fol. 33ra, the text (here ch. II.3.8) reads differently: "Alium etiam modum ostendendi lune etatem reperimus, scilicet Iudei enim lunam primam dicebant, ut intelleximus, in tempore illo a visione prima luna, non attendens cyclum 19lem nec alium cyclum." In opting for 25 March 34 CE, Giles was in agreement with Albert the Great, who was probably his teacher. See Albertus Magnus, *Super Dionysii Mysticam Theologiam et Epistulas*, ed. Paulus Simon (Münster: Aschendorff, 1978), 509–511; B.B. Price, "The Use of Astronomical Tables by Albertus Magnus," *Journal for the History of Astronomy* 22 (1991): 221–240.

189 Giles of Lessines, *Summa de temporibus* (II.3.8), MS Bologna, BU, 1845, fols. 32^{vb}–33va. Giles refers to Ptolemy's era from the death of Alexander (epoch: 12 November 324 BCE), which in his faulty interpretation began on a Monday rather than a Sunday, thus seemingly confirming his hypothesis of an alternative *ordo concurrentium*. This 'proof' is not found in the alternative recension of book II (ch. 12), where he simply surmised that Christians in the first century inserted the bissextile day differently or not at all: MSS Arras, Bibliothèque municipale, 674 (722), fol. 70$^{r–v}$; Paris, BnF, lat. 15268, fol. 229^{r}.

conjunction. Since the opposition falls roughly 14d 18h after conjunction, only conjunctions occurring before 6h on their given day will lead to a full moon no later than 15 Nisan. In all other cases, the corresponding opposition will fall on the following day, meaning that Passover will have to be celebrated either before the full moon or on 16 Nisan, both in violation of Rabanus's stipulation. The present-day Jewish calendar complicates matters further, since, as a result of the various postponement rules, 1 Nisan can often fall one day, sometimes even two days, after the *molad*. Due to this state of affairs, Robert decided to cast his net widely and accept not just the 14th and 15th, but also the 16th day from conjunction as a possible candidate for the historical crucifixion, provided the year in question called for a two-day postponement of 15 Nisan from Thursday to Saturday. In years of this type, the intervening Friday can be interpreted in a threefold manner: as 14 Nisan according to the fixed calendar, as 15 Nisan according to the method of taking the full moon, or as the 16th day from the *molad*. Interpretative wiggle room is also available in years where the conjunction fell on a Friday later than 6h, such that the full moon would have taken place on a Sabbath 15 days later. In this scenario, the Friday previous to this Sabbath can be designated as either 15 Nisan (if counted from conjunction) or 14 Nisan (according to the full moon).[190]

As upper and lower limits for the historical Passion year, Roger accepts the estimates of Marianus Scottus, who dated the crucifixion to 12 CE, and Gerland, who chose 42 CE. In accordance with these stipulations, Robert presents table 10, which shows the weekdays, times, and Julian dates for the *molad* Nisan along with the corresponding weekdays and Julian dates for 15 Nisan for a period of 31 years.[191] In order to see more clearly on how Robert proceeded on this basis, one can turn to the year 55 = 33 CE, which had been Roger Bacon's

190 For unclear reasons, Robert does not apply the method of 'taking the full moon' to year 35 = 13 CE, where the *molad* was on a Thursday after 17h, which would have landed the corresponding full moon on a Friday 15 days later. The latter could have thus been interpreted as 15 Nisan.

191 Robert evidently calculated the dates of 15 Nisan with the aid of his 247-year table, leading to incorrect results in some instances. In years 35 = 13 CE, 39 = 17 CE, and 47 = 25 CE, his date is two days early, because he mistook a 'perfect' year for a 'defective' one. In years 44 = 22 CE and 64 = 42 CE, he treated a 'perfect' year as 'regular' and was thus one day behind. Two further anomalies in his table are not explicable in this fashion: for year 54 = 32 CE, the table in MS D shows Monday, 13 April (it is Tuesday in MS E). Yet the correct date should have been Tuesday, 15 April. In year 57 = 35 CE, Robert puts 15 Nisan on Monday, 11 April, which conflicts with rule *BaDU*. The correct date is Tuesday, 12 April. In the edition below, the latter two errors are treated as instances of scribal corruption and have therefore been emended.

favoured Passion year. According to Robert's table, the *molad* Nisan of this year fell on Thursday, 19 March, 19h 95p. The corresponding date of the opposition would have fallen ca. 14d 18h later, on 3 April, 13h 95p. Due to the fact that 1 Tishri in 33 CE had been subjected to a double-postponement, based on rules *lo ADU Rosh* and *molad zaken*, the month of Nisan started two days later than the corresponding *molad*, on Saturday, 21 March. Counting forward 14 days, we get to 15 Nisan on Saturday, 4 April, as duly indicated in the table. The previous Friday (3 April) coincided with 14 Nisan and was hence a relevant historical candidate for the crucifixion of Jesus. In addition, this date could also be interpreted as the 16th day of the Jewish lunar month, if counted from the day of the *molad*, or as the 15th, since it was the day of the astronomical full moon. A similar scenario presents itself whenever a double-postponement would have moved 1 Nisan from Thursday to Saturday, which was also the case in years 48 (= 26 CE), 58 (= 36 CE), and 62 (= 40 CE) of Robert's table, leading to potential Passion dates on 22 March, 30 March, and 15 April.

Another year worth looking at is 30 CE (no. 52 in the table), where the *molad*-reckoning produces a conjunction on Thursday, 23 March, 3h 994p. Since is was simultaneously the date of 1 Nisan, the following Passover would be noted for Thursday, 6 April. Robert's marginal commentary in the table marks the year in question as "impossible" (*impossibile*), despite being allegedly favoured by Eusebius.[192] He thus excludes from consideration Friday, 7 April, a date favoured by some modern scholars.[193] Robert's reasons for doing so were obviously related to the fact that the conjunction on 23 March fell very early in the day, allowing for an opposition on Thursday, 6 April. The following Friday thus technically fell after the astronomical full moon and could not be passed off as 15 Nisan.

In the end, it appears that Robert's main criterion for adjudicating between the various options produced by his table was how close the resultant dates would stick to the 'canonical' Passion date on 25 March, which he knew was backed by the authority of St. Augustine, Cassiodorus, and the famous *Martyrologium Hieronymianum*.[194] The only perfect match was produced by the first

192 This is consistent with the Eusebian year of the conception of John the Baptist, which is indicated as 5 BCE in table 9. The birth of Christ would thus have occurred in late 4 BCE, making 30 CE the 34th year of his life. A death in the 34th year is also implied by the Passions according to Marianus, the Hebrews, Dionysius, and Bede, noted in the margins of table 10. The only exception is Gerland, who explicitly reckoned the life-span of Jesus as 33½ years and hence chose the 35th year.

193 See, e.g., Finegan, *Handbook*, 353–369.

194 Augustinus, *De Trinitate* 4.5 (CCSL 50, 172); Cassiodorus, "Chronica," in *Chronica minora*,

year of the table, which corresponded to the Passion year according to Marianus Scottus. With a *molad* Nisan on Friday, 11 March, 20h 195p and a full moon on Saturday, 26 March, this year allowed for a crucifixion on Friday, 25 March. The latter would have been 14 Nisan according to the present-day Jewish calendar and according to the method of taking the full moon, but 15 Nisan if counted from the day of conjunction. According to this chronology, the baptism of Jesus would have taken place three years earlier, on 6 January, which fell on a Sunday in the year in question (9 CE). Although Robert clearly emphasizes that Marianus's calculation is in agreement with the Gospels and also enumerates the years of Christ in table 10 according to the latter's incarnation era (starting 22 BCE),[195] he remains somewhat ambiguous as to whether the corresponding Passion date on 25 March 12 CE should be considered the final word in the matter. In any case, it is noteworthy that in the last few paragraphs he goes on to calculate the matching baptismal date for a Passion in 29 CE, 33 CE, and 42 CE, indicating perhaps that he considered each of these years to be close candidates.[196]

Postscript and *Commentariolus*

The brief postscript, which is once again addressed to Richard Swinfield, offers further evidence that the whole treatise was undertaken under the latter's patronage (*vestra sancta benedictione ac monitis animatus*) and contains some important information concerning the circumstances of its composition. Robert claims that his first step had been to "translate" the Hebrew *computus* from "another" text (*quem prius ab alio translatum habui*), evidently not written by himself, and only after his realization that Christian readers would have little use for such exotic material without further elaboration did he decide to add rules for the conversion of the Jewish into the Latin calendar. Due to the ambiguity of the Latin verb *transferre/translatum* it is not entirely certain whether Robert meant to claim that he actually 'translated' a Hebrew calendar text into Latin or whether he perhaps simply 'copied out' an existing Latin text. The translation scenario obviously presupposes that Robert possessed sufficient knowledge of the Hebrew language, which is at least conceivable given his occasional use of Hebrew vocabulary in the treatise.

Alternatively, one might perhaps be tempted to discern in the 'other' text a reference to the *Liber erarum*, if only because the latter appears immediately

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ed. Mommsen, vol. 2, 137. The *Martyrologium Hieronymianum* is printed in AASS 63, 36 and PL 30, 449.

195 In MS E, fol. 85^{rb}, the Dionysiac era (12–42 CE) is used instead.

196 Cf. Nothaft, *Dating*, 198, 283, where I erroneously give Robert's date as 23 March 42 CE.

after the postscript in MS D. If this was indeed the text Robert had in mind, his use of *translatum* must have been intended in a very loose sense—or he considerably re-worked what he had copied in the process of writing *De compoto Hebreorum*. Due to the shared subject matter, there are certainly numerous point of convergence between both texts, but the depth of Robert's understanding of the topic and the breadth of the information he presents urge the conclusion that he had other sources at his disposal. Another reason for doubting the connection between the *Liber erarum* and Robert's work is the unnatural way in which the former work has been inserted in D, which, rather than reflecting the author's original intention, is more likely to have been due to the intervention of a later scribe (see p. 144 above). Instead of following Robert's composition as an appendage, the *Liber erarum* is found sandwiched between the main treatise and a *Commentariolus*, which offers extensive descriptions and explanations of the ten tables included in the text. The short preface to this *Commentariolus*, which again addresses Bishop Swinfield, starts with a reference to the "preceding treatise" (*prescripti tractatus*) that would sit awkwardly if the *Liber erarum* had already intervened in this way in the original arrangement. Nevertheless, Robert was almost certainly familiar with the text and used it as a source of information. This can be seen most clearly from a passage at the start of ch. 2 of the second part, where Robert copies the *Liber erarum*'s concise summary of the Jewish postponement rules (*deḥiyyot*). That the words are not his own can already be seen from the use of the term *minuta* (for *ḥalakim*), where Robert would normally write *partes*:

***Liber erarum*, c. 4, § 15**	***De compoto Hebreorum*, pars II, c. 2**
… dicamus in qua die debeat esse principium anni et exibit istud ex 4 portis, et est quod non debet esse *in die Dominica, neque in die Mercurii, nec in die Veneris* caput anni, *nec in die in qua sit coniunctio 18 hore aut magis, neque si exibit coniunctio in anno simplici in 9 horis et 204 minutis diei Martis, neque si fuerit coniunctio in anno simplici post annum pregnatum in 15 horis et 589 minutis diei Lune*.	… non computantur in anno sicut nec ad mensem nisi dies integros, nec etiam annum suum incipiunt *in die Dominica, nec in die Mercurii, neque in die Veneris*, propter certas sue legis observantias, *nec in die qua sit coniunctio in 18 horis aut magis*; *neque si exibit coniunctio in anno simplici in 9 horis et 204 minutis diei Martis, neque si fuerit in anno simplici post annum pregnatum in 15 horis et 589 minutis diei Lune*.

The following *Commentariolus* goes into great detail in explaining the purpose and operational method of the individual tables, sometimes including descriptions for each line and column or additional reckoning examples. The length at which Robert treats of these matters indicates that he took great pride in his tables, most of which seem to have been his own invention. They were indeed remarkably well thought out and strikingly original, in the sense that most of them had no known precedent in previous literature. This applies in particular to the chronological tables 9 and 10, but also to tables 7 and 8, which enable the reliable conversion of Jewish into Julian dates in a number of well-defined steps, to which the commentary lends the most protracted attention. Since these passages are largely self-explanatory, I will not go through them one by one at this point. All relevant details can be indeed gleaned from the edition and the English translation subjoined below.

4 The Edition

The following edition of *De compoto Hebeorum* combines the only two known witnesses to the text, designated as D and E. In choosing between readings, preference has been given to D, which is the only manuscript to contain the complete text, including its *Commentariolus*. Some slight freedoms have been taken with the orthography in D, which has been normalized in certain cases, using *sicut* for *sicud*, *sed* for *set*, *apud* for *aput* and *lunatio* for *lunacio*. Numbers are displayed in their Hindu-Arabic forms throughout, although MS D on rare occasions uses Roman forms, in particular for 9/IX and 11/XI. Certain consistent divergences between D and E are not explicitly noted in the apparatus, for example *ciclus* in D vs. *cyclus* in E. The *apparatus fontium* records both the texts directly cited by Robert and parallels in other thirteenth-century *computus* texts. Particular attention has been paid to related passages in Roger Bacon's works, for the reasons outlined above. As is the norm in most critical editions, passages that reproduce source texts verbatim appear italicized throughout. For the translation of the prologue, I am greatly indebted to the help of Leofranc Holford-Strevens, whose interpretation of the difficult syntax I have largely taken over. All tables have been moved from the main text to the corresponding chapter in the Commentariolus, where they appear in the form found in MS D, with occasional minor emendations. The tables in MS E are generally the same, although the text in the headings is frequently altered and in a few cases the order of lines is changed or lines are omitted.

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Robertus de Leycestria: Tractatus de compoto Hebreorum aptato ad kalendarium

Prologus sequentis operis et cetera: compotus Leycester

Operis iniuncti novitatem, pater meritis[1] insignissime, magister ac domine, Ricarde, Dei gratia Herefordensis antistes ecclesie, rectius si id meis metirer viribus, summopere declinarem, ne non tam temporum fideliter examinandorum traditio quam ecclesiastice calculationis a sanctissimis ac peritissimis viris hactenus usitate subversio ac per hoc prophane novitatis adinventio videretur.

Quo enim pacto credi posset usque ad hec tempora Hebreorum de cicli lunaris observantia aut astrononorum de anni solaris quantitate sive lunaris cursus cum sole convenientia traditionem Venerabilem Bedam et alios ecclesiasticos calculatores latere potuisse? At magis puto magnos in ecclesiasticis rebus viros, maioribus intentos ecclesie negotiis, ne occasionem dedisse viderentur simplicibus intendendi doctrinis Iudaicis aut astrologorum se implicandi curiositatibus, sanctorum precedentium virorum, utique in talibus simplicium, per cunta vestigiis inhesisse.

Quia igitur occupari circa computum non videtur modernis seriosum negotium, sed magis puerile ludibrium, quamvis forte possit esse magni moliminis seminariorum studiosis, magis vestre voluntati parere statui, sperans rei novitatem sue exilitatis iudicio, meamque temeritatem vestre dignitatis imperio faciliter excusari.

Incipit tractatus de compoto Hebreorum aptato ad kalendarium

In nomine Domini nostri Ihesu Christi, qui est auctor temporum et ipsorum etiam plenitudo, presens opusculum de temporum compoto ad decursorum seculorum notitiam promptius et, ut estimo, si tamen intentionem meam Deus dignetur dirigere, certius optinendam, stilo rudi conscripsi ac in 4

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3 Prologus] [*D* **5** Ricarde] R. *D* ‖ Herefordensis] Herfordensis *D* **17** inhesisse] inhehisse *D* **18** circa] *iter. D* **20** seminariorum studiosis] seminarum stutidiosis *D* **21** meamque] mei que *D* **24** In] [*E* **25** decursorum] decursum *E*

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[1] Cf. Quintilian, *The Lesser Declamations* (372), ed. Shackleton Bailey, 2:378: "Sed meritis pater eram, sed tu tamquam patrem cecideras."

Robert of Leicester: Treatise on the *Computus* of the Hebrews and Its Adaptation to Our Calendar

The Prologue of the Following Work Etc.: The *Computus* of Leicester

Father most distinguished in achievements, master and Lord, Richard, by the grace of God bishop of the Church of Hereford: if I should more properly estimate it according to my powers, I would do my utmost to refuse the novelty of the work enjoined upon me, lest it should appear not so much the passing-on of faithful examination of chronology as the subversion of the ecclesiastical reckoning hitherto used by very saintly and experienced men and therefore the invention of a profane novelty.

For how could it be deemed credible that the observations of the Hebrews regarding the lunar cycle and the tradition of the astronomers about the length of the solar year or the agreement of the lunar orbit with that of the sun could have escaped the notice of the Venerable Bede and other calculators of the Church for all this time? On the contrary, I rather think that men of great standing in ecclesiastical matters, intent on more important church business, lest they should seem to have given occasion to trifles in paying attention to Jewish teachings or entangling themselves in the vain enquiries of astrologers, remained throughout in the footprints of the holy men who went before, certainly simple as they were in such matters.

Now, since the moderns do not consider occupying oneself with the *computus* a serious activity, but rather a childish game, even though it may perhaps be very laborious to students in the schools, I have decided rather to obey your will, hoping that the novelty of this thing is easily excused by its being judged immaterial and my rashness by Your Dignity's command.

Here Begins the Treatise on the *computus* of the Hebrews, Adapted to [Our] Calendar

In the name of our Lord Jesus Christ, who is the author of time and its fullness, I have written, in a rough style, the present short work on the calculation of time, so that knowledge of the bygone ages may be obtained more readily and, as I suppose, more certainly, provided that God deems it worthy to guide my intention; and in order to discern between topics, I have

particulas, ad materiarum distinctionem, partes vero in ulteriora capitula, ad facilem rerum inventionem, divisi.

Prima autem particula continet temporum rationem iuxta cursum et concursum celestium luminarium, videlicet solis et lune. Secunda idem facit iuxta Hebreorum consuetudinem et ritum, quem precipue sequuntur scripture canonice. Tertia Hebreorum compotum adaptat kalendario Latinorum. Quarta vero qualitercumque a mundi exordio usque ad Christi passionem explicat seculi decursum.

Prima pars habet 8 capitula: Primum est de diei naturalis partitione et inceptione. Secundum de mense lunari et eius duratione. Tertium de anno et annorum diversitate. Quartum de anni quantitate. Quintum est de ciclo sive lunari revolutione. Sextum est de terminorum quatuor, scilicet solstitiorum et equinoctiorum inventione. Septimum est quomodo ex una coniunctione habita per notas quasdam sciuntur cetere coniunctiones. Octavum vero, id est ultimum, tenet tabulas notarum ad menses, annos et revolutiones.

Quia vero reliquas partes temporum per diem naturalem mensurare intendimus, quo inter partes temporis nichil apud homines notius nichil uniformius nichil demum simplicius, quod tamen eque patens sit omnibus, ab ipso primo est inchoandum.

Primum capitulum: De dierum acceptione et partitione diei naturalis et eiusdem inceptione

Ex usu percipimus et auctoritate tenemus quod 'dies' uno modo dicitur tempus presentie solis super terram. Sic enim dicit scriptura quod Deus appellavit lucem diem[2] et sic dicimus quod nox et dies dividunt totum tempus; et hec pars temporis dicitur 'dies artificialis'. Alio modo dicitur dies spatium temporis totius circuitus solis circa terram, ab oriente per medium celi ad occidentem et ab occidente sub terra iterum ad orientem, prout dicimus omne tempus. Volui per unum dies quod non sit sine noctibus, sed

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1 materiarum] materiorum *D* **2** facilem … inventionem] leviorem super inventionem *E* **8** explicat] *om. E* **11** est] *om. E* **12** quatuor] 4 *E* **14** habita] *om. E* **17** temporum] *om. E* **18** temporis] temporibus hominibus *E* ‖ apud homines] *om. E* **19** demum] deinde *E* ‖ sit] *om. E* **23** quod] quoniam *DE* **27** temporis] *om. E* **29** non] *om. E*

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[2] Gn 1:5 (ed. Weber, 4): "Appellavitque lucem diem et tenebras noctem/ factumque est vespere et mane dies unus."

divided it into 4 parts, which are themselves further divided into chapters, for an easy finding of subjects.

The first part deals with the reckoning of time according to the course and concourse of the celestial luminaries, i.e. the sun and the moon. The second does the same according to the custom and rite of the Hebrews, which the canonical scriptures follow for the most part. The third adapts the reckoning of the Hebrews to the Latin calendar. The fourth, however, explains, in either fashion, the flow of the ages from the beginning of the world until the Passion of Christ.

The first part consists of eight chapters: the first is on the partition and beginning of the natural day. The second is on the lunar month and its duration. The third is on the year and the diversity of years. The fourth is on the length of the year. The fifth is on the lunar cycle or revolution. The sixth is on how to find the four [seasonal] boundaries, i.e. the solstices and equinoxes. The seventh [is on] how, given one conjunction, all other conjunctions can be known from certain values. The eighth, however, which is the last, contains tables of values for months, years, and revolutions.

Now, since we intend to measure the other time intervals on the basis of the natural day, which is the most notorious and most uniform and most simple of all time intervals known to man (while at the same time being equally accessible to everyone), we shall take it as our starting point.

The First Chapter: On the Definition of the Day and on the Partition of the Natural Day and Its Beginning

We can both perceive from use and hold on the grounds of authority that one way to define 'day' is as the time during which the sun is present above the earth. For it is in this sense that Scripture says that God "called the light Day" [Genesis 1:5], and it is in this sense that we say that night and day divide all time among themselves; and this part of time is referred to as the 'artificial day'. The other way of defining the day is to take it as the span of time during which the sun completes a whole circuit about the earth, from its rising, through the sky's mid-point, to its setting, and from its setting below the earth again onwards to its rising, just as we say all the time. [In the present treatise] I wanted 'one day' not to mean that it was without nights, but one

nox cum die artificiali sic unam diem perficiunt; et hec dies vocatur 'dies naturalis'.

Quia ergo dies artificiales sensibiliter sunt inequalitatis, dierum vero naturalium diversitas non sensu, sed ratione, percipitur, unde apud omnes gentes et omni tempore anni dies naturales equales a vulgo esse creduntur, dies naturalis ad quantitatem temporum metiendam assumatur. Dies ergo hoc modo acceptus dividitur in partes viginti quatuor equales quarum qualibet 'hora equalis' sive, ut nonnulli dicunt, 'hora equinoctialis' vocatur. Est ergo hora 24 pars diei naturalis, spatium videlicet temporis quo 15 gradus equinoctialis circuli super orizontem elevantur cum quodam modico insensibilis quantitatis. Hora vero que est 12 pars diei artificialis 'hora temporalis' nuncupatur. Hora vero equalis, sicut apud astronomos, dividitur in 60 minuta et minutum in 60 secunda et secundum in 60 tertia et tertium in 60 quarta et sic deinceps quantumlibet procedere, ita apud Hebreos, quorum ritum declarare intendo, dividitur hora in mille et octoginta partes vel puncta et pars hore ultra in 76 momenta vel minuta. Valent autem 18 partes hore vel puncta Hebraica unum minutum et una pars Hebreorum 3 secunda et 20 tertia astrologorum.[3]

Sicut autem astrologi diei naturali principium statuunt in precedentis diei meridie et Romani in media nocte, Greci vero a mane, id est a solis ortu, sic Iudei et omnes nationes annos suos secundum cursum lune mensurantes diem sequentem incipiunt a precedenti solis occasu.[4] Sed quia semper uniformiter computant 6 horas usque ad mediam noctem et 6 horas iterum a media nocte usque ad ortum solis et 6 usque ad meridiem et inde 6 usque ad diei finem, oportet ut dies suos computent quasi sub circulo

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3 sensibiliter sunt] sunt sensibiliter *E* **5** et] *add.* in *E* ‖ equales … esse] a vulgo equales esse *E* **6** temporum] *om. E* **7** ergo] vero *E* ‖ partes … quatuor] 24 partes *E* **8** qualibet] quilibet *D* **10** cum] et *E* **11** pars] pars 12 pars *D* ‖ pars] *om. E* **12** sicut] *add.* vero *D* ‖ astronomos] philosophos *E* **13–14** 60 secunda … deinceps] secunda dividitur et sic de aliis *E* **14** 60] *om. D* **15** octoginta] 80 *E* **16** vel minuta] *om. E* **17** Hebraica] Ebraica *E* ‖ minutum] *add.* philosophicum *D* ‖ 3] tria *D* **21** annos suos] annum suum *E* **23** horas] *om. E* **24** ortum solis] solis ortum *E* ‖ et] *add.* ita *E* ‖ et inde] demum *E* **25** finem] finem diei *E*

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[3] Cf. Roger Bacon, *Opus majus*, 1:196: "Sed Hebraei dividunt unam horam in mille octoginta partes, et quodlibet minutum horae continet octodecim partes horae, ut patet ex reductione fractionum unius generis ad fractiones alterius." Bacon, *Opus tertium*, 214.

[4] Cf. Roger Bacon, *Opus tertium*, 211: "Et Judaei considerant tempus lunare. Et apud omnes nationes considerantes hoc tempus, dies naturalis incipit ab occasu solis, ut dicit Alfraganus." al-Farghānī, *Il Libro* (1), ed. Campani, 57; John of Sacrobosco, *De anni ratione*, in *Libellus de Sphaera*, ed. Melanchthon, sigs. B2^{v}–B3^{r}.

night together with the artificial day make up one day; and this day is called 'natural day'.

Now, since the inequality of the artificial days is accessible to the senses, whereas the diversity in the natural days cannot be sensed, but is perceived by reason (which is why common people believe that the natural day is the same for all nations and at every time of the year), the natural day shall be used to measure the quantity of time. A day defined in this manner is divided into 24 equal parts, any of which is called an 'equal hour' or, as some put it, an 'equinoctial hour'. One hour is hence one 24th of the natural day, that is, the stretch of time during which 15 degrees, together with a nearly imperceptible amount, are elevated above the horizon. By contrast, the hour that is one 12th of the artificial day is called the 'temporal hour'. The equal hour, however, as it is known among the astronomers, is divided into 60 minutes, and the minute into 60 seconds, and the second into 60 thirds, and the third into 60 fourths, and so on for as many as you please, whereas according to the Hebrews, whose rite I intend to reveal, the hour is divided into 1080 parts or points and the parts of the hour further into 76 moments or minutes. Moreover, 18 Hebrew parts of the hour or points are equivalent to one minute and one part of the Hebrews to 3 seconds and 20 thirds of the astrologers.

Just as the astrologers have the beginning of the natural day at noon of the preceding day and the Romans at midnight, while the Greeks [begin theirs] in the morning, i.e. from sunrise, the Jews and all nations who measure their years according to the course of the moon begin the following day from the preceding sunset. But since they always uniformly count 6 hours until midnight, and 6 hours from midnight until sunrise, and again 6 hours until noon, and then 6 until the day's end, it befits them to calculate their days as if

equinoctiali, ubi semper dies noctibus adequantur. Insuper cum dies incipiat prius in compoto Hebreorum quam apud Toletum per 3 horas et 504 partes, sicut patere potest diligenter consideranti tempus coniunctionis alicuius per tabulas Hebreorum et per tabulas Arzachelis, necesse erit dicere quod Hebrei computant dies suos ab occasu solis in civitate aliqua sub circulo equinoctiali posita orientalior quam sit Tolentum per 52 gradus, quibus correspondent 2946 miliara terre et due 3e unius.[5]

Capitulum secundum: De mense lunari et eius duratione

Sequitur dicere de mense. Est autem mensis solaris spatium temporis quo sol percurrit unum de 12 signis zodiaci motu suo proprio, cuius quantitas infra erit manifesta.[6] Est etiam mensis lunaris tempus, scilicet ab una aliqua coniunctione solis et lune inchoatum et usque ad aliam coniunctionem extensum; et est tempus illud 29 dies, 12 hore et 793 partes hore, secundum Hebreos, vel 44 minuta, 3 secunda et 20 tertia, secundum astronomos. Hanc autem quantitatem mensis lunaris ponit Arzachel in tabulis, non omittens, ut quidam putant, secunda et tertia, quoniam sine illis ad 360 lunationes sufficerent precise 30 anni Arabum. Nunc autem Arzachel superaddit 20 minuta que si dividantur per 360 exibunt in numero quotiens 3 secunda et 20 tertia, de quibus dictum est.[7] Ptholomeus vero ponit mensem 29 dierum, 12 horarum, 44 minutorum, 3 secundorum, 15 tertiorum et 44 quartorum.[8]

4 tabulas] tabulam *D* ‖ tabulas] tabulam *E* **6–7** quibus … unius] *om. E* **9** dicere] *om. E* **10** zodiaci] zodyaci *E* **13** hore] horis *E* ‖ partes] partibus *E* **19** Ptholomeus] Ptolomeus *E* **20** horarum] hore *D*

[5] Cf. Roger Bacon, *Opus majus*, 1:195: "Et ideo tabulae Hebraeorum astronomicae, quibus Hebraei usi sunt in certificatione temporum, factae sunt ad occasum solis civitatis Ierusalem, sicut tabulae astronomorum Latinorum factae sunt ad meridiem civitatis Toleti vel alterius."

[6] See ch. 1.4 below.

[7] Cf. Robert Grosseteste, *Compotus correctorius* (4), ed. Steele, *Opera*, 232: "Ipse enim Arzachel non curavit de terciis vel quartis. Abjectis itaque terciis et quartis et quintis, quia in maximo tempore parum quantitatis adiciunt, et posito quod tempus equalis lunationis sit 29 dies et 31 minuta et 50 secunda, accidit quod minimum tempus reducens integras lunationes equales ad conimile temporis initium est 30 anni Arabum, qui constat ex 360 lunationibus integris et continent 10631 dies precise." Cf. Roger Bacon, *Opus majus*, 1:196: "Et quamvis peritissimi astronomi in tabulis et canonibus ponant tempus aequalis lunationis esse viginti novem dies et triginta et unum minuta unius diei, et quinquaginta secunda, ut patet per Arzachelem in tabulis Toletanis."

[8] Claudius Ptolemy, *Almagestum* (4.2), ed. Petrus Liechtenstein (Venice, 1515), fol. 36^{r}.

under the equinoctial circle, where days and nights are always equally long. Moreover, since the day, as defined by the *computus* of the Hebrews, begins 3 hours and 504 parts earlier than at Toledo, as is clear to anyone who diligently considers the time of any conjunction according to both the Hebrew tables and the tables of Arzachel, it necessarily follows that the Hebrews calculate their days from the sunset at some city under the equinoctial circle that is 52 degrees to the East of Toledo, which is equivalent to 2946 2/3 terrestrial miles.

The Second Chapter: On the Lunar Month and Its Duration

It is now time to speak about the month. The solar month is the span of time during which the sun travels through one of the 12 signs of the zodiac with its own motion, whose quantity will become manifest below. There is also the time of the lunar month, which starts at one conjunction of sun and moon and extends until the next conjunction; and this takes 29 days, 12 hours and 793 parts of an hour according to the Hebrews, or 44 minutes, 3 seconds and 20 thirds according to the astronomers. Arzachel cites this length of the lunar month in his tables, not omitting, as some think, the seconds and thirds, because without them 360 lunations would be exactly equal to 30 Arab years. Arzachel, by contrast, adds 20 minutes on top, which, if they are divided by 360, make up the aforementioned 3 seconds and 20 thirds per month. Ptolemy, on the other hand, posits the month as 29 days, 12 hours, 44 minutes, 3 seconds, 15 thirds, and 44 fourths. He thus adds 3 seconds along

Unde super Arabes addit 3 secunda cum reliquis fractionibus, sed minus ponit quam Hebrei per 4 tertia et 16 quarta. Ex quo patent quod multo magis deficiant Arabes a vera quantitate secundum Ptholomeum quam excedant Hebrei, quia enim defectum Arabum continetur 4 tertia et 16 quarta 45 vicibus et plus per 3 tertia et 44 quarta.[9]

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Capitulum tertium: De anno et annorum diversitate

Ut de annorum quantitate dicatur aliquid, prius advertendum est quod est annus solaris et est annus lunaris. Annus solaris est spatium temporis quo sol percurrit zodiacum, id est obliquum circulum, quod potest intelligi de zodiaco mobili vel immobili, et ita potest anni varietas quoad hoc causari. Annus vero lunaris alius est simplex 12 mensium lunarium precise, alius est embolismalis vel, ut Hebrei vocant, 'pregnatus', et est 13 mensium. Et vocatur pregnatus, quia mensis ille 13 resultat ex superhabundantia anni solaris super lunarem in pluribus annis. De anno magno, qui perficitur ex completo cursu omnium planetarum nichil ad propositum nostrum pertinet exequendum.[10]

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2 Ex quo] unde *E* **3** Ptholomeum] Ptolomeum *E* **8** est] *om. E* **9** zodiacum] zodyacum *E* ‖ obliquum] zodyacus *E* **10** zodiaco] zodyaco *E* ‖ anni] *om. E* **14** perficitur] *om. E* **16** exequendum] exsequendum *E*

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[9] Cf. Roger Bacon, *Opus majus*, 1:196–197: "Et ideo tempus lunationis aequalis apud Hebraeos, secundum quod respondet praecise lunationi Arabum, non potest esse plus quam viginti novem dies et duodecim horae et septingenti nonaginta duae partes unius horae. Sed Arabes in tabulis et canonibus computant diminute, et deficiunt in omni lunatione per tria secunda, et quindecim tertia, et quadraginta quatuor quarta, quod patet per examinationem legitimam. Et ideo Hebraei astronomi, volentes complere lunationem, apposuerunt unam partem, quia minus non potuerunt ponere secundum hanc divisionem qua usi sunt. Et ideo computant usque nunc in una lunatione viginti novem dies et duodecim horas et septingentas nonaginta tres partes horae. Et longe certior est eorum consideratio quam astronomorum utentium tabulis et canonibus apud alias nationes, quanquam et plus aliquantulum computant quam praecise exigat lunatio. Nam excedunt in quatuor tertiis et sexdecim quartis unius horae. Sed hoc longe minus est quam defectus Arabum praedictus. Quapropter satis melius computant Hebraei. Nec est curandum de excessu Hebraeorum praedicto; quoniam in maximo tempore minimus error contingit, et de quo non est curandum."

[10] Cf. John of Sacrobosco, *De anni ratione*, sigs. C6v–C7r.

with the other fractions to the value of the Arabs, but his value is 4 thirds and 16 fourths less than that of the Hebrews. From this it becomes clear that the Arabs fall short of the true quantity, as it is according to Ptolemy, to a much greater degree than the Hebrews exceed it, for the deviation of the Arabs is 45 times 4 thirds and 16 fourths, plus 3 thirds and 44 fourths.

The Third Chapter: On the Year and the Diversity of Years

It order to say something about the length of the year, it must first be noted that there is a solar and a lunar year. The solar year is the span of time during which the sun travels through the zodiac, i.e. the oblique circle, which can be understood as the mobile or the immobile zodiac, thus accounting for a variety in the year's [length]. The lunar year, on the other hand, can either be simple, consisting of 12 months exactly, or embolismic—or 'pregnant', as the Hebrews call it—and 13 months long. And it is called pregnant, because this 13th month results from the superabundance that the solar year has over the lunar year over a span of several years. An investigation of the 'great year', which is accomplished by the completed course of all planets, is not relevant to our subject.

Capitulum quartum: De anni quantitate

Post hec de quantitate annorum dicendum est. Licet autem apud philosophos de quantitate anni solaris magna sit opinionum diversitas et apud ecclesiam et sanctos et quosdam etiam philosophos et Hebreorum magistros annus habet 365 dies et quartam unius, id est sex horas, apud Hebreos tamen vera quantitas anni reputatur 365 dierum, 5 horarum et 997 partium unius hore et insuper 48 momentorum Hebraicorum, que sunt 12 decemnovene unius partis. Et mensis solaris secundum hoc est 30 dies et 10 hore et 533 partes et non multo plus 10 momentis, quia non nisi 10 momenta et tertia unius. Et iste mensis est maior mense lunari per horas 21, 820 partes, 10 momenta et tertiam. Annus vero simplex lunaris est 354 dierum, 8 horarum et 876 partium et provenit ex ductu unius mensis lunaris in duodecim. Annus vero pregnatus superaddit anno simplici unam lunationem, unde est 383 dies, 21 hore et 589 partes. Annus ergo solaris secundum sanctos addit super annum lunarem simplicem 10 dies, 21 horas et 204 partes, sed annus verus secundum Hebreos addit super annum lunarem simplicem 10 dies 21 horas, 121 partes hore et 48 momenta tantum.

Capitulum quintum: De ciclo lunari

Igitur excessus in duobus annis est 21 dierum, 18 horarum, 243 partium et 20 momentorum. Et in tribus annis, post quam fecimus embolismum in tertio anno, remanet de excessu 3 dies, 2 hore, 651 partes et 68 momenta. Consimiliter in omnibus tribus annis per se sumptis, unde sit ut in sexto anno post embolismum in eo factum erit excessus 6 dies, 5 hore, 223 partes et 60 momenta. Cui excessui adiunctus excessus duorum annorum sequentium fere reddit unam lunationem integram et ideo in 8 anno fit embolismus. Similiter in 11 anno fit embolismus et in 14 et in 17. In 19 vero anno facto embolismo nichil remanet de excessu nec aliquid deficit ad plenitudinem anni, unde fit ut 12 anni communes sive simplices et 7 embolismales sive pregnati omnino sunt equales 19 annis solaribus.

Et hinc est quod 19 anni complent ciclum lunarem post quos reddit eadem habitudo coniunctionum ad cursum solis in zodiaco que prius in

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6 tamen] *add.* reputatur *E* ‖ reputatur] *om. E* ‖ 5] et 5 *E* **9** non nisi] *om. E* **10** maior] maior est *E* ‖ 820] et 820 *E* **14** 21 hore] hore 21 *E* ‖ Annus ergo] Addit vero *E* **16** 10 dies] *iter. D* **17** 121] et 121 *E* **19** et] *add.* in *E* **26** 11 … 17] 11, 14, 17 *E* ‖ anno] *om. E* **31** zodiaco] zodyaco *E*

The Fourth Chapter: On the Length of the Year

Next, it is [time] to speak about the length of the years. Now granted, there is a great diversity of opinions among the philosophers about the length of the year: according to the Church and the Saints and also according to certain philosophers and certain sages of the Hebrews, the year has 365 days and a quarter-day, i.e. six hours, yet among the Hebrews, the true length of the year is considered to be 365 days, 5 hours, 997 parts of one hour plus 48 Hebrew moments, which are 12/19 of one part. And according to this, the solar month has 30 days and 10 hours and 533 parts and not much more than 10 moments, because it is exactly 10 moments and a third. And this month is greater than the lunar month by 21 hours, 820 parts, and 10 moments and a third. The simple lunar year, however, has 354 days, 8 hours, and 876 parts and it accrues from twelve times the duration of one lunar month. The pregnant year, by contrast, adds one lunation to the simple year, which is why it has 383 days, 21 hours, and 589 parts. The solar year according to the Saints thus adds to the simple lunar year 10 days, 21 hours, and 204 parts, whereas the true year according the Hebrews adds to the simple lunar year only 10 days, 21 hours, 121 parts of an hour and 48 moments.

The Fifth Chapter: On the Lunar Cycle

The excess after two years is hence 21 days, 18 hours, 243 parts, and 20 moments. And in three years, after which we insert an embolism in the third year, there remain 3 days, 2 hours, 651 parts and 68 moments. And the same applies to all groups of three years that are taken by themselves, which is why the excess after the embolism in the sixth year will be 6 days, 5 hours, 223 parts, and 60 moments. Adding to this excess the excess of the two following years yields roughly one complete lunation, which is why there is an embolism in the eighth year. Similarly, an embolism happens in the 11th year and in the 14th and 17th. In the 19th year, however, no excess remains after the embolism, neither is anything short of a full year, which is why 12 common or simple years and 7 embolismic or pregnant years are completely equal to 19 solar years.

And hence it is the case that 19 years complete a lunar cycle, after which the same relation of the conjunctions to the course of the sun in the zodiac

prioribus annis 19 precessit. Et sunt in annis 19 solaribus vel lunaribus dies 6393 et 16 hore et 595 partes et accidit hic numerus ex multiplicatione unius mensis lunaris per 235, qui est numerus mensium 19 annorum. Et si illum numerum dierum, horarum et partium diviserimus per 19, perveniet supradicta quantitas anni solaris.

Excessus autem anni solaris secundum quantitatem quam ponit ecclesia, et etiam Samuel Rabi Iudeorum, supra annum dictum lunarem nullo modo potest reduci ad concordiam in 19 annis, sed remanebit in quibuslibet 19 annis de excessu solis una hora et 485 partes. Ad quorum omnium evidentiam subscribitur tabula cum excessu solis super lunam per annos singulos usque 19 secundum utrumque modum sumendi quantitatem anni solaris. Et hec est tabula [Tab. 1].

Capitulum sextum: De solstitiorum et equinoctiorum inventione

Ex dictis patere potest vera positio terminorum per singulos annos circuli lunaris, cuiuscumque quos terminos Hebrei thequfoth vocant et sunt instantia solstitiorum et equinoctiorum. Nam, ut dicit Abraham, primum thequfath annorum mundi pertinens ad mensem Nisan, qui est mensis paschalis, id est terminus vernalis equinoctii, fuit in principio noctis, 4 ferie precedens coniunctionem illius mensis iam dicti per 9 horas et 642 partes hore.[11] Ergo propter equalitatem 19 annorum lunarium et totidem solarium per eandem quantitatem precedet in omni primo anno cuiusvis cicli lunaris eandem coniunctionem.

Cum ergo citius incipiat coniunctio illa in secundo anno cicli quam in primo, propter excessu anni solaris super lunarem simplicem, si auferamus dictas 9 horas et 642 partes de 10 diebus, 21 horis, 121 partibus et 48 momentis sive minutis, residuum post coniunctionem Nisan conputatum ostendet equinoctium vernale in quolibet secundo anno; et hoc est post coniunctionem Nisan per 10 dies, 11 horas, 559 partes et 48 minuta. Eodem modo, si auferantur eedem 9 hore cum 642 partibus de excessu duorum annorum invenietur idem terminus equinoctialis in tertio anno computando

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8 reduci] duci *E* **9–10** una … solis] *om. E* **14** dictis] predictis *E* **15** thequfoth] thekufoth *E* **17** thequfath] tekufath *E* **25** 21] et 21 *E* **25–26** momentis … minutis] minutis sive momentis *E*

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[11] Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), ed. Filipowski, 88; Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 79, p. מד

returns that had gone before during the preceding 19 years. And 19 solar or lunar years contain 6393 days and 16 hours and 595 parts and this number derives from the multiplication of one month by 235, which is the number of months in 19 years. And if we divide this number of days, hours, and parts by 19, the abovementioned length of the solar year is obtained.

By contrast, the excess of the solar year over the lunar year according to the length posed by the Church—and also by Samuel, a rabbi of the Jews—can in no way be brought into harmony with 19 years, but there will always be left, after each 19 years, an excess of the sun of 1 hour and 485 parts. As proof of all this, a table is added below, which contains the excess of the sun over the moon for single years up until 19 according to both ways of reckoning the length of the solar year. And here is the table [Tab. 1].

The Sixth Chapter: On How to Find the Solstices and Equinoxes

From the foregoing, the true position of the [seasonal] boundaries for the individual years of the lunar circle can be inferred; the Hebrews refer to each of these boundaries as *tekufot*, which are the moments of the solstices and equinoxes. For, as Abraham writes, the first *tekufat* of the years of the world, which pertains to the month of Nisan (the paschal month), i.e. the date of the vernal equinox, fell at the beginning of the night of the fourth day of the week that preceded the conjunction of said month by 9 hours and 642 parts of an hour. Due to the equality of 19 lunar years with the same number of solar years, it thus precedes the same conjunction by the same quantity in every first year of every lunar cycle.

Now since this conjunction begins earlier in the second year of the cycle than in the first, due to the excess of the solar year over the simple lunar one, if we subtract the mentioned 9 hours and 642 parts from 10 days, 21 hours, 121 parts, and 48 moments or minutes, the remainder will indicate at what interval from the calculated conjunction of Nisan the vernal equinox will fall in any given second year; and the result is 10 days, 11 hours, 559 parts and 48 minutes after the conjunction of Nisan. In the same vein, if 9 hours and 642 parts are taken away from the excess of two years, one will find the corresponding equinoctial date in the third year, by calculating what

residuum post coniunctionem mensis precedentis Nisan, quoniam ille annus est embolismalis et mensis pregnatus semper computatur ante mensem Nisan. Eodem modo, si auferantur dicte hore 9 etc. de excessu triorum annorum, invenietur idem terminus in 4 anno. Et si de excessu 4 annorum in anno 5 et ita deinceps usque ad finem, ita quod fere semper residuum computetur in anno communi sive simplici post coniunctionem Nisan (preter quam in primo anno cicli), in anno vero embolismali sive pregnato post coniunctionem mensis pregnati, quem vocant Veadar—vel, si placet semper habere respectum ad mensem Nisan, in anno embolismali residuum illud auferatur de quantitate unius lunationis et quod remanet de lunatione computetur ante mensem Nisan. Ceteri termini faciliter haberi possunt, quoniam inter quoscumque duos proximos terminos sunt 91 dies, 7 hore, 519 partes et 31 minuta, que est 4 pars anni solaris.

Quia autem ad habitos terminos et precipue equinoctiales oportet nos in sequentibus habere recursum, supponemus tabulas duas, unam pro equinoctio vernali, respectu mensis Nisan, et aliam pro equinoctio autumpnali, respectu coniunctionis Thisseri, de quibus mensibus simul cum aliis
3[r] in sequenti particula determinabitur. | [Tab. 2]

Capitulum septimum: Quomodo per notas sciuntur coniunctiones

Modo videndum est quomodo habito tempore unius coniunctionis possumus aliarum coniunctionum tempora, sive in preterito, sive in futuro, ad omne tempus cognoscere. Sciendum ergo quod de tempore unius lunationis abiectis integris ebdomadibus dierum remanet 1 dies, 12 hore et 793 partes et illud est nota unius lunationis. Similiter quod remanet de quot volueris mensibus post abiectionem integrarum septimanarum est nota totidem mensium. Similiter quod remanet ultra integras septimanas unius anni vel plurium quot volueris erit nota totidem annorum et quod remanserit de ciclis erit nota ciclorum.

Habita ergo feria et hora cum partibus alicuius coniunctionis, aggrega super datam coniunctionem notam quot volueris lunationum, annorum vel

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5 semper] *om. E* **8** Veadar] Vaedar *DE* **11** faciliter … possunt] haberi poterunt faciliter *E* **14** oportet] sed oportet *E* **18** determinabitur] *add.* Et he sunt tabule in principio proximi folii scripte. Invento termino equinoctiali adde ei dies 91, 7 hore 519 partes et 31 minuta et habebis sequentes solstitium etc. *D om. E* **24** 12] et 12 *E* **31** coniunctionem] *om. E*

remains after the conjunction of the month that precedes Nisan, since this year is embolismic and the pregnant month must always be counted before the month of Nisan. In the same vein, if the aforementioned 9 hours etc. are taken away from the excess of three years, one will find the corresponding date in the fourth year. And if [the same is done] with the excess of four years, [one will find the result] in the fifth year and so forth until the end, such that in the common or simple year (excluding the first year of the cycle) there will almost always be counted a remaining interval after the conjunction of Nisan, whereas in the embolismic or pregnant years it will fall after the conjunction of the pregnant month, which they call Veadar—or, if one prefers to always use the month of Nisan as a point of reference, one should, in the embolismic year, subtract that remainder from the length of one lunation and what remains from this lunation must be reckoned as coming before the month of Nisan. The other boundaries can be easily found, because any two boundaries next to each other are separated by 91 days, 7 hours, 519 parts, and 31 minutes, which is one quarter of the solar year.

Now since we will need to have recourse to these dates, and especially to the equinoxes, in what follows, we attach two tables, one for the vernal equinox, belonging to the month of Nisan, and the other for the autumnal equinox, belonging to the conjunction of Tishri [Tab. 2]. Information on these months together with the others will be provided in the next part.

The Seventh Chapter: How Conjunctions Can be Known from Their Values

It is now left to see how, given the time of one conjunction, we can know the times of all other conjunctions, both past and future. To this end, it should be known that one lunation, after whole weeks have been cast off from the days, leaves a duration of one day, 12 hours, and 793 parts; and this is the 'value' [*nota*] of one lunation. Similarly, what remains from any given number of months after whole weeks have been cast off is the value of this same number months. Similarly, what remains over and above the whole weeks of one year, or any given number of years, will be the value of these years and what will remain from any number of cycles will be the value of these cycles.

If you are thus given the day of the week and the hour with its parts for any conjunction, add to the given conjunction the value of any number of lunations, years, or cycles you want and the result will give you the day of

ciclorum et quod excrescit ostendet feriam et horam et partes coniunctionis proxime post tot lunationes, annos vel ciclos, quot et quorum notam habite coniunctioni aggregasti. Observandum tamen est quod si ex partibus demi possunt 1080, pro illis demptis addatur unitas numero horarum. Similiter pro 24 horis, si excrescant, addatur unitas numero feriarum. Si vero numerus feriarum excedat 7 abiecto septenario residuum propositum presentabit. Similiter nota de tempore habite coniuncitonis subtracta, si fieri potest, vel si non subtracta tunc de eodem cum adiectione 7 dierum, ostendet tempus coniunctionis precedentis per tot lunationes, annos vel ciclos quot et quorum notam subtraxisti.

Ex quo patet quod cum prima coniunctio compoti Hebreorum fuerit feria secunda ad horas 5 et 204 partes, sequens fuit feria 3 ad horas 17 et 997 partes et exordium sequentis anni feria 6 post 14 horas sine partibus. Exordium vero sequentis revolutionis feria 4 post 21 horas et 799 partes. Exordium vero 267 revolutionis, que nunc futura est Anno Domini 1294, erit feria 3 post horas 15 et partes 794 et est hoc 21 die Septembris sicut poterit per sequentia fieri manifestum.

Capitulum octavum: De tabulis notarum ad menses, annos et revolutiones

Iam restat notas ipsas per tabulas describere, ne in earum collocatione fastidium generetur. Primo ergo ponetur tabula ad menses usque 13, secundo ad annos usque 19, tertio ad revolutiones simplices usque 10, quarto per decenas revolutiones usque ad 100, quinto per centenas, ultimo per millenas et sufficient ad totum tempus, ut estimo, tam preteritum quam futurum. Et erit in qualibet tabula numerus mensium vel annorum vel revolutionum a parte sinistra et e directo eius quam notam ipsius, primo quoad feriam imperfectam, secundo quoad horam perfectam, tertio quoad partes hore. Et hee sunt tabule [Tab. 3].

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1 excrescit] exessit *E* **9** tempus] tempore *E* **11** prima] *om. E* **15** futura] ventura *E* **18** annos] et annos *E* **20** per tabulas] *om. E* **27** Et] *om. E*

the week and the hour and the parts of the conjunction that follows after the respective number of lunations or years or cycles, whose values you have joined to the given conjunction. But pay attention that if 1080 can be subtracted from the number of parts, one unit must be added to the number of hours in their place. The same applies for 24 hours: if they are exceeded, one must add one unit to the number of days of the week. If, however, the number of days of the week exceeds seven, the relevant remainder is obtained by casting off the sevens. Similarly, subtracting the value of the time of one conjunction, if that is possible—if not, seven days must be added before subtracting—will yield the time of one of the preceding conjunctions, depending on what value for what number of lunations, years or cycles you have subtracted.

From this it is plain that, since the first conjunction of the *computus* of the Hebrews fell on the second day of the week at 5 hours and 204 parts, the following conjunction was on the third day of the week, at 17 hours and 997 parts, and the beginning of the next year was on the sixth day of the week, after 14 hours without any parts. Yet the beginning of the next revolution was on the fourth day of the week, at 21 hours and 799 parts, whereas the beginning of the 267th revolution, which is now about to happen in the present Year of the Lord 1294, will be on the third day of the week, after 15 hours and 794 parts; and this is the 21st day of September, as will become manifest from the following.

The Eighth Chapter: On the Tables of the Values for Months, Years, and Revolutions

It is now left to describe these values with the help of tables, so as to prevent any hardship in their calculation. The first table to be provided is for months up to 13, the second is for years up to 19, the third is for the simple revolutions up to 10, the fourth is for tens of revolutions up to 100, the fifth is for hundreds, the last is for thousands; and these, I think, will suffice for all times, both past and future. And in any of these tables, the left side will contain the number of months or years or revolutions and next to it there will be the corresponding value, first for the incomplete day of the week, second for the complete hour, third for the parts of the hour. And here are the tables [Tab. 3].

Capitula secunde partis

Capitula secunde partis, scilicet de ratione temporum iuxta consuetudinem et usum Hebreorum. Primum earum est de mensium quantitate. Secundum de annorum diversitate. Tertium de annorum per ciclos et ciclorum per tabulas dispositione. Quartum de mensium per annos varia ordinatione. Quintum vero de usualis compoti ad naturalem concordia et diversitate.

Capitulum primum: De mensium quantitate

Naturalis quantitas mensis sive lunationis, ut supra visum est, est 29 dies, 12 hore et partes 793, ad quam licet Hebrei semper aspiciant, tamen in vulgari compoto cuilibet mensi tantum dies integros assignant, ita quod unum mensem ponunt 30 dierum et alium 29. Et nisi cuilibet lunationi competeret partium dictarum adiectio, in perpetuum sufficeret mensium alterna successio per 30 et 29, unde in anno simplici, quo non restaurantur omisse partes, sunt 6 menses 30 dierum et 6 alii 29 dierum. Et hoc alternatim, ita quod omnes in impari loco computati sunt 30 dierum, ut primus, tertius, quintus, septimus, nonus, undecimus, ceteri vero in loco pari sunt 29 dierum. Partium vero restitutio fit in embolismis et in aliis etiam modis, ut post patebit cum mensium ipsorum nominibus.[12]

1 Capitula … partis] Secunda pars *E* **2–3** consuetudinem … usum] usum et consuetudinem *E* **3** est] *om. D* **5** de] est de *E* **6** vero] *om. E* **7** primum] *add.* secunde partis *D* 1 *E* **8** lunationis] *add.* mensis *D* ‖ dies] *om. D* **9** 12] et 12 *E* ‖ tamen] est enim *E* **11** nisi] ut *E* **12** competeret] *om. E* ‖ dictarum] *add.* fieret *E* **14** 6] sex *D* **16** undecimus] XIus *D*

[12] Cf. Roger Bacon, *Opus majus*, 1:197; Bacon, *Opus tertium*, 213: "Mensis vero secundum vulgus Hebraeorum quidam est triginta dierum, quidam novem et viginti. Nam omnes in numero impari, ut primus, tertius, et caeteri, sunt triginta dierum; omnes in numero pari, ut secundus, et quartus, et caeteri, sunt novem et viginti dierum. Sed haec consideratio vulgaris alia est ab astronomica veritate, quam Hebraei astronomi consideraverunt, et ad quam sensum vulgarem reduxerunt; et non esset error finaliter in vulgi consideratione."

The Chapters of the Second Part

These are the chapters of the second part, dealing with the reckoning of time according to the habit and custom of the Hebrews. The first of these is on the length of the months. The second is on the diversity of years. The third is on the orderly arrangement of years by cycles and of cycles by tables. The fourth is on the changing ordering of the months from year to year, while the fifth is on the agreement and disagreement of the usual with the natural *computus*.

The First Chapter: On the Length of the Months

The natural length of the month or lunation, as seen above, is 29 days, 12 hours, and 793 parts, which the Hebrews always consider, even though in their 'vulgar' computus they assign to each month only a whole number of days, such that one month is given 30 days, the other 29. And if each lunation did not also come with said surplus of parts, it would always for all times be enough for there to be an alternate succession of 30-day and 29-day months, which is why in a simple year, in which the omitted parts are not restored, there are six months of 30 days and six other months of 29 days. And these are arranged in alternate order, such that all those in uneven places are counted as having 30 days, i.e. the first, third, fifth, seventh, ninth, and eleventh, whereas the others in even places have 29 days. The restitution of the parts, however, happens through embolisms and also by other means, as will become clear afterwards together with the names of the months.

Capitulum secundum: De annorum diversitate

3v **O**missis ergo interim mensibus, sciendum est quod apud vulgum Hebreorum non computantur in anno sicut nec ad mensem nisi dies integros, nec etiam annum suum incipiunt *in die Dominica*, *nec in die Mercurii, neque in die Veneris*, propter certas sue legis observantias,[13] *nec in die qua sit coniunctio in 18 horis aut magis, neque si exibit coniunctio in anno simplici in 9 horis et 204 minutis diei Martis, neque si fuerit in anno simplici post annum pregnatum in 15 horis et 589 minutis diei Lune*.[14]

Unde fit, quod—preter hoc quod quidam anni eorum sunt simplices, quidam pregnati—est inter eos alia annorum diversitas, nam annorum simplicium quidam sunt perfecti 354 dierum, quidam diminuti 353, et quidam superflui 355 dierum. Et consimiliter annorum pregnatorum alius est 384 dierum et est perfectus, alius 383 et est diminutus, alius 385 dierum et est superfluus. Et annorum diminutorum, tam simplicium quam pregnatorum, tertius mensis est 29 dierum tantum et similiter quartus. Annorum vero superfluorum secundus est 30 dierum, et similiter tertius. In annis vero perfectis tertius mensis est 30 dierum et quartus 29.

Capitulum tertium: De dispositione annorum per ciclos et ciclorum per tabulas

Rursus, cum eisdem de causis non se possunt dicte annorum diversitates semper eodem ordine precedere vel sequi, evenit ut lunares cicli Hebreorum inter se sunt differentes, prout ciclus aliquis plures habet annos superfluos vel diminutos quam alius, seu perfectos, aliquis enim ciclus habet 6393 dies, aliquis 6940, aliquis vero 6941. Sed totam hanc diversitatem reducunt ad concordiam per tabulam unam 13 ciclorum, quantum ad omnes diversitates possibiles evenire penes variorum annorum dispositionem in ciclis et eorum inceptionem per ferias, sicut nos in magna paschali tabula comprehendimus omnes diversitates que possunt accidere penes litteram dominicalem

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2 ergo] *om. E* **4** Dominica] dominica die *E* **9** preter] ut *E* **10** alia] alique *E* **11** et] dierum *E* **12** consimiliter] similiter *E* **13** est] *om. D* **15** quartus] 2us et 4us *E* **16** et similiter tertius] sicut prius, et 3us *E* **20** se possunt] possunt se *E* **21** Hebreorum] *om. E* **22** aliquis] alius *E* ‖ habet] *om. E* **27** sicut] sicud *E*

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[13] Cf. Bacon, *Opus majus*, 1:201; Bacon, *Opus tertium*, 219–220.

[14] *Liber erarum*, c. 4, [15].

The Second Chapter: On the Diversity of Years

Omitting, therefore, the months for the meantime, it should be known that among the common folk of the Hebrews, there is only a complete number of days in the year and the month, and that they never begin their year on a Lord's Day, or Wednesday, or Friday, due to certain observances of their Law, nor on a day whose conjunction occurs at 18 hours or later, nor if the conjunction in a simple year comes out at 9 hours and 204 minutes on a Tuesday, nor if it falls in a simple year after a pregnant year at 15 hours and 589 minutes on a Monday.

It thus happens that—apart from the fact that some of their years are simple, while others are pregnant—, there is among them another diversity of years: for some of the simple years are 'perfect' or 354 days in length, some are 'diminished' with 353 days, some are 'superfluous' with 355 days. And similarly, one pregnant year has 384 days and is 'perfect', another has 383 days and is 'diminished', another has 385 days and is 'superfluous'. And in diminished years, both the simple and the pregnant ones, the third month has only 29 days, and same with the fourth. In superfluous years, on the other hand, the second month has 30 days, and same with the third. In perfect years, by contrast, the third month has 30 days and the fourth 29.

The Third Chapter: On the Arrangement of Years by Cycles and of Cycles by Tables

And in turn, since the aforementioned diversity of years cannot always precede or follow in the same order due to these same reasons, it happens that the lunar cycles of the Hebrews differ among themselves such that one cycle has more superfluous or diminished years, or perfect ones, than another: for one cycle has 6939 days, another has 6940, while another has 6941. But they bring this whole diversity back into agreement by a table of 13 cycles, in which all possible diversities happen as pertains to the sequence of the various years in the cycles and their initial weekday, just like we comprise in a great paschal table all the diversities that can arise with regard to the

ciclum decemnovenalem et annum etiam bisextilem; et in hac eorum tabula continentur anni 247, dies vero 90216, qui faciunt septimas 12888 precise, unde ad capud redditur.[15]

Tabula hec 13 ciclorum habet in longitudine 19 spatia iuxta numerum annorum in ciclo et 13 in latitudine iuxta numerum ciclorum. Et in quolibet spatio erit numerus designans feriam qua annus incipiat, et littera designans genus anni, ut si sit annus superfluus ponetur 'S', si perfectus 'P', si diminutus 'D'. A sinistris vero tabule erit linea numeri ostendens de quolibet anno quotus sit in ciclo. Et in capite exprimetur quotus fuerit ciclus quilibet in ordine sive quotus modo fuerit ab origine mundi secundum Hebreos, cum designatione Annorum Domini nostri Ihesu Christi. Et hec est tabula, in qua note ex minio ostendent annos embolismales sive pregnatos, cetere vero communes ex encausto [Tab. 4].

Capitulum quartum: De ordinatione mensium varia per annos

Ut supra tractatum est in anno perfecto, sive sit simplex, sive pregnatus, alternatim succedunt sibi menses 30 dierum mensibus 29 dierum et econtrario, ita quod omnes menses imparis denominationis in ordine, ut primus, tertius, quintus etc., sint 30 dierum, reliqui vero paris denominationis 29. In anno vero imperfecto sive diminuto, tam tertius, quam secundus vel quartus est 29 dierum. In anno vero superfluo sunt 3 menses continui quilibet 30 dierum, scilicet primus, secundus et tertius. Hoc etiam scire oportet quod primus dies cuiuslibet mensis est Iudeis festivus, quoad speciales oblationes legales et epulas. Et quoniam 30 dies excedunt quantitatem mensis naturalis, accidit communiter lunam accendi ultimo die mensis 30 dierum, propter quod ipso die etiam celebrant neomeniam et sic ultimus dies mensis

1 eorum] earum *E* **8** anno] *om. E* **10** mundi] *om. D* **12** minio] minio *D* ‖ sive pregnatos] *om. E* **13** encausto] incausto. Tabula in. *E* **14** ordinatione … varia] varia ordinatione mensium *E* **24** accidit] accedit *E* ‖ lunam accendi] accendi lunam *E* **24–230.1** propter … dierum] *om. E*

[15] Cf. Roger Bacon, *Opus majus*, 198: "Et colligunt Hebraei tredecim cyclos lunares et faciunt tabulam et canonem ad hoc; qui tredecim cycli continent ducentos quadraginta septem annos, quia in tanto tempore redeunt omnes observationes festorum legalium ad idem temporis principium. Currit igitur observantia legalis penes hoc multipliciter, necnon alia quamplura." Bacon, *Opus tertium*, 214–215: "Et posuerunt unam tabulam ex tredecim cyclis talibus, qua revoluta complentur omnes, et omnia redeunt ad idem temporis principium. Et hic cyclus cum canonibus suis et expositionibus est apud eos loci computi et kalendarii apus nod quantum ad multa." Ibid., 220.

dominical letter, the 19-year cycle, and also the bissextile years; and this table of theirs comprises 247 years or 90,216 days, which make up exactly 12,888 weeks, which is why it returns to its start.

The present table of 13 cycles has 19 spaces in longitude, according to the number of years in the cycle, and 13 spaces in latitude, according to the number of cycles. And in each space there will be a number designating the day of the week in which the year begins and a letter designating the type of year, such that it says 'S' if the year is superfluous, 'P' if it is perfect, 'D' if is diminished. On the table's left side, however, there will be a line with the number that indicates for each year its position in the cycle. And the header expresses each cycle's position in the order or at least how many there have been since the origin of the world according to the Hebrews, along with an indication of the Years of our Lord Jesus Christ. And here is the table, in which notes in red indicate embolismic years, while the others in black ink are common years [Tab. 4].

The Fourth Chapter: On the Changing Order of the Months from Year to Year

As has been discussed above, a perfect year, be it simple or pregnant, has months of 30 days follow upon months of 29 days in alternating order and vice versa, such that all uneven months, i.e. the first, third, fifth etc., have 30 days and the remaining months that are numbered evenly [have] 29. In an imperfect or diminished year, however, both the third and the second and fourth months have 29 days. In a superfluous year, on the other hand, there are three consecutive months of 30 days, namely the first, second, and third. It is also necessary to know that the first day of each month is a festive day to the Jews, on which there are special offerings and meals. And since 30 days exceed the length of the natural month, it commonly happens that the moon is lit on the last day of a 30-day month, for which reason they celebrate the new moon on this day as well, and thus the last day of the preceding

precedentis 30 dierum et primus sequentis sibi coniunctus uterque epularum est.[16]

Item sicut patet per precedentem tabulam, annus incipiens feria tertia numquam est superfluus, numquam diminutus. Et similiter anni incipientes per alias ferias habent suas determinatas proprietates, tam in annis communibus sive simplicibus, quam pregnatis, propter quod ad notitiam ceterorum mensium anni, quoad istas diversitates, expedit supponere tabulam mensium, ut notata feria initiali cuiusvis anni cum nota generis anni sub ipsa nota e directo cuiusvis mensis per annum signetur numerus ostendens dies epularum, unam vel plures, ita quod si duo sint numeri eodem positi spatio secundus tamen ostendet diem epule et mensis exordium. Note autem in capite ex precedenti tabula extrahuntur. Et erit tabula bipartita prima ex encausto deserviens annis simplicibus, secunda ex minio per pregnatis. Et menses in medio per sua nomina conscribentur. Et hec est tabula [Tab. 5].

Capitulum quintum: De concordia et discordia usualis compoti cum naturali

Modo restat videre qualiter compotus Hebreorum usualis ad naturalem se habeat, quod ex premissis patere potest. Ciclus enim sive revolutio annorum lunarium secundum naturalem compotum continet dies integris 6939 et insuper horas 16 et partes hore 595, sicut dictum erat supra, capitulo 5 prime partis. Ex hiis integris septimanis abiectis remanent 2 dies, 16 hore et 595 partes. Cum ergo Hebrei certam feriam in inchoatione sui anni observent, 4v ad hoc quod cum naturali compoto conveniant, | oportet dictum residuum tociens multiplicari per revolutiones, donec ex eis integre septimane resultent vel quasi, quod non fit antequam 13 cicli compleantur, quia secundum naturalem compotum 13 cicli habent integras ebdomedas 12887 et 6 dies, 23 horas et partes 175, quas usualiter sumunt pro hora integra cum tamen deficiant 905 partes, unde semper 13 cicli usuales plus computant quam totidem naturales per tot partes.

Sed si per has partes diviseris horas unius diei exibit in numero quotiens 28 et adhuc super erint 580. Itaque in 28 vicibus 13 ciclis, id est 364 ciclis,

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1 coniunctus] iunctis *E* **3** sicut] sicud *E* **4** anni] *om. E* **13** encausto] incausta *E* **17** usualis] manualis *E* **18** premissis] predictis *E* **22** feriam] diem *E* ‖ inchoatione] incoatione *D* **24** ex … integre] integre ex eis *E* **30** unius diei] diei unius *E*

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[16] Cf. Bacon, *Opus majus*, 1:198; Bacon, *Opus tertium*, 217–218.

30-day month and the first day of the following month are combined and both become the occasion of meals.

Furthermore, as becomes clear from the preceding table, a year that starts on a Tuesday is never superfluous, never diminished. And similarly, the years that begin on other days of the week (both the common or simple years and the pregnant ones) have fixed characteristics, for which reason—in order to gain an overview of the other months of the year with regard to these diversities—it is expedient to subjoin a table of months, such that below the initial day of the week of any year together with the letter indicating its type one finds for any given month of this year a number that shows the day of the festive meals, one or several, such that if two numbers are written in the same space, the second indicates both the day of the meal and the beginning of the month. The characters in the header, however, are extracted from the preceding table. And the table will consist of two parts, the first in black ink for the simple years, the second in red for the pregnant ones. And the names of the months are written in the middle. And this is the table [Tab. 5].

The Fifth Chapter: On the Agreement and Disagreement of the Usual with the Natural *computus*

It is now only left to see how the usual *computus* of the Hebrews is related to the natural one, which can be elucidated from what has been already said. For the cycle or revolution of the lunar years according to the natural *computus* contains 6939 whole days together with 16 hours and 595 parts of the hour, as was said above, in the fifth chapter of the first part. Once we cast off whole weeks from these, there remain 2 days, 16 hours and 595 parts. Now, seeing how the Hebrews have the beginning of the year on a particular day of the week, this remainder must be multiplied by revolutions as many times until whole weeks, or at least something close to it, result, in order to bring them into agreement with the natural *computus*. This does not happen before 13 cycles are completed, because 13 cycles according to the natural *computus* have 12,887 whole weeks and 6 days, 23 hours, and 175 parts, which in the usual [*computus*] are reckoned as a complete hour, despite the fact that 905 parts are missing. As a result, 13 usual cycles are always greater by this number of parts than the same number of natural cycles.

Yet if you divide the hours of the day by this number of parts, you will get this number 28 times with a remainder of 580. It follows that in 28 times

in quibus sunt anni 6916, notandum erit excessus Hebreorum super naturalem compotum per unum diem, sed remanebunt 580 partes. Ut autem ostendatur quod duo dies, 16 hore, 595 partes non possunt complere integras ebdomadas vel quasi donec 13 vicibus replicentur, sicut supra suppositum est, ostendi potest, si cicli per ordinem numerentur et excessus super septimanas in diebus, horis et partibus colligatur, abiectis 7 diebus si proveniunt et retento residuo, ut in hac tabula demonstratur [Tab. 6].

Capitula Tertie partis: De adaptatione usus Hebreorum ad usum ecclesie

Capitula tertie partis de adaptatione usus Hebreorum ad usum ecclesie. Primum capitulum de quantitate anni apud usum ecclesie. Secundum de ciclo decemnovenali. Tertium de eius discordia ab usu Hebreorum. Quartum de eius discordia a ciclo 19 annorum naturalium. Quintum de collectione diversitatis per tabulas. Sextum de inventione initialium coniunctionum in annis in nostro kalendario.

Incipit pars tertia, quomodo se habet usus Hebreorum ad usum ecclesie et kalendarii

Capitulum primum: De quantitate anni apud ecclesiam

Modum deinceps ecclesiastice observantie prosecutur. Quoniam de die non est diversitas, ab anno est inchoandum. Est autem annus solaris et annus lunaris. Annus solaris secundum ecclesiasticam suppotationem habet precise 365 dies et unam quartam, id est 6 horas. Sed quartas non consuevit computare donec unum integrum compleverunt, unde non computat tres annos continuos nisi quemlibet 365 dierum precise et semper quartum annum 366 dierum. Et penes hos annos solares in omni negotio attenditur computatio Christianorum vel incipiendo a capite Ianuarii, quantum ad annos usuales, vel a quocumque alio die in kalendario quoad annos

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3–4 integras ebdomadas] Hebdomedas integras *E* **4** sicut] sicud *E* **8–9** Capitula … ecclesie] Hic incipiunt capitula tertie partis *E* **11** apud] secundum *E* **13** eius discordia] discordia eius *E* **16–17** Incipit … kalendarii] *om. E* **20** et] *add.* est *E* **22** unam] 1 *D* **27** quoad] *quo E*

13 cycles, i.e. 364 cycles, which contain 6916 years, the Hebrews will exceed the natural *computus* by one day, but 580 parts will remain [until the day is complete]. The fact that 2 days, 16 hours, 595 parts cannot add up to a complete week or thereabouts until they have been multiplied 13 times (as has been reckoned above), can be demonstrated if the cycles are numbered in order and the excess beyond the weeks (in days, hours, and parts) is collected, 7 days being cast off whenever they accrue while the remainder is kept, as is shown in this table [Tab. 6].

The Chapters of the Third Part: On How to Adapt the Use of the Hebrews to the Use of the Church

Here are the chapters of the third part, on the adaptation of the Hebrew reckoning to that of the Church. The first chapter is on the length of the year according to the Church. The second is on the 19-year cycle. The third is on its disagreement with the reckoning of the Hebrews. The fourth is on its disagreement with the cycle of 19 natural years. The fifth is on how to collect the difference by means of tables. The sixth is on how to find the initial conjunctions in the years in our calendar.

Here Begins the Third Part, on How the Reckoning of the Hebrews Relates to the Use of the Church and [Its] Calendar

The First Chapter: On the Length of the Year According to the Church

Hereafter, we discuss the method of the ecclesiastical observance. And since there is no difference with regard to the day, we shall start with the year. There is both a solar and a lunar year. The solar year according to the ecclesiastical calculation has precisely 365 days and a quarter day, i.e. six hours. Yet [the Church] is wont not to count these quarter days until they add up to a complete day, which is why it always counts three consecutive years as only exactly 365 days each and the fourth year as 366 days. And the calculation of the Christians is always based upon these solar years, either with a start at the head of January, as pertains to the usual notion of 'year', or from any other day in the calendar, if the year is taken simply as a span of

emergentes,[17] utpote annos incarnationis renovamus in Annunciatione Domini, annos regni, regis vel pontificatus alicuius episcopi a die quo talem primo consecuti sunt dignitatem.

Annus autem lunaris communis, prout observat ecclesia, est 354 dierum et embolismalis 384 dierum, preter quam in bisexto quo etiam anno lunari additur una dies. Est tamen circa hoc specialis exceptio de 19 anno cicli decemnovenalis, quoniam non est, preter quam in bisexto, nisi 383 dierum.

Capitulum secundum: De ciclo decemnovenali

Est autem ciclus decemnovenalis spatium 19 annorum solarium, in quibus continentur totidem lunares anni, quorum 12 sunt communes et 7 embolismales, ita quod tertius et sextus, octavus et undecimus et quartusdecimus, decaseptimus et decanonus sunt embolismales, ceteri vero communes. Sed advertendum est quod quandoque contingit in 19 annis, 4 annos tantum annos esse bisextiles, ut quando quartus annus est bisextilis, et quandoque sunt bisextiles quinque, ut si primus vel secundus vel tertius fuerit bisextilis. Unde non potest evenire quod omnes decemnovenales cicli inter se sunt equales, sed omnes 4 cicli simul sequentes, id est 76 anni, aliis totidem simul acceptis sunt equales.

Sed ut cicli inter se equari possint, oportet superponere quod quandoque quartus annus est bisextilis, non sufficiunt ad ciclum perficiendum 19 anni, sed oportet de sequenti ciclo ei addere 18 horas, et secundis 19 annis de tertio ciclo oportet addere 12 horas, et tertio ciclo de quarto sex horas, ut sic quilibet ciclus lunaris contineat 6939 dies et 18 horas. Qui dies et hore si dividantur per numerum lunationum illorum annorum provenient

2 pontificatus … episcopi] alicuius episcopi pontificatus *E* **2–3** talem … dignitatem] primo talem dignitatem consecuti sunt *E* **4** autem] vero *E* ‖ observat] servat *E* **5** dierum] *om. D* **11** tertius … quartusdecimus] 3us, 6us, 9us, 11us, 14us *E* **13** est] *om. E* ‖ quandoque] quando *D* **16** decemnovenales cicli] cycli decemnovenales *E* **17** simul] se *E* ‖ id est] scilicet *E* **19** superponere] supponere *E*

[17] Cf. Peter Comestor, *Historia scholastica*, Historia libri Actuum Apostolorum 42 (PL 198, 1671–1672): "Nec removeat si quandoque legatur, conversio ejus facta, primo anno Dominicae passionis, quandoque secundo, alterum de anno usuali, alterum de anno emergenti dicitur. Si enim computes primum annum Dominicae passionis a Kalendis Januarii, qui est annus usualis, tunc secundo anno conversus est Paulus. Si autem computes ab ipso die passionis usque in sequentem diem passionis anno revoluto, qui est annus emergens, in primo anno Dominicae passionis conversus est."

time, in as much as we renew the years from the incarnation on the day of the Lord's Annunciation, the years of a particular reign, king or pontificate of some bishop on the day on which they first succeeded to their office.

The common lunar year as observed by the Church, however, has 354 days and the embolismic one has 384 days, except in bissextile years, in which the lunar year, too, is augmented by one day. There is nevertheless a special exception to this in the 19th year of the 19-year cycle, which has only 383 days, unless it is a bissextile year.

The Second Chapter: On the Cycle of 19 Years

Now, the cycle of 19 years is an interval of 19 solar years that contains just as many lunar years, 12 of which are common and 7 embolismic, such that the third and sixth, the eighth and eleventh and fourteenth, the seventeenth and nineteenth year are embolismic, whereas the rest is common. One must bear in mind, however, that in some cases only 4 out of 19 years are bissextile years, which is the case when the fourth year is bissextile, while at other times there are 5 bissextile years, as when the first or second or third year is bissextile. This is why it cannot happen that all 19-cycles are equal among themselves, but equality is [only] achieved between one group of 4 consecutive cycles, i.e. 76 years, and another.

Yet in order for the cycles to be made equal among themselves, it needs to be added that whenever the fourth year is bissextile, this does not suffice to complete 19 years, but instead the following cycle must add to it 18 hours, and the third cycle must add 12 hours to the second [cycle of] 19 years, and the fourth must add 6 hours to the third, such that every lunar cycle contains 6939 days and 18 hours. If these days and hours are divided by the number of lunations in these years, the result for each and every lunation is 29 days,

unicuique lunationi 29 dies 12 hore, 799 partes et 50 minuta Hebraica et insuper 30 ducentesime tricesime quinte. Et sic lunatio ecclesie excedit Hebraicam in 6 partibus, 50 minutis et 30 235tis. Sed de hoc ad presens non plus reor esse dicendum.

Capitulum tertium: De discordia cicli nostri ad ciclum usualem Hebreorum

Nunc de discordia nostri cicli decemnovenali ad ciclum Hebreorum. Sciendum est quod—preter hoc quod non utimur distinctione annorum lunarium per diminutos, superfluos et perfectos, et quod lunationes nostre excedunt debitam eis quantitatem, ut dictum est, et quod illi annos cicli renovant a Septembri, nos a Januario—est alia maioris ponderis diversitas penes ciclorum inchoationem quod nos ciclum nostrum incipimus ante ipsos per tres annos, quia quartus noster est eorum primus et sic quandoque simul facimus embolismum et quandoque discordamus. Unde licet dicat Rabanus super Leviticum 23 in glosa quod pascha Christianorum, si luna 15 mensis paschalis venerit in Dominica, idem erit cum paschate Iudeorum, sin autem alia die semper tamen erit pascha nostrum uno de diebus azimorum,[18] evenerit tamen in nostro octavo anno, qui est eorum quintus, quia tunc nos embolismum facimus et non illi, illorum pascha nostrum pascha precedit per mensem; et idem accidit in nostro 19 anno. Et hoc non evenisset nobis nisi pro aureo nostro numero ecclesia antiquum lunarem ciclum abiecisset.

Capitulum quartum: De discordia eiusdem a ciclo naturali

Tempus autem predictum cicli decemnovenalis, videlicet 6939 dies, 18 hore, excedit quantitatem revolutionis naturalis, que, ut supradictum erat,

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4 plus reor] reor plus *E* **5–6** usualem Hebreorum] Hebreorum usualem *E* **7** decemnovenali] *om. E* **12** quod] et quod *E* **13** eorum] *om. E* **16** cum] in *D* **18** in] ut *E* ‖ nos] *om. E* **23** videlicet] scilicet *E* ‖ 18] et 18 *E*

[18] Rabanus Maurus, *Enarrationes in Librum Numerorum* 2.1, Cap. 9 (PL 108, 640): "Quoties ergo diem Dominicum mox adventante luna quinta decima habemus, nil nostrum tempus paschale a legali dissonat, quamvis aliis sacramentorum generibus, ejusdem Paschae solemnia colimus. Quoties vero secundo, vel tertio, vel quarto, vel quinto, vel sexto, vel septimo abhinc die, idem Dominicus occurrerit, nec sic quidem legem aut prophetas solvimus." = Bede, *De temporum ratione* 61 (CCSL 123B, 451).

12 hours, 799 parts, and 50 Hebrew minutes and another 30/235. And the ecclesiastical lunation thus exceeds the Hebrew one by 6 parts, 50 minutes, and 30/235. But on this matter nothing more, I suppose, needs to be said at present.

The Third Chapter: On the Disagreement of Our Cycle with the Usual Cycle of the Hebrews

Now [it is time to speak] about the disagreement that exists between our 19-year cycle and the cycle of the Hebrews. It should be known that—aside from the fact that we do not distinguish between diminished, superfluous and perfect lunar years, and that our lunations exceed the appropriate length of theirs (as has been said), and that they renew the years of the cycle in September, while we do so in January—there is another difference of greater importance, which concerns the beginning of the cycles, [namely] that we begin our cycle three years earlier than they, for our fourth year is their first and thus we sometimes have the embolism together and disagree at other times. This is the reason why—although Rabanus, in the Gloss on Leviticus 23, claims that the Pasch of the Christians will coincide with the Passover day of the Jews whenever the 15th day of the paschal month falls on a Sunday, whereas, if it falls on another day, it will always be one of the days of unleavened bread—it nevertheless happens that in our eighth year, which is their fifth, their Passover precedes our Pasch by a month, since we have an embolism in this year, while they do not; and the same happens in our 19th year. And this would not have happened if the Church had not abandoned the ancient lunar cycle in favour of the Golden Number.

The Fourth Chapter: On Its Disagreement with the Natural Cycle

Yet the aforementioned duration of the 19-year cycle, i.e. 6939 days, 18 hours, exceeds the length of the natural revolution, which, as has been said above,

continet 6939 dies, 16 horas et partes 595. Excedit, inquam, quantitate unius hore et 485 partium. Et secundum hoc 4 cicli decemnovenales habentes dies 27759 integros excedunt 4 ciclos naturales per spatium 5 horarum et 860 partium, unde fit ut in quibuslibet 76 annis retrocedant in veritate tempora lunationum et etiam solsticiorum et equinoctiorum secundum intentionem Hebreorum per 5 horas et 860 partes. Et ex hac retractione patere potest via ad sciendum ex una coniunctione cognita omnem consimilem coniunctionem, id est consimilis mensis in consimili anno consimilis cicli, utpote prima coniunctio primi anni cicli habentis primum annum bisextilem ostendet omnem primam coniunctionem consimilis primi anni et secunda secundam et sic deinceps.

Capitulum quintum: De collectione diversitatis ad longum tempus per tabulas

Et ut istud magis conferatur addendum videtur quod dies 4 naturalium ciclorum deficiunt a completione integrarum ebdomadarum per 3 dies et dictas horas cum suis partibus. Et per hoc patebit tempus ferie certe qua erit coniunctio, quia a numero ferie presentis coniunctionis subtrahendo 3 cum dictis 5 horis et 860 partibus, si fieri potest, sin autem subtrahendo a numero ferie cum adiecto septenario, habebitur hora similis et feria coniunctionis sibi correspondentis post 76 annos. Et ita semper pro 76 annos 3 quoad ferie numerum sunt demenda. Amplius ciclus noster solaris continet 28 annos, sed 76 anni non continent nisi duos ciclos solares et 20 annos, unde deficiunt a perfectione ciclorum in 8 annis et ideo habito quoto anno cicli solaris, sit aliqua coniunctio, subtrahantur 8 et habebitur quoto anno cicli fuerit coniunctio correspondens.

Et quod subtrahendum esse dicitur pro futuro tempore pro annis preteritis est addendum, hoc observato quod in addendo 1080 partes unitate augent numerum horarum et 24 hore numerum tam dierum quam feriarum. Septenarius in feriis semper abiciatur, si aliquid ultra proveniat, et similiter 28 in solari circulo. In diminuendo vero econtra partes subtrahantur de partibus, vel de partibus et una hora dempta de numero horarum et resoluta in partes; simliter hora de horis per se vel de horis et die resoluto | in 24 et dempto

4v

6–7 patere potest] patet *E* **14** conferatur] conferat *DE* **20** annos] annis *D* ‖ ferie] *om. E* **21** sunt] semper sunt *E* **24** anno cicli] cyclo anni *E* **27** quod] ut *E* **30** diminuendo] dividendo *E* **31** de] a *E* **32** se] *mg. D* ‖ de horis et] *om. E* ‖ 24] *add.* partes horas *E*

contains 6939 days, 16 hours, and 595 parts. It exceeds it, I say, by the quantity of one hour and 485 parts. And according to this, four 19-year cycles, which have 27,759 whole days, exceed four natural cycles by an interval of 5 hours and 860 parts, which is why the true dates of the lunations and also of the solstices and equinoxes according to the Hebrews recede by 5 hours and 860 parts every 76 years. And this recession opens a way for us to know on the basis of one conjunction every conjunction that is similar to it, i.e. one that falls in a similar month of a similar year in a similar cycle, in as much as the first conjunction of the first year of the cycle that contains the first bissextile year indicates all first conjunctions of a similar first year, and so does the second for the second and so forth.

The Fifth Chapter: On How to Collect the Difference over a Long Time-Span by Means of Tables

And in order to convey this further, it seems that we should add that the days contained in 4 natural cycles are 3 days and the aforementioned number of hours with their parts short of completing a whole number of weeks. And from this will emerge the time of a certain day of the week on which the conjunction will take place, because by subtracting 3 along with the mentioned 5 hours and 860 parts from the weekday number of the present conjunction (if it is possible, otherwise one must subtract this from the weekday number after adding 7) one will get the similar hour and weekday for the corresponding conjunction 76 years later. And thus one must always take away three from the number of weekdays for every 76 years. Furthermore, our solar cycle contains 28 years, whereas 76 years only contain two solar cycles plus 20 years, which means they are 8 year short of completing the cycle and thus, if you have a conjunction in a particular year in the solar cycle, you need to subtract 8 to arrive at the year of the cycle for the [next] corresponding conjunction.

And what is said must be subtracted for dates in the future must be added for years in the past, bearing in mind that in performing additions 1080 parts augment the number of hours by one unit and 24 hours [do the same for] the number of [calendar] days and weekdays. The number 7 must be cast off from the days of the week whenever it is exceeded, and the same applies to the number 28 in the solar cycle. Yet in subtraction, on the other hand, parts must be taken from parts or from both the parts and from one hour that is taken away from the number of hours and dissolved into parts; similarly, hours from hours, either by themselves or from the hours and

de numero, tam feriarum, quam dierum; similiter feria de feriis absolute vel additis 7, sed per hoc nichil de diebus demi debet; similiter dies de diebus et cicli numerus de ciclo simplici vel cum adiectis 28. Et ut vitetur in magno numero ciclorum fastidium expedit per tabulam demonstrare quantum per quaternos aggregatos per 10 usque centum subtrahendum sit vel addendum. Et hec sunt tabule, que vocentur, si placet, 'tabule residuitatum' [Tab. 7].

Capitulum sextum: De inventione initialium coniunctionum annorum lunarium in kalendario

Sciendum insuper quod Anno Domini 1256, 21 die Septembris, feria quinta post 6 horas, 684 puncta fuit initialis coniunctio 265 revolutionis a principio mundi, et coniunctio paschalis 17 die Martii sequentis, die Sabbati, post horas 11 et 42 partes. Adde super utramque quod respondet secundum precedentem tabulam 264 ciclis, qui precesserunt, hoc est 15 dies, 3 ferias, 22 horas et 600 partes, occurret prima coniunctio annorum mundi 7 die Octobris, feria 2, post horas 5 et 204 partes et prima coniunctio paschalis secundo die Aprilis, feria 4 post 9 horis et 642 partes; et, per consequens, equinoctium vernale secundo die Aprilis in primo noctis secundum quod asserit Abraham.[19] Annis incarnationis secundum Dionisium adde 3760 et fient anni a principio mundi secundum Hebreos modernos.

Ut ergo principia sequentium annorum habere potimus, sciendum est quod annus solaris, ut supra tactum est, apud ecclesiam est communiter 365 dierum, sed in bisextili anno sunt dies 366, a quibus si dematur annus lunaris simplex, qui est 354 dierum, 8 horarum et 876 partium, ut supra, remanent de anno communi kalendarii ecclesiastici 10 dies, 15 hore, et 204 partes. De anno vero bisextili remanent 11 dies cum 15 horis et 204 partibus. Annus vero embolismalis lunaris excedit annum communem in 18 diebus, 21 horis et 589 partibus, annum vero bisextilem excedit in diebus 17 cum dictis horis et partibus. Habita ergo prima coniunctione cuiusvis anni lunaris communis subtrahe 10 dies vel 11 si fiet bisextus et 15 horis cum 204 partibus

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5 quaternos] quaternos cyclos simplices usque 10, quantum per quaternos *E* **9** insuper] *om. E* ‖ 1256] 1294 *E* **10** 265] 26 *E* **18–19** Annis … modernos] *om. E* **20** sequentium annorum] annorum sequentium *E* **21** est] erat *E* **23** est] *om. D* **25** partibus] ducentis quatuor punctis *D* **27** diebus] *om. E* **28** ergo] igitur *E* ‖ cuiusvis] *om. E* **29** communis] *om. E*

[19] Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.4), ed. Filipowski, 88; Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 79, p. מד

from one day dissolved into 24 and taken away from the number of both weekdays and [calendar] days; similarly, weekdays from weekdays, either by themselves or after adding 7, but in this case nothing must be taken away from the [calendar] days; similarly, [calendar] days from [calendar] days and the number of the cycle either from the just the cycle or after adding 28. And in order to avoid any weariness that might arise from the large number of cycles, it will be expedient to demonstrate by means of tables how much one must subtract or add for quadruples of cycles multiplied by 10 up to 100. And here are the tables, which we shall call, if you like, 'surplus tables' [Tab. 7].

The Sixth Chapter: On How to Find the Initial Conjunctions of the Lunar Years in [Our] Calendar

On top of this, it should be known that the initial conjunction of the 265th revolution since the beginning of the world fell on the 21st of September AD 1256, on the fifth day of the week, after 6 hours and 684 points. And the paschal conjunction fell on the following 17th of March, a Sabbath, after 11 hours and 42 parts. Add to any of them the value that in the preceding table corresponds to the preceding 264 cycles, i.e. 15 days, 3 days of the week, 22 hours and 600 parts, [and] the first conjunction of the years of the world [is found to] occur on the 7th of October, the second day of the week, after 5 hours and 204 parts, and the first paschal conjunction on the 2nd of April, the fourth day of the week, after 9 hours and 642 parts; and, as a consequence, the vernal equinox [occurred] on the 2nd of April in the first hour of the night, in accordance with what Abraham asserts. Add 3760 to the years from the incarnation according to Dionysius and the result will be the years from the beginning of the world according to the modern Hebrews.

In order for us to get to the beginning of the following years, it should be known that the solar year according to the Church (as has been touched upon above) is 365 days long, but that there are 366 days in a bissextile year; if you subtract from this the simple lunar year, which has 354 days, 8 hours, and 876 parts (as mentioned above), there remain 10 days, 15 hours, and 204 parts of the common ecclesiastical calendar year, while of the bissextile year there remain 11 days with 15 hours and 204 parts. The embolismic lunar year, however, exceeds the common year by 18 days, 21 hours and 589 parts, whereas in a bissextile year there are 17 days with the mentioned hours and parts. If, therefore, you have the first conjunction of any common lunar year, you must subtract 10 days (or 11, if the bissextile day intervenes), along

et relinquetur prima coniunctio anni sequentis. Habita vero coniunctione initiali anni embolismalis, adde 18 dies vel, si interveniat bisextus, 17 cum 21 horis et 589 partibus et remanebit prima coniunctio sequentis anni. Et secundum hunc modum in sequenti serie assignantur prime coniunctiones 76 annorum lunarium continue sibi succedentium a principio mundi, sive ponatur principium anni a mense Thisseri, sive a mense Nisan. Et hec est series annorum [Tab. 8].

5r In proposita serie coniunctio signata in Septembri vel Octobri est coniunctio mensis Thisseri, quem ponunt Iudei primum mensem anni, unde alio nomine vocatur 'Roshasana', id est 'caput anni'. Coniunctio vero signata in Martio vel Aprili est coniunctio mensis paschalis, et hoc est est mensis Nisan, qui est primus mensis in legitimis observandis, ubi etiam cum nostris ponunt anni principium magistri plurimi Iudeorum.[20] Ex qua serie per precedentem tabulam eliciuntur primarie coniunctiones omnium annorum mundi, sive succedentium in veritate, sive precedentium, saltem in sapientum opinione, et hoc utro volueris mense de predictis inceptorum. Per tabulam vero 13 ciclorum cum sequenti tabula de mensibus faciliter haberi potest feria inicialis cuiuslibet anni secundum usum vulgi, que semper proxima est prime coniunctioni ipsius anni. Et hoc de applicatione compoti Iudeorum ad nostrum kalendarium ad presentem dixisse sufficiant.

Capitula quarte partis, que est de seculi decursu

Primum capitulum sequentis partis de die in kalendario quo mundus supersit exordium. Secundum de die quo primo inundavit diluvium. Tertium de die quo populus Israel de Egipto egressus est. Quartum de die quo sub Nabuchodonozor Templum Salomonis succensum est. Quintum erit de anno incarnacionis et de die conceptionis precursoris. Sextum et ultimum de anno et die Dominice Passionis.

3–4 Et … modum] Similiter modo *E* **4** assignantur] signatur *E* **6** sive … mense] vel *E* **9** Thisseri] Tisseri *E* **10** vocatur] *om. E* ‖ Roshasana] Rosasana *E* ‖ id] quod *E* **11** et] *om. E* **12–13** cum … ponunt] ponunt cum nostris *E* **14** primarie coniunctiones] coniunctiones primarie *E* **15** mundi] ab origine mundi *E* **21** Capitula … decursu] Capitula 4te partis de seculi discursu decursu dicturi sumus **22** sequentis partis] *om. E* **24–25** Nabuchodonozor] Nabuhgodonozor *E* **25** Templum … succensum] Iherusalem capta et populus captatus *E* ‖ erit] *om. E*

[20] Cf. M. *Rosh Hashanah* 1:1; B. *Rosh Hashanah* 7a, 8a.

with 15 hours and 204 parts, and you will be left with the first conjunction of the following year. If, by contrast, you have the initial conjunction of an embolismic year, you must add 18 days (or 17, if the bissextile day intervenes) together with 21 hours and 589 and you will be left with the first conjunction of the following year. And in the following series the first conjunctions of 76 consecutive lunar years since the beginning of the world are displayed according to this principle, both for the beginning of the year from the month of Tishri and from the month of Nisan. And here is this series of years [Tab. 8].

In the series featured above, the conjunction assigned to September or October is the conjunction of the month of Tishri, which the Jews regard as the first of the year, which is why it is also called by the name of 'Rosh Hashanah', i.e. the 'head of the year'. The conjunction assigned to March or April, on the other hand, is the conjunction of the paschal month, i.e. the month of Nisan, which is the first month in observing the feasts according to the Law, [and] most sages of the Jews along with ours also put there the beginning of the year. Using the preceding table [Tab. 7], one can draw from this series the principal conjunctions of all years of the world, whether they came afterwards, as is truthful, or before, at least in the opinion of wise men. And this [applies] no matter which of the two aforementioned months you want to take as the beginning. And with the help of the table of 13 cycles [Tab. 4] alongside the following table of months [Tab. 5], the initial weekday of any year according to the use of the common folk, which is always the one closest to the first conjunction of that year, can be easily gleaned. And this much shall at present suffice to be said about the application of the *computus* of the Jews to our calendar.

The Chapters of the Fourth Part, Which is on the Flow of History

The first chapter of the following part is on the day in the calendar on which the world began. The second is on the day on which the deluge began to inundate. The third is on the day on which the people of Israel went out of Egypt. The fourth is on the day on which Solomon's Temple was burnt down under Nebuchadnezzar. The fifth will be on the year of the incarnation and the day of the conception of the precursor. The sixth and last is on the year and day of the Lord's Passion.

Capitulum primum: De primo die seculi

Post hec de cursu seculi dicturi a mundi creatione sumamus exordium. Quo autem die mundus creatus est, nichil nobis certum ex sacra scriptura relinquitur, nisi quod, cum dies septima Sabbatum fuerit, prima dies erat Dominica, qua Deus lucem condidit et a tenebris divisit.[21]

Licet autem Hebrei et Greci, qui ab Octobri vel Septembri annum inchoant, videntur supponere quod mundum Deus fecerit in autumpno. Et Magister in Historiis hoc nititur approbare.[22] Ieromimus tamen et Beda, super Genesin et alibi,[23] Ambrosius quoque in Omelia,[24] id est Exameron, et similiter Basilius[25] et Damascenus 21 capitulo[26] magis arbitrantur mundum incepisse in vere. Item communiter tenetur mundum incepisse in Martio, unde et die ipsius Martii 18 super G litteram, id est 15 kl. Aprilis, kalendariis inscribitur primus dies seculi. Item Rabanus super Exodum 12 in glosa dicit quarto die *sol et luna condita sunt et tunc primum equinoctium fuit. Sol enim in oriente* et *luna in occidente speram mundi ex equo dividebant*.[27] Dicit etiam Damascenus capitulo 21 quod mundus factus est in vernali equinoctio et luna creata est 15, id est plena, quarto die.[28]

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1 De … seculi] De die in kalendario quo mundus incepit *E* **2** cursu seculi] mundi decursu *E* **3** est] *add.* est *D* **8** in … nititur] hoc nititur in historiis *E* ‖ Ieromimus] Iheronimus *E* **9** in] *om. D* **10** 21 capitulo] capitulo 12 *E* **11** tenetur] *om. E* **12** ipsius … 18] 18 Martii *E* **14** sol et luna] luna et sol *D* **15** ex equo] exquos *D*

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[21] Gn 1:3–4 (ed. Weber, 4): "Dixitque Deus/ fiat lux et facta est lux/ et vidit Deus lucem quod esset bona/ et divisit lucem ac tenebras."

[22] Peter Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 5 (PL 198, 1059): "Quidam dicunt mundum in vere factum, quia viror illius temporis est, et fructificatio. Alii quia legunt lignum faciens fructum, et additum, herbam habentem semen, factum dictum in Augusto sub leone. Sed in Martio factum dogmatizat Ecclesia." Cf. B. *Rosh Hashanah* 10b–11a; Roger Bacon, *Opus tertium*, 209–210: "Et non est dubium, quin secundum ordinem temporum naturalem, principium anni est in lunatione Octobris. Et hoc astronomi orientales, Aegyptii, et Graeci, et Persae, et omnes considerant, qui a patriarchis et prophetic habuerunt astronomiam."

[23] Bede, *In Genesim* 1.1.11–13 (CCSL 118A, 14–15); Bede, *De temporum ratione* 6 (CCSL 123B, 290–295).

[24] Ambrose, *Exaemeron* 1.4.13 (CSEL 32.1, 11).

[25] Eustathius, *In Hexaemeron Basilii Caesareae Cappadociae Episcopi latina translatio* (6.8.4), ed. de Mendieta and Rudberg, 81.

[26] John Damascene, *De fide orthodoxa* (21.5), ed. Buytaert, 87.

[27] Rabanus Maurus ap. *Glossa ordinaria*, Lib. Exod. 12.2–4 (PL 113, 217).

[28] John Damascene, *De fide orthodoxa* (21.5, 16), ed. Buytaert, 87, 94.

The First Chapter: On the First Day of History

After this, we shall speak about the flow of history, taking our start from the creation of the world. Sacred Scripture, however, bequeathed to us no certain information about the date on which the world was created, aside from the fact that, since the seventh day was a Sabbath, the first day must have been the Lord's Day, on which God made light and divided it from darkness.

Now, granted, the Hebrews and Greeks, who start the year in October or September, seem to suppose that God made the world in autumn. And the Master of Histories strives to confirm this. Yet Jerome and Bede, in his commentary on Genesis and elsewhere, as well as Ambrose in his Homily, which is the *Hexaemeron*, and similarly Basil and the Damascene, in the 21st chapter, rather believe that the world began in spring. It is also commonly held that the world began in March, which is why the first day of history is inscribed in our calendars at the 18th of March next to the letter G, i.e. the 15th before the kalends of April. Similarly, Rabanus says in the Gloss on Exodus 12 that the sun and the moon were established on the fourth day and this was the time of the first equinox. The sun, in fact, was in the East and the moon was in the West, dividing the sphere of the world into equal parts. The Damascene, in the 21st chapter, likewise says that the world was made at the time of the vernal equinox and that the moon was created on the 15th, i.e. as a full moon, on the fourth day.

Hec si vera sint, G fuit littera dominicalis primi anni mundi et 12 kl. Aprilis vernale equinoctium et etiam plenilunium primi mensis et per consequens in nonis Martii ymaginarie oportet fuisse lunarem coniunctionem, que omnia simul stare non possunt, cum ex predictis constare possit vernale equinoctium non fuisse in Martio, sed Aprili, in anno creationis mundi. Sed ut pie de sanctis sentiam doctoribus, nolentes reverendi expositores se abisso difficultatum immergere, supposuerunt ratum et firmum ecclesie usum in compoto, quoad anni quantitatem, equinoctiorum et solstitiorum localem in kalendariis inmutabilitatem; itemque quod aureus numerus kalendario inscriptus uniformiter a mundi principio locum suum tenuerit et in perpetuum observabit, que tamen in precedentibus sunt improbata.

Sciendum est igitur quod G littera non est, nec esse potest, littera dominicalis in Martio nisi in 6 anno vel 12 vel 17 vel 23 cicli solaris. Ad hoc ergo quod mundus ponatur creatus 15 kl. Aprilis, oportet ponere primum annum mundi fuisse unum de dictis annis in ciclo solari. Item pro tempore quo Iudei ponunt principium mundi, qui minus ceteris ponunt, nec equinoctium potuit esse in Martio, ut dictum est, nec etiam plenilunium primum mensis, nisi forte fuisset annus 16 cicli lunaris, ut patet in preposita annorum descriptione; nec etiam primus mensis potuerit incipere dicto die vel ante, nisi 16 anno cicli lunaris. Si ergo dicto die incepit mundus, nullo modo incepit in equinoctio, nec in plenilunio primi mensis. Immo si incepit in primo mense aliquo modo, oportet quod hoc fuisset primo die mensis.[29] Amplius patet supra in tabula ad hoc capitulo 6 prime partis quod tantum in dicto 16 anno cicli lunaris dies equinoctii vernalis potest esse in plenilunio primi
5v mensis. Ad hoc ergo quod sidera facta fuissent in | equinoctio et plenilunio primi mensis oportebat mundum incepisse 16 anno cicli lunaris et per consequens 19 anno nostri cicli decemnovenalis. Preter hoc, si in quocumque plenilunio sive luna 15 fuissent creata sidera, necesse erat mensem illum ymaginarie incepisse quarta feria.

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3 ymaginarie] in ymaginatione *E* **6** de … doctoribus] sententiam de sanctis doctoribus *E* **9** quod] *om. E* **10** tenuerit] uniformiter obtinuerit *E* **12** est] *om. E* ‖ non] nec *E* **14–15** ponere … mundi] dici annum primum *E* **21** Immo] ymmo *E* **25** sidera] sydera *E* **28** sive … creata] creata fuissent *E*

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[29] Cf. Bacon, *Opus majus*, 1:198–199; Bacon, *Opus tertium*, 215.

If this were true, G would have been the dominical letter of the first year of the world and the 12th day before the kalends of April [21 March] the date of the vernal equinox and also of the full moon of the first month, and, as a consequence, the conjunction would hypothetically have had to occur on the nones of March [7 March], which cannot all be true at the same time, since it can be concluded from the foregoing that the vernal equinox in the year of the world's creation did not fall in March, but in April. Wanting to think piously about the saintly teachers, however, [I suspect that] the venerable expositors did not want to plunge into an abyss of difficulties and thus presupposed the computistical use of the Church to be fixed and stable, as far as the length of the year and the unchanging location of the equinoxes and solstices in the calendars are concerned; as well as [the idea] that the Golden Number, as inscribed into the calendar, has uniformly kept its place since the world's beginning and will always continue to do so, despite the fact that this has been disproved in the foregoing.

It should hence be known that the letter G is not, nor can it be, the dominical letter in March, except in the 6th or 12th or 17th or 23rd year of the solar cycle. With regard to [the opinion], however, that the world was created on the 15the before the kalends of April [18 March], it is necessary to assume that the first year was one of the aforementioned years in the solar cycle. For the time in which the Jews place the beginning of the world (for which they assume a smaller [sum] than all others), [it must] likewise [be noted] that the equinox could not have been in March, as has been said, nor on the full moon day of the first month, unless perhaps if it had been in the 16th year of the lunar cycle, as becomes clear from the previously offered description of the year; neither could the first month have begun on said day [18 March] or earlier, unless it was in the 16th year of the lunar cycle. It follows that if the world began on said day, it in no way could have begun on the equinox, nor on the full moon of the first month. On the contrary, if it began in the first month in any way whatsoever, it would have necessarily been on the first day of the month. Moreover, a look at the above table, which belongs to the sixth chapter of the first part, shows that the day of the vernal equinox can only coincide with the full moon of the first month in the aforementioned 16th of the lunar cycle. It follows that if the heavenly bodies were made at the time of the equinox and the full moon of the first month, the world would have had to begin in the 16th year of the lunar cycle and, by consequence, in the 19th year of our 19-year cycle. Apart from this, if the celestial objects were created on any full moon or 15th day of the moon, this month would have necessarily had its hypothetical beginning on the fourth day of the week.

Hiis visis, cum nichil certum habere possimus quis fuit in kalendario primus dies seculi ex sanctorum positionibus, breviter positionem Hebreorum super hoc videamus. Notandum est ergo quod Hebrei ponunt iam anno isto dominice incarnationis secundum Dionisium 1294 22 diem Septembris feria quarta futurum fore ultimum diem 266 revolutionis a principio mundi, ita quod prima revolutio incepit 7 die Octobris et quod ipso die fuit coniunctio ad 5 horas et 204 partes, ut supra declaratum erat. Primum tamen annum illius prime revolutionis ponunt tantum fuisse in ymaginatione exceptis 6 diebus ultimis, unde annum illum vocant annum 'vanitatis' sive 'ymaginatum', et ultimum diem dicunt diem fuisse sexte ferie et in illo fuisse creatum Adam et in eodem fuisse primam coniunctionem mundi realem post horas 14, ita quod primus homo in ipso die creationis sue in vespere vidit primam novam lunam et in sequenti Sabbato, id est in crastinis, inceperit secundus annus prime revolutionis sive cicli lunaris. Quod autem pro sex diebus ultimis totum annum ymaginantur notabile est, quoniam pro regula habent quod in computando annos, quos semper a certo mense incipiunt, pro uno tantum die alicuius anni totum annum ponunt in numero, ut si quis regnaverit die uno alicuius anni et anno sequenti dicatur duobus annis regnasse.[30]

Cum ergo dicta coniunctio prima mundi secundo anno prime revolutionis fuerit 26 die Septembris ad 14 horas, ut patet in premissa annorum serie, apparet evidenter primum diem mundi fuisse 21 die Septembri, ubi super E litteram inscribitur festum sancti Matthei apostoli et Ewangeliste Deo gratia.

Capitulum secundum: Die die quo primo incepit inundare diluvium secundum Hebreos

Ostenso quem diem ponunt Hebrei primum mundi sequitur post hec de inundatione diluvii. Licet autem secundum sanctos qui computant annos iuxta 70 interpretes ab initio mundi fuerunt usque ad diluvium anni 2242. Tamen secundum Hebraicam veritatem, que ex textu colligitur, fuerunt tantum 1656, in quibus sunt 87 cicli et 3 anni. In 87 ciclis autem continentur

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1–2 primus … seculi] prima seculi dies *E* **2** positionem] rationem *E* **4** Dionisium] Dyionisium *E* ‖ **22** … Septembris] vicesimum secundum Septembris *E* ‖ diem] *om. E* **7** tamen] *add.* aliter *E* **8** revolutionis] revolutionis prime *E* ‖ tantum] *om. E* **10** diem fuisse] fuisse diem *E* **18** uno] *om. E* **20** die] *om. E* **21** ubi] ut *E* **25** Hebrei] Iudei *E* **27** iuxta] secundum *E*

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[30] B. *Rosh Hashanah* 2a–b, 10b.

Having made these observations, and seeing that the saints give us no certain knowledge of what the first day of history was in [our] calendar, we shall briefly look at the position of the Hebrews on this matter. It is therefore to be noted that the Hebrews suppose that Wednesday, 22 September, in this year 1294 since the Lord's incarnation according to Dionysius will be the last day of the 266th revolution since the beginning of the world, such that the first revolution began on 7 October, with a conjunction on this day at 5 hours and 204 parts, as has been revealed above. The first year of this first revolution, however, they regard as existing only in the imagination, with the exception of the six final days, which is why they refer to this year as being 'of emptiness' or 'imaginary'; and they say that its last day was the sixth day of the week and that on this day Adam was created and that on it the first real conjunction of the world took place after 14 hours, such that the first man saw the first new moon on the evening of his creation and that on the following Sabbath, i.e. on the next day, the second year of the first revolution or lunar cycle began. The fact, however, that they imagine a whole year on the basis of the final six days is worth noting, because they have a rule that in calculating the years (which they always begin from a certain month) they reckon a whole year for just one day of any year, such that if someone ruled for one day of any year and for the following year, he is said to have ruled for two years.

Now, since the aforementioned first conjunction of the world was in the 2nd year of the first revolution, on 26 September at 14 hours, as is plain from the foregoing series of years [Tab. 8], it is evident that the first day of the world was on 21 September, where, thanks to God, the feast of St. Matthew, the Apostle and Evangelist, is inscribed at the letter E.

The Second Chapter: On the Day on Which the Flood First Began to Inundate According to the Hebrews

Having shown what day the Hebrews consider as the first of the world, we now turn to the date of Flood. Yet according to the Saints, who calculate the years according to the Septuagint, there were 2242 years from the beginning of the world until the Flood, whereas according to the Hebrew truth, which is deduced from the [Vulgate] text, there were only 1656 years, which comprise 87 cycles and 3 years. In 87 cycles, however, there are contained 6×13 plus

sexies 13 cicli et insuper 9 cicli. Apparet igitur diluvium inundasse anno 3 decimi cicli in tabula 13 ciclorum, aut, ut probat glosa Hebraica Genesi 8, oportuit illum annum non fuisse pregnatum, cum tamen cuiuslibet cicli 3 annus sit pregnatus, aut ergo oportet dicere quod diluvium incepit in mense Iiar, qui est mensis secundus, incipiendo annum a Nisan, et sic embolismus precessit Nisan. Et istum modum tenet Magister Historiarum[31] et doctores communiter et etiam Rabi Iosue. Secundum glosatorem Hebreorum autem oportet quod illi 1656 anni integre completi fuerunt ante diluvium, continuato cum anno vanitatis, id est ymaginato. Et istud magis verum apparebit in sequenti capitulo et hunc modum prosequitur glosator Hebreus et allegat pro se Rabi Eliezer.[32]

Secundum primum modum annus diluvii erat 1656 et, per consequens, annus tertius 88 revolutionis a mundi creatione. In tabula vero 13 ciclorum erat tertius annus decimi cicli. Quero igitur in tabula residuitatum deserviente 5 capitulo partis precedentis quid respondeat 84 ciclis et de ciclo solari colligo 28 (qui faciunt completum, ideo pro nichilo abicio), colligo etiam 5 dies, 5 ferias, unam horam et 780 partes, et hec servo. Hiis 84 ciclis respondent anni 1596, ut ibidem patet. Hos subtracto de annis predictis diluvii remanent 60 et hos quero in annis creationis in superposita annorum serie et ibi invenio ad mensem Nisan annum 5 cicli solaris, 9 diem Aprilis, primam feriam, 17 horas et partes 652 pro coniunctione illius mensis in tali anno. Ex hiis subtraho superiorem collectam servatam et remanet in coniunctione Nisan anni diluvii, que distat ab illa ibi signata per 84 revolutiones precise et est illa coniunctio remanens anno 5 cicli solaris, A littera dominicali, ut semper, die 4 mensis Aprilis, feria tertia, ad horas 15 et partes 952. Invenio etiam annum illum in tabula 13 ciclorum fuisse diminutum, inceptum per diem Sabbatum. Ergo per sequentem tabulam mensium Nisan

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5 Iiar] Yiar *D* **8** illi] *om. D* ‖ anni] *om. E* **13** mundi creatione] creatione mundi *E* **14** tertius] 3 *D* **15** capitulo] capitulo 5to *E* **16** qui … completum] et *E* **19–20** annorum serie] serie annorum *E* **20** ibi] *om. E* **24–25** A … semper] *om. E* **25** Aprilis] *om. E* **26** in tabula] *om. E*

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[31] Peter Comestor, *Historia scholastica*, Historia libri Genesis, cap. 33 (PL 198, 1084).

[32] Roger Bacon (?), *Notae variae*, MS Florence, Biblioteca Laurenziana, S. Croce, Pl. XXV sin. 4, fol. 188^{rb}: "Genesis 7 anno 600 vite Noe mense secundo. Quis fuit iste mensis? Varie sunt opiniones et sententie apud sapientes Hebreorum. Unde dicit Glosa Hebraica quod secundum opinionem Rabi Eliezer mensis iste fuit Marehissevan, i.e. October; secundum opinionem vero Rabi Iosue mensis fuit Iiar, i.e. Aprilis." Cf. *Seder Olam Rabbah* 4 (trans. Guggenheimer, 46); B. *Rosh Hashanah* 11b–12a; Y. *Rosh Hashanah* 1:1 (56b); Rashi on Gn 8:13. Cf. Bacon, *Opus majus*, 1:194–195; Bacon, *Opus tertium*, 211.

9 cycles. It hence appears that the Flood happened in the third year of the tenth cycle in the table of 13 years [Tab. 4]; either such that the year in question was not pregnant, as the Hebrew gloss on Genesis 8 esteems, despite the fact that the 3rd year of any cycle is pregnant, or such that the Flood began in the month of Iyyar, which is the second month if the year begins in Nisan, in which case the embolism preceded Nisan. And this is the view held by the Master of Histories and by the Church Fathers in general and also by Rabbi Josua. According to the Hebrew glossator, however, it is necessary that these 1656 years, as reckoned inclusively from the 'empty', i.e. 'imaginary', year, were wholly completed before the Flood began. And the truth of this will become clearer in the next chapter. And this is the mode of reckoning pursued by the Hebrew glossator, and Rabbi Eliezer also aligns himself to it.

According to the first view, the year of the Flood was 1656 and hence the 3rd year of the 88th revolution since the creation of the world. In the table of 13 cycles, however, it was the third year of the tenth cycle. I thus look in the surplus table that belongs to the fifth chapter of the preceding part [Tab. 7] for whatever corresponds to 84 cycles and I gather 28 for the solar cycle (which make it complete, which is why I cast them away as nil) and also 5 days, 5 days of the week, one hour and 780 parts; and I take this over. The corresponding number of years for 84 cycles is 1596, as becomes clear from the same [table]. If I subtract this from the aforementioned years of the Flood, the result is 60, and this is the number I look for among the years since Creation in the foregoing series of years [Tab. 8], and there I find for the month of Nisan: the fifth year of the solar cycle, the 9th of April, the first day of the week, 17 hours and 652 parts for the conjunction of this month in such a year. From these I subtract the previously gathered surplus and the remainder will be the conjunction of Nisan in the year of the Flood, which is separated by exactly 84 revolutions from the one displayed; and this conjunction falls in the fifth year of the solar cycle, with the dominical letter A, on the 4th of the month of April, the third day of the week, at 15 hours and 952 parts. I also find in the table of 13 cycles [Tab. 4] that this year was diminished and began on a

incepit feria 3. Itaque annus diluvii inchoatus a mense Nisan incepit dicto 4 die (id est pridie nonas) Aprilis, feria 3. Computatis ergo 30 diebus pro mense illo incepit sequens mensis, scilicet Iiar, 4 die Maii, feria 5, cuius 17 die, et hoc est 20 die Maii sive 13 kl. Iunii, die Sabbati, *rupti sunt fontes abissi*[33] et incepit diluvium.

Secundum alium modum annus diluvii fuerit 1657 a creatione, inceptus 28 die Septembris, 5 feria, adhuc anno 5 cicli solaris, et per consequens littera dominicali A; et fuit annus ille annus superfluus per tabulam, licet Glosator accipiat eum pro perfecto. Mensis ergo ille Marehisevan, quem alio nomine vocant 'Bul', ut patet 3 Regum,[34] 6.G, quod interpretatur 'mixtio' sive 'confusio', propter hoc quod diluvium inundavit in eo, quod diluvium vocatur 'Mabul' Hebraice, 'materiam mistens et confudens'; ille, inquam, mensis incepit 28 die Octobris nostri, die Sabbati, ubi kalendariis inscribitur festum apostolorum Simonis et Iude. Ergo 13 die Novembris, feria secunda, *rupti sunt fontes* etc.

Sed hunc diem non computat glosator pro primo die pluvie, quod tantum oporteret si esset annus perfectus ad hoc quod intendit in consequentibus. Posito ergo quod fuerit annus superfluus, ut docet tabula, et quod dies 18 illius mensis fuerit primus pluvie, ut vult glosator, patet faciliter quod 13 dies residui illius mensis et 30 de sequenti de Chisselebe, 29 de Thebet et 30 de Sabat et 29 Adar, 30 de Nisan et 29 de Iiar complent dies pluvie 40 et sequentes 150 dies, quibus *optinuerunt aque terras*[35] sine diminuitione; et quod primo die mensis Sivan, qui est mensis septimus post mensem inchoationis diluvii, ceperunt aque minui. Et 17 die eiusdem mensis recedit archa super montes. Et primo dies mensis Ab, qui est decimus a Marehisevan mense, quo incepit diluvium, apparuerunt capita montium. Et sic 40 die, id est decimo Elul, emisit primo columbam. Et tunc primo die primi mensis

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4 est] *om. E* **6** inceptus] mundi *E* **9** ille] *om. D* ‖ Marehisevan] Marchisevan *E* **12** Hebraice] Ebraice *E* ‖ ille] Iste *E* **14** Simonis … Iude] Symonis et Iude *E* **16** tantum] tamen *E* **17** annus] *om. E* **18** docet] ponit *E* **19** illius … primus] fuerit prima illius *E* **20** Chisselebe] Chysseleve *E* ‖ Thebet] Thebeth *E* **21** Sabat] Sebath *E* **23** mensem] *om. E* **24** diluvii] mense diluvii *E* ‖ recedit] resedit *E* **25–26** Marehisevan mense] mense Marehisevan *E* **27** primo] *om. E* ‖ primi] *om. E*

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[33] Gn 7:11 (ed. Weber, 12): "Anno sescentesimo vitae Noe mense secundo septimodecimo die mensis rupti sunt omnes fontes abyssi magnae/ et cataractae caeli apertae sunt."

[34] III Rg 6:38 (ed. Weber, 467): "Et in anno undecimo mense Bul/ ipse est mensis octavus/ perfecta est domus in omni opere suo/ et in universis utensilibus/ aedificavitque eam annis septem."

[35] Gn 7:24 (ed. Weber, 12): "Obtinueruntque aquae terras centum quinquaginta diebus."

Sabbath day. According to the following table [Tab. 5], Nisan hence began on the third day of the week. The year of the Flood, if it began from the month of Nisan, therefore began on the aforementioned 4th day (i.e. the day before the nones) of April, on the third day of the week. Calculating 30 days for this month, the following month, i.e. Iyyar, began on the 4th of May, on the fifth day of the week, on whose 17th day—i.e. the 20th of May or 13th before the kalends of June, a Sabbath day—"the fountains of the great deep were broken up" [Genesis 7:11] and the Flood began.

According to the other view, the year of the Flood was the 1657th from Creation, which began on the 28th of September, the fifth day of the week, still in the fifth year of the solar cycle, the dominical letter hence being A; and the year was superfluous according to the table, although the glossator treats it as if it had been perfect. The month Marḥeshvan, which also goes by the name of 'Bul', as is clear from 3 Kings 6[:38], which translates as 'mixing' or 'confusion', because in it the Flood took place, which Flood is called 'Mabul' in Hebrew, from 'mixing and mingling matter'; this month, I say, began on a Sabbath day, the 28th day of our October, where the feast of the Apostles Simon and Jude is inscribed in the calendars. As a result, the "fountains etc. were broken up" on the 13th of November, the second day of the week.

Yet the glossator does not count this day as the first day of the rain, which would only have been appropriate if the year intended by him in what follows had been perfect. Accepting the year as superfluous, as the table teaches us, and that the 18th of this month was the first of the rain, as the glossator wants, it is easily grasped that the 13 days of the remainder of this month and the 30 days of Kislev and the 29 days of Tevet and the 30 days of Shvat and the 29 days of Adar and the 30 days of Nisan and the 29 days of Iyyar together comprise 40 days of rain and the following 150 days, during which "the waters prevailed upon the earth" without diminishing; and that on the first day of Sivan, which is the seventh month after the beginning of the Flood, the waters began to decrease. And on the 17th day of this month the Ark rested on top of the mountains. And on the first day of the tenth month from Marḥeshvan (the month in which the Flood began), the mountain tops appeared. And thus on the 40th day, i.e. on the tenth day of Elul, [Noah] sent out the dove for the first time. And then on the first day of the first month

sequentis anni, id est primo die Thisseri, exsiccata est terra,[36] 18 scilicet die mensis Septembris, feria tertia, quoniam G fuit littera dominicalis. Et quod 17 die mensis secundi, id est 3 die Novembris, die Sabati, egressus est Noe de Archa, licet nostra littera dicat 27 die,[37] sed Hebreum habet 17 die, ut patet etiam per Ieronimum, libro 9 super Ezechielem,[38] deo gratias.

Probat hic glosator quod Archa 11 ulnis, quod nos dicimus cubicis, suo pondere se profundaverat in aqua. Nam cum aque excedebant capita montium 15 ulnis et capita montium apparuerunt primo die mensis Ab, hoc est 60. die a principio inminutionis aquarum, qui fuit primo die mensis Sivan, ergo in 60 dies imminuta sunt aque in 15 ulnis alicuius, quod est semper in 4 diebus per unam ulnam, ergo in 16 diebus a principio inminute sunt in 4 ulnis. Remanent 11 adhuc usque ad capita montium, ergo ex quo arche fundus tangebat caput montis 17 die per 11 ulnas fuit tunc profundata in aqua.[39]

Capitulum tertium: De die et feria egressionis filiorum Israel ex Egipto

Sequitur de egressu Hebreorum de Egipto. Inventi sunt post diluvium per successionem generationum anni 392 usque ad ortum Ysaac, a quo usque ad exitum fuerunt 400 anni secundum Hebreos, de quibus Genesis 15.[40] Licet nostri dicant 405 alioquin ab egressu Abraham de Haran non fuissent usque
6r ad exitum de Egipto 430 anni, quos | commemorat scriptura Exod. 12,[41] ad

1 Thisseri] Tisseri *E* ‖ 18] 18 die *E* **2** mensis] *om. E* **5** Ieronimum] Iheronimus *E* **6** Probat] Prabat *D* **6–7** Probat … aqua] *n.l. E* **6–13** Probat … aqua] *mg. E* **11** principio] *om. E* **14** filiorum] *om. D* **16** Egipto] Egypto *E* **17** Ysaac] Ysaach *E* **18** anni] *om. E* **19** ab] de *E* ‖ de] ad *E* ‖ Haran] Aram *E*

[36] *Seder Olam Rabbah* 4 (trans. Guggenheimer, 50–53); *Genesis Rabbah* 33.7; Rashi on Gn 8:3–5.

[37] Gn 8:14 (ed. Weber, 13): "Mense secundo septima et vicesima die mensis arefacta est terra."

[38] Jerome, *In Hiezechielem* 9.29.17/21 (CCSL 75, 417).

[39] Rashi on Gen 8:4; *Seder Olam Rabbah* 4 (trans. Guggenheimer, 50–51); *Genesis Rabbah* 33.7.

[40] Gn 15:13 (ed. Weber, 21): "Dictum est ad eum scito praenoscens quod peregrinum futurum sit semen tuum in terra non sua et subicient eos servituti et adfligent quadringentis annis." Cf. *Seder Olam Rabbah* 3 (trans. Guggenheimer, 39).

[41] Ex 12:40 (ed. Weber, 93): "Habitatio autem filiorum Israhel qua manserant in Aegypto fuit quadringentorum triginta annorum."

of the following year, i.e. on the first day of Tishri, the earth was dry, this being the 18th day of September, the third day of the week, because G was the dominical letter. And he left the ark on the 17th day of the second month, i.e. on the 3rd day of November, a Sabbath day, despite the fact that our text says 'the 27th day'; but the Hebrew [text] has 'the 17th', as is also made plain by Jerome in his 9th book on Ezekiel (thanks to God).

The glossator here shows that the Ark was submerged in the water by 11 ells (which we call cubits) due to its weight. For since the waters exceeded the mountain tops by 15 ells and the mountain tops appeared on the first day of the month of Av, that is on 60th day since the beginning of the decrease of the waters, which was on the first day of the month of Sivan, [it follows that] within 60 days the waters were diminished by 15 ells, that is one ell every 4 days, meaning that the first 16 days since the beginning saw a decrease by 4 ells. And since 11 still remained above the mountain tops, it follows from the fact that the ark touched the top of the mountain on the 17th day that it was submerged in water by 11 ells.

The Third Chapter: On the Day and Day of the Week of Sons of Israel's Exit from Egypt

The next topic is the exit of the Hebrews from Egypt: based on the succession of generations after the Flood, there have been found 392 years until the birth of Isaac; and from there until the exit there were 400 years according to the Hebrews, as mentioned in Genesis 15[:13]. Ours, by contrast, say there were 405 years, because otherwise there could not have been 430 years from Abraham's leaving of Haran until the exit from Egypt, as commemorated by

Galatas 3[42] et Act. 7,[43] et volunt scripturam non posuisse nisi numerum magnum et notabilem.[44] Et fortasse Hebrei illos 400 et 30 annos computant ab alio termino, utpote ab eductione de Ur Chaldeorum.

Ponendo ergo cum Hebreis tantum 400 annos a nativitate Ysaac usque ad exitum, addo 392 annos a diluvio usque ad nativitatem Ysaac, fiunt 792 anni, et annos 1656 a creatione usque ad diluvium, fiunt anni 2448 a creatione usque ad exitum Hebreorum de Egipto, in quibus sunt 128 revolutiones et 16 anni. Si ergo demam superfluitates deservientes 128 revolutionibus de coniunctione Nisan 16 anni creationis, invenitur coniunctio mensis Nisan in anno exitus fuisse 9 die Martii, die Dominica, ad 19 horas, 1027 partes, et illum annum fuisse 12 cicli solaris, G existente littera dominicali, fuit autem idem annus annus 16 duodecimi cicli in tabula 13 ciclorum, ergo eadem feria, hoc est die Dominica, incepit ille mensis Nisan, cuius 15 die egressi sunt.

Istud stare non potest, quia probant Hebrei et etiam beatus Augustinus de *Questionibus veteris et novi testamenti*, questione 95,[45] quod exierunt de Egipto feria 5. et, per consequens, quod mensis incepit feria 5. Probant autem per hoc quod manna incepit primo descendere die Dominica, et hoc patet quia 6 primis diebus continue collegerunt manna et Sabbato non invenerunt, sicut patet Exodi 16.[46] Et hoc erat 16 die mensis secundi, scilicet Iiar, ut eodem capitulo post principium patet.[47] Itaque 16 dies de mense primo computato die egressionis et 16 de secundo reddunt 32, quorum ultimus, scilicet dies casus manne, erat Dominica dies sive prima feria. Ablatis ergo 28 diebus ultimis, qui faciunt ebdomedas integras, remanent 4

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1 et] *om. E* **2** illos … 30] istos 430 *E* **3** ab] de *E* **4** Ysaac] Ysaach *E* **5** Ysaac] Ysaach *E* **7** exitum Hebreorum] Hebreorum exitum *D* **10** 9] 19 *E* **12** annus] *om. E* ‖ duodecimi cicli] cycli duodecimi *E* **13** hoc] licet *E* ‖ hoc est] id est hoc est *D* **14** beatus] sanctus *E* **15** veteris … novi] novi et veteris *E* **16** quod] *om. E* **17** die] *om. D* **18** primis] primis 6 *E* ‖ continue collegerunt] collegerunt continue *E* **22** Dominica] ultima Dominica *E* **23** ergo] igitur *E*

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[42] Gal 3:17 (ed. Weber, 1085): "Hoc autem dico testamentum confirmatum a Deo quae post quadringentos et triginta annos facta est lex non irritam facit ad evacuandam promissionem."

[43] Act 7:6 (ed. Weber, 1707): "Locutus est autem Deus quia erit semen eius accola in terra aliena et servituti eos subicient et male tractabunt eos annis quadringentis."

[44] Augustine, *De civitate Dei* 16.24 (CCSL 48, 528).

[45] pseudo-Augustine, *Quaestiones veteris et novi testamenti*, q. 95.4–5 (CSEL 50, 169–170).

[46] Ex 16:13–31.

[47] Ex 16:1 (ed. Weber, 98): "Profectique sunt de Helim et venit omnis multitudo filiorum Israhel in desertum Sin quod est inter Helim et Sinai quintodecimo die mensis secundi postquam egressi sunt de terra Aegypti."

Scripture in Exodus 12[:40], Galatians 3[:17] and Acts 7[:6], and they would like [to think] that Scripture only put down a large and notable number [when it spoke of 400 years instead of 405]. And perhaps the Hebrews count these 430 years from a different starting point, namely the leading out of Ur in Chaldaea.

Putting therefore only 400 years from Isaac's birth until the exile, in line with the Hebrews, I add 392 year from the Flood until Isaac's birth, which yields 792 years, and 1656 years from Creation until the Flood, which yields 2448 years from Creation until the Hebrews' exit from Egypt, which contain 128 revolutions and 16 years. Once I have subtracted the surplus that corresponds to 128 revolutions from the conjunction of Nisan in the 16th year since Creation, it is found that the conjunction of Nisan in the year of the exit fell on the 9th of March, on the Lord's Day, at 19 hours, 1027 parts, and that this year was the 12th of the solar cycle, with G as the dominical letter, but the 16th year of the 12th cycle in the table of 13 cycles, meaning that this month of Nisan, on whose 15th they left [Egypt], began on the same day of the week, i.e. on the Lord's Day.

This cannot stand, because the Hebrews and also St. Augustine, in question no. 95 of his *Questions on the Old and New Testaments*, demonstrate that they went out of Egypt on the fifth day of the week and hence that the month began on the fifth day of the week. They derive this from the fact that the manna began to come down on the Lord's Day, and this becomes plain from the fact that they collected manna for six consecutive days, while not finding any on the Sabbath, as can be seen from Exodus 16. And this was the 16th day of the second month, i.e. Iyyar, as is clear from the same chapter after the beginning. And so, the 16 days of the first month since the Exodus and the 16 days of the second yield 32 days, whose last day, i.e. the day on which the manna came down, was a Lord's Day or first day of the week. Subtracting the last 28 days, which make up a whole number of weeks, we are left

quorum adhuc ultimus erat prima feria. Ergo retrocedendo primus illorum 4, scilicet dies egressionis, erat feria 5.

Cum igitur per hanc deductionem mensis Nisan anni illius egressionis incepit feria 5, et annus 2448 a creatione inchoatus a Nisan non sic incepit, sed feria prima, ut dictum est, nec etiam annus sequens, qui est 17 duodecimi cicli, scilicet die Sabbati, sed 18 annus duodecimi revolutionis habuit inchoatum 5 feria, oportet dicere, ut volunt Hebrei, quod anni 1656 a creatione usque ad diluvium non includunt annum diluvii, nec anni 792 a diluvio usque ad exitum Hebreorum includunt annum exitus, sed quod illis duobus annis conumeratis cum ceteris fuerit in universo annus 2450 a creatione et, per consequens, annus 18 cicli duodecimi tabule. Et invenietur mensis Nisan illius anni incepisse 18 die Martii, ubi inscribitur primus dies seculi, feria 5, anno 15 cicli solaris, C littera dominicali. Et eadem die fuit coniunctio ad 2 horas et 330 partes et, per consequens, filii Israel exierunt de Egipto die primo mensis Aprilis nostri. Laus tibi Domine.

Capitulum quartum: De destructione primi templi

Sicut legitur 3 Regum 6[48] in principio anno egressionis Israel de Egipto 480 *mense Zio*, qui est mensis Iiar, incepit Salomon edificare templum Domini. Et intelligo hoc numero comprehendi tam annum egressionis, quam annum quo incepit edificare. Duravit autem templum ab inchoatione edificationis sue simul cum illo anno edificationis 410 annis. Adde annos a creatione usque ad exitum Hebreorum, scilicet 2449 ne bis computetur annus egressionis et unum subtrahe de annis durationis templi, ne primus annus edificationis bis computetur: fiunt in universo anni a creatione usque ad destructionem primi templi 3338.

Durationem vero templi Salomonis per 410 annos supponunt ex probatione libri cuiusdam vocati 'ceder haholam', id est 'ordo seculi',[49] nostri

5 est] *om. E* **6** scilicet] set feria prima ut dictum est, sed *E* **7** feria] feria 5 *E* **11** Et] *om. D* **15** Laus … Domine] *om. E* **17** Israel] *om. E* **18** Zio] 10 *E* ‖ qui … mensis] mense scilicet *E* ‖ Salomon] Salamon *D* **20–21** ab … edificationis] a ipse inchoationis *E* **26** vero] autem *E* **27** ceder] cedar *D*

[48] III Rg 6:1 (ed. Weber, 465): "Factum est igitur quadringentesimo et octogesimo anno egressionis filiorum Israhel de terra Aegypti in anno quarto mense Zio ipse est mensis secundus regis Salomonis super Israhel aedificare coepit domum Domino."

[49] *Seder Olam Rabbah* 28 (trans. Guggenheimer, 242); B. *Yoma* 9a.

with four days, the final one of which was the first day of the week. Going back, [we] thus [find that] the first of these four, i.e. the day of the exit, was the fifth day of the week.

Now, since this deduction shows that the month of Nisan of the year of this exit began on the fifth day of the week, whereas the year 2448 since Creation (reckoned from Nisan) did not begin thus, but on the first day of the week (as has been said); and since the following year did not [begin this way] either, being the 17th of the 12th cycle [and] thus [starting on a] Sabbath day, whilst the 18th year of the 12th revolution did have Nisan begin on the fifth year, it must therefore be concluded that, as the Hebrew would like to have it, the 1656 years from Creation to the Flood do not include the year of the Flood, nor do the 792 years from the Flood to the Hebrew's exit include the year of the exit, but that, with these two years included in the count, it was in total the 2450th year since Creation and hence the 18th year of the 12th cycle of the table. And the month of Nisan of this year is found to have begun on the 18th of March (to which the first day of history is assigned), on the fifth day of the week, in the 15th year of the solar cycle, C being the dominical letter. And on this day the conjunction occurred at 2 hours and 330 parts and the sons of Israel hence left Egypt on the first day of our month of April (praise to you, o Lord).

The Fourth Chapter: On the Destruction of the First Temple

As one can read in 3 Kings 6[:37], Solomon began building the Temple at the beginning of the 480th year since the exit from Egypt, "in the month Zio," which is the month of Iyyar. And I understand this number to encompass both the year of the exit and the year in which he began building. The Temple, however, endured for 410 years after the beginning of its erection, the year of the erection itself included. Add to this the number of years from Creation to the exit of the Hebrews, i.e. 2449, so as to make sure that the year of the exit will not be counted twice, and subtract one from the years of the duration of the Temple, so as to make sure that the first year of the erection will not be counted twice: there will be in total 3338 years from Creation to the destruction of the First Temple.

This reckoning of 410 years for the years of Solomon's Temple, however, is based on the doctrine of a certain book called *Seder Olam*, meaning the

autem ponunt templum plus durasse per circiter 20 annos. Credo tamen quod minus, nam Ieronimus super Osee[50] in principio dicit regnum Israel durasse 250 annis quibus si addantur 37 anni Salomonis precedentes et 131 anni regum Iuda sequentes usque ad templi destructionem non erunt in summa nisi 8 plures. Unde breviter ponendo destructionem primi templi fuisse anno seculi 3338, ut dicunt Iudei, cum dicat Scriptura Ieremie 52 quod Nabuzardam in mense 5 decima die mensis venit *in Ierusalem et incendit domum Domini*.[51]

Si ergo superfluitates 172 ciclorum in dictam summam annorum contentorum subtrahamus de coniunctione Nisan 70 anni creationis, a quo annus ille incensionis templi per tot integros ciclos distat, invenietur coniunctio Nisan in anno destructionis anno 7 cicli solaris, 10 die Martii, feria prima, ad horas 14 et 731 partes. Et cum annus ille fuit 13 septimi cicli tabule ciclorum eadem feria prima fuit prima dies Nisan. Computatis ergo 118 diebus 4 mensium invenietur 5 mensem, scilicet Ab, incepisse 6 die Iulii, videlicet in octavis apostolorum Petri et Pauli. Ergo 15 die eiusdem Iulii feria secunda, scilicet in die sanctorum Quirici et Julitte templum Salomonis succensum est.

Sciendum tamen quod 9 die dicti 5 mensis Ab Iudei ieiunant, lugent et nudis incedunt pedibus, credo propter incensionem secundi Templi per Titum, qui tunc facta est. Eodem enim mense utraque incensio fuit secundum Ieronimum super Zachariam,[52] et habetur parte prima decretorum d. 76, 'Ieiunium'.[53]

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1 20] 28 *E* **2** Ieronimus] Iheronimus *E* **6** Ieremie] Io *D* Iho *E* **7** Ierusalem] Iherusalem *E* **10** creationis] creationis cyclorum *E* **11** tot] *add.* annos *E* **13** annus ille] ille annus *E* ‖ septimi] 7 *D* **15–16** octavis] octava *E* **20** utraque] eadem *D* **21** parte … decretorum] et habetur et habetur in capitulo *E*

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[50] Jerome, *In Osee* 1.1.1 (CCSL 76, 7).

[51] Ier 52:12–13 (ed. Weber, 1246): "In mense autem quinto decima mensis ipse est annus nonusdecimus Nabuchodonosor regis Babylonis venit Nabuzardan princeps militiae qui stabat coram rege Babylonis in Hierusalem et incendit domum Domini et domum regis et omnes domos Hierusalem et omnem domum magnam igne conbosuit."

[52] Jerome, *In Zachariam* 2.8.18/19 (CCSL 76, 820): "In quinto mense, qui apud Latinos appellatur augustus, cum propter exploratores terrae sanctae seditio orta esset in populo, iussi sunt montem non ascendere, sed per quadraginta annos longis ad terram sanctam circuire dispendiis, ut exceptis duobus, Caleb et Iosue, omnes in solitudine caderent. In hoc mense, et a Nabuchodonosor, et multa post saecula a Tito et Vespasiano, templum Ierosolymis incensum est atque destructum."

[53] *Decretum magistri Gratiani* (pars I, dist. 76, c. 7), ed. Emil Friedberg (Leipzig: Tauchnitz, 1879), col. 269: "In hoc mense et a Nabuchodonosor, et multa post secula a Tito et Vespasiano templum Ierosolimis incensum est atque destructum."

'order of the world', whereas ours suppose that the Temple endured about 20 years longer. But I believe that this number must be less, for Jerome, at the beginning of his commentary on Hosea, says that the kingdom of Israel lasted for 250 years; if to these are added the 37 preceding years of Solomon and the 131 following years of the kingdom of Juda until the destruction of the Temple, the result will only be greater by 8 years. Accepting therefore the shorter interval, the Temple's destruction was in the 3338th year of the world, as the Jews say, while Scripture states in Jeremiah 52[:12–13] that Nabuzardan came "to Jerusalem in the fifth month, on the tenth day of the month and burnt the house of the Lord."

Now, if we subtract the surplus of 172 cycles (which are contained in the mentioned sum of years) from the conjunction of Nisan in the 70th year since Creation (from which the year of the burning of the Temple is removed by that number of cycles), we find the conjunction of Nisan in the year of the destruction to have been in the seventh year of the solar cycle on the 10th of March, the first day of the week, at 14 hours and 731 parts. And since this year was the 13th year of the 7th cycle in the table of cycles [Tab. 4], the first day of Nisan also fell on the first day of the week. Counting forward 118 days for 4 months, it will be thus found that the fifth month, i.e. Av, began on the 6th of July, which is the octave of the Apostles Peter and Paul. Solomon's Temple was hence burnt down on the 15th of July, the second day of the week, this being the day of Saints Quiricus and Julietta.

Yet it should be known that the Jews fast, lament and walk barefooted on the 9th day of the aforementioned fifth month of Av, which I believe they do because of the burning of the Second Temple by Titus, which happened on this date. For according to Jerome's commentary on Zechariah—and also according to distinction 76 in the first part of the decrees [of Gratian, which starts with] 'Ieiunium'—both burnings were in the same month.

Capitulum quintum: De anno incarnationis et die conceptionis beati Iohannis Baptiste

Inter ecclesiasticos computatores varia est et diversa de incarnationis Christi anno et tempore opinio. Nam annum incarnationis secundum Dionisium precesserunt anni a creatione secundum computationem sepe tactam Iudeorum 3760. Secundum Bedam vero, qui Dionisio 8, et Garlandum, qui Dionisio 7 superaddunt, precesserunt 3768 vel 3767. Eusebius vero de Dionisio diminuit 4 annos, Marianus vero 22, qui et opinionem suam sic sanctorum auctoribus, ewangelica doctrina et ecclesie consuetudine munit, ut omnes secus sentientes hereticos esse vel scismaticos videri velint. Precesserunt ergo anni a creatione annum incarnationis secundum Marianum 3738, secundum Eusebius vero 3756. At cum destructio secundi templi circiter 76 anno incarnationis facta est a Tito Vaspasiani filio, illa vero destructio facta est anno creationis secundum Iudeos 3828, subtractis 76 precedent annum incarnationis secundum opinionem Iudeorum circiter anni 3752.

Erat ergo annus incarnationis secundum Marianum 3739, 15 autem cicli 197 et, per consequens, secundi cicli 15 in tabula. Secundum Hebreum videbitur 3753 decimus vero cicli 198 et, per consequens, tertii cicli in tabula. Secundum Eusebium erat 14 eiusdem cicli, secundum Dionisium 18, secundum Bedam quidem septimus quarti cicli in tabula, secundum Gerlandum sextus. Age ergo per artem superiorem, deme residua 196 ciclorum de coniunctione mensis Tisseri 15 anni creationis et similiter 29, 33, 37 et 44 et 45 et invenietur coniunctio eiusdem mensis in anno incarnationis secundum cuiusvis istorum opinionem.

Mensis autem illius dies decima erat ut semper dies propitiationis. Si ergo Zacharias eo die ministrans in templo accepit revelationem de nascituro filio sibi Iohanne precursore Christi, nec licebat sibi nisi peracto officio redire in domum suam, ut volunt sancti, patet precursoris conceptionem

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1 die] *om. E* **2** beati … Baptiste] J.B. *D* **4** opinio] oppinio *D* **4–5** Dionisium] Dyonisium *E* **6** Dionisio] *om. E* ‖ 8] octo *D* **7** Dionisio 7] 7 Dyonisio *E* **8** opinionem] oppinione *D* **9** ecclesie] *om. E* **10** secus] contrarium *E* ‖ velint] velit *D* **13** anno] annos *E* ‖ Tito] Tyto *E* **15** opinionem] oppinionem *D* **16** autem] ergo *E* **17** 197] 196 *E* ‖ secundi cicli 15] 15 secundi cycli *E* **18** 198] 3978 *E* **19** Dionisium] Dyonisium *E* **22** et 44] 41 *E* **23** et] *om. D* **26–27** revelationem … sibi] recepit revelationem de sibi nascituro filio *E* **26** nascituro] nasscituro *D* **28** in] *om. E*

The Fifth Chapter: On the Year of the Incarnation and the Day of the Conception of St. John the Baptist

Among the ecclesiastical calculators there is a varied and diverse opinion with regard to the year and time of Christ's incarnation. For the year of the incarnation according to Dionysius was preceded by 3760 years in the often-mentioned reckoning of the Jews. According to Bede, however, who adds 8 years to Dionysius, and to Gerland, who adds 7, there were 3768 or 3767 years that preceded. Eusebius, by contrast, takes away 4 years from Dionysius, whereas Marianus takes away 22 years, which opinion he defends based on the saintly authors, the teaching of the Gospels, and the custom of the Church such that all those who think otherwise wish to appear like heretics or schismatics. As a result, there were 3738 years from Creation to the incarnation according to Marianus, but 3756 according to Eusebius. Yet since the destruction of the Second Temple by Titus, the son of Vespasian, took place around the 76th year since incarnation, whereas this destruction happened in the year 3828 since Creation according to the Jews, [it follows that] according to the opinion of the Jews 3752 years precede the year of the incarnation, if 76 years are subtracted.

According to Marianus, the year of the incarnation was thus 3739, which was the 15th year of the 197th cycle, and hence the 15th of the second cycle in the table [Tab. 4]. According to the Hebrews it appears to have been 3753, which is the tenth of the 19th cycle and hence of the third cycle in the table. According to Eusebius, it was the 14th of the same cycle, according to Dionysius the 18th, while according to Bede it was the seventh of the fourth cycle in the table; according to Gerland it was the sixth. Proceed, therefore, according to the aforementioned method [and] subtract the surplus of 196 cycles from the conjunction of the month of Tishri in the 15th year since Creation, and the same must be done for the 29th, 33rd, 37th, 44th and 45th year: and the result will be the conjunction of this same month in the year of the incarnation according to each of these opinions.

The 10th of this month, however, was the Day of Atonement, as it always is. It follows that, if Zechariah received the revelation about the birth of his son John (the precursor of Christ) while serving in the temple on this day, and if he could only have returned to his home after having finished his service (as the saints would like to have it), the conception of the precursor

non fuisse ante 11 die eiusdem mensis.[54] Ponam ergo per ordinem coniunctionem mensis Tisseri in anno incarnationis secundum cuiuslibet opinionem et feriam per quam mensis incepit diem quoque in kalendario, quo fuerit diem etiam 11 mensis et qua feria evenit qua dies conceptionis Baptiste supponitur, et feriam etiam qua fuerit secundum hoc Annunciatio Salvatoris. Annum autem secundum Marianum ponam primum incarnationis, reliquorum autem secundum respectum ad illum numerus nominabo, modo
6v inferius annotato in tabula sequenti [Tab. 9]. |

Sed quid est ergo quod testante Beda super Lucam dicit Crisostomus *gesta* esse *hec mense Septembri 8 kalendis Octobris luna 11, quando oportebat Iudeos ieiunium Scenofegie celebrare. Et inventum est ipsa die octava*rum *kalendarum Octobrium esse equinoctium*?[55] Sicut enim patet Levit. 16,[56] decima die mensis septimi debuit esse afflictio expiationis festum autem Scenofegie non 11 luna debuit esse, i.e. Tabernaculorum, sed die mensis 15, sicut patet Levit. 23.[57] Item si 8 kl. Octobris fuit luna 11, ergo luna prima fuit 14 die Septembris, quod nullius opinioni congruit de predictis, nec etiam signationi primarum in kalendario. Item equinoctii terminus esse non potuit, immo die 18 mensis Septembris, ut patet per 6 capitulum prime partis.

Forte de luna 11 dici potest quod luna 11 fuit naturalis dies expiationis, decima tamen usualis et legalis, vel potius 11 luna fuit quando revelatio mandabatur officium per conceptionem Iohannis et de hoc loquitur Crisostomus, unde addit de equinoctio: *in quo est inchoatio noctis maior quam lucis*,

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7 autem] *om. E* ‖ illum] ipsum *E* ‖ nominabo] numerabo *E* **8** in … sequenti] *om. E* **10** Octobris] a Octobris *D* **11** Scenofegie] Scenofagie *E* **17** equinoctii] equinoctium *D* circa equinoctium *E* ‖ terminus] *om. E* **21** usualiter et legalis] legalis et usualiter *E* **21–22** mandabatur] mandebatur *D*

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[54] Lc 1:5–25.

[55] Bede, *In Lucae Evangelium expositio* 1.1.24 (CCSL 120, 28): "Huius sacratissimae conceptionis Iohannes Constantinopolitanae urbis antistes mentionem faciens, Gesta sunt haec, inquit, mense Septembri octavo Kalendas Octobris incipiente luna undecima quando oportebat Iudaeos ieiunium scenopegiae celebrare. Et inventum est ipsa die octava Kalendarum Octobrium esse aequinoctium."

[56] Lv 16:29–30 (ed. Weber, 158): "Eritque hoc vobis legitimum sempiternum mense septimo decima die mensis adfligetis animas vestras nullumque facietis opus sive indigena sive advena qui peregrinatur inter vos. In hac die expiatio erit vestri atque mundatio ab omnibus peccatis vestris coram Domino mundabimini."

[57] Lv 23:34 (ed. Weber, 168): "Loquere filiis Israhel a quintodecimo die mensis huius septimi erunt feriae tabernaculorum septem diebus Domino."

cannot have been before the 11th day of this same month. I shall therefore list in consecutive order the conjunction of the month of Tishri in the year of incarnation according to any of these opinions, together with the weekday on which this month began as well as the day in the calendar and the weekday that would have been the 11th of this month, on which the conception of the Baptist is supposed to have taken place, and also the respective weekday on which the Annunciation of the Saviour would have taken place. The year of the incarnation according to Marianus, however, I shall put down as the first and list the others according to their distance from it, as is noted below in the following table [Tab. 9].

But what is it that Chrysostom, according to Bede's testimony, says about Luke, [when he claims that] this happened in the month of September, on the 8th before the kalends of October [24 September], on the 11th of the moon, when the Jews were due to celebrate the feast of Tabernacles and that this same 8th day before the kalends of October was found to be the equinox? For, as is plain from Leviticus 16[:29–30], the 10th day of the seventh month must be dedicated to the affliction of atonement, whereas the feast of Tabernacles cannot have been on the 11th of the moon, but instead took place on the 15th of the month, as is plain from Leviticus 23[:34]. Moreover, if the 8th before the kalends of October was the 11th of the moon, then the first of the moon was the 14th of September, which neither matches any of the aforementioned opinions, nor the way the new moons are placed in the calendar. Likewise, it cannot have been the date of the equinox, which much rather fell on the 18th of the month of September, as becomes clear from the 6th chapter of the first part.

Perhaps it can be said about the 11th of the moon that the 11th of the moon was [here] the Day of Atonement according to nature, but the 10th according to use and law, or, rather, that the 11th of the moon was the day when the revelation was dutifully carried out through John's conception, and that this is what Chrysostom speaks about, which is why he adds regarding the equinox: "on this day the nights begin to be longer than the light, because [on

quia ille concipitur qui dixit "*illum oportet crescere me autem minui*."[58] Et diem forte expiationis vocavit Scenofegie propter propinquitatem, quia die 15 debebat incipere Scenofegie vel mensem denominavit a Scenofegia propter solempnitatem, quia durabat per 8 dies in eodem mense, paucis interpositis. De lune coniunctione et equinoctio forte loquebatur secundum opinionem vulgarem hominum vel de coniunctione intellexit fuisse 4 annum cicli decemnovenalis, in anno scilicet 7 incarnationis secundum Marianum, in quo veraciter fuit coniunctio 14 die Septembris 4 feria hora 11. Marianus autem dicit 8 kl. Octobris fuisse conceptionis Iohannis naturalem, ita scilicet quod ab eo die usque ad nativitatem fuerunt integre 9 menses quibus naturaliter gestatur infans in utero matris, sed conceptionem eius realem dicit fuisse certi ministerii gratia 2 kl. Octobris, feria 5.[59] Istud licet fuisset verum secundum rationem primationum in kalendario, secundum tamen veritatem esse non potuit, ut visum est, sed magis in crastino.

Capitulum sextum: De die passionis Christi et quoto anno incarnationis fuerit

Demum de anno dominice Passionis et die in kalendario nostro dicturi oportet attendere quod, preter hoc quod aliqui ponunt plures annos fluxisse a principio mundi secundum Hebreos usque ad incarnationem, ut supra habitum est, et, per consequens, usque ad passionem, ponunt etiam quidam annum passionis fuisse annum ab incarnatione 33, quidam 34, quidam 35. Amplius quidam ponunt Christum passum 10 kl. Aprilis et resurrexisse 8,

2 vocavit] nominavit *E* ‖ Scenofegie] Scenophegie *E* **3** Scenofegie] Scenofagia *D* Scenophegia *E* ‖ Scenofegia] Scenofagia *D* Scenophegia *E* **9** autem] ergo *E* **10** die] *om. E* **11** eius] *om. E* **18** oportet attendere] Attendere oportet *E* ‖ annos] *om. E* **19** Hebreos] Hebreum *E* **20** etiam] *om. E*

[58] Bede, *In Lucae Evangelium expositio* 1.1.24 (CCSL 120, 28): "Et inventum est ipsa die octava Kalendarum Octobrium esse aequinoctium in qua est inchoatio noctis maior quam lucis. *Illum* enim *oportet crescere*, inquit, *me autem minui*." Io 3:30 (ed. Weber II 1662): "Illum oportet crescere me autem minui."

[59] Marianus, *Chronicon* (II.2), MS Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 830, fol. 72r: "Sciendum est ergo duobus modis Iohannis conceptionem esse: primo 8 kl. Oct. usualiter, ut ecclesia celebrat, hoc est ratione naturalis temporis novem mensium, qua infans in ventro matris suae debet portari, numerando versus supra a nativitate eius ad 8 kl. Oct. Secundo vero re iuxta Lucam certi ministerii gratia die XI mensis septimi, id est pridie kl. Oct. ut videtur luna XI, feria quinta convenienter conceptus est."

it] he was conceived who says 'he must increase, but I must decrease'" [John 3:30]. And perhaps he referred to the Day of Atonement as 'Tabernacles' because of their proximity, since the Tabernacles were due to begin on the 15th or the month, or he used the name 'Tabernacles' to designate the whole month, because this feast lasted for 8 days of this month, after only a short interval [from the Day of Atonement]. When he mentioned the lunar conjunction and the equinox, he perhaps followed the common opinion of men, or, when it comes the conjunction, he interpreted it as the 4th year of the 19-year cycle, which was the 7th year of the incarnation according to Marianus, in which the conjunction indeed fell on the 14th day of September, on the fourth day of the week, at the 11th hour. Marianus, however, says that the 8th before the kalends of October would have been the date of John's conception 'according to nature', meaning that there were 9 complete month from this day to his birth, which is the natural time for the child to be carried in the mother's uterus; but his real conception, he says, took place on the 2nd before the kalends of October [30 September], on the fifth day of the week, by virtue of the certain [time] of [his father's] ministry. Now granted, while this would have been true according to the arrangement of the new moons in [our] calendar, it cannot, as has been seen, be the real date, which instead was the next day [1 October].

The Sixth Chapter: On the Day of the Passion of Christ and in Which Year of the Incarnation It Took Place

Finally, as we are about to speak about the year of the Lord's Passion and its day in our calendar, one must pay attention that—apart from the fact that (as stated above) some hold that more years have flown by from the beginning of the world according to the Hebrews until the incarnation, and hence until the Passion—some also hold that the year of the Passion was the 33rd year since the incarnation, some [say it was] the 34th, others [say it was] the 35th. Moreover, some assume that Christ suffered on the 10th before the kalends of April [23 March] and resurrected on the 8th [25 March], while

quidam vero dicunt eum passum fuisse in 8 et resurrexisse in 6 kl. Et hunc modum communiter fere omnes tenent, unde 6 kl. Aprilis inscribitur Resurrectio Domini.

De hiis varietatibus dicit Beda Venerabilis capitulo 61 de temporibus: "*Si 8 kl. Aprilis ut* antiquiores *scripsere, resurrectio Domini facta est, quintus profecto circuli 19lis tunc agebatur annus, habens concurrentes 7 et lunam 14, sicut semper 11 kl. Aprilis. Si autem 6 kl. Aprilis Dominus resurrexit 13 cicli annus, 5 habens concurrentes et lunam 14, ut semper 9 kl. Aprilis. Porro si 5 kl. resurrectio facta est, secundus circuli decemnovenalis existens annus concurrentes habebat 4 et luna erat 14, ut semper 8 kl. Aprilis*." Hec Beda.[60]

Quid in tanta diversitate dicendum est utique quod Christus sexta feria passus fuerit et die Dominica resurrexit nemo qui ewangeliis credit dubitare poterit. Sed utrum hec eadem feria 6 dominice Passionis fuerit luna 15 vel 14, hoc est utrum die pasche Iudeorum vel precedente, non videtur omnino certum. Quod enim passus fuerit luna 15 et cenavit luna 14 manifeste supponit Beda in premissa auctoritate. Et hoc communiter fere tenent omnes Latini. Et videtur hoc ex dictis trium ewangelistarum. Dicitur enim Math. 26: "*Primo die azimorum accesserunt ad* Ihesum *discipuli dicentes 'ubi vis paremus tibi comedere pascha?'*"[61] Et Marc. 14: "*Primo die azimorum quando pascha immolabant* etc."[62] Item Luc. 22: "*Venit dies azimorum in qua necesse erat occidi pascha*."[63]

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1 dicunt] ponunt *E* ‖ in] *om. E* **2** communiter fere] fere communiter *E* ‖ inscribitur] *add.* quod *D* **4** 61] 61 aliter 63 *D* **5** antiquiores] superiores *E* **6** circuli] cycli *E* **12** fuerit] est *E* **15** cenavit] passus fuerit *E* **16** premissa auctoritate] auctoritate precedente *E* **18** Ihesum] eum *E*

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[60] Bede, *De temporum ratione* 61 (CCSL 123B, 452): "Et quidem, ut supra memoravimus, quidam viii kalendarum Aprilium, sed alii vi, nonnulli v, kalendarum earundem die fuisse asseverant. Ubi notandum quia si viii kalendarum memoratarum, ut antiquiores scripsere, resurrectio domini facta est, quintus profecto circuli decemnovenalis tunc agebatur annus, habens concurrentes vii et lunam quartam decimam, sicut semper xi kalendarum Aprilium. Si autem vi kalendarum Aprilium dominus resurrexit, tertius decimus circuli praefati annus extitit, v habens concurrentes et lunam quartam decimam, ut semper xi kalendarum Aprilium. Porro si quinto kalendarum suprascriptarum resurrectio celebrata est Christi, secundus circuli decemnovenalis existens annus concurrentes habebat quattuor et lunam quartam decimam, sicut semper octavo kalendarum Aprilium."

[61] Mt 26:17 (ed. Weber, 1568): "Prima autem azymorum accesserunt discipuli ad Iesum dicentes ubi vis paremus tibi comedere pascha."

[62] Mc 14:12 (ed. Weber, 1599): "Et primo die azymorum quando pascha immolabant dicunt ei discipuli quo vis eamus et paremus tibi ut manduces pascha."

[63] Lc 22:7 (ed. Weber, 1650): "Venit autem dies azymorum in qua necesse erat occidi pascha."

other say that he suffered on the 8th [25 March] and resurrected on the 6th [27 March]. And this view is almost universally accepted, which is why the Lord's Resurrection is entered [in calendars] at the 6th before the kalends of April [27 March].

Regarding these differences, the Venerable Bede says in the 61st chapter of 'On [the reckoning of] time' that "if the Lord's Resurrection took place on the 8th before kalends of April, as the older authorities write, it would then assuredly have been the fifth year of the 19-year cycle, having 7 as its concurrent and the 14th of the moon, as usual, on the 11th before the kalends of April [22 March]. But if the Lord rose on the 6th before the kalends of April [27 March], it would have been the 13th year of the aforementioned cycle, having 5 as its concurrent and the 14th of the moon, as usual, on the 9th before the kalends of April [24 March]. On the other hand, if the Resurrection happened on the 5th before the kalends of the month [28 March], it being the second year of the 19-year cycle, then the year had four concurrents and the 14th of the moon, as usual, was on the 8th before the kalends of April [25 March]." Thus Bede.

In the face of this diversity, it certainly needs to be said that no one who believes the Gospels could doubt that Christ suffered on the sixth day of the week. Yet whether this sixth day of the week of the Lord's Passion took place on the 14th or 15th of the moon, i.e. whether it fell on the Passover of the Jews or preceded it, does not seem to be completely certain. Bede clearly supposes that he suffered on the 15th of the moon and ate dinner on the 14th, as can be seen from the previously cited source. And this is universally believed among the Latins. And this seems to [emerge] from the statements of three of the evangelists, for Matthew 26[:17] says: "Now on the first day of the unleavened bread the disciples came to Jesus, saying to Him, 'Where do You want us to prepare for You to eat the Passover?'" And Mark 14[:12] says: "Now on the first day of the unleavened bread, when they sacrificed the pasch etc." Likewise Luke 22[:7]: "And the day of the unleavened bread came, on which it was necessary that the pasch should be killed."

Ex hiis videtur quod ipso die cene in vespera pascha immolabant et necesse erat tunc immolari, sed pascha immolabatur secundum legem 14 die ad vesperam (Exod. 12),[64] ergo Chistus cenam fecit 14 luna et in crastino passus fuit, ergo luna 15. Contrarium tenent Greci omnes, qui dicunt Christum prevenisse tempus commedendi pascha et sic confecisse in fermentato, unde et ipsum in fermentato conficiunt. Item hoc tenent Iudei quibus numquam dies azimorum sive 15 luna mensis Nisan, sicut nec prima, occurrit feria 6, sicut patet ex eorum tabula de 13 ciclis et sequenti tabula mensium, si tamen tunc istis tabulis usi fuerint.

Item Augustinus de questionibus veteris et novi testamenti, questione 94, que incepit 'Tradito salvatore',[65] querit de Iuda quando retulit 30 argenteos, ostendens quod in mane parasceves non, quia intenti erant seniores et principes circa mortem Christi, nec in templo poterant inveniri, nec post horam nonam, occupati enim erant, sicut estimo dicit Augustinus, seniores et principes sacerdotum, vespere enim eadem diem pascha acturi erant. Et infra eodem libro, questione 106,[66] dicit 14 luna passus est.[67] Et Dionisius abbas in epistula ad Petronium dicit quod hoc convenerunt 8 kl. Aprilium, 6 feria, luna 14, et resurrectio luna 16.[68] Ad hoc arguitur, quia si figure debet veritas respondere, cum agnus, qui erat figura huius, immolaretur 14 luna, Christum etiam passus fuit 14 luna.[69]

Si autem dicatur ad hoc quod Christi passio statim post cenam inchoata est quia factus est in agonia et comprehensus fuerit et ita immolatio eius 14

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4 Contrarium … omnes] in contrarium dicunt omnes Greci *E* **5** in] de *E* **6** in] de *E* **10** Augustinus] alius *D* ‖ veteris et novi] novi et veteris *E* **13** circa mortem] *iter. E* **14** Augustinus] alius *D* **15** pascha] *om. E* **16** 106] *add.* que incipit 'In principio fecit Deus' *E* ‖ Dionisius] Dyonisius *E* **17** dicit] *om. E* **20** passus fuit] scitur passum fuisse *E* **21** inchoata] est inchoata *E*

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[64] Ex 12:16 (ed. Weber, 91): "Et servabitis eum usque ad quartamdecimam diem mensis huius immolabitque eum universa multitudo filiorum Israhel ad vesperam."

[65] pseudo-Augustine, *Quaestiones veteris et novi testamenti*, q. 94 (CSEL 50, 165–166).

[66] pseudo-Augustine, *Quaestiones veteris et novi testamenti*, q. 106.5 (CSEL 50, 238). Cf. Bacon, *Opus majus*, 1:208; Bacon, *Opus tertium*, 221.

[67] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.13), ed. Schabel, Pedersen, and Friedman, "Matthew," 845.

[68] Cf. pseudo-Dionysius Exiguus, *Argumenta de titulis pascalis Aegyptiorum* (15), ed. Bruno Krusch, *Studien zur christlich-mittelalterlichen Chronologie: Die Entstehung unserer heutigen Zeitrechnung* (Berlin: de Gruyter, 1938), 80: "Natum VIII Kl. Ian, passum VIII Kl. Aprl."

[69] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.14), ed. Schabel, Pedersen, and Friedman, "Matthew," 846. Cf. Thomas Aquinas, *Summa theologiae* (III.46.4.1; 46.10.2; 46.10.ad2; 47.4.2; 48.3.1), ed. Pietro Caramello (Turin: Marietti, 1948–1950), 286, 295, 300, 305.

From these [passages] it appears that on the day of the supper they sacrificed the Passover in the evening and that it was necessary to sacrifice at this time; yet according to the Law, as laid down in Exodus 12, the Passover is sacrificed on the 14th day in the evening, which means that Christ held supper on the 14th of the moon and suffered on the following day, i.e. on the 15th of the moon. The Greeks all hold a view to the contrary, saying that Christ anticipated the time for eating the Passover and hence ate it with fermented bread, which is why they themselves use fermented bread. The Jews hold the same view, in so far as they never celebrate the day of the unleavened bread or the 15th of the moon in the month of Nisan, nor the first day [of the month], on the sixth day of the week, as can be seen from their table of 13 cycles [Tab. 4] and from the following table of months [Tab. 5], provided that these tables were already in use at this time.

Likewise, Augustine, in question 94 of his *Questions on the Old and New Testament*, which begins with the words "The Saviour having been betrayed," poses the question when Judas returned the 30 silver pieces, showing that this was not on the morning of the day of preparation, because the elders and principals were attentive of the death of Christ and could not be found in the temple, nor [could they be found there] after the ninth hour, for, as I understand Augustine's words, the elders and chief priests were occupied, because they were to celebrate the Passover on the evening of the same day. And below, in question 106, he says that he that [Christ] suffered on the 14th of the moon. And the abbot Dionysius in his letter to Petronius said that this all happened on the 8th day before the kalends of April [25 March], on the sixth day of the week, the 14th of the moon, and that the Resurrection was on the 16th of the moon. To this the argument can be added that—if truth ought to correspond to its image—since the lamb, which was his image, was sacrificed on the 14th of the moon, Christ likewise suffered on the 14th of the moon.

Now, if someone replies to this that Christ's suffering began immediately after the supper, because he turned into agony and was captured, meaning that his immolation began on the 14th of the moon, although it did not come

luna fuit inchoata licet non consummata, hoc nichil est, nam apud Hebreos ex determinatione etiam legis Levitico 23,[70] dies incipit in vespera. Et hoc etiam docet Alfraganus[71] quod nox diem precedit apud illos qui menses et annos computant secundum lunam. Et cum ab initio seculi menses et annum secundum lunam fuerint computati, semper diem nox precessit. Nox etiam in Genesi diem precessit, sicut Ieronimus exponit super Ionam et illud dicit glosa super illud Math. 12,[72] "Sicut fuit Ionas etc."[73] Unde quod dicitur quod ordo rerum mutatus est in cena Domini et in resurrectione Christi[74] non habet ex scriptura solidum fundamentum. Ergo secundum hoc qua die fuit passio Christi completa fuisset etiam inchoata.

Item Luce 23:[75] "*Et revertentes* mulieres," scilicet in die crucifixionis, "*paraverunt aromata et sabbato quidem siluerunt secundum mandatum*." Si ergo in die crucifixionis paraverunt aromata non ergo fuit luna 15, sive prima dies azimorum, quia de die prima et ultima dicitur Exod. 12:[76] "*nichil operis*

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7 fuit] *om. E* 8 Christi] Domini *E* **10** etiam] *add.* passio *E*

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[70] Lv 23:32 (ed. Weber, 168): "Sabbatum requietionis est adfligetis animas vestras die nono mensis a vespero usque ad vesperum celebrabitis sabbata vestra."

[71] al-Farghānī, *Il Libro* (1), ed. Campani, 57.

[72] Jerome, *In Ionam* 2.1.1 (CCSL 76, 394); *Glossa ordinaria*, Evang. Matth. 12.40 (PL 114, 128).

[73] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.14), ed. Schabel, Pedersen, and Friedman, "Matthew," 846; Roger Bacon, *Opus majus*, 1:195: "Non solum vero de principio mundi et anni naturaliter accidit dubitatio apud theologos; sed de principio diei naturalis, an scilicet nox praecesserit diem artificialem vel e contrario. Et hoc est quintum hic inducendum circa substantiam temporis. Et multi dicunt diem praecessisse noctem, et exponunt scripturam ut possunt. Sed secundum Hieronymum super Ionam et super Matthaeum, nox praecessit diem. Nam, ut ait Alfraganus in astronomia sua, 'Omnes nationes, quae utuntur mensibus lunaribus, incipiunt diem ab occasu solis'. Sed Hebraei et scriptura utuntur mensibus lunaribus et annis, sicut potest probari modis multis. Ergo Hebraei et scriptura utuntur die naturali cuius nox praecedit diem. Et ideo tabulae Hebraeorum astronomicae, quibus Hebraei usi sunt in certificatione temporum, factae sunt ad occasum solis civitatis Ierusalem, sicut tabulae astronomorum Latinorum factae sunt ad meridiem civitatis Toleti vel alterius. Propter quod in lege determinatur, ut a vespera dies incipiat. Nam Levitici xxiii dicitur 'a vespere ad vesperum celebrabitis sabbata vestra'." Bacon, *Opus tertium*, 211–212.

[74] Cf. Alberic of Trois-Fontaines, "Chronica," ed. Scheffer-Boichorst, 679.

[75] Lc 23:56 (ed. Weber, 1655): "Et revertentes paraverunt aromata et unguenta et sabbato quidem siluerunt secundum mandatum."

[76] Ex 12:16 (ed. Weber, 92): "Dies prima erit sancta atque sollemnis et dies septima eadem festivitate venerabilis nihil operis facietis in eis exceptis his quae ad vescendum pertinent."

to an end [on that day]—this is [worth] nothing, for the Hebrews begin the day in the evening, following the injunction of the Law in Leviticus 23[:32]. And Alfraganus likewise teaches that the night precedes the day for those who calculate the months and years according to the moon. And since the months and the years have been calculated according to the moon since the beginnings of time, the night always precedes the day. The night also precedes the day in Genesis, as Jerome explains in his commentary on Jonah; and the same is stated in the gloss on Matthew 12[:40], [starting with the words] "For as Jonah etc." For this reason the claim that the order of things was reversed at the Lord's Supper and the Resurrection of Christ has no solid foundation from Scripture. According to this, therefore, the Passion of Christ both began and ended on the day on which it took place.

Likewise Luke 23[:56]: "And returning," i.e. on the day of the crucifixion, "the women prepared spices and ointments, and on the Sabbath day they rested, according to the commandment." Now, if they prepared ointments on the day of the crucifixion, this cannot have been the 15th of the moon, or the first day of the unleavened, because in Exodus 12[:16] it is said regarding the

facietis in eis exceptis hiis quae ad vescendum pertinent." Sed aromata preparata non pertinent ad vescendum ergo etc.[77]

Item Io. 18:[78] "*Ipsi non introierunt in pretorium ut non contaminarentur, sed manducarent pascha*." Ergo in vespera ventura post passionem commederunt pascha.

Si dicas quod ibi accipitur pascha pro cibo paschali, id est pro azimis, quibus 7 diebus utebantur, et ad edendum ea munditia requirebatur, contra Numerorum 9[79] inmundi perhibentur commedere pascha, sed non azima, si post commestionem pasche infra 7 dies contracta fuerit inmunditia. Immo si post commestionem pasche infra 7 dies commederent fermentum *perib*ant *de cetu Israel*.[80,81]

4 ventura] futura *E* **8** commedere] idem *D* **9** pasche] phase *E* ‖ 7 … fuerit] fuit contracta *E* ‖ Immo] ymmo *E* **10** pasche] phase *E*

[77] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.12), ed. Schabel, Pedersen, and Friedman, "Matthew," 845; Roger Bacon, *Opus majus*, 1:207–208: "Item Lucae xxiii, 'Et revertentes mulieres', scilicet in die crucifixionis, 'paraverunt aromata, et sabbato quidem siluerunt secundum mandatum'. Ergo illo die non fuit dies azymorum, sed xiv; non enim licuit eis parare aromata in die azymorum. Nam Exodi xii de prima et ultima die azymorum dicitur, 'Nihil operis facietis in eis exceptis his, quae ad vescendum pertinent'. Qua ratione enim siluissent die sabbato propter mandatum, eadem ratione siluissent in die Veneris, si fuisset dies azymorum. Nam praeceptum cadit super utrumque, licet sabbatum sit sanctius." Bacon, *Opus tertium*, 222.

[78] Io 18:28 (ed. Weber, 1691): "Adducunt ergo Iesum a Caiapha in praetorium erat autem mane et ipsi non introierunt in praetorium ut non contaminarentur sed manducarent pascha."

[79] Nm 9:6–13.

[80] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.7), ed. Schabel, Pedersen, and Friedman, "Matthew," 844; Roger Bacon, *Opus majus*, 1:207: "Item Ioannes xviii, 'Non introierunt in praetorium ut non contaminarentur, sed manducarent Pascha'. Ergo in vespera proximo ventura manducarunt Pascha; si igitur accipitur ibi Pascha pro agno paschali, in vespera illa incipiebat xv dies, et fuit luna xv, et tunc computabatur. Ergo ante illam vesperam fuit xiv luna. Cum autem dicitur, quod Pascha ibi non sumitur dicto modo, sed aliter, hoc non potest habere auctoritatem ex scriptura, et ideo eadem facilitate contemnitur secundum Hieronymum, qua probatur. Caeterum cum dicunt Pascha hic accipi pro azymis, hoc esse non potest. Nam immundi, licet prohibeantur edere Pascha, id est agnum paschalem, non tamen prohibebantur edere azyma, si post comestionem agni fierent immundi. Immo si aliquis fermentum comederet dicit lex, Exodi xii, quod periret de coetu Israel. Praeterea, nec inveniebatur fermentum in domibus eorum in illis diebus, quare tunc non comederent panem per vii dies, quod est omnino absurdum. Et ideo non habet haec responsio locum." Bacon, *Opus tertium*, 222.

[81] Ex 12:19 (ed. Weber, 92): "Septem diebus fermentum non invenietur in domibus vestris qui comederit fermentatum peribit anima eius de coetu Israhel tam de advenis quam de indigenis terrae."

first and last days of the unleavened: "you shall do no work in them, except those things that belong to eating." Yet the preparation of ointments does not "belong to eating" and therefore etc.

Likewise John 18:28: "They did not enter the praetorium lest they should be defiled; but that they might eat the Passover." This means they ate the Passover on the evening after the Passion.

Now if you say that 'Passover' must here be understood as meaning 'paschal food', i.e. as the unleavened bread that is used throughout the 7 days, and that purity was required for eating them: this is refuted by Numbers 9, which prohibits unclean persons from eating the Passover [lamb], but not the unleavened bread, provided that they became unclean during the 7 days after the eating of the Passover [lamb]. More correctly, it is [only] if they ate fermented bread during the 7 days after the eating of the Passover [lamb] that "they shall perish out of the assembly of Israel" [Exodus 12:19].

Salvo ergo cuilibet meliori iudicio videtur quod Christi prevenit cenam
7r facere, sicut expresse dicit | Remigius in Mattheum, capitulum 351, sicut recitat Zacharias.[82] Et quod 14 die passus sit, tamen in azimis confecit,[83] sicut inmundi qui facere non poterant phase mense primo omnem ritum phase servare deberent mense secundo, sicut dicitur Numeri 9.[84,85] Et quod 3 ewangeliste diem illum vocant diem azimorum, quia Christo et ipsius Apostolis erat dies azimorum, sed tamen dies crastinus erat communiter Iudeis dies azimorum, et illis necesse erat hoc die occidi pascha, non simpliciter.[86]

Rediens ad propositum notandum estimo quod secundum quod docet Rabanus super Numer. 9 in glosa pascha Hebreorum tribus semper observantionibus secundum legem Moysi debet observari. Prima est ut post equinoctium; secunda ut in primo mense; tertia ut in tertia ebdomeda in fine 14 lune, quod est initium 15 lune, celebretur in ipso die plenilunii et non

1 ergo] igitur *E* **4** facere … phase] phase facere non poterant *E* **10** estimo] existimo *D* **11** 9] Levitici 23 *D* **12** Moysi] Moisi *D*

[82] MS Graz, Universitätsbibliothek, 234, fol. 243vb: "Remigius in Matheum capitulum CCCLI: Si anni recte computentur ab inicio mundi usque ad passionem domini, invenimus quum ipso anno quo dominus passus est secundum annos lunares VIII idus Martii fuit neomenia, i.e. inicium nove lune et secundum Hebreos ipsius anni principium, duodecimo kalendas Aprilis in ipso vernali equinoctio feria VI fuit pascha Iudeorum, luna quartadecima et semis. … Sed forte queritur aliquis quare preoccupavit comedere agnum. Cui videndum est quia non fuit sub lege voluit comedere agnum, ut traderat corporis et sanguis sui mysteria discipulis. Videtur enim Iohannes opinioni consentiens esse cum dicit: 'Iudei autem non introierunt in pretorium ut non contaminarentur, sed manducarent pascha' [18:28]."

[83] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.32), ed. Schabel, Pedersen, and Friedman, "Matthew," 850: "Nos autem, sine praeiudicio melioris ententiae nihil in hac quaestione temere asserentes, dicimus cum Graecis quod Christus tempus Paschae praevenit. Dicimus tamen et asserimus cum Latinis Christum in azymis confecisse."

[84] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.34), ed. Schabel, Pedersen, and Friedman, "Matthew," 850–851.

[85] Nm 9:10–11.

[86] Matthew of Aquasparta, *In IV Sententiarum* (dist. 11, art. 4, q. 1.37), ed. Schabel, Pedersen, and Friedman, "Matthew," 851.

It would therefore seem (provided that no better judgement trumps ours) that Christ anticipated the supper, as is expressly held by Remigius, in the 351th chapter [of his commentary] on Matthew, as cited by Zachary; and that he suffered on the 14th day, but nevertheless used unleavened bread, just as unclean persons who could not celebrate Passover in the first month are required to postpone the performance of the entire rite to the second month, as is stated in Numbers 9[:10–11]; and that the three evangelists call this day the day of the unleavened not in a simple sense, because it was in fact the day of the unleavened bread for Christ and the Apostles, whereas for the Jews in general the day of the unleavened bread was the following day, and they had to kill the Passover on this day.

Returning to the main question, I believe it should be noted that, according to what Rabanus teaches in the gloss on Numbers 9, the Passover of the Hebrews must always be observed based on three rules according to the Mosaic Law: the first is that it must be after the equinox; the second is that it must be in the first month; the third is that it must be celebrated in the third week at the end of the 14th of the moon, which is the beginning of the 15th of

ante.[87] Item cum medietas lunationis superius descripte sit 14 dies et 18 hore et plus si lunatio aliqua incipiat post 6 horas alicuius diei a principio eiusdem diei usque ad plenilunium erunt integri 15 dies et plus. Ergo cum sic evenit, de mense paschali oportebit vel pascha fieri ante plenilunium, contra Rabani et etiam aliorum determinationem, vel pascha celebrari 16 die mensis contra legis institutionem, vel ipsum diem coniunctionis ad 6 horas et ultra pro die illius mensis paschalis non computari.

Licet autem Hebrei non semper curent expectare diem plenilunii, communius tamen faciunt, sed tunc in casu posito ipsum diem coniunctionis non computant pro primo die mensis paschalis, sed pro ultimo et non numquam pro penultimo mensis precedentis sicut potest patere diligenter coniunctiones paschales cum exordiis mensium eis correspondentium in tabula consideranti. Ut ergo videri valeat quid ex cuiuslibet opinione quoad annum passionis consequatur signentur omnes coniunctiones paschales per ordinem annorum ab anno passionis secundum Marianum usque ad annum passionis secundum Bedam, hoc est per 31 annos. Et e directo cuiuslibet quota feria incepit mensis ille apud Hebreos secundum tabulam et, per consequens, quota feria paschalis solempnitas, id est 15 luna, evenerit et etiam quo die in kalendario fuerit.

Que vero opinionum sola veritatem habuerit diligentiori scrutino relinquatur. Et ecce tabula, in qua patet quod sola opinio Mariani salvat Passionem Domini 25 die Martii, id est 8 kl. Aprilis, feria 6, et resurrectionem 6 kl. Sed cum coniunctio paschalis fuit feria 6 ultra 20 horas et, per consequens, plenilunium 26 die Martii vel fuit Christus passus in vigilia pasche Iudeorum vel fuit pascha ante plenilunium celebratum [Tab. 10].

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3 eiusdem diei] illius *E* **8** curent] observent *E* **13** opinione] oppinione *D* **18** solempnitas] *om. E* **20** opinionum] oppinionum *D* ‖ veritatem habuerit] vera fuerit *E* **22–23** et … 6] *om. D*

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[87] Rabanus Maurus, *Enarrationes in librum Numerorum* 2.1, Cap. 9 (PL 108, 639–640): "Cum in Veteri Testamento tribus argumentorum indiciis paschale tempus sit observari praeceptum, videlicet ut post aequinoctium, ut mense primo aut tertia ejus septimana, id est, a vespera quartae decimae lunae, quod est initium quintae decimae usque in vesperam; id est, terminum vicesimae primae celebratur quarta in ejusdem observatione, regula est nobis a tempore Dominicae resurrectionis imposita, ut cum, aequinoctio transcenso, lunam primi mensis quartam decimam vespere ortum facere viderimus, non statim ad faciendum Pascha prosiliamus, sed Dominicum diem quo ipse Pascha, id est, transitum de morte ad vitam, de corruptione ad incorruptionem, de poena ad gloriam resurgendo facere dignatus est, facere exspectantes, in ipso tandem congrua Paschae solemnia celebremus." = Bede, *De temporum ratione* 61 (CCSL 123B, 450).

the moon, on the very day of the full moon and not before. Moreover, since one half of the lunation described above contains more than 14 days and 18 hours, if some lunation begins after 6 hours of any given day, there will be 15 entire days and more from the beginning of this day until the full moon. If this happens, it will therefore be true about the paschal month that Passover either happens before the full moon, contrary to the statement of Rabanus and others, or Passover is celebrated on the 16th day of the month, against the institution of the Law, or the day of the conjunction itself, if it falls at 6 hours or later, is not counted as a day of this paschal month.

Now granted, while the Hebrews do not always care to wait until the day of the full moon, they still do so as a general rule, but in this case they do not count the day of the conjunction as the first of the month, but as the final and sometimes as the penultimate day of the preceding month, as can be gleaned from a diligent consideration of the paschal conjunctions together with the corresponding beginnings of the month in the table [Tab. 10]. In order, therefore, to make visible the consequences that result from each of the opinions on the year of the Passion, we shall display all paschal conjunctions, counting them consecutively from the Passion year according to Marianus until the Passion year according to Bede, i.e. for 31 years. And in the lines next to each year we will show on what day of the week this month begins among the Hebrews according to the table [Tab. 4] and, as a result, on what day of the week and on what day in [our] calendar the Passover feast, i.e. the 15th of the moon, would have occurred.

Which of these opinions is the only one to accord with the truth shall [now] be subjected to diligent scrutiny. And behold the table, from which it is clear that only the opinion of Marianus keeps the Lord's Passion on the 25th day of March, i.e. the 8th before the kalends of April, the sixth day of the week, and the Resurrection on 6th before the kalends. Yet since the paschal conjunction fell on the sixth day of the week after 20 hours, and, by consequence, the full moon on the 26th day of March, Christ either suffered on the day before the Passover of the Jews or the Passover was celebrated before the full moon [Tab. 10].

Si igitur discurramus per singulorum opiniones, patet quod Marianus concordat cum ewangelio ponendo diem passionis anno 34 incarnacionis, 6 feria, 8 kl. Aprilis et die mensis 15, supponendo primam mensis fuisse diem coniunctionis. Alioquin, secundum tabulam Iudeorum et volendo servare pro paschate diem plenilunii, passus fuit Christus die nominato, scilicet die
7v 14 mensis, in vigilia pasche. Et secundum | hoc baptizatus fuit in exordio anni 31, feria prima, id est die Dominica, sicut etiam docet Marianus.[88] Secum etiam concordat Ieronimus martirologio[89] et Augustinus 4 de sancta trinitate[90] et Cassiodorus in cronica sua[91] singulis annis suos sub certis assignans imperatoribus consules usque ad suum consulatum et etiam ultra.

Patet etiam quod positio Eusebii quoad annum passionis 34 ab incarnatione, vero secundum Marianum 52, est impossibilis, quia dies pasche fuit eo anno feria 5 necessario. Sed in anno precedenti, scilicet 51, qui secundum eum fuit 33 incarnationis, fuit coniunctio feria 7, hora 20, unde supponendo diem coniunctionis fuisse primam mensis poni potest Christum fuisse passum feria 6, luna 14 tantum, die 15 Aprilis. Et secundum hoc baptizatus fuit anno suo 30, feria prima sive Dominica.

Positio Dionisii pro anno 34 incarnationis, qui fuit 46 secundum Marianum, impossibilis fuerit simpliciter, simliter in 30, 31, 32, 34 et 35, in quorum nullo feria 6 vel sabbato potuit accidere festum pasche, sed in 33 anno suo salvatur 6 feria, luna 15, quantum ad rationem plenilunii, sed luna 14 secundum exigentiam tabule, luna vero 16 diem coniunctionis in numero computando. Et secundum hoc fuisset Christus baptizatus feria 6 principio anni incarnationis 30 in Iordanis flumine, itemque anno 33, Aprilis die 3, in proprio sanguine.

In anno autem 64 secundum Marianum, quem ponit Beda 34, Gerlandus vero 35, et uterque annum passionis possibilis fuit, passio die 23 Martii, feria 6 secundum intentionem, sed tantum in luna 14 et secundum exigentiam coniunctionis et tabule, lunam vero 13 si velimus cum paschate plenilunium expectare. Et secundum hoc festum epiphanie quo baptizatus fuisse

1 singulorum] singulas *E* **3** mensis] *om. E* **4** volendo] volendo *D* **7** id] *om. E* **11–12** ab … vero] *om. E* **15–16** passum] *om. E* **18** Dionisii] Dyonisii *E* **19** in 30] et 30 et *E* ‖ et] *om. E* **20** festum pasche] pascha *E* **21** luna] *om. E* **21–22** secundum] quam ad *E* **23** fuisset] *om. E* ‖ principio] primum *D* ‖ anni] anno *DE* **24** anno] *om. E* **27** annum passionis] passionem *E*

[88] Marianus Scottus, "Chronicon," ed. Waitz, 501.

[89] *Martyrologium Hieronymianum* (AASS 63, 36; PL 30, 449).

[90] Augustine, *De Trinitate* 4.5 (CCSL 50, 172).

[91] Cassiodorus, "Chronica," in *Chronica minora*, ed. Mommsen, vol. 2, 137.

If we thus run through the opinions one by one, it becomes clear that Marianus agrees with the Gospel, putting the day of the Passion in the 34th year since the incarnation, on the sixth day of the week, the 8th day before the kalends of April and the 15th day of the month, if we assume that first day of the month was the day of conjunction. Otherwise, if we follow the table of the Jews and we want to insist on keeping Passover on the day of the full moon, it follows that Christ's suffering on the nominated day took place on the 14th day of the month, on the Passover vigil. And according to this, he was baptized at the beginning of the 31st year, on the first day of the week, i.e. the Lord's Day, as Marianus also teaches. Jerome, in his martyrology, and Augustine in the fourth chapter of *On the Trinity* also agree with him, as does Cassiodorus in his chronicle, assigning consulates to the individual years under certain emperors, up until his own consulate and even beyond.

It is also plain that Eusebius's position is impossible if the Passion [is assigned] to the 34th year since the incarnation, which, however, is the 52nd according to Marianus, because the Passover day in this year was bound to fall on the fifth day of the week. But in the preceding year, i.e. the 51st, which according to him was the 33rd from the incarnation, the conjunction fell on the seventh day of the week, at 20 hours, which is why the Passion of Christ can be dated to the sixth day of the week, on the 14th of the moon, the 15th of April, if it is assumed that the day of the conjunction was the first of the month. And according to this, he was baptized in the 30th year of his life, on the first day of the week or Lord's Day.

Dionysius's position in favour of the 34th year since the incarnation, which corresponds to the 46th according to Marianus, would have been wholly impossible and the same holds true for the 30th, 31st, 32nd, 34th and 35th year, in none of which Passover could fall on the sixth day of the week or on the Sabbath. But in the 33rd year of his life the sixth day of the week is kept on the 15th of the moon, as far as the method of [taking] the full moon goes, whereas it is the 14th of the moon according to the exigencies of the table, or, alternatively, the 16th of the moon if one counts from conjunction. And according to this, Christ was baptized on the sixth day of the week at the beginning of the 30th year from the incarnation in the river Jordan, as well as in his own blood on the 3rd of April in the 33rd year.

Yet in the 64th year according to Marianus, which Bede considers to be the 34th and Gerland to be the 35th (and in both the Passion was possible), the Passion fell on the 23rd of March, the sixth day of the week, as intended, but only on the 14th of the moon according to the exigencies of both the conjunction and the table, whereas it would have been on the 13th if we insisted on having Passover coincide with the full moon. And according to

Christus creditur feria tertia occurrebat. Alii autem in annorum ordine designantur possibiles, utpote quos sacra ewangelia inponendo diem passionis luna 14 vel 15 cum concursu sexte ferie non refellunt.

Conclusio opusculi finalis

Ecce, pater reverende, vestra sancta benedictione ac monitis animatus, Hebreorum compotum, quem prius ab alio translatum habui, sed tamen fere inutilem nostris sine augmento fore perspexi, per certas, ut puto, regulas kalendario Latinorum pro mee tenuitatis modulo coaptavi. In hoc me sperans interim aliquid habiturum solacium, si vestra examinatione libratum opusculum ac correctione prout expedire videbitur elimatum, studiosis ad Dei gloriam prodesse valeat, saltem pro diligentiori scrutinio veritatis.

Explicit opusculum de ratione temporum

8v

Commentariolus super Tabulas

Ad planiorem et pleniorem prescripti tractatus intelligentiam, prout Vestre Sanctitatis reverentia, pater insignissime, proinde curavit disponere, presenti commentariolo tabulas eius singulas per ordinem recenseo ostendens que sit cuiusque illarum specialis utilitas et quid ad propositum singule in eis linee operentur.

TABULA 1[a]

Excessus Iudeorum					Excessus Ecclesie		
Anni	**Dies**	**Hore**	**Partes**	**Momenta**	**Dies**	**Hore**	**Partes**
1	10	21	121	48	10	21	204
2	21	18	243	20	21	18	408
3	3	2	651	68	3	2	899

3 refellunt] revellunt. Deo gratias. Explicit tractatus Leycester. *E* **13** Commentariolus … Tabulas] *om. D* **17** singule] *iter. D* Tabula 1[a]] *om. D*

this, the feast of the Epiphany, on which Christ is believed to have been baptized, was on the third day of the week. Other possible dates, however, are indicated for this series of years, in so far as they are not contradicted by the Holy Gospels, which demand that the 14th or 15th of the moon coincided with the sixth day of the week on the day of the Passion.

Final Conclusion of the Short Work

Behold, o reverend father, here is the *computus* of the Hebrews, which I, animated by your holy blessing and commands, first translated from another; yet [when] I saw that it would be almost useless to our [people] without some augmentation, I adjusted it to the Latin calendar by the small measure that my feebleness allows, using rules that are, as I suppose, reliable. In the meantime, it is my hope that I will get some compensation out of this, if this little work—once it has been weighed by your examination and polished by your correction to as great a degree as will seem expedient—can serve those who study for God's glory, or at least lend itself to a more diligent investigation of the truth.

Here ends the little work on the reckoning of time

Little Commentary on the Tables

For a clearer and fuller understanding of the preceding treatise (in so far as the reverence of your Holiness, o most eminent father, has hereafter taken the trouble to dispose of it) I shall in the present little commentary review its individual tables in their order, pointing out what is each one's particular usefulness and what purpose is served by each of their individual lines.

TABLE 1

Excess of the Jews					Excess of the Church		
Years	Days	Hours	Parts	Moments	Days	Hours	Parts
1	10	21	121	48	10	21	204
2	21	18	243	20	21	18	408
3	3	2	651	68	3	2	899

TABULA 1[a] (*cont.*)

Excessus Iudeorum					Excessus Ecclesie		
Anni	**Dies**	**Hore**	**Partes**	**Momenta**	**Dies**	**Hore**	**Partes**
4	13	23	773	40	14	0	23
5	24	20	895	12	24	21	227
6	6	5	223	60	6	5	718
7	17	2	345	32	17	2	922
8	27	23	467	4	28	0	46
9	9	7	875	52	9	8	537
10	20	4	997	24	20	5	741
11	1	13	325	72	1	14	152
12	12	10	447	44	12	11	356
13	23	7	569	16	23	8	560
14	4	15	977	64	4	16	1051
15	15	13	19	36	15	14	175
16	26	10	141	8	26	11	379
17	7	18	549	56	7	19	870
18	18	15	671	28	18[a]	16	1074
19	0	0	0	0	0	1	485

Quia igitur in prima parte agitur de naturali compoto, qui minutias et, ut ita dicam, fragmenta temporum non omittit, ac in quarto eius capitulo quantitas anni solaris, sive secundum veritatem Hebraicam, sive secundum suppositionem ecclesiasticam, quantitas etiam anni lunaris expressa est, qui quidem annus lunaris precise continet menses sive lunationes 12 aut plerumque 13, ut quanto vicinius potest cum anno solari semper sumat exordium, videbatur ex insequenti dicendum quantum unus annus solaris unum annum lunarem excederet, et duos vel quot volueris solares totidem lunares usque 19, hoc est quantum in uno anno solari, per se sumpto vel pluribus quot volueris usque 19 simul acceptis, remaneret de tempore ultra integras lunationes sive menses lunares naturales, de quibus actum erat superius.

Et hoc intenditur in quinto capitulo cum suo tabula, ut ostendatur quod 19 annis solares secundum intentionem Iudaicam nichil de tempore ultra

18[a]] 17 *E*

TABLE 1 (*cont.*)

Excess of the Jews					Excess of the Church		
Years	Days	Hours	Parts	Moments	Days	Hours	Parts
4	13	23	773	40	14	0	23
5	24	20	895	12	24	21	227
6	6	5	223	60	6	5	718
7	17	2	345	32	17	2	922
8	27	23	467	4	28	0	46
9	9	7	875	52	9	8	537
10	20	4	997	24	20	5	741
11	1	13	325	72	1	14	152
12	12	10	447	44	12	11	356
13	23	7	569	16	23	8	560
14	4	15	977	64	4	16	1051
15	15	13	19	36	15	14	175
16	26	10	141	8	26	11	379
17	7	18	549	56	7	19	870
18	18	15	671	28	18	16	1074
19	0	0	0	0	0	1	485

Now since the first part deals with the natural *computus*, which does not omit time's smaller parts or, so to say, fragments, and its fourth chapter has expressed the length of the solar year (be it according to the Hebrew truth or according to the reckoning of the Church) and also the length the lunar year (which contains precisely 12 lunations, or frequently 13, in order to make sure that it always takes its beginning as close as possible with the solar year), it seemed appropriate to speak in what follows about the quantity by which one solar year exceeds one lunar year (and two or however many solar [years exceed] as many lunar years up to 19), that is, how much time would remain after a solar year (taken by itself or any given number of them up to 19) over and above a complete number of lunations or natural lunar months, which have been treated on above.

And this is the purpose of the fifth chapter with its table, namely to point out that 19 solar years contain no time beyond whole lunations according

integras lunationes contineant, sed secundum intentionem ecclesie per unam horam et 485 puncta semper excedant. Cum ergo de uno vel quot volueris annis solaribus scire placuerit quantum plus habeat de tempore, quam precise lunationes exigant, quere numerum illorum annorum in prima linea a sinistris cui suprascribitur 'anni cicli' et e directo illius numeri annorum equaliter procedendo ad dexteram invenietur in 4 lineis proximis excessus secundum quantitatem Iudeorum et in tribus sequentibus secundum quantitatem ecclesie, sicut etiam ostendit suprascriptorum diversitas.

Et in prima linea propria utrobique ostenditur quot diebus integris excedat quantitas annorum solarium, unde suprascribitur utrobique 'dies'. In secunda vero linea utrobique descendente ostenditur excessus quoad horas ultra dies, ut ostendit suprascriptio; in tertia excessus in partibus hore imperfecte; in quarta excessus in minutis partium, prout eius docet inscriptio.

TABULA 2[a]

Anni cicli	Tabula Thequfoth Tisseri, videlicet equinoctii autumpnalis					Equinoctium vernale ad mensem paschalem, scilicet Nisan				
	Pars sive respectus	Dies	Hore	Partes hore	Minuta	Pars sive respectus	Dies	Hore	Partes hore	Minuta
1	Deme	5	20	162	62	Deme	0	9	642	0
2	Adde	5	0	1038	62	Adde	10	11	559	48
3	Adde	15	22[b]	80	34	Deme	8	4	111	56
4	Deme	2	17	590	70	Adde	2	17	9	68
5	Adde	8	3	610	54	Adde	13	14	131	40
6	Adde	19	0	732	26	Deme	5	1	539	64
7	Adde	0	9	60	74	Adde	5	19	661	60
8	Adde	11	6	182	46	Deme	12	20	9	44
9	Deme	7	9	488	58	Deme	1	22	967	72
10	Adde	3	11	712	66	Adde	8	22	233	52
11	Adde	14	8	834	38	Deme	9	17	437	52
12	Deme	4	6	916	66	Adde	1	3	763	72
13	Adde	6	14	284	58	Adde	12	0	885	44
14	Adde	17	11	406	30	Deme	6	14	865	60

Tabula 2[a]] *om. D* ‖ 22[b]] 20 *E*

to the Jewish doctrine, but that according to the doctrine of the Church they always exceed [them] by one hour and 485 points. If, therefore, you are interested in knowing about the excess in time of one solar year, or as many as you like, compared to the time made up by a precise number of lunations, then look for the respective number of years in the first line to the left, which is overwritten 'years of the cycle', and in the horizontal line corresponding to this number of years, one will find in the next four lines to the right the excess according to the year-length of the Jews, and in the three following lines [the excess] according to the year-length of the Church, as the various headings also indicate.

And in the first line on both sides it is shown by how many whole days the length of the solar years exceeds [that of the lunar years], which is why it is titled 'days' on both sides. In each second line descending on both sides, however, the excess with regard to the hours beyond whole days is displayed, as the heading points out. In the third: the excess of the parts of the incomplete hour. In the fourth: the excess of the minutes of the parts, just as its caption instructs.

TABLE 2

Years of the cycle	Table of Tekufot Tishri, i.e. the autumn equinox					Vernal equinox for the paschal month, i.e. Nisan				
	Relation	Days	Hours	Parts of the hours	Minutes	Relation	Days	Hours	Parts of the hours	Minutes
1	Take	5	20	162	62	Take	0	9	642	0
2	Add	5	0	1038	62	Add	10	11	559	48
3	Add	15	22	80	34	Take	8	4	111	56
4	Take	2	17	590	70	Add	2	17	9	68
5	Add	8	3	610	54	Add	13	14	131	40
6	Add	19	0	732	26	Take	5	1	539	64
7	Add	0	9	60	74	Add	5	19	661	60
8	Add	11	6	182	46	Take	12	20	9	44
9	Take	7	9	488	58	Take	1	22	967	72
10	Add	3	11	712	66	Add	8	22	233	52
11	Add	14	8	834	38	Take	9	17	437	52
12	Take	4	6	916	66	Add	1	3	763	72
13	Add	6	14	284	58	Add	12	0	885	44
14	Add	17	11	406	30	Take	6	14	865	60

TABULA 2 (*cont.*)

Anni cicli	Tabula Thequfoth Tisseri, videlicet equinoctii autumpnalis					Equinoctium vernale ad mensem paschalem, scilicet Nisan				
	Pars sive respectus	Dies	Hore	Partes hore	Minuta	Pars sive respectus	Dies	Hore	Partes hore	Minuta
15	Deme	1	4	264	74	Adde	4	6	335	64
16	Adde	9	16	936	50	Adde	15	3	457	36
17	Adde	20	13	1058	22	Deme	3	12	213	68
18	Adde	1	22	386	70	Adde	7	8	987	56
19	Adde	12	19	508	42	Deme	11	6	763	48

Secunda tabula est ordinata ad inventionem equinoctialium terminorum, ex quo enim, ut dictum est, 19 anni solares totidem lunaribus adequantur. Lunares tamen propter embolismos, quia scilicet quandoque sunt 12 precise lunationum et quandoque 13, aliquando citius incipiunt, aliquando tardius. Unde oportuit principium anni lunaris quandoque precedere terminum alicuius diei vel hore solaris, quandoque sequi, ut patet si ymaginentur annum solarem incipere a capite Aprilis et annum lunarem a die pasche, qui quandoque cadit in Martio et aliquando in Aprili.

Ordinatur ergo tabula illa ad sciendum per quemlibet annum cicli lunaris utrum principium lunaris anni, incoati a coniunctione mensis Thisseri, quem vocant 'Rosha sana', id est 'caput anni', precedat principium anni solaris, quod est autumpnale equinoctium, et quantum in diebus, horis, partibus et minutis. Et hoc fit per primam partem tabule. Per secundam autem partem idem scitur de equinoctio vernali et coniunctione mensis paschalis, scilicet Nisan. Videndum est ergo in primo quotus est annus cicli lunaris, de quo hec scire intendimus, et queratur per numerum ordinis sui in prima linea a sinistris descendentem, que utrique parti tabule deservit. Et per secundam lineam descendentem scietur utrum equinoctium autumpnale precedat coniunctionem mensis Thisseri vel sequatur; per tertiam vero, quartam, quintam et sextam quantum precedat vel sequatur quoad dies, horas, partes, et minuta partium, ut linearum suprascriptiones ostendunt.

21 linearum] linare *D*

TABLE 2 (*cont.*)

Years of the cycle	Table of Tekufot Tishri, i.e. the autumn equinox					Vernal equinox for the paschal month, i.e. Nisan				
	Relation	Days	Hours	Parts of the hours	Minutes	Relation	Days	Hours	Parts of the hours	Minutes
15	Take	1	4	264	74	Add	4	6	335	64
16	Add	9	16	936	50	Add	15	3	457	36
17	Add	20	13	1058	22	Take	3	12	213	68
18	Add	1	22	386	70	Add	7	8	987	56
19	Add	12	19	508	42	Take	11	6	763	48

The second table has been put together for finding the equinoctial dates, on the basis of which, as has been said, 19 solar years are equated to the same number of lunar years. Owing to the embolisms, the lunar years sometimes begin sooner and sometimes later, because they sometimes have exactly 12 lunations and sometimes 13. The beginning of the lunar year is therefore bound to sometimes precede and sometimes follow the time of some solar day or hour, as becomes clear if one pictures the solar year as starting from the beginning of April and the lunar year from the paschal day, which sometimes falls in March and sometimes in April.

This table is hence arranged for the purpose of knowing for any given year of the lunar cycle whether the start of the lunar year (beginning from the conjunction of the month of Tishri, which they call *Rosh Hashanah*, i.e. 'head of the year') precedes the beginning of the solar year, which is the autumnal equinox, and by how many days, hours, parts and minutes. And this is done with the first part of the table. But with the second part, the same is known about the vernal equinox and the conjunction of the paschal month, i.e. Nisan. It therefore first needs to be seen what is the current year of the lunar cycle, about which we intend to find this out, and this may be looked up by the ordinal number in the first descending line to the left, which serves both parts of the table. And from the second descending line it will be known whether the autumnal equinox precedes the conjunction of the month of Tishri or follows it; from the third, fourth, fifth, and sixth, however, by how much in days, hours, parts, and minutes of parts it precedes or follows, as is indicated by the line headings.

Si enim in eadem linea transversali in qua est numerus ostendens quotus est annus intentus in ciclo scribatur 'deme', precedet equinoctium coniunctionem dictam per tot dies, horas, partes, et minuta, quot ex aliis lineis descedentibus inveniuntur in eadem ordine transversali. Et ideo de tempore dicte coniunctionis demptis illis diebus horis partibus et minutis habebitur instans quesiti equinoctii. Si autem scribatur 'adde', addantur tempori dicti coniunctionis tot dies, hore, partes, et minuta, quot ex illis lineis inveniuntur in eodem ordine transversali, quia totum sequitur illud equinoctium dictam coniunctionem et habebitur propositum. Et eodem modo inquiritur in secunda parte tabule equinoctium vernale respectu coniunctionis mensis paschalis. Horum autem mensium inventio in kalendario erit manifestum consequentibus.

TABULA 3[a]

Numerus mensium	Note mensium			Anni cicli	Note annorum cicli			Numerus ciclorum	Note ciclorum simplicium			Numerus collectorum per centenos	Note ciclorum collectorum per 100		
	Ferie	Hore	Partes		Ferie	Hore	Partes		Ferie	Hore	Partes		Ferie	Hore	Partes
1	1	12	793	1	4	8	876	1	2	16	595	100	2	23	100
2	3	1	506	2	1	17[b]	672	2	5	9	110	200	5	22	200
3	4	14	219	3	7	15	181	3	1	1	705	300	1	21	300
4	6	2	1012	4	4	23	1057	4	3	18	220	400	4	20	400
5	0	15	725	5	2	8	853	5	6	10	815	500	7	19	500
6	2	4	438	6	1	6	362	6	2	3	330	600	3	18	600
7	3	17	151	7	5	15	158	7	4	19	925	700	6	17	700
8	5	5	944	8	4	12	747	8	7	12	440	800	2	16	800
9	6	18	657	9	1	21	543	9	3	4	1035	900	5	15	900
10	1	7	370	10	6	6	339	10	5	21	550	1000	1	14	1000

Tabula 3[a]] *om. D* ‖ 17[b]] 16 *DE*

For if the writing in the same horizontal line that signals what year in the cycle the intended year is says 'take' [*deme*], then the equinox precedes the conjunction in question by the same amount of days, hours, parts, and minutes that is found from the other descending lines in the same horizontal row. And thus, if these days, hours, parts, and minutes are taken from the time of the aforementioned conjunction, one arrives at the time of the equinox that one was looking for. If, however, the writing says 'add' [*adde*], then one should add as many days, hours, parts, and minutes to the time of the said conjunction as can be found in the lines of the same horizontal row, because then this equinox follows the aforementioned conjunction by this amount of time and the desired result is reached. And by the same token the vernal equinox is investigated from the second part of the table with respect to the conjunction of the paschal month. The method of finding these months in the calendar, however, will become manifest from what follows.

TABLE 3

Number of months	Values of months			Years of the cycle	Values of years in the cycle			Number of cycles	Values of single cycles			Number of 100s	Values of 100s of cycles		
	Weekdays	Hours	Parts		Weekdays	Hours	Parts		Weekdays	Hours	Parts		Weekdays	Hours	Parts
1	1	12	793	1	4	8	876	1	2	16	595	100	2	23	100
2	3	1	506	2	1	17	672	2	5	9	110	200	5	22	200
3	4	14	219	3	7	15	181	3	1	1	705	300	1	21	300
4	6	2	1012	4	4	23	1057	4	3	18	220	400	4	20	400
5	0	15	725	5	2	8	853	5	6	10	815	500	7	19	500
6	2	4	438	6	1	6	362	6	2	3	330	600	3	18	600
7	3	17	151	7	5	15	158	7	4	19	925	700	6	17	700
8	5	5	944	8	4	12	747	8	7	12	440	800	2	16	800
9	6	18	657	9	1	21	543	9	3	4	1035	900	5	15	900
10	1	7	370	10	6	6	339	10	5	21	550	1000	1	14	1000

TABULA 3 (*cont.*)

Numerum mensium	Note mensium			Note annorum cicli			
	Ferie	Hore	Partes	Anni cicli	Ferie	Hore	Partes
11	2	20	83	11	5	3	928
12	4	8	876	12	2	12	724
13	5	21	589	13	6	21	520
				14	5	19	29
				15	3	3	905
				16	7	12	701
				17	6	10	210
				18	3	19	6
				19	2	16	595

Numerus ciclorum	Collectorum per 10			Numerus ciclorum	Collectorum per 1000		
	Ferie	Hore	Partes		Ferie	Hore	Partes
10	5	21	550	1000	1	14	1000
20	4	19	20	2000	3	5	920
30	3	16	570	3000	4	20	840
40	2	14	40	4000	6	11	760
50	1	11	590	5000	1	2	680
60	7	9	60	6000	2	17	600
70	6	6	610	7000	4	8	520
80	5	4	80	8000	5	23	440
90	4	1	630	9000	7	14	360
100	2	23	100	10000	2	5	280

Tertia tabula, que est tabula notarum, habet 6 partes, ut dicitur in tractatu, quarum distinctio per earum suprascriptiones patet. Et potest per hanc tabulam veraciter haberi ex una coniunctione cognita notitia cuiuslibet alterius, ut sciatur quota feria ebdomade quota illius hora perfecta et quibus partibus hore imperfecte transactis, iuxta quod 3 cuiuslibet partis linee inscribuntur. Cognita enim prima coniunctione cuiuscumque anni possunt ex ea cognosci omnes coniunctiones eiusdem per primam eius partem, immo cognita quacumque congnosci possunt 13 proximos sive precedentes. Sed de prima cognita sic agendum est: scribatur coniunctio habita distincte quoad numerum feriam designandam et numerum horarum et numerum partium sic:

TABLE 3 (*cont.*)

Number of months	Values of months in the cycle			Years of the cycle	Values of years			Number of cycles	10s			Number of cycles	1000s		
	Weekdays	Hours	Parts		Weekdays	Hours	Parts		Weekdays	Hours	Parts		Weekdays	Hours	Parts
11	2	20	83	11	5	3	928								
12	4	8	876	12	2	12	724								
13	5	21	589	13	6	21	520								
				14	5	19	29								
				15	3	3	905								
				16	7	12	701	10	5	21	550	1000	1	14	1000
				17	6	10	210	20	4	19	20	2000	3	5	920
				18	3	19	6	30	3	16	570	3000	4	20	840
				19	2	16	595	40	2	14	40	4000	6	11	760
								50	1	11	590	5000	1	2	680
								60	7	9	60	6000	2	17	600
								70	6	6	610	7000	4	8	520
								80	5	4	80	8000	5	23	440
								90	4	1	630	9000	7	14	360
								100	2	23	100	10000	2	5	280

The third table, which is the table of values [*tabula notarum*], has six parts, as is said in the treatise, which can be distinguished on the basis of their headings. And with the help of this table one can get from one known conjunction to truthful knowledge of any given other one, such that it is known how many days of the week, how many completed hours and how many parts of the incomplete hours have gone by, according to what is written in the three lines belonging to each part. For if the first conjunction of any given year is known, its first part can be used to find from it all other conjunctions of this year—or, rather, if one is known, one can find all 13 that [immediately] follow or precede. But with regard to the first-known, one must proceed in the following way: the given conjunction must be written thus, according to the numbers designating the weekday, hours, and number of parts:

f. h. p.
3.10.256

Et in linea a sinistris, cui inscribitur 'numerus mensium', nota numerum ostendentem quota sit coniunctio sequens querenda. Ut pote si queratur coniunctio 7, esto que est principium 8 mensis, e directo illius numeri in tribus aliis lineis sumantur numeri inventi et locentur sub numeris note coniunctionis prehabite, quilibet sub suo simili, id est numerus in linea feriarum sub feria et numerus horarum sub horis et partium sub partibus sic:

f. h. p.
3.10.256
3.17.151

Quo facto aggregetur uniusquisque numerus suo simili incipiendo a partibus, ita quod si numerus aggregatus ad 1080 perveniat, vel ultra, per 1080 delictis de loco partium unitas addatur numero horarum et si quid residuum fuerit remaneat loco suo. Et similiter si hore 24 vel ultra provenerunt, pro 24 horis addatur unitas numero feriarum. Et si ultra 7 excrescat numerus feriarum, abiectis 7 teneatur residuum, ut totum dictum est in tractatu. Eodem autem modo pro inquisitione alicuius coniunctionis precedentis inveniatur nota eius et subtrahatur de nota coniunctionis agnite scilicet quilibet numerus de suo simili, ut docetur ibidem per eandem tabulam.

Habita coniunctione unius anni prima haberi potest prima coniunctio sequentis anni per additionem note 12 mensium, si erit annus communis, vel 13 si pregnatus. Et similiter prima coniunctio anni precedentis per earumdem notarum subtractionem. Habita vero prima coniunctio alicuius cicli haberi potest simili modo prima coniunctio cuiuslibet anni eiusdem cicli per secundum partem tabule cui inscribitur 'note annorum cicli'. Queratur enim

w. d. p.
3.10.256

And in the line to the left, which carries the heading 'number of months', you must take note of the number that designates the following conjunctions to be looked for. For example: if one looks for conjunction no. 7, which is the one for the beginning of the eighth month, one must take the numbers that are found next to this number in the three other lines and put them below the numbers of the value of the conjunction one had before, [putting] everything below its counterpart, i.e. the number in the line of the weekdays below the weekday, the number of hours below the hour and the parts below the parts, thus:

w. h p
3.10.256
3.17.151

Once this is done, each number must be added to its counterpart, starting with the parts, such that if the result reaches or exceeds 1080, one unit must be added to the number of hours, while 1080 are taken from the parts and whatever is left must remain in its place. And similarly, when 24 hours or more come together, one must add for 24 hours one unit to the number of days of the week. And if the number of days of the week exceeds 7, one must only keep the remainder after having cast off 7, as has all been said in the treatise. The investigation of any preceding conjunction must precede by the same principle, i.e. one must find its value and subtract it from the value of the known conjunction, each number from its counterpart, as is taught [in the treatise] using the same table.

Given the first conjunction of one year, one can arrive at the first conjunction of the following year by adding the value of 12 months, if the year will be common, or of 13, if it will be pregnant. And similarly, the first conjunction of any preceding year [can be arrived at] by subtraction of the same values. Given, however, the first conjunction of any cycle, one can afterwards arrive in a similar way at the first conjunction of any year of this cycle by using the second part of the table, which carries the heading 'values of the years in the cycle'. The number of years that precede the wanted conjunction

numerus annorum a linea a sinistris coniunctionem quesitam precedentium, ut si intendatur prima coniunctio, verbi gratia, decimi anni, videatur ubi in illa linea signatur numerus 9; et numeros e directo illius positos, quoad ferias, horas, et partes, iunge numeris note coniunctions habite, quemlibet suo simili modo supradicto, et proveniet propositum. Hic autem non dico
9r modum eundem |valere subtrahendo pro annis preteractis, propter diversitatem ordinis annorum cicli, quoad interpositionem embolismorum, procedendo et retrocedendo. Annus tamen quilibet potest cognosci ex quolibet sibi proximo cognito.

Per sequentes vero partes, habita cognitione prime coniunctionis unius cicli, haberi potest cognitio prime coniunctionis cuiuslibet. Queratur enim numerus ciclorum perfectorum in aliqua linearum quibus suprascribitur 'numerus ciclorum' et nota contra illum inventa addita coniunctione cognite ostendet propositum per supradictum modum. Quod si numerus illorum ciclorum in nulla linearum inveniatur, quia est compositus ex diversi generis numeris, queratur numerus millenariorum in sua parte, si occurrat, et centenariorum in sua, decadum in sua et simplicium in sua et note summatim simul colligantur cum nota coniunctionis agnite.

Verbi gratia: intendo ex prima coniunctione mundi, quam ponunt Hebrei fuisse feria 2, parte 204 sexte hore, scire primam coniunctionem cicli 267, scilicet nunc in Septembri Anno Domini Mo CCo nonagesimo quarto incoandi. Sumo notam inventam in penultima parte, que continet notas ciclorum collectorum per centenos, e directo numeri 200, et in parte precedente notam positam contra 60, et in parte illorum prima notam positam contra 6, et coniungo numeros notarum adinvicem modo supradicto, quemlibet suo simili, et resultabit nota 266 ciclorum, que coniuncta prime coniunctioni mundi ostendet primam coniunctionem 267 cicli fore feria 3 ad horas 15 et partes 794 hore 16me. Et econverso scitur illa per istam eandem notam de hac subtrahendo.

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20 204] 205 *D* **25** modo] mode *D*

can be found from the line to the left, such that if it is the first conjunction of, e.g., the 10th year, that is wanted, one must see where in this line the number 9 shows up; and one must add the numbers to the right of it (pertaining to days of the week, hours, and parts) to the numbers of the value of the given conjunction, always adding together counterparts according to the aforementioned method, and the desired result will ensue. Yet I do not claim here that the same method can be applied by way of subtraction to find past years, because the order of years in the cycle, as far as the insertion of embolisms is concerned, differs according to whether one counts forward or backward. Still, any given year can be ascertained from the knowledge of any one next to it.

The following parts, however, provide knowledge of the first year of any cycle once the first conjunction of one cycle is known. For in any of the lines that are titled 'number of cycles' one must look for the number of cycles that have gone by, and if the value that is written next to it is added to the known conjunction, one will find the desired result according to the abovementioned method. But if the number of these cycles is found in none of the lines, because it is a composite of various numbers, one should look for the thousands in their respective part, in case there are any, and for the hundreds in theirs, the tens in theirs, and the simple numbers in theirs, and their values should all be added together with the value of the known conjunction.

For example: I want to use the first conjunction of the world, which according to the Hebrews was on the second day of the week, at the 204th part of the sixth hour, to find the first conjunction of the 267th cycle, i.e. the one which is now about to begin in September of the year AD 1294. I take the value that is found in the penultimate part (which contains the values of the cycles grouped into hundreds) right next to the number 200, and in the preceding part the value posed next to 60, and from the first part the value next to 6, and I add the numbers of these values together, one after the other, following the method shown above, i.e. each to its counterpart, and the result will be the value of 266 cycles, which, if added to the first conjunction of the world, shows the first conjunction of the 267th cycle on the third day of the week, at 15 hours and 794 parts of the 16th hour. And, contrariwise, one can be known from the other by subtracting the same value from it.

TABULA 4[a]

Ciclus lunaris	Ciclus XIXlis	1181	1200	1219	1238	1257	1276	1295	1314	1333	1352	1371	1390	1409
		261	262	263	264	265	266	267	268	269	270	271	272	273
		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1	4	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P	7.S	3.P	7.D
2	5	7.D	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P	7.S	3.P
3	6	3.P	7.D	2.D	5.D	7.S	2.S	5.S	2.D	5.D	7.D	2.S	5.S	7.S
4	7	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S
5	8	7.S	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P
6	9	5.D	7.D	2.S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	3.P	5.S	2.D
7	10	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S
8	11	7.S	3.P	5.S	2.D	5.D	7.D	2.S	5.S	7.S	3.P	7.D	2.D	5.D
9	12	7.S	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S	3.P
10	13	5.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S
11	14	2.D	3.P	7.D	2.D	5.S	7.S	3.P	5.S	2.D	5.D	7.D	2.S	5.S
12	15	7.S	2.S	5.P	7.S	5.P	7.S	2.S	5.P	7.S	3.P	5.S	2.D	5.P
13	16	5.P	7.S	2.S	5.P	2.D	5.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D
14	17	2.D	5.D	7.D	2.S	5.S	2.D	3.P	7.D	2.S	5.S	7.S	3.P	5.S
15	18	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P
16	19	5.P	7.S	3.P	5.S	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.D	2.S
17	1	2.S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	2.S	5.S	2.D	3.P	7.D
18	2	2.D	5.P	7.D	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	2.S	5.P
19	3	5.S	2.D	3.P	7.D	2S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	2.S

Sequitur post hec tabula 13 ciclorum, habens in longitudine 19 lineas secundum numerum annorum unius cicli, in latitudine vero 13 iuxta numerum ciclorum. Et habet tres ordines in titulo: unum in capite, in quorum suppremo qui et primo signantur anni incarnationis secundum Dionisium, ita quod quilibet numerus in illo ordine positus ostendit de primo anni cicli sub se conscripti quotus fuerit de Annis Domini, supposito quod Annus Domini inciperet per 6 circiter menses antequam incipiat secundum veritatem. Quilibet numerus in secundo ordine titulorum contentus ostendit quotus fuerit

Tabula 4[a]] *om. D*

TABLE 4

Lunar cycle	19-year cycle	1181 261 1.	1200 262 2.	1219 263 3.	1238 264 4.	1257 265 5.	1276 266 6.	1295 267 7.	1314 268 8.	1333 269 9.	1352 270 10.	1371 271 11.	1390 272 12.	1409 273 13.
1	4	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P	7.S	3.P	7.D
2	5	7.D	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P	7.S	3.P
3	6	3.P	7.D	2.D	5.D	7.S	2.S	5.S	2.D	5.D	7.D	2.S	5.S	7.S
4	7	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S
5	8	7.S	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P
6	9	5.D	7.D	2.S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	3.P	5.S	2.D
7	10	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S
8	11	7.S	3.P	5.S	2.D	5.D	7.D	2.S	5.S	7.S	3.P	7.D	2.D	5.D
9	12	7.S	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S	3.P
10	13	5.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	7.S
11	14	2.D	3.P	7.D	2.D	5.S	7.S	3.P	5.S	2.D	5.D	7.D	2.S	5.S
12	15	7.S	2.S	5.P	7.S	5.P	7.S	2.S	5.P	7.S	3.P	5.S	2.D	5.P
13	16	5.P	7.S	2.S	5.P	2.D	5.P	7.D	2.S	5.P	7.S	3.P	5.S	2.D
14	17	2.D	5.D	7.D	2.S	5.S	2.D	3.P	7.D	2.S	5.S	7.S	3.P	5.S
15	18	7.S	3.P	5.S	2.D	5.P	7.S	2.S	5.P	2.D	5.P	7.S	2.S	5.P
16	19	5.P	7.S	3.P	5.S	2.S	5.P	7.S	2.S	5.P	2.D	5.P	7.D	2.S
17	1	2.S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	2.S	5.S	2.D	3.P	7.D
18	2	2.D	5.P	7.D	2.S	5.P	7.S	3.P	7.D	2.S	5.P	7.S	2.S	5.P
19	3	5.S	2.D	3.P	7.D	2S	5.S	7.S	3.P	7.D	2.D	5.D	7.S	2.S

The next table after this is the table of 13 cycles, which has 19 lines in longitude, corresponding to the number of years in one cycle, whereas in latitude it has 13 lines, according to the number of cycles. And it has three rows in the header: the first and foremost of these signals the years of the incarnation according to Dionysius, such that any given number in this row shows for the first year of each cycle that is written beneath it what Year of the Lord it is going to be, assuming that the year of the Lord would begin six months earlier than it actually does. Any given number contained in the second row of the header indicates for the cycles written below how many

totus ciclus subscriptus a principio mundi. In tertio vero ordine ostenditur de quolibet circulo quotus fuerit de numero illorum 13.

A latere vero sinistro sunt duo ordines numerorum: unus annorum cicli lunaris, quo utuntur Hebrei, alius annorum cicli 19lis, ut docent ordinum intitulationes. Et quilibet numerus utriusque ordinis docet de numero et littera e directo ipsius posito in linea cuiuscumque cicli ad quotum annum cicli lunaris sive 19lis debeant pertinere. Et subponitur quod ciclus 19lis mutetur a Septembri, ut prius.

Cum ergo voluerit quis scire de anno aliquo, qua feria incipiat et qualis annus fuerit apud Hebreos, scilicet utrum superfluus, perfectus aut diminutus, quotus etiam fuerit in ciclo lunari vel 19li, videat primo quotus fuerit de Annis Domini secundum veritatem: pro tempore ante finem Augusti ille querendus est in tabula, pro tempore vero post usque ad tempus Annunciationis, et secundum compotistas usque ad Ianuarium, addatur unitas et queratur sic: si inveniatur numerus ille alicubi in suppremo ordine capitali, noverit primum numerum cum adiuncta littera in eadem linea descendente de tabula scriptum illi anno deservire; si non, queratur numerus in capite proximo minor et ipso denominetur primus annus subscripti cicli. Descendat ergo continue numerando donec pervenerit ad finem Annorum Domini dictorum, et ubi Annus Domini qui querebatur inventus fuerit, numerus ibi scriptus cum littera anno illi deserviunt. Et e directo illius in prima linea laterali a sinistris patet quotus anni fuerit cicli lunaris et secunda linea quotus cicli decenovenalis incoati a Septembris. Et hec de tabula illa.

Invento numero ostendente quotus sit de ciclo 19li, auferatur unitas et residuum est aureus numerus kalendarii. Igitur a 5 kl. Septembris, pro moderno tempore, usque 5 kl. Octobris, ubicumque aureus numerus illius anni invenietur, ibi proxima littera talis feria qualem pretendit numerus scriptus cum littera in tabula est initium anni Hebreorum. Verbi gratia: Annus Domini 1295, qui modo instat, denominat primum annum cicli lunaris septimi in ordine ciclorum. Est ergo 4 cicli 19lis, sed abiecta unitate ternarius est aureus numerus ipsius et numerus deserviens cum littera in tabula est 5P. Ergo littera 5 ferie proxima aureo numero, scilicet G, qui scribitur 9 kl.

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32 est] *add.* est *D*

they were since the beginning of the world. The third row, however, shows for any given cycle its position among these 13.

On the left side, however, there are two rows of numbers: one for the years of the lunar cycle that is used by the Hebrews, the other for the years of the 19-year cycle, as the headings of these rows teach. And any number of either row teaches to what lunar or 19-year cycle the number and letter found in the same horizontal line must pertain. And it should be added that the 19-year cycle changes in September, as before.

Hence, if somebody wants to know about some year on what day of the week it begins and what kind of year it is among the Hebrews (i.e. whether it is superfluous, perfect or diminished), and also what its position in the lunar or 19-year cycle is, he should first look up what Year of the Lord it is according to the truth: for any date before the end of August, this is to be looked up in the table, but for a later date up to the time of the Annunciation (and according to the computists up to January), a unit must be added and then one must proceed thus: if the number in question is found anywhere in the top row, he will know that the first number with its adjunct letter written in the same descending line of the table will belong to this year. If this is not the case, he must first look for the next smallest number and assign it to the first year of the cycle that is written beneath it. He accordingly must go down, counting continuously, until he arrives at the end of the mentioned Years of the Lord, and where he finds the Year of the Lord that was looked for, the number that is written there with its letter will belong to this year. And next to it, in the first line to the left, the corresponding year in the lunar cycle is indicated, and in second line what year it would be in the 19-year cycle, starting from September. And so much for this table.

Having found the number that shows the position in the 19-year cycle, one must take away one unit and the remainder is the Golden Number in the calendar. And so, wherever (for modern times) the Golden Number is found occurring from the 5th before the kalends of September [28 August] to the 5th before the kalends of October [27 September], the nearest [dominical] letter with the same weekday as the one indicated by the number/letter combination written in the table is the beginning of the Hebrew year. For example: the Year of the Lord 1295, which is the next to begin, corresponds to the first year of the 7th lunar cycle in the row of cycles. It is hence the fourth year of the 19-year cycle, but since we must cast off one unit the Golden Number is '3' and the number/letter combination belonging to it in the table is '5P'. As a result, the letter corresponding to the fifth day of the week that is closest to the Golden Number, namely G, which is written next to the 9th

Octobri, ubi est festum sancti Linii pape, est primi diei anni Hebraici proximo instantis.

TABULA 5[a]

	D	D	P	P	S	S	S	Menses	D	D	D	P	S	S	S	
1	2	7	3	5	2	5	7	Thisseri[c]	2	5	7	3	2	5	7	1
2	3/4	1/2	4/5	6/7	3/4	6/7	1/2	Marehisevan	3/4	6/7	1/2	4/5	3/4	6/7	1/2	2
3	5	3	6	1	5/6	1/2	3/4	Chisselev[d]	5	1	3	6	5/6	1/2	3/4	3
4	6	4	7/1	2/3	7/1	3/4	5/6	Thebeth	6	2	4	7/1	7/1	3/4	5/6	4
5	7	5	2	4	2	5	7	Sabat[e]	7	3	5	2	2	5	7	5
6	1/2	6/7	3/4	5/6	3/4	6/7	1/2	Adar	1/2	4/5	6/7	3/4	3/4	6/7	1/2	6
								Vaedar	3/4	6/7	1/2	5/6	5/6	1/2	3/4	7
7	3	1	5	7	5	1	3	Nisan	5	1	3	7	7	3	5	8
8	4/5	2/3	6/7	1/2	6/7	2/3	4/5	Iiar	6/7	2/3	4/5	1/2	1/2	4/5	6/7	9
9	6	4	1	3	1	4	6	Sivan	1	4	6	3	3	6	1	10
10	7/1	5/6	2/3	4/5	2/3	5/6	7/1	Thamuz	2/3	5/6	7/1	4/5	4/5	7/1	2/3	11
11	2	7	4	6	4	7	2	Ab	4	7	2	6	6	2	4	12
12	3/4	1/2	5/6[b]	7/1	5/6	1/2	3/4	Elul	5/6	1/2	3/4	7/1	7/1	3/4	5/6	13

Circa tabulam mensium hoc solum videtur addendum super id quod in littera dicitur quod cum in media tabule scribantur per ordinem nomina mensium, et e directo cuiuslibet in linea prima a latere sinistra quoad menses anni communis, in ultima vero linea a dexteris quoad menses anni pregnati, pateat quotus quilibet mensis sit in mensibus anni. In tabula vero pateat quota feria quilibet mensis incipiat. Feria que, ut dictum est, primi mensis sive totius anni exordium est inveniri debet circa locum ubi primo occurrit aureus, a 5 kal. Septembris ipso die computato. Feria vero secundi mensis circa locum ubi secundo invenitur aureus numerus, et tertius mensis ubi 3, et quarti ubi 4, et ita deinceps usque ad anni finem. Incepto a Ianuario idem erit aureus numerus et numerus quotus cicli 19li.

Tabula 5[a]] *om. D* ‖ 5/6[b]] 3/4 *D* ‖ 'Menses': Thisseri[c]] Tisseri *E* ‖ Chisselev[d]] Chissele *E* ‖ Sabat[e]] Sabach *E*

before the kalends of October [23 September], on which the feast of St. Pope Linus is held, is the first day of the coming Hebrew year.

TABLE 5

	D	D	P	P	S	S	S	Months	D	D	D	P	S	S	S	
1	2	7	3	5	2	5	7	Tishri	2	5	7	3	2	5	7	1
2	3/4	1/2	4/5	6/7	3/4	6/7	1/2	Marḥeshvann	3/4	6/7	1/2	4/5	3/4	6/7	1/2	2
3	5	3	6	1	5/6	1/2	3/4	Kislev	5	1	3	6	5/6	1/2	3/4	3
4	6	4	7/1	2/3	7/1	3/4	5/6	Tevet	6	2	4	7/1	7/1	3/4	5/6	4
5	7	5	2	4	2	5	7	Shevat	7	3	5	2	2	5	7	5
6	1/2	6/7	3/4	5/6	3/4	6/7	1/2	Adar	1/2	4/5	6/7	3/4	3/4	6/7	1/2	6
								Adar II	3/4	6/7	1/2	5/6	5/6	1/2	3/4	7
7	3	1	5	7	5	1	3	Nisan	5	1	3	7	7	3	5	8
8	4/5	2/3	6/7	1/2	6/7	2/3	4/5	Iyyar	6/7	2/3	4/5	1/2	1/2	4/5	6/7	9
9	6	4	1	3	1	4	6	Sivan	1	4	6	3	3	6	1	10
10	7/1	5/6	2/3	4/5	2/3	5/6	7/1	Tammuz	2/3	5/6	7/1	4/5	4/5	7/1	2/3	11
11	2	7	4	6	4	7	2	Av	4	7	2	6	6	2	4	12
12	3/4	1/2	5/6	7/1	5/6	1/2	3/4	Elul	5/6	1/2	3/4	7/1	7/1	3/4	5/6	13

About the table of months, the only thing that seems worth adding to that what is already said in the text is that, since the names of the months are written according to their order in the middle of the table (and for each, the first line to the left pertains to the months of the common years, whereas the last line to the right belongs to the months of the pregnant year), it becomes clear what position among the months each month occupies. From the table itself, however, it can be gleaned on what day of the week any month would begin. As has been said, the day of the week that serves as the beginning of the entire year must be found near the place where the Golden Number first occurs, as counted from the 5th before the kalends of September [28 August]. The day of the week of the second month, however, is found near the date of the second Golden Number, and that of the third month where the third is, and the fourth where the fourth is and so forth until the end of the year. From January onwards, the Golden Number will be the same as the number of the year in the 19-year cycle.

TABULA 6[a]

Cicli	Dies	Hore	Partes
1	2	16	595
2	5	9	110
3	1	1	705
4	3	18	220
5	6	10	815
6	2	3	330
7	4	19	925
8	7[b]	12	440
9	3	4	1035
10	5	21	550
11	1	14	65
12	4	6	660
13	6	23	175

Tabula sequens habet a sinistris lineam continentem numerum ciclorum usque 13. Et ipsa tabula docet quantum tempus quotlibet cicli naturales continent ultra integras et precisas septimanas usque 13, ut ostendatur quam recte observant Iudei 13 ciclos. Qui autem hoc scire voluerit, querat a sinistris numerum quot voluerit ciclorum et e directo illius numeri inveniet quantum excedant integras ebdomedas, primo quoad dies integros, secundo quoad horas additas perfectas, et tertio quoad partes hore imperfecte. Prima enim linea ostendit quantum excedant quantum ad dies, secunda quoad horas, tertia quoad partes, ut patet ex titulis linearum.

Tabula 6[a]] *om. D* ‖ 7[b]] 0 *D* **9** tertia] 30 *D*

TABLE 6

Cycles	Days	Hours	Parts
1	2	16	595
2	5	9	110
3	1	1	705
4	3	18	220
5	6	10	815
6	2	3	330
7	4	19	925
8	7	12	440
9	3	4	1035
10	5	21	550
11	1	14	65
12	4	6	660
13	6	23	175

The following table has on its left side a line that contains the number of cycles up to 13. And this same table teaches how much time any number of natural cycles up to 13 contains beyond a whole and precise number of weeks, so that it can be shown in how far the Jews are correct in observing 13 cycles. Anyone desiring to know this, however, should seek from the left side the number of as many cycles as he likes, and in the same horizontal line he will find by how much time they exceed a whole number of weeks, first with regard to whole days, second with regard to complete added hours, and third with regard to incomplete hours. For the first line shows how much they exceed with regard to days, the second with regard to hours, the third with regard to parts, as is clear from the headings of these lines.

TABULA 7[a]

Num. Ann.	Ciclorum qu.	Ciclorum sim.	Residua sol.	Residua d.	Residua f.[b]	Residua h.	Residua p.	Num. Ann.	Ciclorum qu.	Ciclorum sim.	Residua sol.	Residua d.	Residua f.	Residua h.	Residua p.
76	1	4	8	0	3	5	860	760	10	40	24	2	4	9	1040
152	2	8	16	0	6	11	640	1520	20	80	20	4	1	19	1000
228	3	12	24	0	2	17	420	2280	30	120	16	7	6	5	960
304	4	16	4	0	5	23	200	3040	40	160	12	9	3	15	920
380	5	20	12	1	2	4	1060	3800	50	200	8	12	1	1	880
456	6	24	20	1	5	10	840	4560	60	240	4	14	5	11	840
532	7	28	0	1	1	16	620	5320	70	280	0	16	2	21	800
608	8	32	8	1	4	22	400	6080	80	320	24	19	7	7	760
684	9	36	16	2	1	4	180	6840	90	360	20	21	4	17	720
760	10	40	24	2	4	9	1040	7600	100	400	16	24	2	3	680

Ex tabula residuitatum, que deservit quinto capitulo partis tertie, ostenditur quantum in quotlibet ciclis Latinorum continentium integros dies recedant in veritate instantia solstitiorum et equinoctiorum et etiam coniunctionum, denominationis quoque anni quoad ciclum solarem et diei coniunctionis, quoad ferie nomen. Et habet hec tabula a sinistris 3 ordines numerorum et communiter 5 lineas residuitatum et hoc quoad utramque partem sui. Quando ergo de quotocumque numero annorum scire ista volueris, quere ipsum numerum in linea prima a sinistris partis prime ipsius tabule, que continet numerum annorum. Si ibi inveniatur numerus e directo positus in proxima linea, que intitulatur ciclorum quadruplicium, ostendit quot in illo numero contineantur cicli quadruplices, id est quotiens in eis contineantur 4 cicli sive quotiens 76 anni, numerus vero e directo eius in tertia linea ostendit quot ciclos simplices, i.e. quotiens 19 annos, numerus in prima linea inventus contineat.

In 5 autem lineis sequentibus, quibus supra scribitur 'residua', ostenditur varietas denominationis in annis cicli solaris per numerum in prima linearum illarum; quanta etiam sit retrogradatio sive retractio coniunctionum et equinoctiorum sive solstitiorum quoad dies in secunda; quoad feriarum denominationem in tertia; quoad horas dierum imperfectorum in quarta, et demum quoad partes hore imperfecte in ultima, ut per linearum capitales

Tabula 7[a]] *om. D* ‖ [b]MS *E om.* col. 6 ('ferie')

TABLE 7

Number of years	Cycles		Surpluses					Number of years	Cycles		Surpluses				
	qu.	sing.	sol.	d.	w.	h.	p.		qu.	sing.	sol.	d.	w.	h.	p.
76	1	4	8	0	3	5	860	760	10	40	24	2	4	9	1040
152	2	8	16	0	6	11	640	1520	20	80	20	4	1	19	1000
228	3	12	24	0	2	17	420	2280	30	120	16	7	6	5	960
304	4	16	4	0	5	23	200	3040	40	160	12	9	3	15	920
380	5	20	12	1	2	4	1060	3800	50	200	8	12	1	1	880
456	6	24	20	1	5	10	840	4560	60	240	4	14	5	11	840
532	7	28	0	1	1	16	620	5320	70	280	0	16	2	21	800
608	8	32	8	1	4	22	400	6080	80	320	24	19	7	7	760
684	9	36	16	2	1	4	180	6840	90	360	20	21	4	17	720
760	10	40	24	2	4	9	1040	7600	100	400	16	24	2	3	680

The surplus table, which belongs to the fifth chapter of the third part, shows the rate of recession of the true moments of the solstices, equinoxes and conjunctions—and also of the year's denomination, as far as the solar cycle is concerned, and of the day of conjunction, as far as the name of the weekday is concerned—for any number of Latin cycles. And this table has three rows of numbers to the left and generally five lines of surpluses; and this applies to both of its parts. When you want to know this for any given number of years, look for this number in the first line to the left of the first part of this table, which contains the number of years. If it is found there, the number in the line next to it, which is entitled 'quadruples of cycles', shows you how many quadruples of cycles are contained in this number, i.e. how many times four cycles or 76 years are contained in them, while the number right next to it in the third line shows you how many single cycles, i.e. how many times 19 years are contained in the number found in the first line.

The five following lines, however, which are overwritten 'surpluses', show the change in position in the solar cycle, through the number in the first of these lines; in the second, by how many days the conjunctions and equinoxes recede or retreat; in the third, by how many days of the week; in the fourth, by how many hours of incomplete days; and finally, in the last, by how many

intitulationes evidenter apparet. Idem quoque fiet per secundam partem tabule, si in sinistra illius numerum annorum tuorum inveneris.

Si autem numerus annorum maior fuerit quam ut inveniatur in prima
9v linea | prime partis, nec precise invenire poterit in prima linea secunde, queratur numerus proximo minor in prima linea secunde partis et notetur, si placet, distincte per partes quicquid e directo eius invenitur in eadem linea transversali, sufficeret tamen sumere quod est in 5 lineis residuorum post hec. Numerum illum minorem subtrahe de toto numero annorum et residuum quere in prima linea prime partis, quod si precise reperiatur notetur etiam per partes quicquid e directo eius invenitur, vel solum quod est in lineis residuorum, si prius solum illud in alia parte sumpsisti. Et quodlibet sub suo simili positum suo addatur simili, i.e. dies diebus etc. arte in tractatu expressa. Et quod resultat, illud est in quo fit retrocessio supradicta.

Si autem illud residuum per se non invenitur in prima linea prime partis aut invenitur ibi aliquis numerus minor illo residuo, tunc servatur quod in directo illius invenitur et coniungatur superiori, sicut dictum est, et erit retrocessio quesita. Dematur ergo numerus ille minor de toto residuo et illius residuum notetur, quod necessario minus erit quam 76, aut etiam nullus numerus minor illo residuo primo nec ipsum etiam invenitur in prima linea prime partis et tunc illud necessario minus erit quam 76. Et in utroque casu retrocessio inventa non erit quantum retroceditur a principio annorum omnium usque in finem, sed est quantum retroceditur a fine illius residui minoris quam 76 usque ad finem annorum ominum, sive quantum retroceditur a principio annorum omnium usque ad principium illius residui, vel generaliter quantum retroceditur a principio alicuius anni usque ad pricipium alicuius alterius anni tantum distantis ab illo quantus est numerus annorum e directo quorum, sive in una parte tabule per se, sive in utraque simul, invenitur quesita retrocessio.

16 residuo] *add.* et *D*

parts of incomplete hours, as becomes perfectly clear from the headings of these lines. The same also applies to the second part of the table, if you find to its left the number of your years.

If, however, the number of years in question is larger than what is found in the first line of the first part, and it cannot be found precisely in the first line of the second [part], you should look for the next smallest number in the first line of the second part and note down, if you please, the numbers found in the corresponding horizontal line by their distinct parts, although it will suffice to take what follows in the 5 lines of surpluses. You must then subtract this smaller number from the whole number of years and look for the remainder in the first line of the first part; if this is found directly, you should also note down what is found next to it by its parts—or only what is in the lines of surpluses, if you have previously only taken these in the other part. And everything should be put below its counterpart and added to it, i.e. days to days and so forth, according to the method expressed in the treatise. And what results corresponds to the abovementioned rate of recession.

If, however, this surplus is not found by itself in the first line of the first part, one should find there some smaller number and then turn to what is found in the lines next to it and it should be added to the above, as has been stated, and this will be the rate of recession that is looked for. Subtract this smaller number from the total surplus and note down the remainder, which will be smaller than 76—or there will be no number smaller than this first surplus and nothing will be found in the first line of the first part, and then this will be necessarily smaller than 76. And in either case, the rate of recession found will not be the exact rate of recession from the beginning of all years until the end, but the amount that recedes from the end of this remainder that is smaller than 76 until the end of all years or the amount that recedes from the beginning of all years until the beginning of this remainder or, in general, the amount that recedes from the beginning of any year until the beginning of any other year, whose distance corresponds to the number of years found next to the rate of recession that has been looked for (whether found by itself in only one part of the table or jointly in both).

TABULA 8[a]

Anni creationis	Ciclus solaris	Littere dominicales	Ciclus lunaris	Ciclus 19lis	Menses latinorum	Dies mensium	Feria initialis	Hore dierum	Partes horarum
1	1	F	1	3	Oct	7	2	5	204
	2	E		4	Apr	2	4	9	642
2			2		Sep	26	6	14	0
	3	D		5	Mar	22	1	18	438
3			3		Sep	15	3	22	876
	4	C		6	Apr	10	7	15	1027
4			4		Oct	4	2	20	385
	5	A		7	Mar	30	5	0	823
5			5		Sep	23	7	5	181
	6	G		8	Mar	19	2	9	619
6			6		Sep	12	4	13	1057
	7	F		9	Apr	7	1	7	128
7			7		Oct	1	3	11[b]	566
	8	E		10	Mar	27	5	15	1004
8			8		Sep	20	7	20	362
	9	C		11	Apr	14	4	13	513
9			9		Oct	8	6	17	951
	10	B		12	Apr	3	1	22	309
10			10		Sep	28	4	2	747
	11	A		13	Mar	24	6	7	105
11			11		Sep	17	1	11	543
	12	G		14	Apr	12	5	4	694
12			12		Oct	6	7	9	52
	13	E		15	Mar	31	2	13	490
13			13		Sep	24	4	17	928
	14	D		16	Mar	20	6	22	286
14			14		Sep	14	2	2	724
	15	C		17	Apr	8	5	19	874
15			15		Oct	3	1	0	233

Tabula 8[a]] *om. D* ‖ 11[b]] 5 *DE*

TABLE 8

Years since creation	Solar cycle	Dominical letters	Lunar cycle	19-year cycle	Latin months	Days of the months	Initial weekdays	Hours of the day	Parts of the hours
1	1	F	1	3	Oct	7	2	5	204
	2	E		4	Apr	2	4	9	642
2			2		Sep	26	6	14	0
	3	D		5	Mar	22	1	18	438
3			3		Sep	15	3	22	876
	4	C		6	Apr	10	7	15	1027
4			4		Oct	4	2	20	385
	5	A		7	Mar	30	5	0	823
5			5		Sep	23	7	5	181
	6	G		8	Mar	19	2	9	619
6			6		Sep	12	4	13	1057
	7	F		9	Apr	7	1	7	128
7			7		Oct	1	3	11	566
	8	E		10	Mar	27	5	15	1004
8			8		Sep	20	7	20	362
	9	C		11	Apr	14	4	13	513
9			9		Oct	8	6	17	951
	10	B		12	Apr	3	1	22	309
10			10		Sep	28	4	2	747
	11	A		13	Mar	24	6	7	105
11			11		Sep	17	1	11	543
	12	G		14	Apr	12	5	4	694
12			12		Oct	6	7	9	52
	13	E		15	Mar	31	2	13	490
13			13		Sep	24	4	17	928
	14	D		16	Mar	20	6	22	286
14			14		Sep	14	2	2	724
	15	C		17	Apr	8	5	19	874
15			15		Oct	3	1	0	233

TABULA 8 (*cont.*)

Annus creationis	Ciclus solaris	Littere dominicales	Ciclus lunaris	Ciclus 19lis	Menses latinorum	Dies mensium	Feria initialis	Hore dierum	Partes horarum
	16	B		18	Mar	29	3	4	671
16			16		Sep	22	5	9	29
	17	G		19	Mar	17	7	13	467
17			17		Sep	10	2	17	905
	18	F		1	Apr	5	6	10	1056
18			18		Sep	29	1	15	414
	19	E		2	Mar	25	3	19	852
19			19		Sep	19	6	0	210
	20	D		3	Apr	13	2	17	361
20			1		Oct	7	4	21	799
	21	B		4	Apr	2	7	2	157
21			2		Sep	26	2	6	595
	22	A		5	Mar	22	4	10	1033
22			3		Sep	15	6	15	391
	23	G		6	Apr	10	3	8	542
23			4		Oct	4	5	12	980
	24	F		7	Mar	30	7	17	338
24			5		Sep	23	2	21	776
	25	D		8	Mar	19	5	2	134
25			6		Sep	12	7	6	572
	26	C		9	Apr	6	3	23	723
26			7		Oct	1	6	4	81
	27	B		10	Mar	27	1	8	519
27			8		Sep	20	3	12	957
	28	A		11	Apr	15	7	6	28
28			9		Oct	9	2	10	466
	1	F		12	Apr	3	4	14	904
29			10		Sep	27	6	19	262
	2	E		13	Mar	23	1	23	700
30			11		Sep	17	4	4	48
	3	D		14	Apr	11	7	21	209
31			12		Oct	6	3	1	647
	4	C		15	Apr	1	5	6	5

TABLE 8 (*cont.*)

Years since creation	Solar cycle	Dominical letters	Lunar cycle	19-year cycle	Latin months	Days of the months	Initial weekdays	Hours of the day	Parts of the hours
	16	B		18	Mar	29	3	4	671
16			16		Sep	22	5	9	29
	17	G		19	Mar	17	7	13	467
17			17		Sep	10	2	17	905
	18	F		1	Apr	5	6	10	1056
18			18		Sep	29	1	15	414
	19	E		2	Mar	25	3	19	852
19			19		Sep	19	6	0	210
	20	D		3	Apr	13	2	17	361
20			1		Oct	7	4	21	799
	21	B		4	Apr	2	7	2	157
21			2		Sep	26	2	6	595
	22	A		5	Mar	22	4	10	1033
22			3		Sep	15	6	15	391
	23	G		6	Apr	10	3	8	542
23			4		Oct	4	5	12	980
	24	F		7	Mar	30	7	17	338
24			5		Sep	23	2	21	776
	25	D		8	Mar	19	5	2	134
25			6		Sep	12	7	6	572
	26	C		9	Apr	6	3	23	723
26			7		Oct	1	6	4	81
	27	B		10	Mar	27	1	8	519
27			8		Sep	20	3	12	957
	28	A		11	Apr	15	7	6	28
28			9		Oct	9	2	10	466
	1	F		12	Apr	3	4	14	904
29			10		Sep	27	6	19	262
	2	E		13	Mar	23	1	23	700
30			11		Sep	17	4	4	48
	3	D		14	Apr	11	7	21	209
31			12		Oct	6	3	1	647
	4	C		15	Apr	1	5	6	5

TABULA 8 (*cont.*)

Annus creationis	Ciclus solaris	Littere dominicales	Ciclus lunaris	Ciclus 19lis	Menses latinorum	Dies mensium	Feria initialis	Hore dierum	Partes horarum
32			13		Sep	25	7	10	443
	5	A		16	Mar	20	2	14	881
33			14		Sep	13	4	19	239
	6	G		17	Apr	8	1	12	390
34			15		Oct	2	3	16	828
	7	F		18	Mar	28	5	21	186
35			16		Sep	22	1	1	624
	8	E		19	Mar	18	3	5	1062
36			17		Sep	11	5	10	420
	9	C		1	Apr	5	2	3	571
37			18		Sep	29	4	7	1009
	10	B		2	Mar	25	6	12	367
38			19		Sep	18	1	16	805
	11	A		3	Apr	13	5	9	956
39			1		Oct	7	7	14	314
	12	G		4	Apr	2	2	18	752
40			2		Sep	26	4	23	110
	13	E		5	Mar	22	7	3	548
41			3		Sep	15	2	7	986
	14	D		6	Apr	10	6	1	57
42			4		Oct	4	1	5	495
	15	C		7	Mar	30	3	9	933
43			5		Sep	23	5	14	291
	16	B		8	Mar	19	7	18	729
44			6		Sep	12	2	23	87
	17	G		9	Apr	6	6	16	238
45			7		Sep	30	1	20	676
	18	F		10	Mar	27	4	1	34
46			8		Sep	20	6	5	472
	19	E		11	Apr	14	2	22	623
47			9		Oct	9	5	2	1061
	20	D		12	Apr	4	7	7	419

TABLE 8 (*cont.*)

Years since creation	Solar cycle	Dominical letters	Lunar cycle	19-year cycle	Latin months	Days of the months	Initial weekdays	Hours of the day	Parts of the hours
32			13		Sep	25	7	10	443
	5	A		16	Mar	20	2	14	881
33			14		Sep	13	4	19	239
	6	G		17	Apr	8	1	12	390
34			15		Oct	2	3	16	828
	7	F		18	Mar	28	5	21	186
35			16		Sep	22	1	1	624
	8	E		19	Mar	18	3	5	1062
36			17		Sep	11	5	10	420
	9	C		1	Apr	5	2	3	571
37			18		Sep	29	4	7	1009
	10	B		2	Mar	25	6	12	367
38			19		Sep	18	1	16	805
	11	A		3	Apr	13	5	9	956
39			1		Oct	7	7	14	314
	12	G		4	Apr	2	2	18	752
40			2		Sep	26	4	23	110
	13	E		5	Mar	22	7	3	548
41			3		Sep	15	2	7	986
	14	D		6	Apr	10	6	1	57
42			4		Oct	4	1	5	495
	15	C		7	Mar	30	3	9	933
43			5		Sep	23	5	14	291
	16	B		8	Mar	19	7	18	729
44			6		Sep	12	2	23	87
	17	G		9	Apr	6	6	16	238
45			7		Sep	30	1	20	676
	18	F		10	Mar	27	4	1	34
46			8		Sep	20	6	5	472
	19	E		11	Apr	14	2	22	623
47			9		Oct	9	5	2	1061
	20	D		12	Apr	4	7	7	419

TABULA 8 (*cont.*)

Annus creationis	Ciclus solaris	Littere dominicales	Ciclus lunaris	Ciclus 19lis	Menses latinorum	Dies mensium	Feria initialis	Hore dierum	Partes horarum
48			10		Sep	28	2	11	857
	21	B		13	Mar	23	4	16	215
49			11		Sep	16	6	20	653
	22	A		14	Apr	11	3	13	804
50			12		Oct	5	5	18	162
	23	G		15	Mar	31	7	22	600
51			13		Sep	25	3	2	1038
	24	F		16	Mar	21	5	7	396
52			14		Sep	14	7	11	834
	25	D		17	Apr	8	4	4	985
53			15		Oct	2	6	9	343
	26	C		18	Mar	28	1	13	781
54			16		Sep	21	3	18	139
	27	B		19	Mar	17	5	22	577
55			17		Sep	11	1	2	1015
	28	A		1	Apr	5	4	20	86
56			18		Sep	30	7	0	524
	1	F		2	Mar	25	2	4	962
57			19		Sep	18	4	9	320
	2	E		3	Apr	13	1	2	471
58			1		Oct	7[a]	3	6	909
	3	D		4	Apr	2	5	11	267
59			2		Sep	26	7	15	705
	4	C		5	Mar	22	2	20	63
60			3		Sep	16	5	0	501
	5	A		6	Apr	9	1	17	652
61			4		Oct	3	3	22	10
	6	G		7	Mar	30	6	2	448
62			5		Sep	23	1	6	886
	7	F		8	Mar	19	3	11	244

7[a]] 8 *DE*

TABLE 8 (*cont.*)

Years since creation	Solar cycle	Dominical letters	Lunar cycle	19-year cycle	Latin months	Days of the months	Initial weekdays	Hours of the day	Parts of the hours
48			10		Sep	28	2	11	857
	21	B		13	Mar	23	4	16	215
49			11		Sep	16	6	20	653
	22	A		14	Apr	11	3	13	804
50			12		Oct	5	5	18	162
	23	G		15	Mar	31	7	22	600
51			13		Sep	25	3	2	1038
	24	F		16	Mar	21	5	7	396
52			14		Sep	14	7	11	834
	25	D		17	Apr	8	4	4	985
53			15		Oct	2	6	9	343
	26	C		18	Mar	28	1	13	781
54			16		Sep	21	3	18	139
	27	B		19	Mar	17	5	22	577
55			17		Sep	11	1	2	1015
	28	A		1	Apr	5	4	20	86
56			18		Sep	30	7	0	524
	1	F		2	Mar	25	2	4	962
57			19		Sep	18	4	9	320
	2	E		3	Apr	13	1	2	471
58			1		Oct	7	3	6	909
	3	D		4	Apr	2	5	11	267
59			2		Sep	26	7	15	705
	4	C		5	Mar	22	2	20	63
60			3		Sep	16	5	0	501
	5	A		6	Apr	9	1	17	652
61			4		Oct	3	3	22	10
	6	G		7	Mar	30	6	2	448
62			5		Sep	23	1	6	886
	7	F		8	Mar	19	3	11	244

TABULA 8 (*cont.*)

Annus creationis	Ciclus solaris	Littere dominicales	Ciclus lunaris	Ciclus 19lis	Menses latinorum	Dies mensium	Feria initialis	Hore dierum	Partes horarum
63			6		Sep	12	5	15	682
	8	E		9	Apr	7	2	8	833
64			7		Oct	1	4	13	191
	9	C		10	Mar	26	6	17	629
65			8		Sep	19	1	21	1067
	10	B		11	Apr	14	5	15	138
66			9		Oct	8	7	19	576
	11	A		12	Apr	3	2	23	1014
67			10		Sep	28	5	4	372
	12	G		13	Mar	24	7	8	810
68			11		Sep	17	2	13	168
	13	E		14	Apr	11	6	6	319
69			12		Oct	5	1	10	757
	14	D		15	Mar	31	3	15	115
70			13		Sep	24	5	19	553
	15	C		16	Mar	20	7	23	991
71			14		Sep	14	3	4	349
	16	B		17	Apr	8	6	21	500
72			15		Oct	3	2	1	938
	17	G		18	Mar	28	4	6	296
73			16		Sep	21	6	10	734
	18	F		19	Mar	17	1	15	92
74			17		Sep	10	3	19	530
	19	E		1	Apr	5	7	12	681
75			18		Sep	29	2	17	39
	20	D		2	Mar	25	4	21	477
76			19		Sep	19	7	1	915
	21	B		3	Apr	12	3	18	1066

TABLE 8 (*cont.*)

Years since creation	Solar cycle	Dominical letters	Lunar cycle	19-year cycle	Latin months	Days of the months	Initial weekdays	Hours of the day	Parts of the hours
63			6		Sep	12	5	15	682
	8	E		9	Apr	7	2	8	833
64			7		Oct	1	4	13	191
	9	C		10	Mar	26	6	17	629
65			8		Sep	19	1	21	1067
	10	B		11	Apr	14	5	15	138
66			9		Oct	8	7	19	576
	11	A		12	Apr	3	2	23	1014
67			10		Sep	28	5	4	372
	12	G		13	Mar	24	7	8	810
68			11		Sep	17	2	13	168
	13	E		14	Apr	11	6	6	319
69			12		Oct	5	1	10	757
	14	D		15	Mar	31	3	15	115
70			13		Sep	24	5	19	553
	15	C		16	Mar	20	7	23	991
71			14		Sep	14	3	4	349
	16	B		17	Apr	8	6	21	500
72			15		Oct	3	2	1	938
	17	G		18	Mar	28	4	6	296
73			16		Sep	21	6	10	734
	18	F		19	Mar	17	1	15	92
74			17		Sep	10	3	19	530
	19	E		1	Apr	5	7	12	681
75			18		Sep	29	2	17	39
	20	D		2	Mar	25	4	21	477
76			19		Sep	19	7	1	915
	21	B		3	Apr	12	3	18	1066

Ultima vero tabula partis tertie continet de quolibet 76 annorum a principio seculi inceptorum duas coniunctiones, unam primi mensis anni, scilicet Thisseri, et alteram mensis paschalis, videlicet Nisan, ut docetur post tabulam. Unde cuilibet anno deputantur duo linee transversales in tabula: una pro primo mense, alia pro mense paschali. Latitudo vero tabule optinet 10 ordines linearum a principio ad finem. Longitudinis in primo ordine, cui suprascribitur 'anni creationis', est numerus ab uno usque ad 76 continue procedens, ut per numerum ibi inventum quemcumque sciri valeat quoto anno mundi secundum Hebreos, tota illa linea transversalis, in cuius principio ille numerus est, et linea sequens transversalis deserviant. In secundo ordine ponuntur numeri ostendentes quotus quilibet annus primi ordinis fuit in ciclo solari; in tertio, que littera dominicalis, in quarto quotus cicli lunaris, in quinto quotus cicli 19lis, in sequentibus 5 ostenditur quo mense, die, feria, post quot horas et partes, quodlibet per suum ordinem, qui patet ex capitali inscriptione, fuerit coniunctio, vel prima anni, quoad primam lineam, vel mensis paschalis, quoad secundam.

Hoc autem advertendum est quod quia anni creationis, qui sunt Hebreorum, renovantur a Septembri vel Octobri, anni vero cicli solaris nostri et 19lis mutantur in Januario, tamen quandoque iterum Martio, ideo numerus ordinis cicli solaris cum littera dominicali et numerus cicli 19lis inscripti secunde linee transversali deservienti alicui anno quoad mensem paschalem deserviunt etiam sequenti anno quoad mensem initialem.

Huius autem tabule et precedentis utilitas in hoc consistit, ut sciri valeat de quolibet anno mundi, quoto anno cicli solaris, lunaris et 19lis incepit vel incepturus sit, qui etiam littera dominicalis tunc fuit, quo etiam die cuius mensis kalendarii Latinorum, qua feria post quot horas integras et partes hore imperfecte fuerit vel futura sint coniunctiones primi mensis; quoto etiam anno cicli solaris et, per consequens, que littera dominicalis, quoto vero cicli 19lis vel lunaris etc. cadat vel evenire debeat coniunctio mensis paschalis.

Si quis ergo de aliquo annorum mundi hoc scire desiderat, videat numerum annorum mundi perfectorum precedentium suum annum et per artem premissam tabule residuitatum querat quantitatem rectrocessionis correspondentis toti numero (si totus ibi inveniatur in una parte per se, vel altera

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5 vero] vera *D* **27** sint] sit *D* **32** perfectorum] perfecto *D* **33–34** correspondentis] quorespondentis *D*

The final table of the third part contains two conjunctions for any of the 76 years starting from the beginning of the world: one for the first month of the year, namely Tishri, the other for the paschal month, namely Nisan, as is explained [in the text] after the table. For this reason, two horizontal lines are assigned to each year: one for the first month, the other for the paschal month. In its latitude, however, the table comprises ten rows of lines from start to finish. In the first vertical row, which is entitled 'years since Creation', the numbers 1 to 76 are consecutively displayed, such that anyone can use the number found there to know to what year of the world according to the Hebrews the whole horizontal line, at whose start this number is found, and the following horizontal line belong. The second row contains numbers that show for any year of the first row its position in the solar cycle; the third [shows] what is the dominical letter, the fourth the position in the lunar cycle, the fifth the position in the 19-year cycle, while the following five show in what month, on what day, on what day of the week, and after how many hours and parts (each according to its order, which becomes clear from the inscription in the headline) the conjunction took place, be it the first of the year, as pertains to the first line, or that of the paschal month, as pertains to the second.

One must pay attention, however, that—since the years of Creation used by the Hebrews are renewed in September or October, whereas our solar and 19-year cycles change in January, or sometimes also in March—the number in the row for the solar cycle together with the dominical letter and the number of the 19-year cycle that are written in the second horizontal line and belong to the paschal month of a given year, also belong to the following year as pertains to its initial month.

The utility of this table and the preceding one, however, consists in the fact that it can be used to find out for any given year of the world in what year of the solar, lunar, or 19-year cycle it began or will begin, and also what the dominical letter then was, and also on what day of what month of the Latin calendar, on what day of the week after how many complete hours and parts of the incomplete hours the conjunction of the first month was or will be; and likewise, in what year of the solar cycle and, by consequence, on what Sunday Letter, in what [year] of the 19-year or lunar cycle etc. the conjunction of the paschal month falls or must occur.

If, therefore, somebody wants to know this for any of the years of the world, he must look at the whole number of years of the world that precedes his year and then search, using the aforementioned method of the surplus table, for the rate of recession that corresponds to the whole number (regardless of whether it is completely contained in one part [of the table] or the

per se, vel pars eius in una et residuum in altera) vel quantitatem retrocessionis correspondentis toti numero quam vicinius potest, et hec quantitas retrocessionis, que sunt partes residuorum distincte scribantur per loca sua seorsum. Deinde pro anno imperfecto de quo fit questio addatur unum numero annorum residuo minori quam 76, vel ponatur unitas per se, si nichil remaneat cui fiat additio. Et queratur in linea prima sinistri lateris, qui continet numerum annorum creationis, et ubicumque invenitur numerus iste residuus, addita pro anno imperfecto unitate, sive sit numerus iam 76 sive minor, etiam licet sit ipsa unitas sola, sumatur per ordinem quod est in precedenti linea transversali de ciclo solari, littera dominicali et ciclo 19li, sed quod in eadem linea in eius directo est de ciclo lunari, mense, diebus et feriis etc. usque ad finem. Quandoque tamen inscribitur in directo anni numerus cicli solaris et littera et numerus cicli 19lis et tunc sumatur tantum prout iacet in directo eius, et illud erit, si intendat quis querere, primam coniunctionem anni. Si autem queratur coniunctio mensis paschalis, sumatur totum de secunda linea anno deserviente excepto numero cicli lunaris, qui sumi debet de prima linea.

Hoc facto sub hoc invento scribantur partes residuorum prius extracte de priori tabula, que sunt quantitas retrocessionis, quodlibet sub suo simili, scilicet partes sub partibus, hore sub horis, ferie sub feriis, dies sub diebus (sub nomine autem mensis nichil ponatur, nec sub numero cicli lunaris vel 19lis, sed sub numero cicli solaris, quia iste mutatur per retrocessionem), dematur quodlibet de suo simili modo supradicto in fine quinti capituli huius tertie partis, hoc addito quod quando numerus dierum retrocessionis demi non possit de numero dierum suprascriptorum, mensis nominati deleatur nomen mensis, manente numero dierum, et in loco eius scribatur nomen mensis precedentis ipsum in ordine mensium anni, et quot fuerit dies illius mensis tantus numerus addatur numero dierum mensis deleti, et de toto fiat subtractio. Quod autem subtrahi debere dictum est pro inveniendis coniunctionibus annorum sequentium, addi debet sequentibus pro precedentibus. Numerus autem annorum mundi moderno tempore sic sciuntur:

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24 quando] *om. D*

other, or a part of it in one part and the remainder in the other) or the rate of recession that corresponds to the whole number as closely as possible; and for this quantity of recession, the parts of the resulting surplus must be written down separately, according to their respective places. Hereafter, one must add one unit to the remainder of years smaller than 76 to account for the incomplete year that is the object of investigation—or just put down one unit, in case nothing remains to which the addition could be made. And one must look for it in the first line to the left, which contains the number of years since Creation, and wherever the remainder is found (adding one unit for the incomplete year), regardless of whether it is 76 or less, and even when it is just one unit, one must take according to its order what is found in the preceding line for the solar cycle, the dominical letter, and 19-year cycle, but from the same line the corresponding data for the lunar cycle, the months, the days, the days of the week, and so on until the end. At one point [sc. in the first year] there is nevertheless a number for the solar cycle and [dominical] letter and the 19-year cycle written next to this year, and then must take everything that lies next to it, and this will be, if one should look for it, the first conjunction of the year. Yet if it is the conjunction of the paschal month that is looked for, it must all be taken from the second line belonging to that year, except for the number of the lunar cycle, which must be taken from the first line.

Once this is done, the parts of the surpluses that were previously extracted from the previous table, which correspond to the rate of recession, must be written such that each is below its counterpart, i.e. parts below part, hours below hours, days of the week below days of the week, days below days (below the name of the month, however, nothing must be put, nor below the number of the lunar or 19-years cycle, but [something must be put] below the number of the solar cycle, for this is changed by the recession) [and] everything must be subtracted from its counterpart according to the method that has been explained above at the end of the 5th chapter of this third part, adding that if the number of days of the recession cannot be subtracted from the inscribed number of days, then the name of the nominated month must be deleted (while the number of days is preserved) and the name of the month that precedes it in the order of the months of the year must be written in its place, and the number of days in this month must be added to the number of days of the deleted month, and this is the total from which the subtraction must be made. But that which must be subtracted in order to find the conjunctions of the following years, must be added to the following years to find the preceding ones. The number of the years of the world for modern times, however, is known thus: take the years of the

sumantur anni incarnationis secundum Dionisium et eis addantur 3760 et resultabit numerus annorum a mundi creatione secundum Hebreos modernos. Licet autem per dictam viam et doctrinam inquiratur in capitulo de inundatione diluvii de prima coniunctione et die illius anni.

Quoniam tamen res obscura est, queratur ubi in kalendario, quo die, anno cuiuslibet cicli et feria fuerit prima coniunctio anni a creatione 5055. Quero ergo 5054 in prima linea secunde partis prioris tabule, que est residuitatum, et cum non inveniatur ibi, sumo numerum proximo minorem, scilicet 4560, qui continet 60 ciclos quadruplices, simplices vero 240. Et in directo eius sic de residuitatibus invenio, ut patet: ciclus solis (4), dies (14), ferie (5), hore (11), partes (840).

Demo 4560 de 5054, qui est numerus annorum factorum, remanent 494. Et hunc numerum residuum quero in prima linea prime partis eiusdem tabule. Nec ibi invenio, sed numerus proximo minor ibi inventus est 456, continens 6 ciclos quadruplices, simplices vero 24 et in directo eius invenio de residuitatibus: ciclus solis (20), dies (1), ferie (5), hore (10), partes (840).

Hii anni 456 coniuncti prioribus 4560 reddunt 5016, in quibus continentur coniunctionum cicli quadruplices 66, simplices vero 264. Et residuitates coniuncte: ciclus solis (24), dies (15), ferie (3), hore (22), partes (600), post quam ex partibus sunt 1080 resultantibus facta fuerit una hora et ex 10 feriis abiecta fuerint 7. Dematur ergo numerus ille resultans ex coniunctione, scilicet 5016, de totali numero annorum perfectorum 5054: remanent 38,
10r quibus adiuncta unitas pro anno imperfecto fiunt | 39. Et habens numerum quero in prima linea a sinistris ultime tabule illius partis, qui est annorum creationis, et in prima eius linea transversali invenio de ciclo solis 11, littera dominicali A, dies Octobris 7, ferie 7, hore 14, et partes 314. Et hos numeros pono per ordinem sic hoc modo: ciclus solis (11), mensis (October), dies (7), ferie (7), hore (14), partes (314). Hiis subscribo preacceptas residuitates sic: (24) – (14), (3), (22), (600).

Iam subtrahendi sunt numeri inferiores de superioribus, quilibet de suo simili, incipiendo a numero partium. Partes ergo inferiores tamen sunt plures nec possunt a superioribus per se subtrahi. Subtrahantur ab eis et una hora resoluta in partes 1080 et dempta de numero horarum. Postea subtrahantur hore de horis, residuis additis hore unius diei, dempti tam de

10 residuitatibus] resuitatibus *D*

incarnation according to Dionysius and add to them 3760 years and what will result is the number of years from Creation according to the modern Hebrews. It is by the aforementioned method and doctrine, however, that the first conjunction and day of the year is investigated in the chapter on the inundation of the Flood.

Since this thing is nonetheless [still] obscure, we shall investigate where in the calendar—on what day, in what year of each cycle, and on what day of the week—was the first conjunction of the year 5055 since Creation. I thus look for 5054 in the first line of the second part of the previous table (which is the [table] of surpluses), and since it is not found there, I take the next smallest number, namely 4560, which contains 60 quadruples of cycles, but 240 simple ones. And next to it, I find the values of the surplus as follows: solar cycle (4), days (14), days of the week (5), hours (11), parts (840).

I take away 4560 from 5054, which is the number of completed years, and there remain 494. And I look for this remainder in the first line of the first part of the same table. And again, I do not find it there, but the next smallest number found there is 456, which contains 6 quadruples of cycles, but 24 simple ones, and next to it I find for the surpluses: solar cycle (20), days (1), days of the week (5), hours (10), parts (840).

Adding these 456 years to the previous 4560 yields 5016, which contain 66 quadrupled cycles of conjunctions, but 264 simple ones. And when the surpluses are added together [we get]: solar cycle (24), days (15), days of the week (3), hours (22), parts (600), once an hour has been made out of the 1080 resulting parts and 7 has been subtracted from the days of the week. The combined number, i.e. 5016, must be taken away from the total number of complete years, i.e. 5054: and there remain 38, which become 39 after one unit for the incomplete year has been added. And once the number is obtained, I look for it in the first line to the left of the last table of this part, which is [for] the years since Creation, and in its first horizontal line I find '11' for the solar cycle, 'A' for the dominical letter, the 7th of October, the seventh day of the week, 14 hours and 314 parts. And I put down these numbers according to order in this fashion: solar cycle (11), month (October), days (7), days of the week (7), hours (14), parts (314). And below this I write the previously calculated surplus: (24) – (14), (3), (22), (600).

And now the lower numbers must be subtracted from the ones above, each from its counterpart, starting with the number of parts. Now, the parts below are greater and thus cannot be subtracted by themselves from the ones above. They must therefore be subtracted from the ones above and from one hour resolved into 1080 parts, which must be taken away from the number of hours. Hereafter, hours must be subtracted from hours, while the

numero dierum, quam feriarum. Post hoc subtrahantur numerus feriarum de suo simili residuo et numerus dierum de diebus remanentibus Octobri. Et adiunctis 30 diebus Septembris, qui precedit Octobri, et loco eius scribendus. Ultimo deleatur cicli numerus solaris de sibi superiori adiunctis 28, qui est numerus annorum unius cicli. Hoc facto remanent numeri prime coniunctionis anni 5055, qui est et annus Christi 1295, licet inceptus in anno 1294. Et erunt numeri remanentes hoc modo: ciclus solis (15), September (21), feria (3), hore (15), partes (794). In ciclo solari 15 semper littera dominicali est C, sicut patet in linea litterarum e directo anni 15 cicli solaris. Prima igitur coniunctio anni a creatione 5055 erit, modo hoc Anno Domini 1294, qui etiam est annus 15 cicli solaris, C littera dominicali, 21 die mensis Septembris, feria 3 ad partes 794, hore 16.

Si autem idem numeri residuitatum fuissent subtracti de numeris secunde linee deserventis anno 39 creationis, remansissent numeri coniunctionis paschalis anni instantis. Immo si subtrahantur per ordinem de omnibus coniunctionibus scriptis in tabula a 39 anno creationis usque in finem, pervenient per ordinem omnes coniunctiones similes, id est coniunctiones initiales et paschales omnium istorum 38 annorum proximo futurorum, vel certe generaliter, si subtrahentur de omnibus coniunctionibus per ordinem omnium annorum 76 primorum mundi tam scriptis in tabula, quam non scriptis, provenirent utique omnes coniunctiones per ordinem omnium annorum istorum 38 iam completorum et 38 futurorum, et hec est omnium 76 annorum inceptorum a principio Anni Domini 1257 usque ad finem Anni Domini 1332. Et hec sufficiant.

hours of one day, taken away from both the number of [calendar] days and weekdays, must be added to the remainder. Next, the number of weekdays must be subtracted from its corresponding value and the number of [calendar] days from the remaining days of October. And September, which precedes October, must be written in its place whilst 30 days are added. Finally, the number of solar cycles must be subtracted from the above number whilst 28 are added, which is the number of years in one cycle. After this is done, the result will be the numbers for the first conjunction of the year 5055, which corresponds to the year of Christ 1295, although the latter already begins in 1294. And the result will be: solar cycle (15), September (21), day of the week (3), hours (15), parts (794). When the solar cycle is 15, the dominical letter is always C, as is shown in the line of the [dominical] letters right next to the year 15 of the solar cycle. The first conjunction of the year 5055 since Creation, which falls in this Year of the Lord 1294, which is also year 15 of the solar cycle [and has] the dominical letter C, will therefore be on the 21st day of September, on the third day of the week, at 794 parts of the 16th hour.

Yet if this number of surpluses had been subtracted from the numbers in the second line belonging to the year 39 since Creation, the result would have applied to the numbers for the paschal conjunction of the coming year. Indeed, if it is consecutively subtracted from all conjunctions written in the table from the 39th year since Creation until the end, this would result in all corresponding conjunctions, one after another, i.e. all initial and paschal conjunctions for the next 38 years; or, surely, in general, if they are consecutively subtracted from all conjunctions of all first 76 years of the world, whether or not written in the table, this would certainly result in all conjunctions, one after another, for the 38 years that have already been completed as for the 38 future ones, i.e. of the entire range of 76 years that starts with the beginning of AD 1257 and ends with AD 1332. And this shall be enough [on this subject].

TABULA 9[a]

Cyclus 19lis	Anni a primo secundum Marianum	Opinantes	Littere dominicales	Menses latinorum	Dies	Ferie	Hore	Partes horarum	Ferie initiales. mensis[b]	Conceptionis			Annunt.	
										Dies	Menses	Ferie	Ferie	Luna
17	1	Marianus	C	Sep	21	3	4	213	3	1	Oct	6	6	9
12	15	Hebrei	F	Sep	15	1	23	242	2	26	Sep	5	3	13
16	19	Eusebius	A	Sep	1	6	23	219	7	12	Sep	3	1	28
1	23	Dionisius	C	Sep	17	6	11	989	7	28	Sep	3	6	13
8	30	Gerlandus	B	Sep	1	5	3	67	5	11	Sep	1	1	29
9	31	Beda	G	Sep	19	4	0	646	5	30	Sep	1	2	10

Quarte partis sunt due tabule leves, quarum prima habet 6 lineas transversales, id est a leva in dexteram protractas penes diversitatem sex opinionum de anno incarnationis et conceptionis beati Iohannis Baptiste. Ponuntur autem nomina opinantium in uno ordine a sursum usque deorsum, et in eadem linea protensa a leva in dexteram cum nomine cuiusvis opinantis e directo eius scribitur quotus de Annis Domini secundum Marianum, qui primus est, fuerit annus ille quem talis opinans ponit primum annum incarnationis, quotus etiam annus fuit cicli 19lis incepti a Ianuario, que littera dominicalis, quando etiam fuerat prima coniunctio anni Hebraici illius sive primi mensis, in cuius die 11 Johannes conceptus creditur. Et hec coniunctio distincte ponitur quoad mensem kalendarii nostri diem, feriam, horas perfectas, et partes, et hec singula patent per suprascriptiones linearum descendentium sive ordinum. Patet etiam in eadem linea transversali quota feria mensis ille primus anni Hebraici inceperit, utrum scilicet ipso die prime coniunctionis vel sequenti in crastino vel quoque die tertio; quo etiam die cuius mensis, qua feria, Iohannis conceptionis, que erat undecimo die primi mensis Hebreorum; postea qua etiam feria et quota luna dies annunciationis evenerit, que distincte ex inscriptionibus, tam communibus quam propriis, elucescunt.

Tabula 9[a]] *om. D* ‖ [b]MS *E om.* col. 10 ('Ferie initiales mensis'). **16** erat] *om. D* **17** quota] quata *D*

TABLE 9

19-year cycle	Years from the first according to Marianus	Opinion-holders	Dominical letters	Latin Months	Days	Weekdays	Hours	Parts of the hours	Initial weekdays of the month	Conception Days	Conception Months	Conception Weekdays	Annun. Weekdays	Annun. Lunar age
17	1	Marianus	C	Sep	21	3	4	213	3	1	Oct	6	6	9
12	15	Hebrei	F	Sep	15	1	23	242	2	26	Sep	5	3	13
16	19	Eusebius	A	Sep	1	6	23	219	7	12	Sep	3	1	28
1	23	Dionisius	C	Sep	17	6	11	989	7	28	Sep	3	6	13
8	30	Gerlandus	B	Sep	1	5	3	67	5	11	Sep	1	1	29
9	31	Beda	G	Sep	19	4	0	646	5	30	Sep	1	2	10

The fourth part has two easy tables, because the first one has six horizontal lines, which run from left to right according to the six different opinions on the year of the incarnation and conception of St. John the Baptist. The inscriptions correspond to the names of the opinion holders, which run in one order from top to bottom. And next to the name of any opinion holder, the same line that stretches from left to right shows the Years of the Lord according to Marianus, who is the first in order, i.e. from year that he thought to be the first since the incarnation, as well as the position in the 19-year cycle (starting from January), the dominical letter, and also the time of the first conjunction of the Hebrew year, or of its first month, on whose 11th day John is believed to have been conceived. And this conjunction is respectively dated according to the month in our calendar, the day of the week, the completed hours, and the parts; and all of this is indicated by the titles of the descending lines or rows. The same horizontal line also shows on what day of the week this first month of the Hebrew year began, that is whether it was on the same day as the conjunction, or on the following day or on the third day; and also on what day of what month and on what day of the week the conception of John, which was on the 11th day of the first month of the Hebrews, took place; thereafter also on what day of the week and on what day of the moon the Annunciation occurred, which is all elucidated by the headings, both the general and particular ones.

TABULA 10[a]

Anni Christi	Ciclus 19lis	Littere dominicales	Menses latinorum	Dies	Ferie	Hore	Partes horarum	Ferie paschales	Menses	Dies pasche	
34[b]	13	B	Mar	11	6	20	195	7	Mar	26	Iste primus annus erat annus passionis, id est annus 34 ab incarnatione secundum Marianum
35	14	A	Mar	30	5	17	784	5	Apr	13	
36	15	G	Mar	20[c]	3	2	580	3	Apr	3	
37	16	F	Mar	9	7	11	376	7	Mar	23	Passio possibilis 14 die
38	17	D	Mar	27	6	8	965	7	Apr	11	Passio possibilis utroque modo
39	18	C	Mar	16	3	17	761	3	Mar	30	
40	19	B	Mar	6	1	2	557	1	Mar	20	
41	1	A	Mar	25	7	0	66	7	Apr	8	Passio possibilis 14 die
42	2	F	Mar	13	4	8	942	5	Mar	28	
43	3	E	Apr	1	3	6	451	3	Apr	15	
44	4	D	Mar	21	7	15	247	7	Apr	4	Passio possibilis 14 die tantum
45	5	C	Mar	11	5	0	43	5	Mar	25	
46	6	A	Mar	28	3	21	632	5	Apr	13	
47	7	G	Mar	18	1	6	428	1	Apr	1	
48	8	F	Mar	7	5	15	224	7	Mar	23	Passio secundum Hebreos die 14 vel 15 vel 16
49	9	E	Mar	26	4	12	813	5	Apr	10	
50	10	C	Mar	14	1	21	609	3	Mar	30	
51	11	B	Apr	2	7	19	118	1	Apr	17	Passio possibilis 14 die, sed pascha omnino ante plenilunium
52	12	A	Mar	23	5	3	994	5	Apr	6	Passio secundum Eusebium quod est impossibile
53	13	G	Mar	12	2	12	790	3	Mar	27	

Tabula 10[a]] *om. D* ‖ 34[b] … 64] 12 … 42 *E* ‖ 20[c]] 30 *D*

TABLE 10

Years of Christ	19-year cycle	Dominical letters	Latin months	Days	Weekdays	Hours	Parts of the hours	Paschal weekdays	Months	Paschal days	
34	13	B	Mar	11	6	20	195	7	Mar	26	This first year was the year of the Passion, i.e. the 34th year from the incarnation, according to Marianus
35	14	A	Mar	30	5	17	784	5	Apr	13	
36	15	G	Mar	20	3	2	580	3	Apr	3	
37	16	F	Mar	9	7	11	376	7	Mar	23	Passion possible on the 14th day
38	17	D	Mar	27	6	8	965	7	Apr	11	Passion possible either way
39	18	C	Mar	16	3	17	761	3	Mar	30	
40	19	B	Mar	6	1	2	557	1	Mar	20	
41	1	A	Mar	25	7	0	66	7	Apr	8	Passion possible on the 14th day
42	2	F	Mar	13	4	8	942	5	Mar	28	
43	3	E	Apr	1	3	6	451	3	Apr	15	
44	4	D	Mar	21	7	15	247	7	Apr	4	Passion possible on the 14th day only
45	5	C	Mar	11	5	0	43	5	Mar	25	
46	6	A	Mar	28	3	21	632	5	Apr	13	
47	7	G	Mar	18	1	6	428	1	Apr	1	
48	8	F	Mar	7	5	15	224	7	Mar	23	Passion according to the Hebrews: on the 14th or 15th or 16th day
49	9	E	Mar	26	4	12	813	5	Apr	10	
50	10	C	Mar	14	1	21	609	3	Mar	30	
51	11	B	Apr	2	7	19	118	1	Apr	17	Passion possible on the 14th day, but with Passover wholly before the full moon
52	12	A	Mar	23	5	3	994	5	Apr	6	Passion according to Eusebius: which is impossible
53	13	G	Mar	12	2	12	790	3	Mar	27	

TABULA 10 (*cont.*)

Anni Christi	Ciclus 19lis	Littere dominicales	Menses latinorum	Dies	Ferie	Hore	Partes horarum	Ferie paschales	Menses	Dies pasche	
54	14	E	Mar	30	1	10	299	3[a]	Apr	15[b]	
55	15	D	Mar	19	5	19	95	7	Apr	4	Passio possibilis die 14 vel 15 vel 16
56	16	C	Mar	9	3	3	971	3	Mar	23	Passio secundum Dionisium sed impossibilis
57	17	B	Mar	28	2	1	480	3[c]	Apr	12[d]	
58	18	G	Mar	16	6	10	276	7	Mar	31	Passio possibilis 14 die vel 15
59	19	F	Mar	5	3	19	72	5	Mar	21	
60	1	E	Mar	24	2	16	661	3	Apr	8	
61	2	D	Mar	14	7	1	457	7	Mar	28	Passio possibilis 14 die tantum
62	3	B	Mar	31	5	22	1046	7	Apr	16	Passio possibilis 14 vel 15 vel 16
63	4	A	Mar	21	3	7	842	3	Apr	4	
64	5	G	Mar	10	7	16	638	7	Mar	24	Passio secundum Bedam et Garlandum, scilicet 14 die tantum, et adhuc pascha ante plenilunium

Item prima linea a sinistris ultime tabule ponitur per ordinem numerus Annorum Domini secundum Marianum inceptus a 34, qui fuit secundum eundem annus passionis, secundum Dionisium vero fuit annus 12 ab incarnaitone. Et protenditur usque ad annum 64 secundum eundem Marianum, qui fuit annus 34, et per consequens passionis secundum Bedam et Gerlandum, sed 42 secundum Dionisium. E directo vero cuiuscumque anni ponitur coniunctio mensis paschalis in ipso anno quoad mensem kalendarii et diem eius et feriam, qua accidit ipsa coniunctio, et quoad horas perfectas et partes horarum imperfectarum. Ponitur etiam feria initialis mensis usualis et, per

3[a]] 2 *D* ‖ 15[b]] 13 *DE* ‖ 3[c]] 2 *DE* ‖ 12[d]] 11 *DE* 7 42] 49 *D*

TABLE 10 (*cont.*)

Years of Christ	19-year cycle	Dominical letters	Latin months	Days	Weekdays	Hours	Parts of the hours	Paschal weekdays	Months	Paschal days	
54	14	E	Mar	30	1	10	299	3	Apr	15	
55	15	D	Mar	19	5	19	95	7	Apr	4	Passion was possible on the 14th or 15th or 16th day
56	16	C	Mar	9	3	3	971	3	Mar	23	Passion according to Dionysius: but this is impossible
57	17	B	Mar	28	2	1	480	3	Apr	12	
58	18	G	Mar	16	6	10	276	7	Mar	31	Passion possible on the 14th or 15th
59	19	F	Mar	5	3	19	72	5	Mar	21	
60	1	E	Mar	24	2	16	661	3	Apr	8	
61	2	D	Mar	14	7	1	457	7	Mar	28	Passion possible on the 14th day only
62	3	B	Mar	31	5	22	1046	7	Apr	16	Passion possible on the 14th or 15th or 16th
63	4	A	Mar	21	3	7	842	3	Apr	4	
64	5	G	Mar	10	7	16	638	7	Mar	24	Passion according to Bede and Gerland, but only on the 14th day, when Passover was still before the full moon

Likewise, the first line to the left of the last table indicates the number of the years of the Lord according to Marianus in consecutive order, beginning from the 34th, which according to him was the year of the Passion, whereas according to Dionysius it was the 12th year since the incarnation. And it is stretched out until the 64th year according to the same Marianus, which according to Bede and Gerland was the 34th and, by consequence, [the year] of the Passion, whereas it was the 42nd according to Dionysius. Next to each year, however, is put down the conjunction of the paschal month in this year, as pertains to the month of the calendar and its day and the day of the week on which this conjunction occurred, and also to the completed hours and the parts of the incomplete hours. [The table] also [contains] the

consequens, diei paschalis, que est semper 15 mensis. Ostenditur etiam quo die in kalendario eadem paschalis dies eveniat. Suus autem numerus, ad quid scribitur designandum, docent capitales tituli linearum. Non fuit autem possibile secundum fidem ewangelii Christum passum fuisse nisi in aliquo annorum quibus dies prima mensis Nisan usualis et etiam pasche 7 feria evenerat, et hoc sive consimili feria fuerat coniunctio, sive feria 6, sive quoque feria 5, ex quo patet quo anno licet ponere Christum fuisse passum, et quo non. Et hoc est illius tabule propositum (Deo gratias).

Explicit compotus Hebreorum

initial weekday of the conventional month and, by consequence, also of the paschal day, which is always the 15th of the month. It further shows on what day in the calendar the paschal day occurred. The line headings, however, teach what each number is meant to designate. Based on the faith in the Gospels, however, Christ could only have suffered in a year whose first day of the conventional month of Nisan and also its paschal day had occurred on the seventh day of the week, and the conjunction fell either on this or a similar weekday (either the sixth or also fifth day of the week), from which it becomes clear to which year the Passion of Christ can be assigned, and to which it cannot. And this is the purpose of this table (thanks to God).

Here ends the computus of the Hebrews

CHAPTER 4

Nicholas Trevet's *Compotus Hebreorum* (1310)

1 Introduction

Hebraistic activity in England continued well beyond the expulsion of the Jews of 1290, albeit on a somewhat smaller scale than had been reached during the thirteenth century. In 1312, the Council of Vienne issued a decree calling for the establishment of teaching posts in Greek and oriental languages at the papal court and at four major universities (Paris, Oxford, Bologna, and Salamanca). Following this injunction, the bishops in the Province of Canterbury made provisions to procure tax funds aimed at paying a Jewish convert named John of Bristol for teaching Hebrew and Greek at Oxford, which seems to have taken place from at least 1320 to 1325.[1] This convert may have been identical with the *Magister Johannes dudum conversus*, who is mentioned as a source in a commentary on the Psalter written around this time by Henry Cossey (d. 1336), regent master to the Cambridge Franciscans in about 1325–1326, who evidently knew some Hebrew. Aside from his converted Jewish master, Cossey's exposition of the Psalms adduces Rashi, the Talmud, and the *Superscriptio Lincolniensis*, but also more exotic sources such as the Targum pseudo-Jonathan, Moses ha-Darshan, and Berekhiah ha-Nakdan, relying, for the most part, on citations in Nicholas of Lyra.[2] Another contemporary English scholar with Hebraistic

1 Robert Weiss, "England and the Decree of the Council of Vienne on the Teaching of Greek, Arabic, Hebrew, and Syriac," *Bibliothèque d'Humanisme et Renaissance* 14 (1952): 1–9. For the convert's name, see Wood, *Historia*, 1:159; Cecil Roth, "The Jews in the English Universities," *Jewish Historical Society of England: Miscellanies* 4 (1942): 102–115 (104); Roth, "Jews in Oxford after 1290," *Oxoniensia* 15 (1950): 63–80. See further Berthold Altaner, "Die Durchführung des Vienner Konzilsbeschlusses über die Errichtung von Lehrstühlen für orientalische Sprachen," *Zeitschrift für Kirchengeschichte*, 3rd Ser., 52 (1933): 226–236; Altaner, "Raymundus Lullus und der Sprachkanon (can. 11) des Konzils von Vienne (1312)," *Historisches Jahrbuch* 53 (1933): 190–219.

2 Montague Rhodes James, *A Descriptive Catalogue of the Western Manuscripts in the Library of Christ's College, Cambridge* (Cambridge: University Press, 1905), 28–36; Arduin Kleinhans, "Heinrich von Cossey O.F.M.: Ein Psalmen-Erklärer des 14. Jahrhunderts," in *Miscellanea Biblica et Orientalia*, ed. Adalbert Metzinger (Rome: Herder, 1951), 239–253. On the possible identity of *Magister Johannes*, see ibid., 249. On Cossey and his commentary, see further Hirsch, "Presidential Address," 10–11; Little, *Franciscan Papers*, 139–141; Smalley, *Hebrew Scholarship*, 4–5; Smalley, *The Study*, 344, 348–352; Loewe, "Jewish Scholarship," 136; Klepper, *The Insight*, 121–122.

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leanings was Nicholas Trevet (1257/65–1334 or after), who first becomes visible as a member of the Dominican order in 1297. His scholarly career eventually led him to the position of regent master at Oxford from 1303 until 1307 and again in 1314/15, while the intervening years were partly spent in Italy and at the University of Paris. In 1324, he was a *lector* at the Dominican convent in London, as one can tell from a letter of Pope John XXII to the papal legate in England, in which the latter was enjoined to send a copy of Trevet's commentary on the Psalter (p. 339 below) to the curia.[3]

Nicholas Trevet was, in the words of Beryl Smalley, "a true polymath, being theologian, biblicist, hebraist, historian and classicist."[4] This is borne out by the considerable size of his corpus of writings, which comprises at least thirty titles (two dozen of which are still extant) and covers all of the aforementioned fields.[5] Today, he is perhaps best known for his historical works, which include the *Annales sex regum Angliae* (written ca. 1320/23), covering the reigns of the first six Plantagenet kings, from 1135 to 1307, and *Les Cronicles*, an Anglo-Norman compendium of universal history, written between 1327 and 1334 for the Princess Mary of Woodstock (1278–1332), a sister of King Edward II, who had become a nun. In addition, Trevet penned a Latin *Historia ab origine mundi ad Christum natum* (1327/28), which he dedicated to Hugh of Angoulême, the

3 On Trevet's life and works, see Franz Ehrle, "Nikolaus Trivet, sein Leben, seine Quodlibet und Quaestiones ordinariae," in *Abhandlungen zur Geschichte der Philosophie des Mittelalters* (Münster: Aschendorff, 1923), 1–63; Andrew G. Little and Franz Pelster, *Oxford Theology and Theologians, c. A.D. 1282–1302* (Oxford: Clarendon Press, 1934), 283–285; Ruth J. Dean, "The Life and Works of Nicholas Trevet, with Special Reference to His Anglo-Norman Chronicle" (PhD Diss., University of Oxford, 1938); Ezio Franceschini, *Studi e note di filologia latina medievale* (Milan: Società editrice "Vita e Pensiero," 1938), 19–26; J.I. Catto, "Theology and Theologians 1220–1320," in *The History of the University of Oxford*, vol. 1, *The Early Oxford Schools*, ed. J.I. Catto (Oxford: Clarendon Press, 1984), 471–517 (513–517); Hester Goodenough Gelber, *It Could Have Been Otherwise: Contingency and Necessity in Dominican Theology at Oxford, 1300–1350* (Leiden: Brill, 2004), 62–63 (with references to further recent literature); Weijers, *Le travail*, 6:199–202; Russell L. Friedman, "Dominican Quodlibetal Literature, ca. 1260–1330," in *Theological Quodlibeta in the Middle Ages: The Fourteenth Century*, ed. Christopher Schabel (Leiden: Brill, 2007), 401–491 (426–429); James G. Clark, "Trevet [Trivet], Nicholas," *ODNB*, doi:10.1093/ref:odnb/27744.

4 Beryl Smalley, *English Friars and Antiquity in the Early Fourteenth Century* (Oxford: Blackwell, 1960), 58. See also ibid., 58–65.

5 On the bibliography of his writings, see, in addition to the previously cited literature, Thomas Kaeppeli, *Scriptores Ordinis Praedicatorum Medii Aevi*, 4 vols. (Rome: Ad S. Sabinae, 1970–1993), 3:187–196, 4:213–214; Stegmüller, *Repertorium*, 4:102–103; Glorieux, *La faculté*, 263–266; Sharpe, *A Handlist*, 394–398.

archdeacon of Canterbury and papal nuncio in England.[6] Another large block of his writings consists of biblical commentaries (e.g. on Genesis, Exodus, Leviticus, Chronicles, and Psalms), not all of which have been preserved. Trevet also produced commentaries on St. Augustine's monastic rule[7] and *On the City of God*,[8] on the *De disciplina scholarium* ascribed to Boethius, and on Walter Map's twelfth-century *Dissuasio Valerii ad Rufinum*.[9] His earliest known work, a commentary on Boethius's *De consolatione philosophiae*—completed during a stay in Florence that must have taken place before his inception as an Oxford master in 1303—, was at the same time the most popular one among his contemporaries. It exists in roughly 100 manuscripts and was later famously used by Chaucer for his Middle English translation of the *Consolatio*, known as the *Boece*.[10] A fellow Dominican named Nicholas of Prato, cardinal bishop of Ostia

6 Antonia Gransden, *Historical Writing in England, c. 550 to c. 1307* (London: Routledge and Kegan Paul, 1974), 501–507; Ruth J. Dean, "Nicholas Trevet, Historian," in *Medieval Learning and Literature*, ed. J.J.G. Alexander and M.T. Gibson (Oxford: Clarendon Press, 1976), 328–352; Robert A. Pratt, "Chaucer and *Les Cronicles* of Nicholas Trevet," in *Studies in Language, Literature, and Culture of the Middle Ages and* Later, ed. E. Bagby Atwood and Archibald A. Hill (Austin: The University of Texas, 1969), 303–311. See also Little, *Franciscan Papers*, 38–40; Frank A.C. Mantello, "The Editions of Nicholas Trevet's *Annales sex regum Angliae*," *Revue d'histoire des textes* 10 (1980): 257–275; Laura Barefield, "Lineage and Womens Patronage: Mary of Woodstock and Nicholas Trevet's *Les Cronicles*," *Medieval Feminist Forum* 35 (2003): 21–30. The dedicatory letter to Hugh of Angoulême is found edited in Dean, "The Life and Works," 446–449.

7 See Raymond Creytens, "Les commentateurs dominicains de la Règle de S. Augustin du XIIIe au XVIe siècle," *Archivum Fratrum Praedicatorum* 33 (1963): 121–157 (139–149).

8 See Beryl Smalley, "Thomas Waleys O.P.," *Archivum Fratrum Praedicatorum* 24 (1954): 50–107 (86–107); Smalley, *English Friars*, 88–100; Thomas Kaeppeli, "Une critique du commentaire de Nicolas Trevet sur le *De civitate dei*," *Archivum Fratrum Praedicatorum* 29 (1959): 200–205; Kaeppeli, "Opere latine attribuite a Jacopo Passavanti," *Archivum Fratrum Praedicatorum* 32 (1962): 145–179 (155–162).

9 Ruth J. Dean, "Some Unnoticed Commentaries on the *Dissuasio Valerii* of Walter Map," *Mediaeval and Renaissance Studies* 2 (1950): 128–150.

10 Ruth J. Dean, "The Dedication of Nicholas Trevet's Commentary on Boethius," *Studies in Philology* 63 (1966): 593–603. See most recently Lodi Nauta, "The Scholastic Context of the Boethius Commentary by Nicholas Trevet," in *Boethius in the Middle Ages*, ed. Maarten J.F.M. Hoenen and Lodi Nauta (Leiden: Brill, 1997), 41–67; E.T. Silk and Margaret Bolton-Hall, "Exposicio Fratris Nicolai Trevethi Anglici Ordinis Predicatorum super Boecio De consolacione," in *L'"Orpheé" de Boèce au Moyen Âge*, ed. J. Keith Atkinson and Anna Maria Babbi (Verona: Edizioni Fiorini, 2000), 197–211; Dario Brancato, "Readers and Interpreters of the *Consolatio* in Italy, 1300–1550," in *A Companion to Boethius in the Middle Ages*, ed. Noel Harold Kaylor, Jr. and Philipp Edward Phillips (Leiden: Brill, 2012), 357–411 (363–372).

(1303–1321) and a leading figure at the papal court in Avignon, was so pleased with the work that he asked Trevet to produce commentaries on the whole corpus of tragedies by Seneca the Younger.[11] In addition to his expositions of the Senecan tragedies (ca. 1315) and the pseudo-Senecan *Octavia*,[12] the English scholar also went on to write a commentary on the *Declamationes* of Seneca the Elder, the completion of which had been urged by the confessor to King Edward II, John of Lenham, to whom the work is also dedicated.[13] A further commentary on a classical work, the histories of Livy, was undertaken by Trevet at the behest of Pope John XXII (1316–1334), who also became the recipient of a commentary on *Genesis*.[14] As these examples clearly show, Nicholas Trevet was not only a remarkably prolific, but also well-connected author, who often sat down to write at the express request of powerful patrons. Besides the pope and other aforementioned examples (Nicholas of Prato, Hugh of Angoulême, Princess Mary, John of Lentham), these included John Droxford (or Drokensford), the bishop of Bath and Wells (1309–1329), to whom Trevet addressed a *Liber de officio missae*. Another noteworthy patron was John of Bristol, the Dominican Order's Prior Provincial for England, who wrote to Trevet requesting a literal and historical exposition of the Psalter, a copy of which was also sent to the papal curia.[15]

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11 Ruth J. Dean, "Cultural Relations in the Middle Ages: Nicholas Trevet and Nicholas of Prato," *Studies in Philology* 45 (1948): 541–564; Franceschini, *Studi e note*, 26–55; A.J. Minnis and A.B. Scott, eds., *Medieval Literary Theory and Criticism, c. 1100–c. 1375* (Oxford: Clarendon Press, 1988), 340–344; Simonetta Marchitelli, "Nicholas Trevet und die Renaissance der Seneca-Tragödien," pts. 1 and 2, *Museum Helveticum* 56 (1999): 36–63, 87–104.

12 See Rebekka Junge, *Nicholas Trevet und die Octavia Praetexta: Editio princeps des mittelalterlichen Kommentars und Untersuchungen zum pseudosenecanischen Drama* (Paderborn: Schöningh, 1999).

13 See Nigel F. Palmer, "Das 'Exempelwerk der englischen Bettelmönche': Ein Gegenstück zu den 'Gesta Romanorum'?" in *Exempel und Exempelsammlungen*, ed. Walter Haug and Burghart Wachinger (Tübingen: Niemeyer, 1991), 137–172. The dedicatory letter is edited in Dean, "The Life and Works," 444–445.

14 See Ruth J. Dean, "The Earliest Known Commentary on Livy Is by Nicholas Trevet," *Medievalia et Humanistica* 3 (1945): 86–98; Robert Weiss, "Notes on the Popularity of the Writings of Nicholas Trevet, O.P., in Italy during the First Half of the Fourteenth Century," *Dominican Studies* 1 (1948): 261–265; Leonardo Van Acker, "Nicolas Trevet et son interprétation de quelques passages de Tite-Live," *L'Antiquité classique* 31 (1962): 252–257; Curt J. Wittlin, "Tite-Live, Trevet, Bersuire," *The Humanities Association Review* 28 (1977): 217–231. The dedicatory letter to the *Expositio super Genesim* is edited in Dean, "The Life and Works," 433–436.

15 Dean, "Cultural Relations," 548–549, 551–554, 557–558. For the text of the dedicatory letters to John of Bristol and John Droxford, see Dean, "The Life and Works," 440–443.

This *Commentum in Psalterium*, written between 1317 and 1320 and preserved in five manuscripts, was based on Jerome's *Hebraica* rather than the more common Gallican version of the text.[16] In the explication of individual Psalms, Trevet not only cited Josephus and the standard authorities such as Jerome, Augustine, Cassiodorus, and Isidore, but also had frequent recourse to the *Guide for the Perplexed* of Moses Maimonides, who is referenced no less than 60 times, usually as *rabbi Moyses* or *Mosse*.[17] While he most likely read the *Guide* in Latin translation, some of his references to the opinions of the 'Judaei', the language of the 'Hebraei', and to 'Gamaliel', which was a commonly used Christian moniker for Talmudic lore, suggest that Trevet possessed at least a rudimentary knowledge of Hebrew.[18] One case in point are his remarks on the original Hebrew titles of individual Psalms, which he cites in Latin transcriptions. To give just one example, Psalm 5 begins with the instruction: לַמְנַצֵּחַ אֶל-הַנְּחִילוֹת, מִזְמוֹר לְדָוִד ("For the leader, upon the *neḥiloth*. A Psalm of David"). In Jerome's translation (5:1), the expression 'upon the *neḥiloth*' is rendered as *pro haereditatibus* ("for inheritances"). As Trevet correctly points out, this is a mistake based on a confusion between the Hebrews word for "flute" (*neḥilah*) and that for "inheritance" (*naḥalah*). The title line thus spoke about the musical instrument used to accompany the Psalm.[19] Henry Cossey, who drew

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The letter to John of Bristol is also transcribed and translated, with explanatory notes, in Bruce P. Shields, "A Critical Edition of Selections from Nicholas Trivet's *Commentarius literalis in Psalterium iuxta Hebraeos sancti Hieronymi*" (PhD Diss., Rutgers University, 1970), 57–66.

16 A study of the text with editions of the dedicatory letter, preface, and the commentaries on Ps. 1, 6, 32, 37, 51, 102, 130, and 143 is found in Shields, "A Critical Edition" (previous note). See further Arduin Kleinhans, "Nicolaus Trivet O.P. Psalmorum Interpres," *Angelicum* 20 (1943): 219–236; Friedrich Stummer, "Zwei Bruchstücke aus einer Handschrift des Kommentars des Nicolaus Trevet zum *Psalterium iuxta Hebraeos Hieronymi* im Archiv des Juliuspitals zu Würzburg," in *Festschrift Hans Vollmer* (Potsdam: Athenaion, 1941), 153–163; Hubert M. Stadler, "Textual and Literary Criticism and Hebrew Learning in English Old Testament Scholarship, as Exhibited by Nicholas Trevet's *Expositio litteralis Psalterii* and by MS Corpus Christi College (Oxford) 11" (MLitt thesis, University of Oxford, 1989); Smalley, *Hebrew Scholarship*, 10; Dahan, *Les intellectuels*, 268–269, 304–305; Olszowy-Schlanger, "Robert Wakefield," 77.

17 Shields, "A Critical Edition," 18–20, 158–159; Kleinhans, "Nicolaus Trivet," 234.

18 Shields, "A Critical Edition," 23–27, 161. On medieval Christian references to 'Gamaliel', see n. 64 in Appendix I below.

19 Kleinhans, "Nicolaus Trivet," 224–225. The same distinction is made in Rashi's commentary on Psalm 5:1. Some manuscripts of Trevet's Psalter commentary also contain illustrations of Hebrew musical instruments. See ibid., 228; Ehrle, "Nikolaus," 30; Christopher

upon Trevet's commentary in his own work on the Psalter, confirms that the Dominican consulted a Jewish scholar about the Hebrew text, which is a credible statement, given the evidence.[20]

From the testimony of the Oxford theologian Thomas Gascoigne (1404–1458), we also know of the one-time existence of a copy of Trevet's commentary on the Psalms that contained a parallel Hebrew text besides the Latin translation.[21] Smalley connected Gascoigne's testimony to a bilingual Hebrew-Latin Psalter of the late thirteenth century, found in MS Oxford, Corpus Christi College, 11, whose glosses contain citations from the *Superscriptio Lincolniensis* and a number of remarks on the Hebrew that recur in Trevet's commentary. In his conclusion, the glossator mentions how he collated various Latin translations of the Psalter with the Hebrew original and that he was aided by Jews in his work.[22] Smalley's suggestion, however, that Trevet may have been the anonymous glossator of these pages, was rejected by later scholarship.[23]

2 Context, Contents, and Sources

Given Trevet's evident interest in Hebrew as a biblical language and in the rabbinic interpretation of the sacred text, it is perhaps not surprising that his studies also covered the subject of the Jewish calendar. The evidence comes from MS Oxford, Merton College, 188 (henceforth: M), a parchment codex (iii + 253 fols.; 295×185 mm) written in England early in the fourteenth century and therefore probably still within Trevet's lifetime. It comprises three of his works, including the aforementioned *Liber de officio missae* (218^{v}–249^{v}), written for John Droxford, and the only known copy of a commentary on Leviticus (2^{r}–215^{v}).[24] The commentary is prefaced by a letter written by Aymeric of Piacenza

Page, "Biblical Instruments in Medieval Manuscript Illumination," *Early Music* 5 (1977): 299–309 (300); Page, "Early 15th-Century Instruments in Jean de Gerson's 'Tractatus de Canticis'," *Early Music* 6 (1978): 339–349 (340–342).

20 Smalley, Hebrew Scholarship, 5.

21 Winifred A. Pronger, "Thomas Gascoigne," pts. 1 and 2, *English Historical Review* 53 (1938): 606–626 (621); 54 (1939): 20–37 (20).

22 MS Oxford, Corpus Christi College, 11, fol. 110^{v}. See Smalley, *Hebrew Scholarship*, 9–13; Smalley, *The Study*, 345–347.

23 Stadler, "Textual and Literary Criticism," 35–38; Olszowy-Schlanger, *Les manuscrits*, 18, 162.

24 For descriptions, see Henry O. Coxe, *Catalogus Codicum MSS. qui in Colegiis Aulisque Oxoniensibus hodie adservantur*, 2 vols. (Oxford: E Typographeo Academico, 1852), 1:75; Powicke, *The Medieval Books*, 134–135; J.J.G. Alexander and Elżbieta Temple, *Illuminated*

(d. 1327), Master General of the Order of Preachers, who headed the meeting of the Dominican General Chapter in Strasbourg in 1307. At this occasion, the Chapter is known to have received for its official approval Trevet's commentaries on the books of Genesis (probably a different version to the one later sent to Pope John XXII) and Exodus (which has not been preserved). As the letter in MS M shows, Aymeric was so positively impressed with these commentaries that he requested Trevet to write further expositions of the remaining three books of the Pentateuch. He also commanded that the Dominican exegete should be furnished with books in order to expedite his assignment.[25] Trevet complied by producing the present Leviticus commentary and promised to soon complete the outstanding two books.[26]

Sandwiched in between the Leviticus commentary and the *Liber de officio missae* is a short treatise on the Hebrew calendar (fols. 215^{v}–218^{r}), titled *Compotus Hebreorum*, which thus far has received no closer attention in Trevet scholarship.[27] It begins immediately after the commentary on Leviticus, from which it is separated only by a brief title line. Like the rest of the manuscript, the text is written in two columns of 40 to 43 lines in a gothic rotunda, which

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Manuscripts in Oxford College Libraries (Oxford: Oxford University Press, 1985), 28; Rodney M. Thomson, *A Descriptive Catalogue of the Medieval Manuscripts of Merton College, Oxford* (Cambridge: Brewer, 2009), 138–139. An owner's note on fol. 1^{v} says "Liber domus scolarium de Marton' in Oxon' ex legato Magistri Ioh' Raynham sacre pagine professoris et quondam socii eiusdem domus." Since John Reynham is known to have died in 1376, this is the *terminus post quem* for the manuscript's entry into Merton College Library.

25 MS M, fol. 2ra: "Verum si occasione huiusmodi propter orginalia habenda seu quecumque alia utilia pro dicto opere perficiendo ad quecumque loca fratres mittere fuit opportunum, auctoritate mea possitis mittere de diffinitorum consilio et assensu." The full text of Aymeric's letter and Trevet's reply are edited in Dean, "The Life and Works," 437–439. See further Dean, "Cultural Relations," 548, 557–558.

26 MS M, fol. 2^{rb}: "Exposicionem librorum legis Moysayce, cuius complementum in cumulum meritorum previa potestate mihi iniunxistis, quamvis multis intercurrentibus impedimentis non ea celeritate quam vellem, ea tamen quam potero, diligencia vestris innixus missionibus quas Sancti Spiritus instinctu dirigi non dubito ad finem utcumque perducere conabor optatum."

27 MS M, fol. 215va: "Incipit compotus Hebreorum." Once again, I shall adopt the title *Compotus Hebreorum* with this particular spelling of the word *compotus*, which was the common one in the thirteenth and fourteenth century (see n. 130 in Chapter One above). The text is briefly mentioned in Bale, *Index*, 309; Tanner, *Bibliotheca*, 732n; Ehrle, "Nikolaus Trivet," 30; Sarton, *Introduction*, 3:943; Dean, "Cultural Relations," 547; Thorndike, "Computus," 225; Stegmüller, *Repertorium*, 4:103; Kaeppeli, *Scriptores*, 3:189; Glorieux, *La faculté*, 266; Dahan, *Les intellectuels*, 328.

is conspicuous for its unusually thick strokes and the deep black of the ink used.[28] The main text stops on fol. 217^{rb}, leaving the rest of the page empty, and is followed on fols. 217^{v} and 218^{r} by three elaborate tables using Latin numerals. These tables were drawn up by a different, much thinner, hand, which also features in the chapter headings of the main text and in several interlinear corrections and marginal additions. It is difficult to tell whether or not both these 'hands' belonged to the same scribe, but it is clear that whoever owned the 'corrector's hand' had a very precise idea of what the finished text was supposed to look like.

In any case, there is no reason to doubt that the *Compotus Hebreorum* is one of Trevet's works, despite the fact that this attribution has been treated as uncertain by some scholars, notably Sharpe, whose *Handlist* marks the work with a '?' and refers to it as "an annexe to the commentary on Genesis [sic!], and preceding his *De officio missae* in the manuscript, but without evidence of authorship."[29] This statement ignores the fact that the Hebrew *computus* is directly connected to the Leviticus commentary, as becomes obvious not only from its placement within the MS, but also from its incipit (*Expleta expositione Levitici* …), which explicitly refers to the preceding commentary. It is therefore fairly safe to conclude that the *Compotus Hebreorum* was conceived by Nicholas Trevet as a companion piece to his commentary, serving as a chronological addendum that would elucidate the calendrical background to some of the feasts mentioned in the book of Leviticus.[30] From a dating clause contained in the text, it can be inferred that the *Compotus Hebreorum* was written in 1310 and hence only three years after the Dominican meeting in Strasbourg that sparked Aymeric of Piacenza's interest in Trevet's abilities as an exegete and led the latter to pen his Leviticus commentary. It is certainly not unrealistic to suppose that this commentary was completed in the same year 1310 or only slightly earlier, thus further strengthening the connection between both texts.

As has just been noted, the main purpose of the *Compotus Hebreorum* was to explicate the calendrical framework behind the feasts instituted by Moses and mentioned in the book of Leviticus. In the first of altogether seven chapters, Trevet emphasizes this particular exegetical utility of the Jewish calendar, noting that a thorough understanding of the nature of the Hebrew *computus* will

28 Thomson, *A Descriptive Catalogue*, 139, aptly summarizes the main hand as "a low-grade gothic rotunda bookhand, using a thick nib and very black ink."

29 Sharpe, *A Handlist*, 396.

30 This conclusion is confirmed by Dean, "The Life and Works," 121.

help avoid errors of the kind that the Venerable Bede criticizes in *De temporum ratione* with regard to the chronology of the Exodus. Some of Bede's predecessors had counted 50 days between the first slaying of the Passover lamb on the day before the Exodus (14 Nisan) and the day when the Law was given (3 Sivan). This calculation, which can, for instance, be found in the works of St. Augustine, presupposes an equal length of 30 days for all months of the Hebrew year (17 + 30 + 3 = 50). As Bede pointed out, however, the intervening month of Iyyar only has 29 days, thus lowering the interval to 49 days.[31] It is in order to forestall such errors that Trevet sets out to describe the present-day calendar of the Jews in some detail. Similar to his predecessor Robert of Leicester, Trevet thus implicitly regarded this calendar as an ancient institution that reflected the calendrical principles presupposed by the Hebrew Scriptures.

His readiness to attach an exposition of the Jewish calendar to his Leviticus commentary hints at a personal interest and competence in chronological and astronomical matters that went beyond what can be ordinarily expected from a fourteenth-century Christian exegete. Trevet's astronomical bent is indeed clearly reflected by another work from his pen, a set of canons and tables for the meridian of Salisbury, geared towards the calculation of conjunctions, oppositions and eclipses (*Canones de coniunctionibus, oppositionibus et ecclypsibus solis et lune*).[32] In addition, it is worth noting that several items among his theological *quodlibeta* deal with themes related to astronomy, such as "whether planets move according to epicycles" (III.8: *Utrum planetae moveantur secundum epicyclos*) and "whether some of the superior orbits move faster than oth-

31 Bede, *De temporum ratione* 11 (CCSL 123B, 314–315): "Unde nonnullo moveor scrupulo, quomodo maiores nostri diem qua lex data est, quae est tertia mensis tertii, quinquagesimam ab agni occisione, computent, ponentes videlicet primi mensis residuos dies numero xvii, quia tredecim priores fuerant ante pascha transacti, secundi xxx, tertii iii, qui fiunt simul dies l, cum constet duos menses lunares non lx, sed lviiii diebus terminari. Ideoque si paschalis mensis xxx diebus computatus xvii sui cursus dies post pascha retinuerit, secundum iam mensem non xxx sed undetriginta, diebus debere concludi, ac per hoc in summa temporis memorati non plus quam undequinquaginta dies inveniri." Cf. Augustine, *Epistolae* 55.30 (CSEL 34.2, 204–205); Augustine, *Quaestiones in Heptateuchum* 70 (CCSL 33, 102). See also Roger Bacon, *Opus majus*, 1:199–200.

32 An imperfect version of the *Canones* is attested in MS Dublin, Trinity College Library, 392, fols. 33^{r}–44^{v}: "Incipit prologus fratris Nicholai Treuet in canones coniunctionum et oppositionum et eclipsium ad meridiem civitatis Sarum secundum annos lunares a predicatione Dominici computatos. Multis excrescit desideria ardua aggrediendi …" Some bibliographies of Nicholas Trevet also list an unidentified *De astronomia liber I*. See Ehrle, "Nikolaus Trivet," 17; Franceschini, *Studi e note*, 25.

ers" (V.20: *Utrum aliqui orbes superiores moveantur velocius quibusdam*).[33] In light of this evident astronomical interest, it is striking to note that the *Compotus Hebreorum* largely eschews technical details such as the calculation of the *molad* or the conspicuous differences in computational accuracy that existed between the Christian and Jewish lunisolar cycles. The only indication that the author was aware of these issues is a marginal addition on the bottom of fol. 215^{vb}, informing us that the new moon dates in the Jewish calendar do not exactly correspond to the Golden Numbers in the ecclesiastical calendar, but can sometimes fall two or three days earlier.[34] This addition can be assigned to the aforementioned 'corrector's hand', which was also responsible for the chapter headings and for several other marginal and interlinear glosses that emend errors or augment the text. It is likely that at least some of these glosses constitute genuine parts of the text, whose insertion was intended by the author. In chapter 3, for instance, the main text initially only mentioned two crucial differences between the Jewish and the Christian lunar calendar: (1) the different positions of the embolismic month and (2) the greater number of different year lengths known to the Jews. The corrector's hand added an additional paragraph in the lower margin of fol. 216^{rb}, which dealt with the different starting points of both 19-year cycles. Rather than just tacking this information onto the previous two items, the corrector designated the point made in the margin as the "second difference" (*alia diversitas*) and used signs to indicate that it was meant to be inserted right after the first difference. At the same time, the numbering of the second difference in the text was changed via erasure from *II.* to *III. diversitas* in order to accommodate this new ordering.

Chapter 2 starts by elucidating the twofold definition of the 'first month' in the Jewish calendar, which could fall either in spring (Nisan) or in autumn (Tishri). Trevet's rendering of this fact is actually more specific, as he writes

33 See quodlibets III.8, IV.23, IV.24, and V.20 in the list of contents published by Palémon Glorieux, *La littérature quodlibétique de 1260 à 1320* (Kain: Revue des sciences philosophiques et théologiques, 1925), 250, 252–253.

34 MS M, fol. 215^{vb}: "Et nota quod initium primi mensis isto modo secundum primationem kalendarii nostri semper est post VI kl. Septembris et ante V kl. Octobris. Sed quia quando aput nos est luna prima, apud Iudeos est quandoque III vel IIII, potest eorum mensis primus quandoque incipere aput eos ante VI kl. Septembris." The *Compotus Constabularii*, written 135 years earlier, already contains a very similar passage. See MS London, BL, Cotton Vitellius A.XII, fol. 90^{rb}: "Omnis enim lunatio que nobis incipit post VI kl. Septembris et ante V kl. Octobris primus mensis est anni lunaris secundum modernos Iudeos. Ideo autem diximus 'que nobis incipit' etc., plerumque enim luna prima nobis dicitur quando ipsa est secunda vel tertia vel etiam quarta secundum Iudeos."

that the Jews "define as the first month the one whose full moon first occurs after the autumnal equinox" or, alternatively, the one "whose full moon first occurs after the vernal equinox." In the case of Tishri, this statement is flatly contradicted by the aforementioned gloss found on the same page (fol. 215^{vb}), where the observation is made that 1 Tishri can fall before 27 August.[35] Since the autumnal equinox in Trevet's time would have fallen on 14/15 September, this was clearly too early to fulfil the above definition. Neither did it conform to the *tekufot* Tishri according to Rav Ada, which could fall later than 15 Tishri.[36] On the other hand, there is evidence for the one-time existence of a stipulation of this sort in the Babylonian Talmud (*Sanhedrin* 13a), where R. Jose and R. Judah argue about the intercalation rules to keep Sukkot (which begins on 15 Tishri) from falling before the beginning of autumn. Was Nicholas Trevet aware of this passage? Given the fairly basic level of his treatise, which betrays no first-hand acquaintance with Hebrew or rabbinic sources, this not particularly likely. Much rather, it would seem that Trevet simply modeled the 'rule of the autumnal equinox' by way of analogy after the better-known 'rule of the vernal equinox', which was a core element of the Easter *computus*. Another interesting aspect of Trevet's account is his remark that the beginning of the year in autumn was in line with the custom of the Egyptians, among whom the Hebrews had dwelt before the Exodus. This tidbit of information was likely taken directly from Josephus's *Antiquities* (1.80–81), although relevant passages can also be found in Bede, Peter Comestor or Vincent of Beauvais.[37]

In chapter 3, Trevet goes on to mention the basic characteristics of the Jewish lunar calendar, briefly describing its 19-year cycle and the six different year forms. His terminology happens to be identical to that of Robert of Leicester, who rendered *ḥaserah* ('defective') as *diminutus*, *kesidrah* ('in order') as *perfectum*, and *shelemah* ('perfect') as *superfluus* (see p. 161 above). Curiously, however, he does not explain how these variations in year length partly come about as a result of postponements (*deḥiyyot*) of 1 Tishri. Moreover, unlike

35 See previous footnote.

36 For proof, see table 2 of Robert of Leicester's treatise.

37 Flavius Josephus, *Antiquitates Judaice* (1.3.3), ed. Blatt, *The Latin Josephus*, 133 (see n. 132 in Chapter Three above for the quotation). Peter Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 33 (PL 198, 1084): "Moyses autem in legitimis Nisan, id est Aprilem, primum mensem constituit, secundum Josephum. In contractibus vero, id est in mercibus faciendis, et in alia gubernatione saeculi temporum decreta, et usualem ordinem mensium servavit." See further Bede, *De temporum ratione* 11 (CCSL 123B, 318); Vincent of Beauvais, *Speculum historiale* (1.25), ed. in *Speculum quadruplex*, 4:10, who are both referring to the beginning of the Egyptian year in September.

the treatises discussed previously, Trevet's *Compotus* nowhere deals with the *molad*-reckoning, nor does it show any interest in the conversion between Jewish and Julian dates. Its technical content is indeed largely concomitant with the second book of Robert of Leicester's treatise in that it is almost entirely based on a 247-year table as well as the corresponding table for the months and feasts (tables 4 and 5 in *De compoto Hebreorum*). Other than providing a general understanding of the structure of the Hebrew calendar, the purpose of Trevet's *Compotus Hebreorum* was thus largely limited to presenting an easy way of finding the weekday on which a particular month or feast would fall in a particular year of the Jewish world era.

In order to enable his readers to identify years according to this era, chapter 4 offers a brief chronology, which designates the years since Creation for various major biblical events, from the Flood to the destruction of the Second Temple. The first eight dates given in this chapter, up to the death of Moses, are identical to what can be found in Bede's *Greater Chronicle*, which was based on the 'Hebrew truth', i.e. the lower numbers found in the Masoretic text and its Vulgate translation. This results in a conspicuous deviation from Robert of Leicester's treatise, where the Exodus is dated to the year 2450 JE, whereas Bede and Trevet have it in AM 2453.[38] A major break from Bede comes with the interval between the Exodus and the foundation of the temple by Solomon, which Eusebius and the Northumbrian monk both took to be 480 years (on the basis of 1 Kings 6:1), but which in Trevet's chronology is inexplicably raised to 520 years (2973 – 2453 = 520).[39] For the next interval, he suddenly sides with Robert of Leicester and the rabbis (p. 182 above), counting only 410 years for the duration of the first temple (3383 – 2973 = 410), which is 20 years less than what Bede had assumed. His resulting year of the first destruction, AM 3383, looks conspicuously like a misreading of the rabbinic date (3338 JE), although this presupposes that Trevet's source used Hindu-Arabic numerals, in contrast to the Roman numerals found in MS M. A scribal error based on Roman numerals may lurk behind the date for the destruction of the Second Temple, which is 3828 JE (= I̅I̅I̅.DCCC.XXVIII) in rabbinic chronology, but appears as AM 3838 (= I̅I̅I̅.DCCC.XXXVIII) in MS M. Since Trevet also correctly notes that the Christian era from the incarnation of Jesus starts 3760 years after the creation, this would imply that the destruction took place in ca. 78 CE, which appears excessively late.

38 Bede, *De temporum ratione* 66 (CCSL 123B, 467–471).

39 Eusebius, *Die Chronik*, ed. Helm, 70; Bede, *De temporum ratione* 66 (CCSL 123B, 475–476).

In line with his focus on the Old Testament, Trevet does not go on to comment on the connection between the Jewish calendar and the date of Christ's Passion, which had played a major role in the treatise written 16 years earlier by his compatriot Robert of Leicester. This does not mean, however, that Trevet took no personal interest in the chronology of Jesus's life. Far from it: in a quodlibetal disputation held in ca. 1303, he had previously dealt with the question "whether everything that the Church transmits with regard to the Passion of Christ must be admitted" (*Utrum omnia sint admittenda quae tradit Ecclesia circa passionem Christi*).[40] His solution to the Passion problem largely followed the model of Marianus Scottus, who dated the crucifixion to 25 March 12 CE, arguing that the Dionysiac era was based on a faulty chronology that omitted 22 years of Roman imperial history. Unlike Marianus, however, Trevet did not deem it possible to repair this error, because the "heathen" chroniclers on which Dionysius Exiguus had relied had hopelessly jumbled the years of the Roman emperors that followed upon Jesus's time. He thus declared that the Church was best served in retaining its traditional incarnation era.[41]

While Trevet thus shared Robert of Leicester's predilection for Marianus Scottus's Passion date, it is interesting to note that his scholastic disputation relied on purely computistical means and made no effort to take into account the Jewish calendar. This is puzzling in light of the fact that his *Computus Hebreorum* clearly signalizes that Trevet considered the medieval Jewish calendar to have already been operational in biblical times, meaning that it would have lent itself perfectly to establishing the true date of the crucifixion. As we have seen, Robert of Leicester had pursued this idea a decade previous Trevet's disputation, coming to the same conclusion that Jesus probably died on 25 March 12 CE. One possible explanation for Trevet's omission of the Jewish calendar would be that he intended to simplify the problem for his audience by calculating the dates on the basis of the established Easter *computus*, knowing that the basic result would turn out the same in either case. Alternatively, Trevet may not have attained his own knowledge of the Hebrew calendar until after taking part in this disputation. Chronologically, this is perfectly possible, given that the disputation was held in ca. 1303 and hence ca. 7 years before the writing of the *Compotus Hebreorum*. Another possibility, perhaps the most sensible one, is to suppose that Trevet's understanding of the Jewish calendar was too basic to allow the kind of conversion into dates of the Julian calendar that

40 Glorieux, *La littérature*, 247 (quodl. I.13).

41 For all the pertinent details, see C.P.E. Nothaft, "Nicholas Trevet and the Chronology of the Crucifixion," *The Mediaeval Journal* 2, no. 2 (2012): 37–51.

would have been necessary for a proper investigation of the Passion chronology. The extremely rudimentary contents of the *Compotus Hebreorum* seem to support this, especially if we consider that it fails to touch upon the *molad*-system, whose mastery is an absolute prerequisite for performing calendrical conversions.

Chapters 5 and 6 contain an exposition of the three tables found in the appendix, whose principles are already familiar from the second book of Robert of Leicester's work. Using the first table, Trevet's readers could find for each out of 13×19 = 247 years the initial weekday and the corresponding year length. The seven possible types of common and seven possible types embolismic years that can thus be generated are represented in the two following tables, which lay out the internal structure of these years at one glance. Although their function is thus largely equivalent to tables 4 and 5 in Robert's *De compoto Hebreorum*, the tables in Trevet's treatise also contain some distinctive features. For one thing, MS M employs only Roman numbers, both in the tables and throughout the text, whereas the MSS of Robert of Leicester's treatise display their tables with Hindu-Arabic numerals. Also, while Robert's work combined the 14 different year types for common and embolismic years into a single table, Trevet's appendix features these as separate components, which are executed in far greater detail. His tables not only show the initial weekdays of the individual months, but also the lengths of these months and the weekdays of all major fasts and festivals of the Jewish year. In doing so, they ignore the fact that fasts other than Yom Kippur are illicit on a Sabbath and are therefore always delayed until Sunday if their normal dates were to fall on the seventh day of the week. A special case is the fast of Esther, normally on 13 Adar, which is moved to the previous Thursday, so it can precede Purim (the following Friday is needed as a day of preparation for the Sabbath and the Purim festival on Sunday).[42]

With regard to the 247-year table in MS M, it is interesting to observe that its four top lines proclaim this table to be valid for at least four such 247-year periods or 52 consecutive 19-year cycles, stretching from cycles no. 222 to 273, which span the years 439/40 CE (4200 JE) to 1426/27 CE (5187 JE). This is a striking departure from Robert's table, which only covers a single sequence of 247 years (1181–1427 CE). Indeed, since the cyclicity of the 247-year table breaks down for a few of years, the data displayed in any such table can only be fully accurate for a single 247-year period. Aside from a small number of copying errors, Trevet's table is in fact identical with Robert's in the sense that they

42 This is explained in Abraham Ibn Ezra, *Sefer Ha'ibbur* (II), ed. Goodman, 61, p. לד.

both best match the 247-year period that ran from 1181 CE to 1427 CE. This is incidentally the twenty-first 247-year period since the beginning of the Jewish world era, which covers cycles no. 261 to 273. The one major exception in Robert's and Trevet's table is the tenth of these thirteen 19-year cycles, which is not compatible with cycle no. 270, but rather with its predecessor no. 257 for two critical years (years 4 and 5 of the 19-year cycle), in which cyclicity is broken. If the serendipity of a copying error that just happens to conform to no. 257 is excluded, this finding implies that the final part of the table properly belongs to the previous 247-year period, which ended in 1180 CE. One explanation for this would be that the table found in both treatises was refashioned from a previous one, which had initially started in or close to cycle no. 257, but since this was not the beginning of a 247-year period if counted from creation, the starting date of the table was later on shifted forward to the 261st 19-year cycle, whilst retaining all the data of the original table. In this case, the redactor in question would have erroneously assumed that the calendrical data stayed exactly the same from one 247-year period to the next. That Trevet thought of the 247-year scheme in these terms is indeed evidenced by his statement that after this number of years "all the observations of the Hebrews are found in the same arrangement and in their original order."[43] Robert of Leicester, by contrast, clearly understood that 247 years were 905 parts or *ḥalakim* short of a complete number of days (p. 162), although this did not keep him from using his 247-year table to calculate biblical dates in the distant past. Nicholas Trevet, who at no point remarks on the division of the hour into 1080 *ḥalakim* or the precise length of the lunar month, seems to have been completely oblivious to these finer details of Hebrew calendation. Deficiencies of this kind may shed some doubt on the hypothesis that Trevet was acquainted with Robert of Leicester's *De compoto Hebreorum*, even though the latter may have been present at the University of Oxford during Trevet's tenure. This would it make all the more myserious, however, why Robert's and Trevet's treatises contain 247-year tables that happen to be structurally identical.

Since the treatise was originally conceived as an afterthought to a commentary on the book of Leviticus, which did not touch upon all the feasts listed in the table, Trevet felt compelled to add chapter 7, in which he briefly explained some of the Jewish feasts "not found in the Law" (*que non reperiuntur in lege*), meaning that they were not mentioned in the Pentateuch. These included

43 MS M, fol. 216va: "Est igitur sciendum quod prima tabula continet XIII ciclos lunares sive decemnovenales, hoc est CCXLVII annos, post quos omnis Hebreorum observantia ad statum eundem et ordinem pristinum reperitur."

Ḥanukkah and Purim as well as the major fasts commemorating later events in Jewish history. His comments on these feasts are largely self-explanatory for anyone familiar with the Old Testament and need not indicate any first-hand communication with Jewish informants. In the feast day tables in the appendix, Purim is shown to fall in Adar in common years, but in embolismic years it is assigned to the seventh month Veadar. In line with this fact, Trevet in chapter 3 writes that the Jews always place the embolismic month "after the fifth month from autumn" (*semper post quintum mensem eum collocant ab autumpno*). This correctly implies that the month added to a 'pregnant' year is not actually Veadar or Adar II, which is only 29 days long (as is Adar in common years), but the preceding Adar I, which is 30 days in length, as embolismic month in the Christian calendar generally are. Nicholas Trevet is in fact the only Latin author covered in this study to see clearly on this point.[44]

The text of the *Compotus Hebreorum* closes with an explication of the four main fasts of the Hebrew year, which largely follows Jerome's commentary on Zechariah 8:19, most of which was also incorporated into the *Decretum Gratiani*, the famous twelfth-century collection of canon law.[45] One should note that 10 Tevet is normally thought to commemorate the siege of Jerusalem by Nebuchadnezzar, whereas Trevet, following Jerome, associates it with the day on which Ezekiel heard about the destruction of the city. This squares badly with Scripture (Ezekiel 33:21), where the date given is 5 Tevet, but it is worth noting that R. Simeon (ben Lakish) in the Babylonian Talmud (*Rosh Hashanah* 18b) regards this day as the more appropriate explanation for the Fast of the Tenth Month.

3 The Edition

The following edition reproduces the text of the only preserved manuscript, here designated as M. Spelling and punctuation follow the original MS as closely as possible, although obvious errors have been corrected and the usage of d/t and c/t has been normalized in accordance with modern conventions. Additional text in the margins that has been incorporated into the main text is offset by smaller print. The appended tables are here given in the exact form found in M, with Roman numerals being used throughout.

44 See p. 569 below on the confusion evident in Hermann Zoest's work.

45 Jerome, *In Zachariam* 2.8.18/19 (CCSL 76A, 820–821) = *Decretum magistri Gratiani* (pars I, dist. 76, c. 7), ed. Emil Friedberg (Leipzig: Tauchnitz, 1879), 269–270.

215va **Nicolaus Trevet: Compotus Hebreorum**

Incipit compotus Hebreorum

Capitulum I: De utilitate sciendi compotum Hebraicum

Expleta expositione Levitici, in quo legalium sollemnitatum institutio facta est, convenienter annotanda videtur notitia compoti Hebraici, per quem quo mense et qua feria quelibet dictarum sollemnitatum festivitas incoanda seu celebranda sit valeat inveniri. Nec solum ad hoc, quod forte magis iudicabitur alicui curiosum quam utile, eo quod parvum curandum sit qua feria occurrat sollemnitas que observanti vertitur in perniciem, sed ad exponendum diversa scripturarum loca plurimam afferre commoditatem dinoscitur, in quibus nonnulli ob ignorantiam huiusmodi compoti copiosissime delirarunt. Testatur hoc Beda in libro de temporibus, qui errorem quorundam ex hac occasione circa computationem quinquagesime diei, in qua post exitum de Egipto lex data est, patenter ostendit.[1] Ut igitur in aliis error evitetur consimilis, brevi ac succincta doctrina prefatum compotum, qui ceteris est antiquior, explanare conabor.

Capitulum II: De duplici modo computandi secundum Hebreos

215vb In primis igitur sciendum quod Hebrei anno | utuntur lunari et mensibus lunaribus, inter quos diversimode primum mensem constituunt secundum quod diversimode secundum diversam computationem incipiunt annum suum.

Secundum enim computationem usualem, primum mensem anni ponunt illum cuius plenilunium occurrit primo post equinoctium autumpnalem. Dicitur autem hic annus 'usualis', quia huiusmodi anno utuntur in pactis et contractibus, conformiter cum Egiptiis, inter quos conversabantur antequam per Moysen lex eis data fuisset.[2] Ideo autem annum ab autumpno

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5 annotanda] annatenda *M* **6** mense] mensse *M* **8** sit] *mg. M* **10** commoditatem] ~~cupiditatem~~ comoditatem *M* **16** conabor] *s.l. M* **18** et] *s.l. M*

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[1] Bede, *De temporum ratione* 11 (CCSL 123B, 314–315).

[2] Cf. Flavius Josephus, *Antiquitates Judaicae* (1.3.3), ed. Blatt, 133; Petrus Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 33 (PL 198, 1084).

Nicholas Trevet: On the *Computus* of the Hebrews

Here Begins the *Computus* of the Hebrews

Chapter One: On the Usefulness of Knowing the Hebrew *computus*

Having finished the commentary on Leviticus, in which the observances according to the Law are established, it seems expedient to add a note on the Hebrew *computus*, by which one can find out in what month and on what day of the week any festivity among the aforementioned observances must begin or be celebrated. And not only to this end—which some might consider meddlesome rather than useful, given that there is little reason to care on what weekday an observance occurs that leads the one who observes it into perdition—, but it is [also] understood to bring the greatest utility in the exposition of various passages in the scriptures, where some people produce a great number of delirious words, owing to their ignorance of this *computus*. Bede testifies to this in his book on time, where he clearly points out an error made by some due to this [sort of ignorance], which has to do with the calculation of the 50th day, on which the Law was given after the exit from Egypt. In order, therefore, to make sure that such error be avoided in other cases, I will try to expound, in a brief and succinct fashion, the doctrine of the aforementioned *computus*, which is more ancient than all others.

Chapter Two: On the Twofold Way of Reckoning According to the Hebrews

As a first step one must therefore know that the Hebrews use a lunar year and lunar months, among which they establish different ones as the first month and thus begin their year according to different calculations.

For according to the 'usual' calculation, they define as the first month the one whose full moon first occurs after the autumnal equinox. This year, however, is called 'usual', because it is the year used in treatises and contracts, in conformity with the Egyptians, among whom they lived before the Law was given to them through Moses. The reason, however, they begin the

incoant, quia in illa parte anni putant mundum creatum, eo quod tunc tempus fructuum sit et in creatione omnia terre nascentia onusta fructibus sunt producta.[3] Secundum hunc modum computandi exponunt scripturam ubicumque ante legem datam quoto mense anni factum aliquid annotatur. Unde et diluvium, quod primo mense dicitur inundasse, ad autumpnum referunt, tempore iam ad hyemem declinante. Et nota quod initium primi mensis isto modo secundum primationem kalendarii nostri semper est post VI kl. Septembris et ante V kl. Octobris. Sed quia quando apud nos est luna prima apud Iudeos est quandoque III vel IIII potest eorum mensis primus quandoque incipere aput eos ante VI kl. Septembris.

Secundum vero computationem legalem annum incipiunt a vere, ponentes primum mensem illum, cuius plenilunium primo post equinoctium vernale occurrit, quo tempore per Moysen educti sunt de terra Egipti, unde in memoriam tanti beneficii legis preceptum erat quod mensem illum ponerent esse primum, iuxta illud Exodi: "*mensis iste principium mensium primus erit vobis in mensibus anni*."[4] Et hoc anno utuntur in observantionibus legalibus, unde et in computatione legalium sollemnitatum septimum mensem appellant, qui secundum computationem usualem ponitur esse primus. Unde que in scriptura in lege vel post legem datam secundum menses annotantur iuxta computationem hanc ultimam exponuntur.

Sancti autem exponentes scripturam ubique utuntur computatione legali, unde et mundum creatum in vere ponunt et diluvium etiam in vernali
216ra tempore | inundasse.[5] In kalendario autem Iudaico non secundum legalem, sed secundum computationem usualem menses ordinantur, sumpto anni principio ab autumpno.

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2 nascentia] *p.c. M* **4** ubicumque] *mg. M* **6–9** Et … Septembris] *mg. M*

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[3] Cf. Vincent of Beauvais, *Speculum historiale* (1.25), ed. in *Speculum quadruplex*, 4:10: "Hunc Arabes & Aegyptii incipiunt a Septembre, quia in creatione mundi leguntur arbores fructum habuisse."

[4] Ex 12:2 (ed. Weber, 91): "Mensis iste vobis principium mensuum primus erit in mensibus anni."

[5] Cf. Ambrose, *De Noe* 14.48 (CSEL 32.1, 445); Beda, *In Genesim* 2.7.11–12 (CCSL 118A, 115); Rupert of Deutz, *De sancta Trinitate et operibus eius* 4.25 (CCCM 21, 310–311); Petrus Comestor, *Historia scholastica*, Historia Libri Genesis, cap. 33 (PL 198, 1084).

year from autumn, is that they believe the world was created in this part of the year, seeing how this was the time of fruits and how everything that came forth from the earth at the creation was laden with fruit. They use this principle in expounding Scripture wherever something is recorded to have happened in a numbered month of the year before the Law was given. Accordingly, they assign the Flood, which is said to have take place in the first month, to the autumn, the season already verging towards winter. And note that the beginning of this first month according to this mode [of reckoning], always falls after the 6th before the kalends of September [27 August] and before the 5th before the kalends of October [28 September], [when reckoned] according to the new moon in our calendar. But since our first day of the moon is sometimes the third or fourth day for the Jews, their month can sometimes begin before the 6th before the kalends of September [27 August].

According to the 'legal' calculation, however, they begin the year in spring, taking as the first month the one whose full moon first occurs after the vernal equinox, at which time they were led out of the land of Egypt by Moses, which is why it was prescribed to them, in commemoration of this great favour, that they should count this month as the first, according to the passage in Exodus that says "this month shall be to you the beginning of months; it shall be the first in the months of the year." And they use this year in legal observances, which is why, in calculating the festivities of the Law, they call the 'seventh' the month that is counted as the first in their usual calculation. As a result, they expound events that are recorded in Scripture according to their months for the time of the Law or after the Law by using this latter calculation.

The Saints however, when interpreting Scripture, everywhere use the legal calculation, which is why they state that the world was created in spring and that the Flood likewise happened in springtime. In the Jewish calendar, however, the months are not ordered according to the legal, but according to the usual calculation, taking the year's beginning from autumn.

Capitulum III: Quomodo XIX anni lunares adequantur XIX annis solaribus

Equinoctia secundum revolutionem anni solaris determinantur, qui apud Iudeos annum lunarem, qui regulariter XII mensibus lunaribus constat, quandoque in X, quandoque in XI, quandoque vero in XII diebus transcendit, ex quorum collectione mensis a quo sumitur anni principium per abundantiam dierum huiusmodi a termino equinoctiali minutim elongetur. Quos intercalantes infra XIX annos VII ponunt XIII mensium lunarium, ita quod post XIX annos reditur ad idem principium, XIX annis solaribus totidem lunaribus penitus adequans.

Annum autem XII lunarium mensium vocamus 'communem', qui vero XIII habet menses dicitur 'embolismalis' (apud Iudeos appellatur 'pregnans'). Et quamvis in hoc Iudaicus compotus cum nostro conveniat, in hoc tamen differt quod nos mensem embolismalem non in uno loco certo, sed vario modo inserimus, illi autem semper post quintum mensem eum collocant ab autumpno. Est etiam alia diversitas, quia primus annus cicli annorum apud illos est quartus annus cicli nostri, ex quo accidit quod V eorum et XVI annus, qui apud nos VIII sunt et XIX, cum apud illos sunt communes apud nos sunt embolismales. Est etiam inter nos et ipsos III diversitas, quia nos annum lunarem communem uniformiter ponimus esse trecentorum quinquaginta quatuor dierum, embolismalem vero trecentorum LXXXIIII dierum, excepto decimonono, cui per saltum lune subtrahitur unus dies. Ipsi vero annum communem ponunt quandoque trecentorum quinquaginta trium dierum, quem vocant 'diminutum', quandoque trecentorum LIIII, quem dicunt 'perfectum', quandoque trecentorum LV, quem appellant 'superfluum'. Et similem diversitatem habent in anno embolismali vel pregnato, quem enim ponunt diminutum trecentorum LXXXIII dierum, aliquem perfectum trecentorum LXXXIIII | dierum, aliquem vero superfluum trecentorum LXXXV dierum.

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3 apud] aput *M* **7** elongetur] *add.* constituunt ~~VII menses XIII mensium lunarium~~ *M* ‖ Quos] *mg. M* **8** ita] *s.l. M* **11** Annum] *mg. M* **12** apud … pregnans] *mg. M* **16–18** Est … embolismales] *mg. M* **19** III] *p.c. M* **20** trecentorum] ccc.torum *M* **21** trecentorum] ccc.torum *M* **23** trecentorum] ccc.torum *M* **24** trecentorum] ccc.torum *M* ‖ trecentorum] ccc.torum *M* **26** pregnato] *s.l. M* ‖ trecentorum] ccc.torum *M* **27** trecentorum] ccc.torum *M* **28** trecentorum] ccc.torum *M*

Chapter Three: How 19 Lunar Years are Equated to 19 Solar Years

The equinoxes are determined according to the circuit of the solar year, which according to the Jews exceeds the lunar year, which normally consists of 12 months, sometimes by 10, sometimes by 11, and sometimes by 12 days, by whose accrual the month from which the year's beginning is taken is gradually shifted away from the date of the equinox, due to this kind of abundance of days. In intercalating these, they posit seven years that consist of 13 lunar months among [every] 19 years, such that [everything] is reverted to the same beginning after 19 years, completely equating 19 solar years with the same number of lunar years.

We call a year that consists of 12 lunar months 'common', but one that has 13 months is referred to as 'embolismic' (although the Jews call it 'pregnant'). And although the Jewish *computus* resembles ours in this respect, it nevertheless differs from ours in that we do not insert the embolismic month in a single place, but in various ways, whereas they always place it after the fifth month from autumn. There is also another difference, for their first year of the cycle of years is the fourth year of our cycle, which makes it that their 5th and 16th year, which to us are the 8th and 19th, are common in their reckoning, whereas they are embolismic in ours. There is also between us and them a third difference, because we uniformly count the common lunar years as having 354 days, while the embolismic year has 384 days, except in the 19th year, from which one day is subtracted by the leap of the moon. They, by contrast, count their common years sometimes as 353 days, which they call 'diminished', sometimes as 354 days, which they call 'perfect', and sometimes as 355 days, which they call 'superfluous'. And they have a similar diversity in their embolismic or pregnant years, the diminished ones among which have 383 days, the perfect ones 384 days and the superfluous ones 385 days.

Capitulum IIII: De computatione annorum ab origine mundi secundum Hebreos

Nec pretereundum est quod Iudei ab origine mundi annos suos annotant, quos multo pauciores quam Eusebius et alii cronografi ponunt, qui a translatione LXX numerum annorum extraxerunt, invenimus in Hebraica veritate. Ut autem promtius et facilius huiusmodi anni inveniantur, quorum numerum de translatione nostra extraximus secundum notabiliora que in scriptura sacra facta commemorantur, eos usque ad incarnationem Domini nostri Ihesu Christi convenienter curavimus annotare. Ad operandum enim per artem sequentem quam plurimum poterit hoc valere:

Ab origine mundi usque ad diluvium: Ī.DC.LVI
Ab origine mundi usque ad edificationem turris Babel: Ī.DCC.LVII
Ab origine mundi usque ad nativitatem Abrahe: Ī.DCCCC.XLVIII
Ab origine mundi usque ad nativitatem Ysaac: ĪĪ.XLVIII
Ab origine mundi usque ad nativitatem Iacob: ĪĪ.C.VIII
Ab origine mundi usque ingressum filiorum Israel in Egiptum: ĪĪ.CC.XXXVIII
Ab origine mundi usque ad egressum de Egipto: ĪĪ.CCCCLIII
Ab origine mundi usque ad mortem Moysy: ĪĪ.CCCC.XCIII
Ab origine mundi usque ad regem David: ĪĪ.DCCCC.XXIX
Ab origine mundi usque ad fundationem templi Salomonis: ĪĪ. DCCCC.LXXIII
Ab origine mundi usque ad transmigrationem Babilonis: ĪĪĪ.CCC.LXXXIII
Ab origine mundi usque ad reversionem de captivitate: ĪĪĪ.CCCCLIII
216va Ab origine mundi usque ad incarnationem Christi: ĪĪĪ.DCC.LX |
Ab origine mundi usque ad ultimam destructionem templi per Romanos: ĪĪĪ.DCCC.XXVIII
Ab origine mundi usque ad conscriptionem huius artis sive annum incarnationis M.CCC.X: ĪĪĪĪĪ.LXX.

28 ĪĪĪ.DCCC.XXVIII] ĪĪĪ.DCCC.XXXVIII *M* 30 ĪĪĪĪĪ.LXX] V.LXX *M*

Chapter Four: On the Calculation of the Years from the Origin of the World According to the Hebrews

And one shall not pass over the fact that the Jews designate their years from the origin of the world, of which we find much fewer in the Hebrew truth than are noted by Eusebius and other chronographers, who extracted the number of years from the Septuagint. In order to facilitate the finding of these years (whose number we have extracted from our translation according to the more notable facts that are commemorated in Sacred Scripture), we have taken the trouble to make a convenient list of them until the incarnation of our Lord Jesus Christ. For this will be a great help in working according to the art [that will be described] in what follows.

From the origin of the world until the Flood: 1656
From the origin of the world until the edification of the Tower of Babel: 1757
From the origin of the world until the birth of Abraham: 1948
From the origin of the world until the birth of Isaac: 2048
From the origin of the world until the birth of Jacob: 2108
From the origin of the world until the sons of Israel's entry into Egypt: 2238
From the origin of the world until the exit from Egypt: 2453
From the origin of the world until the death of Moses: 2493
From the origin of the world until King David: 2929
From the origin of the world until the foundation of Solomon's Temple: 2973
From the origin of the world until the removal to Babylon: 3383
From the origin of the world until the return from the captivity: 3453
From the origin of the world until the incarnation of Christ: 3760
From the origin of the world until the destruction of the temple by the Romans: 3828
From the origin of the world until this art was put into writing, or the year 1310 from the incarnation: 5070

Capitulum V: De invenienda nota anni et qualitate eiusdem

Hiis premissis ordinavimus tres tabulas per quas secundum artem tradendam inveniri poterunt que ad kalendarii Iudeorum notitiam requiruntur. Est igitur sciendum quod prima tabula continet XIII ciclos lunares sive decemnovenales, hoc est CCXLVII annos, post quos omnis Hebreorum observantia ad statum eundem et ordinem pristinum reperitur.

In capite ergo tabule ponitur numerus ostendens quotus sit quilibet illorum XIII ciclorum ab origine mundi pro moderno tempore. In quo autem illorum ciclorum sumus nunc, scietur tali arte: annos enim ab origine mundi accipe ex collatione anni quem queris ad cronicam precedentem, quos divide per XIX et numerus ex divisione exiens ostendet numerum ciclorum a principio mundi transactorum. Vide autem de numero diviso utrum aliquid remaneat vel non. Si non, sumus in ultimo anno cicli ultimi illorum quos per numerum exeuntem invenisti; si vero aliquid remanserit, adde numero exeunti unitatem et habebimus numerum ostendentem quotus sit ciclus in quo sumus ab origine mundi. Quere igitur in capite tabule numerum similem et nota lineam descendentem sub eo. Vide etiam numerum qui remanserit de numero diviso et quere similem in linea prima tabule descendente in sinistra parte tabule et considera ubi linea transversalis ab hoc numero
216^{vb} tracta concurrit cum | linea descendente a numero cicli prenotato. Et in concursu harum duarum linearum invenies notam anni tui. Numerus autem inscriptus ostendet qua feria annus tuus incipit, ita quod unitas designat diem dominicum et VII sabbatum. Littera vero superposita ostendit utrum annus ille sit diminutus, perfectus vel superfluus. 'D' enim 'diminutum', 'P'
217^{v} 'perfectum' et 'S' designat 'superfluum'. |

5 est] *s.l. M* **9** mundi] *s.l. M* **15** numerum] *mg. M* **20** prenotato] prenotata *M*

Chapter Five: On How to Find the Character and Type of a Year

With this being said, we have put together three tables by which the required information about the Jewish calendar can be found, using the method that is now going to be conveyed. One should know, therefore, that the first table contains 13 lunar or 19-year cycles, i.e. 247 years, after which each observance of the Hebrews is again found in the same position and in its original order.

The header of this table carries a number indicating, for modern times, the position of any of those 13 cycles since the beginning of the world. Our current place in any of these cycles, however, can be known by this method: take the years from the origin the world by comparing the year you look for with the preceding chronicle, divide the result by 19, and the number that comes out of this division will indicate the number of cycles that have been finished since the beginning of the world. Now see if anything remains of the number divided or not. If not, then we are in the last year of the last cycle of those cycles you have found through the resultant number; if something remains, however, you must add one unit to the resultant number and we will then have the number indicating what cycle since the beginning of the world we are in. Then look in the table's header for the same number and take note of the line that descends below it. Look also at the number that remains from the number divided and search for it the first line of the table that descends to the left, and consider the point at which the line that extends horizontally from this number meets with the line descending from the previously noted number of the cycle. And at the meeting point of these two lines you will find the character of your year. The inscribed number, however, shows on what weekday your year begins, such that one unit signifies the Lord's Day and VII the Sabbath. The above-written letter, however, shows whether the year in question is diminished, perfect or superfluous, because 'D' stands for 'diminished', 'P' for 'perfect' and 'S' for 'superfluous'.

TABULA 1

	CCXXII CCXXXV CCXLVIII CCLXI I	CCXXIII CCXXXVI CCXLIX CCLXII II	CCXXIIII CCXXXVII CCL CCLXIII III	CCXXV CCXXXVIII CCLI CCLXIIII IIII	CCXXVI CCXXXIX CCLII CCLXV V	CCXXVII CCXL CCLIII CCLXVI VI	CCXXVIII CCXLI CCLIIII CCLXVII VII	CCXXIX CCXLII CCLV CCLXVIII VIII	CCXXX CCXLIII CCLVI CCLXIX IX	CCXXXI CCXLIIII CCLVII CCLXX X	CCXXXII CCXLV CCLVIII CCLXXI XI	CCXXXIII CCXLVI CCLIX CCLXXII XII	CCXXXIIII CCXLVII CCLX CCLXXIII XIII	
I	S II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	S VII	P III	D VII	Communis
II	D VII	S II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	S VII	P III	Communis
III	P III	D VII	D II	D V	S VII	S II	S V	D II	D V	D VII	S II	S V	S VII	Pregnans
IV	S II	P V	S VII	P III	D VII	S II	P V	S VII	P III	S V	D II	P V	S VII	Communis
V	S VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	P III	S V	D II	P V	Communis
VI	D V	D VII	S II	S V	S VII	P III	D VII	D II	D V	S VII	P III	S V	D II	Pregnans
VII	P III	S V	D II	P V	S VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	Communis
VIII	S VII	P III	S V	D II	D V	D VII	S II	S V	S VII	P III	D VII	D II	D V	Pregnans
IX	S VII	S II	P V	S VII	P III	S V	D II	P V	S VII	S II	P V	S VII	P III	Communis
X	P V	D VII	S II	P V	S VII	P III	S V	D II	P V	S VII	S II	P V	S VII	Communis
XI	D II	P III	D VII	D II[a]	S V	S VII	P III	S V	D II	D V	D VII	S[b] II	S V	Pregnans
XII	S VII	S II	P V	S VII	P V	S VII	S II	P V	S VII[c]	P III	S V	D II	P V	Communis

Tab. 1: II[a]] V *M* ‖ S[b]] D *M* ‖ VII[c]] V *M*

TABLE 1

	CCXXII CCXXXV CCXLVIII CCLXI I	CCXXIII CCXXXVI CCXLIX CCLXII II	CCXXIIII CCXXXVII CCL CCLXIII III	CCXXV CCXXXVIII CCLI CCLXIIII IIII	CCXXVI CCXXXIX CCLII CCLXV V	CCXXVII CCXL CCLIII CCLXVI VI	CCXXVIII CCXLI CCLIIII CCLXVII VII	CCXXIX CCXLII CCLV CCLXVIII VIII	CCXXX CCXLIII CCLVI CCLXIX IX	CCXXXI CCXLIIII CCLVII CCLXX X	CCXXXII CCXLV CCLVIII CCLXXI XI	CCXXXIII CCXLVI CCLIX CCLXXII XII	CCXXXIIII CCXLVII CCLX CCLXXIII XIII	
I	S II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	S VII	P III	D VII	Common
II	D VII	S II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	S VII	P III	Common
III	P III	D VII	D II	D V	S VII	S II	S V	D II	D V	D VII	S II	S V	S VII	Pregnant
IV	S II	P V	S VII	P III	D VII	S II	P V	S VII	P III	S V	D II	P V	S VII	Common
V	S VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	P III	S V	D II	P V	Common
VI	D V	D VII	S II	S V	S VII	P III	D VII	D II	D V	S VII	P III	S V	D II	Pregnant
VII	P III	S V	D II	P V	S VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	Common
VIII	S VII	P III	S V	D II	D V	D VII	S II	S V	S VII	P III	D VII	D II	D V	Pregnant
IX	S VII	S II	P V	S VII	P III	S V	D II	P V	S VII	S II	P V	S VII	P III	Common
X	P V	D VII	S II	P V	S VII	P III	S V	D II	P V	S VII	S II	P V	S VII	Common
XI	D II	P III	D VII	D II	S V	S VII	P III	S V	D II	D V	D VII	S II	S V	Pregnant
XII	S VII	S II	P V	S VII	P V	S VII	S II	P V	S VII	P III	S V	D II	P V	Common

TABULA 1 (*cont.*)

	CCXXII	CCXXIII	CCXXIIII	CCXXV	CCXXVI	CCXXVII	CCXXVIII	CCXXIX	CCXXX	CCXXXI	CCXXXII	CCXXXIII	CCXXXIIII	
	CCXXXV	CCXXXVI	CCXXXVII	CCXXXVIII	CCXXXIX	CCXL	CCXLI	CCXLII	CCXLIII	CCXLIIII	CCXLV	CCXLVI	CCXLVII	
	CCXLVIII	CCXLIX	CCL	CCLI	CCLII	CCLIII	CCLIIII	CCLV	CCLVI	CCLVII	CCLVIII	CCLIX	CCLX	
	CCLXI	CCLXII	CCLXIII	CCLXIIII	CCLXV	CCLXVI	CCLXVII	CCLXVIII	CCLXIX	CCLXX	CCLXXI	CCLXXII	CCLXXIII	
	I	II	III	IIII	V	VI	VII	VIII	IX	X	XI	XII	XIII	
XIII	P V	S VII	S II	P V	D II	P V	D VII	S[a] II	P V	S VII	P III	S V	D II	Communis
XIV	D II	D V	D VII	S II	S V	D II	P III	D VII	S II	S V	S VII	P III	S V	Pregnans
XV	S VII	P III	S V	D II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	Communis
XVI	P V	S VII	P III	S V	S II	P V	S VII	S II	P V	D II	P V	D VII	S II	Communis
XVII	S II	S V	S VII	P III	D VII	D II	D V	S VII	S II	S V	D II	P III	D VII	Pregnans
XVIII	D II	P V	D VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	S II	P V	Communis
XIX	S V	D II	P III	D[b] VII	S II	S V	S VII	P III	D VII	D II	D V	S VII	S II	Pregnans

Tab. 1: S[a]] D *M* ‖ D[b]] P *M*

TABLE 1 (*cont.*)

	CCXXII CCXXXV CCXLVIII CCLXI I	CCXXIII CCXXXVI CCXLIX CCLXII II	CCXXIIII CCXXXVII CCL CCLXIII III	CCXXV CCXXXVIII CCLI CCLXIIII IIII	CCXXVI CCXXXIX CCLII CCLXV V	CCXXVII CCXL CCLIII CCLXVI VI	CCXXVIII CCXLI CCLIIII CCLXVII VII	CCXXIX CCXLII CCLV CCLXVIII VIII	CCXXX CCXLIII CCLVI CCLXIX IX	CCXXXI CCXLIIII CCLVII CCLXX X	CCXXXII CCXLV CCLVIII CCLXXI XI	CCXXXIII CCXLVI CCLIX CCLXXII XII	CCXXXIIII CCXLVII CCLX CCLXXIII XIII	
XIII	P V	S VII	S II	P V	D II	P V	D VII	S II	P V	S VII	P III	S V	D II	Common
XIV	D II	D V	D VII	S II	S V	D II	P III	D VII	S II	S V	S VII	P III	S V	Pregnant
XV	S VII	P III	S V	D II	P V	S VII	S II	P V	D II	P V	S VII	S II	P V	Common
XVI	P V	S VII	P III	S V	S II	P V	S VII	S II	P V	D II	P V	D VII	S II	Common
XVII	S II	S V	S VII	P III	D VII	D II	D V	S VII	S II	S V	D II	P III	D VII	Pregnant
XVIII	D II	P V	D VII	S II	P V	S VII	P III	D VII	S II	P V	S VII	S II	P V	Common
XIX	S V	D II	P III	D VII	S II	S V	S VII	P III	D VII	D II	D V	S VII	S II	Pregnant

216vb Si autem numerum ciclorum per numerum qui egreditur divisione facta per XIX non inveneris modo predicto in capite tabule, eundem numerum exeuntem, vel per se, si nullus annus remaneat, vel cum adiecta unitate pro annis residuis, divide per XIII, et si nullus remaneat sumus in ultimo ciclo. Si autem aliquid remanserit numerus residuus ostendet in quoto illorum XIII ciclorum sumus. Considera etiam ubi terminatur linea transversalis, in qua invenisti notam anni tui, in ultima linea descendente a dextris tabule, et scies utrum annus tuus sit communis vel embolismalis (seu pregnans).

Capitulum VI: De inveniendis feriis initialibus mensium festorum

Inventa ergo nota anni tui, quere eam in capite alterius duarum tabularum residuarum. Si enim fuerit annus communis, quere notam eius in capite tabule cui prescribitur 'note anni communis'. Si vero embolismalis (vel pregnans), quere eam in capite tabule cui prescribitur 'note anni embolismalis (vel pregnantis)'.

Inventa ergo nota anni in altera duarum tabularum, habebuntur in sinistris in prima linea numerus mensium, in secunda nomina mensium et in tertia nomina festorum celebrandorum in illo mense. In duobus vero lineis sub nota anni tui habebis qua feria quilibet mensis incipiat et qua feria quodlibet festum sit agendum. Et hoc in prima linea. In secunda vero linea contra
217ra quemlibet | mensem habentur quot dies mensis habeat et quota die mensis festum sit celebrandum. Quod si contra aliquem mensem in prima linea sit duplex numerus, designatur quod duobus diebus neomenia in epulis cele-
218r bratur, ita quod secundus numerus designat feriam mensis incoativam. |

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1 Si] *s.l. M* **8** seu pregnans] *s.l. M* **13–14** vel pregnans] *s.l. M* **15** vel pregnans] *s.l. M* **17–18** in tertia nomina] *mg. M*

If, however, you cannot find the number of cycles that results from a division by 19 in the table's header according to the stated method, you must to divide the same resultant number (either by itself, if there is no year remaining, or with one unit added for the remaining years) by 13 and if nothing remains we are in the last cycle. If something remains, however, the remainder will indicate in which of these 13 years we are in. Consider, moreover, the point at which the horizontal line, in which you found the character of your year, ends in the last line that descends to the right of the table, and you will know whether your year is common or embolismic (or pregnant).

Chapter Six: On How to Find the Initial Weekday of the Months and Feasts

Having thus found the character of your year, you must look for it in either of the two remaining tables. For if the year turns out to be common, you must look for its character in the header of the table that is overwritten 'the characters of the common year'. If, however, it is embolismic or pregnant, you must look for it in the header of the table that is overwritten 'the characters of the embolismic or pregnant year.'

Having thus found the character of your year in either of these two tables, the first line to the left is going to contain the number of the months, the second the names of the months and the third the feasts to be celebrated in this month. In the two lines below the year's character you will have on what weekday the month begins and on what weekday the respective feast would be due. And this is in the first line. In the second line, however, you have for each month how many days this month contains and on what day of the month the feast must be celebrated. But if any month in the first line has a double number, this signifies that the new moon is celebrated with banquets for two days, such that the second number signifies the initial weekday of the month.

TABULA 2

Tabula secunda			Note anni communis													
N.	N.M.	N.F.	D II		D VII		P III		P V		S II		S V		S VII	
I	Tysseri	Tubarum	II	XXX	VII	XXX	III	XXX	V	XXX	II	XXX	V	XXX	VII	XXX
		Ieiunium Godolie	IIII	III	II	III	V	III	VII	III	IIII	III	VII	III	II	III
		Dies Expiationis	IIII	X	II	X	V	X	VII	X	IIII	X	VII	X	II	X
		Scenofegie	II	XV	VII	XV	III	XV	V	XV	II	XV	V	XV	VII	XV
II	Marahisvan		III/IIII	XXIX	I/II	XXIX	IIII/V	XXIX	VI/VII	XXIX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
III	Caslev		V	XXIX	III	XXIX	VI	XXX	I	XXX	V/VI	XXX	I/II	XXX	III/IIII	XXX
		Encenniorum	I	XXV	VI	XXV	II	XXV	IIII	XXV	II	XXV	V	XXV	VII	XXV
IIII	Thebeth		VI	XXIX	IIII	XXIX	VII/I	XXIX	II/III	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX
		Ieiunium decimi	I	X	VI	X	III	X	V	X	III	X	VI	X	I	X
V	Sebath		VII	XXX	V	XXX	II	XXX	IIII	XXX	II	XXX	V	XXX	VII	XXX

Tab. 2: 'N.' = numerus mensis; 'N.M.' = nomina mensium; 'N.F.' = nomina festorum

TABULA 2 (*cont.*)

	Tabula secunda		Note anni communis													
VI	Adar		I/II	XXIX	VI/VII	XXIX	III/IIII	XXIX	V/VI	XXIX	III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX
		Ieiunium Hester	VII	XIII	V	XIII	II	XIII	IIII	XIII	II	XIII	V	XIII	VII	XIII
		Phurim	I	XIIII	VI	XIIII	III	XIIII	V	XIIII	III	XIIII	VI	XIIII	I	XIIII
VII	Nisan		III	XXX	I	XXX	V	XXX	VII	XXX	V	XXX	I	XXX	III	XXX
		Phase	III	XV	I	XV	V	XV	VII	XV	V	XV	I	XV	III	XV
VIII	Iar		IIII/V	XXIX	II/III	XXIX	VI/VII	XXIX	I/II	XXIX	VI/VII	XXIX	II/III	XXIV	IIII/V	XXIX
IX	Sivan		VI	XXX	IIII	XXX	I	XXX	III	XXX	I	XXX	IIII	XXX	VI	XXX
		Ebdomad.	IIII	VI	II	VI	VI	VI	I	VI	VI	VI	II	VI	IIII	VI
X	Tamuz		VII/I	XXIX	V/VI	XXIX	II/III	XXIX	IIII/V	XXIX	II/III	XXIX	V/VI	XXIX	VII/I	XXIX
		Ieiunium quarti	III	XVII	I	XVII	V	XVII	VII	XVII	V	XVII	I	XVII	III	XVII
XI	Ab		II	XXX	VII	XXX	IIII	XXX	VI	XXX	IIII	XXX	VII	XXX	II	XXX
		Ieiunium quinti	III	IX	I	IX	V	IX	I	IX	V	IX	I	IX	III	IX
XII	Elul		III/IIII	XXIX	I/II	XXIX	V/VI	XXIX	VII/I	XXIX	V/VI	XXIX	I/II	XXIX	III/IIII	XXIX

TABLE 2

Second table			The characters of the common year													
N.	N.M.	N.F.	D II		D VII		P III		P V		S II		S V		S VII	
I	Tishri	Rosh Hashanah	II	XXX	VII	XXX	III	XXX	V	XXX	II	XXX	V	XXX	VII	XXX
		Fast of Gedaliah	IIII	III	II	III	V	III	VII	III	IIII	III	VII	III	II	III
		Day of Atonement	IIII	X	II	X	V	X	VII	X	IIII	X	VII	X	II	X
		Tabernacles	II	XV	VII	XV	III	XV	V	XV	II	XV	V	XV	VII	XV
II	Marḥeshvan		III/IIII	XXIX	I/II	XXIX	IIII/V	XXIX	VI/VII	XXIX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
III	Kislev		V	XXIX	III	XXIX	VI	XXX	I	XXX	V/VI	XXX	I/II	XXX	III/IIII	XXX
		Encaenia	I	XXV	VI	XXV	II	XXV	IIII	XXV	II	XXV	V	XXV	VII	XXV
IIII	Tevet		VI	XXIX	IIII	XXIX	VII/I	XXIX	II/III	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX
		Fast of the Tenth	I	X	VI	X	III	X	V	X	III	X	VI	X	I	X
V	Shevat		VII	XXX	V	XXX	II	XXX	IIII	XXX	II	XXX	V	XXX	VII	XXX

TABLE 2 (*cont.*)

Second table			The characters of the common year												
VI	Adar		I/II	XXIX	VI/VII	XXIX	III/IIII	XXIX	V/VI	XXIX	III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX
		Fast of Esther	VII	XIII	V	XIII	II	XIII	IIII	XIII	II	XIII	V	XIII	VII	XIII
		Purim	I	XIIII	VI	XIIII	III	XIIII	V	XIIII	III	XIIII	VI	XIIII	I	XIIII
VII	Nisan		III	XXX	I	XXX	V	XXX	VII	XXX	V	XXX	I	XXX	III	XXX
		Passover	III	XV	I	XV	V	XV	VII	XV	V	XV	I	XV	III	XV
VIII	Iyyar		IIII/V	XXIX	II/III	XXIX	VI/VII	XXIX	I/II	XXIX	VI/VII	XXIX	II/III	XXIV	IIII/V	XXIX
IX	Sivan		VI	XXX	IIII	XXX	I	XXX	III	XXX	I	XXX	IIII	XXX	VI	XXX
		Shavuot	IIII	VI	II	VI	VI	VI	I	VI	VI	VI	II	VI	IIII	VI
X	Tammuz		VII/I	XXIX	V/VI	XXIX	II/III	XXIX	IIII/V	XXIX	II/III	XXIX	V/VI	XXIX	VII/I	XXIX
		Fast of the Fourth	III	XVII	I	XVII	V	XVII	VII	XVII	V	XVII	I	XVII	III	XVII
XI	Av		II	XXX	VII	XXX	IIII	XXX	VI	XXX	IIII	XXX	VII	XXX	II	XXX
		Fast of the Fifth	III	IX	I	IX	V	IX	I	IX	V	IX	I	IX	III	IX
XII	Elul		III/IIII	XXIX	I/II	XXIX	V/VI	XXIX	VII/I	XXIX	V/VI	XXIX	I/II	XXIX	III/IIII	XXIX

TABULA 3

Tabula tertia			Note anni pregnatis vel embolismalis													
N.	N.M.	N.F.	D II		D V		D VII		P III		S II		S V		S VII	
I	Tysseri	Tubarum	II	XXX	V	XXX	VII	XXX	III	XXX	II	XXX	V	XXX	VII	XXX
		Ieiunium Godolie	IIII	III	VII	III	II	III	V	III	IIII	III	VII	III	II	III
		Dies Expiationis	IIII	X	VII	X	II	X	V	X	IIII	X	VII	X	II	X
		Scenofegie	II	XV	V	XV	VII	XV	III	XV	II	XV	V	XV	VII	XV
II	Marahisvan		III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX	IIII/V	XXIX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
III	Caslev		V	XXIX	I	XXIX	III	XXX	VI	XXX	VI	XXX	I/II	XXX	III/IIII	XXX
		Encenniorum	I	XXV	IIII	XXV	VI	XXV	II	XXV	II	XXV	V	XXV	VII	XXV
IIII	Thebeth		VI	XXIX	II	XXIX	IIII	XXIX	VII/I	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX
		Ieiunium decimi	I	X	IIII	X	VI	X	III	X	III	X	VI	X	I	X
V	Sebath		VII	XXX	III	XXX	V	XXX	II	XXX	II	XXX	V	XXX	VII	XXX

Tab. 3: 'N.' = numerus mensis; 'N.M.' = nomina mensium; 'N.F.' = nomina festorum

TABULA 3 (*cont.*)

	Tabula tertia		Note anni pregnatis vel embolismalis												
VI	Adar		I/II	XXX	IIII/V	XXX	VI/VII	XXX	III/IIII	XXX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
VII	Va Adar		III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX	V/VI	XXIX	V/VI	XXIX	I/II	XXIX	III/IIII	XXIX
		Ieiunium Hester	II	XIII	V	XIII	VII	XIII	IIII	XIII	IIII	XIII	VII	XIII	II	XIII
		Phurim	III	XIIII	VI	XIIII	I	XIIII	V	XIIII	V	XIIII	I	XIIII	III	XIIII
VIII	Nisan		V	XXX	I	XXX	III	XXX	VII	XXX	VII	XXX	III	XXX	V	XXX
		Phase	V	XV	I	XV	III	XV	VII	XV	VII	XV	III	XV	V	XV
IX	Iar		VI/VII	XXIX	II/III	XXIX	IIII/V	XXIX	I/II	XXIX	I/II	XXIX	IIII/V	XXIV	VI/VII	XXIX
X	Sivan		I	XXX	IIII	XXX	VI	XXX	III	XXX	III	XXX	VI	XXX	I	XXX
		Ebdomad.	VI	VI	II	VI	IIII	VI	I	VI	I	VI	IIII	VI	VI	VI
XI	Thamuz		II/III	XXIX	V/VI	XXIX	VII/I	XXIX	IIII/V	XXIX	IIII/V	XXIX	VII/I	XXIX	II/III	XXIX
		Ieiunium quarti	V	XVII	I	XVII	III	XVII	I	XVII	I	XVII	III	XVII	V	XVII
XII	Ab		IIII	XXX	VII	XXX	II	XXX	VI	XXX	VI	XXX	II	XXX	IIII	XXX
		Ieiunium quinti	V	IX	I	IX	III	IX	VII	IX	VII	IX	III	IX	V	IX
XII	Elul		V/VI	XXIX	I/II	XXIX	III/IIII	XXIX	VII/I	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX

TABLE 3

Third table			The characters of the pregnant of embolismic year													
N.	N.M.	N.F.	D II		D V		D VII		P III		S II		S V		S VII	
I	Tishri	Rosh Hashanah	II	XXX	V	XXX	VII	XXX	III	XXX	II	XXX	V	XXX	VII	XXX
		Fast of Gedaliah	IIII	III	VII	III	II	III	V	III	IIII	III	VII	III	II	III
		Day of Atonement	IIII	X	VII	X	II	X	V	X	IIII	X	VII	X	II	X
		Tabernacles	II	XV	V	XV	VII	XV	III	XV	II	XV	V	XV	VII	XV
II	Marḥeshvan		III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX	IIII/V	XXIX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
III	Kislev		V	XXIX	I	XXIX	III	XXX	VI	XXX	VI	XXX	I/II	XXX	III/IIII	XXX
		Encaenia	I	XXV	IIII	XXV	VI	XXV	II	XXV	II	XXV	V	XXV	VII	XXV
IIII	Tevet		VI	XXIX	II	XXIX	IIII	XXIX	VII/I	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX
		Fast of the Tenth	I	X	IIII	X	VI	X	III	X	III	X	VI	X	I	X
V	Shevat		VII	XXX	III	XXX	V	XXX	II	XXX	II	XXX	V	XXX	VII	XXX

TABLE 3 (*cont.*)

Third table			The characters of the pregnant of embolismic year												
VI	Adar		I/II	XXX	IIII/V	XXX	VI/VII	XXX	III/IIII	XXX	III/IIII	XXX	VI/VII	XXX	I/II	XXX
VII	Adar II		III/IIII	XXIX	VI/VII	XXIX	I/II	XXIX	V/VI	XXIX	V/VI	XXIX	I/II	XXIX	III/IIII	XXIX
		Fast of Esther	II	XIII	V	XIII	VII	XIII	IIII	XIII	IIII	XIII	VII	XIII	II	XIII
		Purim	III	XIIII	VI	XIIII	I	XIIII	V	XIIII	V	XIIII	I	XIIII	III	XIIII
VIII	Nisan		V	XXX	I	XXX	III	XXX	VII	XXX	VII	XXX	III	XXX	V	XXX
		Passover	V	XV	I	XV	III	XV	VII	XV	VII	XV	III	XV	V	XV
IX	Iyyar		VI/VII	XXIX	II/III	XXIX	IIII/V	XXIX	I/II	XXIX	I/II	XXIX	IIII/V	XXIV	VI/VII	XXIX
X	Sivan		I	XXX	IIII	XXX	VI	XXX	III	XXX	III	XXX	VI	XXX	I	XXX
		Shavuot	VI	VI	II	VI	IIII	VI	I	VI	I	VI	IIII	VI	VI	VI
XI	Tammuz		II/III	XXIX	V/VI	XXIX	VII/I	XXIX	IIII/V	XXIX	IIII/V	XXIX	VII/I	XXIX	II/III	XXIX
		Fast of the Fourth	V	XVII	I	XVII	III	XVII	I	XVII	I	XVII	III	XVII	V	XVII
XII	Av		IIII	XXX	VII	XXX	II	XXX	VI	XXX	VI	XXX	II	XXX	IIII	XXX
		Fast of the Fifth	V	IX	I	IX	III	IX	VII	IX	VII	IX	III	IX	V	IX
XII	Elul		V/VI	XXIX	I/II	XXIX	III/IIII	XXIX	VII/I	XXIX	VII/I	XXIX	III/IIII	XXIX	V/VI	XXIX

217ra **Capitulum VII: De ratione festorum et ieiuniorum que non reperiuntur in lege**

Sunt preter festa tempore legis date indicta alia festa et ieiunia signata in hoc kalendario, ut puta encennia et furim, ieiunium Hester, et alia IIII, quorum ratio licet ex aliis scripture locis pateat, hoc tamen etiam hic oportebit compendiose exponi:

'Encennia' interpretatur 'dedicatio', unde designat festum dedicationis templi; non illius, quam sub Salomone tempore autumpnali facta est, nec illius quam sub Esdra et Zorobabel post reedificationem templi facta est tempore vernali, sed illius quam sub Iuda Machabeo facta est tempore hyemali, de qua dicitur etiam in Iohanne "*facta sunt encennia Hierosolimis et hyems erat*."[6] Causa vero ieiunii Hester fuit edictum de morte Iudeorum procuratum per Aman. Sed causa festi quod dicitur 'Furim', id est 'Sortium', est vindicta relapsa in hostes Iudeorum post mortem Aman.

Reliqua IIII ieiunia commemorat Zacharias propheta dicens "*Ieiunium quarti, ieiunium quinti, ieiunium septimi et ieiunium decimi*,"[7] menses secundum computationem legalem enumerans. Est autem ieiunium IIII quod celebratur XVII die Thamuz, eo enim die Moyses post ieiunium prime quadragene descendens de monte propter peccatum vituli creditur tabulas lapideas confregisse.[8] Ieiunium quinti | celebratur nona die mensis Ab, quo 217rb die orta est seditio in populo propter exploratores terre sancte et iussus est populus circumire per desertum quadraginta annis. Hoc etiam mense prius Nabugodonosor et postea Titus templum Ierosolimis destruxit.[9] Ieiunium VII fit III die mensis Tysseri, quo die creditur Godolias occisus et reliqui Iude disperse.[10] Ieiunium X fit X die mensis Thebeth, quo die audivit Ezechiel et populus in capitivitate positus templum esse subversum.[11,12]

Hoc de festis et compoto Hebreorum ad presens dicta sufficiant.

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27 sufficiant] *add.* Hoc opus factum, scriptor tenuit bene pactum *M*

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6 Io 10:22 (ed. Weber, 1678): "Facta sunt autem encenia in Hierosolymis et hiemps erat."

7 Za 8:19 (ed. Weber, 1423): "haec dicit Dominus exercituum ieiunium quarti et ieiunium quinti et ieiunium septimi et ieiunium decimi erit domui Iuda in gaudium et in laetitiam et in sollemnitatis praeclaras veritatem tantum et pacem diligite."

8 Ex 32:15–19.

9 Nm 13:1–14:9.

10 IV Rg 25:25.

11 Jerome, *In Zachariam* 2.8.18/19 (CCSL 76A, 820–821) = *Decretum magistri Gratiani* (pars I, dist. 76, c. 7), ed. Friedberg, 269–270.

12 Ez 33:21.

Chapter Seven: On the Rationale behind the Feasts and Fasts That are Not Found in the Law

Aside from the feasts that were given at the time of the Law, which have already been pointed out, there are also other feasts and fasts signalled in this calendar, such as the 'Encaenia' and Purim, the fast of Esther and the other four [fasts], which, although their rationale becomes clear from other passages in Scripture, it will behove us to succinctly explain here as well:

'Encaenia' translates as 'dedication' and hence refers to the Feast of the Dedication of the Temple; but not the one that was made in autumn under Solomon, nor the one that was made in springtime under Esdras and Zerubbabel after the temple's rebuilding, but the one that was made in winter under Judah Maccabee, about which is also found a remark in John [10:22]: "And it was the feast of the dedication at Jerusalem: and it was winter." The reason behind the Fast of Esther, however, was the edict on the death of the Jews that was administered by Haman. But the reason behind the feast called 'Purim', i.e. 'Lots', is the revenge that fell back on the enemies of the Jews after the death of Haman.

The remaining four fasts are commemorated by the prophet Zechariah, when he says "the fast of the fourth month, and the fast of the fifth, and the fast of the seventh, and the fast of the tenth," counting the months according to the legal calculation. The fast of the fourth is celebrated on the 17th day of Tammuz, for on this day Moses, descending from the mount after the first 40-day fast, is believed to have broken the stone tablets because of the sin of the [golden] calf. The fast of the fifth is celebrated on the 9th day of Av, on which day rebellion broke out among the people because of the spies of the holy land and the people was ordered to wander around the desert for 40 years. In this same month, the temple at Jerusalem was destroyed, first by Nebuchadnezzar and later by Titus. The fast of the seventh is on the third day of Tishri, on which, it is believed, Gedaliah was slain and the remains of Juda were dispersed. The fast of the tenth is on the tenth day of Tevet, on which day Ezekiel and the people put into captivity heard about the destruction of the temple.

And this shall be enough for the present about the feasts and the *computus* of the Hebrews.

CHAPTER 5

The *Computus Iudaicus* of 1342

1 Introduction

After having reached a high point in England during the thirteenth century, the centre of Christian Hebraistic learning began to shift notably away from the British Isles and towards continental Europe. A regional stronghold was eventually established in Germany, where a number of students of the Hebrew language were active during the second half of the fourteenth and the fifteenth century, paving the way for the celebrated scholarship of Johannes Reuchlin (1455–1522), Sebastian Münster (1488–1552), and Johann Buxtorf (1564–1629). Much of the evidence for this late medieval German current of Christian Hebraism was unearthed by Bernhard Walde, whose groundbreaking 1916-monograph on the subject dealt with the work of Henry of Langenstein (ca. 1325–1397), Stephan Bodecker (1384–1459), Petrus Nigri (ca. 1435–ca. 1483), Konrad Summenhart (ca. 1450–d. 1502), and others.[1] Walde based most of his study on manuscript material found in the Bavarian National Library, where he also came across a few late medieval Latin texts on the Jewish calendar, to which he briefly drew attention. Aside from Hermann Zoest's *Calendarium Hebraicum novum* (to be discussed and edited in chapter VI below), these included an anonymous *Computus Judaicus* that incorporated both verse and prose passages.[2] The latter text is easily identifiable in manuscript databases and library catalogues thanks to its rhymed preface, which begins with the memorable words *Me pudet audire Iudeum talia scire*.[3] Using this earmark, I have thus far

1 Bernhard Walde, *Christliche Hebraisten Deutschlands am Ausgang des Mittelalters* (Münster: Aschendorff, 1916). Outside Germany, notable Hebraists from this period include, e.g., Giannozzo Manetti (1396–1459) in Italy, Jacques Legrand (ca. 1360–1415) in France, and Antonio de Nebrija (1444–1522) in Spain. See Christoph Dröge, *Giannozzo Manetti als Denker und Hebraist* (Frankfurt: Lang, 1987); Evencio Beltrán and Gilbert Dahan, "Un Hébraïsant à Paris vers 1400: Jacques Legrand," *Archives juives* 17 (1981): 41–49; Carlos del Valle Rodríguez, *Corpus Hebraicum Nebrissense* (Madrid: Aben Ezra Ediciones, 2000). See further David Gonzalo Maeso, "La enseñanza del hebreo en las antiguas universidades españolas," *Miscelánea de Estudios Árabes y Hebraicos* 14/15, no. 2 (1965–1966): 3–23; Thomas Willi, "Christliche Hebäisten der Renaissance und Reformation," *Judaica* 30 (1974): 78–85, 100–125.

2 Walde, *Christliche Hebraisten*, 175–176. See also Dahan, *Les intellectuels*, 328n110, who mentions MSS London, BL, Add. 15107 (Lo) and Munich, BSB, Clm 14504 (Mc) in a footnote.

3 See TK 854; Hans Walther, *Initia carminum ac versuum medii aevi posterioris latinorum*

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been able to find 61 individual witnesses to the text, 59 of which are still extant.[4] They date from the 1360s to 1492 and are listed *en bloc* below.

2 The Manuscripts

Ba Basel, Universitätsbibliothek, F.IV.50, fols. 240^{r}–251^{v}. Paper, 272 fols., 210 × 145 mm. Date: ca. 1473/74. Provenance: Basel, charterhouse. With running commentary and interlineary glosses, metioning the following years: 1344 (fol. 243^{r}), 1389 (247^{r}), 1396 (245^{v}, 246^{v}, 250^{r}, 251^{r}; *annus praesens*), 1397 (246^{v}).[5]

Be Berlin, Staatsbibliothek Preußischer Kulturbesitz, lat. qu. 46, fols. 176^{r}–184^{r}. Paper, 302 fols., 160/80 × 110 mm. Date: ca. 1449. Provenance: Osnabrück (school). With running commentary, interlineary and marginal glosses, mentioning the following years: 1408 (fol. 180^{r}); 1427 (180^{r}); 1446 (179^{v}); 1447 (184^{r}); 1448 (184^{r}); 1449 (177^{v}; *annus praesens*).[6]

(Göttingen: Vandenhoeck & Ruprecht, 1959), no. 10842. "Ein naives Geständnis" according to the verdict of Moritz Steinschneider, "Miszellen und Notizen," *Zeitschrift für hebräische Bibliographie* 10 (1906): 60–63 (62), who cites from Truhlar's catalogue entry for MS Pb (see below, n. 45).

4 Roughly half of these (namely 30) were already listed by Ernst Zinner, *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes* (Munich: Beck, 1925), nos. 5150–5194. Two further copies, now apparently lost, are attested for the Benedictine monastery St. Ägidien in Nuremberg. See Paul Ruf, *Mittelalterliche Bibliothekskataloge Deutschlands und der Schweiz*, vol. 3.3, *Bistum Bamberg* (Munich: Beck, 1939), 451, 454, 516. See also Christophe Theophile de Murr, *Description du Cabinet de Monsieur Paul de Praun de Nuremberg* (Nuremberg: Schneider, 1797), 487. For the attestation of copies in contemporary library catalogues from Erfurt, see n. 112 below.

5 Beat Matthias von Scarpatetti, *Katalog der datierten Handschriften in der Schweiz in lateinischer Schrift vom Anfang des Mittelalters bis 1550*, vol. 1, *Die Handschriften der Bibliotheken von Aarau, Appenzell und Basel* (Dietikon-Zurich: Graf, 1977), 188; Ulrike Bodemann and Hartmut Bleumer, "Die 'Flores grammaticae' Ludolfs de Luco," in *Schulliteratur im späten Mittelalter*, ed. Klaus Grubmüller (Munich: Fink, 2000), 281–301 (287); Thomas A.-P. Klein, "Der Novus Esopus des Alexander Neckam in der Tradition der spätantiken Phaedrus-Paraphrase Romulus," *Maia* 52 (2000): 127–151 (133n26). An unpublished description by Gustav Binz (Basel, 1907) is available at http://www.ub.unibas.ch/digi/a100/kataloge/mscr/mscr_f/BAU_5_000117288_cat.pdf.

6 Valentin Rose, *Verzeichnis der lateinischen Handschriften der Königlichen Bibliothek zu Berlin, Zweiter Band: Die Handschriften der Kurfürstlichen Bibliothek und der Kurfürstlichen Lande*, 3

Bf Berlin, Staatsbibliothek Preußischer Kulturbesitz, lat. qu. 97, fols. 98^{r}–103^{r}. Paper, 243 fols., 210×150 mm, s. XV. With *interlineary* glosses (for the introductory verses only). Portions of the text have been reworked and shortened.[7]

Bg Berlin, Staatsbibliothek Preußischer Kulturbesitz, lat. qu. 181, fols. 35^{r}–45^{r}. Paper, 68 fols., 220×155 mm. Date: ca. 1414. Written in central Germany. Commentary only (fols. 35^{r}–43^{r}), followed by main text (43^{v}–45^{r}), which breaks off before table 1. Years mentioned in the commentary: 1382 (fol. 37^{v}), 1385 (38^{v}, 40^{r}, 42^{r}; past year), 1413 (41^{v}).[8]

Bh Berlin, Staatsbibliothek Preußischer Kulturbesitz, lat. qu. 587, fols. 211^{v}–215^{v}. Paper, 243 fols., 222×152 mm. Date: ca. 1448. Provenance: Erfurt. Copyist: Nicolaus Currificis de Friberga. With commentary (fragmentary) and interlineary glosses, mentioning the year 1448 (fol. 215^{v}). Additional commentary on inserted flyleaf (after fol. 211^{v}). The main text, which has been shortened and partially reworked, is immediately followed by a Hebrew alphabet (215^{v}).[9]

Br Brussels, Bibliothèque Royale, 961–971 (969), fols. 200^{v}–206^{v}. Paper, 215 fols., 288×204 mm. Date: ca. 1437/39. Scribe: Heinrich Suer (Suyr) of Herbstheim. Provenance: Cologne, charterhouse St. Barbara (acquired in 1455). With running commentary. Incomplete final chapter (5.2 on fol. 206^{v}), followed by an appendix with additional astronomical tables (208$^{r–v}$). Fols. 207$^{r–v}$ are no longer part of this codex.[10]

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vols. (Berlin: Asher, 1901–1905), 3:1192–1196; Menso Folkerts, "Mittelalterliche mathematische Handschriften in westlichen Sprachen in der Berliner Staatsbibliothek: Ein vorläufiges Verzeichnis," in *Mathematical Perspectives*, ed. Joseph W. Dauben (New York: Academic Press, 1981), 53–93 (68–69).

7 Rose, *Verzeichnis*, 3:1246–1247; Charles H. Lohr, "Aristotelica Berolinensia," *Traditio* 54 (1999): 353–423 (392–393).

8 Renate Schipke, *Die lateinischen Handschriften in Quarto der Staatsbibliothek Berlin Preussischer Kulturbesitz*, vol. 1, *Ms. lat. quart. 146–406* (Wiesbaden: Harrassowitz, 2007), 165–169; Folkerts, "Mittelalterliche mathematische Handschriften," 69.

9 Enrico Narducci, *Catalogo di manoscritti ora posseduti da D. Baldassare Boncompagni*, 2nd ed. (Rome: Tipografia delle Scienze Matematiche e Fisiche, 1892), 246–249; Folkerts "Mittelalterliche mathematische Handschriften," 76–78.

10 George Lacombe, *Aristoteles Latinus*, 2nd ed., vol. 1 (Bruges: Desclée de Brouwer, 1957), 314–315; J. van den Gheyn, *Catalogue des manuscrits de la Bibliothèque Royale de Belgique*, 13 vols. (Brussels: Lamertin, 1901–1948), 4:339–340; Roger Calcoen, *Inventaire des*

Co Copenhagen, Kongelige Bibliotek, Thott 825 4°, fols. 44^{r}–54^{v}. Paper, 266 fols., 212×143 mm. Date: ca. 1449. Provenance: Marienfeld monastery. With running commentary, marginal and interlineary glosses, mentioning the years 1408 (fol. 50^{r}), 1427 (50^{r}), 1440 (53^{v}), 1446 (49^{v}), 1449 (46^{v}; *annus praesens*). Fol. 45$^{r–v}$ is an inserted flyleaf, containing excerpts from Nicholas of Lyra and Isidore of Seville. Fol. 48$^{r–v}$ is another flyleaf with calculation tables from a later hand.[11]

Ed Edinburgh, Crawford Library, 2.3, fols. 68^{r}–77^{v}. Paper, 209 fols., 120×83 mm (this text), s. XV$^{2/4}$. Provenance: Hildesheim. With running commentary, mentioning the year 1425 (fol. 72^{v}; *annus praesens*).[12]

El Erlangen, Universitätsbibliothek, 664, fol. 155$^{r–v}$. Paper, 156 fols., 220×150 mm. Date: ca. 1439. Copyist: Johannes de Bayreuth. Text breaks off in the middle of ch. 1.3.[13]

Er Erfurt, Universitäts- und Forschungsbibliothek, Bibliotheca Amploniana, qu. 375, fols. 43^{r}–49^{v}. Paper, 120 fols., 4°. Date: ca. 1433/50. With running commentary and interlineary glosses. Text breaks off after table 4, which remains half-finished.[14]

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manuscrits scientifiques de la Bibliothèque Royale de Belgique, 3 vols. (Brussels: Bibliothèque Royale, 1965–1975), 1:33–34; Richard Bruce Marks, *The Medieval Manuscript Library of the Charterhouse of St. Barbara in Cologne*, 2 vols. (Salzburg: Institut für Englische Sprache und Literatur), 2:210–211. See also Hubert Silvestre, "Incipits des traités médiévaux de sciences expérimentales dans les Mss latins des Bruxelles," *Scriptorium* 5 (1951): 145–160 (154); Henri Michel, "Les manuscrits astronomiques de la Bibliothèque royale de Belgique," *Ciel et Terre* 65 (1949): 199–204 (201); Boncompagni, "Intorno ad un tratatto," 832–835.

11 Ellen Jørgensen, *Catalogus codicum latinorum medii aevi Bibliothecae Regiae Hafniensis* (Copenhagen: Gyldendal, 1926), 423–425.

12 *Catalogue of the Crawford Library of the Royal Observatory, Edinburgh* (Edinburgh: Her Majesty's Government, 1890), 489–490; Neil Ripley Ker, *Medieval Manuscripts in British Libraries*, 5 vols. (Oxford: Clarendon Press, 1969–2002), 2:548–551.

13 Hans Fischer, *Die lateinischen Papierhandschriften der Universitätsbibliothek Erlangen* (Erlangen, 1936; repr. Wiesbaden: Harrassowitz, 1971), 404–407; Eberhard Lutze, *Die Bilderhandschriften der Universitätsbibliothek Erlangen* (Erlangen: Universitätsbibliothek, 1936), 96.

14 Schum, *Beschreibendes Verzeichnis*, 627–629.

Fb Freiburg, Universitätsbibliothek, 57, fols. 67^{r}–70^{r}. Paper, 146 fols., 210 × 145 mm. Date: ca. 1409. Text breaks off after ch. 4. Blank spaces are left in place of tables 1 and 2. Fols. 70^{v}–71^{v} are left blank.[15]

Go Gotha, Forschungsbibliothek, Chart. B 517, fols. 202^{r}–208^{v}. Paper, 325 fols., 205 × 155 mm. Date: ca. 1408. Provenance: Bohemia/Moravia. Formerly in the library of Ludwig Bernhard of Zech. With partial commentary and marginal glosses, mentioning the year 1408 (fol. 208^{v}). Inserted flyleaf (fol. 205a) with additional commentary from different hand, mentioning the year 1409. Main text is preceded by astronomical-computistical notes directly related to the *Computus Judaicus* (200^{r}–201^{r}) and a diagram of the *Spherae Celi* from the *Computus chirometralis minor* (201^{v}); followed by an addendum using Hebrew letters (209^{r}). Fol. $205^{r–v}$ is left blank.[16]

Gr Graz, Universitätsbibliothek, 966, fols. 356^{r}–365^{v}. Paper, 581 fols., 220 × 150 mm. Date: s. $XV^{1/2}$. Provenance: Seiz, charterhouse. With commentary (fragmentary). An inserted flyleaf (fol. 360^{v}) with a commentary on ch. 3.2 contains reckoning examples for 1408 and 1414.[17]

Gw Göttweig, Stiftsbibliothek, 189 (170), fols. 6^{r}–9^{r}; s. $XIV^{2/2}$. Part of a fascicle of 10 fols., Paper, 270 × 70 mm. The lower half of fol. $6^{r/v}$ has been cut out, accounting for a loss of text that encompasses ch. 1.3–4 and most of ch. 2.4.[18]

Ha Hannover, Niedersächsische Landesbibliothek, VII 626, fols. 26^{va}–32^{v}. Paper, 31 fols., 330 × 217 mm. Date: 1492. Provenance: Northeim, St. Blasien

15 Winfried Hagenmeier, *Die lateinischen mittelalterlichen Handschriften der Universitätsbibliothek Freiburg im Breisgau* (*Hs. 1–230*) (Wiesbaden: Harrassowitz, 1974), 47–51.

16 Fr. Jacobs and F.A. Ukert, *Beiträge zur ältern Literatur*, 6 vols. (Leipzig: Dyk, 1835–1843), 5:59–61; Anton Blaschka, "Die Gothaer Handschrift X des Speculum stultorum verglichen mit der Breslauer Handschrift T," *Wissenschaftliche Zeitschrift der Martin-Luther-Universität Halle-Wittenberg* 8 (1958/59): 989–1001; Hans-Joachim Rockar, *Abendländische Bilderhandschriften der Forschungsbibliothek Gotha* (Gotha: Forschungsbibliothek, 1970), 49; Elisabeth Wunderle, *Katalog der mittelalterlichen lateinischen Papierhandschriften* (Wiesbaden: Harrassowitz, 2002), 338–349.

17 Anton Kern, *Die Handschriften der Universitätsbibliothek Graz*, vol. 2 (Vienna: Österr. Staatsdruckerei, 1956), 157–160.

18 Johann Huemer, "Iter Austriacum I," *Wiener Studien* 9 (1887): 51–93 (56).

(Benedictine monastery). Copyist: Heinrich Holthusen. With running commentary for parts of the text only.[19]

Ka Kraków, Biblioteka Jagiellońska, 562, fols. 47^{v}–51^{v}, 54^{r}–56^{v}. Paper, 111 fols., 290 × 210 mm. Date: ca. 1387. Provenance: Prague (?). Copyist: Jacob Styer. With partial commentary/extensive marginal and interlinear glosses from contemporary and later hands (s. $XV^{1/2}$); additional commentary on inserted flyleaves (fol. $49^{r–v}$, $50^{r–v}$, $54^{r–v}$). Fols. 52^{r}–53^{v} are an inserted set of calendrical sheets, unrelated to the present text. Years mentioned in original gloss: 1363 (56^{v}), 1382 (56^{v}). Years mentioned on flyleaves: 1401 (49^{r}); 1406 (49^{v}, 50^{r}); 1407 (54^{r}): 1406–1409 (54^{v}).[20]

Kb Kraków, Biblioteka Jagiellońska, 563, fols. 333^{vb}–51^{vb}. Paper, 374 fols., 305 × 205 mm. Date: 1433. Copyist: Nicholas of Grabostow (Kraków). With running commentary and interlineary glosses, mentioning the years 1363 (fol. 349^{rb}), 1433 (339^{rb}, 339^{va}, 340^{va}, 341^{ra}, 341^{vb}, 344^{ra}, 349^{ra}, 349^{vb}: *annus praesens*), and 1434 (346^{va}, 350^{rb}, 350^{vb}).[21]

Kc Kraków, Biblioteka Jagiellońska, 1847, fols. 10^{ra}–20^{v}. Paper, 227 pp., 4°. Date: 1397 (main text), 1398 (commentary). Provenance: Prague. Copyist: Petrus Pelka. With running commentary, including inserted flyleaves with additional commentary from same hand (fols. $13^{r–v}$, $18^{r–v}$, $20^{r–v}$). Years mentioned: 1344 (12^{v}); 1363 (14^{v}, 16^{r}, 18^{v}, 19^{r}); 1364 (37^{v}); 1381 (13^{r}, 19^{r}, 19^{v}, 20^{v}); 1398 (20^{r}).[22]

Kd Kraków, Biblioteka Jagiellońska, 1848, fols. 33^{r}–37^{v}. Paper, 118 fols., 205 × 150 mm. Date: ca. 1389. With marginal glosses.[23]

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19 Helmar Härtel and Felix Ekowski, *Handschriften der Niedersächsischen Landesbibliothek Hannover*, vol. 2, *Ms I 176a – Ms Noviss. 64* (Wiesbaden: Harrassowitz, 1982), 171–172.

20 Władysław Wisłocki, *Katalog Rękopisów Biblijoteki Uniwersytetu Jagiellońskiego*, 2 vols. (Kraków: Drukarni Uniwersytetu Jagiellońskiego, 1877–1881), 1:175; Maria Kowalczyk et al., *Catalogus codicum manuscriptorum medii aevi Latinorum, qui in Bibliotheca Jagellonica Cracoviae asservantur*, vol. 3, *Numeros continens inde a 445 usque ad 563* (Wrocław: Wydawnictwo Polskiej Akademii Nauk, 1984), 390–397; Mieczysław Markowski, *Astronomica et Astrologica Cracoviensia ante annum 1550* (Florence: Olschki, 1990), 293–294.

21 Wisłocki, *Katalog*, 1:175–176; Kowalczyk et al., *Catalogus*, 397–406; Markowski, *Astronomica*, 294.

22 Wisłocki, *Katalog*, 1:438–439.

23 Ibid., 1:439; Markowski, *Astronomica*, 302.

Ke Kraków, Biblioteka Jagiellońska, 1860, fols. 190^{r}–208^{r}. Paper, 297 fols., 216 × 150 mm. Date: ca. 1424. Copyist: Nicolaus Pykel de Polonia. With running commentary, marginal and interlineary glosses; inserted flyleaves with additional commentary and calculations, partly from later hands (fols. 192^{v}, 194$^{r–v}$, 195$^{r–v}$, 197$^{r–v}$, 198$^{r–v}$, 200$^{r–v}$, 201$^{r–v}$, 203$^{r–v}$, 205$^{r–v}$). Years mentioned in commentary: 1424 (199^{v}, 202^{v}, 204^{r}, 206^{v}: *annus praesens*), 1425 (206^{v}), 1426 (192^{v}, 204^{r}), 1427 (204^{r}, 206^{r}, 206^{v}, 208^{r}), 1428 (208^{r}), 1432 (193^{v}; gloss from later hand).[24]

Kg Kaliningrad (Königsberg), Universitätsbibliothek, 163, no. 6. Date: s. XIV/XV. This manuscript seems to be no longer extant.[25]

Kh Kaliningrad (Königsberg), Universitätsbibliothek, 2° 1781, no. 19. Date: s. XV. This manuscript seems to be no longer extant.[26]

Kx Kraków, Biblioteka Jagiellońska (olim Berlin), lat. qu. 23, fols. 25^{r}–36^{v}. Paper, 399 fols., 160/80 × 100/20 mm. Date: s. XV$^{2/4}$. Provenance: Ruppin, Prussia. Collection assembled by Mag. Henning. With running commentary and interlineary glosses, mentioning the years 1424 (fol. 27^{r}) and 1425 (35^{v}; past year). Several addenda, including a wheel diagram for the 19-year cycle (36^{r}).[27]

Le Leipzig, Universitätsbibliothek, 1462, fols. 128^{r}–141^{r}. Paper, 458 fols., 150 × 210 mm. Date: ca. 1444. With running commentary, interlineary and

24 Wisłocki, *Katalog*, 2:443–444; Markowski, *Astronomica*, 303.

25 See Ernst Zinner, "Aus alten Handschriften," *Bericht der Naturforschenden Gesellschaft Bamberg* 38 (1962): 8–57 (37). The whereabouts of this MS as well as of Kh are presently unknown and it is not unlikely that they were both destroyed during the Second World War. On the fate of the Königsberg University Library's manuscripts, see Ralf G. Päsler, "Auf der Suche nach Königsberger Handschriften: Bericht einer Exkursion nach Kaliningrad, St. Petersburg, Wilna und Thorn," *Preußenland* 34 (1996): 1–10; Päsler, "Die Handschriftensammlungen der Staats- und Universitätsbibliothek und des Staatsarchivs Königsberg," in *Königsberger Buch- und Bibliotheksgeschichte*, ed. Axel E. Walter (Cologne: Böhlau, 2004), 189–249; Päsler, "Zum Handschriftenbestand der ehemaligen Staats- und Universitätsbibliothek Königsberg: Quellenrepertorium und neues Standortverzeichnis," *Scriptorium* 61 (2007): 198–217; Axel E. Walter, "Das Schicksal der Königsberger Bibliotheken und Handschriften: Eine Zwischenbilanz," in Walter, *Königsberger Buch- und Bibliotheksgeschichte*, 1–68.

26 See previous note.

27 Rose, *Verzeichnis*, 3:1187–1192.

marginal glosses, mentioning the years 1442 (fols. 132^{r}, 133^{v}), 1444 (133^{v}), and 1479 (139^{v}). Owner's note: "Istum librum legavit magister Johannes ctenc de lobau pro libraria collegy principis. Cuius anima requiescat in pace 1490."[28]

Lf Leipzig, Universitätsbibliothek, 1469, fols. 28^{v}–38^{r}. Paper, 378 fols., 155 × 210 mm, s. XV$^{2/4}$. With running commentary, mentioning the year 1425 (fol. 33^{v}; *annus praesens*).[29]

Lo London, British Library, Add. 15107, fols. 47^{r}–57^{v}. Paper, 282 fols., 216 × 154 mm. Date: ca. 1446/59. Provenance: Erfurt, charterhouse. With running commentary, mentioning the year 1446 (fol. 49^{r}). On fols. 250^{r}–255^{r}, there is an additional text on the Jewish calendar, entitled *Molath computi Iudaici practicatum usque ad 1517*. The colophon on fol. 71^{v}, which belongs to a copy of the *Theorica planetarum Gerardi* written by a roughly contemporary hand in Erfurt's university library, is dated Tuesday, 5 June 1459 ("Et sic est ffinis Anno Domini 1459 per J.P. d. G. Erffordie in librariam universitatis feria tertia post visitacionem").[30]

Lp London, British Library, Add. 15108, fols. 79^{r}–87^{r}. Paper, 236 fols., ca. 210 × 150 mm. Date: 1431. Provenance: Erfurt, charterhouse. Copyist: Johannes Pauli de Lorth in Erfurt. With interlineary gloss.[31]

Lq London, British Library, Harley 3843, fols. 26^{r}–39^{v}. Paper, 129 fols., 195 × 140 mm. Date: 1456. With running commentary and interlineary gloss.[32]

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28 Joachim Feller, *Catalogus codicum MSSCtorum Bibliothecae Paulinae in Academia Lipsiensi concinnatus* (Leipzig: Gleditsch, 1686), 435 (Nr. 78); Tom R. Ward, "Music in the Library of Johannes Klein," in *Music in the German Renaissance*, ed. John Kmetz (Cambridge: Cambridge University Press, 1994), 54–73 (68).

29 Christoph Falkenroth, *Die* Musica Speculativa *des Johannes de Muris: Kommentar zur Überlieferung und kritische Edition* (Stuttgart: Steiner, 1992), 58–59.

30 *Catalogue of Additions to the Manuscripts in the British Museum in the Years 1841–1845* (London: Woodfall and Son, 1850), 88–89; Robert Priebsch, *Deutsche Handschriften in England*, vol. 2, *Das British Museum* (Erlangen: Junge, 1901), 125; Fritz Saxl and Hans Meier, *Catalogue of Astrological and Mythological Illuminated Manuscripts of the Latin Middle Ages III: Manuscripts in English Libraries*, 2 vols. (London: The Warburg Institute, 1953), 1:17–27.

31 *Catalogue of Additions*, 89; Zinner, "Aus alten Handschriften," 40.

32 *A Catalogue of the Harleian Manuscripts in the British Museum*, 4 vols. (London: Eyre and Strahan, 1808–1812), 3:86; Andrew G. Watson, *Catalogue of Dated and Datable Manuscripts*

Lw London, Wellcome Historical Medical Library, 202, fols. 19^{v}–22^{v}. Paper, 22 fols., 205×145 mm. Date: 1443. Provenance: Regensburg, St. Emmeram monastery. The copy was finished by a certain Wilhelm on 5 February, 1443 (fol. 22^{v}: "Explicit computus iudaicus per manus Wilhellmii sub Anno Domini Mo CCCC XLIII in die Agathe virginis").

Ma Munich, Bayerische Staatsbibliothek, Clm 5963, fols. 57^{v}–59^{v}. Paper, 278 fols., 225×145 mm. Date: 1383. Provenance: Ebersberg (Benedictine monastery). Copyist: Johannes Müntzinger (Prague).[33]

Mb Munich, Bayerische Staatsbibliothek, Clm 7650, fols. 59^{r}–66^{v}. Paper, 131 fols., 220×145 mm. Date: 1389. Provenance: Indersdorf, monastery. Expanded version.[34]

Mc1 Munich, Bayerische Staatsbibliothek, Clm 14504, fols. 163^{r}–170va. Paper, 412 fols., 200/225×140/160 mm. Date: s. XIV$^{2/2}$. Provenance: Regensburg, St. Emmeram monastery. With running commentary mentioning the years 1344 (fol. 170ra) and 1375 (165^{rb}, 165va).[35]

Mc2 Munich, Bayerische Staatsbibliothek, Clm 14504, fols. 256^{v}–263^{r}. Date: s. XV$^{1/2}$. With interlineary gloss and partial running commentary mentioning the years 1417 (fol. 257^{v}) and 1418 (258^{r}; *annus praesens*).

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c. 700–1600 in The Department of Manuscripts, The British Library, 2 vols (London: British Library, 1979), 1:140. Viewable online at http://www.bl.uk/manuscripts/FullDisplay.aspx?Source=BrowseTitles&letter=F&ref=Harley_MS_3843.

33 Karl Halm, Georg von Laubmann, and Wilhelm Meyer, *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*, vol. 1.3, *Codices num. 5251–8100 complectens* (Munich, 1873; repr. Wiesbaden: Harrassowitz, 1968), 60; Hans Szklenar, *Magister Nicolaus de Dybin: Vorstudien zu einer Edition seiner Schriften; Ein Beitrag zur Geschichte der literarischen Rhetorik im späteren Mittelalter* (Munich: Artemis, 1981), 149–150; Petrus Philomena de Dacia, *Opera quadrivialia*, ed. Pedersen, 1:250.

34 Halm, von Laubmann, and Meyer, *Catalogus*, vol. 1.3, 182; J. Wolny, M. Markowski, and Z. Kuksewicz, *Polonica w średniowiecznych rękopisach bibliotek monachijskich* (Wrocław: Zakład Narodowy im. Ossolińskich, 1969), 78.

35 Karl Halm et al., *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*, vol. 2.2, *Codices num. 11001–15028 complectens* (Munich, 1876; repr. Wiesbaden: Harrassowitz, 1968), 182–183.

Md Munich, Bayerische Staatsbibliothek, Clm 16521, fols. 1r–4r. Paper, 163 fols., 205×145 mm. Date: 1462. Provenance: Library of the Canons Regular of St. Augustine in St. Zeno, near Bad Reichenhall. Revised final chapter, mentioning the years 1370 (fol. 3v) and 1382 (3v).[36]

Me Munich, Bayerische Staatsbibliothek, Clm 19685, fols. 21r–26v. Paper, 116 fols., 220×150 mm. Date: 1375. Provenance: Tegernsee monastery. Main text from 1375 with later glosses, additions and corrections from a fifteenth-century hand.[37]

Mf Munich, Bayerische Staatsbibliothek, Clm 20174, fols. 76r–109v. Paper, 274 fol., 105×75 mm. Date: 1467. Provenance: Tegernsee monastery. Expanded version with running commentary mentioning the year 1466 (fol. 106v).[38]

Mg Munich, Bayerische Staatsbibliothek, Clm 24514, fols. 166r–168v. Paper, 235 fols., 200×145 mm. Date: ca. 1374/84.[39]

Ml Melk, Stiftsbibliothek, 951, fols. 27r–32r. Paper, 83 fols., 210×145/50 mm. Date: ca. 1391. Provenance: Vienna (?). With marginal and interlineary glosses. Example in ch. 5.1 updated to 1384 (fol. 31v).[40]

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36 Karl Halm et al., *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*, vol. 2.3, *Codices num. 15121–21313 complectens* (Munich, 1878; repr. Wiesbaden: Harrassowitz, 1969), 73.

37 Halm et al., *Catalogus*, vol. 2.3, 268–269; Wolny, Markowski, and Kuksewicz, *Polonica*, 151. See also Hans Striedl, "Geschichte der Hebraica-Sammlung der Bayerischen Staatsbibliothek," in *Orientalisches aus Münchener Bibliotheken und Sammlungen*, ed. Herbert Franke (Wiesbaden: Steiner, 1957), 1–38 (24n), who refers to Clm 19685 in a footnote and also briefly mentions the unrelated Jewish calendar texts in Clm 14952 and Clm 24868 (which happens to be Hermann Zoest's *Calendarium Hebraicum novum*). For Clm 14952, see n. 200 below.

38 Halm et al., *Catalogus*, vol. 2.3, 287; Wolny, Markowski, and Kuksewicz, *Polonica*, 154.

39 Karl Halm and Wilhelm Meyer, *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*, vol. 2.4, *Codices num. 21406–27268 complectens* (Munich, 1881; repr. Wiesbaden: Harrassowitz, 1969), 127.

40 Vinzent Staufer, *Catalogus codicum manu scriptorum qui in Bibliotheca monasterii Mellicensis O.S.B. servantur* (Wien: Hoelder 1889), 1058; Christine Glassner, *Inventar der Handschriften des Benediktinerstiftes Melk*, vol. 1, *Von den Anfängen bis ca. 1400* (Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 2000), 374–376.

My Mainz, Stadtbibliothek, I 528, fols. 153^{v}–161^{v}. Paper, 205 fols., 200×140 mm. Date: ca. 1410. Provenance: Mainz, Charterhouse. Copyist: Johannes Lemlein (?). With marginal glosses.[41]

Mz Mainz, Stadtbibliothek, I 613, fols. 75^{r}–77^{v}. Paper, 169 fols., 215×140 mm. Date: s. XV^{in}. Provenance: Mainz, Charterhouse. Possibly copied in Prague. Incomplete version, breaks off midway in ch. 3.3. Blank space for table 1.[42]

Ne Nelahozeves, Lobkowitz Library, VI.F.e.62 (IX), pp. 32–59. Paper, 192 fols., 215×145 mm, s. XIV^{ex}/XV^{in}. Provenance: Prague (?). Copyist: Petrus de Praga. Main text (pp. 32–46), followed by separate commentary in two columns (pp. 47–59). Tables 2 and 3 appear jointly after ch. 5.1; table 4 appears after ch. 6. Years mentioned in commentary: 1385 (pp. 50, 51, 53, 54, 56, 57), 1388 (pp. 58–59).[43]

Pa Prague, Národní knihovna České republiky, III.G.14 (539), fols. 120ra–25^{vb}. Paper, 125 fols., 210×150 mm, s. XIV$^{2/2}$. Commentary to the text only, with reckoning examples for the year 1344 (fols. 122^{vb}, 124^{rb}). The final leaf (125$^{r–v}$) is partly destroyed (upper half missing).[44]

Pb Prague, Národní knihovna České republiky, IV.G.8 (740), fols. 56^{v}–61^{v}. Paper, 67 fols., 215×150 mm, s. XIV$^{4/4}$. With interlineary glosses. Tables 3 and 4 are joined together. The last page (fol. 61^{v}) contains a commentary appended to the main text, which mentions years 1342 and 1374–1376.[45]

Pc Prague, Národní knihovna České republiky, XIII.C.17 (2292), fols. 148va–49va. Paper, 207 fols., 310×230 mm. Date: s. XIV^{ex}/XV^{in}. Provenance:

41 An unpublished description by Gerhard List is available at http://www.manuscripta-mediaevalia.de/hs/projekt-Mainz-pdfs/Hs%20I%20528.pdf.

42 Harald Berger, "Ein bemerkenswerter spätmittelalterlicher Codex zur Philosophie, Astronomie und Medizin: Mainz, Stadtbibliothek, HS I 613," *Traditio* 62 (2007): 237–258.

43 Marie Tošnerová, *Rukopisné Fondy Zámeckých, hradních a palácových knihoven* (Prague: Archiv Akademie věd ČR, 1995), 124. A handwritten description is available at http://dtm.bbaw.de/HSA/700420970001.html.

44 Joseph Truhlár, *Catalogus codicum manu scriptorum latinorum qui in C.R. Bibliotheca Publica atque Universitatis Pragensis asservantur*, 2 vols. (Prague: Sumptibus Regiae Societatis Scientiarum Bohemicae, 1905–1906), 1:216.

45 Ibid., 1:294.

Library of the Canons Regular of St. Augustine in Třeboň (Wittingau). The main text stops on 149^{rb} and is then followed by a commentary section, which consists only of computational instructions and gives the *annus praesens* as 1396 (fols. 149^{rb}, 149^{va}).[46]

Pd Prague, Národní knihovna České republiky, XIV.F.1 (2572), fols. 47^{r}–52^{v}. Paper, 109 fols., 220×150 mm. Date: s. $XIV^{2/2}$. Provenance: Library of the Canons Regular of St. Augustine in Třeboň (Wittingau). Other parts of the codex are datable to 1379 and 1396. Commentary to the text only, with reckoning examples for 1343 (fol. 51^{v}) and 1344 (49^{r}, 49^{v}, 51^{r}, 52^{r}).[47]

Pe Prague, Archiv Pražského Hradu (olim: Knihovna Metropolitní Kapituli), L.LII (1296), fols. 118^{r}–125^{v}. Paper, 189 fols., 310×223 mm, s. $XV^{1/2}$. With interlineary glosses and running commentary, mentioning the years 1385 (fols. 120^{r}, 120^{v}, 122^{v}, 123^{r}, 124^{v}, 125^{r}) and 1388 (125^{v}). Table 2 follows directly upon table 1.[48]

Pf Prague, Archiv Pražského Hradu (olim: Knihovna Metropolitní Kapituli), M.CIII (1463), fols. 157^{v}–173^{r}. Paper, 243 fols., 217×150 mm. Date: 1427. With marginal and interlineary glosses and running commentary, mentioning the year 1428 (fols. 166^{r}, 171^{v}; from later hand). Fol. 170^{v} is left blank. A colophon (fol. 173^{r}) dates the completion of the treatise to the Tuesday after Palm Sunday in the year 1427 (= 15 April) and mentions Frankfurt (not clear whether Oder or Main) as the place of writing ("Explicit Judaicus finitus feria tercia post festum palmorum Ffrankfordie sub Anno Domini 1427").[49]

Sa Salzburg, Stiftsbibliothek Sankt Peter, b.VI.35, fols. 97^{r}–104^{v}. Paper, 215 fols., 200×143 mm. Date: ca. 1408/9. Provenance: Dresden (?). Copyist: Oswaldus de Salczburg.[50]

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46 Ibid., 2:224. The MS is viewable online at http://www.manuscriptorium.com/apps/main/mns_direct.php?docId=set20080219_38_145.

47 Ibid., 2:322.

48 Antonín Podlaha, *Soupis rukopisů knihovny metropolitní kapituly pražské*, vol. 2, *F–P* (Prague: Nákladem České Akademie věd a Umění, 1922), 230–231.

49 Ibid., 329–331.

50 Gerold Hayer, *Die deutschen Handschriften des Mittelalters der Erzabtei St. Peter zu Salzburg* (Vienna: Verlag der österreichischen Akademie der Wissenschaften, 1982), 310–312.

Sb Salzburg, Stiftsbibliothek Sankt Peter, b.IX.14, fols. 52^{r}–60^{v}. Paper, 183 fols., 292 × 210 mm. Date: 1429/44. Former owner: Christian Grammätsch of Kitzbühel. Ch. 6 has been reworked. With running commentary, mentioning the year 1429 (fols. 53^{v}, 54^{r}; *annus praesens*), 1344 (59^{v}).[51]

Sf St. Florian, Stiftsbibliothek, XI.113, fols. 191ra–93^{vb}. Paper, 244 fols., 2°, s. XIV. Former owner: Bernhardus de Welsa. Contains interlineary and marginal glosses, mentioning the year 1384 (fol. 193^{r}).[52]

Sg St. Gallen, Stiftsbibliothek, 827, pp. 209–216. Paper, 341 pp., 295 × 210 mm. Date: ca. 1425/28. Provenance: Lake Constance region. Shorter version, with 3 tables only.[53]

So Solothurn, Zentralbibliothek, S I 167, fols. 145^{v}–154^{v}. Paper, 161 fols., 275 × 212 mm. Date: October 1394. Copied by Wernher Mardersperger at Rotweil. Provenance: Solothurn, St.-Ursen-Stift. The text (fols. 145^{v}–147^{v}) is followed by a separate batch of tables (148^{r}–149^{v}) and a commentary (150^{r}–154^{v}), which is in turn followed by a table (155^{r}) that compares the letters of various alphabets (Latin, Syriac [= Samaritan], Hebrew, Greek, 'Egyptian'). As with Sg, this is a shorter version of the text that features only 3 tables. The MS is partly illegible due to liquid spillage. Years mentioned in the commentary: 1394 (146^{v}, 154^{r}, 154^{v}), 1393 (153^{v}, 154^{r}).[54]

Tr Trier, Stadtbibliothek, 8° 1925/1482, fols. 184^{r}–194^{r}. Paper, 448 fols., 146 × 208 mm, s. XV$^{1/2}$. With running commentary and interlineary glosses.

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51 Ibid., 355–359; Zinner, "Aus alten Handschriften," 53.

52 Albin Czerny, *Handschriften der Stiftsbibliothek St. Florian* (Linz: Ebenhöch, 1871), 53–54.

53 Gustav Scherrer, *Verzeichnis des Handschriften der Stiftsbibliothek von St. Gallen* (Halle: Verlag der Buchhandlung des Waisenhauses, 1875), 279–280; Beat Matthias von Scarpatetti, Rudolf Gamper, and Marlis Stähli, *Katalog der datierten Handschriften in der Schweiz in lateinischer Schrift von Anfang des Mittelalters bis 1500*, vol. 3, *Die Handschriften der Bibliotheken St. Gallen–Zürich* (Dietikon-Zurich: Graf, 1991), 69. Viewable online at http://www.e-codices.unifr.ch/en/list/one/csg/0827.

54 Ferdinand Vetter, "Neues zu Justinger: Kunrat Justinger als Schüler und Fortsetzer Königshofens und die ältesten Geschichtsschreiber Berns und des Laupenstreites," *Jahrbuch für Schweizerische Geschichte* 31 (1906): 109–206 (112–151); Alfons Schönherr, *Die Mittelalterlichen Handschriften der Zentralbibliothek Solothurn* (Solothurn: Zentralbibilothek, 1964), 112–120; von Scarpatetti, Gamper, and Stähli, *Katalog*, vol. 3, 137–138. Viewable online at http://www.e-codices.unifr.ch/en/list/one/zbs/SI-0167.

Fol. 187 was jumped over in numeration. Fol. 189 is an inserted leaf containing unrelated computistical material.[55]

Up Uppsala, Universitetsbibliotek, C 655, fols. 14^{r}–27^{r}. Paper, 222 fols., 205 × 150 mm. Date: ca. 1445/47. Place of origin: Braniewo (Braunsberg), later at Frauenburg Cathedral Library. With running commentary, mentioning the year 1442 (fols. 17^{v}, 18^{v}).[56]

Va Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 1437, fols. 55^{v}–57^{v}. Paper, 116 fols., 200 × 145 mm. Date: ca. 1391. Place of origin: Hungary. Text breaks off after ch. 3.3.[57]

Vi Vienna, Österreichische Nationalbibliothek, 3816, fols. 159^{r}–163^{r}. Paper, 200 fols., 210/15 × 150 mm, s. XIV^{ex}/XV^{in}. Provenance: Mondsee, Benedictine monastery. Previous owners: Johannes de Radkaspurg, Johannes de Werdea aka Hieronymus of Mondsee. Marginal gloss on fol. 159^{v} mentions the year 1407. Tables 2–4 featured en bloc, as mere lists of mnemonic words.[58]

Wa Wrocław (Breslau), Biblioteka Uniwersytecka, I.Q.156, fols. 27^{r}–32^{v}. Paper, 253 fols., 205 × 140 mm, s. $XIV^{2/2}$. Provenance: Library of the Canons Regular of St. Augustine in Zagan (Sagan). With running commentary mentioning the years 1344 (fols. 29^{r}, 30^{v}, 32^{r}), 1364 (29^{r}), and 1333 (32^{v}). Fol. 31^{v} is left blank.[59]

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55 Gottfried Kentenich, *Beschreibendes Verzeichnis der Handschriften der Stadtbibliothek zu Trier, Sechstes Heft: Ascetische Schriften; 2. Abteilung: Nachträge* (Trier: Lintz, 1910), 146–148.

56 Margarete Andersson-Schmitt and Monica Hedlund, *Mittelalterliche Handschriften Universitätsbibliothek Uppsala: Katalog über die C-Sammlung*, vol. 6, *C 551–935* (Stockholm: Almqvist & Wiksell, 1993), 223–227; Oloph Odenius, "Cisiojani Latini: Neue Beiträge zur Bibliographie der metrischen Kalendarien des Mittelalters," *Arv* 15 (1959): 61–154 (99–100).

57 Ludwig Schuba, *Die Quadriviums-Handschriften der Codices Palatini Latini in der Vatikanischen Bibliothek* (Wiesbaden: Reichert, 1992), 226–229.

58 *Tabulae codicum*, 3:93–94; Andreas Fingernagel et al., *Mitteleuropäische Schulen*, vol. 2, (*ca. 1350–1410*): *Österreich–Deutschland–Schweiz* (Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 2002), 373. See also Arthur Zacharias Schwarz, "Aus den Handschriften der Wiener 'Tabulae'," in *Abhandlungen zur Erinnerung an Hirsch Perez Chajes* (Vienna: The Alexander Kohut Memorial Foundation, 1933), 204–236 (213): "Viele künstlich gebildete Merkworte, die auf hier nicht vorhandene Molad-Tabellen hinweisen."

59 Willi Goeber and Joseph Klapper, *Katalog rekopisów* (handwritten cataologue), 26 vols., 15:65–69.

Wb Wrocław (Breslau), Biblioteka Uniwersytecka, IV.Q.36, fols. 1^{r}–12^{r}. Paper, 237 fols., 210×145 mm. Date: 1420. Provenance: Library of the Canons Regular of St. Augustine in Wrocław. Copyist: Jodocus Bertold de Ziegenhals (Can. Reg.). With running commentary mentioning the following years: 1344 (fol. 11^{r}), 1409 (9^{r}), 1420 (4^{r}, 4^{v}, 9^{r}, 11^{r}; *annus praesens*), and 1421 (4^{v}).[60]

Wc Wrocław (Breslau), Biblioteka Uniwersytecka, IV.Q.37, fols. 15^{r}–31^{r}. Paper, 324 fols., 220×150 mm. Date: 1428. Provenance: Library of Corpus Christi Church, Wrocław, to which the codex was donated in 1478 by *Gregorius altarista capelle sancti Jeronimi in hospitali pauperum scolarium*. Copyist: Johannes Newisch de Othmuchow in Krosno Odrzańskie (Crossen an der Oder). With interlineary glosses and running commentary mentioning the years 1408 (fol. 26^{va}), 1424 (26^{va}), 1428 (20^{va}, 25^{rb}; *annus praesens*), and 1429 (25^{rb}).[61]

Wo Wolfenbüttel, Herzog-August-Bibliothek, Cod. Guelf. 82.15 Quodl. 4to, fols. 25^{r}–35^{v}. Paper, 35 fols., 200×140 mm, s. $XV^{2/2}$. Text stops after ch. 4/table 3. With running commentary mentioning the years 1454 (fol. 28^{r}) and 1460 (28^{v}, 29^{r}; past year).[62]

Wp Wolfenbüttel, Herzog-August-Bibliothek, Cod. Guelf. 965 Helmst., fols. 56^{r}–68^{v}. Paper, 249 fols., 200×150 mm, s. $XV^{1/2}$. Formerly in possession of the Adelstedt family of Brunswick. Table 3 numbers lines from 19 to 10 in descending order. Table 4 (cycles 10 to 100) has no numerals above the mnemonic words. Inserted flyleaf (fol. 66^{r}) features a second copy of table 5 (without numerals). With running commentary mentioning the year 1431 (58^{v}).[63]

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60 Goeber and Klapper, *Katalog rekopisów*, 19:137–142; Markowski, *Astronomica*, 322; Zinner, "Aus alten Handschriften," 18.

61 Goeber and Klapper, *Katalog rekopisów*, 19:143–149.

62 Otto von Heinemann, *Die Augusteischen Handschriften*, vol. 5, *Codex Guelferbytanus 34.1. Aug. 4° bis 117 Augusteus 4°* (Wolfenbüttel, 1903; repr. Frankfurt: Klostermann, 1966), 252.

63 Otto von Heinemann, *Die Handschriften der Herzoglichen Bibliothek zu Wolfenbüttel, Erste Abtheilung: Die Helmstedter Handschriften*, vol. 2 (Wolfenbüttel: Zwissler, 1886), 325–327.

3 Structure and Contents

With at least 59 extant copies, the textual tradition of the *Computus Judaicus* presents a formidable analytic and editorial challenge. This is all the more true in light of the massive changes that the text underwent in the course of its transmission, which make it particularly difficult to get to a clear picture of its stemmatic filiation. Since the bulk of the work consisted of little more than a loose set of reckoning instructions, scribes and potential redactors were constantly tempted to modify what they found to suit their own interests and purposes. Soon after the initial composition went into circulation, users not only started to adorn it with commentaries and glosses, but also made alterations to the text itself, which indicate that the original version was deemed too concise by many of its readers.[64] While most contented themselves with making minor augmentations, e.g. by simply incorporating material from the commentaries into the main text, others went as far as composing entirely new sections. Yet again others decided to dramatically edit down the text they set out to copy. Redactional interventions of this kind are so frequent in the manuscript transmission of the *Computus Judaicus* that it is quite rare to find any two copies that feature even roughly the same version of the text.[65] Unfortunately, an adequate reconstruction of the history of these interventions is rendered extremely difficult not only by the degree and frequency of variation, but also by signs of heavy contamination between manuscript branches. The situation is such that I have become dissuaded from trying to approach the manuscript tradition by the conventional methods of stemmatic analysis. In what follows, I shall limit myself to summarizing a conjectural 'core' or 'original' version of the treatise, my reconstruction of which is based on a collation of the earliest complete copies, in particular using MSS Gw, Ka, Kd, Ma, Mc1, Me, Mg, Pb, Pc, Sf, and Sg.

The text's distinctive prologue consists of 20 lines in partly rhymed verse, the first of which openly expresses the author's embarrassment over the fact that "the Jew would know such things" (*Me pudet audire Iudeum talia scire*), by which "things" he means the astonishingly precise calculation of the new moon according to the *molad* system. In the next few lines, Christian clergymen and scholars are called upon to avail themselves of the same techniques so as to escape the awkward situation of being surpassed by the Jews in scientific matters. What seems to have aggravated our author was not the prediction of lunar

64 See the section on "Major textual changes," starting on p. 414 below.

65 Exceptions include the manuscript pairs Ed/Lf, Le/Up, and Be/Co.

phases *per se*, for which Christians could always take recourse to astronomical tables, but the fact that Jews, unlike Christians, could make such predictions using their own calendar, and hence within a fairly simple and easy to learn system. In the case of the present text, this palpable motivation of 'calendar envy' was bolstered by a general attitude of anti-Jewish hostility, which made the author choose drastic words to highlight the chasm that existed between the duties of the Christian clergy as paragons of virtue and guides for the laypeople, on the one hand, and their ignorance in astronomical matters, on the other. Such ignorance is declared unacceptable, since it makes the clergy inferior to those who are 'equal to Satan' (*anteriores/ Sunt scitu Sathane quos patet esse pares*). In the commentaries, this line is usually elucidated by translating *Sathanas* as 'adversary', in allusion to the way the Jews opposed the theological dogmas of Christianity.[66]

While the errors of the ecclesiastical calendar and the necessity of its reform were most probably lurking in the background, on the surface the *Computus Judaicus* is focussed almost entirely on the calculation of *molad* times, completely ignoring related topics like the date of Easter or the conversion of Jewish into Julian dates. Despite this narrow outlook, however, the *Computus Judaicus* can still be justifiably classified as a treatise on the Jewish calendar, given that the latter's terminology and framework continue to shine through. In all preserved versions, the rhymed preface is followed by the introduction to the treatise's main part (1.1), which references a line from the opening chapter of Aristotle's *Sophistical Refutations*, according to which "those who are not well acquainted with the force of names misreason both in their own discussions and when they listen to others."[67] In accordance with this caveat, the author exhorts his readers to bear in mind that the Jews refer to the conjunction as *molad*, whereas the 19-year cycle is referred to as *messerim* (1.2). This is immediately followed by a section on the Hebrew month names (1.3), whose sequence

66 MS Pa, fols 121$^{va–b}$: "Et subiungit rationem cum ipsi *sunt similes Sathane*. *Sathan* enim est *dyabolus* vel *adversarius* et quia ipsi preceptis Dei, precipue articulis fidei, penitus adversantur, ex hoc merito *Sathanes* nuncupantur." On the translation of *Sathan*, see, e.g., *Summa Britonis sive Guillelmi Britonis Expositiones vocabulorum Bible*, ed. Lloyd W. Daly and Bernadine A. Daly, 2 vols. (Padua: Editrice Antenore, 1975), 2:685: "SATHANAS in latinum sonat adversarius sive transgressor." Papias, *Elementarium doctrinae rudimentum* (Venice: Theodorus de Ragazonibus, 1491), sig. M3^{v}.

67 Aristotle, *De sophisticis elenchis* (translatio Boethii, 1.1), ed. Bernard G. Dod (Leiden: Brill, 1975), 6: "Quemadmodum igitur illic qui non sunt prompti numeros ferre a scientibus expelluntur, eodem modo et in orationibus qui nominum virtutis sunt ignari paralogizantur et ipsi disputantes et alios audientes."

is elucidated by juxtaposing them with their equivalent months in the Julian calendar. The term *messerim*, which is attested in this form in most manuscripts besides similar spelling such as *mesrim* and *messorim*, is a palpable corruption of the plural of *maḥzor* (here: 'cycle').[68]

As for the *molad*: while Jewish calendrical tradition normally uses it exclusively to denote the time of mean conjunction, the author of the *Computus Judaicus* is somewhat ambiguous about its astronomical meaning. His translation of *molad* as *incensio vel primatio* (1.2) highlights this ambiguity, since both Latin expressions could be used for different aspects of the lunar cycle. The contemporary *Computus chirometralis* (see p. 401), for instance, clearly defines the *primatio* as a point in time exactly one day after the conjunction, and the *incensio* as the 24-hour period that intervenes between both. In this scheme, the day-count for the moon (*luna* I, *luna* II, *luna* III etc.) only starts with the *primatio*.[69] The resulting ambiguity is fully removed only in some later versions of the *Computus Judaicus*, which add a new paragraph that implicitly defines the opposition as the mid-point between two *incensiones*, making it obvious that the *incensio* is meant to be the point of conjunction.[70] That the original author thought along the same lines is very likely, but cannot be proven on the basis of the text alone.[71]

The introductory portion of the *Computus Judaicus* is rounded off with a section that deals with the difference between the 19-year lunisolar cycles as respectively counted by Jews and Christians (1.4). It essentially teaches that the Jews always begin their cycle two full years plus nine months later, from October rather than from January. In elucidating this difference, the author makes use of the principle of counting the years of the cycle on the tips and phalanges of one's fingers. His starting point for counting is the tip of the thumb, which corresponds to year 1 in the Christian cycle (year 18 in the Jewish cycle).[72] For the Jewish cycle, by contrast, one must start with the third 'joint'

68 For further details, see the section on 'Hebrew terms', starting on p. 406 below.

69 *Computus chirometralis*, ed. Mütz (n. 92 below), 64, 66: "Primacio sic patet in quacumque hora alicuius diei invenis coniunctionem in eadem hora sequentis diei est primatio. Et ista dies que mediat dicitur dies incensionis. Que post coniuncta dies. dies hec prima vocatur. Inter coniuncta primaque dies datur incensio." See also ibid., 42.

70 See p. 416 below.

71 The commentary on the initial verses, edited below, would seem to support an understanding of the Jewish calendar as being based on the visibility of the new crescent, since *lunam primari* is here glossed as "primiciali splendore incendi vel principaliter incendi."

72 This differs from the method mentioned by Bede, where one starts at the base of one's thumb. See Bede, *De temporum ratione* 55 (CCSL 123B, 444).

(*articulus*) of the thumb, which should probably be understood as meaning the lower or proximal phalanx. The end of the Christian cycle is supposed to be reached at the tip of the little or auricular finger, which hence corresponds to year 19 in the Christian and year 17 in the Jewish cycle. In order to make this partition work, one can obviously not just count down each finger starting with the tip, since otherwise position 19 would correspond to the auricular finger's lowest phalanx. Instead, one would have to use something like the following order: (1) tip of thumb; (2) distal phalanx of thumb; (3) proximal phalanx of thumb; (4) proximal phalanx of index finger; (5) intermediate phalanx of index finger; (6) distal phalanx index finger; (7) tip of index finger; (8) proximal phalanx of middle finger; (9) intermediate phalanx of middle finger; (10) distal phalanx of middle finger; (11) tip of middle finger; (12) proximal phalanx of ring finger; (13) intermediate phalanx of ring finger; (14) distal phalanx of ring finger; (15) tip of ring finger; (16) proximal phalanx of little finger; (17) intermediate phalanx of little finger; (18) distal phalanx of little finger; (19) tip of little finger.

In many copies, including most early ones, the text offers an example based on year 14 of the Christian cycle, which corresponds to year 12 of the Jewish one.[73] By contrast, a great number of later manuscripts choose the year 17/15.[74] The reason for this change, which first occurs in Kd (ca. 1389), is perhaps found in the statement, contained in numerous copies from the former group, that year 14 of the Christian 19-year cycle is located on the third *articulus* of the little finger or *digitus auricularis*. Following the order just outlined, year 14 should much rather be the distal or third phalanx of the ring finger or *digitus annularis*, which can be easily misread as *digitus auricularis*.[75] Later copyists solved the problem by updating the year in question to '17' and changing the 'third' into the 'second' *articulus* of the *digitus auricularis*, i.e. the intermediate phalanx of the little finger.[76] More isolated, but equally valid, variants include 19/17 in conjunction with the tip of the little finger (Bg, Md, Pc, Sf),[77] 18/16 in

73 MSS Ba, Go, Ka, Kb, Ke, Lw, Ma, Mc1, Mc2, Me, Mg, Pe, Pf, Sg, So, Va, Vi, Wb, Wc. MS Pe (fol. 119^{v}) has 17/12, but this is obviously a scribal error.

74 MSS Be, Br, Co, Ed, Er, Fb, Gr, Ha, Kd, Kx, Le, Lf, Lp, My, Mz, Ne, Pb, Sa, Sb, Tr, Up, Wo, Wp.

75 The correct reading is only found in MSS Go (fol. 202^{v}), Ka (fol. 48^{r}), Kb (fol. 338^{vb}), Ke (fol. 193^{v}), Mc1 (fol. 165^{rb}), Mc2 (fol. 258^{r}), Vi (fol. 159^{v}), Wb (fol. 4^{r}), and Wc (fol. 20ra). In MSS Pe (fol. 119^{v}) and Pf (fol. 160^{v}) the *auricularis* was corrected to *annularis* at a later stage.

76 Of those copies featuring years 17/15, only MS Ed does not make the necessary correction from 'tertio' to 'secundo'.

77 MS Pc, fol. 148^{v} and Sf, fol. 191^{rb} still have "in tertio articulo auricularis digiti."

conjunction with the distal phalanx of little finger (Kc, Ml), 1/18 (Mb),[78] and 3/1 in conjunction with the thumb's proximal phalanx (Lo, Lq).

Following the passage on finger reckoning, the treatise approaches its main brief, which is the computation of the *molad*. In a short opening section (2.1), the author explains that the Jews divide the natural hour into 1080 'particles' (*particulas*), the Hebrew name for which is rendered as *elochim* in most versions of the text—a very evocative term, reminiscent of one of the Hebrew names of God, which I shall henceforth adopt. As one would expect, the text instructs the addition of 1 weekday, 12 hours, and 793 such *elochim* to the time of any given *molad* to arrive at the time of the subsequent one (2.2). Somewhat more unusual is the following section (2.3), which points out an easy method to check the accuracy of one's calculation, which consists in the addition of 5 weekdays, 11 hours, and 287 *elochim* to the result. This, of course, is simply the difference between the above value (1.12.793) and a full number of days, hours and *elochim* (6.23.1080), which hence should lead back to the previous *molad*. Curiously, the Jews are said to refer to this method as *statera*, which happens to be the Latin word for 'scales' or 'balance'.[79] The author obviously intended to evoke the mental image of a pair of scales, where one side goes up as the other goes down. In the same manner, the value to be added in this control method is in inverse proportion to the value added in the original calculation. At the same time, however, the term *statera* appears to be a translation of the Hebrew word *moznayim* (מאזנים), which can likewise mean 'scales' and which Abraham Ibn Ezra uses in *Sefer ha-Ibbur* to designate certain arithmetical sanity tests for *molad*-calculations.[80] Although the methods employed by Ibn Ezra involve principles such as 'casting out nines' and are hence very different from what is proposed in the *Computus Judaicus*, the claim that the Jews call their control methods 'scales' suggests some kind of connection. In this context, it also worth observing that Ibn Ezra was no stranger to the didactic use of mnemonic devices and that his *Sefer ha-Ibbur* begins with five lists of *molad*-values or 'characters' (סימנים) that essentially codify the same numerical information also provided by tables 1–5 in some versions of our present treatise.[81]

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78 MS Mb, fol. 60^{r}: "Quando nos habemus tria in Ianuario tunc ipsi habent unum in October. Et quando ipsi habent 18 pro cyclo eorum tunc nos habemus in Ianuario etc."

79 I owe the explanation of the term to Giuseppe Cuscito.

80 Abraham Ibn Ezra, *Sefer Ha'ibbur* (I), ed. Goodman, 13–14, p. טו. Ibn Ezra's predecessor Abraham bar Ḥiyya instead uses the more conventional term בדיקת ('test' or 'examination') as well as a method of 'casting out sevens': *Sefer ha-Ibbur* (2.6), ed. Filipowski, 52–53.

81 Abraham Ibn Ezra, *Sefer Ha'ibbur* (I), ed. Goodman, 5–8, pp. יא–יג. On the five-table version of the *Computus Judaicus*, see p. 410 below.

The following section (2.4) introduces and explains the first table found in the treatise, which contains the data necessary to calculate all 13 *moladot* of any given year, provided the time of at least one *molad* in this year is already known.[82] From there, the text moves on to calculations involving whole years, with the addition of 4 weekdays, 8 hours, and 876 *elochim* to go from one *molad* Tishri to the next, provided that a common year intervenes (3.1). This is followed again by a section on the corresponding control method or 'statera' (3.2), which here consists in the addition of 2 weekdays, 14 hours and 204 *elochim* (6.23.1080 – 4.8.876 = 2.15.204). The chapter closes by introducing a second table (3.3), which makes it possible to calculate all 19 *moladot* Tishri of any given 19-year cycle, provided that one of them is already known. Afterwards, the text describes a third table (4), with the data necessary to calculate the *molad* Tishri of the first year of any 19-year cycle, in groups of 1 to 10 cycles. In all but three complete copies of the text (Mb, So, Sg), this is followed by various versions of an additional chapter, which explains the use of a fourth table, constructed for finding the *molad* Tishri of the first year of any group of ten 19-year cycles. As we shall see in a moment (p. 409 below), it is quite likely that this table and the accompanying text were not yet present in the original version of the treatise.

Thus far, calculations have been predicated on the impractical assumption that the user already knows the precise value of one conjunction, as timed by the Jewish calendar. The final chapter (5.1) drops this assumption and shows how one can find the time of *any* conjunction, even if no present *molad* time is at hand. This is achieved by first determining the number of 19-year cycles since the beginning of the Jewish world era, the present year of which is obtained by adding 3760 to the Christian era (for dates between January and October). In the concrete example used, the year is 1342 CE = 5102 JE. We are told to divide the sum of years by 19 in order to arrive at the number of cycles that have elapsed along with the year in the present cycle, which is indicated by the remainder. The time difference between two full 19-year cycles—composed of 235 lunations—is 2 weekdays, 16 hours, and 595 *elochim* (235 × 29.12.793 mod 7). This value must be multiplied by the total number of cycles and the result be added to the calendar's root value of 2 weekdays, 5 hours, and 204 *elochim*, which corresponds to the *molad* of Tishri in 3761 BCE (the *molad baharad*). The result will be the first *molad* in the first year of the current cycle. To get to from there to any other year or lunation, further numbers have to be added, which, it is explained, can be extracted from tables 1 and 2 above. As in all

82 The tables will be discussed in detail below, starting at p. 409.

previous sections, the method presented here only yields the day of the week and time of day of the conjunction in question. What is absent are instructions of how to convert the result into the Julian calendar and hence come up with a precise date. In all likelihood, the author presupposed that users of his text would constantly compare their results with the ecclesiastical lunar calendar, whose Golden Number signalled new moons that generally fell three or four days after the Jewish *molad*. If this was known, the weekday of the *molad* was sufficient information to derive the appropriate conjunction date and time.[83]

In the vast majority of preserved manuscripts, the final chapter is augmented by a further section (5.2), which adds some remarks on the conversion between minutes and *elochim*, noting that one sexagesimal minute corresponds to 18 *elochim*. It also comments on the different day-epochs used by various nations, with the Jews preferring an evening epoch, starting six hours after noon. There is a possibility that this last section is a secondary accretion that originated in the commentary to the work, the earliest known version of which contains an identical passage at the end of the exposition of ch. 5.1.[84] Among the integral copies of the main text, however, only So and Sg omit this part, leaving it open whether the passage is authentic. Some support for authenticity may come from the opening verses of the whole work, the last two of which mention that the author intends also to deal with the correspondence between the Christian and Jewish reckoning (*Ipsius ars primo nostra postea detur/ Hinc concordetur nobiscum et referetur*); if it were not for the brief section 5.2, no material matching this description would be found anywhere in the treatise.[85]

83 The same method underlies the mean conjunction tables in the *Compotus philosophicus* (ca. 1273) of Friar John, which were excerpted into the *Compotus novus* (1297) of John of Pulchro Rivo. See Appendix I below.

84 See MSS Pa (fol. 125^{v}) and Pd (fol. 52^{v}). The part is completely missing from MS Wa, whose commentary is otherwise very closely related to the one found in Pa and Pd.

85 This was also acknowledged by several scribes in their final statements. See, e.g., MS Mc1, fol. 170va: "Et sic patet concordantia inter nos et ipsos diligenter consideranti. Et hoc est quod promisit autor in principio libelli, dicens versus: 'Ipsius ars primo post tibi nostra detur. Huic concordetur nobiscum et hinc referetur'." See also MSS Ed (fol. 77^{v}), Kb (fol. 351^{rb}), Le (fol. 141^{r}), Lf (fol. 38^{v}), Pa (fol. 125^{v}), Pd (fol. 52^{v}), Sf (fol. 193^{vb}), and Up (fol. 26^{v}).

4 Context and Transmission

While the sophisticated calendrical treatise of Robert of Leicester had a relatively limited impact, perhaps due to its difficult nature and the many topics breached in it, the much simpler *Computus Judaicus* is still attested in no less than 59 manuscripts, many of which contain extensive commentaries. That this text was not only remarkably widespread, but also well-regarded by its users, can be seen from a remark in Hermann Zoest's *Calendarium Hebraicum novum* (which shall concern us in chapter VI below), where it is referred to as a "most gracefully composed" work.[86] Its appeal to late medieval users is further underlined by the fact that at least one late medieval university, namely that of Vienna (founded in 1365), is known to have occasionally offered lectures on the *Computus Judaicus*.[87] Although this is the only positive documentation of its use in an academic environment, the provenance and contents of the extant manuscripts suggest a much wider circulation among Arts faculties in the German-speaking lands of Central and Eastern Europe, where students were taught *computus* as part of their basic astronomical and mathematical education.[88] In most cases, the *Computus Judaicus* has been preserved in collections of quadrivial school texts and study materials, with a particular focus on astronomical, astrological, musical, mathematical and calendrical lore. One case in point are John of Sacrobosco's treatises *De sphaera* and *Algorismus*, which were in standard textbook use at late medieval universities and are thus among the most frequently encountered items in these collections.[89]

86 Hermann Zoest, *Calendarium Hebraicum novum*, prologus: "Similiter quamvis et novus Hebreorum compotus metrice et prosaice venustissime sit compositus et in diversis mundi partibus satis sit communis, ipse tamen predictam non potest tollere difficultatem, quia et ipse etiam ad dies non est extensus."

87 See Joseph Aschbach, *Geschichte der Wiener Universität im ersten Jahrhunderte ihres Bestehens* (Vienna: Verlag der K.K. Universität, 1865), 94, 353. The only known MSS of the Computus Judaicus that can be linked to Vienna are Ml and Vi. The latter was once in the possession of Johannes de Werdea, who became magister artium at Vienna in 1445 and later, in 1451, entered the Benedictine monastery at Mondsee, changing his name to Hieronymus. See Ludwig Glückert, "Hieronymus von Mondsee (Magister Johannes de Werdea)," *Studien und Mitteilungen zur Geschichte des Benediktinerordens* 48 (1930): 99–201 (126, 201).

88 Some evidence for its use at Kraków will be considered below, p. 404.

89 Versions of and/or commentaries on the *Liber de sphaera* appear in 21 codices, namely Be, Bf, Br, Ed, Fb, Gr, Kb, Kc, Le, Lo, Lp, Mb, Ml, My, Pd, Sa, Sg, Up, Wb, Wc, Wp. The *Algorismus*

Many of the codices containing the *Computus Judaicus* also attach John of Sacrobosco's name to a *Computus ecclesiasticus*, which often turns out to be Alexander of Villedieu's *Massa compoti*, written at the beginning of the thirteenth century.[90] The *Massa* attests to a general trend in late medieval computistical literature of making heavy use of mnemonic devices, such as metrical verses and count-out rhymes, in an effort to help students digest large chunks of information or perform calculation without the aid of tables. The *Computus Judaicus* can indeed be seen as an attempt to apply these didactic techniques, already well-established for the ecclesiastical calendar, to the calendar of the Jews and its *molad*-system.[91] One roughly contemporary text worth mentioning in this regard is the *Computus chirometralis*, composed in ca. 1330 by the astronomer Johannes Algeri (or Eligerus), who was a teacher at the *studium*

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is even found in 31 codices: Ba, Be, Bg, Bh, Co, El, Fb, Ka, Kc, Kd, Ke, Kg, Le, Lp, Lq, Ma, Mb, Ml, My, Pb, Pd, Pe, Pf, Sa, Sb, So, Tr, Up, Va, Wb, Wc. On the context, see Olaf Pedersen, "The Corpus Astronomicum and the Traditions of Mediaeval Latin Astronomy," in *Colloquia Copernicana III*, ed. Owen Gingerich and Jerzy Dobrzycki (Wrocław: Wydawnictwo Polskiej Akademii Nauk, 1975), 57–96; Pedersen, "In Quest of Sacrobosco," *Journal for the History of Astronomy* 16 (1985): 175–221.

90 The text and/or commentaries upon it are found in MSS Ba, Bg, Bh, Br, Ed, Go, Gr, Ka, Kd, Ke, Kg, Le, Lo, Lp, Ma, Me, Mg, Mz, Ne, Pa, Pb, Pe, Pf, Sa, Sb, Sg, Up, Va, Wb, Wc. For editions see Steele, ed., *Opera hactenus inedita*, 268–289; van Wijk, *Le Nombre*, 52–69. The designation of the *Massa computi* as *Computus ecclesiasticus* makes it easy to confuse with another computistical school text from this period. Both texts have been misattributed to John of Sacrobosco, who authored a treatise *De anni ratione*, which is also often referred to as *Computus ecclesiasticus*. Copies of this text appear in MSS Br, Kb, Ma, Mg, Ml, Mz, Pa, Pd, Sb, So, Sg. It was first printed in 1538 as *De ratione anni seu ut vocatur vulgo computus ecclesiasticus* in John of Sacrobosco, *Libellus de Sphaera*, ed. Melanchthon, sigs. Br–H3^{r}. For further details, see Jennifer Moreton, "John of Sacrobosco and the Calendar," *Viator* 25 (1994): 229–244. The general tendency to attribute anonymously transmitted material on the *computus* to John of Sacrobosco is also reflected by some of the extant commentaries on the *Computus Judaicus* (see p. 432 below).

91 The important role played by mnemonic verses in medieval education is impressively documented by Lynn Thorndike, "Unde Versus," *Traditio* 11 (1955): 163–193. For computistical texts specifically, see Bernhard Bischoff, "Ostertagtexte und Intervalltafeln," *Historisches Jahrbuch* 60 (1940): 549–580, and the appendix on 'Memory devices' in Jennifer M. Moreton, *Compotus ecclesiasticus: A Thirteenth-Century Calendar Treatise in Its Context* (unpublished manuscript, based on a PhD Diss., Dublin, 1992). See also Wolfgang Irtenkauf, "Der Computus ecclesiasticus in der Einstimmigkeit des Mittelalters," *Archiv für Musikwissenschaft* 14 (1957): 1–15. For a ninth-century example, see Meerssemann and Adda, *Manuale di Computo*, 138–151.

generale in Erfurt.[92] This work, which spawned numerous commentaries, is still found in well over 150 manuscripts and is known to have been part of the Arts curriculum in Erfurt, Heidelberg, Vienna, Prague, and Kraków. As the title would suggest, the *Computus chirometralis* relies on the principle of using the phalanges and joints on one's hands to perform a variety of calendrical and basic astronomical calculations. In doing so, readers were further aided by approximately 60 sets of verses, which were meant to reduce numbers to an easily memorable system of words, syllables and letters. As just mentioned, a similar objective of facilitating calendrical-astronomical reckoning by a system of mnemonic devices is also discernible in the *Computus Judaicus* and it is indeed striking to observe that close to 75 % of all codices containing the former text are also host to the *Computus chirometralis*.[93]

The popularity of computistical finger reckoning during the late Middle Ages is also attested by multiple other texts, including a metrical *Computus manualis* written by a certain John of Poland (Johannes de Polonia), which is found in 15 of the manuscripts listed above.[94] A reference to the *Computus manualis* occurs in section 1.4 of our *Computus Judaicus* (see p. 395), but it is not clear whether the author had any specific text in mind or whether *Computus manualis* is here merely a generic reference to the art of finger reckoning. Other computistical titles found in the codices are *Computus Brandenburgensis*,[95]

92 Sönke Lorenz, *Studium Generale Erfordense: Zum Erfurter Schulleben im 13. und 14. Jahrhundert* (Stuttgart: Hiersemann, 1989), 149–150, 244–260; Lorenz, "'Studium Generale Erfordense': Neue Forschungen zum Erfurter Schulleben," *Traditio* 46 (1991): 261–289 (285–289); Karl Mütz, ed., *"Computus Chirometralis": Spätmittelalterliches Lehrbuch für Kalenderrechnung* (Leinfelden-Echterdingen: DRW-Verlag, 2003); Alfred Cordoliani, "Les manuscrits de comput des bibliothèques d'Utrecht," *Scriptorium* 15 (1961): 76–85 (76–78).

93 42 out of the 61 codices listed above also contain the *Computus chirometralis*: Ba, Be, Bf, Bg, Ed, El, Er, Fb, Go, Ha, Ka, Kb, Kc, Kd, Ke, Kg, Kx, Le, Lf, Lo, Lp, Lw, Mb, Me, Mg, Ml, My, Ne, Pb, Pd, Pe, Pf, Sa, Sb, Sg, So, Tr, Up, Va, Vi, Wb, Wc. In the commentary that accompanies the *Computus Judaicus* in MSS Le (fol. 131^{r}), Up (fol. 16^{v}), and Wo (fol. 27^{r}), the author of the *Computus chirometralis* is cited as an example of a computist who begins the year in March.

94 Incipit: "Est duplex cyclus lunaris, sit tibi primus …" MSS Co, Ka, Kd, Ke, Kg, Ma, Mb, Me, Ne, Pb, Pe, Sb, Va, Wb, Wc. See TK 435, 508, 950; Walther, *Initia carminum*, no. 5652; Zinner, *Verzeichnis*, nos. 8501–8519. This is not to be confused with the *Computus manualis* of Magister Anianus (written c. 1250/1300), which begins: "Compotus est talis proprie dictus manualis." Editions of the latter are found in: Wordsworth, *The Ancient Kalendar*, 161–175; David Eugene Smith, ed., *Le comput manuel de Magister Anianus* (Geneva, 1928; repr. Geneva: Slatkine, 1977).

95 Inc.: "Quoniam ex astroloye quotacione inbecillumque ruditate …" MS Gr.

Computus Iacobi,[96] *Computus orbicularis*,[97] *Computus sacerdotalis*,[98] *Computus granatus*,[99] and *Tractatus computisticus de tabulis*.[100] A good number of these texts also come with designations of authorship such as the *Computus casualis* of Goswin Kempkin,[101] the *Computus manualis* of John of Brunswick (= John of Pulchro Rivo),[102] the *Computus Nurembergensis* (also *Norimbergensis* or *Nürlebergensis*) of Martin of Nuremberg (Martinus de Norimberga),[103] and the *Computus novus chirometralis*, written in 1390 by Jacob Twinger of Königshofen.[104]

From a look at the manuscripts and their provenance, the geographic area of distribution of the *Computus Judaicus* can be quickly identified as Central Europe, more specifically the German-speaking lands in their full extension, from the Alsace to the cities of Eastern Europe with a substantial German population such as Kraków and Wrocław (Breslau). One major centre of dissemination for this text appears to have been Bohemia, as indicated by the relatively large number early copies that can be traced either to Prague (Ka?, Kc, Mz, Ne?, Pa, Pb, Pe) or to the monastery of the Canons Regular in Třeboň (Wittingau), Southern Bohemia (Pc, Pd). From there the work seems to have made its way to Austria/Slovenia (Gr, Ml, Sb, Sf, Vi) and Bavaria, where several early copies from the 1370s and 1380s, now all at the National Library in Munich, were once

96 MSS Ba, Ed. See Marijke Gumbert-Hepp, *Computus Magistri Jacobi: een schoolboek voor tijdrekenkunde uit 1436* (Hilversum: Verloren, 1987).

97 Inc.: "Cum superiorum motus a quo omnia in infimis gubernantur …" MSS El, Go, Gw, Ka, Kc, Kd, Ke, Lo, Lq, Up, Va. See TK 346; Zinner, *Verzeichnis*, nos. 12035–2053.

98 Inc. (1): "Sacerdotes computus scire tenentur …" Inc. (2): "Quoniam quidem ut viderim quam plures modernorum …" MSS Be, Co, Ed, Ha, Kx, Lf, Wp.

99 MS Ke.

100 Inc.: "Tabula prima tabula terminorum dicitur …" MS Mz.

101 Inc.: "Et quia tepent doctrinarum studia presertim mathematice discipline …" MSS Lf, Lo. See Zinner, *Verzeichnis*, nos. 5738–5741; Erich Kleineidam, *Universitatis Studii Erfordensis*, vol. 2, *Spätscholastik, Humanismus und Reformation, 1461–1521*, 2nd ed. (Leipzig: St.-Benno-Verlag, 1992), 67–68.

102 MS Ma. See Appendix I below.

103 Inc. (1): "Licet omnes homines ex naturali desiderio …" Inc. (2): "Omnia cum inferiora a motibus corporum superiorum gubernantur …" MSS Bh, Co, El, Gr, Kb, Kx, Le, Lo, Lq, Mc, Me, Pf, Sb, Up, Wc. See TK 828, 989; Zinner, *Verzeichnis*, nos. 7513–7555. Printed edition *Computus Nurembergensis perutilis clerico cum figuris textum pulcerrime declarantibus* (Leipzig: Gregor Boettiger, 1494). See further GW 07277–07279, available at http://www.gesamtkatalogderwiegendrucke.de/docs/COMPUTU.htm.

104 MS So. See Vetter, "Neues zu Justinger," 140–142.

located at various Benedictine monasteries such as Tegernsee (Me), Ebersberg (Ma), Indersdorf (Mb), and St. Emmeram in Regensburg (Mc1).[105]

Another important centre for the text's manuscript transmission was the University of Kraków, whose Jagiellonian Library still holds several copies, the earliest of which (Ka) dates from 1387.[106] Although the latter may have originated in Prague, its glosses feature the hands of two Krakówian Arts masters and professors of the second half of the fifteenth century, John of Michałów and Matthew of Szydłów.[107] All of this makes it tempting to think that the *Computus Judaicus* was integrated into the Arts curriculum at Kraków—where astronomical instruction was in particularly high standing—for at least some time during the fifteenth century, as was done at Vienna.[108] One case in point is Jodocus de Ziegenhals (ca. 1380–1447), a member and later abbot of the Canons Regular at Wrocław. MS Wb, now at Wrocław's University Library, is a personal collection of texts from his own hand, copied between ca. 1415 and 1426. Amongst the works included is a commented version of the *Computus chirometralis* (fol. 73^{v}–99^{v}), whose colophon explicitly states that Ziegenhals read the text whilst studying in Kraków for his Arts baccalaureate (fol. 99^{r}).[109] Did he

105 One may also mention MS Md, from the monastery of St. Zeno (Can. Reg.) near Bad Reichenhall, which, although being a late copy from 1462, is evidently based on an exemplar from ca. 1382 (as can be seen from the dating clause on fol. 3^{v}).

106 MSS Ka (ca. 1387), Kb (ca. 1433), Kc (1398), Kd (ca. 1389), Ke (ca. 1424); Kx, now at Kraków, was still in Berlin before the Second World War.

107 For details, see Kowalczyk et al., *Catalogus*, 396–397.

108 See n. 87 above. This supposition seems all the more likely in light of the close ties that existed between both universities in the fifteenth century in the fields of mathematics and astronomy. See Mieczysław Markowski, "Die Beziehungen zwischen der Wiener mathematischen Schule und der Krakauer astronomischen Schule," *Mediaevalia Philosophica Polonorum* 18 (1973): 133–158. See further Markowski, "Astronomie an der Krakauer Universität im XV. Jahrhundert," in *Les universités a la fin du Moyen Age: Actes du Congrès international de Louvain, 26–30 mai 1975*, ed. Jacques Paquet and Jozef Ijsewijn (Louvain: Institut d'Études Médiévales, 1978), 256–275.

109 Wb, fol. 99^{r}: "Hunc computum frater Jodocus pro tunc existens baccalar. arcium legit in studio Cracoviensi. Orate pro eum." Further entries from this MS are printed in Colmar Grünhagen, "Annalistische Nachlese, 1227–1450," *Zeitschrift des Vereins für Geschichte und Alterthum Schlesiens* 9 (1868): 182–190 (186–187). They inform us that Jodocus entered the order of the Canons Regular in 1416 and was promoted to *magister artium* in 1419 and to *baccalaureus decretorum* in 1423. On Jodocus's career, see further Jan Drabina, "Jodok von Ziegenhals und seine Chronik der Augustiner-Chorherren," in *Die Anfänge des Schrifttums in Oberschlesien bis zum Frühhumanismus*, ed. Gerhard Kosellek (Frankfurt: Lang, 1997), 183–191; Christine Stöllinger, "Jodocus Berthold von Ziegenhals (de Czeginhals)," *DLM*, 4:527–529; 11:762.

perhaps come into contact with the *Computus Judaicus* at the same occasion? This would indeed seem likely, especially if we consider that the commentary included in his copy is related to that in MS Kb, dating from 1433.[110] The latter copy was produced by Nicholas of Grabostow, another master of Arts from Kraków, who also redacted a commentary on the *Computus chirometralis* (in 1423).[111]

Between 1400 and 1450, one can witness a veritable explosion of copies of the *Computus Judaicus*, with at least 30 of the 59 known manuscripts dating from this period. In addition, the first half of the fifteenth century marks a noticeable movement of transmission towards the Northern regions of Germany, with Erfurt emerging as a particularly important new centre (Bh, Er, Lo, Lp).[112] The text was still copied as late as 1492 (Ha), by a monk named Heinrich Holthusen at the Benedictine monastery of St. Blasien in Northeim (near Göttingen), where the manuscript was once held.[113] Another noteworthy peculiarity is the fact that a sizeable number of manuscripts from this later period were once

110 For details, see below, pp. 423–424.

111 The colophon of the *Computus Judaicus* in MS Kb, fol. 351^{vb}, reads: "Expliciunt collecta Iudayci per manus magistri Nicolay de Grabostow, finita sub Anno Domini millesimo CCCC^{o}tricesimo tercio in vigilia sancti Nicolay episcopi [5 December] ipso die sabbati in stubella eiusdem." The *Computus chirometralis* is found in the same MS on fols. 245^{rb}–77^{vb}, 280ra–311ra. The name Nicolaus de Grabostow appears twice among those promoted to the master's degree at the University of Kraków: in 1421 "in quarto examine, videlicet post quartam feriam Cinerum," and again in 1432, "in hyeme." See Joseph Muczkowski, ed., *Statuta nec non Liber promotionum philosophorum ordinis in Universitate studiorum Jagellonica, ab anno 1402 ad annum 1849* (Kraków: Typis Universitatis, 1849), 14, 25; Grażyna Rosińska, *Scientific Writings and Astronomical Tables in Cracow: A Census of Manuscript Sources* (*XIVth–XVIth Centuries*) (Wrocław: Polish Academy of Sciences Press, 1984), 82; Markowski, *Astronomica*, 107; Kowalczyk et al., *Catalogus*, 406.

112 The library register of 1497 of the Erfurt *Collegium Universitatis* lists a manuscript containing the "computus Iudaicus et cyrometralis" and other quadrivial texts. It was given to the library by "mag. Hermannus de Essfeld" and does not seem to be identical to any of the preserved MSS listed above. See Paul Lehmann, *Mittelalterliche Bibliothekskataloge Deutschands und der Schweiz*, vol. 2, *Bistum Mainz, Erfurt* (Munich: Beck, 1928), 176. The fifteenth-century library catalogue of the charterhouse St. Salvatorberg in Erfurt lists three codices containing the *Computus Judaicus*. One of these is identical to MS Lo, but the other two could not be identified. See ibid., 480, 483 (= Lo), 485. A further unknown copy appears in the inventory of the Marienknechtskloster in Erfurt, drawn up in 1485. See ibid., 595.

113 MS Ha, fol. 32^{v}: "Et sic est finis huius computi Iudaici scripti per manus fratris Hinrici Holthusen conventualis monasterii sancti Blasii in Northeym Anno Domini 1492, 6 kalendas Septembris [26 September], de quo deo laus et gratiarum actio in evum. Amen."

owned by Carthusian monasteries (charterhouses) in or near towns such as Basel (Ba), Cologne (Br), Mainz (My, Mz), Seiz (Gr) and Erfurt (Lo, Lp).

5 Transliteration of Hebrew Terms

Although the *Computus Judaicus* had little time for the intricacies of the Jewish calendar and remained silent on most of its aspects other than the computation of the *molad*, the text does show some noteworthy interest in the Hebrew terminology that came with this computation. Three such terms are expressly defined in sections 1.2 and 2.1: (1) *molad*, as the word designating the mean conjunction, which is here rendered *incensio vel primatio*,[114] (2) *maḥzor* as the Hebrew equivalent to *cyclus*, and (3) *ḥalakim* as the term for the 1080 parts of the hour. With the exception of the relatively straightforward *molad*, the Latin transliteration of these terms in the various manuscripts shows heavy signs of corruption and/or modification, making it difficult to determine what shape they may have had in the earliest redaction. For *maḥzorim*, the plural of *maḥzor*, the rendering attested most frequently is *messerim*, which thus first appears in 1375 (Me). Other relatively frequent variants, probably even earlier, are *mesrim* (Be, Gr, Le, Lq, Md, Pa, Sg, Up, We, Wo) and *messorim* (Ed, Kd, Ke, Ma, Mg, Pc, Pd) or *mesorim* (Mc, So), while the more exotic renderings include *mezerim* (Bg), *messzerim* (Wb), *messzerym* (Wb), *messerym* (Vi) and *mezorym* (Mz). In the relatively early copy found in Pb (last quarter of the fourteenth century), one mnemonic verse refers to the cycles as *magssorim*, which is phonetically close to the Hebrew plural.[115] A variant of this is *magssorym*, found in Pe. A singular form of the word is attested only in the commentary to Wp (copied in ca. 1431 in Northern Germany), where we find a mention of *maczor* (fols. 58^{v}, 59^{r}), which perhaps indicates some competence in Hebrew on the part of the redactor.

An even more confusing picture is presented by the transliteration of *ḥalakim*, which usually crops up as *elochim*. Close variants to this are *elochym* (Co, Fr, Kb, Lo, Ma, Ne, Pa, Sa), *elachim* (Bh, Pf) and *elachym* (Bf, Sb, Vi). A reading that might bring us closer to the archetype is *helochim* or *helachim* (both in Mc1).[116] Since the 'h' and 'ch' in *helachim* can be taken to represent the initial ח and the ק of *ḥalakim* (חלקים), it certainly would appear likely that *elochim*

114 On the ambiguity of these Latin terms, see above, p. 395.

115 MS Pb, fol. 57^{r}. It also appears in the appended short commentary section ibid., fol. 61^{v}.

116 Variants would be *helechym* in Vi and *helohym* in Mz.

originated as a corruption of the former. This conclusion seems reasonable, although it is worth noting that some manuscripts offer transliterations that are arguably phonetically even closer to the Hebrew original, such as *calochim* (Md), *galachim* (Wo), *gelochim* (So) or *gelochym* (So). In Go (only on fol. 209^{r}) and Wb we even find *chalakym*, while the commentary on Wo offers *challachym*, but this could easily be the work of a competent redactor. The same may be said about the *halakim/halakym* found in Sf and the commentary on Pb (fol. 61^{v}). The most intriguing comment in this regard can be found in a marginal gloss on fol. 17^{v} in Wc, copied in 1428, which notes: *Chalochim aliqui dicunt pro elochim, machsorim pro mesrim*.

No such rhyme or reason can be discerned in the transmission of the Hebrew month names, where the signs of variation and corruption are overwhelming. Some of the aberrations are indeed so great as to suggest the possibility that several of the copies of the *Computus Judaicus* were made by scribes writing from dictate—perhaps even the result of lecture notes. The following examples shall illustrate this:

Tishri
Most common: *Tisri/Tysri*. Select variants: *Tyssry* (Pe); *Cisri* (Kd); *Dis*(*s*)*eri* (Mg, Sb); *Trisi* (Vi); *Thisre* (Mc); *Tissre* (Wb); *Tysrim* (Kb, Kd, Mb, Pf); *Thissri* (Lf); *Thezei* (Bg).

Marheshvan
Most common: *Martheswan/Marcheswan*. Select variants: *Mareswan* (Wp); *Marchsuan* (Lo); *Marchiswan* (Lq, Sa); *Marchiswam* (My); *Marchyswan* (Sa); *Martiswan* (Be); *Marheswan* (Bh, Br, Mc2, Sg); *Martiswan* (Be); *Marcheszwan* (Wb); *Merschewan* (Ed); *Marthessewan* (Ml); *Mortheswa* (Ne); *Marthoswan* (Ne); *Marchasvan* (Pf); *Martesphan* (Pf II); *Mergenspan* (Wo); *Mergesphan* (Wo); *Martheswaysn* (Lp); *Marzessenam* (Mz); *Martezonam* (Bg).

Kislev
Most common: *Ke*(*s*)*slef*(*f*). Select variants: *Kislef* (Mc1); *Kissleff* (Wb); *Kisselew* (Ml); *Kasleph* (Kd); *Kesleph* (Bg, Fr, Ha, Ka, Kc, Kd, Mg, Pf, We); *Kessleph* (Pb); *Keschlef* (Lw); *Keslech* (Er, Pb, Pe); *Kesleve* (Gr); *Kysleph* (Mc2, So); *Kisleu* (Wo); *Kosleph* (Mz).

Tevet
Most common: *T*(*h*)*ebes*. Select variants: *T*(*h*)*ewes* (Mg, Mc2, Ml, Up, Wo); *Thewesz* (Wb); *Thephis* (Mc1); *Taibes* (Kx); *Theywes* (Kd); *Thelies* (Ne); *Tewesch* (Md); *Cebes* (Vi); *Cephes* (So); *Zephos* (Mz); *Zcephos* (Bg).

Shevat
Most common: *Swat*(*h*). Select variants: *Sabhat* (Mz); *Saphat* (Mc); *Siwath* (Wo); *Swach* (Bf, Er, Ka, Kb, Kc, Kx, My, Pb, Sa, Vi); *Swac* (Sg); *Swad* (Co); *Swan* (Er); *Schwach* (Ma); *Swayt* (Ne); *Zephant* (Mz); *Zcephat* (Mz); *Eswat* (Up); *Cesant* (Md).

Adar
Most common: *Adar*. Variants: *Adir* (Sg, Lq, Wb); *Ydar* (Pc).

Nisan
Most common: *Ny*(*s*)*san/Ni*(*s*)*san*. Select variants: *Naysan* (Vi); *Nizan* (Ba, Kb, Pb); *Niszan* (Wb); *Nyan* (Ka); *Nyzan* (Bg, Ka, Kc, Ke, Ne); *Nisac* (Mg); *Nyson* (Sb); *Nisy* (So).

Iyyar
Most common: *Ydar*. Select variants: *Ycar* (Ba, Lp, Ma, Me, Vi); *Ytar* (Lw); *Ygar* (Mf, Ml); *Yger* (Co); *Ydor* (Bf), *Iar* (Be, Mc, So), *Ydzar* (Wb); *Issar* (Up); *Y*(*s*)*sar* (Gr, Le, Mb, Md, Mz, Up); *Ycsar* (Pf); *Idzar* (Wo); *Ycor* (Lw).

Sivan
Most common: *Schyban/Schiban*. Select variants: *Scheyban* (Ma); *Schiwan* (Be, Ml); *Siwan* (Ml, Ne); *Siban* (Kx); *Chyban* (Vi); *Cyssan* (Up); *Phiban* (Pc); *Schybar* (Gr, Pe); *Schibar* (Pb); *Swiwan* (Kb); *Swiban* (Pf); *Swywan* (Bg); *Schwibon* (Sb); *Synor* (Kd); *Szwan* (Mg); *Zephan* (Mz); *Zcephan* (Bg); *Zephar* (Md); *Ziphan* (Wo).

Tammuz
Most common: *Tham*(*m*)*us/Tham*(*m*)*os*. Select variants: *Tamotz* (Up); *Thasmos* (Sb); *Thamusz* (Wb); *Tamnet* (So); *Tammons* (Wo); *Thomos* (Lw, Me); *Thammes* (Mc); *Thawuis* (Md); *Chamos* (Pc); *Hamus* (Bg).

Av
Most common: *Aff/Aph*. Select variants: *Affh* (Co); *Aphe* (Gr, Le, Up, Wo); *Aw* (Ml); *Auf* (Ne, Pf, Wp); *Auff* (Pc, Pf); *Awff* (Pc); *Ayff* (Lf); *Aiph* (Lo).

Elul
Most common: *E*(*l*)*ol/E*(*l*)*ul*. Select variants: *Elolium* (Vi); *Elon* (Er, We); *Elil* (Mc1); *Alil* (Mz).

6 The Tables

The calculation tables included in nearly all versions of the treatise are among its most distinctive element and suggest a roundabout way of grouping the extant manuscripts into family branches. Leaving aside sundry incomplete copies,[117] manuscripts of the *Computus Judaicus* generally feature either four or five different such tables. The older of these two arrangements is evidently the one based on four tables, as found in MSS Go, Gw, Ka, Kb, Kc, Kd, Ke, Lw, Ma, Mc1, Md, Me, Mg, Ml, Ne, Pb, Pc, Pe, Sb, Sf, Vi, Wb. It is worth observing, however, that the earliest version of the commentary, featured in MSS Pa, Pd, and Wa, does not yet contain any exposition of the passage that accompanies table 4 in most copies. The suspicion that the fourth table is therefore a secondary accretion receives further support from MSS Mb, So, and Sg, which omit this part from the main text, thus effectively representing a three-table version.[118] As indicated above (p. 398), the three tables in question cover (1) the 12/13 *moladot* in a common/embolismic year; (2) the *molad* Tishri for any individual year of the 19-year cycle; and (3) the first *molad* Tishri of any 19-year cycle, in groups of 1 to 10 cycles. The fourth table is a continuation of the previous table, meaning that it starts with the last line of table 3 and goes on to give the first *molad* Tishri of any group of ten 19-year cycles, from 10 to 100, usually followed by 110 and 120 cycles, although some copies falsely designate these as '200' and '300' (Kb, Ke), '101' and '102' (Ka) or '200' and '260' (Pe).[119] In those few cases where Julian month names are added to table 1, the months are normally

117 MS Vi stops after the first table, while Bg stops before. Va stops after section 3.3. Mz breaks off during the same chapter, but also omits table 1. No tables are found in Fb, although spaces had been left by the scribe. MS El breaks off midway into section 1.3 and hence too early to make any guesses about the tables its *Vorlage* may have contained.

118 It should be noted, however, that MS So features a version of table 4 in an appendix to the main text (fol. 140^{r}). This copy follows a curious arrangement, because tables 1 and 2 are featured twice each, first in the text and then again in an appendix that also offers tables 3 and 4, independently of the main text.

119 Further notable variants tables include MSS Wb, where table 4 stops at 100, and Go (fol. 207^{r}), which adds two more lines for the 130th and 140th iteration of the cycle. Md even counts '… 90, 100, 200, 260, 270'. The parameters in the last two lines of Mc1 likewise suggest '200' and '260', but they are designated '200' and '300' instead. In So, the line for 100 cycles is followed by one for 200 cycles, after which the table stops. Very peculiar is MS Pe, where tables 3 and 4 are combined into one and arranged horizontally. A (vertical) merger of both tables also took place in Sf, where the lines are simply numbered from 1 to 22, despite belonging to cycles 1–10 and 10–120.

counted such that the first line is assigned to November (Go, Kb, Ke, Ml, Wb).[120] This makes sense, seeing that the calculation, as specified in ch. 2.4, is supposed to work in such a way that the *molad* Tishri/October is already known, meaning that adding the numbers in the first line of the table will lead to the second *molad* of the Jewish year. For similar reasons, some versions of table 2 designate their first year as the second year of the 19-year cycle, thus numbering from 2 to 1 rather than 1 to 19 (Sg, So, Wb).

This four-table arrangement began to be replaced around ca. 1408/9 (the date of MS Sa) with an augmented version including a fifth table. Due to the great number of copies made in the fifteenth century, this version is in fact encountered more widely among the preserved manuscripts, including MSS Ba, Be, Bf, Bh, Br, Co, Ed, Er, Gr, Ha, Kx, Le, Lf, Lo, Lp, Lq, Mc2, Mf, My, Pf, Sa, Tr, Up, Wc, Wo, and Wp.[121] One major hallmark shared by most members of this group is that tables 1–5 are distinguished by names: *tabula mensium* (table 1), *tabula residuorum* (table 2), *tabula digitorum* (table 3), *tabula articulorum* (table 4), and *tabula centenariorum* (table 5).[122] As the name would suggest, the newly added table 5 lists the values for finding the first *molad* Tishri of any group of 100 19-year cycles, from 100 to 1000.[123] As in the earlier manuscripts, most copies of the five-table version start table 1 with November, and only a relative minority with October (Be, Bf, Le, Lo, Lq, Up). A peculiar case is Wp, which enumerates the lines of table 3 from 19 to 10 in descending order.

Tables in both of the aforementioned groups usually consist of two parts or halves, one for the main reckoning operation in question and a second so-called 'collateral table' (*tabula collateralis*). The latter always offers the complementary value that can be added to any given *molad* to extrapolate back into the past, in line with the principle of *statera* laid out in sections 2.3 and 3.2. Another characteristic of these tables is their consistent use of mnemonic devices as a supplement to (and sometimes in place of) the numbers designating the day, hour and *elochim*. These mnemonic devices are words constructed from

120 The exception is MS So, which starts with October.

121 Wo is evidently part of this group, even though it stops after table 3. The same goes for MS Er, in which the 4th table is left incomplete, while the 5th is missing. MS Bh contains the 5th table only in part, as it breaks off after the fourth lines ('400'). MS Ba is peculiar in that table 5 is featured twice, in different versions (fols. 247^{v}, 248^{v}).

122 The only example from the four-table group to fully employ these designations is MS Wb.

123 Copies of table 4 in MSS from this group normally contain twelve lines, from 10 to 120. Exceptions include MSS Ha, Tr, and Wp, which stop at 100, and Mf, which only goes to 90. In Lo and Lq, the fourth table is carried forward for twenty lines, from 10 to 200. In Bh, the *tabula centennariorum* only reaches to 400, while Bf only features six lines from 100 to 600.

a straightforward correlation of numerals with letters according to the following principle: a = 1, b = 2, c = 3 … u/v = 21, x = 21, y = 22, z = 0/23. After each numeral has been assigned its corresponding letter, these letters are vocalized and fashioned into syllables, seemingly at random, to produce fantasy words, preferably such that would be easy to keep in mind by virtue of their sound or similarity with existing words. For example: the first line of table 1 contains the numbers 1.12.793, which is in line with the fact that one weekday, 12 hours and 793 *ḥalakim* is the time difference between two conjunctions (*modulo* 7) according to the Jewish calendar. In accordance with the principle just outlined, these numbers are converted into letters in reverse order, from right to left, such that the resultant word is usually *Coniungo mea* (3 = c + 9 = i + 7 = g + 12 = m + 1 = a; *ConIunGo MeA*). The corresponding 'counter-value' in the collateral table is 6.23.1080 – 1.12.793 = 5.11.287, which is normally verbalized as something like *Ganhabe Lien* (7 = g + 8 = h + 2 = b + 11 = l + 5 = e; *GanHaBe LiEn*).[124]

While the preserved versions of the *Computus Judaicus* generally agree on this principle of correlating numbers with letters, they differ conspicuously not just with regard to how these letters are vocalized and elaborated into words, but also as to the style in which these number-letter-correlations are displayed in tabular form. In a great number of manuscripts, the words take the centre place, whereas the numerical digits are written in smaller script above each syllable, sometimes very faintly. In this type of layout, numbers and syllables are always written backwards, from right to left, as if the language in question was Hebrew. Only MS Go, however, goes the logical next step and additionally offers Hebrew letters designating the numbers in question. In a brief *addendum* to the main text found on a separate page (fol. 209^{r}), the scribe notes the correct Hebrew equivalents to the Arabic numerals associated with the aforementioned *Coniungo Mea* (1.12.793) and *Ganhabe Lyen* (5.11.287), namely א.יב.תשצג (which is additionally transcribed as *Ayawf Tasch zage*) and ה.יא.רפז (transcribed as *Hy reffaz*).[125]

As far as the tables themselves are concerned, the scheme used in most MSS, including Go, is the following:[126]

124 A similar, but somewhat more complicated, system of alphanumerical mnemonic substitution, first found in Alexander of Villedieu's *Massa compoti* and John of Sacrobosco's *De anni ratione*, is discussed in Don C. Skemer, "*Armis Gunfe*: Remembering Egyptian Days," *Traditio* 65 (2010): 75–106 (89–103).

125 See on this manuscript also Blaschka, "Die Gothaer Handschrift," 990.

126 See MS Go, fol. 205^{r}.

	3	9	7	12	1		7	8	2	11	5	
1	Con	Iun	Go	Me	A	*No*[*vember*]	Gan	Ha	Be	Ly	En	1
	6	0	5	1	3		4	7	5	22	3	
2	Frax	Zo	Er	Ar	Cri	*De*[*cember*]	Dor	Gut	Et	Y	Cos	2

This 'vertical scheme' is the predominant one among manuscripts copied in the fifteenth century and is first featured, in very rough and basic form, in MS Ka from ca. 1387 as well as in MS Sf, which might also date to the 1380s. Further MSS from this group are: Be, Bh, Co, Ed, Er, Go, Gr, Ha, Kb, Kc, Ke, Kx, Le, Lf, Lo, Lq, Mc2 (table 2 only), Ml, My, Ne, Pf, Sa, Sb, Tr, Up, Wb, Wc, Wo, Wp. An earlier, but less frequent, variant displays numbers and words in horizontal order according to the following scheme:

1	12	793	Coniungo Mea	5	11	287	Ganhabe Lyen
3	1	506	Fraxzoer Arcri	3	22	574	Dorgutet Ycos

MSS from this group include: Ba, Kd, Lw, Ma, Mb, Md, Me, Pc, Me, Mf, Mc2 (table 1 only), and Va, the earliest datable copy among which is Me, from 1375.[127] While the 'horizontal group' thus probably predates the 'vertical group', it is an open question whether the earliest redaction of the *Computus Judaicus* already featured words and numbers side by side in the same table. Some doubt on this is shed by the fact that a number of earlier manuscripts omit ciphers altogether and only feature the mnemonic words. In the case of MSS Gw, Bf, Br, a tabular format is still retained, whereas Mg and Vi contend themselves with mere verbal lists.[128] Conversely, MSS Sg and So limit their tables to numbers only.

127 MS Pc is an exceptional case in that words are here followed by numbers, which are here written in reverse order, from right to left. This may point to an influence from the 'vertical group'.

128 MS Mc2 offers a mixture of these differents variants by omitting numbers in tables 3, 4, and 5, while retaining the 'vertical arrangement' in table 1 and the 'horizontal arrangement' in table 2. Numbers are also missing from tables 3 and 4 in Kx. The same applies to the third table in Pe, which is in fact a combination of tables 3 and 4. MS Ba contains two versions of table 5, one of which omits numbers altogether (fol. 247^{v}).

The words are not lost, however, but listed separately in the preceding text.[129] Given that MSS Sg and So are free of what are probably some widespread later additions (table 4 and ch. 5.2), it would be tempting to suppose that the original tables were purely numerical and were only later augmented by the mnemonic words found in the text. This conclusion, however, is undermined by the fact that MS Mc1, which seems to be earlier than the codices just mentioned, already features words in both the text and the tables. The arrangement in Mc1 is in fact unique in that here the main and collateral tables are arranged not in parallel, but one after another, i.e. vertically rather than horizontally.[130] Another puzzling aspect is the inclusion of a full list of 2×13 mnemonic words in the chapter preceding table 1 (ch. 2.4) in some of the earliest MSS, including Bg, Mc1, Mz, Sg, and So.[131] The presence of this full list is quite inconsistent with the wording of the preceding passage, which reads:

> And this becomes plain from the following verses, whose first five belong to the first table, for the investigation of future new moons; the other five, however, belong to the second table, made for the investigation of past new moons. The first five of these are these and they are contained [in the table] in this order.[132]

One would therefore expect the main text to go on listing only five mnemonic 'verses' for each part of the table, not thirteen of them. Worse even, the vast majority of MSS still contain versions of the same passage in their description of table 1 without following it up with any separate list of mnemonic words (other than those found in the table). Two scenarios to explain this state of affairs

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129 This latter feature is also found in MSS Bg and Mz, although in Mz a blank space is left for table 1 (no other tables are included due to the text breaking off).

130 In MS Mc2, the two parts of table 1 also happen to be arranged in this fashion, although here they appear on separate pages (fol. 259^{r-v}).

131 MS Mc1 is peculiar in that it also includes such a full list of mnemonic words before tables 2 and 3 (fols. 168^{va} and 169^{ra-b}). These lists, however, seem to be a part of the commentary, although they are written in the enlarged script normally used only for the main text. The commentary in MS Pd (fols. 51^{v}–52^{r}), which is closely related to that in Mc1, features the same inserted passages in both instances, but omits the words for the 'collateral' table.

132 MS Mc1, fol. 166^{vb}: "Et hoc patet per versus subsequentes, quorum primi quinque sunt de tabula prima, quoad inquisitionem noviluniorum futurorum; alii autem quinque sunt de tabula secunda, facta de inquisitione noviluniorum preteritorum. Quorum primi quinque sunt isti et continentur secundum ordinem." Versions or remnants of this passage also appear in MSS Ba, Be, Br, Ed, Er, Fb, Go, Ha, Ka, Kd, Kx, Le, Lf, Lo, Lq, Ma, Mb, Mc2, Mg, Ml, My, Ne, Pb, Pc, Pe, Pf, Sa, Sb, Sf, Sg, So, Up, Va, Vi, Wb, Wc, Wo, Wp.

are worth considering: according to the first, the passage mentioning the 2×5 'verses' is the result of a later corruption, not yet present in the text's archetype. This might receive some support from the relatively early copy in MS Me (made in 1375), where the just-cited passage simply introduces the following table, without mentioning the number of 'verses'.[133] Alternatively, the original version of ch. 2.4 really did list five mnemonic terms for each part of the table (i.e. 'main' and 'collateral'), reserving the full set of 2×13 pairs of words for the subsequent table. This would mean that a redactor early on extended the list in ch. 2.4 from 2×5 to 2×13, which version drove the original form out of circulation. At a further stage, the list was dropped altogether from the chapter, thus accounting for the form found in most extant manuscripts. In line with the hypothesis just presented, the edition featured in the present volume will reduce the list in ch. 2.4 back to 2×5 words.

7 Major Textual Changes

As the previous survey of the tables has already demonstrated, the manuscript tradition of the *Computus Judaicus* is marked by constant redactional interventions, which betray the fact that the treatise was regarded as a working textbook, not as a rigid literary composition. Users of the text soon found the original version too concise or otherwise unsuited to their purposes, which over the decades resulted in a confusing variety of additions. Some of these were simply instances of incorporating material that originated in the commentaries into the main text, whereas in other cases redactors went as far as composing new verses or even entirely new chapters and tables. An example of the former case would be the entirety of ch. 5.2, which, although it is found in nearly all copies of the main text and is therefore included in the edition below, was probably at one point part of the commentary, as featured in MSS Pa and Pd. A more clear-cut case for the intrusion of material from the commentary into the main text is a passage that instructs the readers on how to convert a given

133 MS Me, fol. 23^{r}: "Ut patet per versus quorum primi sunt hii de tabula prima, quoad [in]quisitionem futurorum. Alii autem sunt de secunda tabula et videlicet pro inquisitione preteritorum. Quorum primi sunt hii: 'Coniungo mea', que ponuntur in tabula." The final sentence could be a faint echo of the original list, indicating that it was still included in the exemplar and removed by a redactor, who considered it redundant. In this case, this redactor could have also been responsible for the removal of the word 'quinque'. The passage is wholly absent from MSS Gr, Kb, and Md. MSS Ke (fol. 196^{v}), Lw (fol. 20^{v}), and Tr (fol. 186^{v}) retain most of it, but omit the 'quinque'.

year of the Christian era into a corresponding year of the Jewish world era by adding 3760. This instruction is couched in the following five verses:

> Tu septingenta tria milia sexaque ginta/ Annis iunge Dei facis annos gentis Ebrei/ Per denos nonos ex tunc si divideris illos/ Qui superest numerus ipsorum sit tibi ciclus/ Sed si nil restat decimum nonum fore constat.[134]
>
> By adding 3760 to the Years of God you make the years of the Hebrew people. And if you afterwards divide these by 19, what is left of them will give you the [year of the] cycle. But if nothing is left, it is evident that it will be the 19th [year].

The addition already appears in the earliest versions of the commentary, in a section that directly precedes the exposition of ch. 2.1.[135] This is also the exact location where it is encountered in many copies that feature it as part of the main text, i.e. in a separate section that has been inserted between 1.4 and 2.1 (Be, Co, Bg, Fb, Ha, Kd, Ke, Kx, Le, Lo, Lq, Ma, Mf, Sb, Sg, Tr, Up, Wo). An exception would be MS Md, which tacks the passage onto the end of a completely reworked version of ch. 5. The *terminus ad quem* for the paragraph's insertion into the main text can be dated to ca. 1389 (Kd), while other MSS, including Ka from ca. 1387, feature it as a separate marginal gloss, perhaps indicating an intermediate stage in its transfer to the main text.[136] At first glance, the inclusion of these verses may seem gratuitous, because the difference between the Christian and the Jewish era is once more broached in the final chapter of the original text (5.1). Clearly, however, users found it expedient to have such a verse directly follow upon the section that explained the difference between the Jewish and Christian 19-year cycles (1.4). The transmission of the passage thus shows how changes to the text could be dictated by the practical needs of its users.

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134 MS Pd, fol. 49^{v}.

135 MSS Pa (fol. 123ra); Pd (fol. 49^{v}), Mc1 (fol. 165va), Wa (fol. 29^{r}). The latter three also add "Pro centum quinque, bis sex pro mille relinque," meaning that a century contains 5 and a millennium 12 years above a full number of 19-year cycles. This line is also included in Kc, fol. 13^{r}, although here the preceding verses have been moved to the main text. Further commentaries featuring the passage quoted above include MSS Ba (fol. 243^{r}), Bg (fol. 37^{v}), Br (fol. 201^{v}), Pb (fol. 61^{v}), So (fol. 151^{v}), Wc (fol. 20^{vb}).

136 MS Ka, fol. 48^{r}. See also MSS Go, fol. 203^{r}; Ml, fol. 27^{v}.

An example of the creation of altogether new material is a brief paragraph and adjoined table that serve to calculate the time of the opposition of sun and moon as well as the time of the two half-moons (*lunae semisticae*) that occur within each lunation. As one would expect, this is done by respectively adding to the time of the present *molad* one half (0.18.396) or one quarter (0.9.198) of the value for the month length (1.12.793). Needless to say, an instruction of this kind is quite alien to the usual purposes of a calendar treatise. Its presence in 20 out of the 59 preserved copies of the *Computus Judaicus* clearly bespeaks the fact that its redactors saw in it first and foremost an astronomical text, whose value lay in its aid in calculating the lunar phases rather than providing any information on the Jewish calendar as such. What follows is the passage in question as found in MS Wb, which was copied in the year 1420:

> Sed ad inveniendum oppositionem, scilicet quando sol est in remotissima distantia a luna perfectissime rotunditatis, tunc adde ad incensionem *faicax sulzax*. Ad probandum adde *darhafax effert*. Si autem scire volueris quando luna est semistica, tamquam esset per dimidium divisa, tunc adde ad incensionem *hoioax iozax*. Ad probandum adde *barhahex orfus*, ut patet in figura sequenti. Et ille textus non est de essencia.[137]

Hec est tabula opposicionum

6	9	3	18	0	4	8	6	5	6
Fa	I	Cax	Sul	Zax	Dar	Ha	Fex	Ef	Fert
8	9	1	9	0	2	8	8	14	6
Ha	Io	Ax	Io	Zax	Bar	Ha	Hex	Or	Fus
Chalakym			n.h.	n.d.	*Chalakym*			n.h.	n.d.

Translation:

> Yet in order to find the opposition, i.e. when the sun is at its farthest distance from the moon, the latter being perfectly round, you need to add

137 MS Wb, fol. 7r. The addition is also present in MSS Be, Br, Bh, Co, Go, Gr, Ha, Le, Lo, Lp, Lq, Kb, Kx, Mf, Pf, Sb, Up, Wb, Wc and Wo. Out of these, Go, Gr, Le, Lq, and Up feature the text without the accompanying table, whereas Ha has only the table itself.

> *faicax sulzax* to the conjunction [*incensio*]. In order to test [the result], add *darhafax effert*. If, however, you want to know when the moon is at its semi stage, such that it looks like divided by half, you need to add *hoioax iozax* to the conjunction. In order to test [the result], add *barhahex orfus*, as is plain from the following table. And this text is not essential.

As it happens, MS Wb is the only witness to point out that the passage in question is not an 'essential' part of the treatise (*Et ille textus non est de essencia*), indicating perhaps that the scribe was aware of it being a recent addition. This detail is lost in all later witnesses to the passage, while the only attestation to the passage that is earlier than Wb is found in Go, which was probably copied in 1408/9. Here, the section appears not as part of the main text, but among some related 'study material', composed of astronomical notes and diagrams, which precede the actual *Computus Judaicus*.[138] The corollary value for finding the half-moon is here incorrectly given as *barhahe dorfex*, i.e. as 6.4.288 instead of 6.14.288 (*barhahex orfus*), an error that was carried over to all other copies of the passage, except for Wb. Moreover, all copies made after Go and Wb adjust the time of the corresponding value to make it agree with this mistake, such that it is now *Hoioax tozax* (0.9.198) instead of *Hoioax ioax* (0.19.198). The fact that this error persisted to such a degree, in spite of being easily corrected on arithmetic grounds, speaks quite eloquently not just of the incompetence of scribes in general, but also of the increasingly pervasive textual corruption that is encountered in the manuscript tradition of the *Computus Judaicus*.

Another instance of a wholly original addition, which is found in the majority of copies, is an extension of the mnemonic verses for the 12 Hebrew month names of the Jewish calendar. Fifteenth-century copies of the text usually add a third line that specifies the embolismic month of *Veadar* or Adar II, which went unmentioned in the original version:

> Tysri, Marchiswan, Keslef, Thebes, Swath et Adar/ Nysan, Ydar, Schyban, Thamus, Aff, simul ultimus Elol/ Vadar addetur qui embolismus habetur.[139]

138 MS Go, fol. 201^{r}. The only other examples where the passage does not follow directly upon table 1 are MSS Kx (fol. 35^{v}) and Ha (fol. 31^{v}), where it instead appears as an appendix to the main text, and MS Br (fol. 202^{r}), where it is sandwiched between ch. 2.3 and 2.4. MS Mf (fol. 80^{r}) has a modified version of the passage, which focusses only on the opposition. It is inserted between sections 1.2 and 1.3.

139 MS Sa, fol. 97^{v}.

> Tishri, Marḥeshvan, Kislev, Tevet, Shevat and Adar; Nisan, Iyyar, Sivan, Tammuz, Av, and also the last [named] Elul. Veadar is added, which counts as an embolism.

In this or similar forms, the addition appears in MSS Ba, Be, Br, Co, Ed, Er, Fb, Gr, Ha, Kx, Le,[140] Lf, Lo, Lq, Mc2, My, Sa, Sb, Sg, Tr, Up, Wo, and Wp, none of which seems to be earlier than 1408/9 (Fb and Sa). It is the extended version of these verses that also appears as a quotation in Hermann Zoest's *Calendarium Hebraicum novum* (see p. 491 below).[141] Hermann may have taken his quotation from MS Co, which was once at the Cistercian monastery of Marienfeld near Münster, where he was a monk. It should be noted that earlier variants of the passage do not yet possess the rhymed form (*addetur—habetur*) that later became widespread.[142] The embolismic year, which received little consideration in the original version, was also the subject of a number of later additions to ch. 3.[143]

A further salient example of a part of the text that was frequently enlarged and rewritten is the final chapter (5.1), although it should be stressed that these changes never affect the basic arguments contained therein. Substantially modified versions can be found in MSS Ed, Gr, Ha, Lf, Kx, Lp, Lq, Mb, Sb, Tr, and Wp. One early alteration to the text is the inclusion of the mnemonic

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140 MS Le, fol. 131^{r}: "Vadat addetur, quia tunc embolismus continetur."

141 This quotation is reproduced on the basis of MS Munich, BSB, Clm 18470, fol. 20^{r} (MS N in the edition of Chapter Six below), in Thiel, *Grundlagen*, 128n488. Thiel misreads *Wasar* as *Wasat*, prompting him to speculate about a derivation from *We-Swat*.

142 See, e.g., MS Kb, fol. 338^{r}: "Embolismalis vadir est lunatio dicta." See also MSS Pf (fol. 159^{v}), Lp (fol. 80^{r}), Mb (fol. 59^{v}), and Wb (fol. 3^{v}). Greatly expanded versions of the passage are found in MSS Mf (fol. 81$^{r–v}$), Wc (fol. 19$^{r–v}$), and Wo (fol. 27^{r}). They also all quote a mnemonic on the order of emolismic years: "Christus (3), factus (6), homo (8), levat (11), omnia (14), redita (17), throno (19)." This is taken from Alexander of Villedieu, *Massa compoti*, ed. van Wijk, *Le Nombre*, 60. In MS Ml (fol. 27^{v}) from ca. 1391, the embolismic *Wader* is not yet the recipient of a separate verse, but it is already listed among the lunations of the Jewish calendar. In MS Mz (fol. 75^{v}), it is featured as a marginal gloss (*embolismus Vadar*).

143 See, e.g., MS Fb, fol. 69^{v}: "Sed in anno embolismali adduntur ea que ponuntur in 130 ordine." See also MSS Be (fol. 179^{v}), Bf (fol. 100^{r}), Co (fol. 49^{v}), Gr (fol. 361), Ha (fol. 29^{r}), Ka (fol. 51^{v}), Kb (fol. 343^{vb}), Kc (fol. 14^{v}), Lo (fol. 52^{v}), Lp (fol. 83^{r}), Mb (fol. 62^{r}), Md (fol. 2^{r}), Ml (fol. 29^{v}), Pf (fol. 165^{v}), Sb (fol. 56^{r}), Wb (fol. 7^{v}), Wp (fol. 62^{r}). In MS My such an addition is found as a marginal gloss (fol. 157^{r}). An additional passage on the placement and calculation of the embolismic month in the Jewish calendar is found at the very end of the text in Go (fol. 208^{v}).

verses: *Altera dat feria primum molath horaque quinta/ Sub elochim quarto simul et ducenta quando prescribo*. This addition, which describes the use of the *baharad* value as the epoch for all calculations of the *molad*, is found in nearly all MSS, except for some very early ones (Mb, Mc1, Mg, Gw, and So, as well as Be, Md, Sg). At another stage, the reference to the year 1342 CE = 5102 JE in ch. 5.1 was replaced by the word *zofagicum*, as a generic instruction to add 3760 years to the *Annus domini* (z = 0, f = 6, g = 7, c = 3 → z.f.g.c. → *zofagicum*). Versions that have incurred this change are very widespread and include MSS Ba, Be, Bf, Bh, Br, Co, Ed, Go, Gr, Kx, Le, Lf, Lo, Lp, Lq, Mc2, My, Sb, Up, and Wc.[144] The earliest of these is perhaps Go, which at the same time still retains the reference to 1342.[145] In MSS Be, Co, Br, Kx, Le, Lo, Lp, Lq, Sb, Up, this new mnemonic word is integrated into a separate verse: *Tempus 'zofagicum' precessit virgine natum*.[146]

8 The Commentaries

One characteristic feature of computistical school texts such as the aforementioned *Computus chirometralis* is that they are often accompanied by running commentaries, which shed light on difficult passages, provide reckoning examples, and adduce further information culled from the subjects of the quadrivium. The *Computus Judaicus* is no exception in this regard, as 36 out of its 59 preserved copies feature some kind of commentary, while numerous others come with extensive marginal annotations and/or interlineary glosses that guide the reader through the text. Some MSS, notably Pa, Pd, Wa, contain stand-alone versions of these commentaries and omit the main text altogether, thus testifying to the value that was attributed to the exposition of this work.[147] Among the remaining copies that contain both main text and commentary, the length

144 MS Ba is peculiar in that it features ch. 5.1 and ch. 5.2 twice, in different versions and each with a separate commentary (fols. 249$^{r–v}$, 250^{v}–251^{r}). The second copy of ch. 5.1 (fol. 250^{v}) is the one featuring the *zofagicum*-addition.

145 MS Go, fol. 207^{v}: "Quo scito recipiantur anni seculi qui precesserunt Christi nativitatem qui sunt tria milia septuaginta et sexaginta ut patet in hac dictione: *'Zofagica'*, quibus adde annos qui sunt annos domini 1342 in Ianuario et post in Octobre sequenti et erunt 5102 anni."

146 MS Kx, fol. 33^{v}. This verse also appears in the commentary of Bf (fol. 37^{v}) and on the back of a flyleaf in Wp (fol. 66^{v}).

147 In the copies mentioned, the actual *Computus Judaicus* was meant to be present only in the form of brief lemmata indicating what part of the original text was being commented on. In the case of MSS Pa and Pd, blank spaces are left in place of these lemmata.

and extent of the latter can differ considerably. While some confine themselves to a selection of marginal notes, others contain a fully developed commentary section that dwarfs the main text in comparison. Some manuscripts restrict the main text to a small window in the middle of the page, which is surrounded by an ocean of commentary, in an arrangement reminiscent of medieval glossed Bibles or early editions of the Talmud.[148] In other copies, the commentary is added in a less orderly manner, being crammed into the margins or written on additional flyleaves when there was no remaining place on the pages of the main text (Kc, Ke). Only in a few cases does the commentary follow *en bloc* upon the main text (Ne) or is itself followed by it (Bg).

Even more so than the main text, the commentary was subject to frequent change—contraction, augmentation as well as wholesale efforts at rewriting. These changes are so pervasive that it would be more appropriate to speak of a whole series of different commentaries, despite the fact that certain parts, such as the exposition of the introductory verses, generally preserved a stable outline of contents and argument. The most volatile part of the commentaries was their own preface, which was usually only tenuously related to the subject of the main text and got completely replaced at several instances during the text's transmission history, while other copyists decided to drop it altogether. In the oldest known version, preserved in MSS Pa, Pd, and Wa, the commentary begins with a lengthy exposition of some verses on the attributes of the moon:

> Luna est solis emula, malefactorum revelatrix, itinerantium solamen, largativa roris, oculus noctis, presagium tempestatis, fex superiorum, puritas inferiorum, mater humidorum.[149]
>
> The moon is the sun's rival, the revealer of evildoers, the solace of travellers, a spendthrift in dew, an eye of the night, a foreboder of the weather, the dregs of the superior [realms], the purity of the inferior [realms], the mother of all wet things.

This poetic description turns out to be a modified version of an answer attributed to Secundus of Athens, 'The Silent Philosopher', the popular *Vita* of whom was translated in the twelfth century by Wilhelmus Medicus.[150] In the

148 The most spectacular examples are MSS Kc and Sb, where the main text is surrounded by commentary on four sides. In MSS Br, Ed, Lf, Pf, and Wp the text is aligned with the page on the inside, but surrounded by the commentary on the other three sides.

149 MS Pa, fol. 120ra.

150 *Secundus the Silent Philosopher*, ed. Ben Edwin Perry (Ithaca, NY: The American Philolog-

early commentaries on the *Computus Judaicus*, the nine characteristics of the moon mentioned in these verses are explained in detail. The archetype of this version seems to have been written very soon after the main text's initial composition, in ca. 1344, as is evident from the reckoning examples used in the manuscripts.[151] Out of the three early copies mentioned, MS Wa comes with a unique closing section, which references a verse that indicates 1333 as the beginning of the present Jewish 19-year cycle. This might be further confirmation that the text and its earliest commentary were composed within the 19-year cycle that stretched from 1333 to 1351.[152] A further commentary very close to Pa, Pd and Wa is found in Mc1, where some of the examples are updated from 1344 to 1375. The commentary in Ba, which was copied relatively late, in ca. 1473/74, also preserves the introductory exposition of this early version, but differs significantly in some of the later portions. Indeed, some of the examples have been updated to the *annus praesens* 1396, thus giving us an idea when this version of the commentary was first redacted. Further versions of the same prologue based on *Luna est solis emula* are found in Sb and Wp, whilst the verses themselves also make a brief appearance in the marginal notes of Ka (fol. 47^{v}) and Mc2 (fol. 256^{v}).

In 1385, a new version of the commentary was composed, which featured a completely different, and much shorter, prologue, beginning with an exposition of the words *Labia sacerdotis custodiunt scientiam*, taken from the book of Malachi (2:7).[153] It is preserved in MSS Bg, Ne, and Pe, all three of which attach this commentary to differing versions of the main text (only fragmentarily preserved in the case of Bg). In MS Ne, the commentary follows as a separate entity after the main text of the *Computus Judaicus*, which is also the arrangement chosen by the scribe of MS So, who additionally inserted a separate set of tables between the two blocks of text. The whole ensemble was copied in October 1394 by Werner Mardersperger, a student in Rottweil, who in that year produced a

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ical Association, 1964), 95: "Quid luna? Celi purpura, solis emula, malefactorum inimica, itinerantium solamen, navigantium directio, signum sollempnitatum, recirculatio mensium, oculus noctis, larga roris, presagium tempestatum." Cf. also *Computus chirometralis*, ed. Mütz, 8: "Luna est oculus mundi splendor noctis pedissequa solis fex superiorum infimus planetarum aurarum alteratrix. mensium permutatrix. fons humiditatis atque noctis domina."

151 MSS Pa, fols. 122^{vb}, 124^{rb}; Pd, fols. 49^{r}, 49^{v}, 51^{r}, 52^{r}; Wa, fols. 29^{r}, 30^{v}, 32^{r}.

152 For more on the dating question, see p. 428 below.

153 MS Pe, fol. 118^{r}: "Quia iuxta auctoritatem prophete scientia quelibet pertinens ad divinum officium a quolibet literato est custodienda. Dicit enim: *Labia sacerdotis custodiunt scientiam*."

series of transcriptions of computistical and astronomical works by his teacher Johannes Müntzinger, formerly an Arts master at Prague.[154] These included a *Tractatus de computo ecclesiastico* written in 1392 and a commentary on Sacrobosco's *Computus ecclesiasticus*, but also the mentioned commentary on our *Computus Judaicus*, which is explicitly said to have been edited by Müntzinger "for his students" (*pro suis scolaribus*).[155] All three texts mentioned begin with what may be regarded as Müntzinger's signature line, taken from the opening verses of the late antique *Disticha Catonis*: "If God is a spirit, as poets sing, With mind kept pure make thou thy offering" (*Si Deus est animus, ut nobis carmina dicunt, Hic tibi precipue sit pura mente colendus*).[156] Before becoming *rector scolarum* at Rottweil, Müntzinger is attested to have spent eleven years at the University of Prague (from 1372 to 1383), first as a student and later (from 1378) as a master of Arts, and one may conjecture that his commentary was written during that time—or that he first came across the *Computus Judaicus* whilst studying and teaching there.[157] Müntzinger can also be linked to MS Ma, which contains an excerpt from Nicholas of Dybin's *Viaticus dictandi* produced, and maybe also copied, by him (fols. 168^{r}–222^{v}).[158] It must be noted, however, that the recension of the *Computus Judaicus* in Ma (datable to 1383) is not from

154 See the colophon in MS So, fol. 154^{v}: "Scriptum in domo Berchtoldi Balghain feria quinta facta prandio et proxima feria secunda precedente Crispini et Crispiniani, decima nona die octobris Anno Domini millesimo ccclxxxx^{o} quarto." On the background, see Vetter, "Neues zu Justinger," 133–151.

155 MS So, fol. 154^{r}: "Et sic Dei omnipotentis auxilio finitur exposicio super computum judaycum per magistrum Johannem Mvnezinger reverendum necnon in talibus bene probatum pro suis scolaribus edita, Pro hac sit Deus in seculum seculi benedictus, etcetera." Further works by Johannes Müntzinger in the same codex are: *Tractatus de computo ecclesiastico* (featured twice, fols. 2^{r}–7^{r}, 116^{r}–122^{r}), *Computus abbreviatus cum commento* (fols. 122^{v}–128^{v}), *De cyclo lunari* (fols. 59^{v}–60^{r}), a commentary on John of Sacrobosco's *Computus ecclesiasticus* (fols. 62^{r}–92^{r}) and a *Tractatus de astris* (fols. 93^{v}–96^{v}).

156 *Disticha Catonis* (1.1), ed. Marcus Boas and Hendrik Johan Botschuyver (Amsterdam: North-Holland, 1952), 34. Translation according to *The Distichs of Cato: A Famous Medieval Textbook*, trans. Wayland Johnson Chase (Madison: University of Wisconsin Press, 1922), 17. For Müntzinger's uses of this line, see MS So, fols. 2^{r}, 61^{v}, 116^{r}, 122^{v}.

157 See Vetter, "Neues zu Justinger," 142–151; Albert Lang, "Johann Müntzinger, ein schwäbischer Theologe und Schulmeister am Ende des 14. Jahrhunderts," in *Aus der Geisteswelt des Mittelalters*, ed. Albert Lang, Joseph Lechner, and Michael Schmaus, 2 vols. (Münster: Aschendorff, 1935), 2:1200–1230; Arne Holtorf, "Johannes Müntzinger," *DLM*, 6:794–799.

158 See Hans Szklenar, *Magister Nicolaus de Dybin* (Munich: Artemis, 1981), 62, 150, who suggests that Müntzinger may have also been the scribe.

the same hand and differs conspicuously from the one copied by Marder-sperger in 1394.[159]

Another commentary that was still written within the confines of the fourteenth century is the one in MS Kc, the copy of which was finished in Prague in 1398 by a certain Petrus Pelka "on the Tuesday after the conversion of St. Paul," which would be 29 January.[160] For the early portion it is quite close to the text of Pa, Pd, and Wc, but it lacks a preface and the later sections are considerably reworked and enlarged. As in the case of Ba, the date of 1344 is retained at the beginning on fol. 12^{v}, but for all subsequent examples it is changed to 1363, which is exactly 19 years later (fols. 18^{v}, 19^{v}, 20^{r}, 20^{v}, 18^{vb}is). On fol. 13^{r} and in the commentary on the final chapter (fol. 19^{v}), the examples again change to 1381 and 1382.

Two fifteenth-century versions that still preserve the old four-table arrangement, but include extensive commentaries, are Wb and Kb, which, despite substantial differences, may have been derived from a common exemplar. They both start by referencing the Aristotelian dictum that "a small error in the beginning will lead to a large one in the end," before applying this principle to the calculation of the conjunction and opposition of sun and moon.[161] As

159 MS Ma, fol. 59^{v}: "Explicit computus Iudaycus Anno Domini 1383 in proxima dominica ante Egidium [30 August]."

160 MS Kc, fol. 20^{r}: "Et sic est finis huius et gloria ideo sit Deo. Amen. Tertia feria, Prage, anno 1398, post conversionem sancti Pauli [29 January]." The colophon for the main text (Ibid., fol. 19^{v}) reads: "Anno Domini Mo CCCo nonagesimo septimo, undecimo die mensis Augusti, sexto kalendas eiusdem mensis, indictione quarta, sabbato, in die sancti Tyburey, in domo ad Ethiopes; tunc temporis Wenceslao rege Bohemie regnante, Wladislaoque rege Polonie et suppremo principe Littanorum regnante ac herede Rusie, dum Dabragostius erat archiepiscopus Genznensis Petrusque episcopus Cracoviensis, eximii doctores, Andreaque episcopus Wilnensi, Wolbramo archiepiscopus Pragensi, viguit dum dominus Wenceslaus, patriarcha Pragensis, per manus Petri, tunc temporis regnante in paupertate, explicit Iudaicus Computus."

161 MS Wb, fol. 1^{r}: "Teste philosopho primo *Celi et mundo* et tercio De *anima* inquiente, quoniam parvus error magnus erit in fine. Ista scribit Aristoteles primo *Celi et mundi*. Et quia coniunccio solis cum luna et eorum opposicio sunt principia in astronomia …" MS Kb, fol. 333^{vb}: "Quoniam parvus error in principio maximus est in fine, teste Philosopho primo *Celi et mundi* et tertio *De anima*; coniunccio vero solis et lune et eorum opposicio sunt principia in astronomia." Cf. Thomas Aquinas, "De ente et essentia" (prol.), in *Opera omnia iussu Leonis XIII P.M. edita*, vol. 43 (Rome: Editori di San Tommaso, 1976), 369: "Quia parvus error in principio magnus est in fine secundum Philosophum in I Celi et mundi …"; Averroes, *Commentarium magnum in Aristotelis De anima libros* (III.4), ed. F. Stuart

has already been mentioned above, the copy in Wb dates from 1420 and was written by Jodocus de Ziegenhals, a member of the Canons Regular at the Sandkloster in Wrocław.[162] He studied at Kraków, where he acquired a degree as Arts master, just like Nicholas of Grabostow, the copyist of Kb, who produced his version of the text in 1433.[163] In contrast to Wb, the commentary on the *Computus Judaicus* in Kb also contains a reference to the year 1363 in the exposition of the last chapter (fol. 349^{rb}). A Nicolaus de Polonia appears as the main scribe in codex Ke, which contains a copy of the *Computus chirometralis* (fols. 62^{v}–110^{v}), made in 1426 in Poznań.[164] The commentary here references 1424 as the *annus praesens* (fol. 206^{v}) and has a unique preface that starts: "*Me pudet audire*: these little lines can be added to the beginning of any *computus* in every book" (*Me pudet audire. In omni libro possunt isti versiculi in principio cuiuslibet computi assignari*). Rosińska's catalogue of Cracovian manuscripts claims that this was a "lecture on the computus Iudaicus given at Kraków university, copied by Nicholas of Grabostow," but this appears to be a confusion with Kb.[165] As a matter of fact, the scribe in Ke only identifies himself as *Nicolaus* (fol. 25^{r}), *Nicolaus de Polonia* (fol. 110^{v}), *Nicolaus frater tuus fratre Nicolae Pyklu* (fol. 186^{r}) and *Nicolaus Polonus* (fol. 229^{v}).

Among the commentaries attached to five-table versions of the text, a particularly long prelude of astronomical disquisitions is found in Ed, where a reckoning example on fol. 72^{v} mentions the year 1425. This version begins with a quote from the beginning of the computistical section of Guillaume Durand's *Rationale divinorum officiorum*, proclaiming that "the priests are required to know the *computus*, otherwise they do not deserve to carry that name."[166] The same version of the commentary is also found in Lf, which is indeed very

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Crawford (Cambridge, MA: The Mediaeval Academy of America, 1953), 384: "Minimus enim error in principio est causa maximi erroris in fine, sicut dicit Aristoteles."

162 Ms Wb, fol. 12^{r}: "Explicit computus Judaycus feria quinta, Anno Domini 1420. Explicit expliciunt, beys mich nicht du aldir schul hunt" ("Here ends the *computus Iudaicus* on a Thursday, in the Year of the Lord 1420. It ends, they end, do not bite me, old school hound"). See n. 109 above.

163 See n. 111 above.

164 MS Ke, fol. 110^{v}: "Explicit cirometralis per Nicolaum de Polonia, terminatus tercia feria quinto idus ipsius aprilis Anno Domini 1426 Gnozolitos(?) Poznani." Rosińska, *Scientific Writings*, 82; Markowski, *Astronomica*, 107.

165 Rosińska, Scientific Writings, 237.

166 Guillaume Durand, *Rationale divinorum officiorum* 8.1.1 (CCCM 140B, 131): "Quoniam, sicut ait beatus Augustinus, sacerdotes compotum scire tenentur, alioquin uix in eis sacerdotis nomen constabit." Cf. *Decretum magistri Gratiani* (pars I, dist. 38, c. 5), ed. Friedberg, 141–142.

closely related to Ed (the latter is perhaps copied directly from Lf). A unique—and very lengthy—prelude, which offers a commentary on the chant *Domum tuam, Domine, decet*, is found in Wc, a manuscript formerly at the library of Corpus Christi Church, Wrocław, copied in 1428.[167] MSS Ha, Le, Up, and Wo, which were copied between ca. 1444 and 1492, all share a similar preface dealing with various commonplaces regarding the disciplines of the quadrivium (including references to Ptolemy's *Almagest* and the musical treatises of John of Murs). The complete version, which begins with the words *Circa initium computi iudaici assumantur verba Tollomei summi astronomi* …, can only be found in Wo, whereas the earlier copies in Le and Up begin later, using the heading *Cum ignorancia negacionis omnium ignoranciarum est pessima* …, which then segues into the last part of the preface in Wo. The commentaries in Le and Up are virtually identical, such that Le, from ca. 1444, was in all likelihood Up's exemplar.[168] MS Wo runs roughly parallel to these, although different years are used for some of the reckoning examples, 1442 having been replaced by 1454. In MS Ha, the latest of all manuscripts, the prologue to the commentary has a slightly shortened beginning, starting: *Nota mathematica dividitur penes divisionem subiecti* … This shortened version of the commentary is also found in MS Pf, which was copied in 1427. The heading *Cum ignorancia negationis* … is also chosen by the commentary in Kx (ca. 1426), but its preface is very short and seems to bear no further relation to Le/Up/Wo.

Finally, a large number of commentaries skip the preface altogether and begin directly with an explication of the introductory verses (Kc, Lq, Tr) or limit themselves to a few lines of introduction (Be, Co, Kx, Lo). Among these, a likely connection can be established between Co and Be, which both originated in north-western Germany, in the regions of Münster (Co) and Osnabrück (Be). Their commentaries start identically (*Queritur primo circa manum huius computi que sit utilitas eius* …) and share a unique reference to the year 1446.[169] Furthermore, Co and Be generally feature the same order of materials, although Co retains much more of the commentary in the margins than Be. At the same time, however, Be contains commentary portions not found in Co, thus under-

167 MS Wc, fol. 31^{r}: "Explicit Computus Judaicus anno 1428 in die sancti Thome Apostoli ante nativitatem Christi [21 December]."

168 The relation between both MSS can be established on the basis of a passage mentioning the year 1442 in Le, fol. 133^{v} and Up, fol. 18^{v}, where part of the sentence is gone in Up and was obviously overread by the scribe.

169 MSS Co, fol. 49^{v} and Be, fol. 179^{v}: "Nota Anno Domini 1446 Iudei habuerunt unum pro suo mesrim [Co: aureo numero] et nos tria. Et incensio Tisri [Co : Octobris] fuit feria quarta, hora quarta, 154 elochim, que incensio probatur per tabulam ultimam."

mining the conclusion that the former was directly copied from the latter. Another MS that is relatively close to these two is Lo from the St. Salvatorberg charterhouse in Erfurt, which features a much fuller version of the commentary. A close relative of Lo is Lq, dated to 1456, which may have been copied from a common exemplar or derived from Lo via an intermediary. MS Lo and Lq are also noteworthy for being the only copies where the commentary on the introductory verses contains the following version of a peculiar explanation for why the Jewish calculation of the lunar conjunction is as precise as it is:

> But *Iudeus* is otherwise translated as 'producing a stain of the flux' [*dans maculam fluxionis*] from which both men and women suffer monthly. And it is for this reason that they know the time of conjunction of each moon down to the blink of an eye, because once every month they have this flux and then they are watchful not to leave the house unless they are well-armed with napkins or other things that help them hide this flux.[170]

What is being referenced here is the pernicious myth of Jewish male menstruation that first cropped up in the thirteenth century and would continue to have a varied career throughout the early modern period.[171] References to the idea that both Jewish men and women menstruate—usually in conjunction with Matthew 27:25 ("His blood be upon us and our children")—are extremely common in the preserved commentaries on our text (27 out of 36).[172] A passage of this kind is in fact already attested in the earliest versions, as represented by MSS Pa, Pd, and Wa, where the 'flux' is referred to more specifically as a

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170 MS Lo, fols 47$^{r–v}$: "Sed *Iudeus* aliomodo interpretatur quasi *dans maculam fluxionis* ex quo tam viri quam mulieres menstruum patiuntur. Et pro tanto ad ictum oculi sciunt incensionem cuiuslibet lune, quia in quolibet mense semel habent talem fluxum et tunc custodiunt se ne domum exiunt nisi sunt valde armati lintheaminibus [Lo: linthegaminis] vel aliis que valent eis pro illius fluxus absconsione." See also MS Lq, fol. 26^{v}, which contains a very similar rendering of this passage.

171 On the background, see Peter Biller, "A 'Scientific' View of Jews from Paris around 1300," *Micrologus* 9 (2001): 137–168; Irven M. Resnick, "Medieval Roots of the Myth of Jewish Male Menses," *Harvard Theological Review* 93 (2000): 241–263; Resnick, *Marks of Distinction: Christian Perceptions of Jews in the High Middle Ages* (Washington, DC: The Catholic University of America Press, 2012), 175–214. For further details on how this myth was incorporated and embellished in the commentaries on the *Computus Judaicus*, see C.P.E. Nothaft, "The Meaning of *Judaeus* and the Myth of Jewish Male Menses in a Late Medieval Astronomical School Text," *European Journal of Jewish Studies* 7 (2013): 73–91.

172 MSS Ba, Be, Bh, Br, Co, Ed, Er, Ha, Kb, Kc, Kx, Le, Lf, Lo, Lq, Mc1, Pa, Pd, Pf, Sb, Tr, Up, Wa, Wb, Wc, Wo, Wo.

bleeding "from the posterior" (*per posteriora*).[173] While this reference to anal menstruation may have originally served no other purpose than simple slander, at some point in the transmission a redactor recognized that the myth provided a perfect pretext to tie the discussion of the alleged meaning of the word *Iudeus* back to the main subject of the treatise: in Pf, copied in ca. 1427, and a host of later manuscripts (Bh, Ha, Le, Tr, Up, Wo, and Wp), we can already read that it was "for this reason that [the Jews] know the time of the conjunction down to the blink of an eye, because it is once every lunation that they suffer this flux."[174] With MSS Lo and Lq, this idea gets embellished even further, by claiming that the Jews refrain from leaving the house during their menstrual period, unless they are equipped with napkins (*lintheaminibus*). It is worth speculating whether this latter idea reflects folk belief and common hearsay that clustered around the myth of Jewish menses at the time in Germany, provided the commentator did not simply make it up. In any case, it is clear that the link between the pre-existing notion of menstruating Jewish men and the calculation of the *molad* was a conscious effort on the side of the anonymous commentators to relativize and attenuate the unsettling astronomical finesse of the Jewish lunisolar calendar. Its remarkable precision in tracking the new moon, which, as the *Computus Judaicus* itself admitted, was a source of embarrassment to Christians, could thus be explained as the outgrowth of a physical necessity, because Jews had to somehow predict the monthly occurrence of their ailment. To a Christian who took the opening line of this text (*Me pudet audire Iudeum talia scire*) seriously, this may indeed have been a welcome way of dealing with the shame and grief his own perceived calendrical inferiority caused him.

173 MS Pa, fol. 121va: "Item, sicut *clericus* dicitur quasi *custos floris*, sic ipsi, scilicet Iudei, interpretantur quasi *dantes materiam fluxionis*. Cum igitur inter Iudeos tam viri quam mulieres menstruose fluant per posteriora, ut bene eorum intentio indicabat, dicens in die passionis domini: *Sangwis eius super nos et super filios nostros*." See also MSS Pd (fol. 48^{r}) and Wa (fol. 28^{r}).

174 MS Pf, fol. 157^{v}: "Sed *Iudeus* interpretatur quasi *dans maculam fluxionis*, quia tam viri quam mulieres menstruosi sunt et menstrua fluunt per posteriora quod indicat earum incensio coram preside pilato cum dixerunt: *Sanguis eius super nos et super filios nostros*. Et propterea ipsi ad ictum oculi sciunt incensionem, quia in qualibet lunatione semel patiuntur fluxum." See also MSS Bh (fol. 211^{v}), Ha (fol. 26^{v}), Le (fol. 129^{r}), Tr (fol. 184^{r}), Up (fol. 14^{v}), Wo (fol. 26^{r}), and Wp (fol. 57^{r}).

9 Authorship and Date

Despite the evident popularity of the *Computus Judaicus*, the precise origins of this work are shrouded in mystery. The text itself gives us little indication, except for the presence of a dating clause in the final chapter, which uses the year 1342 CE = 5102 JE as its example of how to calculate the time of any given *molad* Tishri in cases where only the epoch date of the Jewish calendar is known: *Quo scito recipiantur anni seculi, qui Anno Domini 1342 in Ianuario et post in Octobri sequenti erant 5102 anni* ("Knowing this, one must take the years of the world, which were 5102 in the year of the Lord 1342 in January and also afterwards, in the following October"). Versions of this passage are attested in the majority of early manuscripts,[175] but the statement contained in it seems erroneous, seeing that the following Jewish year 5103 JE already began on 2 September of 1342. One may conjecture that the original text had *prius* in place of *post* and *precedenti* in place of *subsequenti*, which would make more sense chronologically, if read as a reference to the beginning of 5102 JE, whose first month corresponded to September/October 1341.[176] The passage in question was hence in all likelihood written after January 1342, but before the beginning of 5103 JE in September of that year. That said, the two extant copies of what was presumably the original three-table version (Sg, So) as well as MSS Kb, Wb, and Pf, change the year in question to 1344/5104.[177] This change may have been influenced by the corresponding commentary, which, as we have seen, originally used 1344 for its reckoning examples (including the commentary for this particular passage). Further exceptions include Ne and Pe, which have 1345 (probably a scribal error), Ml, which has 1384/5144, and Md, which instead calculates the *moladot* Tishri for 1370 and 1382.

A more direct attestation to the year of authorship is uniquely found in MS So, whose background has been remarked upon in the previous section (p. 421). Here, the main text closes with the following colophon: *Explicit computus Judaycus factus per magistrum Petrum Roseveld Judeum Anno Domini millesimo*

175 This includes most manuscripts of the four-table version (Go, Gw, Ka, Kc, Kd, Ke, Ma, Mc1, Me, Mg, Pb, Pc, Vi) as well as some copies of the five-table version (Ba, Ha, Sa, Tr, Wp).

176 I will edit and translate the passage in ch. 5.1 in line with this conjecture. What seems like a half-hearted attempt at such a correction is already found in MS Mc1 (fol. 169^{v}), which has "prius in Octobri sequenti."

177 The commentary in MS Wb (fol. 11^{r}) expressly calls 1344 "illum annum in quo liber iste est compositus."

*344^mo^* ("Here ends the *Computus Judaicus* composed by Master Peter Roseveld, the Jew, in the year of the Lord 1344").[178] It is likely, however, that the year was simply culled from the final chapter of the text, which in So uses the years 1344/5104 instead of 1342/5102. Moreover, it is very difficult to know what to make of the reference to the author, a *magister* and converted Jew named Petrus Roseveld, about whose identity nothing can be ascertained. In particular, it is unclear if this Petrus was still a Jew when he wrote the text, as the epithet *Judeus* would imply, or if he only decided to share his knowledge of the Jewish calendar with a Christian audience after a religious conversion. The latter option would seem far more likely given the Christian name *Petrus* and the anti-Jewish tone that pervades parts of the treatise.

Caution in accepting the testimony of MS So is clearly advisable, not only because of its isolated status, but also in light of the strongly diverging information found in a number of commentaries on the text. At the end of the prefaces to these commentaries, one frequently encounters some remarks on the reasons behind the work's existence, which are discussed—in a fashion typical of scholastic commentaries—in accordance with Aristotle's 'four causes', i.e. the 'material', 'formal', 'efficient', and 'final' cause.[179] As one would imagine, the passages regarding the 'efficient cause' usually have something to say about the authorship of the *Computus Judaicus*, albeit in ways that, if viewed over the whole history of the text's transmission, turn out to be highly volatile and confusing.[180] In MS Pa, copied in the 1360s or 1370s, we read that the *causa efficiens* of the passage was "Hippocrates (*Ypocras*), i.e. it is obscure or doubtful and there is no reason to care about the efficient cause, because the goodness of the effect proves the goodness of the cause."[181] The transition from Hippocrates's name to the claim that the cause is "obscure or doubtful" does not seem very natural and suggests that already at this stage the text had been

178 MS So, fol. 146^r^. Cf. the faulty rendering in Vetter, "Neues zu Justinger," 114: "Explicit computus judaycus factus per magistrum petrum Besenold judeum Anno Domini millesimo 399."

179 See A.J. Minnis, *Medieval Theory of Authorship*, 2nd ed. (Aldershot: Wildwood House, 1988), 28–29.

180 A similar pattern can be encountered in the prologues to Nicholas of Dybin's commentary (late fourteenth century) on the *Laborintus* of Eberhard the German. See Christoph Fasbender, "*Non sit tibi cura quis dicat, sed quid dicatur*: Kleine Gebrauchsgeschichte eines Seneca-Zitates," in *Anonymität und Autorschaft*, ed. Stephan Pabst (Berlin: de Gruyter, 2011), 35–48 (43–44).

181 MS Pa, fol. 121^ra^: "Causa efficiens est ypocras, i.e. obscura vel dubia, et non est cura de causa efficiente, quia bonitas effectus arguit bonitatem causarum."

tinkered with.[182] The redactor of the version represented by Pa might have understandably been incredulous regarding Hippocrates's authorship and thus inserted the rest of the passage as a sort of disclaimer. A similar reaction to the presence of the great physician is also reflected by the commentary in Mc2, which uses the *annus praesens* 1418. Here it reads: "The efficient cause of the science of the present book is said to have been Master Hippocrates. Whether it is really so needs not concern us. Whence Seneca: not who says it, but what is being said should be your concern."[183] The difficulty of reconstructing the passage as it may have originally looked is exacerbated by the fact that other early witnesses to Pa's version of the commentary (Mc1, Pd, and Wa) all change the name *Ypocras* to *ypocrisa* or *ypocrita*.[184] It is therefore tempting to suppose that the moniker 'hypocrite' was originally placed in the commentary to refer to the anonymous Jewish author of the text. This would also explain why the commentaries designate the authorship as 'obscure' or 'doubtful' (*obscurus*). In this case, *Ypocras* may well have resulted from a corruption of *ypocrita/ypocrisa*.

The strange ascription to *ypocrisa* also appears in a marginal gloss in the top left corner of the first page of MS Ka, whose main text can be dated to ca. 1387. Significantly, the glossator here adds a second opinion, according to which the author had the name Johannes. Because the page's corner has been slightly damaged, it is not clear if the passage originally gave any further specification as to this author's identity.[185] It seems that the earliest appearance of this name can be located in the distinctive version of the commentary that was redacted in ca. 1385 and is shared by MSS Pe, Ne, and Bg. In all three manuscripts, the

182 Cf. the more straightforward rendering in MS Ed, fol. 69^{v}/Lf, fol. 29^{v}: "Causa efficiens fuit ypocras."

183 MS Mc2, fol. 256^{v}: "Causa autem efficiens scientie presentis libri dicitur fuisse magister Yppocras. Utrum ita sit non est curandum. Unde Seneca: 'Non curare quis dicat, sed quid dicatur accedere'." See Martin of Braga, "Formula vitae honestae," in *Opera omnia*, ed. Claude W. Barlow (New Haven: Yale University Press, 1950), 240: "Non te moveat dicentis auctoritas, nec quis, sed quid dicat intendito." On the use of this pseudo-Senecan quote in late medieval commentaries, see Fasbender, *"Non sit tibi cura."*

184 MS Pd, fol. 47^{v}: "Causa efficiens est ipocrisa, i.e. obscura. Unde bonitas effectus arguit bonitatem esse." MS Wa, fol. 27^{v}: "Causa efficiens est ypocrita, i.e. ignota, sed bonitas efficiens arguit bonitatem cause." MS Mc1, fol. 163va: "Causa efficiens est ypocrisa, i.e. obscura. Unde bonitas effectus arguit bonitatem in causa." See also MS Ba, fol. 241^{r}: "Causa efficiens fuit ypocras et ypocriso, scilicet obscuro, unde bonitas effectus arguit bonitatem causarum."

185 MS Ka, fol. 47^{v}: "[Causa] efficiens est ypocrisa, i.e. dubia./ Secundum aliquos [… /page cut-off/ …] fuisse quidam nomine Iohannes."

commentary discerns between the work's 'primary' cause, God himself, and 'secondary' cause, i.e. the human author. The latter is reported to have been

> a certain man by the name Johannes, who converted from Judaism to the Christian faith and who, upon seeing that the Jews possess a precise knowledge of the conjunctions of the sun and moon, as [calculated] for days, hours, and points, translated the knowledge of this book from Hebrew into Latin. Yet whether this is true shall not be our concern, according to the authority of Seneca, in his book *On the four cardinal virtues*, where he says: "You should not let the authority of the one who says it move you, as in who says it, but instead pay attention to what is being said." For the person who edited this book was experienced in the language and the science of the Hebrews.[186]

The mysterious Johannes, who thus first becomes palpable in the 1380s, was to remain a steady and recurring element in subsequent elaborations of the *causa efficiens* of the *Computus Judaicus*. MS Kc, from ca. 1398, informs us that this Johannes was born as a Polish Jew with the name Salomon, but later converted to Christianity and decided to translate his computistical knowledge from Hebrew into Latin.[187] Another lengthy report on the work's authorship appears in the commentary of Ke, redacted in ca. 1424, which changes the man's original Hebrew name to 'Achel' and offers a re-telling of the story not found

186 MS Pe, fol. 118r: "Secundaria est [sic!], ut dicitur communiter, fuit quidam de Iudaismo conversus ad fidem Christianam nomine Iohannes, qui considerans Iudeos precisem (?) habere scientiam de coniunctionibus solis et lune quoad dies, horas, et puncta, transtulit istam scientiam libri huius de Hebraico in Latinum. Utrum autem hec sit verum non est curandum iuxta auctoritatem Senece in libello *de 4or virtutibus cardinalibus*, sic dicens: 'Non te moveat dicentis auctoritas, ut quis dicas [sic!], sed quid dicatur attendito'; quia editor huius libri peritus fuit in lingua et scientia Hebreorum." The same text also appears in MS Ne, p. 47. A different ending is found in MS Bg, fol. 35r: "Utrum autem hec sit verum non est curandum iuxta auctoritatem Senece: 'Non attendito quis dicat sed quid dicatur'. Opinandum tamen est quod editor huius libri peritus fuit in lingua et scientia Ebreorum."

187 MS Kc, fol. 11r: "Causa efficiens est duplex … colligens fuit quidam nacione Iudeus et Polonus, nomine Iohannes, qui Salomon Iudayco dicebatur, qui peritus in hac arte ad fidem sancte matre ecclesie conversus ipsam de Hebreys transtulit in Latinum et ad hoc invocavit divinum auxilium per quod probavit se fide Christianum, cum dixit 'Sed si verbigene'." Cf. Majer Bałaban, *Historja Żydów w Krakowie i na Kazimierzu, 1304–1868*, 2 vols. (Kraków: "Nadzieja" Towarzystwo ku Wspieraniu Chorej Młodzieży Żydowskiej Szkół Średnich i Wyższych w Krakowie, 1931–1936), 1:92.

elsewhere.[188] The text's backstory is again slightly changed in Wb, the copy made in 1420 by Jodocus de Ziegenhals (see pp. 404 and 424 above), where the commentary underlines that Johannes revealed this knowledge to the Christians "so that the Jews would not seem more exact in computistical matters than the clergymen." In contrast to the previous cases, however, there is no indication that Johannes, who is here referred to as an *astronomus*, was once a Jew himself.[189] Johannes, the Jew who converted to Christianity to divulge the secrets of the Jewish calendar to the clergy, reappears in MSS Kx, which was copied at some point after 1425, and Kb, from ca. 1433. In Kx, the passage is augmented by an interesting marginal gloss, which states that "according to others [the author] was John of Sacrobosco."[190] This additional ascription to the well-known author of quadrivial school texts was to carry over to several subsequent versions of the commentary, where one often encounters a tricolon of ascriptions, beginning once more with Hippocrates, who is then followed by John of Sacrobosco and "a certain Jew converted to the faith." The earliest of this is Pf, copied in ca. 1427, which seems to have provided the model for Bh, Lo, Lq, Wp, and Ha.[191] The same tricolon also appears in Le

188 MS Ke, fol. 190^{r}: "[*Computus*] Iudaicus vocetur et non aliter ratio alia non est nisi quia Iudeus quidam qui tenuit fidem eorum fuit expertus numerum istum scilicet aureum numerum. A deinde conversus ad fidem Christianam, qui postremo per modos alias fuit mancipatus doctrinis scolasticis etc. illam diversitatem quae fuit circa aureum numerum Iudeorum convertit de Ebrayco idiomate ad Latinum. Et hec ideo fecit ne clerici non sint ipsis minores in eorum scientiis(?). Et sic patet causa efficiens et fuit quidem Iudeus nomine Achel, ut quidam asserunt."

189 MS Wb, fol. 1^{r}: "Sed causa efficiens fuit quidam astronomus nomine Iohannes qui transtulit nobis istam scientiam de Iudayco in Latinum ne videntur Iudeos subtiliores computisticas ipsis clericis."

190 MS Kx, fol. 25^{r}: "Sed causa efficiens dicitur fuisse quidam studens nomine Iohannes qui olim fuit Iudeus et quondam baptisatus ille transtulit illam scientiam de Iudayco in Latinum ne videntur Iudeos esse subtiliores in arte computistica ipsis clericis latinis." Marginal gloss (ibid.): "Vel secundum alios Iohannes de Sacrobusco." MS Kb, fol. 334^{rb}: "Sed causa efficiens fuit quidam studens nomine Iohannes conversus de fide Iudayca in Christianam. Et ille transtulit nobis istam scientiam de Iudayco in Latinum, ne videntur Iudeos esse subtiliores in arte computistica ipsis clericis." See further MS Wc (fol. 16va), Be (fol. 176^{r}), Co (fol. 44^{r}), Sb (fol. 42^{v}), with similar content to Kb. John of Sacrobosco is already mentioned as a possible *causa efficiens* in MS Ke, fol. 190^{r}.

191 MS Pf, fol. 157^{v}: "Sed causa efficiens secundum aliquos fuit Ypocras. Sed secundum alios fuit Iohannes de Sacrobusco. Alii tamen dicunt quod fuit quidam Iudeus conversus ad fidem qui transtulit nobis istam scientiam de Iudaico in Latinum." See further MSS Bh (fol. 211^{v}), Wp (fol. 56^{v}), Ha (fol. 26^{v}). A slight variation appears in MS Lo, fol. 47^{r}: "Quidam enim dicunt quod fuit magister ypocras medicus. Alii dicunt quod fuit Iohannes de

(ca. 1444), Wo, Up, although here the converted Jew's name is once again given as Johannes.[192]

Given the fact that the commentators themselves often expressed a degree of reservation towards their own suggestions of authorship—a reservation underlined by the pseudo-Seneca quote found in many renderings of the passage[193]—there is certainly no reason to put a great deal in confidence in any of these claims. The attribution to John of Sacrobosco is indeed easily discarded as a secondary accretion, doubtlessly influenced by the fact that the *Computus Judaicus* is often transmitted in close proximity to his quadrivial works (see p. 400 above). As we have just seen, his name makes its first tangible appearance in a marginal gloss to Kx, where the main text ascribes the work to the former Jew Johannes.[194] This raises the suspicion that this *Iohannes quondam Iudeus* was simply conflated with *Iohannes de Sascrobusco*. Likewise, the idea that the *Computus Judaicus* was written by a former Jew is probably best seen as a conjecture, based on the notion that the author must have been "experienced in the language and science of the Hebrews", as the otherwise sceptical commentator in MS Bg puts it, and therefore someone with a Jewish background.[195] The idea that he was a convert to Christianity was also plausible given the heavily anti-Jewish tone of the prologue, in which the author expressly implores the "virtue of the One who was born from the Word" (*Sed si verbigene virtus michi prospera fiet*)—a palpable reference to first chapter of John's Gospel.[196] Although this does not yet solve the question of where the name Johannes or the uniquely attested alternatives Petrus Roseveld (So), Salomon (Kc) or Achel (Ke) may have been taken from, it is probably safest to treat the *Computus Judaicus* as an anonymously transmitted work, as is done in the present edition.

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sancto sepulchro [sic!]. Alii tamen dicunt quod fuit quidam Iudeus ad fidem Christianam conversus et sic ab illo nomine liber intitulatur 'computus iudaicus'." Largely the same wording is also found MS Lq, fol. 26$^{r–v}$.

192 MS Le, fol. 128: "Causa efficiens secundum aliquos fuit Ypocras. Sed secundum aliquos Iohannes de Sacrobusco. Alii tamen dicunt et melius quod fuit quidam studens nomine Iohannes, qui olim fuerat Iudeus et conversus est ad fidem et tandem baptizatus. Et iste transtulit nobis istam scientiam de Ebrayco in Latinum, ne Iudei videntur subtiliores in arte computistica ipsis Latinis et Christianis." See also MSS Wo (fol. 25^{v}) and Up (fol. 14$^{r–v}$).

193 Versions of the quote appear in MSS Bg, Ke, Mc2, Ne, Pe, Pf, Wb, and Wc. See n. 183 above.

194 Cf. Pedersen, "In Quest of Sacrobosco," 180.

195 MS Bg, fol. 35^{r}: "Opinandum tamen est quod editor huius libri peritus fuit in lingua et scientia Ebreorum."

196 This is already pointed out in MS Kc, fol. 11^{r}. See n. 187 above for the quotation.

10 The Users

Since the *Computus Judaicus* was clearly meant to be of practical use, it is not surprising to find examples of its direct application in numerous copies of the work itself and also elsewhere. A particularly striking example comes from a fourteenth-century collection of computistical, astronomical, mathematical, and medical notes and materials, bound into MS 4° Cod 55 of the Staats- und Statdbibliothek, Augsburg (fols. 194^{r}–215^{r}).[197] The very first page of this collection (fols. 194^{r}) opens with three sets of mnemonic verses taken from sections 2.1–3 of our *Computus Judaicus*, which together summarize the computation of the *molad* on the basis of successive additions of the value 1.12.793. This is followed by another short summary of the same procedure, apparently in the scribe's own words. As his example, he uses a past new moon on St. Stephen's Day (26 December) in the year 1354, which is timed as 13 hours, 1023 *helachim*. This happens to match the *molad* Shevat of 5114 JE = 1353/54 CE, showing us that the author counted the years according to the *stylus nativitatis*, such that 1354 CE already began on 25 December of the previous year.[198] Appended to this is a table listing all the *molad* times for the years 1370 to 1372, starting with the *molad* Shevat of 5130 JE, which fell on 29 December 1369 CE. Its final line corresponds to the *molad* Shevat of 5133 JE = 1372/73 CE, which again fell on St. Stephen's day (26 December), exactly one 19-year cycle after the *molad* mentioned in the previous example. The dates in the Julian calendar are not numbered, but represented only by their equivalent Saint's days (e.g. *Thome* = Thomas Becket, for 29 December) and the corresponding syllable of the Cisiojanus.[199]

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197 See Wolf Gehrt, *Die Handschriften der Staats- und Stadtbibliothek Augsburg 4° Cod 1–150* (Wiesbaden: Harrassowitz, 1999), 104–107.

198 MS Augsburg, Staats- und Stadtbibliothek, 4° Cod 55, fol. 194^{r}: "Compotus secundum Ebreos: Ad faciendum novilunium ad incipiendum diem de sero numeretur quatuor ebdomade in manu tunc adiunge unum diem et dimidium et tot helachim 793 semper ad superiora, quoniam erunt tot helachim quod possunt dividi in 1080, quia 1080 helachim faciunt unam horam et 24 hore faciunt unam diem. Nota per illas dicciones: 'Coniungo mea'. Nota per 'con' intelligitur '3', per 'iun' intelligitur '9', per 'go' intelligitur '7'; et nota per 'm' intelligitur '12', quia est duodecima littera et significat 12 horas; per 'a', qui est prima littera, significatur dies, et sic procede sinistrum. In illa sillaba in qua determinabitur, in eadem incipitur et adiungitur, videlicet Anno Domini 1354 in die sancti Stephani erat incensio hora 13, helachim 1023; modo numera 4 ebdomadas in manu et adde diem unam et 12 horas et 793 helachim et erit novelunium in conversionem sancti Pauli et hoc est hora 2, helachim 736, computando diem a vespere more Hebreorum."

199 The *Cisiojanus* is a hexametrical calendrical poem, which contains one syllable for each

A hundred years later, readers in Southern Germany were still interested in calculating the *molad* according to the Jews. A *Kalendarium Judaicum*, copied in 1452 but starting already in 1447, can be found in a manuscript from the Benedictine monastery of St. Emmeram (Regensburg), which also once owned MSS Mc1/2 and Lw.[200] It offers tables for the 19-year cycles 1447–1465, 1466–1484, and 1485–1503 CE, with *molad* times in hours and *elochim* inscribed next to the equivalent Julian dates (starting in January). The *kalendarium* is accompanied by a brief commentary, which mentions that the Jewish year begins in October and that 3760 years must be added to the Christian year. This point is driven home by the mnemonic *zofagicum* (c = 3, g = 7, f = 6, z = 0), which is the same expression used in many later versions of the final chapter of the *Computus Judaicus* (see p. 419 above). There can be thus no doubt that the latter was used as a source. Indeed, the colophon informs us that the original version of this *kalendarium* was composed in 1427 *secundum computum Judaicum* in the city of Ulm.[201] Southern Germany is also the setting for MS Mc1, copied in the last quarter of the fourteenth century, where the practical application of the lore offered by the *Computus Judaicus* gave rise to a whole supplementary treatise. Using some of the space left on the last page of the main treatise (fol. 170^{vb}) as well as the three following pages (fols. 171ra–72^{rb}), a second scribe, working in 1393, complemented the original work by an additional summary of how to calculate the beginning of the lunar months, starting: *Nota quod tempus medie coniunctionis Iudeorum positum est secundum longitudinem civitatis Iherusalem* ("Note that the time of the mean conjunction used by the Jews is set according to the longitude of Jerusalem"). This bit of information about the theoretical meridian of the calendar is absent from the *Computus Judaicus* itself and must therefore have been taken from another source. The author also correctly extrapolates the duration of one *ḥelek* as 3;20s (in sexagesimal notation) and links the Jewish estimate of the mean lunation to Ptolemy.[202] He goes on to

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day of the Julian year. It was widely used in the late Middle Ages as a means of memorizing the saint days and festivals of the Julian calendar. See Odenius, "Cisiojani Latini"; Rolf Max Kully, "Cisiojanus: Studien zur mnemonischen Literatur anhand des spätmittelalterlichen Kalendergedichts," *Schweizerisches Archiv für Volkskunde* 70 (1974): 93–123.

200 MS Munich, BSB, Clm 14952, fols. 1^{r}–27^{r}. See Walde, *Christliche Hebraisten*, 176, who was the first to draw attention to this text.

201 MS Munich, BSB, Clm 14952, fols. 27^{r}: "Et hoc kalendarium compositum est secundum computum Iudaicum in civitate Ulmensi 1427 et scriptus est 1452 in dominica 2a adventus domini."

202 MS Mc1, fol. 170^{vb}: "Et ipsi Iudei utuntur in suis computis quantitatem lunationis secundum Tholomeum regem inventam, que constat ex 29 diebus, 12 horis, 44 minutis et

explain that in order to convert the new moons as observed "according to our computus" (*secundum nostrum computum*) into the Jewish *molad*, it is necessary to add 3 hours and at the same time subtract 286 *ḥalakim* from the given new moon. From what is stated next, it emerges that the author was active in the region of the city of Konstanz, whose meridian he presupposed for his own calculations.[203]

Unlike the *Computus Judaicus* itself, the author of this text expressly shows how to find the *molad* times within the framework provided by the Julian solar year. Amongst other things, he notes that the *radix* or epoch date for the *annus praesens* 1393 CE is 13 days, 11 hours, and 936 *helochim*, a value which is then translated into the syllables *na.la.iu.ca.fa* (n = 13; l = 11; i = 9; c = 3; f = 6).[204] This is obviously meant to denote the first new moon of the Julian year in question, which happened to be the *molad* of Shevat, but the correct date would have been 13 January, 20h 642p. The text concludes with a generic table for the thirteen *moladot* of the year as well as a brief note that points out that the Jewish year begins with the lunation ending in October and that the *radix* for the *molad* Tishri falls on the day after St. Bartholomew's Day (24 August). This is presumably meant to be the earliest possible day for *molad* Tishri, which was 25 August for the period in question. The value of the *molad* Tishri in 1393 is given as 12d 23h 792p. Adding this to 25 August leads to 6 September, 23h 792p, whereas the expected result should have been 7 September, 2h 506p.[205] This time, the discrepancy is not due to an error, but shows that the author implemented the aforementioned correction for the meridian of Konstanz: his result is indeed 286p greater and 3h less than the 'Jewish' *molad* allegedly calculated for Jerusalem.[206]

Another short text of this kind, which teaches how to calculate the *moladot* for 1388 on the basis of the tables and rules of the *Computus Judaicus*, imme-

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tribus secundis et duobus tertiis. Modo illa minuta, secunda et tertia faciunt Iudeis 793 helochim."

203 Ibid., fol. 171ra: "Sed si ad meridianum civitatis Constantiensis, que est in Almania, habere volueris in perpetuum novilunium ad oculi conclusionem, tunc primo considera illos secundos versus."

204 Ibid., fol. 171va.

205 Ibid., fol. 172^{rb}.

206 As pointed out in n. 23 on p. 26 above, the actual meridian implied by the *molad* times lies several degrees further to the east. In the present case, the stated time difference of 3h–286p = 2h 794p implies a difference in longitude of 41°. If the longitude of Konstanz is accepted as 9° 11′ East, this points to a location in western Iran.

diately follows upon the main text in Ml (fols. 32r–33r).[207] A more elaborate supplementary treatise can be found in MS Lo, which stems from the Erfurt charterhouse of St. Salvatorberg, contains a section entitled *Molath computi Iudaici practicatum usque ad 1517* in a later part of the same astronomical-astrological codex (fols. 250r–255v). This text opens with a tidily written list for the *molad* Tishri of all years from 1446 to 1517 CE (251r–253r). In some years (1452–1457), the *moladot* for all other months of the Jewish calendar are supplied as well.[208] On fol. 253v we find a table that juxtaposes Jewish and Christian month names (from *Tishri*/October to *Elol*/September, with *Vadir*/Embolismus inserted after Adar). This is followed by an explanatory text (fols. 253v–255v) that concisely summarizes the same method of calculating the *molad* that is proposed in the *Computus Judaicus* and its commentaries. It clearly references table 1 of the treatise (the one beginning with *Coniungo mea*) and quotes the mnemonic verses of sections 2.2, 2.3, 3.1, and 3.2 as well as the *zofagicum*-rule mentioned above. On fol. 254v there is a table that simply shows which years in the 19-year cycle are embolismic. Reckoning examples are provided for the years 1447 and 1448 (fol. 253v), which seem to have been close to the year of writing. The year 1446 was evidently chosen as the starting point for the above lists of *moladot*, because its autumn was the beginning of a new Jewish 19-year cycle, as is expressly stated on fol. 255r.[209]

In MS Go, which was copied at the beginning of the fifteenth century, the main text of the *Computus Judaicus* is preceded by a series of astronomical materials that are partly related to the treatise itself (fols. 200r–201v). The composition starts on fol. 200r with a table listing the 19 *moladot* Tishri from 1409 to 1427 CE. Another table to its right is related to table 3 in that it lists the *molad* Tishri of the first year of ten consecutive 19-year cycles (again starting with 1409). One of the accompanying texts comments on the calculation of successive *moladot* Tishri (October) with explicit reference to the *tabula fungiholt*, i.e. table 2 of the *Computus Judaicus*. This is followed on fol. 200v by a version of ch. 5.2, to which is attached a note to the effect that sunset at the author's meridian occurs 1h 864p later than in Jerusalem. On the facing page (fol. 201r), the scribe has placed a planetary diagram that looks half-finished, followed by the

207 MS Ml, fol. 32r: "Item nota ad inveniendum incensionem secundum compotum iudaycum …"

208 Unrelated to the Jewish calendar is the flyleaf inserted and numbered as fol. 252, which contains a table of "incensiones et oppositiones practicate secundum figuras computi cyrometrali et dies incipit in media nocte."

209 This year is also used as an example in the margins of the *Computus Judaicus* contained in the same MS (Lo, fol. 49r), but the hand is not the same.

passage and table on the calculation of the opposition discussed above (p. 416). The section closes with a wheel diagram of the planetary spheres taken from the *Computus chirometralis* (fol. 201^{v}).[210]

In MS Lp, another manuscript from St. Salvatorberg in Erfurt, copied in 1431,[211] the main text of the *Computus Judaicus* is followed by an appendix (fol. 87^{v}) containing a 76-year table, which conveniently lists the times of the *molad* Tishri for all years from 1418 to 1493 CE. In the accompanying text, the readers are instructed to find the appropriate line in the table by subtracting 1417 from the current year and then dividing the remainder by 76. This is odd advice, considering that the table in question was valid maximally until 1493 CE, i.e. 1417 + 76 years, so no division would strictly speaking ever be necessary. It would therefore seem that the author of this text mistook his table as representing a true 76-year cycle, akin to what was known among users of the Christian 19-cycle (see p. 163 above).

For determining the other conjunctions of each year in this cycle, he offered a second table, which is essentially a replication of the table of months (table 1) found in the main treatise.[212] The same table and a slightly truncated version of the accompanying text also appear at the end of MS Br (fol. 208^{v}), copied in ca. 1439 and once in the possession of the Carthusians at Cologne. Here, the additional table of months is omitted and instead reference to table 1 in the preceding *Computus Judaicus* is made. What we find on fol. 208^{v} is only part of a larger appendix, the first two pages of which (fol. 207$^{r–v}$) have gone missing. The recto-side of fol. 208 features a set of tables for the calculation of the moon's position in the zodiac, which carry the names of tables 2–5 in the main text

210 Cf. Mütz, ed., "*Computus chirometralis*", 153, for a corresponding image from MS Fb, fol. 62^{v}.

211 The colophon on fol. 87^{r} reads: "Et sic est finis computi judaici Anno Domini 1431, 8 ydus Februarii [6 February], in die beate Dorothee virginis, tertia feria post dominicam. Exurge quere obdormis."

212 MS Lp, fol. 87^{v}: "Si vis scire punctualem incensionem apud Iudeos, subtrahe primo ab annis domini 1417 et residuum divide per 76 quoties poteris. Quo facto cape residuum post divisionem, quid quere in prima linea que intitulatur 'Ciclus magnus', et quidquid ex directo inveneris erit prima incensio sive molath Tisri aput Iudeos, sive Octobris incensio, quid idem est. Sed si volueris habere incensionem secundi mensis, hoc est Novembris sive Marhesan, prescribe molat Tisri, ad quod adde ea que ponuntur in prima linea tabule mensium. Sed si volueris habere tertii mensis, hoc est Kesleff sive Decembris, adde ea que ponuntur in secunda linea eius tabule etc. Consequenter de aliis mensibus per circuli anni. … Et nota quod dies naturalis secundum Iudeos incipitur hora sexta ante medium noctis precedentis diei et finitur hora sexta sequentis diei. Et annus incipit ab Octobre."

(*residuorum*, *digitorum*, *articulorum*, *centennarioum*) and appear to be based on the latter.[213]

Aside from the cases just mentioned, the margins of many MSS of the *Computus Judaicus* contain *molad*-calculations and related scribblings, mostly inserted by later hands. To name but a few examples: a particularly lengthy gloss appears at the end of MS Pb (fol. 61$^{r–v}$), containing a reckoning example for the year 1374. A calculation for 1432 from a later hand is found in Ke (fol. 193^{v}), while the hand that copied the main text in ca. 1424 inserted fly-leaves, some of which contain the data for all *moladot* from October 1425 to July 1426 (fol. 194^{v}) and again for all *moladot* of the years 1425/26, 1426/27 (fol. 198^{r}) and 1427/28 (fol. 198^{v}). Curiously, the embolismic month of 1426/27 (19/19 of the Jewish cycle) is here interpreted as falling between October and November. In MS Kx, a later hand added calculations for 1428–1434 (fols. 33^{v}–34^{r}) and for 1437–1439 (fols. 36^{v}). Both this MS (fol. 36^{r}) and Ed (fol. 71^{v}) also feature calendrical wheel diagrams inserted into the main text. MS Co features several additions from a later hand—both in the margins and on a flyleaf containing a table of *moladot* for all months from October 1461 to January 1462 (fol. 48^{r}) and, on the backside, the times of all Passover new moons (designated as the new moon of April) for the 19-year period from 1480 to 1498 (fol. 48^{v}). MS Me (fol. 25^{v}–26^{r}) contains calculations for 1447 from a different hand, whilst a later user of MS Gr inserted a marginal gloss for 1491 on fol. 358^{v}. This latter MS also contains a flyleaf (fol. 360^{v}) with examples for 1414 and 1408, which are treated as years in the past. Yet another hand used the free space at the bottom of the final page (fol. 365^{v}) to add a table, showing the *moladot* Tishri for the years 1477 to 1492. Calculations for 1479 are featured at the bottom of fol. 139^{v} in MS Le. Flyleaves with additional commentary and calculations for the years 1407–1409 are also found in MS Ka (fols. 49$^{r–v}$, 50$^{r–v}$, 54$^{r–v}$). Finally, there is a noteworthy inclusion of a Hebrew alphabet at the end of the text in MS Bh (fol. 215^{v}), which shows the names as well as the phonetic and numerical values of the individual letters.

11 The Edition

The following edition is based on a selection of seven early manuscripts, which give the impression of being relatively free from major redactorial intervention:

213 Note, however, that the *tabula residuorum* here has 28 instead of 19 lines, whereas the *tabula centennariorum* stops after merely 5 lines.

Ka Kraków, Biblioteka Jagiellońska, 562, fols. 47^{v}–51^{v}, 54^{r}–56^{v}
Kd Kraków, Biblioteka Jagiellońska, 1848, fols. 33^{r}–37^{v}
Mc1 Munich, Bayerische Staatsbibliothek, Clm 14504, fols. 163^{r}–170^{va}
Me Munich, Bayerische Staatsbibliothek, Clm 19685, fols. 21^{r}–26^{v}
Pb Prague, Národní knihovna České republiky, IV.G.8, fols. 56^{v}–61^{v}
Sf St. Florian, Stiftsbibliothek, XI.113, fols. 191^{ra}–93^{vb}
Sg St. Gallen, Stiftsbibliothek, 827, pp. 209–216

Among these, the earliest securely datable copy is MS Me, where the colophon on fol. 26^{v} marks the date of completion as 10 December 1375 (*sub Anno Domini 1375° quarto ydus Decembris*). The latest MS is Sg, which was written between 1425 and 1428. Throughout, I shall try to steer close to what I suspect to be the original structure of the text, albeit without being able to vouchsafe the authenticity of any of these readings, for the reasons already mentioned. In cases where the MSS offer diverging readings and no clear criterion for adjudicating between them was available, I have generally followed MS Mc1, which was probably copied in 1375 or not long thereafter. The division of the introductory verses into lines corresponds to the one found in MSS Mc1, Me, Pb, Sf and Sg. With the exception of Sg, all of the MSS used for this edition contain a fourth table and a corresponding chapter (located between ch. 4 and 5), albeit with a great deal of variation between individual copies. As has been explained above (p. 409), this part is in all likelihood a secondary accretion, which is why I have decided to omit it from the present edition. I have similarly suppressed an additional mnemonic verse on the computation of the Jewish world era, which appears after ch. 1.4 in MSS Kd and Sg (see p. 415) as well as an extension of ch. 4 found only in MS Kd. A different approach has been taken with regard to the ch. 5.2, which appears in MSS Pa and Pd as part of the commentary. Since versions of this chapter are found in nearly every complete copy of the *Computus Judaicus*, I have decided to include it in the edition as a regular part of the text, despite mild doubts regarding its authenticity (see p. 399).

The appended tables are adapted from the layout found in MS Sg, although the spelling of the mnemonic words follows Mc1. As in the other editions in this volume, slight differences in word order between manuscripts are generally ignored and no account is taken of minor variants in spelling, e.g. *cyclus* vs. *ciclus*. For the 'Hebrew' calendrical terms used throughout the text I have consistently used the following forms: *molad*, *messorim*, *elochim*, and *Tisri*. Occasional variants found in the MSS used for this edition are *molat* (Ka, Me, Sf, Sg), *molath* (Kd, Mc1, Pb, Sg), *molet* (Sg), *mesrim* (Sg), *messerim* (Ka, Me, Sf), *mesorim* (Mc1), *magssorim* (Pb), *halakim* (Sf), *halakym* (Sf), *helochim* (Mc1, Pb), *helachim* (Mc1), *elachim* (Sg), *eclochim* (Sg), *Tyzri* (Ka), *Tysri* (Kd, Pb).

In order to further elucidate the cryptic introductory portion of the *Computus Judaicus*, it seemed apposite to append a transcription and translation of the commentary that accompanies this particular section in a number of manuscripts. As noted above (p. 420), the earliest preserved version of this commentary features the date 1344 and can be found in manuscripts that do not include the main text of the treatise:

Pa Prague, Národní knihovna České republiky, III.G.14 (539), fols. 120^{ra}–25^{vb}
Pd Prague, Národní knihovna České republiky, XIV.F.1 (2572), fols. 47^{r}–52^{v}
Wa Wrocław, Biblioteka Uniwersytecka, I.Q.156, fols. 27^{r}–32^{v}

As the main basis for the present edition, I have used Pa. In cases where the text in this manuscript seemed corrupt or unintelligible, certain sentences and variants have been supplied from Pd and the closely related commentary in Mc1. In each case, the commentary is divided into three sections, corresponding to three parts of the metrical prologue. In order to facilitate orientation, I have reproduced the text that is commented upon at the start of each of section, although these quotes do not appear in the manuscripts in question.

Computus Judaicus

Me pudet audire Iudeum talia scire
Deberet clericus noscere que pocius
Me piget et miseret simul et tedet quod Apella
Iudeus[1] clerum per sibi nota preit
Qui quasi nauclerus ante preire plebes
Deberet iure. Sed prochdolor anteriores
Sunt scitu Sathane quos patet esse pares
Rennuitur sensus sic cessat gloria cleri
Et petitur census ut patet hic et ibi

Lunam primari dum Iudeus meditatur
Punctus et hora sibi certa diesque datur
Ymmo quod magis est horam si partior unam
In mille partes et octuaginta simul
Incendi luna per eum reperitur in una
Istarum; sic est ars bene certa sibi

Sed si verbigene virtus michi prospera fiet
Et michi gratuite celitus adveniet
Ammodo ne clero velut hactenus hic dominetur
Ipsius ars primo postea nostra detur
Hinc concordetur nobiscum et referetur

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2 Iudeum] Iudeos *Sg* **3** Deberet] Debet *Sg* ‖ clericus] clerus *Mc1SgSf* **4** Me] Et *Sg* ‖ et] *om. MeSf* ‖ quod] *om. Sg* ‖ Apella] Appella *KaKdMc1PbSf* appelat *Me* **5** clerum] clericum *Kd* **7** iure] iuret *Me* ‖ prochdolor] prodoloribus *Me* **8** Sathane] sathone *Me* ‖ patet] videlicet *Sg* **8–10** esse … patet] *om. Me* **10** ibi] ubique *Kd* **12** Punctus] Puncta *Me* Punctum *Sf* ‖ et] *om. KaMePbSf* ‖ sibi … datur] datur sibi certaque dies *Ka* sibi datur que certa dies *Pb* **13** est] *om. Sg* ‖ si] sibi *Sg* ‖ unam] una *Me* **14** In] Ad *Mc1* ‖ mille] cÿle *Mc1* cille *Sf* ‖ et] *om. KdMc1* ‖ et octuaginta] octuagintaque *MeSg* ‖ octuaginta] octuagintaque *KdPb* **15** luna] lunam *Sf* ‖ eum] eam *Sg* ‖ in] et *Sg* **16** Istarum] Istorum *KaMePb* ‖ ars] ars est brevis *Pb* ‖ bene] brevis *KaMe* **17** Sed] Et *KaPb* **19** Ammodo] Ammode *Me* ‖ clero] clerus *Me* ‖ hactenus] attenus *Ka* actenus *MeSf* huc usque *Sg* ‖ hic] hii *Ka om. Sg* **20** ars] *add.* detur *Me* ‖ postea nostra] nostra postea *Ka* post tibi nostra *Mc1* tibi nostra postea *Pb* post hec tibi mea *Sf* vobis postea nostra que *Sg* **21** Hinc] Huic *PcSg* ‖ concordetur] *add.* ut *Kd* ‖ nobiscum] nobis *Pb* ‖ et] ac *KaMePbSf om. Kd* sic *Sg*

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[1] Horace, *Serm.* I.5.100, ed. D.R. Shackleton Bailey, *Q. Horati Flacci Opera* (Stuttgart: Teubner, 1985), 190: "credat Iudaeus Apella, non ego."

On the Jewish *Computus*

It shames me to hear that the Jew knows such things,/ which to study would much rather befit the clergy./ It irks and grieves and offends me, all at once, to find that 'Apella/ the Jew' takes precedence over the clergy with his knowledge,/ who should go before the people like a skipper,/ as would be just. Yet—alas!—superior are those/ in knowledge who are plainly akin to Satan./ Experience is spurned and thus the glory of the clergy fades away./ And wealth is what is desired, as is plain here and everywhere.

Meanwhile, the Jew thinks of the moon as it becomes new/ which [moment] he knows by the point, hour, and certain day/ What is more, if I divide one hour/ into one thousand combined with eighty parts./ this indicates when the moon is in conjunction, down to one/ such [part]; and thus this art is well known to him.

But if the power of the word-born one is propitious towards me/ and comes to me freely from heaven,/ so that from now on [the Jew] will here no longer rule over the clergy as before,/ his art shall be given first, afterwards ours,/ and hence it shall be harmonized with ours and made known.

[1.1] "Qui *virtutes* vocabulorum *sunt ignari* defacili *paralogizantur*," ut dicit Aristoteles primo *Elencorum*.[2] Nos igitur in hoc brevi compendio incensionem primationis cuiuslibet lune ad unguem declarare volentes, primo discutienda sunt vocabula apud Hebreos plenius usitata; postea ad facultatem huius scientie descendemus.

[1.2] Primo sciendum quod per molad incensio vel primatio denotatur, et per messorim cyclus lunaris penitus designatur. Unde versus: *Per* '*molad*' *incensum, sed per* '*messorim*' *cape cyclum*.

[1.3] Secundo notandum quod menses secundum eos, inter quos October est primus, hoc modo nuncupantur: October primus Tisri vocatur. November secundus Marcheswan. December tertius Kislef. Januarius quartus Thebes. Februarius quintus Swath. Martius sextus Adar. Aprilis septimus Nissan. Maius octavus Ydar. Iunius nonus Schiban. Iulius decimus Thamus. Augustus undecimus Aph. September duodecimus Elul. Unde Versus: *Tisri*,

1 virtutes] virtutibus *Mc1* ‖ vocabulorum] nominum *Mc1Sf* ‖ ignari] ignorari *Mc1* ‖ paralogizantur] paraloyzantur *KaMc1Me* paraloysantur *Pb* paraloizantur *Sf* paralogisantur *Sg* **2** primo] in primo *MeSf* ‖ hoc] *om. Pb* ‖ brevi compendio] brevium compendiolo *Me* **3** primationis] lunationis *Pb* ‖ cuiuslibet] cuius *Me* **3–4** discutienda] distinguenda *Sg* **4** Hebreos] Hebraicos *Mc1Sf* Ebreos *Me* Hebreas *Pb* Ebraycos *Sg* ‖ plenius] que plenius sunt *Sg* **4–5** postea … descendemus] ascendendum est *Ka* accedendum est *Pb* descendendo *Mc1SfSg* **5** descendemus] *om. Me* **6** Primo] *add.* ergo *Kd* ‖ quod] est *Pb* ‖ vel] sive *Ka* **7** et] *om. KaMc1PbSfSg* ‖ per] semper *Mc1* ‖ messorim] *add.* autem *Mc1* ‖ penitus] *om. KdMe* ‖ Unde] *add.* dantur *Ka* ‖ Unde versus] *om. Sf* **8** sed] *om. KaPbSg* ‖ messorim] *add.* hinc *Ka* **9** menses] *om. Ka* ‖ secundum] apud *Me* **9–10** inter … vocatur] 12 sunt menses: October est primus qui vocatur Tyzri *Ka* quod sunt 12 menses inter quod Oxtober est primus qui modo nuncupatur: October primus Tyzri vocatur *Kd* **9** inter quos] quorum *Sg* **10** primus] *add.* in quo mundum dicunt esse creatm *Me* ‖ nuncupantur] nominatur *Me* ‖ October] *om. Pb* ‖ Tisri] Tyzri *Ka* Tysri *Kd* Thisre *Mc1* Tyssrim *Pb* ‖ vocatur] nuncupatur *Me* **11** Marcheswan] Marceswan *Kd* Malhespan *Mc1* Marcheswam *Me* Marchesswan *Pb* Marceswan nuncupatus *Sg* ‖ Kislef] Kesleph *Ka* Kasleph *Kd* Keschlef *Me* Kessleph *Pb* Keslef *Sf* Kesliff *Sg* **11–12** Thebes] Theywes *Kd* Thephis *Mc1* Thewes *Sg* **12** Swath] Saphat *Mc1* Swat *MeSfSg* **12–13** Nissan] Nyan *Ka* Nysan *Kd* Nizan *Pb* Nisan *MeSf* **13** Ydar] Iar *Mc1* Ycar *Me* ‖ Schiban] Synor *Kd* Siphan *Mc1* Schyban *Me* Schibar *Pb* Schiwan *Sg* ‖ Thamus] Thamos *KaPb* Thammes *Mc1* Thomos *Me* **14** Aph] Aff *KaMePb* Af *Sf* ‖ duodecimus] *add.* vero vocatur *Pb* ‖ Elul] Elil nuncupatur *Mc1* Ellul *Sg* ‖ Tisri] Tyzri *Ka* Tysrim *Kd* Thisre *Mc1*

[2] Aristotle, *De sophisticis elenchis* (1.1), ed. Dod, 6: "Quemadmodum igitur illic qui non sunt prompti numeros ferre a scientibus expelluntur, eodem modo et in orationibus qui nominum virtutis sunt ignari paralogizantur et ipsi disputantes et alios audientes."

[1.1] "Those who are not well acquainted with the force of words are easily led to reason incorrectly," as Aristotle says in the first [book] of his *Refutations*. We, who are intent on showing with exactness in this brief compendium the conjunction [*incensio*] of any given new moon, shall therefore first discuss the vocabulary that is widely used among the Hebrews; and afterwards we shall descend to the details of this science.

[1.2] The first thing to know is that *molad* denotes the conjunction or new moon, while *messorim* designates the lunar cycle. Whence the verse: "'*molad*' gives you the conjunction, '*messorim*' the cycle."

[1.3] The second thing to note is that the months according to the [Hebrews], the first among which is October, carry the following names: October is the first, called Tishri; November is the second, Marḥeshvan; December the third, Kislev; January the fourth, Tevet; February the fifth, Shevat; March the sixth, Adar; April the seventh, Nisan; May the eighth, Iyyar; June the ninth, Sivan; July the tenth, Tammuz; August the eleventh, Av; September

Marcheswan, Kislef, Thebes, Swath, Adar, Nissan, Ydar, Schiban Thamus, Aph, ultimus Elul.

[1.4] Si autem scire voluerit aliquis quid Iudei habeant pro suo messorim, precognito quid habeamus pro cyclo nostro, tunc incipiat a summitate pollicis intra manum numerare, procedendo ut docetur in computo manuali. Et consideretur articulum in quo invenitur annus cycli, et sic inveniet 19 in summitate auricularis digiti. Demum pro Iudeis incipiat numerare 1, 2, 3, 4 etc. in tertio articulo pollicis, sic ulterius computando, et inveniet 17 in summitate auricularis digiti et 18 in primo articulo pollicis et 19 in secundo articulo pollicis. Quidquid ergo ceciderit super articulum in quo noster invenitur cyclus, habeantur pro cyclo Iudeorum, hoc supposito quod cum nos incipimus annum in Ianuario, ipsi vero in Octobri post. Verbi gratia: dum nos habemus 14 pro aureo numero, ipsi invenitur in tertio articulo annularis digiti incipiendo in primo membro pollicis, tunc Iudei habent 12,

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1 Marcheswan] Marceswan *KdSg* Malhesphan *Mc1* Marcheswam *Me* Marcesswan *Pb* ‖ Kislef] Kesleph *KaKd* Keschlef *Me* Keslech *Pb* Keslef *Sf* Kessleff *Sg* ‖ Thebes] Tebes *Ka* Teywes *Kd* Thephis *Mc1* Thewes *Sg* ‖ Swath] Saphat *Mc1* Swat *MeSfSg* ‖ Nissan] Nyzan *Ka* Nysan *KdPb* Nisan *MeSf* ‖ Ydar] Iar *Mc1* Ycar *Me* ‖ Schiban] Sywar *Kd* Siphan *Mc1* Schibar *Pb* Schiwan *Sg* ‖ Thamus] Tamos *Ka* Thammes *Mc1* Thamos *Pb* Thomos *Me* ‖ Aph] Aff *KaPb* Af *KdSf* Apf *Me* **2** ultimus] sit et ultimus *KdMc1 om. Me* sit ultimus *Sf* ‖ Elul] Elil *Mc1* Ellul. Warid addatur quia embolismus habeatur *Sg* **3** voluerit] volueris *Me* ‖ aliquis] *om. Me* quis *Mc1Sg* **4** quid] quot *Pb* ‖ precognito … tunc] cognoscatur autem prius noster cyclus, quo cognito *Ka* ‖ tunc] *om. Me* ‖ incipiat] incipiant *Me* ‖ a] in *KaPb* **5** manum] *add.* solum *Me* ‖ numerare] *om. Pb* **6** consideretur] considera *Sg* ‖ invenitur] finitur *Mc1Me* ‖ annus cycli] *om. KdMc1* aureus numerus *Sf* ‖ cycli] *add.* nostri *Sg* ‖ et] *om. KdSg* ‖ inveniet] invenit *Sf* invenies *Sg* **7** auricularis] annularis *Mc1* ‖ digiti] *add.* et semper numera intra manum *Sg* ‖ Demum] Deinde *MeSg* ‖ incipiat] incipiant *Me* incipias *Sg* **8** 4] *om. KdSf* ‖ in] *om. Kd* incipiendo a *Mc1* ‖ articulo] membro *Kd add.* ipsius *Me* **8–9** pollicis … et] *om. Mc1* **8** sic] *om. Ka* et sic *Me* ‖ sic … computando] incipiendo *Sf* ‖ et] *add.* sic *Ka* ‖ inveniet] invenies *Sg* **9** digiti] *om. MeSf* ‖ et] *om. Pb* ‖ in] in summitate pollicis sive in *Pb* ‖ primo articulo] summitate *Sf* ‖ articulo] membro seu articulo *Ka* **10** articulo] membro *Sf* ‖ pollicis] *add.* secundum eos *Ka* ‖ ergo] autem *Sg* ‖ super] supra *KdSg* **11** noster] *add.* etiam *Ka* ‖ pro] hoc pro *Sg* ‖ supposito] presupposito *KaSg* ‖ quod] *om. KaPbSf* **12** cum] *om. MeSg* **12–13** nos … dum] *om. Sf* **12** annum] *om. KaMc1Me* ‖ in] a *Me* ‖ vero] incipiunt *Ka om. KdMc1Pb* ‖ post] *om. KaSg* **12–13** Verbi gratia] Unde *Kd om. Pb* **13** dum] cum *Ka* ‖ 14] 17 *KdPb* 19 *Sf* ‖ ipsi] quod *Kd* ipsa *Mc1* qui *Sg* **13–14** ipsi … digiti] *om. Me* **13** invenitur] inveniuntur *KaMc1* ‖ tertio] secundo *KdPb* **14** annularis] auricularis *KdPbSfSg* ‖ digiti] *add.* qui vocatur medius secundum aliquos *Sg om. Sf* ‖ incipiendo … pollicis] *om. KaMc1Sf* sursum numerando *Kd* ‖ 12] 15 *KdPb* 17 *Sf*

the twelfth, Elul. Whence the verses: "Tishri, Marḥeshvan, Kislev, Tevet, Shevat, Adar, Nisan, Iyyar, Sivan, Tammuz, Av, the last is Elul."

[1.4] Yet if someone wants to know what [year] the Jews currently have in their *messorim*, given knowledge of what [year] we have in our cycle, then he should start to count on the inside of his hand from the top of his thumb, proceeding as it is taught in the *computus manualis*. And he should look for the joint on which that year of the cycle is found, such that he will find '19' on the tip of the little finger. Hereafter, he should count down 1, 2, 3 etc. for the [years of the] Jews, starting at the third joint of the thumb: and counting onwards in this fashion, he will find '17' on the tip of the little finger and '18' on the thumb's first joint and '19' on the thumb's second joint. Whatever will thus fall on the joint that corresponds to our cycle, shall be had for the cycle of the Jews, bearing in mind that we begin the year in January, whereas they do in October. For example: when we have '14' for the Golden Number, which is found on the second joint of the ring finger, starting from the thumb's first joint, the Jews have '12', starting from the thumb's third joint.

incipiendo in tertio membro pollicis numerare. Ista autem 12 incipiunt post in eodem anno in Octobri. Unde versus: *Pollex iuncturam vult Iudeis dare ternam/ sed primam nobis. Scandere sic poteris/ donec articulum videas dantem tibi cyclum*.

[2.1] Hiis igitur omnibus prelibatis sagaciter trutinetur quod Iudei quamlibet horam naturalem in 1080 particulas dividunt, sub quarum quamlibet lune incensionem reperiunt, quas quidem particulas elochim nominant. Unde versus: *Horam partitur Iudeus ad octoginta/ et partes mille elochim quas nuncupat ille*.

[2.2] Quicumque ergo molad alicuius mensis scire anhelaverit, cognito molad precedenti, addat tantum ad istud cognitum unam feriam, 12 horas et 793 elochim, et hoc semper 28 diebus superadditis. Unde elochim addantur ad elochim prius cognita, hore ad horas, ferie ad ferias et sic de aliis. Unde versus: *Si precedentem scieris lunamque sequentem/ queris ad huic unam iunge sibi feriam/ horam bissenam, elochim sociabis eidem/ septingenta simul nonagintaque tria*.

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1 membro] articulo *KaMc1* ‖ pollicis] *add.* numerare *Me* ‖ numerare] *om. KaPbSfSg* ad eundum articulum auricularis digiti computando *Kd* ‖ Ista] Illa *Mc1* **1–2** Ista … Octobri] *om. Ka* Ista autem etiam incipiunt post Octobrem eiusdem mensis *Me* **1** 12] 17 *KaSf* 15 *Pb* **2** in] *om. KdSg* ‖ anno] eundem annum *KdSg* ‖ in] *add.* sequenti *Pb* ‖ in Octobri] Octobrem eiusdem mensis *Me* ‖ Unde versus] Unde datur versus *Ka om. KdSf* **2–3** ternam] terciam *Me* **3** donec] *add.* ad *Ka* ‖ articulum videas] ad articulum venies *Ka* ‖ videas] videbis *Pb* **4** tibi] sibi *Pb* **5** igitur] ergo *KaSf* vero *Me* ‖ omnibus] *om. Sg* ‖ prelibatis] prelabatis *Me* ‖ trutinetur] intuetur *Kd* trutinemur *MePbSg* **6** 1080] 10 et 80 *Ka* mille et octuaginta *Me* ‖ particulas] partes *Ka* **6–7** sub … reperiunt] *om. Sf* **6** quamlibet] qualibet *Ka* cuiuslibet *Kd* **7** reperiunt] reperitur *Mc1* ‖ quidem] in quam *KaKd* **8** versus] *add.* et appellant *KaMc1Sf* vocant *Kd* vocantur *Me add.* seu appellant *Pb* appellant seu nominant *Sg* ‖ ad] in *Kd om. Sg* ‖ et] ac *Mc1* **10** Quicumque] Si quis *Me* ‖ ergo] autem *Mc1Pb* ‖ scire] invenire *Pb* ‖ anhelaverit] voluerit *KaPb* voluerit anhelanter *Mc1* volueris *Me* ‖ cognito] precognito *Ka* **11** precedenti] precedentis *Ka* precedentes *Me* ‖ addat] addatur *Mc1MeSf* ‖ tantum] autem *Ka add.* scilicet *Mc1* tunc *Pb* ‖ istud] illud *Sg* ‖ cognitum] *om. Ka* ‖ feriam] feria *Mc1Me* ‖ horas] *add.* et *KaKd* hore *Mc1MeSf* ‖ et] *om. Mc1Me* **12–13** et … aliis] sic quod addat elochim ad elochim malath precogniti, horas ad horas, ferias ad ferias et sic de aliis. Et hoc superadditis 28 diebus. *Sg* **12** et … semper] adduntur *Me* etiam addantur ad hoc *Pb* ‖ semper] *om. KaSf* **13** cognita] cognitum *Pb om. Sf* ‖ aliis] *om. Kd* sicut docetur in algorismo *Me* dies et ades *Pb* **14** Unde versus] *om. Kd* ‖ queris] queras *Me* ‖ ad huic] adhuc *Sg* ‖ huic] hunc *Ka* hanc *KdSf* hinc *Me* **15** iunge] iungito *Kd* iungita *Sg* ‖ sibi] mox *KdSg* ‖ horam] ad horas *Sf* ‖ bissenam] bissenas *MeSf* ‖ elochim] puncto *Sf* ‖ eidem] idem *MeSf* ‖ septingenta] septuaginta *Pb* **16** nonagintaque] et nonaginta *Mc1* octuagintaque *Sg*

These 12, however, start later in the same year, in October. Whence the verses: "The thumb wants to give the third joint to the Jews, but the first to us. You will be able to climb up in this way until you see the joint that gives you the cycle."

[2.1] Having touched upon all these things, it should be wisely weighed [in mind] that the Jews divide any natural hour into 1080 particles, by which they find any conjunction of the moon. These particles they call *elochim*. Whence the verses: "The Jew splits the hour into eighty and one thousand parts, which he calls *elochim*."

[2.2] Whoever, therefore, desires to know the *molad* of any month, given knowledge of the preceding *molad*, must only add to this known [*molad*] one weekday, 12 hours, 793 *elochim* (with 28 days always added on top). This means that the *elochim* should be added to the *elochim* of the known value, the hours to the hours, the weekdays to the weekdays, and thus for all other [cases]. Whence the verses: "If you know the preceeding moon and seek the following one, join to it one weekday, twice six hours and 700 *elochim* along with 93."

[2.3] Habito autem molad alicuius mensis, si scire volueris utrum bene feceris, an non, recipe productum et horis habitis adde 11 horas, feriis 5 ferias, elochim 287 addicias elochim, et opereris ut prius per additionem. Et si redibit molad prius adinventum est bene operatum. Et talis regula apud Iudeos dicitur 'statera'. Unde versus: *Si probare velis si recte feceris, adde/ undenas horas quinque simul ferias/ cum elochim ducentis octuagintaque septem/ ad molad anterius quod modo quesieras./ Si factum bene sit tibi luna priorque redibit./ Ex hac statera quevis tibi luna patebit.*

[2.4] Quicumque autem scire voluerit molad secundum, tertium, quartum, quintum etc., precognito molad mensis a quo queritur, tunc accipiet ferias, horas, elochim in prima linea prime tabule, addendo eas feriis, horis, elochim ipsius molad precogniti, eo modo quo prius est determinatum; et hoc quoad primum. Si autem secundum, tertium vel quartum scire optaverit, addat ferias, horas, elochim secunde linee, tertie vel quarte, ad ferias, horas

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1 molad] molat *Pb* molath *Sg* ‖ si] et *Mc1MePbSfSg* ‖ scire] probare *KdMc1PbSfSg* ‖ volueris] velis *KdPb* **2** an non] *om. KdMc1PbSf* **2–3** horis … elochim] feriis adde 5 ferias, horis 11 horas, elochim 287 ad elochim aditias *Ka* **2** habitis] additis *MePbSf om. KdSg* ‖ adde] *om. MePbSf* ‖ horas] *add.* et *MePb om. Sg* **2–3** horas … ferias] ad horas et 5 ferias ad ferias addendo *Pb* **3** ferias] *om. Sg* ‖ addicias] *om. KdSg* ‖ elochim] *om. Mc1PbSg* ‖ et] operare *Me* adde *Sg* ‖ additionem] *om. KaMe* ‖ additionem] *add.* et subtractionem *Sg* **4** si] *add.* per additionem *Ka* ‖ redibit] *add.* eadem *Me* ‖ adinventum] inventum *KaMeSg* habitum *Kd* ‖ est … operatum] tunc tu bene es operatus *Me* ‖ Et] *om. Pb* **5** Unde versus] *om. KdSf* ‖ Si] Cum *Mc1* ‖ velis] *om. Sg* ‖ si recte] utrum bene *KaPb* ‖ adde] addas *KaKd om. SfSg* **6** ducentis] ducenta *KaSg* ‖ octuagintaque] 80 *Kd* **7** anterius] alterius *KaKdMePbSg* ‖ quesieras] quesieris *KaMe* ‖ tibi] *om. Kd* **8** redibit] priorque luna *Me* ‖ redibit] *om. PbSf* ‖ statera] hoc pondere *KaMe* hoc pendere *Mc1* hoc patere *Sf* ‖ tibi] *om. Mc1* ‖ luna] lunacio *Mc1* ‖ patebit] patet *Mc1Me* potest *Sf* **9** autem] hoc *KdMc1 om. MeSfSg add.* hoc *Pb* ‖ voluerit] *om. Kd add.* scilicet *Mc1* cupiverit scilicet *PbSf* ‖ molad] primum *Me* molat *Sg* ‖ tertium] *add.* vel *Sf* **9–10** quartum] *add.* vel *KdMc1* **10** quintum] *om. KaMeSf* ‖ etc] et sic de aliis usque ad tredecimum *Kd* et sic de aliis *Mc1Me* ‖ precognito] cognito *Pb* ‖ molad] *add.* precedentis *Pb* ‖ queritur] inmediate precedentis *Ka* ‖ accipiet] accipiat *KaKdPbSg* accipias *Me* incipias *Sf* **11** horas] *add.* et *Mc1* ‖ prime tabule] *om. Pb add.* scilicet 'Coniungo mea' *Ka* ‖ eas] ea *KaKdMePbSfSg* **12** elochim ipsius] *om. Kd* ‖ molad] molath *Pb* molat *Sg* ‖ precogniti] precognita *Mc1* precoginto *Kd add.* et sic secundum hanc tabulam *Sg* ‖ eo] eodem *Ka* ‖ quo] ut *KaMe* ‖ determinatum] declaratum *Kd* **13** primum] primam incensionem *Sg* ‖ vel] aut *Ka* ‖ secundum … quartum] tertium, quartum *Pb* secundam, tertiam vel quartam etc. *Sg* ‖ vel quartum] quartum vel quintum *Me* ‖ optaverit] voluerit *KaMe* volueris *KdPbSg* adoptaverit *Sf* **14** addat] sciat *Ka* addas *KdPbSf* accipias *Sg* **14–452.1** secunde … elochim] *om. SfSg* **14** linee] vel *Me* ‖ quarte] secunde, tertie, quarte vel quinte linee *Kd* secunde vel tertie vel quarte et *Me* ‖ quarte] addendo *KaMc1* et addendo *Me* addendo eas scilicet *Pb* **14–452.1** ad … elochim] et addendo ad horas et ad ferias et ad elochim *Me*

[2.3] But if you have the *molad* of a given month and want to know if you calculated correctly or not, you need to take the result and add 11 hours to the hours that you already have, 5 weekdays to the weekdays, 287 *elochim* to the *elochim*, and you must operate via addition, as before. And if this leads to the previous *molad*, you have done well. And the Jews call this rule 'the scales'. Whence the verses: "If you want to test if you reckoned correctly, add eleven hours together with five weekdays and 200 and 87 *elochim* to the previous *molad* that you just looked for. If you did well, the former moon shall be your result. And with this pair of scales any moon you want you will become plain to you."

[2.4] But whoever wants to know the second, third, fourth or fifth *molad* (and so forth), given knowledge of the *molad* of the month from which the inquiry is made, must then take the weekdays, hours, and *elochim* in the first line of the first table, adding them to the weekdays, hours and elochim of the molad already known to him, according to the method previously defined; and this applies to the first. But if he hopes to know the second, third or fourth [*molad*], he must add the weekdays, hours, *elochim* of the second, third or fourth line, always adding them to the weekdays, hours, and *elochim*

et elochim ipsius molad precogniti. Et sic secundum hanc tabulam molad quodcumque futurum sibi patere poterit indilate.

Similiter: qui voluerit habere primum inmediate preteritum secundum, tertium vel quartum etc. precognito molad cuiuscumque mensis addat ad ipsum ferias, horas, elochim que sunt in prima linea secunde tabule; et hoc si primum preteritum scire voluerit; vel ea que sunt in secunda, si secundum scire voluerit; vel ea que sunt in tertia, si tertium scire voluerit. Et sic molad quodcumque preteritum infallibiliter apparebit. Et hoc patet per versus sequentes, quorum primi quinque sunt de tabula prima, quoad inquisitionem noviluniorum futurorum, alii autem quinque sunt de tabula secunda facta pro inquisitione noviluniorum preteritorum. Quorum primi quinque sunt isti. Unde versus: *Coniungo mea. Frutzues arcum. Iaxaban odis. Braxaziar bufex. Ebegan pufex … Ecce futura molad tibi prebent*. Hii autem versus qui sequuntur sunt de molad preteritis inveniendis. Unde versus:

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1 precogniti] precognita *Mc1* prius habita *Me* cogniti *Sf* ‖ molad] *om. Me* **2** sibi] tibi *KdMeSgSf* ‖ patere] patefieri *Mc1* ‖ patere … indilate] patebit infallibiliter *Sg* ‖ indilate] *om. Me* **3** voluerit] cupeverit *Mc1* ‖ habere] *om. MeSf* ‖ primum] *om. Ka* ‖ primum … preteritum] preteritum inmediate positum *Kd* ‖ preteritum] *add.* molat vel *Sg* **3–4** secundum … quartum] scire *Me* **4** vel] *om. Pb* ‖ etc] *om. KaKdMc1MePbSf* ‖ molad] *om. Ka* **5** ipsum] *add.* punta precognitum *Ka* ‖ horas] *add.* et *KdSg* ‖ secunde tabule] *om. Kd* prime tabule secunde *Me* **6** voluerit] volueris *Sg* ‖ vel] Et *Sg* **6–7** vel … voluerit] addat ea que sunt in secunda. Si tertium addat ea que sunt in tertia *Kd* Sed si querit secundum preteritum addat ut prius ea que sunt in secunda linea. Sed si tertium addat ea que sunt in tertia linea *Me* **6** secunda] *add.* linea *PbSg* **7** scire voluerit] *om. Sg* ‖ vel] et *Sg* ‖ voluerit] voluit *Ka* volueris *Sg* **8** apparebit] patebit *Sg* ‖ Et hoc] ut *KdMe* ‖ patet] *om. PbSfSg* **9** sequentes] *om. Me* subsequentes *KaKdMc1* ‖ quorum primi] *om. Sg* ‖ quinque] *om. Me* ‖ de] in *Ka* ‖ quoad] a quo *Me* **10** inquisitionem] incensionem *KaPb* quisitionem *Me* de inquisitione *Sg* ‖ noviluniorum] *om. Me* ‖ alii autem] et alii *Ka* ‖ quinque] *om. Me* ‖ sunt] *om. Ka* ‖ de] in *Ka* **11** facta pro] quoad *KaKd* facta de *Mc1* et videlicet pro *Me* ‖ pro inquisitione] incensionem *Ka* per inquisitionem *Sf* ‖ noviluniorum] *om. Me* **11–12** Quorum … isti] Ecce futura molath hec tibi prestat. Sed hec preterita prestat tibi molath *Kd add.* et continuentur secundum ordinem etc. *Mc1 add.* Quorum primi sunt hii, 'Coniungo mea', qui ponuntur in tabula *Me add.* Quorum primi quinque hic facti, scilicet 'Coniungo' etc. *Pb add.* etc. *Sf* **12** isti] hii *Ka om. Sg* **12–454.2** Unde … prestant] *om. KaKdMePbSf* **12–13** Coniungo … pufex] Coniungo mea. Frutzues artu. Iaxaan odis. Braxaziax bufex. Egayan puzes. Kerzida debes. Anria xankant. Tardays exest. Graefa surfend. Zurgica geant. Renhart urbem. Fargahis pellet. Iohaer xoent. *Sg* **13** pufex] *add.* Hercide debes. Axea rancant. Dardais exest. Graesa surfent. Surgica geant. Cenhart urbem. Fergahus heldet. Iohaer xoent. *Mc1* ‖ futura] futurum *Sg* ‖ autem] *om. Sg* **14** Unde versus] *om. Sg*

of the *molad* already known. And thus in accordance with this table any future *molad* will immediately be able to become plain to him.

Similarly, anyone who wants to have the first, second, third or fourth etc. *molad* immediately previous to the present one, given knowledge of the *molad* of any month, shall add to the latter the weekdays, hours, and *elochim* found in the first line of the second table, if he wants to know the first previous one; or those in the second, if he wants to know the second one; or those in the third, if he wants to know the third. And this way any previous *molad* will be found without error. And this can be learned from the following verses, whose first five belong to the first table, which is there to find future new moons, whilst the other five belong to the second table, constructed for finding past new moon. The first five of these are as follows (whence the verses):"*Coniugo mea, Frutzues arcum, Iaxaban odis, Braxaziar bufex, Ebegan pufex* ... Behold, these show you the future *molad*." The following verses, however, are for finding preceding *molads* (whence

Ganhabe lien. Darguet ycos. Anfahe iambos. Harfan xigat. Erecos hufolt ... Preteritum molad hec tibi prestant.

TABULA 1

October	1	12	793	Coniungo mea	5	11	287	Ganhabe lien
November	3	1	506	Frutzues arcu	3	22	574	Darguet ycos
December	4	14	219	Iaxaban odis	2	9	861	Anfahe iambos
Ianuarius	6	2	1012	Braxaziar bufex	0	21	68	Harfan xigat
Februarius	0	15	725	Ebagan pufex	6	8	355	Erecos hufolt
Martius	2	4	438	Hercida debes	4	19	642	Bardafe tondolt
Aprilis	3	17	151	Axea rancant	3	6	929	Iambei faccas
Maius	5	5	944	Dardais exest	1	18	136	Farcia saxas
Iunius	6	18	657	Graefa surfent	0	5	423	Cambidet ezox
Iulius	1	7	370	Zurgica geant	5	16	710	Zaaga quiens
Augustus	2	20	83	Cenhart urben	4	3	997	Gaii cordens
September	4	8	876	Fergahus hedet	2	15	204	Dozibe pubes
Embolismus	5	21	589	Iohaer xoent	1	2	491	Axide braxant

[3.1] Si autem noveris Tisri anni presentis vel cuiuscumque alterius et vis scire Tisri anni inmediate subsequentis, tunc anno communi adde quatuor ferias, 8 horas et 876 elochim. Unde versus: *Unum si noscis Tisri reliquum quoque poscis/ addito bis binas ferias, octo simul horas/ octingenta elochim septuagintaque sex.*

1 Ganhabe ... hufolt] Ganhabe lyen. Darguet ycas. Anflihe iambos. Harssan xizant. Erecos honfolt. Bardase tendolt. Iamboy faccas. Sarrea saxas. Cambidet ezox. Zyag quies. Gay fordes. Dozibe pribens. Axide baxant *Sg* ‖ hufolt] *add.* Bardafe tondolt. Iambei faccas. Farcia saxas. Cambidet ezox. Zaaga querens. Gay cordens. Dozibe pubes. Axide braxant. *Mc1* **3** noveris] volueris *KdPb* ‖ et] *add.* si *Me* **4** scire] *om. Ka* ‖ anni] *om. Sf* ‖ subsequentis] sequentis *KdMePbSg a.c. Mc1* ‖ anno communi] anno presenti *Kd* Tysri presenti *s.l.* scilicet anno communi *Mc1* anno communi habentis et *Pb* **5** et] *om. Kd* ‖ Unde versus] *om. KaKd* ‖ Unum] Primum *Sg* **6** poscis] *add.* scilicet annum qui continue sequitur *PbSg* ‖ addito] *om. KaKdMePbSf* ‖ ferias] *add.* addas *Kd* ‖ octingenta] cum octingentis *Kd* octoque *Me add.* que *Pb*

the verses): "*Ganhabe lien, Darguet ycos, Anfahe iambos, Harfan xigat, Erecos hufolt* … These supply you with the past *molad*."

TABLE 1

October	1	12	793	Coniungo mea	5	11	287	Ganhabe lien
November	3	1	506	Frutzues arcu	3	22	574	Darguet ycos
December	4	14	219	Iaxaban odis	2	9	861	Anfahe iambos
January	6	2	1012	Braxaziar bufex	0	21	68	Harfan xigat
February	0	15	725	Ebagan pufex	6	8	355	Erecos hufolt
March	2	4	438	Hercida debes	4	19	642	Bardafe tondolt
April	3	17	151	Axea rancant	3	6	929	Iambei faccas
May	5	5	944	Dardais exest	1	18	136	Farcia saxas
June	6	18	657	Graefa surfent	0	5	423	Cambidet ezox
July	1	7	370	Zurgica geant	5	16	710	Zaaga quiens
August	2	20	83	Cenhart urben	4	3	997	Gaii cordens
September	4	8	876	Fergahus hedet	2	15	204	Dozibe pubes
Embolism	5	21	589	Iohaer xoent	1	2	491	Axide braxant

[3.1] But if you have found out the Tishri of the present or any other year and you want to know the Tishri of the year that immediately follows, then add to the common year 4 weekdays, 8 hours, and 876 *elochim*. Whence the verses: "Once you have found one Tishri, you can also ask for the other, by adding twice two weekdays together with eight hours and 876 *elochim*."

[3.2] Si autem vis habere preteritum Tisri ex molad anni presentis, ita quod preteritum fuerit annus communis, tunc adde duas ferias, 15 horas et 204 elochim. Unde versus: *Sed si preteritum vis per presens reperire/ horas ter quinas atque duas ferias/ et elochim socia sibi quatuor atque ducenta*.

[3.3] Si autem volueris scire quomodo ex Tisri presentis anni non solum inveniatur Tisri primi anni inmediate sequentis, sed etiam Tisri secundi vel tertii anni et sic de aliis usque ad 19 annos: tunc cognito Tisri primi anni cicli Iudeorum, in quo pro tunc existunt, tunc ad illud precognitum Tisri anni primi addantur ferie, hore et elochim que sunt in prima linea prime tabule subscripte, ubi ponitur binarius in tabula subsequente 19 annis deserviente. Et tunc resultabit Tisri anni eiusdem messorim. Si autem quis habere voluerit Tisri tertii, quarti vel quinti anni eiusdem messorim, tunc addat ea que ponuntur in linea ubi ternarius vel quaternarius continetur in tabula proposita.

1–4 Si … ducenta] *om. Kd* **1** habere] scire *KaMePb* ‖ Tisri] *om. Sg* ‖ Tisri … presentis] Tizri anni precedentis *Ka* molat anni presentis *Me* molath Tysri anni presentis *Pb* molad *Sf* **2** fuerit] sit *Pb* fuit *Sf* ‖ annus] molat qui fuerit *Ka* ‖ annus] anni *PbSg* ‖ et] *om. MeSf add.* computo *Pb* **3** presens] prius *Me* **4** ter quinas] quindecas *Ka* ‖ sibi] sint *Sf* ‖ ducenta] *add.* Sed si in anno bisextili, adduntur qui ponuntur in 13 ordine tabularum sicud prius patuit *Sf* **5** volueris] scire vis seu volueris *Pb* vis scire *Sf* ‖ scire] reperire *KaMc1Sf* ‖ quomodo] *om. Mc1* ‖ anni] *add.* vel cuiuscumque alterius *KaPb* **6** inveniatur] in brevi *Me* ‖ primi] omni *Sf* **7** vel] aut *Ka* ‖ tertii] *add.* vel quarti *Pb* ‖ tunc] vel *Kd* et tunc *Pb* **8–9** cicle … primi] *om. Me* **8** pro] *om. Kd* ‖ existunt] existit *Kd* ‖ tunc] et *Kd* ‖ ad illud] adde *Pb* ‖ precognitum] cognitum *Sg* **9** primi] presentis *Pb* ‖ primi] presentis *Pb* ‖ addantur] adduntur *Me* ‖ ferie] *add.* et *Sf* ‖ et] *om. KaMe* **10** prime] *om. Pb* ‖ subscripte] subscriptum *Kd* subsequente *Me* ‖ binarius] unitas *KaKdMePbSf* **10–11** subsequente … deserviente] subsequenti deserviens 19li et adde sicut prius *Ka* sequente 19 annis deserviens et adde sicut prius *KdSf* subsequente illius et addat ut prius *Me* subsequentes decem et novem adde sicut prius *Pb* **11** Tisri] *om. Kd* ‖ anni] *om. Sf* ‖ messorim] messerim. Et hoc in anno communi. Sed si sit annus embolismalis, a quo queritur Tyzri, tunc post additionem sicud docetur ad hoc productum addatur prima linea, scilicet 'coniungo', et sic invenitur Tyzri que queritur *Ka* magssorim *Pb* mesrim *Sg* ‖ quis] aliquis *KdMe* **12** voluerit] vellet *Mc1* velit *Sg* ‖ tertii] *add.* vel *Sg* ‖ tertii … quinti] secundi, tertii vel decimi *Ka* secundi vel tertiii vel decimi *Kd* secundi vel tertii *Me* primi, secundi, tertii vel decimi *Pb* secundi vel tertii vel decimi *Sf* ‖ tunc] *om. Sg* **13** ea] *om. Sg* **13–14** que … proposita] ubi 2, 3 continentur vel 10 *Ka* **13** ponuntur] sunt *KaMc1* continentur *Sg* ‖ ubi] *add.* ponitur *Sg* ‖ ternarius] binarius *Sg* ‖ ternarius … continetur] secunda vel tertia vel decima *Kd* secundi vel tertii et *Me* **13–14** continetur … proposita] correspondens *Kd* propositi continetur *Mc1* et continentur *Me* continentur *Pb*

[3.2] But if you want to have the previous Tishri from the *molad* of the present year, such that the past year was a common year, then you need to add two weekdays, 14 hours, and 204 *elochim*. Whence the verses: "But if you want to find the previous from the present, [take] thrice five hours and two weekdays and to it 204 *elochim*."

[3.3] But if you want to know how to find from the Tishri of the present year not only the Tishri of the first year that immediately follows, but also the Tishri of the second or third year, and so forth until 19 years: then, knowing the Tishri of the first year of the current cycle of the Jews, one must add to this previously known Tishri of the first year the weekdays, hours and *elochim* in the first line of the first table written below, where the number '2' is put down in the table for 19 years that is about to follow. And then the Tisrhi of the [second] year in this *messorim* will result. But if someone wants to have the Tisri of the third, fourth or fifth year of the same cycle, he shall add what is put down in the proposed table in the line containing the number '3' or '4'.

Collateralis autem tabula est probatio prime. Nam quando per primam inventum est molad Tisri (i.e. Octobris) alicuius anni huius messorim (i.e. cycli) in quo sunt Iudei, et hoc per additionem feriarum, horarum et elochim huius linee cuius anni Tisri habere quis voluerit ad ferias, horas, et elochim que in linea huic iuncta habentur. Et si redibit molad Tisri primi anni, tunc est bene operatum. Unde versus: *Regula sit talis ut tabula collateralis/ puncta probat sicque statera fiat.*

TABULA 2

2	4	8	876	Fugiholt hundolt	2	15	204	Dorzibe puber
3	1	17	672	Bargafa roax	5	6	408	Herzide faxen
4	0	15	181	Anhea pinzil	6	8	899	Iaxiha helfar
5	4	23	1057	Groeziaf zade	2	0	23	Cambus zambus
6	2	8	853	Coeher habes	4	15	227	Garbaba pindel
7	1	6	362	Bafice fluxans	5	17	718	Hexaga raxes
8	5	15	158	Haxea praes	1	8	922	Balbai haxa
9	4	12	747	Gardiga mandes	2	11	333	Cincice lorben
10	1	21	543	Candie xias	5	2	537	Gancie braxes
11	6	6	339	Iacice furfur	0	17	741	Andaga rozi
12	5	3	928	Horboi coes	1	20	152	Baxea uxar
13	2	12	724	Dorbigo morbus	4	11	356	Faxece ludan
14	6	21	520	Zoboe xufent	0	2	560	Zarfae buzex
15	5	19	29	Iambes taxes	1	4	1051	Axeziar diar
16	3	3	905	Ezoi cocus	3	20	175	Egrear urcos
17	0	12	701	Azogans mozas	6	11	379	Iurgice lorfex
18	6	10	210	Zoarbans kofa	0	13	870	Zogaha nozel
19	3	19	6	Fer truncans	3	4	1074	Dengazia dorci
1	2	16	595	Exiens quibus	4	7	485	Ehade gidant

1 autem] et *Me* ‖ prime] prioris *Ka* secunde prime *Me* ‖ per primam] primum *KaMc1Pb* **2** est] *om. Kd* ‖ molad] *add.* id est incensio *Ka* ‖ Tisri … Octobris] Tysri Octobris *Kd* Octobris *Me* Tysri et Octobris *Pb* **2–3** alicuius … cycli] *om. Sf* **2** messorim] mechoserim *Sg* **3** cycli] et cicli *KdMe* i.e. cyclo *Mc1* **4** quis] *om. Kd* ‖ voluerit] volueris *KdMe* ‖ ad] addat *KaPb* ‖ et] *om. KaKdMe* **5** iuncta] iuncte *Me* ‖ habentur] *add.* adde *KaMePb* ‖ Et] *om. Kd* ‖ Tisri] *om. Ka* ‖ anni] *om. Kd* ‖ tunc] *om. Kd* **6** est] es *Me* **6–7** Unde … fiat] *om. Kd* **6** versus] vero *Me* ‖ ut] in *Ka* ‖ puncta] preiunctam *MeSf* **7** probat] probet *Sf* ‖ sicque … fiat] et sic statera fiet *Ka* et sathera tibi fiat *Me* et sic statera fiat *Pb* et sic statera tibi fiet. Dat nobis ha ha kay quat ab at caf halort hebers embolicos annos v.a. vel e.c. signando *Sf* et sic statera tibi fiet *Sg*

The collateral table, however, is the control for the first one. For if the first has been used to find the *molad* Tishri (i.e. of October) of any year of the current *messorim* (i.e. cycle), in which the Jews are now, then one must add the weekdays, hours, and *elochim* of the line for whose year one would like to know the Tishri to the weekdays, hours, and elochim in the line next to it. And if the result is the Tishri of the first year, you have operated well. Whence the verses: "The rule shall be that the collateral table test the 'points' and thus work like a pair of scales."

TABLE 2

2	4	8	876	Fugiholt hundolt	2	15	204	Dorzibe puber
3	1	17	672	Bargafa roax	5	6	408	Herzide faxen
4	0	15	181	Anhea pinzil	6	8	899	Iaxiha helfar
5	4	23	1057	Groeziaf zade	2	0	23	Cambus zambus
6	2	8	853	Coeher habes	4	15	227	Garbaba pindel
7	1	6	362	Bafice fluxans	5	17	718	Hexaga raxes
8	5	15	158	Haxea praes	1	8	922	Balbai haxa
9	4	12	747	Gardiga mandes	2	11	333	Cincice lorben
10	1	21	543	Candie xias	5	2	537	Gancie braxes
11	6	6	339	Iacice furfur	0	17	741	Andaga rozi
12	5	3	928	Horboi coes	1	20	152	Baxea uxar
13	2	12	724	Dorbigo morbus	4	11	356	Faxece ludan
14	6	21	520	Zoboe xufent	0	2	560	Zarfae buzex
15	5	19	29	Iambes taxes	1	4	1051	Axeziar diar
16	3	3	905	Ezoi cocus	3	20	175	Egrear urcos
17	0	12	701	Azogans mozas	6	11	379	Iurgice lorfex
18	6	10	210	Zoarbans kofa	0	13	870	Zogaha nozel
19	3	19	6	Fer truncans	3	4	1074	Dengazia dorci
1	2	16	595	Exiens quibus	4	7	485	Ehade gidant

[4] Ostenso quomodo ex Tisri anni presentis Tisri per 19 annos valeat invenire, nunc videndum est quomodo per bis vel per ter 19 annos Tisrim poterit reperire. Si enim per 19 annos quis voluerit habere Tisrim, precognito presenti addat ea que in prima linea figure postea subsequente continentur. Et sic inveniet Tisri secundi messorim subsequentis et sic de aliis suo modo. De preteritis quantum ad tabulam collateralem est operandum.

TABULA 3

2	2	16	595	Exie quibus	4	7	485	Exhada galdet
3	5	9	110	Zaxaart ixer	1	14	970	Zangair oxam
4	1	1	705	Ezogat axa	5	22	375	Eugicus ypen
5	3	18	220	Zombibe sarcis	3	5	860	Zurhafat ecer
6	6	10	815	Exahe kifos	0	13	265	Eufaban nizam
7	2	3	330	Zincice cubos	4	20	750	Zaxegar undam
8	4	19	925	Ebrei tondet	2	4	155	Exea durbax
9	0	12	440	Zadide mozat	6	11	640	Zadaxas lorfax
10	3	4	1035	Ecirzia draco	3	19	45	Edat turcor
1	5	21	550	Zaxee xuent	1	2	530	Zincie braxant

1 quomodo] *add.* quis *MeKd* ‖ Tisri] *om. KaMePbSf* ‖ annos] *add.* quis *Sf* **2** valeat invenire] quis valeat incensionem Tisri invenire *Sf* ‖ invenire] inveniri *Me* ‖ videndum] dicendum *Sf* ‖ est] *om. Sf* ‖ per 19 annos] per bis, per ter vel quater 19 annos *Ka* per bis vel per ter vel per quater et sic usque ad 10 per 19 annos *Me* per bis vel ter vel quater decem et novem annos *Pb* per duo vel per tria vel per 19 annos *Sg* ‖ Tisrim] Tisri *Sg* **2–3** Tisrim … reperire] quis poterit Tisri, i.e. incensionem Octobris, invenire *Sf* **3** poterit] poteris *Mc1Sg* ‖ reperire] inveniri *MePb* invenire *KaSg* ‖ enim] *om. Kd* ‖ quis] *om. Pb* ‖ Tisrim] *om. Pb* ‖ precognito] precognita *Kd* cognito *Mc1Sg* **4** presenti] precedenti *KaMePb* ‖ addat] addantur *Ka* ‖ ea] *om. Me* ‖ que] *add.* sunt *KaPb* ponuntur *Me* ‖ figure … continentur] prime tabule vel figure subscripte continentur *Ka* prime tabule subscripte continentur *Kd* prime vel figure subscripte continentur *Me* prime tabule scripte continue *Pb* prime tabule subscripte continentur *Sf* figure prime subscripte continentur *Sg* **5** inveniet] invenies *KdSfSg* ‖ Tisri] Tisri *Sg* ‖ secundi] primi *Sf* ‖ messorim] *add.* id est semel post 19 annos *Me* ‖ et … aliis] sic etiam *Kd om. Mc1* et adde annos *Me* et adde alios *Pb* ‖ modo] simili modo *KaSf* suos *Me* **6** est operandum] hic et in aliis est operandum *Ka* et eodem modo hic sicut in aliis est operandum *MePb add.* suo modo. Secuntur tabule *Sg*

[4] Having shown how one can find from the Tishri of the present year the Tishri for 19 years, it is now time to see how one can find the Tishri for two or three [cycles of] 19 years. For if someone wants to know the Tishri for [a cycle of] 19 years, he shall add to the one presently known what is contained in the first line of the following table. And thus he will find the Tishri for the second *messorim* that follows thereafter; and so for all others according to this way. For the past ones one must operate according to the collateral table.

TABLE 3

2	2	16	595	Exie quibus	4	7	485	Exhada galdet
3	5	9	110	Zaxaart ixer	1	14	970	Zangair oxam
4	1	1	705	Ezogat axa	5	22	375	Eugicus ypen
5	3	18	220	Zombibe sarcis	3	5	860	Zurhafat ecer
6	6	10	815	Exahe kifos	0	13	265	Eufaban nizam
7	2	3	330	Zincice cubos	4	20	750	Zaxegar undam
8	4	19	925	Ebrei tondet	2	4	155	Exea durbax
9	0	12	440	Zadide mozat	6	11	640	Zadaxas lorfax
10	3	4	1035	Ecirzia draco	3	19	45	Edat turcor
1	5	21	550	Zaxee xuent	1	2	530	Zincie braxant

[5.1] Quia dictum est quomodo quodlibet molad est reperiendum aliquo precognito precedenti: consequenter dicendum est quomodo quodlibet poterit inveniri, si quis penitus nichil sciverit de quocumque molad, gratia cuius subtiliter trutinandum est. Si scire volueris quid iam pro molad habeatur, tunc sciendum est quod secundum Hebreos molad primum in initio seculi fuit in Octobri, feria secunda, hora quinta, elochim 204. Quo scito recipiantur anni seculi, qui Anno Domini 1342 in Ianuario et prius in Octobri precedenti erant 5102 anni, qui dividantur per 19 et numerus quotiens erit 268 et tot messorim tunc temporis fuerunt elapsi. Superfluebant autem 10 anni in messorim 268, quibus exeuntibus per illum numerum quotiens debent multiplicari 2 dies, hore 16 et elochim 595, et tunc remanent in superfluo 6 dies, 19 hore et elochim 700. Quo facto illi sex dies addantur ad feriam secundam in initio seculi, 19 hore predicte ad horas initii mundi; similiter 700 elochim ad illa 204 initii mundi, et resultabit novilunium 269. messorim.

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1 Quia] *add.* prius *Kd* Quoniam *Mc1* Cum *Pb* ‖ est] poterit *Sf* ‖ reperiendum] inveniendum *MeSg* inveniri *Sf* **2** precognito] cognito *Sf* ‖ precedenti] *om. Kd* ‖ consequenter] conformiter *Me* ‖ consequenter … est] sequitur *Sf* **3** inveniri] reperiri *Kd* ‖ sciverit] scit *Kd* sciret *Pb add.* etiam *Mc1MePbSg* ‖ molad] *om. KdMc1MePbSg* **4** trutinandum] declarandum est *Kd* ‖ iam] *om. Sg* **5** tunc] *om. KaKdPb* ‖ est] *om. Pb* ‖ Hebreos] Ebreos *KdKdPb* ‖ in] *om. Kd* **6** in] ipsius *Pb* ‖ quinta] *om. Mc1* ‖ 204] Unde versus: *Altera dat feria primum molat, horaque quinta, sub elochim quarto quando ducenta prescribo KaKd* Unde versus: *Altera dat feria … Sub elochim quarta ducenta describo Me* Unde versus: *Altera dat feria … Sub elochim quarta ducentaque dato/ sunt elochim 4to quando ducenta scribo Pb* Unde versus: *Altera dat feria … Sub halakim quarta quando ducenta rescribo Sf* ‖ scito] prescito *Sg* **7** recipiantur] capiantur *Me* ‖ anni] *om. Kd* ‖ qui] quia *Kd om. Me* ‖ 1342] 1344 *Sg* ‖ prius] post *KaMePbSfSg* postea *Kd* **7–8** Octobri] Octobre *Ka* **8** precedenti] sequenti *KaMePbSfSg* sequente *KdMc1* ‖ 5102] 5103 *Mc1* 5104 *Sg* ‖ qui] *add.* simul iuncti *Kd add.* anni *Mc1 add.* anni seculi *Me* ‖ dividantur] dividuntur *Me* ‖ 19] 10595 *Pb* ‖ et] *om. Pb* **9** et] *om. Mc1MePbSg* ‖ messorim] *add.* i.e. cycli *Sf* ‖ tunc] *om. Mc1Pb* ‖ fuerunt] ymmo etiam *Me* ‖ temporis … elapsi] *om. Mc1* transierunt *Me* fuerint transacti tunc temporis *Pb* ‖ elapsi] *om. KaSfSg* **10** 10] 40r *Mc1* 12 *Sg* ‖ 268] 269 *KdMc1Sf* 2068 *Pb* ducentesimo sexagesimo octavo *Sg* **10–14** quibus … messorim] Et tunc remanebunt in superfluo 6 dies qui addantur ad feriam 2am initio mundi et 19 hore ad horas simul 700 elochim 204 et ex initio mundi resultabit novilunium 269 messerim *Ka* **10** exeuntibus] stantibus *Kd* ‖ per … numerum] primus numerus *Pb* ‖ quotiens] *add.* scilicet 268 *Kd* **11** multiplicari] *om. Me add.* etiam *Pb* **11–12** dies … dies] *om. Me* dies *Pb* **11** et] *om. KdMe* ‖ 595] 590 *Me* ‖ et] *om. Me* ‖ remanent] remanebunt *Kd* **12** 19] 16 *Sg* ‖ et] *om. Kd* ‖ 19 … dies] *om. PbSf* **13–14** in … 204] *om. Me* **13** seculi] mundi *KdPbSg* ‖ 19] *om. Pb* et 16 *Sg* ‖ initii] initio *Kd* ‖ initii … similiter] simul *Pb* **14** illa] ipsa *KdPbSf* ‖ initii] initio *Kd* initium *Me* ex initio *Pb* ‖ et] *om. Pb* ‖ 269] 268 *Pb* ducentesi68mi *Sg* ‖ messorim] messerim Octobris *Pb* mehoserim *Sg*

[5.1] Since it has been said how any given *molad* can be found if any preceding one is known, it is consequently time to say how any given one can be found even if one knows nothing at all about any *molad*, which is to be weighed with care. If you want to know what the *molad* is now, you need to know that the first *molad* at the beginning of the world according to the Hebrews took place in October, on a Monday, at 5 hours, 204 *elochim*.

Knowing this, one must take the years of the world, which were 5102 in the year of the Lord 1342 in January and also earlier, in the preceding October. These need to be divided by 19 and the number of the quotient will be 268 and this is the number of *messorim* that have elapsed until this time. There is, however, a surplus of 10 years beyond the 268 messorim, which, after having been taken away from this number, must be multiplied by 2 days, 16 hours, and 595 *elochim*, after which remain 6 days, 19 hours, and 700 *elochim*. Once this is done, these six days must be added to the Monday at the beginning of the world, the aforementioned 19 hours to the hours at the beginning of the world; similarly the 700 *elochim* to those 204 at the beginning of the world, and the result will be the new moon of the 269th *messorim*.

Isto prescito considera in quoto anno cycli sumus et quere signum illo anno deserviens in tabula 19 annis approbata et adde super lunationem predictam preinventam, scilicet dies diebus, horas horis etc., et patebit principale novilunium Tisri illius anni in quo sumus. Postea vero si es in secundo mense vel in tertio, quere signum sibi deserviens in tabula 13 mensibus approbata, et invenies novilunium mensis instantis, addendo dies diebus etc. Et sic patet diligenter consideranti quomodo novilunium sit inveniendum quod penitus ignoratur.

[5.2] Conveniter sciendum: ad habendam concordantiam inter quesitionem novilunii quoad nos et quoad Hebreos tunc in horis et in diebus nulla penitus est differentia, sed in ipsis elochim, quia nos dividimus horam in 60 minutas, ipsi autem in 1080 puncta, modo semper unum minutum correspondentem 18 elochim. Ex quo patet quod sagax algorista potest invenire novilunium nostrum ex novilunium ipsorum Iudeorum et equo dividendo

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1 Isto] *add.* sic *Ka* Illo *Mc1* ‖ prescito] precognito *KaKdPb* ‖ considera] consideremus *KaKdPb* consideramus *Me* ‖ quoto] quo *Ka* ‖ sumus] simus *Mc1* ‖ et] *add.* tunc *KaKd* ‖ illo] illi *KaKdPb* isti *MeSg* **2** tabula … approbata] in tabulis 19 annis deservientibus, scilicet 'fungiholt hundolt' *KaKd* ‖ approbata] deservienti scilicet fungiholt singum hunc illi appropriatum *Pb* ‖ et … super] que adde ad *KaKd* ‖ super] ad *Pb* supradictam *Sf* **2–3** predictam] nunc predictam *Kd om. Sf* **3** preinventam] inventam *KaKdSf* inventa *Pb* ‖ etc] *om. KaKd* **3–4** principale] *om. KaKdPb* precise *Me* **4** illius] 19 *Mc1* huius *Pb* istius *Sf* ‖ anni] anno *Kd* ‖ sumus] *add.* scilicet 1342 *Me* ‖ vero] quere *Ka om. MeSg* **5** in tertio] tertio vel quarto *Sf* ‖ tertio] add. mense *Me* ‖ sibi] *om. KaKdPb* ‖ 13] 12 *KaKdPb* 19 *Mc1* ‖ mensibus] lunationibus *Mc1* **6** approbata] computatur, scilicet 'Coniungo mea' *KaPb add.* scilicet 'Coniungo mea' *KdSf* ‖ instantis] in *Pb* **7** sic] *om. Pb* **7–8** diligenter … ignoratur] propositum *Me* ‖ inveniendum] inventum *Ka* **8** quod … ignoratur] si quis penitus ignorat *Kd* quod quis penitus ignoraret *Pb* quod quis penitus ignorat *Sf* quid penitus ignorat *Sg* ‖ ignoratur] si quis penitus ignorat *Kd* quod quis penitus ignoraret *Pb* quod quis penitus ignorat *Sf* quid penitus ignorat *Sg* **9** Conveniter] *om. KaKdPb* Consequenter *Sf* **9–466.7** Conveniter … consideranti] *om. Sg* **9** sciendum] *om. Ka add.* quod *Kd add.* est *Mc1 add.* est quod *Sf* ‖ habendam] *om. Kd* **9–10** quesitionem] inquisitionem *Me* **10** et] vel *Mc1* ‖ Hebreos] Ebreos *Kd* Iudeos *Me* ‖ tunc] et tunc *KaPb* **11** penitus] *om. KaKdPb* ‖ sed] *add.* solum *KaKd* ‖ elochim] elochim *Pb* ‖ horam] horas *Sf* **12** minutas] minuta *KaKdSf* ‖ 1080] mille et octuaginta *Pb* ‖ puncta] *om. Ka* helachim *Mc1* ‖ modo] Ymmo *Ka* et *Me* ‖ semper] super *Ka* **12–13** correspondentem] correspondet *KaSf* **13** elochim] *add.* nisi quod unum elochim remanet *KdMc1 add.* 18 elochim correspondent uni minuto *Me* ‖ elochim] *add.* nisi quod unum elochim manet *Me* **14** ex] ex nostro novilunio *KaKdMePbSf* ‖ ipsorum] *om. Pb* ‖ Iudeorum] *om. KdMe* ‖ equo] eorum *Sf* ‖ equo] ergo *KaKdPb* eque *Me* ‖ dividendo] dividendum *Ka* dividendum est *Pb* dividendum *Sf*

Knowing this, you need to consider in which year of the cycle we are in and then look for the corresponding value in the table made for 19 years; and you must add it to the aforementioned lunation that has already been found, i.e. days to days, hours to hours etc., and the initial new moon of Tisri of the year in which we presently are will become plain. But afterwards, if you happen to be in the second or third month, you need to look for the corresponding value in the table made for 13 months and you will find the new moon of the present month, adding days to days etc. And thus it becomes plain to the diligent inquirer how one can find a completely unknown new moon.

[5.2] It is [also] fitting to know that when it comes to obtaining the correspondence between finding the new moon according to us and according to the Hebrews there is no difference in hours and days, but only in the elochim, because we divide the hour into 60 minutes, whereas they [divide it] into 1080 points, such that one minute always corresponds to 18 elochim. From this it is plain that the perceptive reckoner can derive our new moon from the new moon of the Jews by dividing equally one minute into 18 elochim

unum minutum in 18 elochim, similiter 18 elochim accipiendo pro uno minuto. In horis autem nulla est differentia nisi quod diversitas inchoationis, quia aliqua kalendaria apud nos ad inveniendum novilunium directe sunt super mediam noctem, aliqua super meridiem. Ars autem huius scientie directe est super horam vespertinam, 6 horas computando ante mediam noctem et 6 post. Et sic patet concordantia inter nos et ipsos diligenter consideranti.

1 unum] *om. Me* ipsum *Sf* ‖ unum … elochim] elochim per 18 minuta *Kd* ‖ 18] 80 *Mc1* 10 *Me* ‖ similiter] et similiter *Mc1* ‖ 18] 80 *Mc1* ‖ elochim] *om. Mc1* ‖ accipiendo] recipiendo *KaKdMePbSf* **2** est] tamen *Ka* ‖ quod] *om. MeSf* **3** ad inveniendum] inveniendo *Sf* ‖ sunt] facta *Kd* **4** super] supra *KaKd* ‖ mediam] *om. Pb* ‖ aliqua] alia *KaPb* ‖ super] supra *KaKd* ‖ meridiem] sequentem meridiem *Mc1* ‖ autem] nunc *Pb* ‖ huius] istius *Me* **5** horas] horis *Pb* ‖ ante] ad *KaPb* **6** inter] *om. Pb* ‖ et] ad *Pb* ‖ ipsos] *add.* Iudeos *KaSf* ‖ diligenter] *om. Me*

and, similarly, by counting one minute for 18 elochim. In the hours, however, there is no difference except for a the divergence in the beginning [of the day], because some of the calendars that we use for finding the new moon are set up for midnight, others for noon. The method of the present science, however, is based on the evening hour, reckoning 6 hours before midnight and 6 hours after noon. And thus the concordance between us and them becomes plain to the diligent inquirer.

Commentarius in *Computum Judaicum*

Me pudet audire Iudeum talia scire/ Deberet clericus noscere que pocius/ Me piget et miseret simul et tedet quod Apella/ Iudeus clerum per sibi nota preit/ Qui quasi nauclerus ante in plebes/ Deberet iure. Sed prochdolor anteriores/ Sunt scitu sathane quos patet esse pares/ Rennuitur sensus sic cessat gloria cleri/ Et petitur census ut patet hic et ibi.

121rb |Iste liber, cuius subiectum est incensio punctualis, dividitur prima sui distinctione in duas partes. Primo premittit partem prohemialem, secundo executivam. Secunda ibi: *Qui virtutes vocabulorum sunt ignari* etc. Prima adhuc in duas: primo invehit contra scientiam istam ignorantes, secundo invocat divinum auxilium. Secunda ibi: *Sed si verbigene*. Prima adhuc in duas: primo facit hoc quod dictum, secundo ostendit ex quibus habeat integrum novilunium secundum horas et puncta, quoad commendationem huius artis. Secunda ibi: *Lunam primari*. Prima adhuc in duas: primo facit hoc quod dictum est, secundo ponit conclusionem, vilipendendo hanc scientiam ignorantes. Secunda ibi: *Rennuitur sensus*.

Primo dicit quoad sententiam totam quod *Me pudet audire Iudeum talia scire* et cognoscere, quia *clericus* (i.e. populus clericalis aut literatus) videtur ignorare, *que* tamen *pocius* deberent sibi esse nota. Et subiungit rationem: nam ipse est *quasi nauclerus* (i.e. rector navium vel rector suorum subditorum), qui *deberet iure antecedere* omnem plebem. *Sed prochdolor*, illi qui sunt *pares* (i.e. similies) ipsi *Sathane* (i.e. dyabolo), sicut sunt Iudei, illi *sunt anteriores* in *scitu* (i.e. in scientia) et *cessat gloria* et honor et reverentia huius *cleri* ratione ignorantie huius scientie. *Petitur* autem *census* (i.e. pecunia vel pecunia censualis), ut manifestum est *hic et ibi* (i.e. tam inter literatos quam non literatos, tam inter clericos quam inter laycos).

Ubi notandum est: primo innuitur in prima littera quod maxime verecundandum est *Iudeum talia scire* que populus clericalis videtur ignorare. Ratio est quia omne nobilius debet precedere ignobilius quoad omnia huiusmodi

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13 integrum] *Mc1* intelligi *Pa* interrogare *Pd* **19** ignorare] ignaris *Pa* ignorare *Pd* ‖ rationem] *mg. Pa* **26** inter … laycos] *Mc1* a literatis quam non literatis *Pa* inter literatos quam non inter literatos, tam inter clericos quam non clericos, id est laycos *Pd* **27** primo innuitur] *Mc1* dicit primo innuendo *PaPd* **29** ignobilius] ignobilius *Pa* **29–470.1** quoad … consequentia] *Mc1Pd* proferendo quoad divina *Pa*

Commentary on the 'Jewish *Computus*'

> *It shames me to hear that the Jew knows such things,/ which to study would much rather befit the clergy./ It irks and grieves and offends me, all at once, to find that 'Apella/ the Jew' takes precedence over the clergy with his knowledge,/ who should go before the people like a skipper,/ as would be just. Yet—alas!—superior are those/ in knowledge who are plainly akin to Satan./ Experience is spurned and thus the clergy's glory fades away./ And wealth is what is desired, as is plain here and everywhere.*

This book, whose subject is the precise time of the kindling [of the new moon], is divided, according to its first distinction, into two parts. In the first [the author] sends ahead the preface, in the second [he delivers] the executive part. The second [starts] here: *Those who are not well acquainted with the force of words* … The first [comes] in two more parts: in the first he attacks those who are ignorant of this science, in the second he calls upon divine assistance. The second [starts] here: *But if the* [*power of the*] *word-born one* … The first [comes] in two more parts: in the first he does what has been said, in the second he shows how one gets the complete lunation according to hours and points, in praise of this art. The second [starts] here: *The new moon becoming new* … The first [comes] in two more parts: in the first he does what has been said, in the second he poses the conclusion, despising those who are ignorant of this science. The second [starts] here: *Experience is spurned* …

In the first [part the author] says with regard to the whole purpose that *It shames me to hear that the Jew knows* and is acquainted with *such things*, because the *cleric* (i.e. the clerical and lettered folk) seems to be ignorant of [things] that it would much rather befit him to know. And he supplies the reason: for [the cleric] is *like a skipper* (i.e. a helmsman of ships or a governor of his subordinates), who *should, as would be just, go before* all common people. *Yet—alas!*—those who are *akin* (i.e. similar) to *Satan* himself (i.e. to the Devil), as is the case with the Jews, *are superior* in *knowledge* (i.e. in science) and *the clergy's glory fades away* as does its honour and respect as a result of the ignorance of this science. Instead one *desires* the *census* (i.e. money or property connected to the census), as is manifest *here and everywhere* (i.e among both the educated classes and unlettered people, both clerics and laymen).

Here it should be noted that it is intimated at the beginning in the first [line] that it is a great occasion for shame that *the Jew knows such things*, which the clerical folk seems to be ignorant of. The argument is that the

nobilitatem consequentia. Sed populus clericalis (i.e. literatus) est nobilior populo Iudayco et ergo maior est clara. Minor probatur: virtus nobilitat hominem. Ergo habens virtutem est nobilius illo non habente ipsam. Sed
121va populus clericalis habet virtutem, Iudaycus | vero non, ergo etc. Quia populus clericalis habet articulos fidei et alias virtutes theoloycales, de quibus Iudei toto conamine recalcitrant, quare merito nuncupantur 'collicervix', ergo etiam clericus debet precedere Iudeos in hoc quod reddit eum virtuosum. Sed hoc est ipsa scientia, ut patet in *Ethicis*: quia scientia speculativa est summa felicitas hominis.[1] Ergo autor merito dicit quod verecundandum est *Iudeum talia scire* que clerus videtur ignorare.

Sed patet nobilitas ipsius clerici ratione interpretationis vocabuli: dicitur enim 'clericus' congregatio clericorum; et 'clericus' dicitur a 'cleos' Grece, quod est 'flos', et 'ycos', 'custos', quasi 'custos floris' (i.e. 'castitatis'). Item dicitur a 'cleos', quod est 'flos', et 'ycos', 'scientia', quasi 'habens floridam scientiam' Dei. 'Devs' enim dicitur quasi 'dans eternam vitam suis'. 'Iudeus' autem dicitur a Iuda, qui ipsum Christum tradidit in manus Iudeorum, qui eternam vitam nobis dederunt. Dederunt autem in intentione mala Christum occidendo. Item, sicut 'clericus' dicitur quasi 'custos floris', sic ipsi scilicet Iudei interpretantur quasi 'dantes materiam fluxionis', cum igitur inter Iudeos tam viri quam mulieres menstruose fluant per posteriora, ut bene eorum intentio indicabat, dicens in die Passionis domini: '*Sanguis eius super nos et filios nostros*'.[2] Ergo patet per interpretationem duplicem clerum esse longe nobiliorem, ergo et merito quoad ea que talia sequuntur nobilitatem cuiusmodi est ipsa scientia.

Item notandum: Iudeus dicitur '*Apella*', ab '*a*', quod est 'sine', et '*pelle*', quasi 'sine pelle' aut 'sine cute', non quod omnino sit sine cute vel sine pelle, sed quia cutis in preputio est sibi abscisa.[3] Et hoc est quod intendit autor dicens

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6 collicervix] *Mc1Pd* celle curarum(?) *Pa* **16** autem] enim *Pa* autem *Pd* **22–24** Ergo … scientia] *Mc1Pd* Ergo per interpretationem patet clerum multo esse nobiliorem quam Iudeum. Ergo merito, quoad ea qui talem secuntur nobilitatem, huiusmodi est scientia ipsa *Pa* **24** cuiusmodi] *Mc1* huiusmodi *Pd*

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[1] Aristotle, *Ethica Nicomachea*, Translatio Lincolniensis (Recensio Pura) (10.8), ed. René Antoine Gauthier (Leiden: Brill, 1972), 362: "Perfecta autem felicitas quoniam speculativa quedam est operacio, et hinc utique apparebit."

[2] Mt 27:45.

[3] Cf. pseudo-Acro, *Scholia in Horatium vestustiora*, ed. Otto Keller, 2 vols. (Leipzig: Teubner, 1902–1904), 2:73; Pomponius Porphyrio, *Commentarii in Q. Horatium Flaccum*, ed. Wilhelm Meyer (Leipzig: Teubner, 1874), 218.

nobler person must surpass the ignobler one with regard to everything that follows from this nobility. But the clerical (i.e. the lettered) folk is nobler than the Jewish folk and therefore the major premise is clear. The minor premise follows from the fact that virtue ennobles a man. But the clerical folk has virtue, whereas the Jewish [folk] has not, and therefore etc. For the clerical folk has the articles of faith and other theological virtues, which the Jews resist with all their might, which is why they are deservedly called 'stiff-necked', and thus the cleric has to go before the Jew also in that which renders him virtuous. But this is science itself, as is clear from the *Ethics*, because the speculative science is man's greatest happiness. Thus the author rightly says that it is a cause for shame that *the Jew knows things* which the clergy seems ignorant of.

But the nobility of the 'cleric' [*clericus*] becomes clear from a translation of the word: for *clericus* is the name for the congregation of [all] clerics; and *clericus* comes from *cleos*, i.e., 'flower', and *ycos*, 'guardian', as in 'guardian of the flower' (i.e. 'of chastity'). It also comes from *cleos*, i.e., 'flower', and *ycos*, 'knowledge', as in 'having a blooming knowledge of God'. For 'God' [*deus*] means 'he who gives eternal life to those who are with him' [*Dans Eternam Vitam Suis*], while 'Jew' [*Iu-deus*] is derived from Judas, who extradited Christ into the hands of the Jews, who thus gave us eternal life. But they did so through their evil intention of killing Christ. Likewise, just as 'cleric' means 'guardian of the flower', the Jews' name translates as 'those who produce a substance of flux' [*dans materiam fluxionis*]. This is because among the Jews both men and women have a menstruous flux from their posteriors, as their own intention well indicated when they said on the day of the Lord's Passion: "His blood be upon us and upon our children" [Matthew 27:45]. And thus it is clear from the twofold translation that the clergy is far nobler than the Jews, and this also rightly applies to the things that accompany this nobility, to which belongs this science.

Note also that the Jew is here called *Apella*, from *a*, which means 'without', and *pelle*, as in 'skinless' or 'hideless', not in the sense that he lacks skin or hide altogether, but that his hide has been cut away at the foreskin. And this

me pudet audire (i.e. tedium habeo) quod *Apella* (i.e. Iudeus sine pelle) *preit* (i.e. precedit sive precellit) ipsum *clerum per sibi nota* (i.e. cognita).
121vb Et |subiungit rationem: cum ipsi *sunt similies Sathane*. '*Sathan*' enim est 'dyabulus' vel 'adversarius' et quia ipsi preceptis Dei, precipue articulis fidei, penitus adversantur ex hoc merito 'Sathanes' nuncupantur. Et hoc est quod intendit autor cum subiungit '*prochdolor*' et hos esse *anteriores*.

Item notandum quod dicit autor quod sic spernitur *sensus*. Ratio est: tunc spernitur sensus quando scientia fugitur et hec a multis fugitur igitur etc. Maior patet cum in proposito sensus et scientia conveniuntur, quia scientia non potest haberi sine sensu, ut patet per Aristotelem in tertio *De anima*[4] et in *De sensu et sensato*. Minor patet quia scientia fugitur quando ab hominibus extruncatur, sicut accidit in pluribus ignaris et rudibus igitur etc. Et subiungit autor tunc *cessat gloria cleri*, cum per ipsam scientiam maxima gloria habeatur. Igitur ubicumque reperitur scientie absentia, ibi etiam et glorie carentia. Ubi notandum quod ex hoc sequitur quod *petitur census* (i.e. pecunia), quapropter avarus, similiter et ignarus deficiens scientiam, dicit: "Scientia est denarius denariorum, qui cor letificat, mentem illuminat et omne bonum operatur." Cuius oppositum Aristoteles in *Ethicis* clamat *quod* ipsa est *habitus* ipsius *anime*.[5] Et Avicenna in suis *Moralibus*: "*Vir speculativus est quasi deus in humano corpore hospitatus*."[6] Homo autem illiteratus habet se modo opposito, quapropter metrista non immerito dixit: "*Clericus indoctus nec crudus nec est coctus*."[7] Et qui diligat pecuniam et odit scientiam digne patitur in fine penam etc.

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1 habeo] habere *Pa* habeo *Pd* **6** cum] *Mc1Pd* et tunc *Pa* **10** tertio] secundo *Pa* tertio *Pd* **16** et] *Mc1Pd om. Pa* **19** quod] Si *Pa* quod *Pd* **20** speculativus] *Mc1Pd* sapiens *Pa* **20–21** Homo … dixit] *Pd* Hec est illiteratus et *Pa* **23** in … penam] gehenne penam *Mc1Pd*

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[4] Aristotle, *De anima* (3.7), trans. Ioannes Argyrpopylus, in Eckhard Keßler, ed., *Aristoteles Latine* (Munich: Fink, 1995), 224.

[5] ps.-Peckham, *Commentarium in* Ethicam Novam *et* Veteram (§ 27, c. 1), ed. in Valeria Andrea Buffon, "L'idéal éthique des maîtres des arts de Paris vers 1250" (PhD Diss., Université Laval, Quebec, 2007), 231: "Ad ultimum dicendum quod scientia est habitus anime secundum partem intellectiuam." Cf. Peter of Auvergne, *Quaestions on Aristotle's "De caelo"* (1.1), ed. Griet Galle (Leuven: Leuven University Press, 2003), 23: "Et quia dictum est quod scientia est habitus animae …"

[6] *Vir speculativus*, ed. in Erika Kihlman, *Expositiones Sequentiarum* (Sweden: Stockholm University, 2006), 194: "Seneca in libro epistolarum sic ait: Vir speculativus est quasi Deus in humano corpore hospitatus." Cf. Seneca, *Epistulae morales ad Lucilium* 31.11.

[7] Samuel Singer, ed., *Thesaurus proverbiorum Medii Aevi*, 13 vols. (Berlin: de Gruyter, 1995–2002), 9:78.

is what the author intends when he says *it shames me to hear* (i.e. 'I take offence') that *Apella* (i.e. 'the hideless Jew') *goes before* (i.e. 'takes precedence over' or 'surpasses') the *clergy with his knowledge* (i.e. 'experience'). And he supplies the reason: because they *are akin to Satan*. For 'Satan' means 'Devil' or 'adversary', and because they deeply oppose the precepts of God, in particular the articles of faith, they are rightly referred to as 'Satans'. And this is what the author intends and he then adds '*alas!*' [to the fact that] they are *superior*.

Note also that the author says that *experience* [*sensus*] is despised. The reason for this is that *experience* is despised whenever science is shunned and it is shunned by many and therefore etc. The major premise is plain since in the proposed case experience and science go together, because science cannot be obtained without experience, as is clear from Aristotle in the third [book] *On the Soul* and in *On Sense and the Sensible*. The minor premise is plain because science is shunned whenever it is cut off from people, as is the case in numerous ignorant and coarse [individuals] and therefore etc. And the author adds that then *the clergy's glory fades away*, for through this science one can obtain the greatest glory. As a result, wherever an absence of this science is found, there is also a shortage of glory. Here one must note that from this it follows that *wealth* (i.e. money) *is desired*, wherefore the greedy individual, and similarly the ignorant one who lacks science, says: "Science is the denar of denars, which enriches the heart, enlightens the mind, and brings about all good things." Aristotle, in the *Ethics*, proclaims the contrary, namely that [science] itself is the basic condition of the mind. And Avicenna, in his *Moralia* states that "the reflective man is like a God lodged in a human body." The unlettered man, by contrast, has the opposite disposition, which is why the rhymester says not without justification that "an uneducated clergyman is neither raw nor cooked." And he who values money and hates science will deservedly suffer punishment in the end etc.

Lunam primari dum Iudeus meditatur/ Punctus et hora sibi certa diesque datur/ Ymmo quod magis est horam si partior unam/ In mille partes et octuaginta simul/ Incendi luna per eum reperitur in una/ Istarum; sic est ars bene nota sibi.

Hic autor ostendit virtutem facultatis et sui dicti. Dicit enim quod aliqua Iudeo sunt nota que sunt ab hominibus procul mota. Hoc declarat dicens: *dum Iudeus* (i.e. homo infidelis) *meditatur* (i.e. recordatur) ipsam scilicet *lunam primari* (i.e. primiciali splendore incendi vel principaliter incendi), tunc etiam *punctus* (i.e. ictus oculi) *et hora* diei et *certa dies* sibi *datur*. *Ymmo*, dicit, *quod magis est*, *si* ego *partior* (i.e. divido) *unam horam in mille* et *octuaginta partes*, tunc *per eum* (supple 'Iudeum') *reperitur in una istarum* partium huiusmodi incensio lune infallibiliter. Ergo hec *ars* (i.e ista scientia) *est bene* nota (i.e. manifesta) *sibi*. Quomodo et qualiter hec habeat inveniri patebunt plane in sequentibus, propter quod invehitur nos Christianos tali facultati insudare etc.

Sed si verbigene virtus michi prospera fiet/ Et michi gratuite celitus adveniet/ Ammodo ne clero velut hactenus hic dominetur/ Ipsius ars primo postea nostra detur/ Hinc concordetur nobiscum et referetur.

212ra Hic autor invocat divinum auxilium ignorantiam huius incensionis punctualis penitus removendo, quia dictum est quod est maxime verecundandum hanc scientiam ignorare. Ad quam evitandum autor dicit *Si virtus verbigene* (i.e. filii Dei vel verbi geniti de patris gloria in divinis) *fiet mihi prospera* (i.e. favorabilis) et pia *et mihi adveniet gratuite* (i.e. gratiose) *celitus* (i.e. a summo celo), tunc ars huius facultatis primo *manifestetur* (i.e. in presenti libello doceatur), postea autem *nostra* incensio punctualis secundum nostrum modum inveniendi, scilicet dividendo horam in 60 minuta; postea fiet concordantia inter nostrum novilunium et ipsorum. Et subdit rationem quoad incendium lune, ne ipsi *clero* (i.e. populo clericali) *hic* (supple 'Iudeus') *dominetur velut hactenus* (i.e. huc usque) fecit.

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8 primari] primaria *Pa* primari *Pd* ‖ i.e.] *om. Pa* **10–11** in … partes] in cyle partes, id est in 1000 partes et 80 partes *Mc1* in celler (?) in mille et octuaginta partes *Pa* in cille, id est in millle partes et 80 partes *Pa* **14–15** invehitur … etc] ipsi multum admirantur nos Christianos tali facultate iocundari *Mc1Pd* **18** referetur] *om. Pa* **20** penitus] *om. Pa* **21** evitandum] evidenam *Pa* **22–23** i.e. … prospera] *Mc1* ipsius filii geniti, id est ad verbo *Pa* **23** gratiose] gratioso *Pa* **24** celo] *Mc1 om. Pa* celi *Pd* **26** 60] mille et octuaginta *Pa* **27** subdit] suddit *Pa*

> *Meanwhile, the Jew thinks of the moon as it becomes new/ which* [*moment*] *he knows by the point, hour, and certain day/ What is more, if I divide one hour/ into one thousand combined with eighty parts./ this indicates when the moon is in conjunction, down to one/ such* [*part*]*; and thus this art is well known to him.*

Here the author points out the virtue of the ability [in question] and of his own words. For he says that certain things are known to the Jew which are far removed from the people. This he declares by saying that *while the Jew* (i.e. the unbelieving person) *thinks of* (i.e. calls to mind) this, namely *the moon becoming new* (i.e. when it is lit with its initial splendour or is first kindled), then the *point* (i.e. the blink of an eye) *and the hour* of the day and the *certain day* are also at his disposal. *Indeed*, he says, *what is more, if* I *part* (i.e. divide) *one hour in one thousand and eighty parts*, then *he* (supply 'the Jew') *can find for one of these* parts any given kindling of the moon without error. As a result, this *art* (i.e. this science) *is well* known (i.e. manifest) *to him*. How and in what way this can be found will become clear in what follows, for which reason he exhorts us Christians to sweat at [acquiring] this ability etc.

> *But if the power of the word-born one is propitious towards me/ and comes to me freely from heaven,/ so that from now on* [*the Jew*] *will here no longer rule over the clergy as before,/ his art shall be given first, afterwards ours,/ and hence it shall be harmonized with ours and made known.*

Here the author calls upon divine assistance in entirely removing the ignorance of the precise time of the kindling [of the new moon], because it has been said that one should be ashamed to the greatest degree for not knowing this science. In order to escape this the author says: *But if the power of the word-born one* (i.e. of the Son of God begotten through the divine glory of the father) *is propitious* (i.e. favourable) and good *towards me* and *comes to me freely* (i.e. kindly) *from heaven* (i.e. from the highest heaven), the art of this ability should be *disclosed* (i.e. taught in the present book) first, but afterwards *our* precise time of the kindling [of the new moon] according to our method of finding it, that is by dividing the hour into 60 minutes; afterwards there shall be the concordance between our new moon and theirs. And he adds the reason, namely that *here*—supply: the Jew—shall not *rule over the clergy* (i.e. the clerical folk) *as* he has done *before* (i.e. up to this point), with regard to the moon's kindling.

Hic notandum est secundum Boecium tertio *De consolatione* quod in omnibus operibus divinum auxilium est inpetrandum[8] secundum quod dicitur in metro: "*Omnibus in factis, peragendis sive peractis, debet proponi Deus humane ratione*." Quare merito dicit "*Si virtus verbigene*." Unde nota quod 'verbigena' dicitur a nomine 'verbum' et a verbo 'gigno' quasi 'verbo genitus' et id est quod Christus. Unde nemo est verbigena nisi Christus, vera sophia. Item nota: cum dicit huiusmodi *virtus adveniat michi celitus* (i.e. de celo et a possessore ipsius celi), quia secundum Aristotelem primo *Celi* ab hoc quidem ente derivatum est singulis *esse et vivere, hiis quidem clarius, hiis quidem obscurius*,[9] quare merito dicit *celitus*.

Item notandum quod hic autor rationem subiungit quare hanc artem tradidit: quia ne *amodo* (i.e. ulterius) ipse Iudeus imminetur *clero*. Et hec propter confusionem evitandam, quia maxime esset indignum ut mali bonis proferantur, rudes literatis, iuniores antiquiores. Hoc accidit ex ignorantia huius artis, unde punctualis incensio usque ad hodiernum diem fideles latuit, infidelibus prochdolor patet et patuit. Quare autor rationem huius rationabiliter subiungit, dicens *amodo ne clerus*.

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2 divinum auxilium] Dei et auxilium eius *Pa* **5–7** a … sophia] *Mc1* a 'verbo' et 'gigno' quia Christus fuit natus ex verbo solo, unde allegatur nomen est 'verbigena' etc. *Pa* a verbo' gigno' illud quasi 'a verbo genitus' et est idem quod Christus quapropter dicit non est verbigena nisi Christus vera sophia *Pd* **13** evitandam] *Mc1* per concultationem *Pa* propter confusionem eius evitandam *Pd* **17** dicens … clerus] divens declarative *clerus amodo Pa* dicens *amodo ne clerus Pd*

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[8] Boethius, *De consolatione philosophie* (3.9.33), ed. Claudio Moreschini (Munich: Saur, 2000), 79: "Invocandum, inquam, rerum omnium patrem, quo praetermisso nullum rite fundatur exordium."

[9] Aristotle, *De caelo et mundo* (1.9), trans. William of Moerbeke (Bekker 279a), 149: "Et enim hoc nomen divine enuntiatum est ab antiquis; finis enim continens id quod uniuscuiusque vite tempus, cuius nichil est extra secundum naturam, eternum uniuscuiusque vocatum est. Secundum eandem autem rationem et totius celi finis et omne tempus et infinitatem continens perfectio eternum est, a semper esse sumens denominationem, immortalis et divinus. Unde et aliis communicatum est hiis quidem clarius, hiis autem obscurius esse et vivere." [Aristoteles Latinus Database]

Here it should be noted according Boethius in the third [book] of *On the Consolation* [*of Philosophy*] that divine help should be implored in all work according to what is said in the [following] verse: "In everything you do, whether yet to complete or already carried out, God must be put before human reason." Which is why [the author] rightly says *If the power of the word-born one* … Whence note that 'word-born' comes from the term 'word' and the word 'born', as in 'born from the word', which is what Christ is. For there is no one born from the word but Christ, the true wisdom. Likewise note that he says such *power may come to me from heaven* (i.e. from the sky and from its owner), because according to Aristotle, in the first [book] of the *Heavens*, it is from this entity that every single thing derives its being and living, some more clearly, other less so; which is why he rightly says *from heaven*.

Note also that the author here supplies the reason why he transmitted this art: so that *from now on* (i.e. henceforth) the Jew will no longer loom over *clergy*. And this [he does] in order to avoid confusion, because it is highly unworthy that bad people are favoured over good ones, coarse over lettered ones, young over old ones. This [state of affairs] comes about through the ignorance of this art, because the exact time of the kindling [of the new moon] escapes the notice of the faithful until this day, whereas—alas!—it was and is well known to the infidels. Which is why the author supplies the reason in a reasonable manner, saying *so that the clergy shall no longer* etc.

CHAPTER 6

Hermann Zoest's *Calendarium Hebraicum Novum* (1436)

1 The Jewish Calendar in the Work of Hermann Zoest

As the manuscript tradition of the *Computus Judaicus* demonstrates in quite spectacular fashion, the Jewish calendar continued to be a subject of interest to Christian scholars well into the fifteenth century, during which at least 39 copies of this particular text were produced.[1] One of these (Co) can be traced back to the Cistercian monastery of Marienfeld, near Münster in Westphalia, where it may have passed through the hands of the monk Hermann Zoest, whose interest in the Jewish calendar is evidenced by a whole string of works preserved from his pen.[2] Born close to the year 1380 in Münster, Hermann received his early education at the local school of St. Liudger, before entering

1 MSS Ba, Be, Bf, Bg, Bh, Br, Co, Ed, Er, El, Fb, Go, Gr, Ha, Kb, Ke, Kx, Le, Lf, Lo, Lp, Lq, Lw, Mc2, Md, Mf, My, Mz, Pe, Pf, Sa, Sb, Sg, Tr, Up, Wb, Wc, Wo, Wp.

2 In addition to the present discussion, see Nothaft, "A Tool." On Hermann Zoest's life and works more generally, see Friedrich Zurbonsen, *Hermannus Zoestius und seine historisch-politischen Schriften* (Warendorf: Schnell, 1884); Zurbonsen, *Das "Chronicon Campi s. Mariae" in der ältesten Gestalt (1185–1422)* (Paderborn: Schöningh, 1884), 7–9; Zurbonsen, "Hermann Zoestius von Marienfeld und seine Schriften," *Westdeutsche Zeitschrift* 18 (1899): 146–173; Heinrich Finke, "Westfalica aus der Pariser und Eichstädter Bibliothek," *Zeitschrift für vaterländische Geschichte und Alterthumskunde* 47 (1887): 209–222 (218–219); Josef Tönsmeyer, "Hermann Zoestius von Marienfeld, ein Vertreter der konziliaren Theorie am Konzil zu Basel," *Westfälische Zeitschrift* 87 (1930): 114–191; Klemens Löffler, "Zur Biographie des Hermann Zoestius," *Auf roter Erde* 6 (1931/32): 48–50; Löffler, "Stifts- und Klosterbibliotheken des Bistums Münster," *Auf roter Erde* 7 (1932): 88; 8 (1933): 5–6; Karl Zuhorn, "Die Familie des Hermann Zoestius und des Malers Johann von Soest: Zugleich ein weiterer Beitrag zur Geschichte des Münsterschen Honoratiorentums im Mittelalter," *Westfalen* 27 (1948): 20–27; Paul Leidinger, "Die Zisterzienserabtei Marienfeld (1185–1803): Ihre Gründung, Entwicklung und geistig-religiöse Bedeutung," *Westfälische Zeitschrift* 148 (1998): 9–78 (29–31); Wilhelm Kohl, *Die Zisterzienserabtei Marienfeld* (Berlin: de Gruyter, 2010), 442–443. See also the entries in *Dictionnaire de spiritualité ascétique et mystique*, ed. Marcel Viller et al., 17 vols. (Paris: Beauchesne, 1937–1995), 7:296–297; *Dictionnaire des auteurs Cisterciens*, ed. Émile Brouette, Anselme Dimier, and Eugène Manning (Rochefort: Abbaye Notre-Dame de St-Remy, 1975), 363–364; Stegmüller, *Repertorium*, 3:43; *Repertorium Fontium Medii Aevi*, vol. 11 (Rome: Istituto storico italiano per il medio evo, 2007), 537–538.

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the abbey of Marienfeld in ca. 1415. During the following years, he served as a confessor to the nearby nunnery of St. Giles in Münster, whilst simultaneously embarking on a remarkably varied literary career, which ranged from history and ecclesiastical politics to hagiography, theology, astronomy, and poetry, making him the most important scholar and author to come out of Westphalia during the fifteenth century.[3]

A large part of Hermann's literary oeuvre was written during his long sojourn at the Council of Basel (1431–1449), from ca. 1434 to 1443, where the Cistercian monk rose to prominence alongside Nicholas of Cusa as one of the most outspoken advocates for a reform of the ecclesiastical calendar. His personal interest in the calendar and its possible correction is already evident in the year 1424, when Hermann, still at Marienfeld, penned a *Tractatus phase*, a treatise in four chapters, which is now uniquely preserved in a manuscript from the University Library of Rostock.[4] The *Tractatus phase* contains a reference to the *Compotus emendatus* of Reinher of Paderborn, whom Hermann is the only known medieval author to cite by his actual name (*Reinherus*).[5] Aside from this mention of Reinher, which gives away one of the sources from which Hermann drew his information regarding the technical features of the Jewish calendar, the text also contains a noteworthy reference to the unusually early Passover eve of the year 1424, which fell on 15 March. Hermann claims to have double-checked the validity of this date with the help of a Jew who was "quite understanding [*satis intelligente*] in these matters."[6] As it happens, this

3 Detlev Hellfaier, "Von Brügge nach Detmold: Anmerkungen zur Überlieferungsgeschichte der Detmolder Naturen-Bloemen-Handschrift," in *Jacob van Merlants 'Der naturen bloeme' und das Umfeld*, ed. Amand Berteloot and Detlev Hellfaier (Münster: Waxmann, 2001), 119–134 (131–132): "Hermann Zoest … der als der bedeutendste Gelehrte und Schriftsteller Westfalens im 15. Jahrhundert gilt."

4 MS Rostock, UB, math.-phys. 1, fols. 15^{r}–24^{r}. See Max Perlbach, "Der Uebersetzer des Wigand von Marburg," *Altpreussische Monatsschrift* 32 (1895): 411–424 (414–415n); Kurt Heydeck, *Die mittelalterlichen Handschriften der Universitätsbibliothek Rostock* (Wiesbaden: Harrassowitz, 2001), 80–81.

5 *Tractatus phase*, c. 1, MS Rostock, UB, math.-phys. 1, fol. 17^{r}: "Nec solum Dyonisius erravit illo, ymmo plus, nam dicit Reinherus in computo suo: 'Contigit enim ex doctrina Dyonisii frequenter ut mense primo legali, sicud primo statutum fuerat, pascha non celebretur, sed nec in mense cuius plenilunium sit in equinoxio vel primum post equinoxium'. Patet illud dictum Reinheri esse verum, quia presenti anno non celebratur primo mense, sed secundo, nec primo plenilunio post equinoxium, ut postea dicetur." See also ibid., fol. 22$^{r–v}$. The quoted passage references Reinher, *Compotus emendatus* (1.12), ed. van Wijk, *Le comput*, 26.

6 *Tractatus phase*, c. 3, MS Rostock, UB, math.-phys. 1, fol. 21^{v}: "Et si adhuc non credis, tunc remitto te ad Iudeos, prout sanctus Ieronimus in prologis suis sepe remittit ad Hebreos

tantalizingly short remark is our only hint that the Westphalian monk, far from solely relying on Reinher of Paderborn's work, was also willing to ask real-life Jews about their own calendar.

The arguments and data assembled in the *Tractatus phase* provided the basis for its author's continued lifelong effort to get the calendar officially corrected. In 1432, he composed a *Tractatulum exhortatorium*, which is unfortunately lost, but seems to have been the basis for a petition submitted to the Council of Basel and read out to the general assembly on 18 June 1434. According to the council's historian John of Segovia, the exhortations contained in this text were instrumental in the formation of a calendrical reform commission, in which Hermann became one of the most active members.[7] During the following years, he revised and expanded his *Tractatus* into a much more elaborate text, entitled *Phaselexis*, which exists in two different recensions, respectively composed in 1435 and 1437. In its later, and much more common 1437-version, the *Phaselexis* served as a companion to an official reform decree worked out by Hermann's commission, which was presented to the council on 2 September 1437, albeit without ever taking effect. Both recensions contained numerous references to the contemporary calendar of the Jews, to whose range of Passover dates and order of embolisms Hermann appealed in order to justify his own suggestions as to how to rebuild and improve Christian Easter reckoning.[8] Besides writing his calendarical works, Hermann Zoest's stay in Basel also provided him with the leisure and inspiration to compose an elaborate Gospel harmony, the *Evangelium ex quatuor* [*in*] *unum*, which was finished in 1441. It is found in numerous manuscripts, including a lavishly produced and illuminated codex now in the Lippische Landesbibliothek in Detmold, which was once in

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emulos suos sibi non credentes. Interroga igitur Iudeos et invenies eos pascha celebrare et legalem agnum edere ydus Martii … cuius veritatem a quodam satis intelligente Iudeo investigavi."

7 John of Segovia, *Historia gestorum generalis synodi Basiliensis* (8.19), ed. Ernst von Birk (Vienna: Typ. Aulae et Status, 1873), 708–710. See further Kaltenbrunner, "Die Vorgeschichte," 336–354; Honecker, "Die Entstehung"; Sudmann, *Das Basler Konzil*, 266–272.

8 See Nothaft, "A Tool," for details. According to Hermann's *Compendium paschale* (c. 8), written in 1443 in a final attempt to motivate the Council of Basel to pass legislation on the calendar, the reform commission that he had been a member of sought the advice of both Christian and Jewish astronomers. See MS Copenhagen, Kongelige Bibliotek, Thott 825 4°, fol. 184^{v}: "Et ideo domini deputati postquam plus tribus annis multum diligenter laboraverunt circa dictam materiam scribendo et mittendo ad diversas mundi partes diversarum nationum ad astronomos non solum Christianos verum etiam ad Iudeos … ad hoc ventum est quod refutatis omnibus modis et viis elegerunt viam et modum subtractionis 7 dierum."

Hermann's possession and contains corrections, marginal glosses, and a personal bibliography from his own hand.[9] Another noteworthy part of Hermann's intellectual output are the various ecclesiastical-political writings, with titles such as *De potestate ecclesiastica et papali* (1436) and *De vocibus definitivis in conciliis generalibus* (1438), in which he defended a strong conciliar position, which sought to demote papal power, and advocated an equal right to vote for the lower clergy in the council's general assembly.[10]

One area where calendars and ecclesiastical politics met was the ongoing dispute with the Greek Churches of the East over the form of bread used for the Eucharist. As has been noted above (p. 190), the Roman Church traditionally used unleavened bread (or *azyma*) as the basis for its rituals, finding one of its justifications in the synoptic chronology of the Last Supper. The Greek side strongly rejected this practice, condemning it at as a 'judaizing' heresy, and instead insisted on the use of fermented bread. Aside from the vexed *filioque* question, this so-called 'azymes controversy' had been one of the major issues dividing Eastern and Western Christianity since the Great Schism of 1054. When Hermann first came to Basel, hopes were high that the Council could achieve a new union between the Latin and Greek Churches, but this was before Pope Eugene IV decided to take the matter into his own hands by convoking the 'Union Council' of Ferrara-Florence (1438/39), whose success contributed to the disruption and eventual failure of the Basel assembly.[11]

In 1436, only three years before a short-lived compromise on the Eucharist was reached in Florence,[12] Hermann Zoest decided to address some of the

9 MS Detmold, Lippische Landesbibliothek, Mscr. 71. On this MS, see Ulrich Hinz, *Handschriftencensus Westfalen* (Wiesbaden: Reichert, 1999), 27; Hellfaier, "Von Brügge," 129–130. See further Heinrich Joseph Vogels, *Beiträge zur Geschichte des Diatessaron im Abendland* (Münster: Aschendorff, 1919), 125–126.

10 Tönsmeyer, "Hermann," 132–179; Wattenbach, "Über Hermann," 102–106; Zurbonsen, *Hermannus Zoestius*, 21–31; Zurbonsen, "Hermann Zoestius," 162–172; Leidinger, "Die Zisterzienserabtei," 30–31. On the reception of Hermann's ideas, see Alois Schröer, "Das Tridentinum und Münster," in *Das Weltkonzil von Trient: Sein Werden und Wirken*, ed. Georg Schreiber, 2 vols. (Freiburg: Herder, 1951), 2:295–370 (309–311).

11 On the background, see Joachim W. Stieber, "The 'Hercules of the Eugenians' at the Crossroads: Nicholas of Cusa's Decision for the Pope and against the Council in 1436/37," in *Nicholas of Cusa in Search of God and Wisdom*, ed. Gerald Christianson and Thomas M. Izbicki (Leiden: Brill, 1991), 221–255; Michiel Decaluwe, *A Successful Defeat: Eugene IV's Struggle with the Council of Basel for Ultimate Authority in the Church 1431–1449* (Brussels: Belgisch Historisch Instituut te Rome, 2009).

12 See Joseph Gill, *The Council of Florence* (Cambridge: Cambridge University Press, 1959), 270–304; Chadwick, *East and West*, 258–273.

issues underlying the azymes controversy in his treatise *De fermento et azymo*, which also dealt with various aspects of the Jewish calendar.[13] At the heart of the debate was the question whether Jesus and his disciples had anticipated the ordinary Passover when they convened for a meal on Thursday evening. Back in the twelfth century, Rupert of Deutz and Reinher of Paderborn had both noticed how the Jewish postponement rules or *deḥiyyot*, which prohibited the celebration of Passover on a Friday, implicitly backed the Johannine account of the Passion, which set the Last Supper on the evening of 13/14 Nisan.[14] This version of events was later endorsed by Roger Bacon and Robert of Leicester, who realized that the events described in the Gospels were in conflict with the obligation of sabbatical rest on 15 Nisan, thus backing the Greek position. Unlike Robert of Leicester, however, Bacon never explicitly invoked the *deḥiyyot* in this context, despite the fact that he was well-acquainted with both these rules and the ritual justifications behind them.[15] One can only suspect that he refrained from using the postponements as evidence, because he realized that the rules of the Jewish calendar of present times could not be projected back into the ancient past.

The *deḥiyyot* were once again thrown into the ring in ca. 1429–1431 by the Castilian bishop Pablo de Santa María, better known as Paul of Burgos, who produced a massive corpus of critical *Additiones* to Nicholas of Lyra's biblical commentaries or *Postilla*. Before his conversion to Christianity in 1390/91, Paul had been a well-known Rabbi in his hometown Burgos, meaning that he could boast first-hand familiarity with the Jewish calendar and its postponement rules. In his lengthy *Additio* on Matthew 26, he used this knowledge to argue that the *deḥiyyot* provided the key to explaining away the troubling contradiction between the synoptic evangelists and John concerning the Passion date. Paul's solution to this problem was to assume that Jesus and his disciples had refrained from applying the *deḥiyyot*, causing them to celebrate Passover one day earlier than all other Jews. He supported this view by pointing out that rule *lo BaDU Pesaḥ*, which prevented Passover from falling on a Friday, was a mere corollary of another rule, according to which Hoshana Rabbah on 21 Tishri

13 MSS of this text include Vatican City, BAV, Ottob. lat. 718, fols. 1^{r}–16^{v}; Barcelona, Arxiu capitular de la Catedral, 26, fols. 1^{r}–20^{r}; Munich, BSB, Clm 3564, fols. 145ra–55ra, and Clm 18536, fols. 201^{r}–218^{v}. See also Zurbonsen, "Hermann Zoestius," 167; Manuel Candal, "El 'De fermento et azymo' del Ottoboniano Latino 718," in *Mélanges Eugène Tisserant*, 7 vols. (Vatican City: Biblioteca Apostolica Vaticana, 1964), 6:289–311, who discusses aspects of this text without being aware of Hermann's authorship.

14 See p. 56 above, and Nothaft, *Dating*, 136–144.

15 See p. 198 above, and Bacon, *Opus majus*, 1:201; Bacon, *Opus tertium*, 219–220.

could never fall on a Sabbath. This effectively meant that the postponement of Passover in the year of the crucifixion was contingent upon a feast that still lay several months ahead, belonging to a future in which, thanks to Christ's self-sacrifice, mankind had been redeemed and the law of the Old Covenant abolished. The calendrical rules attached to Hoshana Rabbah, Paul argued, were hence already ineffective for the Passion year, explaining why Jesus, in his foresight of events to come, chose not to postpone the Passover shortly before his death.[16]

Although Hermann was still unaware of Paul of Burgos's *Additio* when he first composed *De fermento et azymo*, his own musings on the subject are in fact largely analogous to Paul's. In chapter 6 of his treatise, he provides ample information on the Jewish calendar and its feasts, noting for instance that the Jews in his own day follow the custom of entering the Synagogue barefooted on the eve of Yom Kippur.[17] Hermann's discussion of the laws of sabbatical rest and how they necessitate a postponement of Passover in certain years is also noteworthy. His explanation of why the Jews keep 15 Nisan from falling on Monday or Wednesday is in line with reasons given in the Talmud: since Nisan and Tishri are exactly 177 months apart, such a combination of dates would make Yom Kippur fall immediately before or after a Sabbath. The resulting two consecutive days of ceremonial rest would have intolerable consequences, considering that no fresh food could be prepared for their duration, nor could the recently deceased be buried during that period.[18] What is peculiar, however, is Hermann's following explanation of the Jewish avoidance of Friday Passovers. In contrast to Paul of Burgos, who correctly tied this rule to Hoshana Rabbah, Hermann believed it to be related to the beginning of Sukkot (15 Nisan), which in this event would fall on a Sunday "and then it would have been necessary to

16 The text of Paul's *Additio* to Mt 26 is printed in Nicholas of Lyra, *Postilla super totam Bibliam*, 4 vols. (Strasbourg, 1492; repr. Frankfurt: Minerva, 1971), vol. 4, sigs. h3^{va}–4^{rb}. See Nothaft, *Dating*, 215–222, for details.

17 *De fermento et azymo*, c. 6, MS Munich, BSB, Clm 3564, fol. 148^{vb}–49ra: "Nona die hora vespertina nudis pedibus intrabant templum, prout Iudei hodiernis diebus in Synagogis suis faciunt, incipiebantque ibidem legere et psallere ac deo laudes canere absque cibo et potu atque requiete usque ad solis occasum sequentis diei, scilicet decime."

18 Ibid., fol. 149$^{rb–va}$: "Et sequeretur magnum inconveniens, scilicet quod duobus diebus continuis, sexta feria scilicet et sabbato, non possent cibaria preparare. Quod quidem post tantos labores intollerabile extitisset cibariis omnino frigidis sese tunc reficere. Etiam si quis mortis debitum ante diem expiationis persolvisset, duobus diebus ad minus defuncti cadaver sepeliri nequisset et sine custodia permansisset, porro si fortuitu casu damnum accidisset nullum remedium tunc fuisset."

set about doing manual labour on a Sabbath, cutting branches and leaves from trees and carrying them home and making tents out of them."[19] Apparently, Hermann could not imagine that the Jews would be willing to simply build their *sukkot* a few days in advance, as presumably he could have observed from Jewish practice in his own day.

In any case, Hermann, like Paul of Burgos, concluded that Jesus and his disciples, since they were no longer bound by the rules pertaining to the seventh month (Tishri), decided to celebrate their Passover on the evening of the 14th day of the lunar month, as reckoned from the conjunction, and thus without observing the postponement that the Jewish calendar demanded for that particular year.[20] Since Jesus had eaten the Passover lamb before the official beginning of the feast, it could not be inferred with any certainty whether fermented or unleavened bread had been available on the table during the Last Supper. Although Hermann remained steadfast in his allegiance to the Latin use of *azyma*, he therefore took a pointedly irenic stance in the azymes controversy, defending the legitimacy of the Greek rite and calling for a policy of mutual toleration.[21] Moreover, once he learned about the bishop of Burgos's *Additiones*, Hermann decided to equip his finished text with several additions that took into account the latter's ideas. One manuscript copy that contains these revisions is found in the Bavarian National Library and was copied by the

19 Ibid., fol. 149va: "Preterea si id primus mensis initium sexta feria caperet, tunc ipse mensis Tysri in dominicam caderet diem. Et 15a dies, qui est prima et celebrior festi tabernaculorum, etiam in dominicam diem caderet. Et tunc fuisset insistere manuum laboribus in sabbato ramos et frondes de arboribus secando ad domos portando et tabernacula ex hiis construendo."

20 See especially ibid., c. 8, fol. 150^{vb}.

21 Ibid., c. 11, fol. 153$^{ra–b}$: "Non curemus cerimonialium differentias. Abiciamus multitudinem errorum contra Grecos a diversis collectorum. Si qua differentia est in hiis que sunt fidei, hec in karitate mutua plenius disputentur. O utinam non essent, aut fuissent, discordias inter fratres venenose seminantes!" Ibid., c. 12, ibid., fol. 155ra: "Hec autem scripsi, ut concordia, pax et caritas inter Latinos et Grecos ampliores conserventur, et facilior modus ipsos reducendi habeatur. Non curemus ea que fidem non contingunt, et de cerimonialibus nulla cura sit. Nam Slavi a ceteris Christianis multum in ritibus suis differunt in karacteribus seu litteris. Dicunt enim quod sanctus Hieronimus litteras illas adinvenit et eas illis tradidit, et bibliam ad ipsorum linguam transtulit, ex eo quod ipse Sclavus extitit. Et sic in sua lingua Sclavica missas et cunctum divinum officium peragunt, et consecrationis verba in eadem lingua proferunt. Que omnia sancta mater ecclesia toleravit ac tolerat. Quare ergo in Grecis eadem per mater nostra multa tollerare debet, quia nos et hos latum fretum dividit."

Augsburg humanist Sigismund Gossembrot (ca. 1417–after 1488). It is prefaced by a short note, entitled *Notabilia super prologum subsequentem de fermento et azymo*, in which Hermann cites Reinher of Paderborn and Paul of Burgos as the only two scholars known to him to have paid any attention to the Jewish postponement rules in their treatment of the Passion chronology. Regarding Paul's "excellent commentary on Matthew 26 in his *Additions* to Nicholas of Lyra's *Postilla* on the Bible," he remarks that it had "only reached my hands in the ninth month after compiling the present book." In order to make sure that Paul's wisdom was properly incorporated into the present treatise, the note went on to ask prospective scribes to transfer Hermann's marginal additions, which contained excerpts from Paul's commentary, into the main text of future copies.[22] As the ca. 20 individual references to Paul of Burgos's *Additio* in the text of the Munich manuscript show, Gossembrot complied with this request rather diligently.[23]

2 Calendarium Hebraicum Novum: Structure and Contents

In 1436, the same year that saw the composition of *De fermento et azymo*, Hermann sat down to produce a *Calendarium Hebraicum novum* ("A New Hebrew Calendar"), which applied the Jewish calendar to biblical chronology in an even

22 Ibid., fol. 144^{v}: "Et non vidi aliquem michi mentionem facientem duobus exceptis, scilicet Reinhero et Burgensi episcopo, qui quidem dominus Paulus Burgensis in addicionibus super postillas Biblie Nicolai de Lyra luculenter et optime scripsit super illo verbo Mathei 26, *primo autem die azymorum*. Cuius quidem addiciones nono mense post presentis libelli compilacionem ad manus meas pervenerunt. Extraxi michi quaedam et ad margines huius in quibusdam locis posui in testimonium et confirmationem. Patet igitur quod Christus prevenit pasca Iudeorum. Et an ipse in cena usus sit azimo pane vel fermentato pane asserere non tentabo, sed audacter dico quod Iudei fermentato pane usi sunt quinta feria, quando Christus cenavit, et sexta feria quando passus est usque ad vesperam. Precor igitur eos qui huius libelli copiam habere concupiscunt, ut etiam ea que in marginibus annotata sunt, diligenter ad suas margines scribere non omittant." The above note is partly transcribed in Erwin Rauner, *Katalog der lateinischen Handschriften der Bayerischen Staatsbibliothek München: Die Handschriften aus Augsburger Bibliotheken*, vol. 1, *Stadtbibliothek: Clm 3501–3661* (Wiesbaden: Harrassowitz, 2007), 268–269.

23 MS Munich, BSB, Clm 3564, fols. 146va, 147va, 147^{vb}, 148ra, 148^{vb}, 149^{rb}, 149va, 150ra, 150^{rb}, 150va, 150^{vb}, 151^{vb}, 152ra, 152^{rb}, 152$^{va–b}$. Munich's National Library also holds an earlier copy from Tegernsee monastery, dated to 1444, which does not contain any of these addition. See MS Munich, BSB, Clm 18536, fols. 201^{r}–218^{v}.

wider sense than just the date of the Last Supper.[24] Despite its striking originality and the fact that it received a printed edition at the beginning of the eighteenth century,[25] this work has thus far received little to no attention from scholars. The only noteworthy exception is Friedrich Zurbonsen, who briefly described it in his two pioneering studies on Hermann Zoest, albeit without displaying a proper understanding of the text and its purpose.[26] At its core, the *Calendarium* is a remarkably innovative attempt to adapt the Jewish calendar to the standard exigencies of biblical reading. In his introduction, Hermann begins by discussing the various difficulties readers faced when trying to understand the historical minutiae behind certain biblical passages. Following some distinctions drawn by Nicholas of Lyra, Hermann accepts that Scripture is endowed with a fourfold sense, the most basic of which is the historical-literal sense. He goes on to acknowledge that contributions to the elucidation

24 *Calendarium Hebraicum novum* is the title used by Zurbonsen (see n. 26 below), whom I have decided to follow in this regard. It appears in this form in Hermann's owner's note of MS W, fol. 1^{v} (see n. 48 below) as well as in a list of his writings found at the end of the same codex (W, fol. 69^{v}). It should be noted, however, that the MSS of the text generally use the more laconic title *Calendarium* (or *Kalendarium*) *Hebraicum*. To judge from an eighteenth-century catalogue, the longer form (*Calendarium Hebraicum novum*) was also used in a MS at the library of the Order of the Knights Hospitallers in Strasbourg. See Johann Jacob Witter, *Catalogus codicum manuscriptorum, in Bibliotheca Sacri Ordinis Hierosolymitani Argentorati asservatorum, confectus* (Strasbourg: Kürsner, 1746), 30. This MS was later found at Strasbourg's Municipal Library, where it was probably destroyed in the great fire of 1870. See Gustav Haenel, *Catalogi librorum manuscriptorum qui in Bibliothecis Galliae, Helvetiae, Belgii, Britanniae M., Hispaniae, Lusitaniae asservantur* (Leipzig: Hinrichs, 1830), 464. The codex contained five works by Hermann Zoest: 1) *De fermento et azymo*. ch. 4. 2) *De potestate conciliorum papae*. 3) *Phaselexis*. 4) *Calendarium Hebraicum novum*. 5) *De vocibus definitivis in Conciliis generalibus*. For manuscript sigla, see p. 491 below.

25 See p. 494 below.

26 See Zurbonsen, *Hermann Zoestius*, 19–20 (reproducing the calendar page for Nisan); Zurbonsen, "Hermann Zoestius," 161–162. Zurbonsen alleges that the *Calendarium* was written "mit besonderer Berücksichtigung der Chronologie der Weltschöpfung" (ibid., 161), even though the creation of the world played no discernible role in the text. Similarly confused is Zurbonsen's claim that Hermann intended a correction of the date of Easter to 17 April: "Das Sonderbare der Rechnung, welche mit dem fixen Osterdatum 17. April beginnt, erkennt der Autor an, aber er will ohne Rücksicht auf Beweglichkeit und Grenze des Festes überhaupt nur einen Rahmen der biblischen Ereignisse selbst schaffen. Übrigens erinnert sein Vorgang lebhaft an die neuerdings von Förster-Berlin ausgehenden Vorschläge, Ostern zu einem nur eng beweglichen Feste zu machen" (ibid.).

of difficult passages were made not only by Christian (or 'Catholic') exegetes, but also by Jewish sages, among whom he specifically mentions Rashi, whose influence on Nicholas of Lyra was a well-known fact. Not even these two luminaries, however, could answer every relevant question concerning the months and calendar dates that regularly cropped up in the Old and, to a lesser extent, in the New Testament. In order to remove all obstacles to an understanding of the chronological indications encountered in Scripture, Hermann decided to compose the present work. From his own remarks, it can be gathered that his intended audience included students and teaching personnel at universitary faculties of theology, in particular the 'Biblical Bachelors' (*baccalaurii biblici*), who had the task of teaching Scripture to students before being allowed to ascend to higher academic ranks.[27] Although next to nothing is known about Hermann's own time as a university student, which brought him to Cologne in 1430 and probably also to Prague before that, it is not unlikely that the *Calendarium* was in part a reaction to his own first-hand experience with the demands of biblical teaching.[28]

To assist in this line of work, Hermann drew up thirteen calendar pages, one for each month of the Hebrew calendar, starting with Nisan and ending with *Veadar* or Adar II. Each day of the respective month is represented by an individual line, into which are entered important events from biblical and apostolic history, with the source texts being indicated in the margin. The top line of each calendar page features the name of the month in both Hebrew and Latin letters as well as the equivalent lunation in the Julian calendar. Using these indications, the reader of Hermann's *Calendarium Hebraicum* could easily recognize the seasonal and calendrical context of any dated event mentioned in the Bible. One example of this use is subjoined in a brief 'second prologue', which got tacked onto the main prologue as a kind of afterthought, giving the work a somewhat unpolished look:[29]

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27 Ulrich G. Leinsle, *Introduction to Scholastic Theology* (Washington, DC: The Catholic University of America Press, 2010), 121.

28 Zurbonsen, "Hermann Zoestius," 151–152, introduces the conjecture that he may have followed his abbot Hermann of Warendorf to the University of Prague. This was later supplemented by Tönsmeyer, "Hermann Zoestius," 118–119, who cited documentary evidence showing that Hermann enrolled at Cologne in 1430. See also Zurbonsen, *Hermannus Zoestius*, 8; Kohl, *Die Zisterzienserabtei Marienfeld*, 442.

29 In MSS A (fol. 2^{v}), L (fol. 2^{r}), and M (fol. 115^{v}), which are closely interrelated, the two prologues are consequently fused into one. In MS O (fol. 25^{r}), the headings are missing, but the second part is still offset by a new paragraph.

> When someone reading Genesis arrives at chapter seven, where it is said that Noah entered the ark on the 17th day of the second month [Genesis 7:11], this reader should take a look at the following calendar and search for the second month, where he will find the entry: "Noah with his kin entered the ark." He should say to those listening: "the month in question here is not the Roman month called February, but a month of the Hebrews, called 'Iyyar' in Hebrew. And it is the lunation of May, which actually begins in April, but takes its name from the month in which it ends."[30]

As Hermann indicates in the preface, the tabular layout of his calendar pages was consciously modelled after Christian *kalendaria*, whose initial line often contained the letters 'KAL' in large script and coloured ink, representing the *kalendae* or 'calends' (the beginning of each month in the Roman year), which are at the root of the word 'calendar'. In analogy to this practice, Hermann decided to begin each Hebrew month with the (red or crimson) letters 'MOL', being short-hand for *molad*. This was a somewhat awkward choice, considering that the day of the *molad* or mean conjunction was not always the first day of the Jewish month, but could precede the latter by up to two days. The conceptual proximity of Hermann's *Calendarium Hebraicum* to Christian *kalendaria*, and especially to the martyrologies that were based upon these calendars, is also revealed by the inclusion of extra-biblical events relating the life of the Virgin Mary (her Assumption to Heaven) and to the early apostles and martyrs. For the dates of these events, Hermann had recourse to the ever-popular *Legenda Aurea*, known to him as the *Passionale* or *Passionale novum*. Apart from the *Legenda*, there is only a modest use of non-biblical sources to be noted, which is unsurprising, given that most entries were taken directly from the Old or New Testament. Among the references that can be unambiguously identified are Augustine's *De trinitate*, Isidore's *Etymologiae*, and the prologues to Nicholas of Lyra's *Postilla*. For information on the lives of the Four Evangelists, Hermann drew on the so-called 'Monarchian' Gospel prologues, which he, as was customary in his time, wrongly attributed to Jerome.[31]

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30 MS W, p. 113: "Quando vero legens Genesin pervenit ad c. 7, ubi dicitur quod Noe intravit archam 17 die mensis secundi, ipse legens inspiciat sequens kalendarium quaeratque secundum mensem, quo invento inveniet ibi: *Noe cum suis intravit archam*. Dicat audientibus: 'Iste mensis, de quo hic agitur, non est Romanus mensis, qui vocatur Februarius, sed est Hebraeorum mensis, Ygar Hebraice vocatus. Et est lunatio Maii, que quidem lunatio incipit in Aprili, sed capit denominationem a mense in quo ipsa lunatio terminatur'."

31 See Maurice E. Schild, *Abendländische Bibelvorreden bis zur Lutherbibel* (Gütersloh: Mohn, 1970), 89–95.

While inscribing Old Testament dates like the Flood into the Hebrew calendar was a relatively straightforward affair, the assignment of events from later apostolic history and the New Testament often required a good deal of chronological expertise. Since most of the corresponding dates could normally not be found in Scripture, but only existed as feast days in the liturgical calendar—which was solar, not lunar—, Hermann was forced to first determine the exact year in which these events happened and then perform the appropriate conversion from the Julian back into the Jewish calendar. As a result, the Adoration of the Magi, the baptism of Jesus, and the turning of water into wine at Cana, which were normally all commemorated on 6 January (Epiphany), appear on different dates on his calendar page for the month of Tevet. Hermann made sure to explain such difficult cases to his readers in short commentaries, which were meant to adorn the margins of the respective months, although some scribes, having run out of space, moved them to separate pages. These commentaries not only deal with the issues surrounding calendrical conversion, but also with related chronological and exegetical problems, ensuring that Hermann's readers would be able to appreciate his reasons for choosing his particular dates.[32]

In all preserved MSS, the text closes with a brief explanation or *declaratio*, which summarizes, in a very succinct and rudimentary manner, some of the basic features of the Jewish calendar for the convenience of readers unfamiliar with the subject. One important issue this *declaratio* fails to cover is the variability of Marḥeshvan and Kislev and the resulting set of six different year lengths. Instead, Hermann's summary makes it look as if there were only common years of 354 days and embolismic years of 384 days, while the preceding calendar pages make it seem as if the length of each month was fixed. His silence with regard to the existence of 'defective' and 'perfect' years may well reflect a lack of knowledge on this particular point, which might in part explain why his calendrical conversions encountered on the calendar pages often deviate by one or two days from the correct results.[33] The most noteworthy remarks made in this section concern the common features of the Greek and Hebrew lunisolar cycles in contrast to the Latin one. Hermann's claim that the Greeks begin their year from Tishri is reminiscent of Robert of Leicester's supposition that the Greeks hold the world to have been created in autumn

32 Individual cases will be discussed in the 'chronological commentary' starting on p. 556 below.

33 See pp. 557 and 562 below for examples. Hermann's failure on this point could be due to his reliance on the conversion methods laid out in Reinher of Paderborn's *Compotus emendatus*, where no mention is made of the various year types.

(see p. 169). In both cases, the conclusion was apparently based on the joint beginning of the Byzantine world era and Orthodox liturgical year on 1 September. Hermann is also correct in stating that the Byzantine-Greek cycle shared a beginning with the Hebrew cycle that was three years (or, rather, two years and nine months) later than that of the Dionysiac cycle used by the Western Church.[34] Contrary to what his words implied, however, the Hebrew and Greek cycles did not converge completely, because there was no correspondence in their pattern of common and embolismic years. Instead, the order of intercalation in the Greek cycle remained identical to the Dionysiac one, apart from the different way in which the years were numbered. That Hermann misunderstood this point is evident from the ninth chapter of his *Phaselexis*, where he praises the possibility of achieving synchronicity between the Latin, Greek, and Hebrew lunar cycles by setting back the Golden Number by three years. Hermann's assumption that this would make them all converge was probably due to Nicholas of Cusa, who propagated the same mistaken idea at greater length in his treatise on calendar reform.[35]

It can be concluded that Hermann's *Calendarium Hebraicum novum* takes an approach previously explored by Robert of Leciester and Nicholas Trevet in that it treats the Jewish calendar first and foremost as an exegetical tool. That said, it is very unlikely that Hermann had read either of these texts. Instead, we are in the lucky position of knowing at least two written sources that furnished the Cistercian scholar with information about Jewish calendar reckoning—aside from his personal contacts with Jewish informants (see pp. 479–480 above). The first of these sources was Reinher of Paderborn, a Westphalian compatriot of his, whose *Compotus emendatus* is referenced multiple times in Hermann's treatises *Tractatus phase* (1424), *De fermento et azymo* (1436), *Phaselexis* (1435/37), and *Compendium paschale* (1443) as well as in an undated *Opusculum de primo die saeculi* very likely written by him.[36] In addition, the *Calendarium Hebraicum*'s prologue contains a reference to the "new *computus* of the

34 On the Byzantine cycle, see Mosshammer, *The Easter Computus*, 92–94, 278–316.

35 Hermann Zoest, *Phaselexis*, c. 9, MS Oxford, Bodleian Library, Lyell 63, fol. 311$^{ra–va}$; Nicholas of Cusa, *Die Kalenderverbesserung*, ed. Stegemann, 52–54, 70–72, 76–80. Cf. the criticism in Kaltenbrunner, "Vorgeschichte," 346, 348–349.

36 See *Tractatus phase*, c. 1, MS Rostock, UB, math.-phys. 1, fol. 17^{r}; *De fermento et azymo*, c. 4, MS Munich, BSB, Clm 3564, fol. 147ra; *Phaselexis*, c. 2, 5, 7, 9, MS Oxford, Bodleian Library, Lyell 63, fols. 303^{rb}, 305$^{ra–b}$, 306^{vb}, 307ra, 311ra; *Opusculum de prima die saeculi*, MS Copenhagen, KB, Thott 825 4°, fols. 175^{vb}, 176^{rb}, 176^{vb}; *Compendium paschale*, ibid., fol. 181^{v}; *Phaselexis* (1435-recension), c. 2, 3, 4, 6, ibid., fols. 195^{v}, 197^{v}, 201^{r}, 207^{v}. For more on these texts, see Nothaft, "A Tool."

Hebrews that was composed in verse and prose in a most graceful maner" (*novus Hebreorum computus metrice et prosaice venustissime compositus*). This is an unmistakable acknowledgment of the *Computus Judaicus* of 1342, as confirmed by the fact that Hermann goes on to quote a mnemonic verse on the Hebrew months contained in numerous recensions of this text. The version he used is the one augmented by an additional line for *Veadar* (see p. 417 above), which can be found in a nearly identical form in the aforementioned MS Co from Marienfeld, containing both the *Computus Judaicus* and several of Hermann's own calendrical-chronological works.[37]

3 The Manuscripts

The *Calendarium Hebraicum novum* is attested in nine manuscripts plus one fragment, which shall be discussed in detail after this summary listing:[38]

A Vienna, Österreichische Nationalbibliothek, 12844, fols. 1^{r}–12^{r}. Paper, 12 fols., 8°; s. $XV^{2/2}$. Provenance: Viktring monastery.[39]

B Berlin, Staatsbibliothek Preußischer Kulturbesitz, lat. fol. 246, fols. 101^{v}–108^{v}. Paper, 268 fols., 283×201 mm. Date: 1458. Copied in Brunswick by Ludolph Borchtorp.[40]

L Lilienfeld, Stiftsbibliothek, 110, fols. 1^{r}–10^{v}. Paper, 224 fols., 4°; s. $XV^{2/2}$. Provenance: Kleinmariazell monastery.[41]

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37 MS Copenhagen, KB, Thott 825 4°, fol. 46^{r}: "Vadir addetur sic embolismus habetur." The codex contains the aforementioned *Opusculum de prima die seculi* (fols. 175^{rb}–177^{ra}), a short discussion *Quare interdum secundo mense pascha celebratur* (fols. 177^{ra}–178^{rb}), excerpts from Paul of Burgos (fol. $178^{rb–va}$), Hermann's *Compendium paschale* (fol. 179^{r}–186^{r}), the text of a reply sent by the Council of Basel to the clergy of Cologne regarding the date of Easter in 1444 (fol. $186^{r–v}$), a sermon on John 11:9 (fol. 187^{r}–188^{v}), and the rare 1435-version of the *Phaselexis* (fols. 191^{r}–208^{v}).

38 A further MS was once extant in Strasbourg's Municipal Library. See above, n. 24.

39 *Tabulae codicum*, 7:154.

40 Wilhelm Wattenbach, "Aus Handschriften der Berliner Bibliothek," *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde* 9 (1884): 624–630 (628); Folkerts, "Mittelalterliche mathematische Handschriften," 63–65; Zinner, "Aus alten Handschriften," 14–17; Pedersen, *The Toledan Tables*, 1:91–92.

41 Conrad Schimek, "Verzeichniss der Handschriften des Stiftes Lilienfeld," in *Die Handschriften-Verzeichnisse der Cistercienser-Stifte*, 2 vols. (Vienna: Hölder, 1891), 1:481–561 (516);

M Munich, Bayerische Staatsbibliothek, Clm 5919, fols. 114^{r}–124^{v}. Paper, 197 fols., 205×150 mm; s. XV. Provenance: Ebersberg monastery.[42]

N Munich, Bayerische Staatsbibliothek, Clm 18470, fols. 19^{v}–27^{v}. Paper, 147 fols., 290×210 mm; s. XV. Provenance: Tegernsee monastery.[43]

N1 Munich, Bayerische Staatsbibliothek, Clm 18470, fol. 24$^{r–v}$. Inserted leaf, fragment of a separate copy of the text, s. XVI$^{1/2}$ (?).

O Munich, Bayerische Staatsbibliothek, Clm 24868, fols. 23^{v}–32^{r}. Paper, 32 fols., 205×155 mm. Date: 1490. The text is preceded by the *Phaselexis* (1^{r}–23^{v}). Fols. 24^{r}–32^{v} are written by a different hand than the rest of the codex.[44]

P Wrocław, Biblioteka Uniwersytecka, IV.F.49, fols. 1^{r}–9^{r}. Paper, 230 fols., 300×215 mm. Date: ca. 1443–1453. The first leaf of the text, which included the beginning of the prologue, is no longer extant.[45]

V Vatican City, Biblioteca Apostolica Vaticana, Pal. lat. 1370, fols. 37^{r}–40^{v}. Paper, 177 fols., 285×210 mm. Copied in southwestern Germany in 1462.[46]

W Wolfenbüttel, Herzog-August-Bibliothek, Cod. Guelf. 206.1 Gud. lat., pp. 108–129 = fols. 55^{v}–66^{r}. Parchment, 60 fols., 215×145 mm. Provenance: Marienfeld monastery/Hermann Zoest, ca. 1443–1445.[47]

Pride of place among these MSS must doubtlessly be given to W, a luxuriously produced codex that is wholly dedicated to Hermann Zoest's works. An owner's

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A. Haidinger and F. Lackner, "Lilienfeld—Handschriftenliste (Version 2)," http://www.ksbm.oeaw.ac.at/lil/hss_v02.htm.

42 Halm, von Laubmann, and Meyer, *Catalogus*, vol. 1.3, 54.

43 H.V. Shooner, *Codices manuscripti operum Thomae de Aquino*, vol. 2, *Bibliothecae Gdańsk—Münster* (Rome: Editori di San Tommaso, 1973), 408; Wolny, Markowski, and Kuksewicz, *Polonica*, 138.

44 Halm and Meyer, *Catalogus*, vol. 2.4, 150.

45 Goeber and Klapper, *Katalog rekopisów* (see above, n. 59), 3:168–170.

46 Fritz Saxl, *Verzeichnis astrologischer und mythologischer Handschriften des lateinischen Mittelalters in römischen Bibliotheken* (Heidelberg: Winter, 1915), 20–30; Schuba, *Die Quadriviums-Handschriften*, 71–79.

47 Franz Köhler and Gustav Milchsack, *Die Gudischen Handschriften* (Wolfenbüttel, 1913; repr. Frankfurt: Klostermann, 1966), 192–193.

note on the verso side of fol. 1 leaves us in no doubt that the book was once in Hermann's personal possession and therefore probably comes from Marienfeld's monastery library.[48] In this capacity, it can be regarded as a companion to the aforementioned 'deluxe' MS of the *Evangelium ex quatuor unum* in Detmold (p. 480 above). Both MSS were produced in the same scribal workshop and contain annotations and marginalia from what appears to be Hermann's own hand.[49] Besides the *Calendarium Hebraicum novum* (fols. 66^{v}–65^{v}), W features two of Hermann's ecclesiastical-political works, which were likewise written during his time at the Council of Basel: *De ecclesiastica potestate et papali* from 1436 (fols. 2^{r}–42^{r}) and *De vocibus diffinitivis in conciliis* from 1438 (fols. 43^{r}–54^{r}). Appended to the *Calendarium* are a number of Hermann's lyrical works (fols. 66^{v}–68^{r}), mostly penned in his youth, which include a hymn on the Emperor Sigismund (1415), dedicated to the nuns of St. Giles and complete with musical notation.[50] As a final addendum, the collection closes with a list of Hermann's writings (fol. 69^{v}), mentioning 15 titles, which, however, cannot be regarded as even nearly exhaustive.[51] The text of W is very beautifully written, perhaps by a professional scribe who received his instructions directly from Hermann. There is a rich use of colour throughout the codex, including gold and multi-colour illuminations for large initials at the beginning of individual

48 MS W, fol. 1^{v}: "Liber Hermanni Zoest. de. Monasterio professi. in monte. de campo S. Marie. cisterciensis ordinis. Mon diocesis. ab. ipso. compilatus. opuscula tria. continens. scilicet de. ecclesiastica. potestate. et. papali. ac de vocibus. diffinitivis. in. conciliis. generalibus. atque kalendarivm. hebraicum. novum." Köhler and Milchsack, *Die Gudischen Handschriften*, 192, claim that the codex was written in Italy, but this doubtful.

49 Hellfaier, "Von Brügge," 129–130.

50 This hymn is edited in Zurbonsen, *Hermannus Zoestius*, 6–7. See also ibid., 5, for Hermann's *Carmen pro scolaribus sti. Liudgeri* (1399).

51 W, fol. 69^{v}: "Infrascripta compilata sunt ab Hermanno Zoest de Mon[asterio]: Sermones 25 de festis/ De fermento et azimo, Capitula 12/ Phaselexis de correctione paschalis erroris, Capitula 10/ Kalendarium hebraicum novum/ De vocibus diffinitiuis in conciliis generalibus, partes 3/ De potestate ecclesiastica et papali, capitula 14/ Questio de sabbato sancto/ Evangelium ex quatuor unum, capitula 190/ Historia de sanctis victorino et floriano cum notis/ Historia de s. Iheronimo cum notis/ Novus modus translationis corporum sanctorum/ Cronica quedam/ Gesta ottonis quarti Monast. ep./ De laude s. Benedicti et filiorum suorum, capitula 21/ De cesarea maiestate capitula 4." For an attempt at a full list, which, however, is also incomplete, see Tönsmeyer, "Hermann," 132, who knows of 23 works and 6 poems. On Hermann's possible authorship of an *Ars memorativa* in MS Vatican City, BAV, Pal. lat. 1769, fols. 137^{r}–140^{r}, see Sabine Heimann-Seelbach, *Ars und scientia: Genese, Überlieferung und Funktionen der mnemotechnischen Traktatliteratur im 15. Jahrhundert* (Tübingen: Niemeyer, 2000), 81–82.

texts as well as smaller red and blue initials to designate partitions within the texts. Red and blue ink is also used for particular historical entries in the *Calendarium*. Following its presumed origins in Marienfeld, the codex can be next located in the private library of Ferdinand of Fürstenberg (1626–1683), prince-bishop of Paderborn, who in 1678 added the diocese of Münster to his territory (as bishop coadjutor). Shortly before his death in 1683, Ferdinand bequeathed a number of his manuscripts, including W, to the philologist Marquard Gude (1635–1689), who had come to Münster as an emissary of the Danish king Christian V. Gude's sizeable manuscript collection was in turn acquired in 1710 by the ducal library in Wolfenbüttel, whose main librarian at the time was Gottfried Wilhelm Leibniz. At some point before his death, Gude allowed the Lutheran theologian Hector Gottfried Masius (1653–1709) to make a transcription of the whole codex, which was printed in its entirety in 1701 in Copenhagen.[52] This *editio princeps* of our text is now exceedingly rare and deviates from W in many places, making it a rather unreliable witness to the text. I therefore felt justified in making W once more the basis for my re-edition of the *Calendarium Hebraicum novum*.

Since the owner's note on fol. 1^{v} expressly states that the codex was compiled by Hermann himself, we can take the year of his death (1445) to establish a definite *terminus ad quem* for its production. The latest text it contains is from 1438, but the date could be narrowed down further, if the codex was put together only after Hermann return from Basel to Marienfeld in the year 1443. This might be indicated by the designation of Hermann as *professus in monasterio de campo S. Marie* in the owner's note on fol. 1^{v}. Hermann's monastery is also mentioned in five lines of verse that appear twice in the codex, once at the end of *De ecclesiastica potestate et papali* (fol. 42^{r}) and another time as an appendix to the *Calendarium Hebraicum novum* (fol. 66^{v}):

> Edidit Hermannus opus hoc vi pneumatis almi/ Ordo Cisterci fovet hunc campusque Marie/ Summe theos Christe, sis merces, sis salus ipsi/ Cum nece mandante persolvit debita carnis/ Tunc deus empirea des huicque perhennia regna.
>
> Hermann edited this work with the power of the nourishing [Holy] Spirit/ Whom the Cistercian Order and Marienfeld [monastery] foster./ Christ,

52 *Hermanni Zoestii Monachi ex ordine Cisterciensi qui tempore Concilii Basileensis vixit: Tria Opuscula Theologica*, ed. Hector Gottfried Masius (Copenhagen: Erythropel, 1701). Our *Calendarium hebraicum* is here found on pp. 108–136.

> greatest God, may you be his reward and salvation/ So that when he pays his carnal debts by the order of death/ You, God, may give him fiery and everlasting kingdoms.

In the case of the *Calendarium*, this is preceded by a note mentioning the time and place of composition: *Compilatum est prescriptum kalendarium anno gratie 1436 in Basilea, tempore concilii generalis* ("The above *kalendarium* was compiled in the year of grace 1436 in Basel, at the time of the general council"). A similarly styled ending is found at the end of *De vocibus definitivis* (fol. 54^{r}), dated to 1438, where the epigram reads:

> Herman conflavit opus hoc, erronea stravit/ De Münster natus, sed religione renatus/ Cisterci forma regit hunc sub celibe norma/ Quam dedit invictus legislator benedictus/ Nunc ipsum duces tu, qui super omnia luces/ Sic ducas, xpe, ne penas sentiat iste.
>
> Hermann put this work together, laying low false things. Born in Münster, but reborn through his religion. The Cistercian rule guides him under the standard of celibacy, which is given by the undefeated blessed law-giver. Now you shall guide him, you who shines above everything. May you guide him thus, Christ, that he shall not experience punishment.

The first set of verses, mentioning the monastery of Marienfeld, also accompanies the *Calendarium Hebraicum novum* in three other MSS, namely B (fol. 108^{v}), P (fol. 9^{r}), and V (fol. 40^{v}), although the third line (*Summe theos Christe, sis merces, sis salus ipsi*) is here consistently omitted. Out of these, MSS B and P also retain the statement that the work was compiled at Council of Basel in 1436, although only P preserves the original wording.[53] MS B additionally features the second epigram, placing it at the end of Hermann's *Phaselexis* (fols. 94^{v}–101^{r}), which is then followed by the draft text of the ill-fated calendar reform decree of 1437 (fol. 101$^{r–v}$) and the *Calendarium Hebraicum* (fols. 101^{v}–108^{r}). As can be inferred from a colophon on fol. 101ra (*copiatus autem in Brunswick 1458° currente in vigilia corporis Christi*), the entire string of texts

53 MS B, fol. 108^{v}: "Et in hoc terminatur declaratio huius kalendarii, quod completum est et editum anno gratie 1436 in Basilea, tempore concilii generalis." MS P, fol. 9^{r}: "Compilatum est prescriptum kalendarium anno gratie 1436 in Basilea, tempore concilii generalis." See also MS N, fol. 27^{v}: "Compilatum est prescriptum kalendarium anno gratie 1436." The date 1436 is also mentioned at the end of MS O, fol. 32^{r}.

was copied in 1458 in Brunswick (Braunschweig), Northern Germany. Although the colophon only directly applies to the *Phaselexis*, the script and arrangement in the MS strongly suggest that all three texts were written down in close succession. Indeed, the final page of the *Calendarium Hebraicum* (fol. 108^{v}) contains a note in red ink that refers back to the previous two treatises with the following words: *Set cum consilium* [sic!] *Basiliense non habuit progressum, ideoque hec materia huius tractatus mansit non confirmata et ecclesia mansit in pristinis erroribus* ("Yet since the Council of Basel did not make any progress, the subject matter of this treatise remained unconfirmed and the church remained in its old errors"). From the wording (*huius tractatus*) and placement of the note in the MS, it would seem that the copyist made no great distinction between the *Phaselexis* and the *Calendarium*, but treated them as one continuous treatise.

The copyist in question can be identified as Ludolph Borchtorp, who studied at the University of Erfurt and became a *magister artium* in 1445. He later went to Padua, where he attained the doctorate in medicine, before returning to his hometown Brunswick, where the present part of MS B was copied.[54] Concerned not to waste any paper, Borchtorp made ample use of the wide margins that the layout of the calendar pages in the *Calendarium Hebraicum* permitted to add further content. A number of these additions are related to the subject at hand. For example, the page for Nisan is adorned with an excerpt from the *Phaselexis* dealing with the chronology of Christ's Passion.[55] In contrast to this, the lower half of the calendar page for Tammuz, which was empty in Hermann's original composition, is filled with an unrelated table listing all 30 instances in which the Easter dates according to the Church were about to differ from the astronomically legitimate dates during the years 1477 to 1531. To the right of the table, a long paragraph explains the troubles caused by the receding date of the equinox, before lashing out against the Jews for their insolent mockery of

54 On Ludolph Borchtorp, see Helmar Härtel, "Ludolphus Borchdorp de Brunswick," *Braunschweigisches Jahrbuch* 68 (1987): 113–120 (116–118); Olivier de Solan, "La réforme du calendrier dans une question quodlibétique d'Henri de Runen (1444)," *Bibliothèque de l'École des Chartes* 157 (1999): 171–220 (180–183).

55 MS B, fol. 102^{v}: "Dominus noster cenavit quarto nonas Aprilis, luna 14a, et tertio nonas Aprilis, luna 15a, mors mortem in cruce superavit et pridie nonas eiusdem mensis sabatisavit in sepulchro, requiescens ab opere quod patrarat orbem perditum, recuperando ac rediviva fevicis caro nonas Aprilis, 17a luna, florens resurrexit." This is a modified quotation from *Phaselexis* (1437), c. 3. Cf. MS B, fol. 95^{vb}. Further examples would be the excerpts from *De fermento et azymo*, c. 6 that appear on fols. 105^{v} and 108^{v}. Cf. MS Munich, BSB, Clm 3564, fols. 148va–49va.

the ecclesiastical calendar. The table along with the accompanying text was in fact copied from Johannes Regiomontanus's popular printed *Calendarium* and thus cannot have been added to the MS before the latter's first appearance in 1474.[56] Regiomontanus's calendar was also the source for a table indicating the natural day length for different latitudes, which takes up most of the calendar page for Marḥeshvan.[57]

Besides W and B, the only other copy that can be associated with a particular person is MS V, which is part of a codex of astronomical and astrological works, assembled and owned by Matthias Widman of Kemnat, a humanistic scholar and historian who taught in Heidelberg.[58] Among the noteworthy features of V is its parsimonious use of space, always cramming two months of the Hebrew calendar onto a single page. The text's prologue here follows as an appendix to the main *kalendarium* rather than prefacing it. From the point of view of the present edition, however, the most important feature of MSS B and V is that they present the text of the *Calendarium Hebraicum novum* in a different version than MS W, which shall henceforth be referred to as recension β. This second recension is also found in all other remaining MSS (ALMNOP), making W the sole witness to what I take to be the original form (α). Although frequent and noticeable, the textual differences between the two recensions remain for the most part superficial and usually concern the precise wording rather than the actual content of individual passages. A telling example would be the following snippet from Hermann's commentary on the date of Jesus's birth, which shall be reproduced both as it appears in W and in the version found in all other MSS, here represented by P:

56 MS B, fol. 104^{r}: "Maxima autem ac nimis pudenda est contumelia quam nobis Hebraica duricies, servuum istud pecus, inferre non erubescit. Numquam in nos cavillandi finem faciens: ut qui a se non minimam sacre litterature partem mutuati simus ne primum quidem divine legis monimentum servare studeamus, ignorantiam nobis vel inconstantiam impingens." See Johannes Regiomontanus, *Kalendarium* (Nuremberg, 1474), not paginated, which is also the source for the rest of the paragraph, with the exception of a few lines in the middle.

57 MS B, fol. 106^{r}: "Tabula quantitatis dierum artificialium, sed diversam elevationem poli artici." This is based on the chapter "De magnitude diei" in Regiomontanus, *Kalendarium*.

58 On the owner, see Ute von Bloh, "Hostis Oblivionis et Fundamentum Memoriae: Buchbesitz und Schriftgebrauch des Mathias von Kemnat," in *Wissen für den Hof*, ed. Jan-Dirk Müller (Munich: Fink, 1994), 29–120.

W, p. 124	**P, fol. 6^{v}**
Quidam professor Theologie dicit unam diem esse pretermissam, et negat radices notarum anni Alphonsi. Et errat valde, quia si Christiani errassent, numquid Iudei, Arabes et Persi etc. errassent? Et si bissextus fuisset omissus, tunc semper una die tardius haberemus coniunctiones, eclipses et motus quam alie nationes.	Est igitur quidam professor Theologie, qui propter hoc ad tantam venit vesaniam, ut dicat unam diem esse pretermissam, et negat radices notarum anni Alfonsi. Sed hoc dicere est absurdum, quia si Christiani errassent, certe Iudei, Arabes et Perse non errassent. Etiam si bissextus omissus fuisset, tunc nos semper una die tardius haberemus coniunctiones, eclipses et motus quam alie nationes.

The most dramatic change to the text in recension β consists in the addition of a complete paragraph to the commentary on the date of John the Baptist's conception, belonging to the calendar page for Tishri. In MS P it reads thus:

> Annunciatio Iohannis non est hic signata. Et ratio est quia Albertus super Lucam et multi alii doctores dicunt angelum Gabrielem Zacharie apparuisse in die expiationis. Sed Nycolaus de Lyra sentit oppositum, quia si Zacharias illa die incensum obtulisset, tunc summus sacerdos fuisset, quia nullus poterat intrare sanctam sanctorum quam summus pontifex semel in anno. Et ipse dicit quod per incensum debet intelligi holocaustum super altare holocausti positum. Et addit nullibi legitur quod Zacharias erat summus pontifex.[59]
>
> The Annunciation of John is not marked here. And the reason for this is that Albert, [in his commentary on] Luke and many other doctors say that the angel Gabriel appeared to Zechariah on the Day of Atonement. But Nicholas of Lyra thinks the opposite, for if Zechariah had made an offering of incense on that day, he would have been the High Priest, because nobody can enter the Holy of Holies except for the High Priest once a year. And [Nicholas] says that by 'incense' one must understand the burnt offering that was put on the Altar of Burnt Offering. And he adds that it is nowhere to be read that Zechariah was the High Priest.

59 MS P, fol. 5^{r}.

In MSS ALMPV as well as in N1 (with slight revisions), this paragraph is always found prefacing the original commentary on the conception of John, which in Hermann's *Calendarium* is assigned to 27 Tishri. Yet the wording makes it clear that the text added by recension β cannot have been intended for the same date. It starts with the statement that "The Annunciation of John is not marked/signalled here" (*Annunciatio Iohannis non est hic signata*), which means that it must have originally belonged to a date and line in the calendar that lacked any notice of this event. Indeed, the paragraph mentions the traditional view regarding this date, which places the appearance of the archangel Gabriel to the priest Zechariah on the Day of Atonement and which was opposed by Nicholas of Lyra (see pp. 183, 187–188 and 562–563 for further details). According to this view, one could have expected the conception of John to fall either on the Day of Atonement itself (10 Tishri) or the following day (11 Tishri), and one of these two dates must have been the original point of reference for the paragraph in recension β. This arrangement is to a certain extent still discernible in the margins of MSS P (fol. 5^{r}) and V (fol. 38^{v}), where the commentary in question begins roughly at the height of 14 Tishri and is visibly offset as a separate unit of text, although it is immediately followed by the commentary on 27 Tishri. In MSS A (fol. 7^{v}), L (fol. 6^{v}), and M (fol. 120^{r}), by contrast, the remarks on 10/11 and 27 Tishri have been fused into one and appear together on a separate page. A further deterioration of the original arrangement is exhibited by MS B (fol. 105^{v}), where the additional paragraph, with revised wording, comes as an appendix to the commentary on 27 Tishri, rather than prefacing it. This order is also chosen in MS O (fol. 28^{v}), where the passage has been truncated, leaving out most of the second half. As we shall see further below (p. 501), this was probably also the case in MS N, whose original calendar page for Tishri has been lost.

It is difficult to tell whether the new paragraph on John's 'Annunciation' or any of the other changes in recension β go back to Hermann Zoest himself or were the work of a later redactor. The former possibility would receive some support from the fact that Hermann did produce more than one redaction of the *Phaselexis* (and also intended a revision of *De fermento et azymo*) and thus would certainly have been capable of writing out slightly different versions of his work on separate occasions.[60] Since the additional paragraph fulfils an

60 The earlier version of the *Phaselexis* from 1453 contains six chapters and is found in MS Copenhagen, Kongelige Bibliotek, Thott 825 4°, fols. 191^{r}–208^{v}. The more common version in ten chapters dates from 1437 and discusses a calendar reform slated to take place in May 1439 (in chapter 8). See, e.g., MSS Oxford, Bodleian Library, Lyell 63, fol. 309va; Melk,

important function by justifying the *Calendarium*'s controversial dating of the conception of John the Baptist to 27 rather than 11 Tishri, it is perhaps not too bold a conjecture that recensions α and β both came from Hermann's pen. Moreover, it has already been noted that MSS B and P both explicitly mention 1436 and the Council of Basel as the time and place at which the present work was compiled. If this was not simply derived from the dating clause in W, this might raise the possibility that the archetype of this recension dates back to Hermann's time at Basel.[61] In such a scenario, it is even possible that recension α is the later of the two versions, perhaps written down only after Hermann had returned to Marienfeld. Whatever may have been the case, the text of W is so clearly superior to that of any MS containing recension β, none of which is without signs of corruption, that it seemed advisable to make it (and hence recension α) the basis for the edition to follow.

Another noteworthy feature of the MSS of recension β is that they omit the month names in Hebrew script that adorn the top of the pages in W. This omission runs counter to Hermann's announcement in the prologue, also preserved in recension β, that he will feature the names of the Jewish months in both Hebrew and Latin letters.[62] It is therefore likely that the Hebrew script was still present in the archetype, but was soon after dropped by copyists who were unfamiliar with the Hebrew alphabet or irritated by the foreign script. One major exception is MS N, from the monastery of Tegernsee in Bavaria, where the Hebrew names are supplied, but in a completely different, and peculiar, orthography compared to W, where most of the names are spelt correctly. As a matter of fact, the renderings in N are best explained as transliterations from the Latin. This indicates that the scribe of N, knowing from the prologue that the original version contained Hebrew script, but not finding it in his exemplar, decided to supply the missing names himself. The scribe was hence familiar with the phonetic values of the Hebrew letters or with some system of conversion between Hebrew and Latin script, but not with the orthography of the Jewish month names. MS N was almost certainly the exemplar of O, which was copied in 1490, making it the latest fully preserved witness to the *Calendar-*

Stiftsbibliothek, 1916, p. 15. The copies found in codices that also contain the *Calendarium Hebraicum novum* feature a slightly altered second recension that changes the date of reform to February 1441. See MSS B (fol. 98^{vb}), N (fol. 14^{v}), and O (fol. 16^{v}). The same change occurs in MSS Munich, BSB, Clm 3564, fol. 143ra; Vatian City, BAV, Pal. lat. 870, fol. 10^{v}.

61 See n. 53 above.

62 In MSS A (fol. 2^{v}) and L (fol. 2^{r}) *Hebraicis et Latinis literis* is changed to *Hebraicis et Latinis nominibus*, apparently in response to this omission.

ium Hebraicum.[63] Although the scribe of O once more suppressed the Hebrew script, the relation between both MSS is clearly indicated by the strong similarities in layout and the use of colour as well as their shared variations and scribal errors. This conclusion is further supported by the fact that both manuscripts most likely originated in the same geographical region and that in both the *Calendarium Hebraicum* follows upon Hermann's *Phaselexis*.[64]

Given this relation, the value of MS O lies chiefly in its ability to serve as an indirect witness to two calendar pages that have been lost from N. That these pages have gone missing can be inferred from the fact that the pages for Tishri and Marḥeshvan found in the present make-up of N (fol. 24^{r-v}) were written in a completely different script and layout from the rest of the MS. It must be suspected that the leaf containing these pages was originally taken from a different copy of the *Calendarium* and inserted into N at a later point, presumably in order to compensate for a lost leaf. The calendar page for Tishri in this foreign copy, here designated as N1, features a number of additions that cannot be found in any other known version of the text. These *inter alia* concern the seven-day feast celebrated by Solomon for the dedication of the Temple (2 Chronicles 7:8–9), which, in accordance with Nicholas of Lyra's exposition of the relevant passage, is here assigned to 8–14 Tishri,[65] as well as an episode recorded in 2 Chronicles 7:10, where Solomon "sent the people away unto their tents" on 23 Tishri. Moreover, the entries for 23 and 24 Tishri reference the events described in the book of Nehemiah 9, when the "seed of Israel separated themselves from all foreigners" (9:2).[66] Since all preserved versions of the *Calendarium* elsewhere date the separation of the Jews from the foreign wives and children to 20 Kislev, based on the parallel account in

63 See the dating clause in MS O, fol. 32^{r}: "Hec anno etc. 1436. Et rescriptum 1490 IIIa die Mai."

64 In MS N, the first page of the *Phaselexis* (fol. 4^{r}) contains the following marginal note: "Ille tractatus est compilatus per Hermannum Cisterciensis ordinis monacum, ut patet infra tertio capitulo, ubi aliqua dicit se latius declarasse in tractatum ab eodem edito de fermento et azimo, qui requiratur in libello ubi habetur Augustinus 'De spiritu et anima' et Seneca 'De 4or virtutibus cardinalibus'." This is an unmistakable reference to MS Munich, BSB, Clm 18536, also from Tegernsee, which contains the mentioned texts alongside an early copy of the *De fermento et azymo* (a. 1444).

65 See Nicholas of Lyra, *Postilla* (2 Paralipo. 7), vol. 1, sig. $ZZ7^{va}$: "Eo quod dedicasset altare septem diebus, quae dedicatio incepit octava die mensis septimi et finita fuit .xiiii. die eiusdem mensis inclusive."

66 This again follows the commentary of Nicholas of Lyra, *Postilla* (Neemie 9), vol. 3, sig. $B8^{ra}$: "Et ideo transacta die collecte que fuit .xxii. dies mensis septimi in crastino separaverunt semen filiorum israel ab alienigenis et .xxiiii. die ieiunaverunt induti saccis et aspersi capita pulvere in signum vere penitentie et humiliationis."

the book of Ezra (10:9), it seems clear that these additions do not go back to Hermann himself. Neither are any of these additions found in MS O, whose text differs considerably from N1, despite being close to identical to N on all other pages. This suggests that N1 was inserted into N only after O had been copied from it.[67]

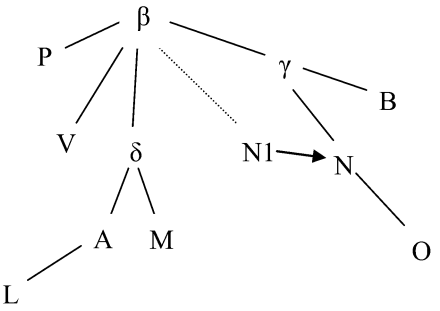
The aforementioned variations in the commentary section provide a formidable starting point for parsing the MSS of recension β into groups. A clear relationship can be established between A, L, and M, which share a large number of unique variants. The similarities are particularly conspicuous between MS A, originally from Viktring, a monastery of Hermann's Cistercian order in Carinthia, and MS L, now at the library of the Cistercians in Lilienfeld (Lower Austria). Aside from a large number of shared textual variants, corruptions, and omissions, both copies also have in common a distinctive layout, which differs from that found in other codices. In this layout, most of the longer marginal commentaries (those for 3/15 Nisan, 3 Iyyar, 17/27 Iyyar, 27 Tishri, 11 Tevet, 23/25 Tevet, and 30 Veadar) have been moved to separate pages, whilst a system of symbols (in red ink) links the texts back to their respective dates on the calendar pages.[68] The fact that these symbols look virtually identical in both manuscripts strengthens the supposition, followed in the stemma below, that L was copied directly from A, although the text incurred numerous further corruptions in the process. A close relative to both is MS M, which comes from the Benedictine monastery of Ebersberg near Munich. This copy accords with A and L in its use of separate pages for the chronological commentaries on Nisan, Tishri, and Tevet (fols. 116^{v}, 120^{r}, 122^{r}), although it lacks any symbols for identification and the notes on Iyyar are still found in the margins of the same calendar page, as is the case in all other MSS. At the same time, however, it omits certain elements of the text, in particular the calendrical entries for 13 Nisan ('Judas sold Christ') and 21 Shevat ('Hypapante'), which are present in both A and L. The most economical way to explain this situation is to suppose that A and

67 The same holds true for the numerous further additions and annotations made from a third hand (sixteenth century) that appear in N, but not in O. Additions from later hands are also found in M.

68 In MS A (fol. 3^{r}), the long commentary on the date of the Annuntiation and Passion (3/15 Nisan) is featured on a separate page after prologue. MS L (fol. 2^{r}) instead simply tacks the text onto the second prologue, without indicating where it originally belonged. Both use an extra page for the commentaries on Iyyar that precedes the actual calendar page (A, fol. 4^{r}; L, fol. 3^{r}). In the case of Tishri (A, fol. 7^{v}; L, fol. 6^{v}) and Tevet (A, fol. 9^{v}; L, fol. 8^{v}), this order has been reversed. The commentary on 30 Veadar appears on the same page as the closing *declaratio* (A, fol. 11^{v}; L, fol. 10^{v}).

M go back to the same exemplar rather than being copies of each other. This sub-archetype, designated δ in the stemma below, was in turn related to the exemplar of P, which is a relatively early copy, probably still made in the 1440s. Its most unusual feature is the occasional insertion of additional information about month names, taken from Josephus's *Jewish Antiquities*, into the headlines of certain calendar pages.[69]

In putting together a rough stemma for recension β, I have used the additional paragraph on John's conception as the crucial diagnostic feature. As has been noted above (p. 499), the paragraph in question must have originally preceded the commentary on 27 Tishri. This is the order still preserved in MSS P, V, and δ (which spawned ALM), whereas MSS B and N/O reverse this arrangement and thus obfuscate the paragraph's original function. This suggests that P, V, and δ are more closely related to the archetype of recension β than B and N/O. For the latter three witnesses, I have conjectured that they are removed from β via the shared sub-archetype γ. This mutual relationship is also supported by other variants and scribal corruptions documented in the critical apparatus. For instance, both B and O (which serves as an indirect witness to the lost pages of N) suppress the brief marginal note on the martyrdom of St. Matthew found in all other MSS on the calendar page for Tishri. Due to the paucity of preserved material (i.e. only the pages for Tishri and Marḥeshvan) and the signs of heavy revision, I have been unable to clearly assign MS N1 to either of these groups. Since, however, the arrangement of the paragraphs on John's conception is more similar to that in ALMPV, I have tentatively associated it with the latter group. The resulting stemma looks like this:



69 In the case of Av (fol. 4ʳ), Shevat (fol. 7ʳ), and Adar (fol. 7ᵛ).

4 The Edition

The present edition closely follows the text of recension α of Hermann's *Calendarium*, which is solely represented by MS W. The page breaks in the original MS are noted in the margins. Wherever possible, I have preserved the original interpunctuation and spelling of W, although the use of *c*/*t* and *u*/*v* has been normalized (as in the previous editions). In noting variant readings in the apparatus, the main goal was to document the major changes to W made by recension β, without listing every single variant between its individual manuscripts. To do otherwise would have considerably inflated the apparatus without offering much additional insight. Among the variants that have not or only rarely been documented are mere changes in word order, variations in orthography and in the use of numerals as well as some of the more obvious scribal corruptions in L and V. In B, the scribe filled the empty spaces left on the calendar pages with various additional texts and tables. Since this material is not directly related to the text at hand, it has been omitted from the edition. The same applies to entries and marginal notes found on the calendar pages of M and N that come from considerably later hands. The source references found in the outer and inner margins of the calendar pages have been added in parentheses next to the entries themselves, in the forms found in W. Omissions and corruptions of these source references in the manuscripts of recension β have been acknowledged in only a few particularly significant cases.

Prologus in kalendarium hebraicum

"*Vidi in dextra sedentis super thronum librum scriptum intus et foris*." Apokalipsis 5. Illa gloriosa et prepotens regina, Sacra Scriptura, *dicitur liber scriptus exterius, quantum ad sensum historicum et litteralem, et interius, quantum ad sensum misticum et spiritualem*.[1] Qui quidem misticus sensus tripharie dividitur, scilicet in allegoricum, tropologicum et anagogicum. Et cum historicus sensus tribus hiis adiungitur, proculdubio quadruplex sensus sacre theologie reperitur. Unde versus: "*littera gesta docet, quid credas allegoria, moralis quid agas, quo tendas anagogia*."[2]

Quamvis igitur litteralis sensus ipso mistico sensu longe sit inferior, ipse tamen est fundamentum super quo misticus sensus est fundatus et radix unde suum traxit ortum. Licet etiam manifestus et clarus fore videatur, in quibusdam tamen, ymmo in multis quidem, locis multum intricatus est
109 et | obscurus. Reperio igitur in eo triplicem obscuritatem seu difficultatem, prout sufficit pro presenti: prima quidem difficultas consistit in hoc quod ille primus theologus legisquelator, Moises, et prophete interdum nimis obscure sunt locuti. Contra hanc quidem difficultatem per doctores tam hebraicos quam catholicos satis est provisum, qui illas obscuritates in suis expositionibus et postillis plene elucidarunt. Quibus ipsa vera sophia ineffabile premium promittit, dicens "*qui me elucidant vitam eternam habebunt*."[3] Et hoc saltem quoad catholicos.

Secunda difficultas est in hoc quod in quibusdam locis non solum sufficit expositio littere, sed etiam requiruntur imagines et figure. Sicut est

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2 Prologus] Sequitur nunc prologus *B* ‖ hebraicum] [*ABLNOVW* ‖ hebraicum] hebraycum *NOW* **3** Vidi] [*M* ‖ scriptum … foris] intus scriptus et foris *V* **4** regina … Scriptura] pagina sacre scripture *L* **6** Qui … sensus] Qui quidem sensus misticus *NO* Qui quidem misticus *V* Misticus quidem sensus *L* ‖ tripharie] triumpharie *V* **8** tribus] *om. M* **9** versus] *mg. W* ‖ quid] quod *A* **11** longe] longo *M om. V* **13–14** manifestus … quidem] in aliquibus *L* **15** igitur] ego *L* ergo *AM* **16** pro] de *ALM* **17** legisquelator] legislator *ALM* **18** hanc] *om. ALM* ‖ quidem] quam *L* **23–24** sufficit] *add.* in hoc *AM* sufficiat *V*

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[1] Nicholas of Lyra, *Postilla super totam Bibliam* (prologus secundus), vol. 1, sig. A2^{vb}.

[2] Ibid. (prologus primus), vol. 1, sig. A2^{va}.

[3] Sir 24:31.

Hermann Zoest: A New Hebrew Calendar

Prologue to the Hebrew Calendar

"And I saw, in the right hand of him that sat on the throne, a book, written within and without." Apocalypse 5:1. This glorious and very powerful queen, Holy Scripture, is [here] called a book written on the outside, in so far as its historical and literal sense is concerned, and on the inside, as pertains to its mystical and spiritual sense. The mystical sense is divided into three parts, namely allegorical, tropological, and anagogical. And as soon as the historical sense is joined to these, one doubtlessly finds a fourfold sense of holy theology. Whence the verses: "The letter teaches the events, the allegory what you should believe, the moral [sense] what you should do, the anagogy where you should be going."

Now although the literal sense is inferior by far to the mystical, it nonetheless serves as the basis on which the mystical sense is founded and as the root from which it traces its origin. And although it may seem evident and clear, it nevertheless turns out to be very complex and obscure in some, or rather in many, places. I consequently find in it a threefold obscurity or difficulty, as shall suffice for the present: the first difficulty consists in the fact that the first theologian and lawgiver, Moses, and the prophets sometimes spoke all too vaguely. Against this difficulty sufficient help has indeed been provided by the doctors, both Hebrew and Catholic, who have fully elucidated these obscurities in their commentaries and postills. To these men, true Wisdom promises an unspeakable reward, saying "they that explain me shall have life everlasting." And this holds true provided that they are Catholic.

The second difficulty consists in the fact that in some passages the exposition of the letter does not suffice by itself, but images and symbols are also

dispositio arche Noe, fabrica tabernaculi testimonii, archa federis, mensa propositionis, candelabrum septem lucernarum. Et sicut est ornatus et figura altaris incensi et altaris holocausti. Preterea sicut sunt dispositio templi Salomonis et in ipso contentorum, scilicet columnarum maris enei et
110 luterum. Insuper sicut sunt quedam contenta seu descripta in Ezechiele | 5
et Apokalipsi. Contra has nempe difficultates etiam satis est provisum per doctores hebraicos et catholicos, et precipue per Rabi Salomonem et Nicolaum de Lira.

Tertia difficultas consistit in temporibus, scilicet in annis, mensibus et diebus. Isti enim anni qui in Biblia reperiuntur non sunt illi qui in Romano 10
kalendario continentur (similiter menses et dies), sed sunt lunares Hebreorum menses. Hii denique sunt menses de quibus dominus Genesis 1° dicit: "*Erunt in signa et tempora, in dies et annos* et menses." Hii sunt menses de quorum uno, qui Nysan dicitur, dominus ait Exodi 12: "*Mensis iste principium mensium, primus erit vobis in mensibus anni*," qui quidem pasche cerimoniis 15
sacratus est. In cuius plenilunio filii Israhel de durissimo pharaonis imperio sunt erepti per esum paschalis agni. Hii sunt menses in quorum primo et eius plenilunio agnus Dei, qui tollit peccata mundi, pro salute nostra immolatus est per tipicum agnum presignatus. Hii sunt menses in quorum primo sacrosancte sinodi et sacri canones pascha mandant celebrari.[4] Et qui hos 20
111 menses non cognoscit parvam | noticiam, ymmo nullam veram, primi mensis noticiam habet. Primus enim terminus relativus est et ideo refertur ad subsequentes.

Cum igitur ipsa sacra theologia hiis mensibus sit plena et cum propter ipsorum ignorantiam normam iam dictorum mensium non cognoscimus, 25
eo quod usum Romanorum annorum et mensium habemus, ideo necessarium fore iudicavi obscuritatem hanc elucidare. Nondum enim aliquem vidi in hac materia laborasse. Licet autem septuaginta interpretes Hebreorum computum ad Grecam linguam transtulerunt, ipsos tamen menses ad dies nequaquam extenderunt. Similiter quamvis et novus Hebreorum com- 30
potus metrice et prosaice venustissime sit compositus et in diversis mundi

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1 Noe] *om. B* **2** septem] 7 *W* **3** dispositio] dispositiones *AL* **5** seu] et *B* **9** difficultas] facultas *V* ‖ temporibus] tribus *AL* **10** enim] quidem *V* ‖ reperiuntur] inveniuntur *V* **11** sed sunt] Sunt enim *M* **13** Erunt] *add.* vobis *L* ‖ in] *om. AM* **18** Dei] ducitur *A* **21** veram] veterem *A* veterum *L* **24** ipsa] *om. ALM* ‖ cum] *om. AL* **25** normam] *om. V* **27** enim] *mg. L om. V* **29** Grecam] gratam *AM* ‖ linguam] litteram *NO* **30** Similiter] *add.* et *ALM*

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[4] Cf. Hermann Zoest, *Phaselexis* (1435), prologus, MS Copenhagen, KB, Thott 825 4°, fol. 193[r].

required. This is the case with the layout of Noah's Ark, the shape of the Tabernacle of Testimony, the Ark of the Covenant, the Table of Proposition, the Seven-Armed Candelabrum. And thus it is also with the decor and shape of the Altar of Incense and the Altar for Burnt Offerings. Other examples of this kind are the layout of Solomon's Temple and the things contained in it, namely the columns, the Brazen Sea, and the lavers. Moreover, it is the case with some of the things included or described in Ezekiel and the Apocalypse. Against these difficulties, sufficient help has certainly been provided by the Hebrew and Catholic doctors, and chiefly by Rabbi Salomon and Nicholas of Lyra.

The third difficulty is chronological, i.e. it concerns years, months, and days. For the years that are found in the Bible are not the same as those included in the Roman calendar (the same being true for the months and days), but they are based on Hebrew lunar months. These, in fact, are the months about which the Lord speaks thus in Genesis 1:14: "Let them be for signs, and for seasons, and for days and years and months." These are the months concerning one of which, called Nisan, the Lord says in Exodus 12:2: "This month shall be to you the beginning of months; it shall be the first in the months of the year," which indeed is dedicated to the paschal ceremonies. During the full moon of this month the sons of Israel were rescued from Pharaoh's ruthless tyranny through the eating of the Passover lamb. These are the months in whose first, during its full moon, the Lamb of God, who takes away the sins of the world, was sacrificed for our salvation, having been prefigured by the symbolic lamb. These are the months in whose first Easter must be celebrated according to the order of the most holy synods and sacred canons. And anyone unacquainted with these months has little idea, indeed none that is true, of the first month. For the time of the first is relative to and thus dependent on those that follow.

Now since sacred theology is itself replete with these months and since, thanks to our ignorance of them, we are unable to recognize the pattern of said months, due to the fact that we have the Roman years and months in use, I have deemed it necessary to bring light into this darkness. For thus far I have seen no one else working on this subject matter. The Seventy Interpreters, although they translated the *computus* of the Hebrews into the Greek language, did by no means extend this from months to days. Similarly, although a new Hebrew *computus* was composed in both verse and prose in

partibus satis sit communis, ipse tamen predictam non potest tollere difficultatem, quia et ipse etiam ad dies non est extensus.

Est igitur optime advertendum quod Hebrei duplices primos menses habent. Ab antiquo namque et a principio Tisri erat primus mensis et adhuc est quoad ciclum incipiendum et quoad lunationes. *Sed propter illud magnum benefitium* et speciale | donum quando eos Dominus nocte pasche de Egipto liberavit ipse mensis Nysan, qui erat septimus, ex Domini precepto primus est vocatus.[5] Et hoc quoad festa.

Menses hebreorum de quibus Scriptura loquitur in hiis metris continentur: "*Tysri, Marhezwan, Kyslev, Tewes, Svat et Adar/ Nysan, Ygar, Siwan, Thamus, Av, sit ultimus Elul/ Wasar addetur, sic embolismus habetur*."[6]

Est igitur kalendarium subsequens maxime necessarium hiis qui in scholis Biblie libros legere solent, sive sint Baccalaurii Biblici, sive hiis altiores, sive per se studere cupientes. Nam cum legunt Genesi 7° quod Noe intravit arcam 17 die mensis secundi, non debent credere quod hoc sit factum in Februario, qui secundus Romanus mensis est. Et cum legunt quod idem Noe exivit de archa mense secundo, 27 die, non estiment ipsum ultra annum in archa stetisse. Et ita de aliis in textu biblie conscriptis.

Et quia non de ciclo aut noviluniis intendo tractare, sed de festis et aliis notabilibus gestis, ideo de ipso mense Nysan incipiere temptabo. Confidens igitur de largo conditoris munere, *qui solem suum oriri | facit super bonos et malos*,[7] ad aratrum manum ponam, Hebreorum communem annum per

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2 ipse … extensus] *om. L* **3** primos] diversos *ALM* **4** et] a quo *N* (*p.c.*) *O* **5–6** quoad … et] *om. V* **10** Tysri] Tisri *ABMO* Trisi *L* ‖ Marhezwan] Marchezwan *B* Marherwan *ALM* Mareswan *V* ‖ Kyslev] Kislev *BO* ‖ Tewes] Teyres *ALM* ‖ Svat] Swat *ALMNOV* ‖ Nysan] Nisan *O* ‖ Ygar] Agar *A* ‖ Ygar] [*P* ‖ Siwan] Sywan *B* Swan *ALM* **10–11** Thamus] Tamus *LV* **11** Av] Aw *AL* autem *V* ‖ Wasar] Waser *V* ‖ sic] si *V* ‖ habetur] *add.* (red ink): Aliter scribuntur et melius menses Hebreorum ab Aprili inchoantes sic: Nysan [Aprilis], Ydar [Maius], Sywan [Iunius], Thamus [Iulius], Aw [Augustus], Elul [September], Tysri [October], Marcheswan [November], Kyslew [December], Tewes [Ianuarius], Swat [Februarius], Adar [Martius], Wasar [Embolismus] addetur sic embolismus habetur. *L* **12** igitur] ergo *AM* ‖ qui] *om. P* **13** Biblici] Biblie *B* **15** 17 … secundi] 17 mensis die mensi dicti *M* ‖ 17 … sit] *om. AL* ‖ factum] *add.* est *L* **18–20** Et … gestis] *om. L* **18** ita] *add.* dicitur *AM* **20** Nysan] *om. AL* **21** igitur] ergo *ALM om. V*

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[5] Cf. Hermann Zoest, *Phaselexis* (1435), c. 6, MS Copenhagen, KB, Thott 825 4°, fol. 206r: "Sed propter illud magnum beneficium quod prestitit illis deus in prima paschali nocte precepit mensem dictum Nysan aliomodo vocari primum et sic Nysan est primus mensis legalis ex precepto et etiam quoad festorum observationem."

[6] *Computus Judaicus*, c. 1.3, MS Copenhagen, KB, Thott 825 4°, fol. 46r.

[7] Mt 5:45.

a most graceful manner and is [now] quite common in various parts of the world, it cannot remove the aforementioned difficulty, because it, too, does not extend to individual days.

It is therefore necessary to pay close attention to the fact that the Hebrews have two definitions of the 'first month'. From antiquity and from the beginning the first month was Tishri and it still is as far as the beginning of the cycle and the lunations are concerned. Yet as a result of the great privilege and special gift they received when the Lord liberated them from Egypt during the Passover night, the month of Nisan, which is the seventh, is according to the Lord's precept also called the 'first'. And this [is the first month] for feasts.

The Hebrew months that are mentioned in Scripture are contained in these verses: "Tishri, Marḥeshvan, Kislev, Tevet, Shevat, and Adar/ Nisan Iyyar, Sivan, Tamuz, Av, the last shall be Elul/ Veadar is added and so an embolism is had."

The following calendar is thus of great necessity to those who are wont to read the books of the Bible in the schools, regardless of whether they be Biblical Bachelors or their superiors, or whether they desire to study for themselves. For when they read in Genesis 7:11 that Noah entered the Ark on the 17th day of the second month, they must not think that this happened in February, which is the second Roman month. And when they read [in Genesis 8:14] that the same Noah exited the Ark in the second month, on the 27th day, they must not assume that he remained in the Ark for more than a year. And the same applies to other things written in the text of the Bible.

And since I do not intend to treat on cycles or new moons, but on feasts and other noteworthy events, I shall attempt to begin from the month of Nisan. Trusting in the plentiful offering of the creator, "who maketh his sun to rise upon the good and bad" [Mt 5:45], I shall therefore put my hand to the plow, laying out the common Hebrew year month by month, to which I

menses extendendo et sic demum embolismalem mensem subiungendo. Non enim est aliqua lingua vel natio habens embolismos proprio nomine decoratos, sed sola Hebreorum lingua hoc privilegium habet speciale. Nam embolismus ex divina revelatione *sancto Moysi revelatus*[8] est, Ysidoro teste Ethimologiarum libro 6°.

Sacro pneumate adiuvante procedere sic intendo: in capite namque cuiuslibet mensis ponam ipsius mensis nomen, Hebraicis et Latinis literis scriptum et cuius lunationis Romani mensis sit. Deinde in prima linea versus sinistram descendendo numerum dierum ponam. Et in capite illius linee "Molath" tribus literis cum titello scribam ad instar kalendarum in Romano kalendario scriptarum. "Molath" autem in Hebreo, "incensio" dicitur in Latino. Preterea ex directo dierum ordinabo festa et alia que in Biblia, tam in novo, quam in veteri testamento, continentur, non tamen ea de quibus pauca vis existit. Scribam etiam quedam alia excellentiora facta. In marginibus
114 vero libros | et capitula signabo unde originaliter sunt extracta. Et quasdam declarationes ibidem annotabo. Explicit prologus.

Sequitur alius prologus

Quoniam quidem ea que obscura sunt per exempla clarificari solent, ideo ut ea que iam dicta sunt manifestius appareant, exempla subiungam. Quando vero legens Genesim pervenit ad c. 7, ubi dicitur quod Noe intravit archam 17 die mensis secundi, ipse legens inspiciat sequens kalendarium queratque secundum mensem, quo invento inveniet ibi: "Noe cum suis intravit archam." Dicat audientibus: "iste mensis, de quo hic agitur non est Romanus mensis qui vocatur Februarius, sed est Hebreorum mensis, 'Ygar' Hebraice vocatus. Et est lunatio Maii, que quidem lunatio incipit in Aprili, sed capit denominationem a mense in quo ipsa lunatio terminatur." Dicatur similiter de primo mense cum legitur illud Exodi 12: "*Mensis iste principium mensium*." Explicit prologus.

4 sancto] *om. B* **7** et] *om. O* ‖ literis] nominibus *AL* **8–13** sit … continentur] *om. L* **9** descendendo] *om. M* **10** kalendarum] *om. M* kalendarii *V* **11–12** kalendrio … Preterea] ac *NO* **14** quedam] *om. ALM* **15** unde … extracta] *om. L* **16** prologus] *om. ALMOV* **17** Sequitur … prologus] *om. BMOV* Item prologus *NP* **18** clarificari] certificari *ALM* ‖ ideo] *om. V* **18–19** ideo … subiungam] *om. L* **19** exempla] per exempla *V* **24** mensis] *om. ALM* ‖ Ygar] Igar *B* **24–25** Ygar … vocatus] qui vocatur Ygar Hebraice *V* **24** Hebraice] Hebrayce *M om. NO* **24–25** Hebraice … vocatus] *om. L* **26** lunatio] illuminatio *V* ‖ terminatur] terminabitur *B* **28** Explicit prologus] *om. LOV*

[8] Isidore of Seville, *Etymologiae*, ed. Lindsay, 6.17.22.

shall then also join the embolismic month. For there is no other language or nation that has the embolisms honoured with a proper name, but only the Hebrew language holds this special privilege. For the embolism was divinely revealed to Moses according to the testimony of Isidore in the sixth book of the *Etymologies*.

With the help of the Holy Spirit, I intend to proceed thus: in the headline of each month I will put the name of the month in question, written both in Hebrew and Latin letters, as well as the lunation of the Roman month that corresponds to it. Hereafter, I will put the number of days in the first line that runs down on the left side. And at the top of this line I shall write "Molath" with three large letters, after the fashion in which the kalends are inscribed in the Roman calendar. "Molath," however, is the same in Hebrew what is called "incensio" in Latin. Moreover, in the lines assigned to the days I will arrange the feasts and other events contained in the Bible, both in the New and in the Old Testament, excepting only those that are of small importance. I shall also add certain further distinguished events. In the margins, however, I will indicate the books and chapters from which these have been originally extracted. And in the same place I will also note down some explanations. (End of the prologue.)

Here Follows the Second Prologue

Since obscure things are often clarified by examples, I shall adjoin examples so that what has been said already may appear more clearly: when someone reading Genesis arrives at chapter seven, where it is said that Noah entered the ark on the 17th day of the second month, this reader should take a look at the following calendar and search for the second month, where he will find the entry: "Noah with his kin entered the ark." He should say to those listening: "the month mentioned here is not the Roman month called February, but a month of the Hebrews, called 'Iyyar' in Hebrew, and it is the lunation of May, which actually begins in April, but takes its name from the month in which it ends." And one should speak similarly about the first month when reading Exodus 12:2: "This month shall be the beginning of the months." (End of the prologue.)

115 **Incipit kalendarium hebraicum**

ניסן—Mensis primus—Lunatio Aprilis—Nisan

1. **Mol**. Aque diluvii imminute sunt (Gn 8). Tabernaculum erectum est et consecratum (Exodi ultimo). Lazarus suscitatus est (Ioh 11).
2.
3. Annuntiatio Dominica (Lu 1).*
4.
5.
6.
7.
8.
9. Ihesus discubuit in domo Simonis in Bethania (Math 26; Mar 14; Lu 7; Ioh 12).
10. Illatio paschalis agni in domos (Exo 12). Ihesus cum palmis est receptus (Mat 21; Mar 11; Lu 19; Ioh 12).
11.
12.
13. Iudas Christum vendidit (Mat 21; Mar 14; Lu 22; Ioh 13).
14. Immolatio agni hora vespertina (Exo 12). Christus cenavit (Mat 26; Mar 14; Lu 22; Ioh 13).
15. Dies phase legalis (Exo 12; Lev 23). Christus crucifixus est (Mat 27; Mar 15; Lu 23; Ioh 19).* Prima dies azimorum.
16. 2a dies azimorum.
17. Christus resurrexit. Pascha nostrum (Mat. ultimo; Mar. ultimo; Luc. ultimo; Ioh. 20). 3a dies azimorum.
18. 4a dies azimorum.
19. 5a dies azimorum.
20. 6a dies azimorum.

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1 Incipit] Nunc sequitur *B* Sequitur *N* ‖ Incipit … hebraicum] *om. ALMOPV* **2** ניסן] *om. ABLMOPV* ניסאן *N* ‖ Mensis primus] Primus mensis pasche cerimoniis sacratus *ABLMPV* Primus mensis cerimoniis pasche sacratus *NO* ‖ Lunatio Aprilis] *add.* videlicet Nisan *O* Lunatio Maii Aprilis *M* ‖ Nisan] *om. O* Nysan *ABLNV* Nysan, qui et Xandicus Macedonum lingua appellatur *P* **3** Mol] Molat, id est incensio *ALM* Moloth *V* **3–4** Tabernaculum … consecratum] Thabernaculum est consecratum *AL* Est et consecratum tabernaculum *M* **4** suscitatus] resuscitatus *AL* **12** in … Simonis] *om. ABLMNOPV* **14** in domos] *om. B* **15** 19] 9 *ALM* **18** Judas … 13] *om. M* ‖ 13] *om. AL* **21** phase] pasche *AMN* pasce *LOV* ‖ crucifixus] passus *ABLMNOPV* **24** resurrexit] *add.* a mortuis *B* ‖ nostrum] *om. ABLMNOPV* **25** 20] 19 *B*

Here Begins the Hebrew Calendar

ניסן—First month—Lunation of April—Nisan

1. **Mol**. The waters of the flood were lessened (Gn 8:13). The tabernacle was erected and consecrated (Ex 40:2). Lazarus was revived (Jn 11:44, 55).
2.
3. Annunciation of the Lord (Lk 1:26–38).
4.
5.
6.
7.
8.
9. Jesus reclined in Bethany in the house of Simon (Mt 26:6–13; Mk 14:3–9; Lk 7:36–50; Jn 12:1–3).
10. The bringing of the paschal lambs into the houses (Exodus 12:3). Jesus was received with palm branches (Matthew 21:1–11; Mark 11:1–11; Luke 19:28–38; John 12:12–18).
11.
12.
13. Judas sold Christ (Matthew 26:14–15; Mark 14:10–11; Luke 22:3–6; John 13).
14. The slaughtering of the lamb in the evening hour (Ex 12:6). Christ ate supper (Mt 26; Mk 14; Lk 22; Jn 13).
15. Passover day according to the Law (Ex 12:18; Lv 23:6). Christ was crucified (Mt 27; Mk 15; Lk 23; Jn 19).* First day of unleavened bread.
16. Second day of unleavened bread.
17. Christ resurrected. Our Easter (Mt 28; Mk 16; Lk 24; Jn 20). Third day of unleavened bread.
18. Fourth day of unleavened bread.
19. Fifth day of unleavened bread.
20. Sixth day of unleavened bread.

21. Dies celeberrima (Exo 12; Levi 23). Ihericho corruit. 7a dies azimorum.
22. Nabugodonosor consilium habuit subiugandi totam terram (Iudith 2).
23.
24. Ihesus ostendit Thome manus et latus (Ioh 20).
25. Ihesus duodecennis in medio doctorum sedit (Luc 2).
26.
27.
28.
29.
30.

*Queritur quare in presenti mense ab Annuntiaione usque ad Passionem Domini sunt 12 dies, cum tamen Augustinus dicat dominum *eadem die fuisse passum qua et conceptus*[9] fuit. Respondetur quod secundum Lucam Ihesus quando baptizatus est *erat incipiens quasi annorum 30*[10] et sic complevit 29 annos integros et 12 dies et 13 die baptizatus est. Tribus autem annis predicavit et quasi 4 parte anni. Unde sequitur quod 33 anno currente passus est. Et tunc lunaris ciclus erat 15, primus vero mensis et paschalis incepit 14 kl. Aprilis et luna 15 erat 3 nonas Aprilis, quamvis Iudei in crastino pascha celebrabant, propter rationes in tractatu *De fermento et azimo*[11] dictas. Quando vero Christus est conceptus, tunc fuit primus annus lunaris cicli primusque mensis incepit 11 kl. Aprilis et luna 3a Annunciatio Dominica facta est, sicut videri potest in Romano kalendario. Constat igitur quod primus mensis Passionis Domini precessit primum mensem conceptionis Christi 3 diebus

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1 Ihericho] *om. BLMNOPV* **11** Queritur] Questio est in presenti kalendario *B* Ratio est *ALM* Questio est *NPV* Questio *O* ‖ Annuntiaione] *add.* dominica *ABLNOPV* ‖ usque] *om. M* **12–13** Augustinus … fuit] beatus Augustinus *De trinitate* dicat dominum passum fuisse eadem die qua et conceptus est *ABLMNOPV* **13** quod] *om. ABLMV* ‖ secundum Lucam] secundum Bedam super Lucam *L* secundum Lucam et Iohannem *V* ‖ Ihesus] *om. V* **14** quando] cum *M* ‖ est] *om. NO* ‖ complevit] *add.* tunc *ABLMNOPV* **15** 13] 14a *B* ‖ est] *om. M* **16** Unde … quod] *om. L* ‖ quod] *om. A* ‖ passus] crucifixus *ABLMNOPV* **17** ciclus] annus *L* ‖ erat] est *M* **18** 15] *add.* scilicet dies pasche *ABLMNOPV* **19** rationes] timores *M* ‖ in … azimo] alibi *ABLMNPV* alibi et per Burgensis Mt 26 *O* ‖ dictas] assignatas *ABLMNOP* signatas *V* **20** est] erat *B* ‖ fuit] erat *ABLMNOV om. P* **22** igitur] ergo *ALM* ‖ primus] *om. AL* ‖ mensis] *add.* Nysan *ABLMNP add.* Nisan *OV* **23** Passionis] Passionem *NOV* positum *P* ‖ conceptionis] exceptionis *N*

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[9] Augustine, *De trinitate* 4.5 (CCSL 50, 172).

[10] Lc 3:23.

[11] Hermann Zoest, *De fermento et azymo*, c. 6, MS Munich, BSB, Clm 3564, 148^{v}–149^{v}.

21. High feast day (Exodus 12:16; Leviticus 23:8). Jericho collapsed. Seventh day of unleavened bread.
22. Nebuchadnezzar held counsel to subjugate the whole earth (Jth 2:1–3).
23.
24. Jesus showed Thomas his hands and side (Jn 20:27).
25. Jesus, aged 12, sat in the midst of the doctors (Lk 2:46).
26.
27.
28.
29.
30.

*The question arises why in the present month there are 12 days between the Annunciation and the Passion of the Lord, whereas Augustine says that the Lord *suffered and was conceived on the same day*. The answer is that according to Luke Jesus *was beginning about the age of thirty years* when he was baptized and thus completed 29 whole years and 12 days and was baptized on the 13th day. His preaching, however, took three years and about one quarter of a year. From this it follows that he suffered in the 33rd year of his life; and the lunar cycle then was 15. The first and paschal month, however, began on the 14th before the kalends of April [19 March] and the 15th of the moon was the 3rd before the nones of April [3 April], although the Jews only celebrated Passover on the following day for reasons outlined in the treatise *De fermento et azimo*. Yet when Christ was conceived, it was the first year of the lunar cycle and the first month began on the 11th before the kalends of April [22 March] and the Annunciation of the Lord was made on the third day of the moon, as can be seen in the Roman calendar. It is thus established that the first month of the Passion preceded the first month of the conception of Christ by three days in the Roman calendar. And since

in Romano kalendario. Et quia Dominus 15 luna passus est, subtrahantur
116 ergo 3 dies | inde et manent 12. Sunt ergo tot dies ab Annuntiatione usque ad Passionem in anno lunari. Illud autem quod aliqui nostri doctores dicunt, scilicet quod Dominus passus est die conceptionis sue, stare non potest, quia nec luna, nec dominicalis littera concordant cum illo dicto. Nec potest reperiri concordia lune et littere nisi 3 nonas Aprilis.

116 **אגור—Mensis secundus—Lunatio Maii—Ygar**

1. **Mol**. Masculinus sexus numeratus est, numero 603550 (Num 1).
2. Levite numerati sunt, numerus erat 22000 (Num 3).
3. Marcus evangelista passus est (In passionali).*[12]
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17. Noe cum suis intravit Archam (Gen 7).**
18.
19.
20. Columpna ignis et nubis movit se de Synai (Num 10).
21.

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2 ergo] igitur *BNOPV* ‖ manent] *add*. in residuo *ALPV* manebunt in residuo *BN* remanent in residuo *MO* ‖ Sunt] Et *N* ‖ ergo] igitur *BNOPV* **3** autem] vero *ABLMNOPV* **4** est] sit *ABLMNOPV* ‖ stare … potest] nullomodo stare potest *ABLMNOPV* **5** concordant … dicto] cum hoc concordant *O* cum illo dicto concordant *ABLMNPV* **7** אגור] *om. ABLMOPV* עגאר *N* **8** numero 603550] Et erat numerus de Levi 603550 *A* Et erat numerus eorum 603,550 *L* Et erat numerus 603550 *PV* Et erat numerus *BMN om. O* **9** numerus … 22000] *om. BMO* 22000 *A* De levitis 22000 *P* Et erat 22000 *V* Et erat numerus 2200 *L* **10** In passionali] In Legenda *BNOPV* Requere in legenda *AL* **27** se] *add*. recedens *ABLMNOPV*

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[12] Iacopo da Varazze, *Legenda Aurea* (c. 57), ed. Maggioni, 1:402.

he suffered on the 15th day of the moon, three days must be thereupon subtracted and 12 days remain. This is hence the sum of days between the Annunciation and the Passion in the lunar year. The claim, however, that is made by some of our doctors, according to which the Lord suffered on the day of his conception, cannot be upheld, because neither the lunar age nor the dominical letter agree with this claim. And the only day on which the lunar age and the letter are found in agreement is the 3rd before the nones of April [3 April].

אִיר—Second month—Lunation of May—Iyyar

1. **Mol**. The male sex was numbered and the number was 603,550 (Nm 1:46).
2. The Levites were numbered, the number was 22,000 (Nm 3:39).
3. Mark the evangelist suffered (In the *Passionale*).*
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17. Noah entered the ark with his kin (Gn 7:13).
18.
19.
20. The pillar of fire and cloud moved out from Sinai (Nm 10:11–12).
21.

22.
23.
24.
25.
26. Christus celos ascendit (Marci et Luce ultimo. Et Act. 1).
27. Noe egressus est de archa (Gn 8).**
28.
29.

*Iheronimus in prologo: Marcus *scripsit evangelium* post Matheum *in Italia*.[13] Sed *passionale novum* locum nominat, quia in Aquilegia illud scripsit.[14]

**Cum doctores nostri et etiam Glosa dicant quod Noe per annum in archa stetit, que igitur est ratio quod hic habetur differentia 11 dierum inter introitum in archam et exitum de ipsa? Respondetur quod lunaris annus 11 diebus minor est solari. Ergo ponitur hic egressio Noe de archa 11 diebus post introitum in archam, quia isti menses sunt lunares. Et ergo bene dicit Glosa Genesis 8: "*Si presenti diei addantur 11, qualis luna hodie est, talis erit post annum ipsa die. Quando ergo Noe ingressus est 17* die *mensis secundi fuit. Ideo post annum 11 additis* erat *27 dies*."[15]

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5 Christus] Ihesus *NO* **6** archa] *add.* iussu domini *ABLMNOPV* **9** Marcus] *add.* evangelista *B* **10** passionale novum] aurea legenda *ABLMNOPV* **11** nostri] communiter *ALMNOPV om. B* ‖ Glosa] communiter Glose *V* Glosa communiter *B* **12** que] *om. M* ‖ que … quod] queritur quare *B* ‖ habetur] habet *ALM* **13** archam] *om. ALM* ‖ exitum] exeundi *V* ‖ de ipsa] ex ipsa *M* ipsam *V* arche *O* ‖ quod] Respondetur verum est nam Noe per unum integrum solarem annum stetit in archa. Sed quia *ABLMNOPV* **14** solari] *add.* anno *ABLMNOPV* **15** in archam] *om. B* **16** 8] *add.* sic *ABLMNOP* **17** Quando] Si *ALM* ‖ 17] *add.* luna vel 17 *ABLMNOPV* **18** erat] sunt *ALM* fuit *NOP* ‖ dies] add. vel 27 luna *ABMNOPV* ad 17 2 fuerunt 28 dies vel 28 luna qua Noe egressus est de Archa *L*

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[13] *Argumentum Evangelii secundum Marcum*, ed. Peter Corssen, *Monarchianische Prologe zu den vier Evangelien* (Leipzig: Hinrich, 1896), 9: "Marcus evangelista … evangelium in Itala scripsit ostendens in eo, quod et generi suo deberet et Christo."

[14] Iacopo da Varazze, *Legenda Aurea* (c. 57), ed. Maggioni, 1:400.

[15] *Glossa ordinaria*, Gen 8:14 (PL 113, 110).

22.
23.
24.
25.
26. Christ ascended to heaven (Mk 16:19; Lk 24:51; Acts 1:9).
27. Noah left the ark (Gn 8:14–18).**
28.
29.

*Jerome [says] in the prologue [that] Mark wrote his Gospel after Matthew in Italy. But the *New Passionale* mentions the location, because [it says] he wrote this in Aquilea.

**Considering that our doctors and also the Gloss say that Noah spent a year inside the ark, what, then, is the reason that here a difference of 11 days is indicated between the entrance into the ark and the exit from it? The answer is that the lunar year is 11 days shorter than the solar one. Noah's exit from the ark is thus put 11 days after the entrance, because the months here are lunar months. And the Gloss on Genesis 8 is therefore correct in saying: "If 11 days are added to the present day, this day will have the lunar age of the present day after one year. Accordingly, when Noah went in it was the 17th day of the second month and the corresponding day after one year and 11 added days was the 27th."

117 סיון—**Mensis tertius—Lunatio Iunii—Sivan**

1. **Mol**. Filii Israel venerunt in desertum Synai (Exo 19).
2.
3. Moises sanctificavit populum (Exo 19).
4.
5. Dies penthecostes seu festum ebdomarum (Exo 19).
6.
7. Penthecostes. Spiritus sanctus missus est (Act 2).
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23. Littere pro salute Iudeorum iussu Assueri scripte sunt (Hest 8).
24.
25.
26.
27.
28.
29.
30.

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1 סיון] *om. ABLMOPV* סיבאן *N* ‖ Sivan] Sywan *BV* Swan *ALM* Siwan *NOP* 8 2] *om. B*

סיון—Third month—Lunation of June—Sivan

1. **Mol**. The sons of Israel entered the wilderness of Sinai (Ex 19:1).
2.
3. Moses sanctified the people (Ex 19:14).
4.
5. Pentecost or Feast of Weeks (Ex 19:16).
6.
7. Pentecost: the Holy Spirit was sent (Acts 2:1–4).
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23. Letters for the salvation of the Jews were written at the order of Assuerus (Est 8:9).
24.
25.
26.
27.
28.
29.
30.

118 תמוז—**Mensis quartus—Lunatio Iulii—Tamus**

1. **Mol**.
2.
3.
4.
5. Ezechiel primam visionem vidit (Eze 1). Iohannes baptista natus est (Luc 1).
6.
7.
8.
9. Iherusalem dirupta est (Iheremie 52). Iohannes evangelista quievit (In ecclesiastica historia).*
10.
11.
12. Iohannes circumcisus est (Luce 1).
13.
14.
15. Moises descendit de monte cum tabulis legis quas et fregit (Exo 32).
16.
17.
18.
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21.
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1 תמוז] *om. ABLMOPV* טאמזת *N* ‖ Tamus] *om. V* Thamus *ABLMNOP* **11** 52] *om. W* **11–12** In … historia] *om. ABLMNOPV* **15** 1] 2 *W* **18** monte] *add.* Synay *ABLMNOPV* ‖ 32] 19 *W*

תמוז—Fourth month—Lunation of July—Tammuz

1. **Mol**.
2.
3.
4.
5. Ezekiel saw his first vision (Ez 1:1). John the Baptist was born (Lk 1:57).
6.
7.
8.
9. Jerusalem was broken up (Jer 52:6–7); John the Evangelist rested (In the Ecclesiastical History).*
10.
11.
12. John [the Baptist] was circumcised (Lk 1:59).
13.
14.
15. Moses came down from the mountain with the tablets of the Law and broke them (Ex 32:15–19).
16.
17.
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*Iheronimus in prologo: Iohannes *scripsit evangelium in Asia, postquam in Pathmos Apokalipsim scripsit*[16] et post alios ultimus.

119 **אב—Mensis quintus—Lunatio Augusti—Av**

1. **Mol**. Aaron mortuus est in monte Hor (Num 20).[17]
2.
3.
4. Ihesus interrogavit quem dicunt homines esse filium hominis (Mat 16; Mar 8; Luc 9).
5.
6.
7. Nabuzardan incendit Iherusalem et templum (4 Regum ultimo; Iheremie 52).
8.
9.
10.
11. Ihesus transfiguratus est in monte Thabor (Mat 17; Mar 9; Luc 9).
12.
13.
14.
15.
16.
17.
18.
19. Stephanus lapidatus est (Act 7).*
20.
21.
22.
23.
24.

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1 in prologo] *om. B* **2** scripsit] scripserat *ABLMNOPV* ‖ ultimus] evangelium scripsit *ABLMNOP* evangelium scripserat *V* **3** אב] *om. ABLMOPV* אז *N* ‖ quintus] Quintus menses et vocatur Sedebach apud Hebreos ut dicitur Iozephus *P* ‖ Av] Aw *ALMNOPV* **11–12** Nabuzardan … 52] *om. O* **24** Stephanus … est] Transitus Stephani prothomartiri *NO*

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[16] *Argumentum Evangelii secundum Iohannem*, ed. Corssen, *Monarchianische Prologe*, 7: "Hoc autem evangelium scripsit in Asia, posteaquem in Pathmos insula apocalypsin scripserat."
[17] Nm 33:38 (ed. Weber, 229).

*Jerome [says] in the prologue [that] John wrote the Gospel in Asia and [that he] afterwards wrote the Apocalypse on Pathmos; and he was last after the others.

אב—Fifth month—Lunation of August—Av

1. **Mol**. Aaron died on Mount Hor (Nm 20:25–29).
2.
3.
4. Jesus asked "Whom do men say that the Son of man is?" (Mt 16:13; Mk 8; Lk 9).
5.
6.
7. Nabuzardan burnt down Jerusalem and the temple (2 Kgs 25:8–9; Jer 52:12–13).
8.
9.
10.
11. Jesus was transfigured on Mount Thabor (Mt 17:1–6; Mk 9:1–7; Lk 9:28–36).
12.
13.
14.
15.
16.
17.
18.
19. Stephen was stoned (Acts 7:57–58).*
20.
21.
22.
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24.

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*Dubium hic oritur, quare transitus Stephani sit hic signatus 19 die huius mensis quinti cum tamen ecclesia celebret festum martirii eius 7 kl. Ianuarii. Respondetur quod Stephanus lapidatus est 3 nonas Augusti, que quidem dies erat 19 luna mensis 5 eodem anno quo Christus ascendit celos 81 die post. Festum autem inventionis corporis eius 7 kl. Januarii deberet celebrari, quia ea die ipsa inventio facta est. Sed ecclesia ordinavit quod natale Stephani celebretur die inventionis et inventio die passionis, propter hoc quod ipse est signifer martyrum, qui primus pro Christo sanguinem suum fudit.[18]

120 **אלול—Mensis sextus—Lunatio Septembris—Elul**

1. **Mol**.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.

7 sit] *om. L* ‖ hic] *om. ABMNOPV* ‖ signatus] signatur *L* ‖ 19] 10 *W* **8** quinti] quinti scilicet lunationis Augusti *ABLMNOPV* 5i *W* ‖ martirii eius] sui martirii *B* martirii Stephani *AMNPV* **9** Stephanus] ipse prothomartir *ABMNOP* ipse prothomartir Stephanus *L* **10** 5] quinti scilicet Aw *ALMNOP* quinti scilicet Augusti *BV* ‖ 81] 8° *M* **10–11** 81 … Festum] In proximo mense Augusti, tertia die intrante festum *L* **12** ea] illa *ABLMNOPV* ‖ est] *om. LM* **14** Christo … fudit] domino sanguinem suum fudit et testimonium sibi perhibuit *ABLMNOPV* **15** אלול] *om. ABLMOPV* עלול *N*

[18] Iacopo da Varazze, *Legenda Aurea* (c. 8), ed. Maggioni, 1:85–86; Ibid. (c. 108), 2:713–714.

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*At this point a doubt arises as to why the passing of Stephen is here assigned to the 19th day of this fifth month, when the Church instead celebrates the feast of his martyrdom on the 7th before the kalends of January [26 December]. The answer is that Stephen was stoned on the 3rd before the nones of August [3 August], which was indeed the 19th day of the fifth lunar month in the same year in which Christ ascended to heaven, the 81st day after [the latter event]. The feast of the invention of his body, however, should be celebrated on the 7th before the kalends of January [26 December], because the invention was made on this day. Yet the Church ruled that the nativity of Stephen is to be celebrated on the day of the invention and the invention on the day of his Passion, for the reason that he is the standard-bearer among the martyrs, being the first to shed his blood for Christ.

אלול—Sixth month—Lunation of September—Elul

1. **Mol**.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.

14.
15. Maria assumpta est in celum (In Legenda).[19]
16.
17.
18.
19.
20.
21.
22.
23.
24.
25. Murus Iherusalem est completus post reditum de Babilon (Neemie 6).
26.
27.
28.
29.

121 תשרי—**Mensis septimus—Lunatio Octobris—Tisri**

1. **Mol**. Festum tubarum et clangoris (Levi 23). Esdras legit in libro legis (Neemie 8).
2. Esdras interpretatus est verba legis (Neemie 8).
3.
4.
5.
6.
7.
8.
9.

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2 Maria] *add.* virgo *BLO* ‖ in celum] *om. BLMNOPV* ‖ In Legenda] Require in cronicis et legendis *A* In cronicis et legendis *BPV* Require in cronicis *L* In cronicis et legenda *M om. NO* **16** 29] *N*] **17** תשרי] *om. ABLMOPV* ‖ תשרי] [*N1* ‖ Mensis septimus] Septimus mensis celebris *AL* Septimus mensis multum celebris *BOP* Septimus est et multum celebris *V* ‖ Tisri] Trisi *L* Tysri *OP* **18** clangoris] clangorum *ALM* ‖ Levi 23] *add.* Numer. 29 *N1* ‖ legis] Regum *ALM* **20** Esdras … 8] *om. ALM* **26** 8] *add.* Festi dedicationis per Salomonem factae 1a dies (20 Paralipo. 7 testis est Lyranus) *N1* **27** 9] *add.* Secunda dies dedicationis *N1*

[19] Ibid. (c. 115), 2:779.

14.
15. Mary was taken up into heaven (In the [Golden] Legend).
16.
17.
18.
19.
20.
21.
22.
23.
24.
25. The wall of Jerusalem was completed after the return from Babylon (Neh 6:15).
26.
27.
28.
29.

תשרי—Seventh month—Lunation of October—Tishri

1. **Mol**. Feast of sounding trumpets (Lv 23:24). Ezra read from the book of the Law (Neh 8:1–3).
2. Ezra studied the words of the Law (Nehemiah 8:13).
3.
4.
5.
6.
7.
8.
9.

10. Dies expiationis celeberrima (Levi 23).
11.
12.
13.
14. Matheus passus est (In passionali).*[20]
15. Festum tabernaculorum (Levi 23). Prima dies palmarum.
16. 2a dies frondium.
17. 3a dies tentoriorum.
18. 4a dies palmarum.
19. 5a dies tabernaculorum.
20. 6a dies dies frondium.
21. Aggeus prophetavit ad Zorobabel et ad Ihesum sacerdotem (Agge 2). 7a dies tentoriorum.
22. Cetus et collecte (Levi 23).
23.
24. Zacharais prophetavit iterum ad Zorobabel et ad Ihesum (Zach 4).
25.
26.
27. Archa requevit super montes Armenie (Gn 8). Iohannes baptista conceptus est (Luc 1).**
28.
29.
30.

1 Dies … 23] Dies expiationis et tertia dedicationis celeberrima (de priore Lev. 23 et 16 et Numer. 29, de posteriore 3 Reges). Ieiunium legale usque ad noctem (de quo Levitici 16, 23 Zach 70 c.) *N1* **2** 11] *add.* Quarta dies dedicationis *N1* **3** 12] *add.* Quinta dies dedicationis *N1* **4** 13] *add.* Sexta dies dedicationis *N1* **5** Matheus … passionali] Septima dies dedicationis qua et Mattheus apostolus et evangelista passus est (ut docet Legenda) *N1* **6** Festum … palmarum] Scenopegia, id est festum tabernaculorum et prima dies palmarum Levi. 23 et Numer. 29 *N1* **12** Aggeus prophetavit] *om. M* **14** Cetus … 23] Octava dies qua erat festum. Cetus et collectae sic vocatur celebre multum Levi. 23 *N1* **15** 23] *add.* Salomon divisit populum ad tabernacula sua (2 Parali. 8). Separatus est semen filiorum Israel ab alienigenis (Neemie 19 teste Lyranus) *N1* **16** Zacharias … 4] *add.* Filii Israel convenerunt in ieiunio et sacra aspersisque capitibus pulvere steterunt separati ab alienigenis ibidem *N1*

[20] Ibid. (c. 136), 2:960.

10. The most solemn Day of Atonement (Lv 23:27).
11.
12.
13.
14. Matthew suffered (In the *Passionale*).*
15. Feast of Tabernacles (Lv 23:34–42). First day: palm branches.
16. Second day: leaves.
17. Third day: tents.
18. Fourth day: palm branches.
19. Fifth day: tabernacles.
20. Sixth day: leaves.
21. Haggai prophesied to Zorobabel and to the priest Jesus (Hg 2:1–2). Seventh day: tents.
22. Assembly and congregation (Lv 23:36).
23.
24. Zachary again prophesied to Zorobabel and to Jesus (Zec 4).
25.
26.
27. The Ark rested upon the mountains of Armenia (Gn 8:4). John the Baptist was conceived (Lk 1:24).**
28.
29.
30.

*Iheronimus in prologo: *Matheus sicut in ordine primus ponitur, ita evangelium primus scripsit in Iudea*.[21]

**Dubium hic oritur quare conceptio Iohannis hic ponitur 27 die mensis Tisri, et an in Romano kalendario bene posita sit 24 Septembris. Respondetur quod secundum evangelicam veritatem illa positio in kalendario bene stat. Nam Luce 1° Gabriel dixit: "*Hic mensis sextus est illi*." Modo annus ille fuit embolismalis et bissextilis et sic Annuntiatio Dominica facta fuit 183 diebus post conceptionem Iohannis. Clarum est enim quod tam secundum theologos quam secundum phisicos menses sunt solares cum de concepcionibus agitur et embrionum qualitatibus. Annus autem Annuntiationis bissextilis fuit et embolismalis et ideo illomodo positio in kalendario videtur fore vera. Est autem notandum quod astronomi assignant 3 moras infanti in utero, scilicet minorem, mediam et maiorem. Mora minor est 258 dierum, media est

1–2 Iheronimus … Iudea] *om. BO* **1** prologo] *add.* scripsit *AM* ‖ Matheus] *add.* ex Iudea *L* **3** Dubium … quare] Hic queritur quare *B* Questio quare *O* Annuntiatio Iohannis non est hic signata. Et ratio est quia Albertus super Lucam et multi alii doctores dicunt angelum Gabrielem Zacharie apparuisse in die expiationis. Sed Nicolaus de Lira sentit oppositum, quia si Zacharias illa die incensum obtulisset, tunc Summus Sacerdos fuisset, quia nullus poterat intrare sanctam sanctorum quam summus pontifex semel in anno. Et ipse dicit quod per incensum debet intelligi holocaustum super altare positum. Et addit nullibi legitur quod Zacharias erat summus pontifex. Hic oritur dubium quare *ALMPV* Annuntiatio Ioannis baptiste non est hic signata. Vero secundum Albertum magnum super Lucam … Et addit: Nullibi legitur Zachariam Summum fuisse pontificem. Paulus tamen Burgensis contendit longa disputatione Zachariam patrem Ioannis baptiste in die expiationis adolevisse incensum et omnino Summum fuisse Sacerdotem. Questio cur *N1* ‖ hic] *om. V* ‖ Iohannis] *add.* baptiste *N1* ‖ hic] *om. V* ‖ ponitur] *add.* videlicet *N1* ‖ mensis] *add.* Octobris *AL* **4** et] *om. B* ‖ an] cum *B* ante *N1* iam *V* ‖ bene … sit] ponatur *B* ‖ Septembris] *add.* que erat 27 luna *ABLMN1OPV* **5** quod] *om. V* **6** Nam] Patet nam *ABLMN1OPV* ‖ dixit] angelus *B* ‖ sextus] beatus *AL* ‖ ille] iste *V* ‖ fuit] erat erit *B* erat *ALMN1OPV* **7** et] *om. N1* ‖ sic] *om. V* **8** post … Iohannis] a die post Iohannis conceptionem *ABLMN1OP* a die post conceptionem *V* **10** et] *add.* ceteris *ABLMN1OPV* ‖ embrionum] hominum *N1O* ‖ Annus] *add.* et *M* ‖ Annuntiationis] conceptionis *V* **10–11** bissextilis fuit] erat bissextilis simul *P* **11** fuit] erat *ABLMN1OV* ‖ ideo] *om. B* sic *ALMN1OPV* ‖ illomodo] *om. N1* ‖ positio] simul posito *B* ‖ videtur … vera] vera est *N1* ‖ fore] esse *M* **12** est … autem] Pro ampliori igitur huius declaratione est *ABLMOPV* Pro ampliori declaratione *N1* **12–13** scilicet] *om. N1* ‖ scilicet … maiorem] *om. O* **13** est] *om. N1*

[21] *Argumentum Evangelii secundum Mattheum*, ed. Corssen, *Monarchianische Prologe*, 5: "Mattheux ex Iudaea sicut in ordine primus ponitur, ita evangelium in Iudaea primus scripsit."

*Jerome [says] in his prologue [that] Matthew, being placed first in the order [of evangelists], was also the first to write the Gospel, in Judea.

**At this point a doubt arises as to why the conception of John is here put on the 27th day of the month of Tishri and whether the Roman calendar correctly assigns this to 24 September. The answer is that according to the Gospel truth this position in the calendar is correctly chosen. For in Luke 1[:36] Gabriel says: "This is her sixth month." But this year was embolismic and bissextile and thus the Annunciation took place 183 days after the conception of John. For it is clear that both according to the theologians and the physicians the months are solar when it comes to talk about conceptions and embryonic stages. But the year of the Annunciation was bissextile and embolismic and therefore this positioning in the calendar seems to have been correct. It must be noted, however, that the astronomers assign three periods to the stay of the infant inside the uterus, namely a minor, a mean and a major one. The minor stay is for 258 days, the mean one is for 273 days,

273 dierum, maior est 288.[22] Iohannes quidem uno die plus more medie fuit in utero. Ihesus autem in gremio virginis duobus diebus plus more medie, quia ipsum *oporte*bat *crescere*, illum *autem minui*. Quamvis et altior illorum verborum sit exposicio.[23]

121 מרחשון—**Mensis octavus—Lunatio Novembris—Marhesuan**

1. **Mol**.
2.
3.
4. Dionysius Areopagita passus est (In passionali).[24]

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1 maior … 288] maior vero mora est 288 dierum *ABLMPV* maior mora est 288 dierum *Nı* Sed maior mora est 288 dierum *O* ‖ Iohannes] *add.* baptista *Nı* ‖ quidem] *om. MNıO* autem erat *BP* ‖ fuit] *om. BP* erat *ALMNıOV* **2** Ihesus] Sed Ihesus *B* ‖ autem] erat *BN add.* erat *ALMV* vero erat *Nı* ‖ medie] *add.* 275 dies *Nı* **3** autem] vero *Nı* ‖ minui] *add.* Unde etiam in ortu Iohannis dies decrescebat et in ortu Christi veri solis crescebant dies *ALMNıOPV add.* Queritur quare annuntiatio Iohannis non est hic posita. Respondetur Albertus super Lucam et multi alii doctores et dicunt quod angelus Gabriel apparuit Zacharie in die expiationis. Sed Nicolaus de Lira sentit oppositum, quia si Zacharias illa die incensum obtulisset, tunc summus sacerdos fuisset, quia nullus poterat intrare sanctam sanctorum nisi summus sacerdos sive pontifex semel in anno. Et ipse dicit quod per incensum debet intelligi holocaustum super altare holocausti positum. Et addit nullibi legitur quod Zacharias fuisset summus pontifex *B* **4** exposicio] *add.* Paulus tamen Burgensis docet circa medium septimi mensis Ioannem baptistam conceptum servatorem vero benedictum circa medium primi. Et menses illos non solares esse quemadmodum author noster opinatur, sed lunares. Tamen ego in hoc magis assentirem quam contrarium sentienti *Nı add.* Nota de die expiationis, Albertus super Lucam et plures alii dicunt angelum apparuisse Zacharie in die expiationis, sed Nicolaus de Lira sentit oppositum, quia Zacharias non fuit summus sacerdos, ut Luc 10 etc. *O* ‖ exposicio] *add.* Paulus tamen Burgensis docet circa medium septimi mensis Ioannem baptistam conceptum servatorem vero benedictum circa medium primi. Et menses illos non solares esse quemadmodum author noster opinatur, sed lunares. Tamen ego in hoc magis assentirem quam contrarium sentienti *Nı add.* Nota de die expiationis, Albertus super Lucam et plures alii dicunt angelum apparuisse Zacharie in die expiationis, sed Nicolaus de Lira sentit oppositum, quia Zacharias non fuit summus sacerdos, ut Luc 10 etc. *O* **5** מרחשון] *om. ABLMNıOPV* ‖ Novembris] decembris *W* ‖ Marhesuan] Marherwan *ALM* Marhesuva *Nı* ~~Kylsev~~ Marhezwa *O* Marchezwan *BV* Marhezwan *P* **9** Areopagita] Ariopagita *PW*

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[22] Cf. Abraham Ibn Ezra, *Liber de nativitatibus* (Venice: Ratdolt, 1484), sig. a2$^{r–v}$; Omar Tiberiades, *Liber de nativitatibus et interrogationibus*, ed. Luca Gaurico (Venice: Sessa, 1503), fol. 31^{r}; Chabás and Goldstein, *A Survey*, 223–226.

[23] Io 3:30. Cf. Bede, *In Lucae Evangelium expositio* 1.1.24 (CCSL 120, 28).

[24] Iacopo da Varazze, *Legenda Aurea* (c. 149), ed. Maggioni, 2:1049.

the major one is for 288 days. Now, John was inside the uterus one day longer than the mean stay. Jesus, by contrast, stayed in the lap of the virgin for two days longer than the mean stay, for he was "bound to increase, but the other to decrease," although there is also a higher interpretation of these words.

מרחשון—Eighth month—Lunation of November—Marḥeshvan

1. **Mol**.
2.
3.
4. Dionysius the Areopagite suffered (In the *Passionale*).

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123 כסליו—**Mensis nonus—Lunatio Decembris—Kislev**

1. **Mol**.
2.
3·
4. Angelus iterum locutus est ad Zachariam (Zacha 7).
5·
6.
7·
8.

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25 29] *Nl*] **26** כסליו] *om. ABLMOPV* בעזלעז *N* ‖ כסליו] [*N* ‖ Kislev] Kyslew *LNV* Kyslev *AMOP* **30** 7] 6 *BLMNOPVW*

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כסליו—Ninth month—The Lunation of December—Kislev

1. **Mol.**
2.
3.
4. The angel again spoke to Zechariah (Zec 7:1).
5.
6.
7.
8.

9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20. Populus separavit a se mulieres alienigenas (Esdre 2^{i}, c. 9).
21.
22.
23.
24.
25. Purificatio templi facta est (Macha 2, c. 1).
26.
27.
28.
29.
30.

124 **טבת—Mensis decimus—Lunatio Januarii—Teves**

1. **Mol**. Cacumina montium apparuerunt (Gn 8).
2.
3.
4.
5.
6.
7.
8.
9.
10. Nabugodonazor circumdedit Iherusalem (4 Regum ultimo; Iheremie 52).

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12 a ... mulieres] se a mulieribus *ALV* **23** טבת] *om. ABLMOPV* טעבת N ‖ Teves] Teires *A* Tewes *BOPV* Teyres *LM*

9.
10.
11.
12.
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14.
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16.
17.
18.
19.
20. The people separated the foreign women from itself (Ezr 10:9–12).
21.
22.
23.
24.
25. The temple was purified (2 Mc 1:18).
26.
27.
28.
29.
30.

טבת—Tenth month—Lunation of January—Tevet

1. **Mol**. The mountain tops appeared (Gn 8:5).
2.
3.
4.
5.
6.
7.
8.
9.
10. Nebuchadnezzar surrounded Jerusalem (2 Kgs 25:1; Jer 52:4).

11. Ihesus Christus natus est in Bethleem Iude (Luc 2).*
12.
13.
14. Theophania: Ihesus baptizatus est (Mat 3; Mar 1; Luc 3; Ioh 1).
15.
16.
17.
18. Ihesus circumcisus est (Luc 2).
19.
20.
21. Iohannes ostendit Ihesum dicens 'Ecce agnus Dei' (Ioh 1).
22. Christus dixit de Nathanael 'Ecce vere Israelita' (Ioh 1).
23. Epiphania: Magi munera obtulerunt (Mat 2).**
24.
25. Bethphania: Christus convertebat aquam in vinum (Ioh 2).**
26.
27.
28.
29.

*Doctores quidam dicunt quod Christus sit natus Dominica die. Sed hoc stare non potest, quia annus nativitatis Christi erat 9 cicli solaris, et erat bissextilis, et per consequens DC erant littere dominicales. Quare sequitur quod B, ubi signata est nativitas Domini, fuit Sabbatum. Quidam professor Theologie dicit unam diem esse pretermissam, et negat radices notarum anni Alphonsi. Et errat valde, quia si Christiani errassent, numquid Iudei, Arabes et Persi etc. errassent? Et si bissextus fuisset omissus, tunc semper una die tardius haberemus coniunctiones, eclipses et motus quam alie nationes. Sed

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8 Ihesus … 2] *om. V* **15** Bethphania … 2] *om. V* ‖ Christus] Ihesus *B* **20** Doctores … dicunt] Notandum de nativitate domini *O* ‖ quidam] aliqui *ABLNOPV om. M* ‖ Christus … natus] Christum natum *V* **20–21** Sed … quia] In oppositum est quod *O* **21** Christi] *om. O* ‖ 9] communis annus *ALM* nonus annus et *V* nonus annus *B* ‖ cicli] *om. W* **23** signata] signatum *AL* ‖ nativitas] *om. AL* ‖ Domini] *om. ALMNPV* ‖ fuit] erat *ABLMNOPV* ‖ Quidam] Est ergo quidam *AMNO* Est igitur quidam *PV* Est autem quidam *B* Est ergo sciendum quod quidam *L* ‖ professor] *add.* sacre *AL* **24** dicit] qui propter hoc ad tantam venit vesaniam ut dicat *ALMNOPV* qui propter hoc … ut diceret *B* ‖ esse] *om. M* fore *O* **25** Alphonsi] Alfongi *ALM* **25–26** Et … errassent] Sed hoc dicere est absurdum, quia si Christiani errassent, certe Iudei, Arabes et Persi non errassent *ALMNOPV* quod absurdum est dicere, quia si … Perse non errassent *B* **26** Et] Etiam *ABLMNOPV* ‖ tunc] *add.* nos *ABLMNOPV* ‖ una die] *om. B* **27–544.1** Sed illius] Cuius *O*

11. Jesus Christ was born in Bethlehem, Judea (Lk 2:7).*
12.
13.
14. Theophany: Jesus was baptized (Mt 3:13–17; Mk 1:9–10; Lk 3:21–22; Jn 1:29–33).
15.
16.
17.
18. Jesus was circumcised (Lk 2:21).
19.
20.
21. John pointed out Jesus saying: "Behold the Lamb of God" (Jn 1:29).
22. Christ said of Nathanael: "Behold an Israelite indeed" (Jn 1:47).
23. Epiphany: The Magi offered gifts (Mt 2:11).
24.
25. Bethphany: Christ turned water into wine (Jn 2:1–10).**
26.
27.
28.
29.

*Certain doctors say that Christ was born on the Lord's Day. But this cannot stand, for the year of the nativity was the 9th of the solar cycle and it was a bissextile year and hence the dominical letters were DC, from which it follows that the letter B, to which the nativity is assigned, was a Sabbath. A certain professor of theology claims that one day was omitted [from the calendar] and he rejects the epoch dates of the Alfonsine tables. And he is very mistaken, for if the Christians had erred, would the Jews, Arabs and Persians also have erred? And if the bissextile day had been omitted, then we would always have the conjunctions, eclipses and celestial positions

illius falsitas patet per antiquissimum Hebreorum compotum et per tabulas in Almagesti et alias antiquissimas tabulas. Dicit etiam quod anno 1424 dies circumcisionis erat Dominica, que tamen fuit Sabbatum.

**Oritur dubium cum sancta mater ecclesia canit et doctores scribunt quod Christus eodem die a Magis est adoratus et a Iohanne baptizatus est et aquam vertit in vinum, quare hic tanta dierum differentia posita sit? Respondetur quod 13 die nativitatis Christi Magi munera obtulerunt et erat secundus annus cicli lunaris et erat luna 23. Sed Ihesus 30 etatis anno a Iohanne baptizatus est, eratque ciclus 12, luna fuit 14. Anno vero sequenti aquam vertit in vinum, eratque ciclus 13 et luna 25 mensis Teves, qui quidem mensis incepit 13 die Decembris. Ex quo ergo presentes menses sunt lunares, ergo secundum dies illorum dicta festa sunt hic bene posita. Qui lunares dies quamvis sint diversi, tamen omnes concurrebant in uno die solari, scilicet 6 Januarii.

125 שבט—**Mensis undecimus**—**Lunatio Februarii**—**Svat**

1. **Mol**. Moyses obiit in vertice Nebo montis Abarim (Deu ultimo).
2.
3.
4.
5.
6.

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1 patet] *add.* manifeste *O* ‖ et] *om. ABLMNOPV* **1–3** per … Sabbatum] *om. O* **1** tabulas] *add.* Ptolomei *ABLMNOPV* **2** etiam] enim *V* ‖ anno] *add.* Christi *ABLMNPV* **3** fuit Sabbatum] apud omnes nationes erat Sabbatum *ABLMNOPV* **4** Oritur dubium] Hic dubitatur *B* Hic oritur dubium *ALMNOPV* **4–5** doctores … Christus] quasi doctores hoc scribunt scilicet quod *A* quasi hoc scribunt scilicet quod *M* sancti doctores hoc scribunt scilicet quod *NOPV* sancti doctores hoc scribunt quod *B* quasi omnes doctores hoc scribant scilicet quod *L* **5** die] *add.* Christus *BLMNOPV* **5–6** et … vinum] Et aquam vertit in vinum ac etiam a Iohanne baptizatus est *ABLMNOPV* **6** sit] sunt *V* **7** quod] Verum est quod *ALMNOPV* quod verum est *B* **7–8** secundus] 2us *PW* **8** lunaris] solares *V* ‖ et erat] Eratque predicta dies *ABLMNOPV* ‖ Ihesus] Si Christus *V* ‖ etatis] *add.* sue *ABLMPV* **9** eratque] erat *V* ‖ luna … 14] Et ergo predicta dies erat luna 14 *ALM* Et ergo dicta dies erat luna 14a *BNOPV* **10** eratque … mensis] qui annus erat 13 cicli. Eratque predicta dies luna mensis 25 *ABLMNOP om. V* ‖ Teves] Teires *A* Teyres *LM* Tewes *NOP om. V* **11** ergo] *om. ABLMNOPV* **12** bene] *om. ABLMNOPV* **14** 6] 13 *ABMNOPVW* 13 die *L* **15** שבט] *om. ABLMOPV* סואת *N* ‖ Mensis undecimus] Undecimus mensis et vocatur [*ras.*] apud Hebreos secundum Iozephum *P* ‖ Svat] Swath *BOV* Swat *AL* Svath *MNP*

one day later than the other nations. But the incorrectness of this is made plain by the most ancient *computus* of the Hebrews and from the tables in the *Almagest* and from other very ancient tables. He also claims that in the year 1424 the day of the circumcision [1 January] was the Lord's Day, whereas in reality it was a Sabbath.

**A doubt arises: since the holy mother Church celebrates and the doctors write that Christ was adored by the Magi on the same day as he was baptized by John and turned water into wine, why is there such a difference among the days here? The answer is that the Magi offered gifts to Christ on the 13th day after his nativity [6 January] and that this was in the second year of the lunar cycle and the lunar age was 23. But Jesus was baptized by John in the 30th year of his life, when the cycle was 12 and the lunar age was 14. In the following year, however, he turned water into wine, and this was the 13th year of the cycle and the 25th lune of the month of Teves, which month began on the 13th day of December. And since the present months are lunar, the mentioned feasts are therefore here correctly assigned according to their days. For although these lunar days differ from each other, they nevertheless all fall together on same solar day, namely on the 6th of January.

שבט—Eleventh month—Lunation of February—Shvat

1. **Mol**. Moses died on the summit of Mount Nebo in the Abarim range (Dt 34).
2.
3.
4.
5.
6.

7.
8.
9.
10.
11.
12. Noe emisit corvum et post illum columbam (Gn 8).
13.
14.
15.
16.
17. Paulus est conversus (Act 9).
18.
19. Iterum emisit columbam, que cum virenti olive ramo est reversa (Gn 8).
20.
21. Ypapanti: Maria obtulit puerum in templo (Luce 2).
22.
23.
24. Zacharias diversas propheticas figuras vidit (Zacha 1).
25. Christus a dyabolo temptatus est (Math 4; Mar 1; Luce 4).
26. Noe tertio emisit columbam, que non est reversa (Gn 8).
27.
28.
29.
30.

126 אדר—**Mensis duodecimus—Lunatio Martii—Adar**

1. **Mol**.
2.
3. Novum templum consummatum et dedicatum est: Encenia (Prime Esdre 6).
4.
5.

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16 Ypapanti … 2] *om. M* **21** que … reversa] *om. A add.* ad eum ultra *L* **26** אדר] *om. ABLMOPV* אדאר *N* ‖ Mensis duodecimus] Duodecimus mensis vocatur Adar apud Hebreos secundum Iozephum et in inicio eius mortuus est Moyses, ut dicitur liber IIII Antiquitatum in fine libri *P* **29–30** Novum … 6] *om. NO* **29** Encenia] *om. L*

7.
8.
9.
10.
11.
12. Noah sent out the raven and after him the dove (Gn 8:6–8).
13.
14.
15.
16.
17. Paul was converted (Acts 9:3–18).
18.
19. He again sent out the dove, which returned with the greening bough of an olive tree (Gn 8:10–11).
20.
21. Hypapante: Mary presented the boy in the temple (Lk 2:22–24).
22.
23.
24. Zechariah saw diverse prophetic images (Zec 1:7).
25. Christ was tempted by the Devil (Mt 4:1–11; Mk 1:12–13; Lk 4:1–13).
26. Noah for the third time sent forth the dove, which did not return (Gn 8:12).
27.
28.
29.
30.

אדר—Twelfth month—Lunation of March—Adar

1. **Mol**.
2.
3. The new temple was finished and dedicated: Encaenia (Ezr 6:15–16).
4.
5.

6.
7.
8.
9.
10.
11.
12.
13. Dies tristitie Iudeorum conversa est in gaudium (Hester 9).
14. Dies Phurim, id et sorcium (Hester 9).
15. Dies Phurim (Hester 9).
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27. Evilmoradag elevavit Ioachim de carcere (Iheremie 52).*
28.
29.

*Quarti Regum ultimo habetur quod Evilmoradag elevavit Ioachim de carcere 27 die mensis 12.[25] Iste Evilmoradag missus fuit in carcerem a Nabugodonosor patre suo, ubi vinctus sedebat Ioachim et ibi contraxerunt mutuam amiciciam. Et ad consilium Ioachim divisit corpus patris sui in 300 partes et dedit 300 vulturibus. Timuit enim quod sicut a bestialitate reductus erat ad humanos sensus, sic etiam posset a mortuis resurgere et ipsum privare regno et amare morti tradere.[26]

8 tristitie] solstice *N* solsticie *O* **25–31** Quarti … tradere] *om. B* **25** ultimo] *om. V* **26** 27] 25 *ALM* ‖ fuit] est *V* **29** vulturibus] vulteribus *PVW* **31** amare] amari *W*

[25] IV Rg 25:27.

[26] Petrus Comestor, *Historia scholastica*, Historia libri Danielis, cap. 5 (PL 198, 1453). Cf. *The Chronicles of Jeraḥmeel* (66.5–6), trans. Gaster, 206–207.

6.
7.
8.
9.
10.
11.
12.
13. The day of sadness for the Jews was turned into joy (Est 9:1, 17–18).
14. Purim, i.e. "Lots" (Est 9:17–21).
15. Purim (Est 9:18, 21).
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27. Evilmerodach lifted Jehoiachin out of prison (Jer 52:31).*
28.
29.

* In the final chapter of the fourth book of Kings, it is related that Evilmerodach lifted Jehoiachin out of prison on the 27th day of the twelfth month. This Evilmerodach was sent to prison by his father Nebuchadnezzar, where Jehoiachin was held captive; and while there they contracted a mutual friendship. And following the advice of Jehoiachin he divided his father's body into 300 parts and gave them to 300 vultures. For he feared that just as [his father] had been restored from his bestial state to human senses, he might also rise again from the dead and strip him of his reign and deliver a bitter death upon him.

127 **ואדר—Mensis tredecimus—In anno embolismali—Vadar**

1. **Mol**.
2.
3. Petrus Antiochie exaltatus est in cathedra positus (Ecclesiastica historia).
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.
28.
29.
30. Iacobus decollatus est (Act 12).*

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1 ואדר] *om. ABLMOPV* ואדאר *N* ‖ In … embolismali] Lunatio embolismalis *ABLMNV* Lunatio embolismalis que non semper habet locum *O* Luna embolismalis *P* ‖ Vadar] *add.* (qui) non semper habet locum *ABLMNP* Wassar *B* Wasar *MPV* **4–5** Ecclesiastica historia] In ecclesiastica historia *ALMP*

ואדר—Thirteenth month—In the embolismic year—Veadar

1. **Mol**.
2.
3. Peter was exalted at Antioch and put on his chair (Ecclesiastical history).
4.
5.
6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.
28.
29.
30. James was beheaded (Acts 12:2).*

*Ex quo ecclesia celebrat festum Iacobi 8 kl. Augusti, quare hic est signatum ultima die Vadar? Notandum ergo quod Iacobus decollatus est 8 kl. Aprilis et erat 13us annus completus post Passionem Domini. Et ciclus erat 9 atque embolismalis annus. Et luna 30 fuit 8 kl. Aprilis. Et ergo bene signatum est. Ecclesia vero celebrat festum Iacobi 8 kl. Augusti, non quod tunc passus sit, sed ideo quia corpus suum fuit translatum eo tempore.[27]

128 **Declaratio prescripti kalendarii**

Prescriptum opus largo nomine kalendarium vocari potest. Romanum denique kalendarium propter kalendas in ipso positas proprie 'kalendarium' dicitur. Reperimus tamen neomeniam 'kalendas' nominari, unde Ysaie 1° dicitur: *"Kalendas vestras et sollemnitates odivit anima mea."*[28] Et primi Regum 20: "*Kalende sunt crastino*."[29] Et sic non immerito presens opusculum iam prescriptum 'kalendarii' nomine gaudere potest.

Pro ipsius igitur declaratione est primo sciendum quod lunationes capiunt suas denotationes a fine, scilicet a mensibus in quibus terminantur. Exemplum: Lunatio que in Martio incipit vocatur lunatio Aprilis, quia ibi desinit. Unde versus: "*Illius est mensis cui dat lunatio finem*."[30]

Secundo notandum est quod communis annus lunaris continet 354 dies. Et hii ex 12 mensibus colliguntur in prologo tactis et in kalendario plene

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1–2 Ex … Vadar] *om. B* **1** ecclesia] etiam *V* **1–2** signatum] ergo hic est assignatum *ALM* ergo hic est signatum *NOP* hec signabitur est *V* **2** Vadar] Vazar *WP* Wasar *ALMNOV* ‖ Notandum ergo] Nota *B* Unde notandum *ALMNOPV* ‖ quod] *om. B* **4** atque] et *ABLMNOPV* ‖ fuit] erat *ABLMNOPV* ‖ ergo] sic festum *M* sic *ABLNOPV* **5** est] *om. V* ‖ vero] autem *B* **6** sit] est *O* ‖ ideo] *om. BMNO* ‖ quia] *add.* tunc *BO* ‖ suum] eius *BO* ‖ fuit … tempore] tunc fuit translatum *ABLMNOPV* **7** Declaratio … kalendarii] *om. MOV in margine* Sequitur maior decelaratio huius kalendarii *L* **8–9** denique] namquidem *B* **10** kalendas] kalendis *ALM* **11** sollemnitates] *add.* vestras *AL* **13** iam prescriptum] *om. O* **14** igitur] ergo *ALM* **16** vocatur] dicitur *B* **17** versus] *mg. W* **19** hii] *om. B*

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[27] Iacopo da Varazze, *Legenda Aurea* (c. 95), ed. Maggioni, 1:654.

[28] Is 1:14.

[29] I Sm 20:5.

[30] Alexander of Villedieu, *Massa compoti*, ed. van Wijk, *Le Nombre*, 59, l. 323; *Computus chirometralis*, ed. Mütz, 58; *Computus Magistri Jacobi*, ed. Gumbert-Hepp, 128.

*Considering that the Church celebrates the feast of James on the 8th before the kalends of August [25 July], why is it here assigned to the last day of Veadar? It should be noted that James was beheaded on the 8th before the kalends of April [25 March] and that this was the 13th completed year since the Lord's Passion and that the cycle was 9 and it was an embolismic year and the lunar age was 30 on the 8th before the kalends of April and that [the date] has therefore been correctly assigned. The Church, however, celebrates the feast of James on the 8th before the kalends of Augustus [25 July] not because he suffered on this day, but because his body was then transferred.

Explanation of the Foregoing Calendar

The foregoing work can in a wide sense of the word be referred to as a *kalendarium*. The Roman calendar is indeed rightly called *kalendarium* because of the kalends that are featured in it, but we find that [any] new moon can be called 'kalends', whence it is said in Isaiah 1:14: "My soul hateth your kalends, and your solemnities." And in the first book of Kings 20:5: "Tomorrow are the kalends." And thus the present little work, which has already been written out, can rightly boast the name *kalendarium*.

For its further elucidation, it must first be known that the lunations receive their names from the end, i.e. from the months in which they finish. For example: the lunation which begins in March is named after the lunation of April, because this it where it ends. Whence the verse: "The lunation belongs to the month that provides its ending."

Secondly, it must be noted that the common lunar year contains 354 days. And these are made up of 12 months, which are mentioned in the prologue

positis. Sed in annis scilicet 3, 6, 8, 11, 14, 17, et 19 tredecimus mensis est addendus, quia isti anni sunt embolismales. Et tales anni continent 384 dies.

129 Tertio notandum quod ciclus Latinorum multum | differt a ciclo Hebreorum et Grecorum. Nam ciclus Latinorum incipit in principio Ianuarii, Hebreorum vero et Grecorum incipit a Tysri. Item ciclus Latinorum precedit alios annis tribus. Item Hebrei et Greci non habent nonas, ydus et kalendas, nec litteras aut numerum dictum aureum. Differunt tamen ciclus Hebreorum et Grecorum in uno, nam Greci habent menses fixos, tot dies continentes quot Latinorum menses continent. Sed Hebrei habent menses mobiles lunares, quibus in mundi principio pater humani generis Adam secundum sapientiam a Deo sibi traditam nomina contulerat.

Ultimo notandum quod neomenia et Sabbatum sunt duo festa apud Hebreos que per anni circulum sepius repetuntur. Neomenia quidem per singulos menses, Sabbatum autem per singulas septimanas. 'Neomenia' denique in Greco, 'Molath' in Hebreo et 'incensio' in Latino idem significant, scilicet tempus coniunctionis solis et lune. Et sufficit media coniunctio, quia nec synagoga neque ecclesia in ipsarum cerimoniis verum motum et veram coniunctionem advertere consueverunt. Explicit.

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1 Sed] *add. mg*. Sed in annis Hebreorum scilicet 3, 6, 8, 11, 14, 17 et 19 tredecimus mensis est addendus quia isti etc. *L* ‖ annis] *add. s.l.* Latinorum *L* ‖ 3 … 19] 2, 5, 8, 10, 13, 16 et 18 *L* **1–2** tredecimus … addendus] *om. L* **3–4** multum … Latinorum] *om. ALM* **4** in] a *AL* **14** septimanas] menses septimonas *V* **16** tempus] hanc *P* **17** nec] *om. P* **18** consueverunt] potuerunt *B* ‖ Explicit] non plus. Deo gratias. *A om. L* Explicit kalendarium hebraycum *M* Explicit declaratio. Compilatum est prescriptum kalendarium anno gratie 1436 *N* Explicit declaratio … anno gratie 1436, in Basilea tempore concilii generalis *P* Et in hoc terminatur declaratio huius kalendarii, quod completum est et editum anno gratie 1436 in Basilea, tempore concilii generalis *B* Hec anno etc. 1436. Et rescriptum 1490 IIIa die Maii *O*

and laid out fully in the *kalendarium*. Yet in years 3, 6, 8, 11, 14, 17, and 19 a thirteenth month must be added, for these years are embolismic. And such years contain 384 days.

Thirdly, it must be noted that the cycle of the Latins differs a lot from the cycle of the Hebrews and Greeks: for the cycle of the Latins begins at the start of January, whereas that of the Hebrews and Greeks begins from Tishri. Likewise, the cycle of the Latins precedes the others by three years. Likewise, the Hebrews and Greeks do not have nones, ides, and kalends, nor [dominical] letters or the Golden Number. Yet the cycles of the Hebrews and Greeks still differ in one point: for the Greeks have fixed months, containing the same number of days as the Latin months, whereas the Hebrews have mobile lunar months, which Adam, the father of the human race, named at the beginning of the world according to the wisdom that God conferred upon him.

Finally, it must be noted that the new moon and the Sabbath are two feast days among the Hebrews which are frequently repeated within the course of a year: the new moon once per month, the Sabbath every week. '*Neomenia*' in Greek, '*molad*' in Hebrew and '*incensio*' in Latin all refer to the same thing, namely to the time of the conjunction of sun and moon. And the mean conjunction suffices, since neither the Synagogue nor the Church are wont to pay attention to the true motion and true conjunction in their ceremonies. The End.

5 Chronological Commentary on Hermann's *Calendarium*

1 Nisan

Lazarus of Bethany's resuscitation is only mentioned in the Gospel of John, who offers no clear indication of the date, except for the statement that "the pasch of the Jews was at hand: and many from the country went up to Jerusalem, before the pasch, to purify themselves" (11:55). Hermann apparently took this to mean a fortnight's interval between this event and 15 Nisan. In MSS ALMPV—and hence in their shared sub-archetype δ—Lazarus's resurrection is instead moved to 3 Nisan, for reasons that are altogether unclear.

3/15 Nisan

In his commentary gloss on the dates of the Annunciation and Passion of Christ, Hermann reacts to an influential tradition, partly grounded in the works of St. Augustine, which puts both events on 25 March, the old Roman date of the vernal equinox.[70] As he explains to his readers, this coincidence of dates in two different years of the Julian calendar cannot be maintained in the Jewish calendar, as the latter is based on lunar months. The chronology of Jesus's life is a subject also broached in some of Hermann's other writings, including the *Phaselexis* and the treatise *De fermento et azymo*, which is explicitly mentioned in the present gloss.[71] In line with his previous discussions, Hermann states that Jesus was baptized at the beginning of his 30th year (Luke 3:23), accepting the traditional liturgical date of 6 January (see p. 564 below). He estimates Jesus's public ministry to have lasted three full years, based on the Gospel of John, from which he infers a crucifixion in 33 CE. In this year, 25 March corresponded to Wednesday and to 5 Nisan in the fixed Jewish calendar, which is irreconcilable with the Gospel statements implying that Jesus died on Friday, 14/15 Nisan. Hermann therefore sees himself justified in rejecting this traditional date and instead opts for Friday, 3 April, which would have been equivalent to 14 Nisan in 33 CE.[72] In Hermann's interpretation, this was *luna* 15, even though the

70 Hermann cites Augustine, *De trinitate* 4.5 (CCSL 50, 172), but one could also mention Augustine, *De civitate dei* 18.54 (CCSL 48, 655); *De diversis quaestionibus octoginta tribus* 56 (CCSL 44A, 96); *Quaestiones Exodi* 90 (CCSL 33, 115–116). See further Vincenzo Loi, "Il 25 Marzo data pasquale e la cronologia giovannea della passione in età patristica," *Ephemerides Liturgicae* 85 (1971): 48–69.

71 Hermann Zoest, *De fermento et azymo*, c. 4–5, MS Munich, BSB, Clm 3564, fols. 146^{vb}–48va; *Phaselexis*, c. 2–3, MS Oxford, Bodleian Library, Lyell 63, fol. 302^{vb}–3^{vb}.

72 This is the date first suggested by Roger Bacon (see p. 199 above). In MS B (fol. 102^{v}), Hermann's explication of the Passion date is preceded by a slightly modified citation taken from the *Phaselexis*. See n. 55 above for the quotation.

Jewish calendar postponed 15 Nisan to the following day "for reasons outlined in the treatise *De fermento et azimo*." The reasons alluded to here are the *deḥiyyot*, which prohibit 15 Nisan from falling on a Friday. As we have seen above (p. 482), Hermann held that Jesus rejected this rule and thus celebrated the Passover meal one day earlier than the other Jews. All of this clearly brings to the surface the basic historical assumption that also underlies the rest of Hermann's *Calendarium Hebraicum novum*, namely that the calendar and *molad*-system used by the Jews in his own time had already been in place during biblical antiquity and could thus be applied to events both in the Old and the New Testaments.

While the traditional date for the crucifixion on 25 March had to be rejected due to its failure to conform to the Gospel account, Hermann had no problem retaining the same tradition for the conception of Christ, for which no widely accepted 'lunar' date existed. The year in which Jesus's conception took place according to Hermann's chronology was 3760 JE = 2/1 BCE, which began with a *molad* Tishri on Saturday, 30 August 2 BCE (7.14.400). The following year 3761 JE began with a *molad* Tishri on Friday, 17 September 1 BCE (6.11.989), while 1 Tishri fell on the subsequent Saturday, 18 September, due to rule *lo ADU Rosh*. Since Rosh Hashanah in 3760 and 3761 fell on the same weekday, it follows that the intervening year must have been an embolismic and abundant year of 385 days, which is the only permissible year length in the Jewish calendar to consist of a whole number of weeks (3760 JE is the 17th year of the 19-year cycle and hence embolismic). The distance between 1 Tishri and 1 Nisan in such a year is 208 days ($5 \times 30 + 2 \times 29$ days), which happens to be exactly the distance between 30 August and 25 March in a Julian leap-year.[73] We can conclude that Hermann should have put the conception of Jesus on 1 Nisan instead of 3 Nisan. This discrepancy of two days is also encountered in a few other entries relating to New Testament history, most of which are chronologically linked to the present one (see the entries for 5 Tammuz, 11 Tevet, 23 Tevet, 25 Tevet on pp. 559, 564–565 below). In several other instances, Hermann's Jewish lunar data are only one day off (see the entries for 4/11 Av, 19 Av, 15 Elul, 14 Tishri, 27 Tishri, 14 Tevet on pp. 560–562, 564 below). His commentary on 15 Nisan adds to the confusion by claiming that Nisan in the year of the conception began on the 11th day before the kalends of April = 22 March, which, if true, would put the Annunciation on 4 Nisan. Another idiosyncratic aspect of Hermann's

73 The February of 1 BCE would contain a bissextile day according to the leap-year cycle, although in historical terms it did not, since the Emperor Augustus had ordered a suspension of the leap-day rule for 5 BCE, 1 BCE, and 4 CE. See Ginzel, *Handbuch*, 2:288.

explanation is that he refers to the corresponding years in the 19-year cycle (1 BCE = 1/19, 33 CE = 15/19) not according to the Jewish calendar, but according to the Christian-Dionysiac cycle, which begins two full years earlier. This raises the suspicion that he might have calculated these dates not on the basis of the Jewish calendar, but by using the ecclesiastical lunisolar calendar, which put a new moon on 23 March in the first year of the 19-year cycle, making 25 March correspond to *luna* 3. Most of his other dates, however, do not gel with this hypothesis (exceptions are the entries for 15 Elul and 27 Tishri on pp. 561–562 below), leaving it open as to how exactly Hermann may have arrived at his specific results.[74]

25 Nisan

In Luke 2:42 it is stated that, when Jesus was twelve years old, the holy family went up to Jerusalem, "according to the feast," which is generally understood to be Passover. "And having fulfilled the days, when they returned, the child Jesus remained in Jerusalem. And his parents knew it not" (2:43). The final day of Passover is 21 Nisan. Next, the Gospel informs us that "thinking that he was in the company, they came a day's journey and sought him among their kinsfolks and acquaintance." This day's journey would have taken up the whole of 22 Nisan. "And not finding him, they returned into Jerusalem, seeking him" (2:45). Luke 2:46 says: "And it came to pass, that, after three days, they found him in the temple, sitting in the midst of the doctors, hearing them and asking them questions" (2:46). Adding these three days to 22 Nisan leads to 25 Nisan, which is congruent with Hermann's dating of the episode.

3 Iyyar

Although Hermann here cites the *Legenda Aurea* (or *Passionale*) as his source with regard to the death of Mark the Evangelist, no calendrical date for this particular event can be found there. What the *Legenda* states, however, is that Mark suffered during the reign of Nero, "which began about the year of the Lord 57."[75] As it happens, 57 CE was a year in which 3 Iyyar in the fixed Jewish

74 An attempt to perform these conversions on the basis of the tables found in Reinher of Paderborn's *Compotus emendatus* (ed. van Wijk, *Le comput*, 34–36) showed that these only occasionally support Hermann's dates.

75 Iacopo da Varazze, *Legenda Aurea* (c. 57), ed. Giovanni Paolo Maggioni, 2 vols., 2nd ed. (Florence: SISMEL, 1998), 1:402: "Et hoc dicens spiritum exhalavit sub Nerone qui cepit circa annum domini LVII." For 25 April, see Bonnie J. Blackburn and Leofranc Holford-Strevens, *The Oxford Companion to the Year* (Oxford: Oxford University Press, 1999), 171–174.

calendar would have corresponded to 25 April, which is the feast day of St. Mark in the Western liturgical calendar. Hermann hence obviously took the latter to commemorate Mark's martyrdom in Alexandria.

26 Iyyar

The Feast of the Ascension of Jesus is celebrated on the 40th day from Easter Sunday (and thus always on a Thursday), which explains why the ascension is here noted for the 40th day after his resurrection on 17 Nisan (counting inclusively).

3/5/7 Sivan

The date of Shavuot, the Jewish 'Feast of Weeks', which is taken to commemorate the giving of the Law to the Israelites at Mount Sinai, is usually 6 Sivan. This is the 50th day from the second night of Passover (16 Nisan), if counted inclusively. Hermann, by contrast, assigns it to the 5th day of the month and thus puts it at two days' remove from Pentecost, i.e. the descent of the Holy Spirit upon the Apostles as commemorated in the second chapter of Acts, which he notes on 7 Sivan. Since Pentecost in the Christian liturgical year is always celebrated 49 days or 7 weeks after Easter Sunday, this latter date can be easily explained as being the 49th day after the resurrection of Jesus on 17 Nisan (last 13 days of Nisan + 29 days of Iyyar + first 7 days of Sivan = 49). As for the placement of the Feast of Weeks on 5 Sivan, it may be that Hermann counted it as the 50th day from 15 Nisan rather than 16 Nisan. Alternatively, he may have been influenced by the account in Exodus 19:14–16, where it is stated that God came down to Mt. Sinai to proclaim the Law "on the third day" after Moses had sanctified the people. This interval is reflected by Hermann's placement of the sanctification on 3 Sivan. This was in turn the third day since the people's arrival at Sinai, which is marked as 1 Sivan in Exodus 19:1 and Hermann's calendar. It is possible that he simply decided that the events described in Exodus 19:1–14 needed three days to transpire and that the sanctification and giving of the Law consequently had to fall on 3 and 5 Sivan.

5 Tammuz

The account of the conception and birth of John of Baptist in the first chapter of Luke's Gospel indicates that Mary conceived Jesus six months after Elizabeth conceived John (1:24–38). The liturgical year accordingly puts the birth of John the Baptist in midsummer, on 24 June, which is six months before Christmas and three months or 91 days after the Annunciation on 25 March.[76] We have

76 See p. 183 above.

previously seen (in the entry for 3/15 Nisan, p. 556 above) that the latter date coincided with 1 Nisan in 1 BCE. Counting forward 91 days would lead us to 3 Tammuz, but since Hermann wrongly dated the Annunciation to 3 Nisan, he naturally entered the birth of John two days later as well.

15 Tammuz

Jewish tradition commemorates Moses' breaking of the stone tablets as part of the fast on 17 Tammuz, which takes place 40 days after the second day of Shavuot (7 Sivan), in parallel to the 40 days and nights (Exodus 24:18) that Moses stayed on top of Mt. Sinai. In placing this event on 15 Tammuz instead, Hermann took into account that he had previously established 5 Sivan (rather than 7 Sivan) as the date of Shavuot and the giving of the Law (p. 559 above).

4/11 Av

The Transfiguration of the Lord is celebrated on 6 August, following a tradition that was first established in the Greek East, but became increasingly popular in the West during the late Middle Ages (it became a feast of the universal Church only in 1457, in commemoration of the victory over the Turks at Belgrade in the previous year).[77] Hermann's choice of 11 Av as the locus for the transfiguration on Mt. Thabor thus probably indicates that he considered this to be the Jewish equivalent to 6 August in the appropriate year. Since his chronology of Jesus's life sets 6 January 30 CE and 3 April 33 CE as the starting and end dates for the public ministry, the three possible candidates would be 30, 31, and 32 CE, in which 6 August fell on 19, 29 and 10 Av respectively. It would hence seem that Hermann dated the events to 32 CE (which makes sense, since it is among the later events of the public ministry), but committed an error of one day in converting the Julian into a Jewish date, arriving at 11 instead of 10 Av. In the Gospel of Luke (9:28), the scene of the transfiguration is placed "about eight days" after Jesus's speech on the "Son of Man," which Hermann accordingly places on 4 Av (counting inclusively).[78] He thus chose the reading in Luke over that of Matthew 17:1 and Mark 9:2, who both speak of six days instead.

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77 Blackburn and Holford-Strevens, *The Oxford Companion*, 324 (6 August). On the theological significance, see now Aaron Canty, *Light & Glory* (Washington, DC: The Catholic University of America Press, 2011).

78 In MS M, fol. 118^{v}, this entry is accidentally placed in the line for 3 Av.

19 Av

According to the *Legenda Aurea*, the commemorative dates of the martyrdom of St. Stephen (26 December) and the invention of his body (3 August) had been switched by the Church.[79] In line with this explanation, Hermann assumed that Stephen really died on 3 August. The *Legenda* also states that his martyrdom took place in the year of Christ's crucifixion, which Hermann took to be 33 CE.[80] In that year, 3 August would have fallen on 18 Av, but Hermann puts it on 19 Av, committing the same error of one day as in the previous case of the Transfiguration (11 Av).

15 Elul

The feast of the Assumption of Mary is celebrated on 15 August, but this date is not mentioned in the account in the *Legenda Aurea* referenced by Hermann. What the *Legenda* instead does is to put her age at 14 when Jesus was conceived and at 15 when he was born, whilst further stating that Mary survived her son by 12 years.[81] This latter piece of information places the Assumption in the year 45 CE, if Hermann's date of the crucifixion (3 April 33 CE) is maintained. The Jewish equivalent to 15 August in this year was 14 Elul, so it would seem that Hermann once again committed an error of one day in calculating the date. His result is instead in agreement with the ecclesiastical lunisolar calendar, where 45 CE has the 'Golden Number' 8, with a new moon on 1 August.

14 Tishri

The feast of St. Matthew the Apostle and Evangelist is traditionally celebrated on 21 September, but although his martyrdom is described in the *Legenda Aurea*, no further chronological information can be found there. In the Jewish calendar, the equivalent date for 21 September would have been 13 Tishri in

79 Iacopo da Varazze, *Legenda Aurea* (c. 8, 108), ed. Maggioni, 1:85–86, 2:713–714. See also Johannes Beleth, *Summa de ecclesiasticis officiis* 143 (CCCM 41A, 278–279); Blackburn and Holford-Strevens, *Oxford Companion*, 319–320 (3 August), 532–533 (26 December).

80 Iacopo da Varazze, *Legenda Aurea* (c. 28), ed. Maggioni, 1:198. See n. 89 below for the quote.

81 Ibid. (c. 115), ed. Maggioni, 2:779: "Et, secundum quod ait Epiphanius, XXIV annis post ascensionem filii sui supervixit. Refert ergo quod beata virgo quando Christum concepit erat annorum XIV et in XV ipsum peperit et mansit cum eo anno XXXIII et post mortem Christi supervixit annis XXIV et secundum hoc quando obiit erat annorum LXXII. Probabilius tamen videtur quod alibi legitur, ut XII annis filio supervixerit et sic sexagenaria sit assumpta, cum apostoli totidem annis predicaverint in Iudea et circa partes illas, sicut ecclesiastica tradit hystoria." Cf. Epiphanius Monachus, *Ystoria gloriose semper virginis Marie*, ed. Franceschini, *Studi e note*, 115, 123–124.

47 CE, one year after the martyrdom of St. James, which Hermann assigned to 25 March 46 CE (p. 569 below). Given his tendency to pick Jewish dates one or two days too late, it is likely that this is the date he had in mind, but the precise rationale for his choice of year remains unclear.

24 Tishri

Although this entry purports to refer to Zechariah's prophecy to Zerubbabel (Zechariah 4), it really seems to be inspired by Haggai 2:20: "And the word of the Lord came a second time to Aggeus in the four and twentieth day of the month …" It was certainly easy to confuse both prophecies, seeing that they are both directed at Zerubbabel. Yet the assignment of this passage to Tishri remains problematic, since in Haggai 2:10 and 2:18 it is indicated that this took place in the ninth month, not in the seventh month as had previously been the case for the first prophecy (2:1), which Hermann correctly places on 21 Tishri.

27 Tishri

In his commentary on this date, Hermann stresses that the year of the Annunciation was embolismic and bissextile, which is in line with the fact that he dated the latter to 1 BCE (a Julian leap-year) and 3760 JE (the 17th year of the Jewish lunisolar cycle). The conception of John the Baptist on 24 September, the old Roman date of the autumnal equinox, precedes the Annunciation by six months and hence falls in 2 BCE, but still in the same Jewish year. As stated above (in the entry for 3/15 Nisan, p. 556 above), 1 Tishri 3760 JE fell on 30 August, making 24 September coincide with 26 Tishri. Hermann's erroneous equation of 24 September with 27 Tishri happens to be in agreement with the ecclesiastical lunisolar calendar, where 2 BCE is the final year of the 19-year cycle, with a new moon on 29 August. The discrepancy is raised from one to two days for the two subsequent dates in 3760 BCE, already mentioned, namely the conception of Jesus on 25 March/3 Nisan and the birth of John on 24 June/5 Tammuz. One may suspect that this was due to the fact that 3760 BCE was a 'perfect' year in which Marḥeshvan had 30 days. Hermann, who nowhere in his text acknowledges the variability of the Jewish months, probably just counted 29 days, as written in his calendar, and hence increased the error by a further day.

In either case (26 or 27 Tishri), the placement of the conception of John the Baptist is at odds with the influential view expressed by the author of the sermon *On the solstices and equinoxes*, which is also endorsed by Bede in his commentary on Luke: this view wrongly assumes that John's father Zechariah was the High Priest and that, by consequence, the annunciation scene depicted in Luke took place in the Holy of Holies on Yom Kippur—which was the only

day of the year on which the High Priest entered this area of the Temple (cf. Leviticus 16:29–33; Hebrews 9:7). The latter is on 10 Tishri in the Jewish calendar, which would put the conception of John on the following day, assuming that Zechariah went home to his wife immediately afterwards.[82] In the Julian calendar for 2 BCE, this would have been equivalent to 9 September. Addressing this problem, the MSS of recension β supplement Hermann's discussion of the entry for 27 Tishri with a number of additional remarks on the same subject (see p. 498 above). The new paragraph in question first explicitly references Albert the Great's commentary on Luke, which endorses the view that the angel Gabriel appeared to Zechariah on the Day of Atonement.[83] This is then juxtaposed with the exposition of Nicholas of Lyra, who rightly pointed out that this interpretation of Zechariah and his status was by not supported by the Gospel account.[84] By referencing Nicholas's criticism of the traditional view, the redactor of this passage successfully defended Hermann's placement of the conception on 27 instead of 11 Tishri. The version found in MS N1 (fol. 24^{v}), however, also points out that Paul of Burgos, in his *Additio* to Nicholas's commentary, defended the traditional view (found in Ambrose and Bede) that Zechariah was the High Priest and that the burning of incense mentioned in Luke 1 took place on the Day of Atonement.[85]

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82 Bede, *In Lucae Evangelium expositio* 1.1.24 (CCSL 120, 28): "Huius sacratissimae conceptionis Iohannes Constantinopolitanae urbis antistes mentionem faciens, Gesta sunt haec, inquit, mense Septembri octavo Kalendas Octobris incipiente luna undecima quando oportebat Iudaeos ieiunium scenopegiae celebrare. Et inventum est ipsa die octava Kalendarum Octobrium esse aequinoctium." For further details, see p. 188 above.

83 Albertus Magnus, *Enarrationes in Evangelium Lucae* (1:8–10), in *Opera omnia*, ed. Auguste Borgnet, 38 vols. (Paris: Vivès, 1890–1899), 22:17–19.

84 Nicholas of Lyra, *Postilla* (Luce 1), vol. 4, sigs. 13^{vb}–14ra: "Sed qualiter ille Zacharias fuerit summus sacerdos non legitur, ideo ad declarationem huius dixerunt aliqui, quod .xxiiii. sacerdotes praedicti erant aequales in ordine et in dignitate, non tamen simul sed successive, quia ille in cuius hebdomada festum expiationis cadebat, erat summus sacerdos toto illo anno. Et ad hoc confirmandum inducunt illud quod dicit Ioh. 11 quod *Cayphas erat pontifex anni illius*. Dicunt ergo quod Zacharias fuit summus sacerdos anno illo, eo quod praedictum festum cecidit in hebdomada ipsius. Sed quia nulla scriptura autentica, neque Iosephus, neque alii hystoriographi describentes sacerdotium Iudaeorum, aliquam mentionem faciunt de summo sacerdotio huius Zachariae, ideo salvo meliori iudicio videtur melius dicendum eum fuisse simplicem sacerdotem. Nec ex his quae inducta sunt, ostenditur fuisse summus sacerdos, sed magis oppositum videtur."

85 See Paul's *Additio* to Luke 1, ibid., sig. 17ra.

4 Marḥeshvan

The feast of St. Denys is celebrated by the Roman Church on 9 October, who in ecclesiastical tradition is identified with Dionysius the Areopagite. According to the *Legenda Aurea*, the latter suffered martyrdom at the age of 90 during the reign of Domitian (81–96), the year being 96 CE.[86] In this year, 9 October fell indeed on 4 Marḥeshvan, thus confirming Hermann's choice of date.

11 Tevet

In the previous entries for 3 Nisan, 5 Tammuz and 27 Tishri (see pp. 556, 559, and 562 above), Hermann had already established the correlations between the respective liturgical dates for the conception and birth of John the Baptist (24 September and 24 June) and the conception Jesus (25 March) and the equivalent dates in the Jewish calendar, which all fall within the year 3760 JE (= 2/1 BCE). The birth of Jesus, which is traditionally assigned to the old Roman date of the winter solstice on 25 December, necessarily had to take place nine months after his conception or exactly 184 days after the birth of John on 24 June. In the Jewish calendar, this was already the year 3761 JE. As noted above (p. 557), this year began on Saturday, 18 September and was preceded by a *molad* with the value 6.11.989. The following year 3762 JE had the *molad* Tishri fall on Tuesday, 6 September (3.20.785), meaning that the Jewish year only began on Thursday, 8 September due to the coincidence of rules *molad zaken* and *lo ADU Rosh*. There is thus an interval of 5 weekdays between the beginnings of both years (Saturday vs. Thursday), indicating that the intervening common year was 'perfect' and 355 days in length. Counting forward 184 days from John's birth on 24 June = 3 Tammuz leads to 9 Tevet as the date of Christ's birth (26 last days of Tammuz + 30 Av + 29 Elul + 30 Tishri + 30 Marḥeshvan + 30 Kislev + 9 first days of Tevet = 184) and thus to the familiar two-day discrepancy compared to Hermann's date.[87] For the sake of further clarification, the following table juxtaposes the four liturgical dates with the Jewish dates both according to Hermann and according to the correct calculation, whilst also noting the calendrical intervals between them.

14 Tevet

See the entry for 25 Tevet below.

86 Iacopo da Varazze, *Legenda Aurea* (c. 149), ed. Maggioni, 2:1049: "Passi sunt autem Anno Domini XCVI sub Domitiano, etatis vero beati Dionysii XC." Blackburn and Holford-Strevens, *Oxford Companion*, 408–409 (9 October).

87 The correct correlation is already noted by Abraham bar Ḥiyya, *Sefer ha-Ibbur* (3.10), ed. Filipowski, 109.

	Julian date	Jewish date	*Calendarium*
Conception of John	24 Sep [2 BCE] + 183d	26 Tishri	27 Tishri
Conception of Jesus	25 Mar [1 BCE] + 91d	1 Nisan	3 Nisan
Birth of John	24 June [1 BCE] + 184d	3 Tammuz	5 Tammuz
Birth of Jesus	25 Dec [1 BCE]	9 Tevet	11 Tevet

23 Tevet

The Roman Church commemorates the Adoration of the Magi on 6 January (Epiphany), the twelfth day after Christmas. In full agreement with this tradition, Hermann assigns the Adoration to 23 Tevet, twelve days after Jesus's birth on 11 Tevet. Since the latter date was two days off (see p. 564 above), the correct date for the arrival of the Magi in Bethlehem would have been 21 Tevet.

25 Tevet

As Hermann explains in his commentary on 25 Tevet, the baptism of Jesus, the miracle of turning water into wine at Cana, and the Adoration of the Magi are all traditionally associated with the same date in the Julian calendar, namely 6 January (Epiphany). They nevertheless take up different positions in the Jewish calendar, due to their occurrence in different years. According to Hermann's chronology, the year of Christ's baptism was 30 CE, in which 6 January would have coincided with 13 Tevet, while the wedding at Cana in the following year (31 CE) would have fallen on 23 Tevet. The dates Hermann gives for these events (14 and 25 Tevet) are hence respectively one and two days off.

1 Shevat

Deuteronomy 1:3 notes the first day of the eleventh month in the 40th year since the Exodus as the day on which "Moses spoke to the children of Israel all that the Lord had commanded him to say to them." Hermann's rationale for putting Moses's death (narrated in the final chapter of Deuteronomy) on the very same date is unclear. In rabbinic tradition, the death of Moses is commemorated on 7 Adar.[88]

88 *Seder Olam*, ch. 10. I owe this reference to Sacha Stern.

17 Shevat

The Feast of the Conversion of St. Paul is celebrated on 25 January, which coincided with 17 Shevat in 34 CE. Hermann hence dated this event to the January after the crucifixion, in perfect agreement with the *Legenda Aurea*.[89]

21 Shevat

According to Mosaic Law, an offering at the temple was supposed to be performed 40 days after the birth of a newborn, which is why both Hermann's *Calendarium* (11 Tevet vs. 21 Shevat) and the Christian liturgical year (25 December vs. 2 February) have the "Purification of the Blessed Virgin Mary" exactly on the 40th day after his nativity on 11 Tevet (see p. 564 above).[90] In both cases an inclusive count is employed, i.e. 7 final days of December + 31 days of January + first 2 days of February = 40. Likewise: 19 final days of Tevet + first 21 days of Shevat = 40.

25 Shevat

All three synoptic evangelists (Mk 1; Mt 3–4; Lk 3–4) agree in narrating Jesus's sojourn in the wilderness as the episode that follows immediately upon his baptism in the river Jordan. According to Matthew 4:2–3, Jesus fasted for 40 days and nights, at the end of which he was tempted by the Devil. This harmonizes with Hermann's decision to put the episode of the temptation exactly 40 days after the baptism on 14 Tevet.

27 Adar

Although most of Hermann's sources are conventional in being either books of the Bible or entries in the *Legenda Aurea*, there is room for the occasional surprise. For the 27th of Adar, he notes the release of the Judean king Jehoiachin from prison following the death of Nebuchadnezzar and the accession of his son Amel-Marduk (*Evilmerodach* in the Vulgate) to the throne, only to add that Amel-Marduk cut up his father's body into 300 pieces and fed them to 300 vultures at the Jehoiachin's instigation.[91] The idea that Amel-Marduk removed

89 Iacopo da Varazze, *Legenda Aurea* (c. 28), ed. Maggioni, 1:198: "Conversio sancti Pauli apostoli facta est eodem anno quo Christus passus est et Stephanus lapidatus, anno non naturali, sed emergenti. Nam Christus VIII kal. Aprilis passus est, Stephanus eodem anno III die Augusti lapidatus est, Paulus vero VIII kal. Februarii conversus est."

90 Blackburn and Holford-Strevens, *The Oxford Companion*, 62–63 (2 February). Cf. Iacopo da Varazze, *Legenda Aurea* (c. 37), ed. Maggioni, 1:238–251.

91 In MS M (fol. 123^{r}), the entry is mistakenly assigned to 28 Adar.

the dead body of his father from its place of rest appears in several guises in ancient Jewish and later rabbinic sources.[92] In the Second Targum to Esther, for instance, one can read how the magnates of the state objected to Amel-Marduk's ascending the throne out of fear that Nebuchadnezzar might somehow return, whereupon Amel-Marduk "went into the royal treasuries and brought out from there iron and copper chains and cast (them) upon the heels of Nebukhadnezzar and dragged him out of his grave."[93] Jerome later used a version of this story for his commentary on Isaiah, where he simply attributes it to 'the Hebrews' (*narrant Hebraei huius modi fabulam*).[94] The notion, however, that the exhumation of Nebuchadnezzar was suggested by Jehoiachin and that the body was separated into 300 pieces that were fed to vultures is a more recent addition to the narrative not attested before the twelfth century, when it first appears in Peter Comestor's popular *Historia scholastica*. In Peter's retelling of the story, Jehoiachin recommends cutting up of the corpse of Nebuchadnezzar with the following words: "Thy father shall not rise up again until the vultures have returned him in one piece."[95] This version was later also

92 See Louis Ginzberg, *The Legends of the Jews*, 7 vols. (Philadelphia: Jewish Publication Society of America, 1909–1938), 6:427–428; Ronald Herbert Sack, *Amel-Marduk, 562–560 B.C.* (Neukirchen-Vluyn: Butzon & Bercker, 1972), 18–23; Sack, *Images of Nebuchadnezzar*, 2nd ed. (Selinsgrove, PA: Susquehanna University Press, 2004), 36–41.

93 See the "Targum Sheni" in *The Two Targums of Esther*, trans. Bernard Grossfeld (Edinburgh: T & T Clark, 1991), 97.

94 Jerome, *Commentarii in Esaiam* 5.14.18/20 (CCSL 73, 169–170): "Narrant Hebraei huiusmodi fabulam: Evilmarodach qui, patre suo Nabuchodonosor vivente per septem annos inter bestias, ante regnaverat, postquam ille restitutus in regno est, usque ad morten patris cum Ioachim rege Iudae in vinculis fuit; quo mortuo, cum rursus in regnum succederet, et non susciperetur a principibus, qui metuebant ne viveret qui dicebatur exstinctus. Ut fidem patris mortui faceret, aperuit sepulcrum, et cadaver eius unco et funibus traxit." Sack, *Images*, 58, 111–112, is wrong in claiming that Jerome's version is not attested in earlier sources.

95 Peter Comestor, *Historia scholastica*, Historia libri Danielis, cap. 5 (PL 198, 1453): "Tradunt tamen quidam quod Evilmerodach frater minoris Nabuchodonosor, in diebus electionis paternae, multa egit impie in terra, et, patre restituto, accusatus apud eum, missus est in carcerem, ubi Joachim erat, usque ad mortem fratris sui. Cumque regnare coepisset, elevavit Joachim, quem socium habuerat in carcere, timensque ne resurgeret pater suus, qui de bestia redierat in hominem, consuluit Joachim. Ad cujus consilium cadaver patris sui effossum, divisit in trecentas partes, et dedit eas trecentis vulturibus. Et ait ad eum Joachim: 'Non resurget pater tuus, nisi redeant vultures in unum'."

referenced by Jacobus de Cessolis in his account of how the game of chess was invented by the philosopher Xerxes in an attempt to reform Amel-Marduk's wicked lifestyle.[96] Peter Comestor does not indicate his sources except by remarking that "certain people transmit" (*tradunt tamen quidam*) this story, but it is quite likely that it was relayed to him by Jewish informants.[97] An account extremely similar to that in Comestor's *Historia scholastica* can in fact be found in the Hebrew *Chronicles of Jeraḥmeel*, which exists in a fourteenth-century recension composed of earlier (twelfth-century) material.[98] Although the wording of Hermann's summary of the story is not very similar to the text of the *Historia scholastica*, it remains the most plausible scenario that he derived it directly from Peter Comestor rather than from Jewish sources.

3 Veadar

The feast of *Cathedra Petri* is traditionally celebrated on 22 February and commemorates St. Peter's consecration as bishop of Antioch. In medieval papal chronicles, this event is dated to 38 CE,[99] in which 22 February would have coincided with 29 Adar, four days earlier than the date given by the *Calendarium*. Since 38 CE = 3798 JE is the only embolismic year in the vicinity in which 22 February comes this close to the 3rd day of Adar II,[100] it is nevertheless quite likely that this is the year Hermann had in mind. Perhaps the entry was displaced as the result of a scribal error and the intended date was 1 Veadar (a

96 Jacobus de Cessolis, *Liber de moribus hominum et officiis nobilium*, ed. Ernst Köpke (Brandenburg a. d. Havel: Matthes, 1879), 1: "Tempore enim Evilmerodag regis Babyloniae, hominis lascivi iniusti crudelis, qui patris corpus in trecentas partes divisit, et trecentis vulturibus tradidit ad comedendm, hic ludus inventus est de moribus hominum et officiis nobilium." See further H.J.R. Murray, *A History of Chess* (Oxford: Clarendon Press, 1913), 537–550; Harry Golombek, *A History of Chess* (London: Routledge & Kegan Paul, 1976), 65.

97 Regarding Peter Comestor's use of Jewish sources, see James H. Morey, "Peter Comestor, Biblical Paraphrase, and the Medieval Popular Bible," *Speculum* 68 (1993): 6–35 (12–14); Ari Geiger, "*Historia Judaica*: Petrus Comestor and His Jewish Sources," in *Pierre le Mangeur ou Pierre de Troyes, maître du XII^e siècle*, ed. Gilbert Dahan (Turnhout: Brepols, 2013), 125–145.

98 See *The Chronicles of Jeraḥmeel* (66.5–6), trans. Moses Gaster (London: Royal Asiatic Society, 1899), 206–207.

99 Martin of Troppau, "Chronicon pontificum et imperatorum," ed. Ludwig Weiland, *MGH Scriptores*, vol. 22, ed. Georg Heinrich Pertz (Hannover: Hahn, 1872), 409; Thomas Ebendorfer, *Chronica pontificum Romanorum*, ed. Harald Zimmermann (Munich: Monumenta Germaniae Historica, 1994), 59. On the date, see Blackburn and Holford-Strevens, *Oxford Companion*, 87 (22 February).

100 In 3795 JE (14/19) the corresponding date is 25 Adar, in 3800 (19/19) it is 20 Adar.

reverse case to the one noted on p. 556 above). In this case, we would be back to the familiar discrepancy of two days already encountered in several previous cases.

30 Veadar

In Hermann's version of the Hebrew calendar, the intercalary *Veadar* or Adar II is presented as the thirteenth and final month, with a length of 30 days, while the regular Adar (I), which is a 'defective' month of 29 days, remains in its usual position as the twelfth month. This is at odds with the conventions of the fixed Jewish calendar, where the intercalary 30-day Adar is always inserted before the regular 29-day Adar (which thus becomes Adar II or *Adar Sheni* while retaining its original duration).[101] As a result, the 30th day of Veadar, on which the decapitation of James is placed in the present *Calendarium*, would be equivalent to 29 Adar II in the regular Jewish calendar. The latter date coincided with 25 March in 46 CE, which is the 13th year since Christ's Passion (33 + 13 = 46), as specified by Hermann in his commentary on the date. The calendar date (25 March) for James's death was conveniently stated in the *Legenda Aurea*,[102] but the question remains why Hermann chose this particular interval of years. Perhaps he based himself on the end of the reign of Herod Agrippa, who is recorded in the Acts of the Apostles (12:2) as having ordered James's execution. In the chronicle of Eusebius, Herod's death is recorded for the fourth year of the 205th Olympiad (= 4th year of Emperor Claudius), whereas the crucifixion, in the 18th year of Tiberius, is assigned to the third year of the 202nd Olympiad. The interval between both events is exactly 13 years.[103]

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101 See Burnaby, *Elements*, 30–32.

102 Iacopo da Varazze, *Legenda Aurea* (c. 95), ed. Maggioni, 1:654.

103 Eusebius, *Die Chronik*, ed. Helm, 174, 179. It may also be significant that the *Legenda aurea* elsewhere gives the period during which the apostles preached in Judea as 12 years. See Iacopo da Varazze, *Legenda Aurea* (c. 115), ed. Maggioni, 2:779.

APPENDIX I

John of Pulchro Rivo on the Jewish Calendar

Most of the very little information that can be ascertained about John of Pulchro Rivo's *oeuvre* and biography comes from his own remarks on the *Compotus novus* ("Omissis preternecessariis cum intentionis sit in hoc epilogo …"), a work he wrote in the year 1297.[1] It is still preserved in three copies, found in MSS Glasgow, University Library, Hunter 444, pp. 18–47 (s. XIII/XIV), Leiden, Universiteitsbibliotheek, Scaliger 66, fols. 9^{r}–37^{v} (s. $XIV^{1/2}$), and Florence, Biblioteca Medicea Laurenziana, Plut. 30.24, fols. 78^{r}–86^{r} (s. $XIV^{2/2}$).[2] Only the Florentine codex, which was copied towards the end of the fourteenth century, adds to this John's own commentary or *Sententia* on the text ("Sicut dicit Ptolomeus in Almagesti …"), which he completed in the following year, on 1 April 1298.[3] In addition, there are separate copies of this commentary in MSS Vatican City, Biblioteca Apostolica Vaticana, lat. 3112, fols. 29^{r}–67^{v} (s. XIV), and Erfurt, Universitäts- und Forschungsbibliothek, Ampl., 4° 365, fols. 132^{r}–139^{r} (s. $XIV^{1/2}$), though the latter only preserves some extracts.[4]

For the most part, the *Compotus novus* is a compilation of computistical, astronomical, astrological, natural philosophical, and medical lore, excerpted from various texts of the Latin computistical tradition and mixed with material from ancient authorities such as Aristotle and Galen as well as Arabic writers. The principal sources used are listed cumulatively in the introduction, but John also takes care to acknowledge them separately in the course of the text. As he makes clear at the very beginning, he compiled the present text in order to supplement a previous and less developed work of his, which refrained from

1 A fuller treatment of the bio-bibliographical information presented in this section will appear in C.P.E. Nothaft, "John of Pulchro Rivo and John of Saxony: A *mise au point*," *Journal for the History of Astronomy* (forthcoming).

2 These three copies, together with the commentary in Vat. lat. 3112, were first noted by Boncompagni, "Intorno ad un tratatto," 689–694, 711–732.

3 MS Vatican City, BAV, lat. 3112, fol. 67^{va}: "Explicit Anno Domini 1298 die Martis post ramos palmarum kl. Aprilis. Explicit sententia compoti nove compilations."

4 MS Erfurt, UB, Amploniana, 4° 365, fol. 139^{r}: "Expliciunt notule supra compotum magistri Iohannis de Saxonia, extracte a scriptis eiusdem completis Anno Domini 1297." Since the extracts focus on the physical and medical aspects and omit nearly all the material relevant to the Jewish calendar, I shall ignore this MS in what follows.

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the use of Hindu-Arabic numerals.[5] The commentary on these introductory remarks further informs us that this earlier composition began with the words "Ad habendum ciclum solarem secundum Gerlandum …" (TK 41), which makes it possible to identify the text in question with a widely copied *Compilatio elucidans compotum manualem* (or simply *Compotus manualis*), a work focusing on computistical finger reckoning. Its more than two dozen extant manuscripts include the aforementioned Leiden codex, where the *Compilatio* precedes the *Compotus novus* (1^{r}–7^{r}).[6] According to the colophon in this manuscript, work on the *Compilatio* was begun in Paris in 1289, but "brought to perfection" (*consummata*) in the northern German town of Brunswick (Braunschweig).[7] In the commentary to his *Compotus novus* of 1297, John presents himself as a native of this town, adding that the bulk of the *Compotus novus* was written in Goslar, which lies about 40 km south of Brunswick.[8] In general, John refers to himself both as a Saxon (*Saxo*) and a German (*Alemannus*), while the incipits and explicits in the three preserved manuscripts of the *Compotus novus* (Florence, Glasgow, and Leiden) assign the text to *Iohannes de Saxonia*. This has given rise to the view, defended in particular by Emmanuel Poulle, that the

5 MS Florence, BML, Plut. 30.24, fol. 78^{r}: "Omissis preternecessariis cum intentionis sit in hoc epylogo compendium emendare—utinam ad unguem—nuper minus deliberatum a nobis ob importunas precum instantias ad omne datum tempus sine cyfra compilatum perutile videbatur addere omnia secundum propositum utiliora que declivitas ingenii freta Dei auxilio pro posse suppetivit colligere modo lucido compendioso et moderno de phylosophicis voluminibus Dyonisii, Bede, Hilperici, Gerlandi, Herimani, Ydioth, Ymaginis mundi, Compoti ecclesiastici, Masse compoti, Johannis de Sacrobosco, Lyconiensis, Campani, Metri ecclesie, Baldeuini, Ferrandi, Compoti phylosophici, Compoti manualis, Iohannis de Meldis, Thome de Auge, et quam plurium aliorum." Other authorities cited in the course of the text and its commentary include Plato, Aristotle, Hippocrates, Galen, Ptolemy, Macrobius, Boethius, Johannes Hispalensis, Albategni, Alfraganus, Alcabitius, Thebit, Haly, Azarquiel, 'frater Egidius', the 'liber Nemroth', Albertus Magnus, and Petrus de Dacia.

6 MS Vatican City, BAV, lat. 3112, fol. $30^{rb–va}$: "Unde notandum est quod auctor iste quoddam aliud compendium absque omni cifra ad omne tempus interrogatum compilavit propter petitionem quorundam amicorum suorum et hoc sine magna deliberatione. Quod incipit sic: 'Ad habendum ciclum solarem secundum Gerlandum'." Ibid., fol. 32^{vb}: "'Ut docet manus', id est compotus manualis quem compilavit Iohannes Alemannus de Pulcro Rivo, qui minus subtilis est quoad manum." For a list of manuscripts, see Nothaft, "John of Pulchro Rivo."

7 MS Leiden, UB, Scaliger 66, fol. 7^{r}: "Parisius inchoata Anno Domini 1289°, Brunsvich consummata, ad instancias quorundam meorum specialium amicorum quantum declivitas mei ingenioli colligere suppetebat."

8 See n. 68 below for the quotation.

Compotus novus is a work by John of Saxony, who was active as an astronomer in Paris during 1320s and 1330s, where he studied under John of Lignères and later wrote the best-known set of canons to the Alfonsine Tables (1327).[9] Yet the latter is never referred to as John of Pulchro Rivo or John of Brunswick in the manuscripts. Instead, he went by the name of John Danko or Danecowe, confirming that this John of Saxony was a separate person, who was born a few decades after John of Pulchro Rivo.[10]

The *Compotus novus* consists of 18 chapters, some of which include substantial information on the Jewish calendar (esp. ch. 5, 8, and 13–15), as indicated by their respective headings:[11]

[1] De ciclo solari et anno bissextili in manu
[2] De littera dominicali tam per chifram quam sine chifra et de concurrentibus et epactis
[3] De littera dominicali ad omne tempus in manu
[4] De maiori et minori anno et de solari anno et eius correctione et de causa bissexti
[5] De quatuor partibus anni apud ecclesiam et astronomos et Iudeos et de solstitiis et equinoctiis et de ieiuniis ecclesie et Iudeorum
[6] De diebus et nominibus mensium et de diebus canicularibus et de diversa inceptione anni
[7] De septimana et de diebus et de quatuor quadris diei et de diversa denominatione et inceptione earundem
[8] De festis fixis in manu et de festis Iudeorum
[9] De kalendis, idibus et nonis et in quo signo sit sol et de diebus Egyptiacis in manu
[10] De aureo numero et ciclo lunari et epactis in manu
[11] De anno lunari et mensibus lunaribus et de quantitate lunationis equalis et de causa erroris aurei numeri
[12] De etate lune in manu et de saltu lune et regulari lunari
[13] De media coniunctione secundum Arzachelem, Iudeos et Arabes et de diversa computatione diversorum et quid sit coniunctio media et vera et

9 Emmanuel Poulle, "Les astronomes parisiens au XIV^{e} siècle et l'astronomie alphonsine," in *Histoire littéraire de la France*, vol. 43.1 (Paris: Diffusion de Boccard, 2005), 1–54 (45–53).

10 See Nothaft, "John of Pulchro Rivo," for details.

11 I reproduce the chapter headings as they appear in the closely related MSS Glasgow (Hunter 444) and Leiden (Scaliger 66). The Florentine MS (Plut. 30.24) prefaces the text with a separate chapter list, which, however, only goes up to ch. 15.

de luna in quo signo sit et de diurno recessu eius a sole et per quot horas de nocte luceat

[14] De annis embolismalibus et de diversis generibus annorum apud nos et Iudeos et de saltu lune et de neomeniis

[15] De compositione et correctione omnium tabularum et de feriis Tisri et de longitudine temporis positi in tabulis

[16] De festis mobilibus in manu et errore termini paschalis et eius correctione et de clavibus et littera tabulari in manu

[17] De septimanis inter nativitatem et festa mobilia et inter penthecoste et festum Iohannis et inter penthecoste et adventum et de adventu et de indictionibus et evo et seculo

[18] Hic ultimo addit quamdam questionem valentem ad diversa et modum scribendi absque exemplari tabulam Dyonisii vel Gerlandi

Most of the information on the Jewish calendar presented in these chapters was excerpted from a single source, which John appears to have used more extensively than any other. This source, a *Compotus* (*novus*) *philosophicus* in two parts, is still preserved in at least four manuscripts, one of which (Vat. lat. 3112) also contains John's commentary on the *Compotus novus*.[12] John expressly lists this *Compotus philosophicus* among the authorities he relied on for his compilation.[13] The work's title also appears in a number of further passages, which quote the text more or less verbatim:

12 In MS Vatican City, BAV, lat. 3112, fol. 1^{r}–28^{v}, the text takes up the first 28 leaves and is then followed by the commentary on the *Compotus novus* of John of Pulchro Rivo, after which the codex ends. Neither text carries an ascription of authorship. Further copies of the *Compotus philosophicus* are found in MSS Hannover, NLB, IV 389, fols. 1^{r}–15^{v} (dated 1342); Lüneburg, Ratsbücherei, Miscell. D 4° 46, fols. 1^{ra}–19^{r}; Vienna, ÖNB, 5239, fols. 10^{r}–28^{v}. The Vienna MS of this text was briefly mentioned by Kaltenbrunner, "Die Vorgeschichte," 307–308. See also Boncompagni, "Intorno ad un tratatto," 787–788, with regard to Vat. lat. 3112.

13 See the beginning of the preface, quoted in n. 5 above.

Compotus philosophicus	*Compotus novus*
In solstitio enim hyemali secundum scripturas Dominus fuit natus, quod nunc fere tot diebus precedit nativitatem Domini quod centenarii annorum transierunt ab eius nativitate. Quidam autem compotiste dicunt quod a 120 annis deberet excipi unus dies. Et hoc adhuc magis consonum videtur esse ei quod accidit, quia temporibus nostris solstitium precedit nativitatem Domini 10 diebus et 14 horis et totiens 120 anni fluxerunt ab eius nativitate, quod patet per instrumenta considerationis: Anno enim Domini 1272, anno bisextili, 19 kl. Ianuarii, in meridie inveniebatur sol in principio Capricorni in puncto solstitiali. [MS Vat. lat. 3112, fol. 3$^{rb–va}$]	Nam solstitium legimus Christo nascente fuisse, quod nunc antecedit nativitatem 10 diebus 14 [Ms. 19] horis, ut probat compotus philosophicus, et est fere ydus Decembris, quia totiens 120 anni fluxerunt ab eius nativitate. [MS Leiden, UB, Scaliger 66, fol. 13ra].
Iudei etiam fere habent eandem quantitatem lunationis equalis. Ipsi enim computant pro lunatione equali 29 dies et 12 horas et 793 partes, quarum 1080 secundum eos faciunt unam horam … et hec est eadem quantitas lunationis equalis precise quam ponit Arzachel in suis tabulis astronomie … [Ibid., fol. 3^{vb}]	… secundum Iudeos 29 dies, 12 horas, 793 gelachim. Et est hec quantitas lunationis equalis precise, ut dicit compotus philosophicus, quam ponit Arzachel in tabulis toletanis … [Ibid., fol. 19$^{rb–va}$]

Compotus philosophicus	*Compotus novus*
Cum autem voluerimus tempus habere coniunctionis medie cuiuslibet lunationis quolibet anno intrabimus primo cum Annis Domini imperfectis tabulam ciclorum … [Ibid., fol. 6^{rb}]	Aliquis volens scire tempus medie coniunctionis cuiuslibet lunationis quolibet anno, primo, ut docet compotus philosophicus, cum Annis Domini imperfectis intrabit tabulam ciclorum … [Ibid., fol. 22^{rb}]
Si vero volueris scire que sit prima lunatio Arabum et principium anni eorum et quo die incipiat annus et quilibet mensis, cum Annis Domini vel numero minori propriori … [Ibid., fols. 14^{vb}–15ra]	Si vero volueris scire que sit prima lunatio Arabum et principium anni eorum, in qua feria incipiat annus et mensis qui vis, cum annis domini, ut docet philosophicus, vel numero minori propriori [Ms.: priori] … [Ibid., fol. 24$^{rb–va}$]

According to its incipit ("Cum sit intentio ostendere falsitatem kalendarii nostri et dare viam per quam possit verificari"), the *Compotus philosophicus* was written in an effort to uncover the errors of the ecclesiastical calendar and to look for ways of its correction, yet large parts of the text have more in common with a general introduction to computational astronomy. Indeed, its second half is mainly concerned with the calculation of eclipses, to which end it contains numerous tables as well as planetary diagrams for the Sun and Moon.[14] A passage in the first half mentions the vernal equinox on 13 March 1273 as a date in the past,[15] but it is not entirely clear if the work's composition still fell in the same year or somewhat later. Even so, it can be

14 The second part is expressly labelled *De eclipsibus* in MS Hannover, NLB, IV 389, fol. 10^{r}, where the tables pertaining to this part are jointly moved to the end of the treatise (fols. 12^{v}–15^{v}). Cf. John of Pulchro Rivo's remark in the commentary on the *Compotus novus* in MS Vatican City, BAV, lat. 3112, fol. 30va: "… ut patet per compotum philosophicum, qui tradit de eclipsi solis et lune etc."

15 MS Vatican City, BAV, lat. 3112, fol. 9ra: "Anno enim Domini 1273, anno primo post bisextum, pridie ydus Martii in meridie, sol inveniebatur pertransisse de primo gradu Arietis 40 minuta. Ex quo patet quod precedenti die, id est 3 ydus Martii, post horas 20 fuit in puncto equinoctiali."

concluded to a high degree of certainty that the author worked during the 19-year cycle that lasted from 1273 to 1291, which is the starting point for the various syzygy tables included with the text. As the author informs his readers at one point, these tables were calculated for the meridian of Jerusalem, in conformity with the Jewish calendar. In order to adapt these tables for a given longitude West of Jerusalem, "where almost the entire Western Church is at home" (*sicut est fere tota occidentalis ecclesia*), it was necessary to perform a correction, whose quantity could be derived from the time difference between eclipses observed in Jerusalem and other European cities. The author offers two examples for such a conversion: for Toledo, it is necessary subtract 3 hours and 27 minutes, whereas "for the city of Magdeburg, which is in Germany" (*ad civitatem Magdeburgensem, que est in Almania*), one only needs to take away 2 hours and 40 minutes.[16] The reference to the meridian of Toledo is easily explained by the widespread popularity of the Toledan Tables, on which most of the tables in the *Compotus philosophicus* were ultimately based, but the choice of Magdeburg is an unusual one. It strongly suggests that author was, like John of Pulchro Rivo, a man from north-eastern Germany, where Magdeburg was one of the chief cities and the seat of an archbishopric. Indeed, Magdeburg is also mentioned in the second half of the *Compotus philosophicus*, where it is used as the locality of reference for a set of tables for the oblique ascension, with its latitude very accurately stated as 52°.[17] The only other reliable piece of information that can be ascertained about the author is that he was a member of the Franciscan order who went by the name of John. An ascription to "Friar John of the Order of Friars Minor" is found in the earliest preserved copy of the work, an astronomical miscellany from the Franciscan abbey of St. Marien in Lüneburg (s. XIV^{in}).[18] A fuller version of the author's name is given in the corresponding explicit, but part of the text has been erased, such that only *per*

16 Ibid., fol. 17^{vb}: "Sed si ad alteram civitatem, que est in occidente respectu Iherusalem, sicut est fere tota occidentalis ecclesia, volueris habere tempus medie coniunctionis vel oppositionis, vide eius differentiam ad Iherusalem in eclipsi et illam subtrahe a tempore coniunctionis vel oppositionis civitatis sancte ibi invento. Si autem ad Tholetum habere volueris ipsum, subtrahe 3 horas et 27 minuta. Et si ad civitatem Magdeburgensem, que est in Allemania, habere volueris tempus medie coniunctionis vel oppositionis, subtrahe 2 horas et 40 minuta a tempore secundum longitudinem civitatis sancte in tabulis invento."

17 Ibid., fol. 21^{vb}: "Notandum est etiam quod ascensiones et partes hore circuli obliqui in tabulis posite fundate sunt super latitudinem 52 graduum, cuiusmodi est Magdeburg, quod est in Teutonia."

18 MS Lüneburg, Ratsbücherei, Miscell. D 4° 46, fol. 1^{r}: "Incipit conpotus philosophicus compositus per fratrem Iohannes ordinis fratrum minorum."

fratrem Iohannem de Gu … remains legible.[19] In any case, the ascription in the Lüneburg MS matches the repeated references to *Frater Iohannes minor* in John of Pulchro Rivo's *Compotus novus*:

Compotus philosophicus	*Compotus novus*
Propter hoc ipsi vulgariter computant per integros dies, sed hec computatio est accepta a computatione per minutias et secundum hanc duplicem computationem dupliciter diem incipiunt diem naturalem. [MS Vat. lat. 3112, fol. 14^{vb}]	Propter hoc, ut ait frater Iohannes, ipsi vulgariter computant per integros dies, sed hec computatio accepta est a computatione per minutias et secundum hanc duplicem computationem diem dupliciter incipiunt naturalem. [Leiden, UB, Scaliger 66, fol. 24^{rb}]
Et sciendum est quod in ista computatione septimane abiciuntur et quidquid est ultra septimanas, hoc ponitur in tabulis, quia hoc tantum facit varietatem in inceptionibus lunationum, ita quod sequens lunatio alia feria, post horas alias et partes, incipiat quam precedens. [Ibid., fol. 5va]	Notandum est de compositione tabularum quod, ut docet frater Iohannes minor, septimane a tempore lunationis equalis abiciantur et quidquid est ultra septimanas, hic imponitur in tabulis, quia hoc facit varietatem in inceptionibus lunationum, ita quod sequens lunatio alia feria, post horas alias et minuta incipiat quam precedens. [Ibid., fol. 31ra]
Unde sciendum est quod in primo plenilunio post equinoctium vernale celebratur pascha in veteri lege et si plenilunium fuisset in equinoctio	Unde notandum est quod, ut dicit frater Iohannes minor, in primo plenilunio post equinoctium vernale, et si fuisset in ipso equinoctio,

19 Ibid., fol. 18^{vb}: "Explicit conpotus novus philosophicus compositus per fratrem Iohannem de Gu …" See Martin Wierschin, *Handschriften der Ratsbücherei Lüneburg*, vol. 1, *Miscellanea und Historica* (Wiesbaden: Harrassowitz, 1969), 76–81, for a description of the codex. Several of the texts in the Lüneburg MS, including the *Compotus philosophicus*, were copied into MS Vienna, ÖNB, 5239, fol. 28^{r}, where the name is altered to what looks like *Iohannes de Su …*

Compotus philosophicus	*Compotus novus*
ibidem. Mundus enim creditur fuisse factus in huiusmodi equinoctio et plenilunio. [Ibid., fol. 8^{rb}]	celebrabatur pasca veteris legis, quia mundus creditur in hoc plenilunio factus esse … [Ibid., fol. 33ra]
Unde et Iudei in hiis discordant a nobis in lunatione paschali prevenientes nos in una lunatione. [Ibid., fol. 9^{rb}]	Propter quod, ut dicit frater Iohannes, Iudei discordantes a nobis in hiis annis in una lunatione prius quam nos celebrant suum pascha. [Ibid., fol. 34ra]

John relied on the Franciscan friar of the same name not just for textual information, but also for most of the tables included in his compilation. Among these was a tripartite table for the calculation of the *molad* according to the Jewish calendar (table 1), whose basic principles are familiar from previous texts like the *Liber erarum* and Robert of Leicester's *De compoto Hebreorum*:

TABLE 1[20]

Tabula medie coniunctionis Iudeorum												
Tabula ciclorum				**Tabula annorum**					**Tabula lunationum**			
a.d.	f.	h.	g.	aur.	d.	h.	g.		lun.	d.	h.	g.
1273	4	16	894	1	0	0	0		1	Tisri		
1292	7	9	409	2	4	8	876	Emb	2	1	12	793
1311	3	1	1004	3	3	6	385		3	3	1	506
1330	5	18	519	4	0	15	181		4	4	14	219
1349	1	11	34	5	4	23	1057	Emb	5	6	2	1012
1368	4	3	629	6	3	21	566		6	0	15	725
1387	6	20	144	7	1	6	362		7	2	4	438
1406	2	12	739	8	5	15	158	Emb	8	3	17	151

20 MSS Glasgow, UL, Hunter 444, p. 33; Leiden, UB, Scaliger 66, fol. 25^{r}; Florence, BML, Plut. 30.24, fol. 82^{rb}. Abbreviations: a. d. = anni domini, f. = ferie, h. = hore, g. = gelachim, aur. = aureus, lun. = lunationes.

Tabula ciclorum				Tabula medie coniunctionis Iudeorum Tabula annorum					Tabula lunationum			
1425	5	5	254	9	4	12	747		9	5	5	944
1444	7	21	849	10	1	21	543	Emb	10	6	18	657
1463	3	14	364	11	0	19	52		11	1	7	370
1482	6	6	959	12	5	3	928		12	2	20	83
1501	1	23	474	13	2	12	724	Emb	13	4	8	876
1520	4	15	1069	14	1	10	233		14	5	21	589
1539	7	8	584	14	5	19	29					
1558	2	1	99	16	3	3	905	Emb				
1577	5	17	694	17	2	1	414					
1596	1	10	209	18	6	10	210					
1615	4	2	804	19	3	19	6	Emb				
1634	6	19	319	20	2	16	595					

The table's starting point is the *molad* Tishri of the year 5034 JE, which fell on Wednesday, 13 September 1273 CE, at 16h 894p. Contrary to what one might expect, this is not the beginning of the Jewish 19-year cycle, but rather its 18th year. This explains why already the second year of the 'tabula annorum' is marked with an 'emb.' for embolism. With the third year, the cycle returns to its beginning and the usual intercalation pattern ensues. Confusing as this may seem, it is justified by the fact that the table was deliberately drawn up to aid in the computation of Easter. In line with this purpose, the starting date (1273) corresponds to the first year of the Dionysiac cycle, which begins two years and ca. nine months earlier than the Jewish cycle. As already mentioned, John of Pulchro Rivo wrote his *Compotus novus* in the year 1297 and hence in the second 19-year cycle, stretching from 1292 to 1310. For John's purposes, the table's first line was thus practically obsolete and its presence is simply owed to the fact that he lifted the table wholesale from Friar John's *Compotus philosophicus*, written during the previous cycle (1273–1291).[21] In the latter work, the year 1273 also serves as the starting point for similarly structured tables based on

21 The corresponding template from the *Compotus philosophicus* is found in MSS Hannover, NLB, IV 389, fol. 5^{v}; Lüneburg, Ratsbücherei, Miscell. D 4° 46, fol. 7^{r}; Vienna, ÖNB, 5239, fol. 16^{r}; Vatican City, BAV, lat. 3112, fol. 11^{v}.

the parameters of Ptolemy, 'Azarquiel' (*Arzachel*), and the Arabic calendar (in the first part) as well as for a set of mean syzygy and trepidation tables (in the second part).[22] In addition to the Jewish table, John of Pulchro Rivo helped himself to the tables "based on the estimate of Azarquiel" (*Tabule medie coniunctionis fundate super quantitatem Arzachelis*) and those for the Arabic calendar, which reappear in much the same form in his *Compotus novus*.[23]

The name 'Azarquiel' is a reference to the Toledan Tables, which were often attributed to Ibn al-Zarqālī in medieval manuscripts. Toledan-style tables for mean syzygy normally use a lunation of 29;31,50,8,20d or 29d 12h 44m 3⅓ s, which is identical to the Jewish value (29d 12h 793p). While this value is also implicit in the tables "based on the estimate of Azarquiel," the conjunction times are only displayed according to days, hours, and minutes, which means that the additional 3⅓ are taken account of through tacit additions. Their structure is in fact analogous to the tables for the *molad* (table 1 above), in that the syzygies dates are only marked according to the day of the week, making them independent of the Julian calendar or any other specific calendrical scheme.[24] This was entirely sufficient given the table's primary purpose, which was to correct the new moon dates indicated by the Golden Number in the ecclesiastical calendar. In line with this purpose, the table's starting point is the Easter lunation of 1273, which is timed to Monday [20 March], at 06:25h (counted from midnight). The conjunctions in Friar John's table 'according to Azarquiel' thus fall 03:27h later than the ones derivable from the Toledan Tables, where the

22 In contrast to the other known copies, MS Hannover, NLB, IV 389 omits the first three lines of *anni collecti* from the syzygy and trepidation tables of the second part, which thus only start in 1330 (fols. 12^{v} and 13^{v}). This marks the beginning of the 19-year cycle in which the manuscript was copied, as stated in the colophon: "Finitus est liber iste qui vocatur Compotus philosophicus Anno Domini 1342 18. die Martii" (fol. 12^{v}).

23 Compare, for instance, ibid., fols. 5^{r} and 9^{r}, with MS Glasgow, UL, Hunter 444, pp. 32, 34. In the *Compotus philosophicus*, the tables "according to Azarquiel" come with a sub-table for the mean opposition, which was omitted from the *Compotus novus*.

24 The same limitation characterizes the tables "based on the quantity of Ptolemy" (*Tabule temporis medie coniunctionis fundate super quantitatem Ptolomei*), which is the first set of tables found in the *Compotus philosophicus* (e.g., MS Hannover, NLB, IV 389, fol. 3^{r}). These tables use a unique subdivision of the hour into 64 'minutes', with one lunation lasting 29d 12h 47m, which is equivalent to 29;31,50,9,22,30d. This odd definition of the minute is evidently due to an attempt to get as close as possible to 29;31,50,8,9,20d, the value for the mean synodic month implicit in the *Almagest* (see n. 93 on p. 157 above), whilst using only a single time unit beyond the hour. Indeed, the table subtracts two minutes over the course of 19 years, which slightly improves the implied mean value to 29;31,50,8,10 … d.

corresponding time would have been 02:58h.[25] This discrepancy reflects the fact that the tables in Friar John's treatise were re-computed for the hypothetical meridian of the Jewish calendar, which the author associated with Jerusalem (see p. 576 above and p. 608 below). Since the conjunctions 'according to Azarquiel' are thus based both on the same reference meridian and the same value for the mean synodic month as the Jewish *molad* system, it is possible to convert the former into the latter via a relatively simple series of steps, which are outlined in the text:

Step 1: add the value for six consecutive lunations (2d 4h 24 m) to get from the Easter lunation to the beginning of Tishri, which is the start of the year in table 1. An exception must be made in years 8 and 19 of the 19-year cycle, when only five lunations (6d 2h 56 m) are added. In these years, the Christians celebrate Easter in Iyyar, rather than Nisan (a result of the different starting points of the Jewish and Alexandrian-Dionysiac 19-year cycles).

Step 2: add 6 hours in order convert the time from the midnight epoch used in the present table to the evening epoch used in the Jewish calendar.

Step 3: multiply the number of minutes by 18 in order to convert them into the equivalent number of 'parts' or *ḥalakim*.

Step 4: add another 1p to the total result for each 19-year cycle after the first one. This is due to the fact that the table of cycles "based on the estimate of Azarquiel" adds 2d 16h 33 m per cycle, which is equivalent to 2d 16h 594p, whereas the Jewish calendar adds 2d 16h 595p.

Step 5: add a further predetermined number of *ḥalakim* to the result. These additions are necessitated by the fact that 29d 12h 44 m (the length of the lunation used in the 'table of months') correspond to 29d 12h 792p and are thus 1p shorter than a Jewish lunation of 29d 12h 793p. For the first year, the resulting discrepancy is 12p, after the second year it has risen to 24p, but since full minutes are always tacitly restored in the

25 According to the Toledan syzygy tables (edited in Pedersen, *The Toledan Tables*, 4:1327–1340), the mean conjunction that preceded Ramadan in 671 AH (= March 1273 CE) fell at 14:58h, which is 02:58h if adjusted from noon to the midnight epoch used in the *Compotus philosophicus*. The latter times the first spring conjunction of 1273 to 06:25h, which is 03:27h or 3h 486p less. This is in good agreement with a direct comparison between the Toledan Tables and the Jewish calendar, whose *molad* Nisan for 1273 CE fell at 12h 456p. The Toledan value (02:58h), if adjusted for the Jewish evening epoch, is equivalent to 8h 1044p, the discrepancy being 3h 492p. As seen in n. 90 on p. 156 above, the comparison for the Hijra epoch of the Toledan Tables yields an almost identical discrepancy of 3h 491p.

tables 'according to Azarquiel', the value to be added drops to 24 – 18 = 6p. The third year is an embolismic year of thirteenth months, which means that 13p have to be added, making the total drop to 6 + 13 – 18 = 1p. The remaining additions can be derived from table 2, which accompanies the syzygy tables "based on the estimate of Azarquiel" in the *Compotus philosophicus*.[26] John of Pulchro Rivo not only faithfully copied this table into his *Compotus novus*,[27] but also closely replicated the instructions for its use (i.e. the five steps just outlined), as the following comparison shows:

TABLE 2

Tabula equans gelachim

Aureus	**Gelachim**
1	12
2	6
3	1
4	13
5	7
6	2
7	14
8	8
9	3
10	15
11	19
12	4
13	16
14	11
15	5
16	17
17	12
18	6
19	18

26 MSS Hannover, NLB, IV 389, fol. 5^{r}; Lüneburg, Ratsbücherei, Miscell. D 4° 46, fol. 6^{r}; Vienna, ÖNB, 5239, fol. 15^{r}; Vatican City, BAV, lat. 3112, fol. 10^{v}.

27 MSS Glasgow, UL, Hunter 444, p. 32; Leiden, UB, Scaliger 66, fol. 22^{v}; Florence, BML, Plut. 30.24, fols. 81^{vb}–82ra.

Compotus philosophicus, c. 9	*Compotus novus*, c. 13
Si etiam radicem sive principium anni Iudeorum per has tabulas quis voluerit invenire, querat tempus coniunctionis lunationis septime, sed in anno 8 et 19 lunationis sexte, cui addat 6 horas, quia ipsi incipiunt diem naturalem in occasu solis.	Si autem per has tabulas principium Iudeorum quis voluerit invenire, querat tempus lunationis septime a lunatione paschali, sed in anno 8 et 19 lunationis sexte, cui addat 6 horas.
Post hec minuta hic inventa multiplicet in 18 et habebit partes sive chelacim Iudeorum, quia unum minutum valet 18 chelacim Iudeorum, quibus addat tot chelachim quot cicli transierunt a capite tabule ciclorum.	Post hec minuta ibi inventa multiplicet in 18 et habebit gelachim, quibus addat tot quot cicli transierunt a capite tabule ciclorum.
Post hec cum aureo numero intret tabulam equantem chelacim et chelacim ibi inventam addat eisdem et habebit certissime quod quesiverit.	Post hec cum aureo intras tabulam equantem gelachim, gelachim ibi inventa eisdem addat et habebit certissime molat Tisri.
Post hec si sequentium lunationum voluerit habere principia secundum Iudeos cum quotalibet earum intret tabulam lunationum et ibi inventum addat super radicem, de minutis faciendo chelacim multiplicando ea in 18, quibus addat chelacim tot quot lunationes pertransiverut.	Post hec si lunationum sequentium voluerit habere molat cum quotalibet earum tabulam lunationum intret et ibi inventum addat radici, de minutis faciendo gelachim, quot lunationes pertransiverunt tot gelachim coadiunctis.
[MS Vat. lat. 3112, fol. 10$^{ra–b}$]	[MS Glasgow, UL, Hunter 444, pp. 32b–33a]

This passage is immediately followed by the explanation of table 1, for the calculation of the *molad*. In the *Compotus novus*, the contents of this explanation were excerpted into two different chapters:

Compotus philosophicus, c. 9	*Compotus novus*, c. 13
Si autem hoc idem per tabulas proprias quis voluerit invenire, cum Annis Domini et aureo numero intret tabulas eorum et ibi inventum querat ante aureum numerum proximum post 6 kalendas Septembris et habebit molat Tysri, id est principium illius mensis, sive radicem anni. Habita autem radice sequentium lunationum principia inveniuntur in tabula lunationum cum additione radicis modo priori. Iudei vero addendo radici precedentis anni semper inveniunt radicem sequentis anni et omnia principia sua per tabulas lunationum. Addunt enim penultimam lineam tabule lunationum radici anni communis et ultimam radici embolismi et sic habent radicem sequentis anni. Post hec eandem tabulam cum qualibet lunatione post Tysri intrant et in directum eius addunt radici et habent principium cuiuslibet lunationis post Tysri.	Si autem tempus medie coniunctionis per tabulas proprias Iudeorum aliquis voluerit invenire, cum Annis Domini et aureo intret eorum tabulas hac positas et quid ibi invenit querat ante aureum suum post 6 kalendas Septembris et habebit omni anno molat, id est principium Tisri seu principium anni. Habita vero radice aliarum lunationum principia inveniet in tabula lunationum modo priori. [MS Glasgow, UL, Hunter 444, p. 33a]
	c. 15
Compositio autem harum tabularum uniformis est, ita quod nichil superadditur, et est similis premissi, nisi quod embolismus septimi anni tabule annorum transfertur in octavum in 8 et 18 in 19, quia ciclus eorum in hiis duobus annis non concordat cum nostro. Unde sciendum est quod ciclus eorum	Tabule medie coniunctionis Iudeorum sine additione aliqua componuntur sicut tabule Arzachelis, nisi quod in tabula annorum embolismus septimi animi transfertur in octavum in 8 et 18 in 19, quia ciclus eorum in hiis annis non concordat cum nostro. Et ideo etiam in his annis lunatio Tisri erit sexta a nostra

	c. 15
incipit in nostro tertio, unde eorum primus annus intrat cum illa lunatione quam ostendit ternarius 8 kalendas Octobris positus. Sunt igitur anni embolismales eorum 3us, 6us, 8us, 11us, 14us, 17us, 19us. Illa igitur lunatio quam ostendit aureus numerus post 6 kalendas Septembris secundum computationem ecclesie quolibet anno vocatur Tysri apud Iudeos et est sollempnior apud eos et ideo prima secundum artem compoti eorum. Et prima dies huius lunationis vocatur 'Rossasana', id est 'capud anni'.	pascali, in aliis autem annis erit septima.
Unde lunatio paschalis septima est in anno communi et in anno embolismali octava, quia lunatio embolismalis tunc est septima. Secundum legem vero lunatio paschalis est prima et Tysri septima et ita duplex habent principium. [MS Vat. lat. 3112, fols. 10^{v}–11^{r}]	Unde notandum quod lunatio pascalis in anno communi septima est a lunatione Tisri apud Iudeos, in embolismali autem octava, quia tunc embolismalis est septima. Similiter deberet esse apud nos. [Ibid., p. 41a]

Although table 1 only indicates weekdays, hours, and parts, it was nevertheless relatively easy to find the corresponding conjunction date in the Julian calendar with its help. As both texts point out, one could start by looking for the first Golden Number of the year in question that falls after 27 August (the 6th day before the kalends of September). Since the new moon in the ecclesiastical calendar, as defined by the Golden Number, tended to occur two or three days after the Jewish *molad*, the latter could be quickly found by counting back to the correct weekday indicated in table 1. The choice of 27 August was determined by it being the earliest corresponding date for 1 Tishri at the time the *Compotus philosophicus* was written (e.g., AD 1261, 1272, 1280, 1291). As Friar John and John of Pulchro Rivo both knew, however, the weekday of the first *molad* of the Jewish year and the weekday of 1 Tishri could differ by up to two days as a result

of the various postponement rules. These rules give rise to six different year lengths and fourteen different year types, which are the subject of tables 3 and 4.

TABLE 3[28]

Tabula litterarum tabularum secundum Iudeos

A.N.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
C.I.	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1292	O	S	N	K	S	N	H	T	N	P	K	L	Q	H	M	Q	H	O	V
1311	I	X	O	N	R	O	N	R	O	S	N	K	S	N	H	T	N	H	X
1330	M	Q	H	O	V	I	O	V	I	X	O	N	R	O	N	P	K	N	P
1349	H	T	N	H	T	N	H	X	M	Q	H	O	V	I	O	S	N	K	S
1368	N	R	O	N	P	K	L	Q	H	T	N	H	T	L	I	X	O	N	R
1387	O	V	I	O	S	N	K	S	N	R	O	N	P	K	L	Q	H	M	Q
1406	H	X	M	I	X	O	N	R	O	V	I	O	S	N	K	S	N	H	T
1424	N	P	H	M	Q	H	O	V	I	X	M	I	R	O	N	R	O	N	P
1444	K	S	N	H	T	N	K	T	L	Q	H	M	Q	H	O	V	I	O	S
1463	N	R	O	N	R	O	N	P	K	S	N	H	T	N	H	T	L	I	X
1482	M	Q	H	O	V	I	O	S	N	V	O	N	R	O	N	P	K	L	Q
1501	H	T	N	H	X	M	I	X	O	V	I	O	S	N	K	S	N	H	T
1520	N	P	K	N	P	H	M	Q	H	T	L	I	X	O	N	R	O	N	R

Table 3, as found in the *Compotus novus*, displays the sequence of year types for 247 years, i.e. for 13 consecutive 19-year cycles, valid from 1292 to 1538. It is modelled after a table found in the *Compotus philosophicus*, which must have originally covered the years 1273 to 1519, although this template has been badly preserved.[29] Since John of Pulchro Rivo's version of the table begins 19 years later, he evidently was able to calculate the final line, for years 1520–1538, on

28 MSS Glasgow, UL, Hunter 444, p. 39; Leiden, UB, Scaliger 66, fol. 30^{r}; Florence, BML, Plut. 30.24, fol. 84^{r}. A handful of incorrect letters in the MSS were silently emended for the version reproduced above. Abbreviations: A.N. = Aureus numerus, C.I. = Ciclus Iudeorum.

29 MSS Hannover, NLB, IV 389, fol. 7^{v}; Lüneburg, Ratsbücherei, Miscell. D 4° 46, fol. 8^{r}; Vienna, ÖNB, 5239, fol. 17^{r}; Vatican City, BAV, lat. 3112, fol. 12^{v}. In the Lüneburg MS and its Viennese copy, the table breaks off after the line of 1387–1405, which was pre-drawn but not filled in with letters. In MSS Vat. lat. 3112 and Hannover IV 389, the table finishes even earlier, after two and three lines respectively.

his own, which presupposes a good understanding of the way the Jewish calendar operates. The result is closely related to the 247-year tables found in Robert of Leicester's *De compoto Hebreorum* and Nicholas Trevet's *Compotus Hebreorum*, although the layout appears reversed: Robert and Nicholas arranged the 13 cycles horizontally, and the 19 years of each cycles vertically. In reversing this principle, the present table is in fact closer to the form normally found in Hebrew calendar manuscripts, where the 13 cycles take up the vertical axis.[30] At the same time, however, table 3 is clearly a Christian adaptation with no immediate relation to any Jewish source. This can be seen from the fact that the initial years of each cycle (1292, 1311 etc.) are chosen according to the Alexandrian-Dionysiac version of the 19-year cycle rather than its Jewish version, which would have started two full years later. Another obvious sign of Christian intervention is the use of Latin letters to represent the 14 year types. In Hebrew tables, the years are normally designated by the number of the initial weekday and the first letter of the word denoting their character (*kesidrah*, *ḥaserah*, or *shelemah*, i.e., 'regular', 'defective', or 'perfect'). This principle is still discernible in the tables used by Robert of Leicester and Nicholas Trevet, although here the Hebrew letters are transposed into the Latin alphabet and Arabic (Robert) or Roman (Nicholas) numerals. Whoever originally drew up table 3 replaced such number-letter combinations by arbitrarily assigning to each year type a letter from H to X, which represent the following values:

H 'perfect' (355d) common year starting on the 2nd day of the week
I 'regular' (354d) common year starting on the 3rd day of the week
K 'defective' (353d) common year starting on the 2nd day of the week
L 'perfect' (355d) common year starting on the 5th day of the week
M 'defective' (353d) common year starting on the 7th day of the week
N 'regular' (354d) common year starting the 5th day of the week
O 'perfect' (355d) common year starting on the 7th day of the week
P 'perfect' (385d) embolismic year starting on the 2nd day of the week
Q 'regular' (384d) embolismic year starting on the 3rd day of the week
R 'defective' (383d) embolismic year starting on the 2nd day of the week
S 'perfect' (385d) embolismic year starting on the 5th day of the week
T 'defective' (383d) embolismic year starting on the 7th day of the week
V 'defective' (383d) embolismic year starting on the 5th day of the week
X 'perfect' (385d) embolismic year starting on the 7th day of the week

30 An exception is the table printed in Abraham bar Ḥiyya, *Sefer ha-Ibbur*, ed. Filipowski, 115.

John of Pulchro Rivo's readers could derive these correspondences from a glance at table 4, which was again lifted straight from the *Compotus philosophicus*:

TABLE 4[31]

	H	I	K	L	M	N	O	P	Q	R	S	T	V	X
Tisri	2	3	2	5	7	5	7	2	3	2	5	7	5	7
Mariesuan	3.4	4.5	3.4	6.7	1.2	6.7	1.2	3.4	4.5	3.4	6.7	1.2	6.7	1.2
Kislef	5.6	6	5	1.2	3	1	3.4	5.6	6	5	1.2	3	1	3.4
Tevez	7.1	7.1	6	3.4	4	2.3	5.6	7.1	7.1	6	3.4	4	1.2	5.6
Civath	2	2	7	5	5	4	7	2	2	7	5	5	3	7
Adar	3.4	3.4	1.2	6.7	6.7	5.6	1.2	3.4	3.4	1.2	6.7	6.7	4.5	1.2
Vadar								5.6	5.6	3.4	1.2	1.2	6.7	3.4
Nissan	5	5	3	1	1	7	3	7	7	5	3	3	1	5
Yzar	6.7	6.7	4.5	2.3	2.3	1.2	4.5	1.2	1.2	6.7	4.5	4.5	2.3	6.7
Cyvan	1	1	6	4	4	3	6	3	3	1	6	6	4	1
Tamuz	2.3	2.3	7.1	5.6	5.6	4.5	7.1	4.5	4.5	2.3	7.1	7.1	5.6	2.3
Auhe	4	4	2	7	7	6	2	6	6	4	2	2	7	4
Elul	5.6	5.6	3.4	1.2	1.2	7.1	3.4	7.1	7.1	5.6	3.4	3.4	1.2	5.6
Tisri sequentis anni	7	7	5	3	3	2	5	2	2	7	5	5	3	7
	**	**	**	**	**	**	**	***	***	**	***	**	**	***
	***	**	*	***	*	**	***	****	***	***	****	***	***	****

In terms of content, table 4 is largely identical to table 5 in Robert of Leicester's work (see p. 162 above) and thus needs no further in-depth discussion. The most significant 'innovation' in John's case concerns the final two lines of each column, which add (1) the initial weekday of the respective subsequent year

31 See MSS Hannover, NLB, IV 389, fol. 7r; Lüneburg, Ratsbücherei, Miscell. D 4° 46, fol. 8r; Vienna, ÖNB, 5239, fol. 17r (*Compotus philosophicus*) and MSS Florence, BML, Plut. 30.24, fol. 84r; Glasgow, UL, Hunter 444, p. 39; Leiden, UB, Scaliger 66, fol. 30v (*Compotus novus*). The month names are here spelled as found in the Glasgow MS. With the exception of the Leiden MS, the cited copies all feature two additional columns to the right, which are not reproduced above: one shows the order of the month "according to the Law" (*menses secundum legem*), Tishri being numbered '7' and Nisan being numbered '1', the other indicates the number of days contained in each month (with double entries '29/30' for Marḥeshvan, Kislev, and *Vadar*).

and (2) the interval in weekdays between the beginning of the present year and the beginning of the subsequent year. This interval is 4 for regular common years, 3 for defective common years, 5 for perfect common years and defective embolismic years, 6 for regular embolismic years, and 7 for perfect embolismic years. In all preserved copies, these intervals are expressed through dots, which are arranged in a manner reminiscent of domino pieces. The principle behind them is only explained in the commentary on the *Compotus novus*, but not in the *Compotus philosophicus* itself, which once again shows us that John of Pulchro Rivo had an excellent understanding of the material he copied.[32] This material included Friar John's lengthy exposition of the postponement rules, most of which reappears in the *Compotus novus*, albeit not in exactly the same order:

***Compotus philosophicus*, c. 10**	***Compotus novus*, c. 16**
Primum vero diem Tysri ipsi non agunt in prima, quarta et sexta feria, ne oporteat eos duo sabbata pariter feriari. Unde si principium huius lunationis cadit tertia, quinta vel septima feria, non incipiunt eam sequenti feria, cum tamen hoc deberent facere, sed aliquando eodem die quo cadit principium, aliquando tertia die incipiunt eam, ut intrent ferias iam dictas. Ex hoc contigit eis lunationem paschalem non inchoare nisi feriis imparibus, scilicet prima, tertia, quinta, septima, quia oportet eos, ut dicunt, a prima die lunatonis paschalis usque	Iudei enim, ut dictum est, in qualibet feria quasdam lunationes non incipiunt. Propter hoc lunationes sepe terminantur lunationibus aliis quam deberent. Propter quod etiam contingit eis Nissam non nisi feriis imparibus inchoare, quia oportet eos, ut aiunt, a pascha usque ad Rossana habere determinate 163 dies, sicut ad Penthcoste 50. Ob hoc etiam sepe

32 MS Vatican City, BAV, lat. 3112, fol. 57^{r}: "Et hoc designant etiam puncta in tabula neomeniarum. Verbi gratia: in anno communi ubicumque inveniuntur in tabula inferius 4 puncta illa designant 4 dies qui excrescunt ultra integras septimanas. Et hoc in anno regulari. Ubicumque autem ponuntur 5 puncta designant 5 dies. Et hoc in anno irregulari communi maiori. Ubicumque autem 3 puncta ponuntur notant 3 dies et per consequens annum minorem. Similiter est in annis embolismalibus: ubi ponuntur 6 puncta ille est regularis et ubi 5 minor est irregularis et ubi 7 est maior irregularis."

Compotus philosophicus, c. 10	*Compotus novus*, c. 16
ad primum diem Tysri habere numerum dierum determinatum, scilicet 177, sicut a pascha usque ad Penthecostem 50. Propter hoc omnes lunationes que sunt a lunatione paschali usque ad Tysri semper sunt ex numero dierum determinato, alie autem non omnes, ita quod una est 30 dierum, reliqua 29. Unde omnes lunationes fere quosdam appropriatas habent ferias quibus incipiunt eas, unde aliquando eodem die cadit principium lunationis, aliquando sequenti die, aliquando tertio die incipiunt eam. Propter hoc multotiens transponunt lunationes a sua vera primatione. [Vat. lat. 3112, fol. 11^{rb}–12ra]	lunationes prius incipiunt quam deberent. [MS Glasgow, UL, Hunter 444, p. 42b]

...	c. 14
Propter hec igitur que dicta sunt oportet eos habere 6 genera annorum, tria communium et tria embolismalium. Communem enim dividunt in regularem et in duplicem irregularem. Regularis habet 50 ebdomadas et 4 dies. Tunc enim menses regulariter habent unus 30 dies et alius 29 per totum. Irregularis maior superat regularem minorem in uno die, qui additur primo mensi imperfecto, scilicet Marcheysuan, que cum regulariter habeat 29 dies, tunc habebit 30 et tunc sunt 3 menses continue 30 dierum, scilicet Tysri,	Ulterius sciendum quod Iudei habent 6 annorum genera. Communem enim dividunt in regularem et in duplicem irregularem. Regularis habet 50 ebdomadas et 4 dies. Tunc enim menses regulariter habent per totum, unus scilicet pefectus 30 dies, alius 29, scilicet imperfectus. Irregularis maior superat regularem in uno die, qui additur primo mensi imperfecto Mariesuan, qui cum regulariter habebat 29 dies, tunc habebit 30. Et tunc erunt 3 menses simul 30 dierum, scilicet Tisri, Mariesuan, Kislef.

...	c. 14
Marcheysuan, Caslev. Mensem perfectum vocant qui est 30 dierum, imperfectum qui est 29. Irregularis vero minor deficit a regulari in uno die, qui subtrahitur primo mensi perfecto post Tysri, scilicet Caslev, qui cum regulariter habeat 30 dies, tunc habet 29 et tunc 3 menses continue sunt 29 dierum, scilicet Marcheysuan, Caslev, Thebet.	Irregularis minor deficit a regulari uno die, que subtrahitur primo mensi perfecto, scilicet Kislef, qui cum regulariter habeat 30 dies, tunc habebit 29. Et tunc 3 menses simul 29 dierum, scilicet Mariesuan, Kislef, Tevez.
Similiter est de anno embolismali: regularis enim habet 54 ebdomadas et 6 dies et est similis regulari communi, nisi quod Adar, sicut in omni embolismo, habet 30 dies et Vadar 29. Irregularis maior habundat in uno die, qui additur Marcheysuam, et minor deficit in uno die, qui subtrahitur Caslev. Et hoc totum sicut in communi.	Similiter est in anno embolismali: regularis habet 54 ebdomadas et 6 dies et est similis regulari communi, nisi quod Adar, sicut in omni embolismo habet 30 dies et Vadar 29. Irregularis maior habundat uno die, qui additur Mariesuan. Minor vero deficit in uno, qui subtrahitur Kislef. Et hoc totum sicut in communi. [...]
Item communis regularis incipit feria tertia vel quinta, terminante ipsum septima vel secunda. Minor secunda vel septima, terminante ipsum quinta vel tertia. Maior vero secunda, quinta vel septima, terminante ipsum septima, tertia vel quinta. Embolismalis regularis tantum incipit feria tertia, terminante ipsum secunda. Irregularis vero secunda, quinta vel septima, terminante maiorem secunda, quinta vel septima, minorem vero septima, tertia vel quinta.	Item regularis communis incipit feria tertia vel quinta, terminante ipsum septima vel secunda. Minor secunda vel septima, terminante ipsum quinta vel tertia. Maior vera secunda, quinta, septima, terminante ipsum septima, tertia vel quinta. Regularis vero embolismalis tantum incipit feria tertia, terminante ipsum secunda. Minor secunda, septima, vel quinta, terminante ipsum septima, quinta, vel tertia. Maior incipit secunda, quinta vel septima, eisdem ipsum terminantibus.

...	c. 14
Propter hoc sunt in tabula primationum 14 linee, 7 communium et 7 embolismalium. Si vis scire in quo genere sit aliquis annus, vide primo utrum sit communis vel embolismalis. Post hec computa a feria in qua incipit ille annus usque ad feriam terminantem ipsum exclusive. Unde feria terminans non est illius anni quod terminat, sed semper prima [Ms.: perma] dies anni sequentis, sicut visum est superius et scies. [Ibid., fols. 12$^{ra–va}$]	Ob hoc in eorum tabula sunt 14 linee, 7 communium et 7 embolismalium. Si autem vis scire in quo genere annorum sis, vide primo an annus communis sit an embolismalis. Post hoc computa a feria in qua incipit ille annus usque ad feriam terminanten ipsum exclusive et scies. [Ibid., pp. 38b, 40a]
c. 11	**c. 15**
Ad sciendum neomenias sive primos dies mensium totius anni sufficit scire primum diem Tysri anni de quo queritur et sequentis.	
Unde sciendum quod ferie Tysri illicite sunt prima, quarta, sexta, relique quatuor sunt licite. Unde si principium Tysri cadit in feriam illicitam, semper incipunt eum sequenti die. Si autem in feriam licitam septima vel quinta cadit ante meridiem, eadem die incipiunt eum. Si post meridiem, tertia die. Unde termini feriarum licitarum Tysri sunt hii: feria septima vel quinta post horas 18. Feria tertia post horas 18 in anno embolismali. In anno autem communi feria tertia post	Unde sciendum quod ferie Tisri illicite sunt prima, quarta, sexta, relique quatuor licite. Igitur si principium Tisri cadit in feriam licitam, quintam vel septimam ante meridiem, eadem die inipciunt eum. Si post meridiem, tertia feria [sic!]. Si vero in feriam illicitam, semper sequenti feria incipiunt eum. Unde termini feriarum licitarum Tisri sunt hii: feria quinta vel septima post horas 18. In anno communi: feria tertia post 9 horas et gelachim 204. In anno embolismali: feria tertia post 18

c. 11	c. 15
horas 9, partes 204. Feria secunda post horas 15, partes 589, in anno postembolismali. In anno autem non postembolismali feria secunda post horas 18. Unde si principium Tysri cadit in feriam licitam infra terminum eius, eadem die incipiunt eum, sed si ultra terminum ad unicum chelachim venerit, proxima sequenti feria licita ponunt prium diem eius.	horas. In anno postembolismali: feria secunda post horas 15 et gelachim 589. In anno autem non postembolismali, feria secunda post horas 18. Unde si molat Tisri cadit in feriam licitam infra terminum eiusdem, eodem die incipiunt eum, sed si ultra terminum ad unum gelachim, proxima sequenti feria licita ponunt ipsum.
Habitis igitur feriis sive primo die Tysri anni quesiti et sequentis, feriam quesiti anni quere in superiore latere tabule primationum, sequentis autem in inferiori inter communes, si annus de quo queritur fuerit communis, vel inter embolismales, si fuerit embolismalis. Post hoc descendendo habebis feriam cuiuslibet mensis illius anni indirecto eius.	Habitis autem feriis sive primo die Tisri anni quesiti et sequentis anni, quere easdem ferias in tabula neomeniarum in superiore et inferiore linea Tisri, scilicet inter annos communes, si annus de quo queritur communis fuerit, vel inter embolismales, si embolismalis fuerit. Et littera eis directe superposita erit littera tabularis. [Ibid., p. 41b]

	c. 14
Cuius vis igitur mensis feriam sume quam queris ante aureum numerum suum in kalendario et habebis primum diem illius mensis secundum Iudeos. Et ubi due ferie ponuntur, signat quod in illis duabus incipiunt	Accipe igitur cum Annis Domini et aureo litteram tabularem in tabula litterarum tabularium ipsorum, cum qua tabulam neomeniarum intra. Et primum diem cuius mensis volueris descendendo sume quem quere ante aureum suum in kalendario et habebis primum diem mensis illius apud Iudeos. Et ubi ponuntur due ferie, signat quod in illis duobus

	c. 14
illum mensem quam ad cantum kalendarium. Sed prior est ultima dies mensis precedentis, secunda vero, super quam ponitur punctum, proprie vocatur primus dies ipsius mensis. Hoc idem defacili potest invenire intrando eadem tabulam cum littera tabulari quolibet anno. Sed litterarum tabularium formatio supponitur ex predictis. Item, si subtraxeris penultimam lineam tabule lunationum a termino septime ferie, habebis terminum tertie ferie in anno communi, et si addideris ultimam lineam eiusdem tabule termino tertie ferie in embolismo, habebis terminum secunde ferie in postembolismo. Suppositis enim illis quatuor qui terminantur in meridie necessarie est reliquos duos ponere ad hoc ut habeatur divisio annorum predicta. [Ibid., fol. 12va–13ra]	incipiunt illum mensem quoad cantum. Sed prior est ultimus dies mensis precedentis, secundus vero, super quem ponitur punctum, vocatur proprie primus dies mensis. Habitis autem primis feriis mensium et omnia festa et ieiunia per consequens invenies supradicta. [Ibid., p. 40]

Since table 4 served to find the initial weekday of each month and, by extension, the weekdays of all the major fasts and feasts, the author of the *Compotus philosophicus* saw fit to offer his readers a succinct rundown of the Jewish festive calendar. It is at this point that the *Compoti* of John of Pulchro Rivo and Friar John begin to diverge more strongly, as John of Pulchro Rivo is able to add information on Jewish customs that he could not find in his source. For example: Friar John explains the prohibition against beginning the year on the first, fourth or sixth day of the week with the problems that arise if the Day of Atonement (Yom Kippur), the most solemn feast day of the Jewish year, falls

immediately before or after a Sabbath.[33] John of Pulchro Rivo's commentary on the *Compotus novus* expands on these remarks by alluding to the rabbinic justification (p. 29 above) according to which Yom Kippur next to a Sabbath would leave the dead unburied for two days in a row.[34] Elsewhere in the commentary, John adds the following details regarding the Day of Atonement:

> Note that the Jews say that God holds judgment every year on 10 Tishri, when sets in order what will happen to each person throughout the entire year, if he must die or live or be hung. And for this reason they pray and sing to an utmost extent on this day and go barefooted and so forth. The more devout ones among them, moreover, anticipate this day by abstaining from meat from the 9th day of Av until 'Rosh Hashanah'.[35]

In talking about the Festival of Tabernacles (Sukkot), Friar John shows himself puzzled by the fact that the Jews add an extra day to particularly important festivals such as Sukkot (15/16 Tishri), Shemini Atzeret (22/23 Tishri), the first and last days of Passover (15/16 and 21/22 Nisan), and Shavuot (6/7 Sivan).[36]

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33 MS Vatican City, BAV, lat. 3112, fol. 13^{vb}: "Item decimo die Tysri erat dies propitiationis. Hoc erat multum sollempnis et ferialis. Propter hoc Iudei moderni noluerunt eum agere prima vel sexta feria, quia in hiis difficulter possent eum debita sollempnitate peragere et maxime in feriando, ut dicunt, propter sabatum quod sibi cohereret. Similis est ratio de primo, 15 et 21 [Ms: 22] die Tysri, et quolibet anno cadunt in eandem feriam, qui etiam sunt multi sollempnes. Hinc est quod noluerunt incipiere Tysri qualibet feria et per consequens alios menses, sed tantum feriis superius assignatis."

34 Ibid., fol. 59^{rb}: "Et notandum quod causa huius est quia si primum diem Tisri peragerent in prima feria vel in quarta vel in sexta, tunc contingeret eis duo sabbata pariter feriare seu celebrare, quia hoc esset eis difficile, ideo in his feriis Tisri non incipiunt sive istum mensem, quia si moraretur infirmus in illis diebus feriis non posset intumulari propter sabbatum et Tisri initium."

35 Ibid., fol. 38ra: "Notandum est hic, ut dicunt Iudei, Deus omni anno in 10 die Tisri preest iudicio et tunc ordinat quilibet quid ipsi contingere debet per totum annum, scilicet utrum mori debeat vel vivere vel suspendi. Et ideo illo die maxime orant et cantant et vadunt nudi pedes etc. Et etiam quidam inter ipsos magis devoti hunc diem preveniunt in abstinendo a carnibus a nono die Anhe sive mensis illius usque ad Rosana."

36 Ibid., fol. 14ra: "Post hoc Iudei ad maiorem ornatum aliquos dies feriales in hiis duplicaverunt. Verbi gratia: prima dies Tysri ferialis erat ex precepto legis, ut dictum est, cui addiderunt sequentem diem, minus tamen ferialem. Similiter fecerunt 15 die Tysri et 15 Nizan, quibus addiderunt sequentes inmedietate, ut et sint feriales, non tamen adeo ut principales, ut in illo festum tabernaculorum, in isto festum pasche magis ornaretur. Similiter forte factum est de diebus Pentecostes, quia in Pentateuco non legimus nisi unum."

In an earlier passage, he had already remarked upon the duplication of the festival of *Rosh ḥodesh* and the blessing of the new moon, which he refers to as the "chant of the new moon" (*cantus neomeniae*). This blessing was carried out on two days in a row in cases where the previous month was 'perfect' or 30 days in length—"as a precaution" (*ob cautelam*), as John of Pulchro Rivo assiduously adds.[37] Both Johns are aware that the Jews call the new year festival *'Rossana'*, i.e. *Rosh Hashanah*, which they correctly translate as *caput anni* ("Head of the Year").[38] After the biblically ordained feasts, Friar John briefly mentions the two post-biblical festivals Ḥanukkah (*Encaenia*) and Purim.[39] In

37 Ibid., fol. 13$^{ra–b}$: "Sciendum est etiam quod Iudei primo die cuiuslibet mensis agunt cantus neomeniarum, sed omnis mensis sequens perfectum, et non alius, neomenias quam ad cantum duplicat modo supradicto. Unde 30 die cuiuslibet mensis habentis 30 dies propter protelationem eius anticipiant cantum neomenie sequentis mensis et sequenti die iterum cantant. Sed sequens dies principalior est in cantu, quia ipse proprie vocatur primus dies mensis incipientis." For the parallel passage in the *Compotus novus*, see MS Glasgow, UL, Hunter 444, p. 27a: "Hebrei nec kalendas nec nonas nec idus observant, sed annos, menses, dies et festa secundum novam lunam computant, ut Iudei in rossa cuiuslibet mensis agunt cantus neomeniarum. Et hunc in mensibus sequentibus perfectos duplicant ob cautelam." See also MS Vatican City, BAV, lat. 3112, fol. 41^{vb}, where the commentary expands: "Causa autem huius cautele est quia qualibet lunatio habet 29 dies et 12 horas, ut modo presupposito, et Iudei faciunt lunationem perfectam ex 30 diebus, imperfectam vero ex 29. Et ideo, ut possint decantare principium accensionis lune a sole in eadem hora qua accenditur, saltem secundum mediam coniunctionem, ipsi anticipant cantum per unum diem, quia lunatio habens 30 dies nimis habet de tempore quoad dimidium diem. Ideo in ultimo die perfecti mensis et primo imperfecti cantant."

38 MS Vatican City, BAV, lat. 3112, fol. 11^{r}: "Et prima dies huius lunationis vocatur 'Rossasana', id est 'capud anni'." MS Glasgow, UL, Hunter 444, p. 25: "Iudei vero propter magistratum repugnantem dupliciter incipiunt uno modo iuxta equinoctium autumnale a Tisri, ob hoc primus dies huius lunationis vocatur 'Rossana', id est 'caput anni'. Alio modo a Nissam. Et ideo iuxta illud Exodi 'mensis iste vobis erit principium in mensibus anni' hec lunatio prima et pascalis dicitur. Nos vero talia principia imitantes diversa diversimode inchoamus." For the commentary, see MS Vatican City, BAV, lat. 3112, fol. 39^{rb}: "Notandum est quod quidam Iudeorum magistri dixerunt mundum esse factum iuxta equinoctium autumpnale, et ideo incipiunt ibi annum et primum diem anni, qui 'Rossana' dicitur. Alii magistri eorum dixerunt mundum esse creatum iuxta euqinoctium vernale, et ideo lunatio Nissan ibi incipiens pascalis dicitur et ibidem incipiunt cupha, ut quidam eorum dicunt."

39 MS Vatican City, BAV, lat. 3112, fol. 14$^{ra–b}$: "Preterea processu temporis hiis superaddiderunt quedam festa, eo quod aliqua magna contigissent eis in illis, unde 25 die Caslev agunt encenia, id est dedicationem templi, de qua legitur in libro Machabeorum, 14 vero die Adar vel Vadar diem sortium, de quo legitur in Hester."

his *Compotus philosphicus*, Purim is called 'Day of Lots' (*dies sortium*), as is the case in Nicholas Trevet's *Compotus Hebreorum*, but John of Pulchro Rivo refers to it as the festival of *Amon*, which is a garbled reference to Haman (*Aman* in the Latin text), the villain whose defeat is commemorated during Purim.[40] Next in line are the four main fasts mentioned in the book of Zechariah (8:19), which fall on 17 Tamuz, 9 Av, 3 Tishri and 10 Tevet. Unlike his Franciscan source, John of Pulchro Rivo incorrectly identifies the fast of the seventh month as 10 Tishri, 'the day of judgment', rather than 3 Tishri (the Fast of Gedaliah).[41] He does, however, include the 3rd of Tishri in a list of additional fast days, which are not found in the *Compotus philosophicus*. Among these is the fast on the day before *Rosh Hashanah* (29 Elul), the Fast of Esther (13 Adar/Veadar), and the practice of fasting on the first two Mondays and the first Thursday of Iyyar and Marḥeshvan, which is postponed by a week of if the first Monday coincides with *Rosh ḥodesh*.[42] In the commentary on this passage, John rattles down a whole range of further dates, which he claims to be personal fast days observed by devout Jewish women. In reality, most of the dates he mentions correspond to standardized commemorative fast days, as they are noted in the *Megillat Ta'anit Batra* and related medieval sources, for instance:[43]

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40 MS Glasgow, UL, Hunter 444, p. 27a: "Demum a 25 die Kislef usque ad 4 diem Tevet festum candelarum, 14 et 15 die Adar peragunt festum Amon." See the commentary on the final sentence in MS Vatican City, BAV, lat. 3112, fol. 42ra: "14 et 15 die Adar similiter duobus diebus peragunt diem sortii sive Amon, de quo legitur in Hester."

41 MS Vatican City, BAV, lat. 3112, fol. 14^{rb}: "Item agunt quatuor ieiunia sollempnia, de quibus legitur in Zacharia: ieiunium quarti 17 die Tamuz, ieiunium quinti 9 die Ab, ieiunium septimi 3 die Tysri, ieiunium decimi 10 die Thebet." MS Glasgow, UL, Hunter 444, p. 24a: "Iudei etiam peragunt 4 ieiunia solempnia, de quibus legitur in Zacharia: ieiunium quarti mensis 1. die Tamuz, ieiunium quinti 9 die Auhe, ieiunium septimi 10 die Tisri, qui dies iudicii vocatur, ieiunium decimi 10 die Tevez."

42 MS Glasgow, UL, Hunter 444, p. 24b: "Similiter Iudei, si non est Rossa, solent ieiuniare prima 2a et 5a et secunda 2a feria in Izar et Mariesvan, precedente die Rossana et 3a eiusdem et 13 die Adar." For the commentary on this passage, see MS Vatican City, BAV, lat. 3112, fol. 38^{rb}: "Unde notandum quod Iudei solent ieiuniare, si non est Rossa (id est primus dies mensis), primo die Lune et in die Iovis et in secundo die Lune, hoc est infra octo dies inclusive ter, id est in istis mensibus seu lunationibus, scilicet Yzar et Mariesuan, et in vigilia Tisri seu precedenti die Rossana et in tertia die Tisri et in 13 die Adar."

43 MS Vatican City, BAV, lat. 3112, fol. 38^{rb}: "Notandum quod antique vetule et mulieres Iudeorum magis devote observant quidam ieiunia specialia et secreta. Et sunt ista in primo et 10 et in 25 die Nissan, 20 et 25 die Civam, primo die Auhe, 7 et 29 die Elul, 27 Tebez, 5 et 7 Civam [read: Shevat], 7 et 9 et 25 Adar, 2 et 5 die Vadar." MS Florence, BML, Plut. 30.24, fol. 90va, has "5 et 27 Cyvam" where one would expect the dates for Shevat. If

1 Nisan: Death of Aaron's sons
10 Nisan: Death of Miriam
25 Sivan: Death of R. Simeon, R. Ishmael, and R. Ḥanina
1 Av: Death of Aaron
7 Elul: Death of the *meraglim* (spies)
5 Shevat: Death of the righteous in the days of Joshua
7 Shevat: War against the tribe of Benjamin
7 Adar: Death of Moses
9 Adar: Controversy between the schools of Hillel and Shammai

John also records 25 Nisan, which could be an error for 26 Nisan, commemorating the death of Joshua.[44] Similarly, 29 Elul might be an error for 28 Elul, an alternative date for the death of the *meraglim* or Holy Land spies mentioned in the book of Numbers (13:1–4).[45] If 29 Elul was intended, it probably referred to *Erev Rosh Hashanah*, the day before New Year, which John had already mentioned in the previous passage. The mentioned observance of 20 Sivan might have been in commemoration of the twelfth-century Martyrs of Blois, for which a fast day was encouraged at the time.[46] Contrary to John's statement, none of these fasts is specific to women, although there do remain a few unexplained dates on his list: 27 Tevet, 25 Adar, 2 and 5 Veadar.[47]

In the *Compotus philosophicus*, the summary of the Jewish feast day cycle culminates in some remarks on the *tekufot*, which John of Pulchro Rivo once more follows almost verbatim. Friar John refers to the *tekufot* as 'cupha', which may reflect the pronunciation used by his Jewish informants, since the first syllable of *te-kufah* tends to be very short and barely audible. In Samuel's system, which is the only one discussed by the two Johns, the year is equally divided into four seasons, each of which lasts 91 days and 7 ½ hours. This value allows for each of *tekufot* to fall on four different times of the day until the

27 Sivan was intended, however, this might refer to the fast for the death of R. Ḥaninah b. Tradyon. For this and the other dates, see Shulamit Elizur, *Wherefore Have We Fasted? "Megillat Ta'Anit Batra" and Similar Lists of Fasts* [in Hebrew] (Jerusalem: World Union of Jewish Studies, 2007), 278–289.

44 Ibid., 282.

45 Ibid., 285.

46 Susan L. Einbinder, *Beautiful Death: Jewish Poetry and Martyrdom in Medieval France* (Princeton, NJ: Princeton University Press, 2002), 57.

47 For Jewish fasting practices in medieval Ashkenaz, with particular reference to women, see ch. 2 in Elisheva Baumgarten, *Practicing Piety: Men, Women and Everyday Observance in the Jewish Communities of Medieval Northern Europe* (Philadelphia: University of Pennsylvania Press, forthcoming). I am very grateful to Prof. Baumgarten for her advice on fast days and for letting me consult her work before publication.

cycle repeats itself after four years. The *Compotus philosophicus* and *Compotus novus* are probably the only medieval Christian texts to list all 16 resulting *tekfot*-times, which are as follows:

> Bissextile year:
> 25 March, 18h – 25 June, 1 ½ h – 24 September, 9h – 24 December, 16 ½ h.
>
> First year after the *bissextus*:
> 25/26 March, 24h – 25 June, 7 ½ h – 24 September, 15h – 24 December, 22 ½ h.
>
> Second year after the *bissextus*:
> 26 March, 6h – 25 June, 13 ½ h – 24 September, 21h–25 December, 4 ½ h.
>
> Third year after the *bissextus*:
> 26 March, 12h – 25 June, 19 ½ h – 25 September, 2h – 25 December, 10 ½ h.[48]

As John of Pulchro Rivo informs us in his commentary on the *Compotus novus*, all these times are counted from sunset, such that 18h in the first year is

48 MS Vatican City, BAV, lat. 3112, fol. 14$^{rb–va}$: "Iudei etiam habent eandem quantitatem anni solaris quam nos, quam dividunt in quatuor partes equales et initium uniuscuiusque quarte vocant 'cupha'. Sunt ergo ab uno cupha usque ad aliud 91 dies, 7 hore, 540 chelachim. Hoc autem cupha per compotum ecclesie sic potest inveniri: in anno bisextili est in annunciatione beate virginis post horas 18. Sequenti die Iohannis baptiste post horam et dimidian. Octavo kalendas Octobris post horas 9. Vigilia nativitatis Domini post horas 16 et dimidian. Anno primo post bisextum est eisdem diebus, sed primum post horas 24, secundum post horas 7 et dimidiam, tertium post horas 15, quartum post horas 22 et dimidiam. In anno secundo post bisextum est sequenti die annunciationis post horas 6, sequenti die Iohannis post horas 13 et dimidiam, octavo kalendas Octobris post horas 21, die nativitatis post horas 4 et dimidiam. Anno tertio post bisextum est sequenti die annunciationis post horas 12, sequenti die Iohannis post horas 10 et dimidiam, 7 kalendas Octobris post horas 3, die nativitatis domini post horas 10 et dimidiam. Cupha vero vernale et autumpnale semper veniunt in principio hore, estivale et hyemale in medio hore." John of Pulchro Rivo's *Compotus novus* (c. 5) has essentially the same text, to which he adds: "Cufa Nissan et Tisri, id est vernalem et autumnalem, semper veniunt in principio hore. Cufa vero Tamuz et Tevez, id est estivale et hyemale, in medio hore. Et sciendum quod per additionem 6 horarum ad cufa presentis anni habebis cufa sequentis" (MS Glasgow, UL, Hunter 444, p. 24a).

really equivalent to noon.[49] Both the *Compotus philosophicus* and *Compotus novus* close their account of the *tekufot* by mentioning that the Jews observe certain customs with regard to the equinoxes and solstices, whose nature is not further specified. Friar John surmises that these customs may be taken from the Talmud, but refrains from giving any details. Instead, he encourages his readers to ask the Jews themselves:

> On these four 'cupha' they are wont to observe certain customs, which are perhaps taken from their Talmud. He who wants to know about these [customs] should ask the Jews themselves, but few will admit them, because they are ridiculous.[50]

In the main text of the *Compotus novus*, John of Pulchro Rivo does not add any substantial information to this, other than labelling the customs in question as 'fraudulent' (*trufaticus*).[51] In his commentary, however, the nature of these customs is finally disclosed and we are treated to a brief, but vivid, account of the practice of protecting drinking water from malignant influences during the change of *tekufot*:

> And they also find the exact hour of these 'cuphas', at which they observe certain erroneous customs. For it is worth knowing that the Jews claim that any given thing has its guardian or angel. And accordingly, as they say, every quarter of the parts of time [also] has its guardian: when one quarter

49 MS Vatican City, BAV, lat. 3112, fol. 37va: "In anno bissextili primum cufa semper cadit in die annuntiationis beate virginis post horas 18, hoc est in meridie, quia ipsi diem incipiunt de vespere. Secundum semper cadit sequenti die Iohannis baptiste post horam et dimidiam, et sic de aliis, ut habetur in littera. Et unum cufa in eodem anno semper addit super aliud 7 horas cum dimidia, ita tamen quod 24 horas non excedant, quod si excederent deberent deponi." Cf. the remark in the *Compotus Constabularii* (1175), found in MS London, BL, Cotton Vitellius A.XII, fol. 95ra: "Secundum Samuelem Iudeum in omni anno bisextili equinoctium vernum est VIII kl. Aprilis in meridie, in tribus annis sequentibus vespere, media nocte, mane que sequitur dies VII kl. Aprilis."

50 MS Vatican City, BAV, lat. 3112, fol. 14va: "Sciendum est etiam quod ipsi omnia festa sua secundum annum lunarem computant, sed cupha habent ut sciant quando festa eorum maturius, quando tardius, veniunt secundum annum solarem. In hiis etiam 4 cupha solent facere quasdam consuetudines, que forte de Talmut eorum sumpte sunt. Quas qui voluerit scire querat ab eis. Pauci tamen fatentur eas, quia ridiculose sunt."

51 MS Glasgow, UL, Hunter 444, p. 27a: "Per cufa vero inveniunt in quantum festa in anno solari ascendunt et descendunt et certas horas quarundam turfaticarum [sic!] consuetudinum quas observant."

> of the year ends, it receives a new guardian, and during this change of guards there will be a short moment without a guardian. And because of this, they pour out all the water they have left in their houses at this particular hour. For they say that if anybody drank from it, he would become dropsical or die. And they conclude that it is for this reason that many Christians are dropsical, but few or no Jews become dropsical. But they do not pour away wine or beer, even though it would seem that the same reasoning applies here. And this, I believe, they take from their Talmud, which contains many similar stipulations. The Talmud is a book of the Jews as large as four Bibles, and whoever knows it is [regarded as] a master.[52]

The way John of Pulchro Rivo was able to flesh out the relatively meagre account in the *Compotus philosophicus* with a little 'ethnographic' excursus of this kind raises question about the relationship between himself and his source Friar John—as well as the latter's identity. At first glance, it would appear that John of Pulchro Rivo simply followed the advice given by his namesake and consulted the Jews about the *tekufot*, reporting what he thus learned. The discussion of the *tekufot*, however, is far from being the only instance where John's knowledge of the Jewish calendar goes considerably beyond what he could find in the *Compotus philosophicus*. One major example is his very extensive commentary on the six different year lengths, in the course of which John makes some rather unusual observations about Hebrew calendrical terminology:

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52 MS Vatican City, BAV, lat. 3112, fol. 42$^{ra–b}$: "Et etiam inveniunt horas certas ipsarum cufarum, in quibus quasdam consuetudines erroneas observant. Unde sciendum quod Iudei dicunt quamlibet rem habere custodem suum sive angelum et ideo, ut dicunt, qualibet quadra partium temporis habet suum custodem: cum terminatur una quadra pars anni tunc recipit novum custodem et in illa transmutatione custodium erit illud minutum temporis absque custode, et ideo omne aqua quam habent in domibus suis que manet illa hora effundunt, quia, ut dicunt, si aliquis biberet de illa efficeret ydropicus vel moreretur. Et ideo concludunt quod multi Christiani sunt ydropici, sed pauci vel nulli Iudei fiunt ydropici. Vinum vero vel cervisiam non effundunt, cum tamen eadem ratione videretur hoc fieri. Et ita, ut credo, accipiunt a suo Talmut, qui multas consimiles causas ponit. Talmut id est liber Iudeorum qui est in quantitate 4 Bibliarum et qui illum scit est magister." The final sentence reads slightly differently in MS Florence, BML, Plut. 30.24, fol. 91^{vb}: "Et ita, ut credo, accipiunt a suo Talmot, qui multas consimiles trufas ponit. Talmot id est liber Iudeorum qui est in quantitate quasi quatuor Bibliarum et qui illum scit est magister inter eos." Note the change from *causa* ('stipulation') to *trufa* ('ruse').

> It must be noted that the Jews do not have the same common idiom everywhere, because in Germany they have have a different common idiom and it is a Slavic one. For I have heard a Jew trading [*emere et vendere*] with a Slav in Germany, that is, in my home region, and he nonetheless spoke [with him in] his common 'Jewish' [idiom]. And, therefore, I say that the Jews in Germany, although it is not commonly [used], call the common year 'sanapsuta', whereas the embolismic one they call 'sanamuberet' or 'gabur'. In a similar vein, they call the regular year, be it common or embolismic, 'cassedram'. The major irregular year they call 'slenum', whereas the minor irregular one they call 'gasserim'. And I have found out [while staying] in the town of Paris that [the Jews there] do not understand these words, which is why I have not included them in the main text.[53]

Here we receive confirmation of the fact, already known from the colophon in some manuscripts of his *Compotus manualis* (1289),[54] that John of Pulchro Rivo spent a certain amount of time in Paris.[55] During this stay, he apparently tried to test some of the Hebrew calendrical vocabulary he had learned from Jews in Saxony on the local Jews, but without much success. As the heavily

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53 MS Vatican City, BAV, lat. 3112, fol. 56^{rb}: "Nota quod Iudei in omnibus partibus non habent idem ydioma commune, quia in Almannia aliud habent ydioma commune eis et est Slavicum. Nam audivi Iudeum emere et vendere cum Slavo in Almannia, scilicet in partibus meis, et tamen loquebatur Iudaycum suum commune. Et ideo dico quod Iudei in Almannia, licet non sit commune, vocant annum communem 'sanapsuta', embolismalem vero nominant 'sanamuberet' sive 'gabur'. Similiter vocant annum regularem, sive sit communis sive embolismalis, 'cassedram'. Irregularem maiorem vocant 'slenum', irregularem vero minorem vocant 'gasserim'. Et sum expertus in villa Parisiensi quod ista vocabula non intelligunt propter quod ad litteram non posui." Part of this historically interesting passage about the Jews' Slavic idiom was quoted, via Boncompagni, by Moritz Steinschneider, "Miscellen," *Hebräische Bibliographie* 11 (1871): 57, and, via Steinschneider, in the following linguistic studies: Leo Wiener, "On the Hebrew Element in Slavo-Judaeo-German," *Hebraica* 10 (1893–1894): 175–187 (176n9); Roman Jakobson and Morris Halle, "The Term *Canaan* in Medieval Hebrew," in *For Max Weinreich on His Seventieth Birthday* (The Hague: Mouton, 1964), 147–172 (161n71).

54 See n. 7 above.

55 Nothing definite is known about his activity there, although it is possible that he attained a Master of Arts degree at the Parisian university, since he is generally referred to as *magister* in manuscript incipits and explicits. Glorieux, *La faculté*, 233, lists him as 'Jean de Ponte Rivo' among the thirteenth-century Parisian Arts masters, but provides no information beyond what can be inferred from the *Compotus manualis*.

garbled forms transmitted in his commentary indicate, the communication problems were probably caused primarily by John's own tainted pronunciation, although he himself puts this failure down to the different ('Slavic') idiom used by Jews in Germany. In reality, each word has a recognizable Hebrew origin:

> 'sanapsuta' from *shanah peshutah* (שנה פשוטה) [common year]
> 'sanamuberet' from *shanah meuberet* (שנה מעוברת) [pregnant year]
> 'gabur' from *ibbur* (עיבור) [lit. 'intercalation']
> 'cassedra(m)' from *shanah kesidrah* (שנה כסדרה) [regular year]
> 'slenu(m)' from *shanah shelemah* (שנה שלימה) [perfect year]
> 'gasserim' from *shanah ḥaserah* (שנה חסרה) [defective year][56]

The passage is thus an important and fascinating witness to the fact that John's knowledge of the Jewish calendar was not merely based on the *Compotus philosophicus*, but was equally informed by his personal contacts to Jews in his Northern or Northeastern German environment. Thanks to these contacts, he was in a position to tell his readers about peculiar details that cannot be found in any other medieval Latin text on the subject, including the custom of not drinking water at the time of the *tekufot*.[57] John's personal interlocutions with Jews are also evident from another passage, where, in commenting upon table 4 (p. 588 above), he mentions a set of mnemonic words that could used to designate the various configurations or *keviyyot* that arise from the three admissible year types ('defective', 'regular', 'perfect') in combination with the four admissible initial weekdays. In Hebrew texts, such words were formed from the letters corresponding to (a) the number of the initial weekday of the year and (b) the initial letter of the word that designates the year type.[58] John presents the resulting mnemonic terms in phonetically transliterated Latin

56 As Sacha Stern points out to me, a similar instance of mishandled Hebrew vocabulary may be discerned in the appearance of the term *gelachim*, which is consistently employed in all manuscripts of the *Compotus novus* (and its commentary), but not in the *Compotus philosophicus*, where *chelachim* is the prevailing form. John of Pulchro Rivo may have confused the derogatory term *gelaḥim* ('shaven heads'), used by Jews for Christian clergymen, with the *ḥalakim* (*chelachim*) used in the computation of minutes of time.

57 It is quite likely that this kind of oral transmission also informed the passages on the Jewish calendar in Friar John's *Compotus philosophicus*, which contains occasional references to what the Jews "say" or "claim" (*ut dicunt*). See MS Vatican City, BAV, lat. 3112, fols. 11^{vb}, 13^{vb}.

58 To this could be added the letter for the weekday of the first day of Passover. See Feldman, *Rabbinical Mathematics*, 195–197; Lasker and Lasker, "Behold," 14–15.

form, but does not explain the principles by which they were derived. He says that a common year starting on the 2nd day of the week and ending on the 5th day of the week is called 'bach'. 'End' must here be understood as referring to the beginning of the subsequent year. The case described is hence a 'defective' year of 353d, starting on a Monday. This implies ב for the 2nd day of the week and ח for *ḥaserah* = 'defective', leading to בח or 'bach'. In his transliterations, John used 'ch' to represent both ח and the letter כ for *kesidrah* (the 'regular' year). A year starting on the 5th day and 'ending' four days later, on the 2nd day, is thus designated 'hach'. Similarly, the 'defective' year starting on the 7th day of the week is named 'zach' (ז = z = 7) and the 'perfect' year starting on the 7th day is rendered as 'zas', with s = ש for *shelemah*.[59]

Another impressive example, which again shows that John must have had access to sources other than the *Compotus philosophicus*, occurs in relation to the question of the Jewish calendar's historical origins. As the texts edited in the present volume would seem to indicate, medieval Christian authors tended to be unaware of the fact that the contemporary *molad*-based Jewish calendar, with its intricate postponement rules, was a fairly recent invention, which differed considerably from the Jewish calendar(s) of Antiquity. One exception, which I have noted previously (p. 67 above), is the *Compotus Constabularii* of 1175, whose anonymous English author rejected the present-day calendar's ancient pedigree. This rejection was partly motivated by the fact that his preferred historical date of Christ's Passion (Friday, 26 March 34 CE) could not be brought in agreement with the present-day calendar. In addition, the Constabularius pointed out that its postponement rules prevented 15 Nisan from ever falling on a Friday. Since he himself believed, based on the synoptic Gospels, that the Friday of Jesus's crucifixion had been the 15th day of the first Jewish month, this served as an argument against the rule's existence in the first

59 MS Vatican City, BAV, lat. 3112, fol. 56^{vb}: "Ulterius sciendum quod secundum diversam inceptionem et terminationem annorum Iudei imponunt eis diversa nomina. Unde sciendum quod in tabula neomeniarum inter annos communes illum annum qui incipit feria secunda et terminatur septima vocant 'bas'. Similiter illum annum qui incipit feria tertia [Ms: quinta] et finitur feria septima vocant 'gach' [Ms.: chiach]. Annum qui incipit feria secunda et terminatur feria quinta vocant 'bach'. Annum qui incipit feria quinta et finitur feria tertia [Ms.: secunda] vocant 'has'. Annum qui incipit feria septima et finit feria tertia nominant 'zach'. Annum qui incipit feria quinta et terminatur feria secunda vocant 'hach'. Annum qui feria septima incipit et finitur feria quinta, talem annum, scilicet irregularem maiorem, vocant 'zas'. Similiter intelligatur de annis embolismalibus." The order of year-types listed corresponds to years H to O in table 4 above.

century CE.[60] The same basic argument is made by Friar John in the *Compotus philosophicus*, where he states his conviction

> that they did not have this method of computation before the incarnation of the Lord, which can be shown the following way: on the day of the Lord's Passion the moon was 15 [days old] according to the Scriptures. For it was the day of the Passover and it was a Friday and thus the first day [of the month] had the same weekday. Yet this is against the *compotus* they use now, where the paschal lunation cannot begin on such a weekday. The same thing can be demonstrated by several argument to those who are familiar with their *compotus*. The Jews also admit themselves that they took over the beginning of this computation from the nations among whom they dwelt. From this it seems that they did not have it from the very beginning.[61]

In the commentary to John of Pulchro Rivo's *Compotus novus*, the same historical issue is raised in a slightly different context. Chapter 16 of the main treatise comments on the different 19-year cycles used by the Jewish and ecclesiastical calendars, whose divergences caused Easter and Passover to fall a month apart in certain years.[62] In his commentary on this passage, John notes that:

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60 MS London, BL, Cotton Vitellius A.XII, fol. 96va: "Attamen quod Iudei tunc non habuerint illum compotum quem nunc habent ex hoc elicio quod tunc pascha Iudeorum teste evangelio fuit VI feria, nunc autem secundum compotum eorum hoc numquam potest accidere."

61 MS Vatican City, BAV, lat. 3112, fol. 12ra: "Unde credimus eos non habuisse hunc modum computandi ante incarnationem Domini, quod sic potest probari: in die passionis Domini luna fuit 15 secundum scripturas. Fuit enim dies pasche et fuit feria sexta et ita eadem feria fuerat prima. Hoc autem est contra compotum eorum quem nunc habent, cum lunationem paschalem non incipiunt tali feria. Hoc idem possit ostendi per plures rationes scientibus compotum eorum. Fatentur etiam Iudeimet principium huius computationis se accepisse a gentibus inter quas conversati sunt. Ex hoc videtur sequi quod ipsi a principio non habuerunt."

62 MS Glasgow, UL, Hunter 44, pp. 43b–44a: "Notandum iuxta predicta quod Iudei, saltem moderni, non respicientes equinoctium veritatem, sed annos embolismales, secundum preceptum 14 die Nissan ad vesperas inchoant suum pascha. Die vero 15o festum celebrant azimorum. Et in anno communi descendit, in embolismali vero ascendit eorum pascha fere cum nostro termino. … Et cum in 8o et 19o, id est in 5o et 16o quoad Iudeos, nos ascendamus, ipsi vero multum descendant, ideo in his annis solum nos preveniunt in una lunatione. Propter quod sciendum est quod in omni anno lunatio illa que incipit secundum ecclesiam post quarto nonas Martii vocatur Nissan apud Iudeos. Et ideo si hanc

> the Jews of Antiquity did not observe this computation. For Gamaliel rightly corrected the error of Passover [*pasce Iudeorum*] in his book, which is why he said in his book "why would we want to calculate and celebrate our Passover badly if we can calculate and celebrate properly?"[63]

This reference to a book on Jewish calendrical calculation by an author named Gamaliel is tantalizing in its obscurity. No Hebrew text that fits the above description seems have been preserved and it is unclear if John knew Gamaliel's book first hand or was simply told about its existence by his Jewish informants. At the same time, however, it is worth noting that references to Gamaliel or a book of this name appear with frequency in twelfth- and thirteenth-century Christian sources, where they are applied to passages in the Talmud and to other rabbinic texts.[64] In the judgment of Judith Olszowy-Schlanger, it is possible that there was indeed once a *Sefer Gamaliel*, which was "a kind of anthology or digest of aggadic passages in the Talmud and midrashim."[65] In addition, there is at least one other thirteenth-century Christian author who defers to Gamaliel as an authority on computistical matters. In his calendrical treatise *De anni ratione* (ca. 1232/35), John of Sacrobosco writes that the new moon fell on 23 March at the beginning of the 19-year in which Christ's nativity took place, both according to Eusebius and Jerome and according to "Gamaliel, who was the teacher of the apostle Paul."[66] A similar reference is found much later in Paul

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Aprilem et paschalem acciperet ecclesia, pascha magis rite cum Iudeis in primo mense perageret annuatim per transpositionem embolismalibus variatis."

63 MS Vatican City, BAV, lat. 3112, fol. 61$^{va–b}$: "Iudei antiqui istam computationem non observant. Nam recte Gamaliel in libro suo errorem pasce Iudeorum correxit. Unde dixit in libro suo 'quare vellemus male computare vel celebrare pasca nostrum cum possemus bene computare et celebrare'."

64 On medieval Christian references to 'Gamaliel', see Raphael Loewe, "Alexander Neckam's Knowledge of Hebrew," *Mediaeval and Renaissance Studies* 4 (1958): 17–34, repr. in *Hebrew Study from Ezra to Ben-Yehuda*, ed. William Horbury (Edinburgh: T & T Clark, 1999), 207–223 (214–217, 220); Frans van Liere, "Gamaliel, Twelfth-Century Christian Scholars, and the Attribution of the Talmud," *Medieval Perspectives* 17, no. 2 (2002): 93–104; de Visscher, "The Jewish-Christian Dialogue," 152–158; de Visscher, "Cross-Religious Learning," 130–131; de Visscher, "'Closer to the Hebrew'," 265–266; Goodwin, "*Take Hold*", 139, 146.

65 Olszowy-Schlanger, "A School of Christian Hebraists," 263.

66 John of Sacrobosco, *De anni ratione*, in *Libellus de Sphaera*, ed. Melanchthon, sig. F2^{v}: "Sed Gamaliel secundum Iudaeos qui Pauli Apostoli erat magister, secundum vero nos Eusebius Caesariensis Episcopus, & Hieronymus in initio Cycli illius, in quo dominus incarnatus fuit, consideraverunt Lunam fuisse primam 10 Calendas Aprilis, & quod ad idem redit 10

of Middelburg's *Paulina de recta celebratione paschae*, which was published by the printing press of Ottaviano Petrucci in 1513. In this massive chronological dissertation, Paul, who served as the bishop of Fossombrone (1494–1534), cites from a Hebrew text whose title he translated as *Liber de solis et lunae motibus, annique ratione*. Its alleged author was Rabbi Gamaliel, "the pupil of Christ and teacher of Paul."[67]

Whatever may have been lurking behind the elusive 'book of Gamaliel', John of Pulchro Rivo's heavy reliance on the *Compotus philosophicus* of Friar John for matters pertaining to the Jewish calendar, coupled with his simultaneous ability to expand on this material, seemingly at will and with information of a sometimes obscure and unusual kind, further heightens the question, as yet unsolved, of how both authors are actually related to each other. Are we to conclude that the final three decades of the thirteenth century gave rise to two distinct Saxon scholars who both acquired an outstanding expertise on the Jewish calendar, one basing himself on the work of the other? Or could it be the case that John of Pulchro Rivo and his alleged informant Friar John were in fact one and the same person? A hint in the latter direction might be derived from a comparison of the following passage in the *Compotus philosophicus* with its summary in the *Compotus novus*:

Calendas Februarii, unde ibi unitas pro aurea numero ponitur." The same passage was later cited by Nicholas of Cusa, *Die Kalenderverbesserung*, ed. Stegemann, 20. Gamaliel is mentioned as a calendar institutor in Petrus Alfonsi's *Dialogue against the Jews* and in medieval Karaite sources. See p. 54 above, and Stern, *Calendar and Community*, 177. The erroneous identification of Gamaliel II with the Gamaliel mentioned in the Acts of the Apostles (5:34–39, 22:3) is already found in the Syriac-Arabic *Chronology* of Elias of Nisibis (1019 CE). See de Blois, "Some Early Islamic and Christian Sources," 75–76.

67 Paul of Middelburg, *Paulina de recta Paschae celebratione: et de die passionis domini nostri Iesu Christi* (Fossombrone: Petrucci, 1513), sig. D8$^{r–v}$. See Nothaft, *Dating*, 229, for the full quotation. The same reference to "sanctum gamalielem christi discipulum et pauli preceptorem … ad cuius pedes apostolus ipse legem et prophetas se didicisse gloriatur, qui in libro suo quem de solis et lune motibus annique ratione instituit sic dicit," but with a different Hebrew text attached to it, had been previously printed in Paul of Middelburg, *Epistola apologetica ad doctores Lovanienses* (Louvain: Johannes de Westfalia, 1488), sigs. A7^{v}–8^{r}. Offenberg, "The First Use," 51–53, suspects that Paul received his Hebrew 'Gamaliel' from Flavius Mithridates, whereas Grafton and Weinberg, *"I Have Always Loved"*, 219n184, suspect that Paul might have invented the reference.

Compotus philosophicus, part II, c. 1	*Compotus novus*, ch. 15
Sciendum est etiam quod tempus medie coniunctionis et oppositionis positum in tabulis primi libri est secundum longitudinem civitatis sancte Iherusalem. Magistri enim Iudeorum respectu huius civitatis posuerunt ipsum, quos nos secuti sumus in hac parte. Sed si ad alteram civitatem, que est in occidente respectu Iherusalem, sicut est fere tota occidentalis ecclesia, volueris habere tempus medie coniunctionis vel oppositionis, vide eius differentiam ad Iherusalem in eclipsi et illam subtrahe a tempore coniunctionis vel oppositionis civitatis sancte ibi invento. Si autem ad Tholetum habere volueris ipsum, subtrahe 3 horas et 27 minuta. Et si ad civitatem Magdeburgensem, que est in Allemania, habere volueris tempus medie coniunctionis vel oppositionis, subtrahe 2 horas et 40 minuta a tempore secundum longitudinem civitatis sancte in tabulis invento. [MS Vat. lat. 3112, fol. 17^{vb}]	Cum hoc notandum quod tempus medie coniunctionis hic positum est secundum longitudinem citivatis Iherusalem, quia Compotus philosophicus est secutus magistros Iudeorum, qui respectu huius civitatis posuerunt. Et quamvis Iudei sic ubique habeant, nihilominus si ad civitatem Magdeburch, que est in Almannia, habere volueris subtrahe 2 horas et 40 [Ms.: 4] minuta a tempore civitatis Iherusalem iam predicto. Si autem ad villam Parisiensem volueris 15 minutas subtrahe et 3 horas. [MS Glasgow, UL, Hunter 444, pp. 41b–42a]

In the cited passage, Friar John informs his readers that the syzygy tables in the first part of his *Compotus philosophicus* are valid for the meridian of Jerusalem, as he believes to be the case for the Jewish calendar. To make the tables adaptable to locations in Western Europe, he supplies the time differences between Jerusalem and the meridians of Toledo and Magdeburg, which, as mentioned above (p. 576), was probably close to the author's place of origin. In his *Compotus novus*, John of Pulchro Rivo retains the reference to Magdeburg, but replaces the time correction for Toledo with one for Paris. He may have done so for biographical reasons, since Paris was the city where he wrote his *Compotus*

manualis (1289). Either way, his dependence on the *Compotus philosophicus* is clearly acknowledged in the passage cited. But in his commentary on the same passage, John writes as if he himself had been responsible for the choice of Magdeburg as an example of longitude conversion. This holds true, at any rate, for the wording in MS Florence, BML, Plut. 30.24, where we read:

> Note that the Jews in all parts of the world always state the *molad* Tishri to be at the same hour and the same *gelachim* of the hour as in Jerusalem, which is against the astronomers and the truth. And they do this in order to avoid discord in the celebration of Passover. Note also that here I teach to adjust [the time] to the city of Magdeburg in Germany and not to Brunswick, where I was born, because Magdeburg is the seat of an archbishopric and therefore more famous, nor to the city of Goslar, where I compiled the book for the greater part.[68]

In the manuscript cited, the second sentence is consistent in its use of the first person, which neatly links the explanation of the choice Magdeburg to the commentator's personal reminiscences about his birthplace (Brunswick) and place of writing (Goslar). A slightly different picture is presented in MS Vat. lat. 3112, which contains the only other known copy of the relevant passage from the John's commentary and generally preserves superior readings to the Florentine codex. Here, the initial first-person statement (*nota quod doceo hic adequare*, i.e., "note that I here teach") is altered to a third-person one (*nota quod docet hic adequare*), while the order of subordinate clauses is slightly changed:

> Note also that here he teaches to adjust [the time] to the city of Magdeburg in Germany, because Magdeburg is the seat of an archbishopric and

68 MS Florence, BML, Plut. 30.24, fol. 96^{vb}: "Notandum tamen quod Iudei in omnibus regionibus semper molat Tisri dicunt esse in eadem hora et in eodem gelachim hore sicut est [in] Iherusalem, quod est contra astronomos et veritatem. Et hoc ideo faciunt ne oporteat ipsos discordare in celebratione pasce. Ulterius nota quod doceo hic adequare ad civitatem Magdebrach in Alemannia et non ad Bruneswich, de qua sum natus, quia Magdebrach est metropolis et ideo magis famosa, neque ad civitatem Goslarie, in qua librum pro maiori parte compilavi." Poulle, "Les astronomes," 49, reads *Gesmarie*, which he takes to be Geismar in Thuringia, a village of no significance in the thirteenth century. If anything, a more promising candidate would have been Geismar in Lower Saxony, which today is a part of Göttingen, but the reading of *Goslarie*, as confirmed by the Vatican MS (see following note), is clearly the preferred one.

> therefore more famous, and not to Brunswick, where I was born, nor to the city of Goslar, where I compiled the book for the greater part.[69]

The resulting text looks somewhat incoherent, because it gives the impression that the commentator and the author of the main treatise were two different persons. At the same time, however, the change matches the fact that John refers to himself in the third person (as the 'author' of *Compotus novus*) almost consistently throughout his commentary.[70] While the reading in the Vatican MS may well be the original one, the switch to the first person in the Florentine MS is probably more than just the result of an unintentional scribal error. Instead, the present case can be compared to an earlier divergence between both manuscripts, where three references to a *tabula Iohannis Alemanni* in Vat. lat. 3112 (fols. 31^{vb}–32^{r}) are changed to *tabula mea* in Florence Plut. 30.24 (fol. 41^{r}).[71] In any case, it seems quite likely that both extant versions of the passage must be taken to refer to John of Pulchro Rivo himself, in his capacity as the author of the *Compotus novus*. John's own commentary thus gives the impression that it was his own decision to use Magdeburg's meridian as an example, despite the fact that he clearly depended on Friar John's *Compotus philosophicus* in this respect. This confusing state of affairs opens up the possibility that Friar John was in fact no more than an alter ego of John of Pulchro Rivo, who may have preferred to refer to his own previous work in the third person, because this was more in keeping with the general tone of his computistical compilation—a work based almost entirely on excerpts from other authors. In this case, the extended quotations of the former work in the *Compotus novus* would simply be a case of John of Pulchro Rivo revisiting material that he himself had produced several years earlier.

Attractive as this hypothesis may seem, it faces a number of recalcitrant facts, which in the end seem to advise against its acceptance. For one thing, the partially deleted colophon in one of the manuscripts of the *Compotus philosophicus* gives the author's name as *Iohannes de Gu* … (see p. 577 above), which

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69 MS Vatican City, BAV, lat. 3112, fol. 59^{vb}: "Ulterius nota quod docet hic adequare ad civitatem Megdeburg in Almannia, quia Megdeburg est metropolis et ideo magis famosa, et non ad Bruneswic, de qua sum natus, neque ad civitatem Goslarie, in qua librum pro maiori parte compilavi."

70 The very few exceptions include a brief self-identification early on in the preface. Ibid., fol. 29^{vb}: "Ideo ego Iohannes Alemannus hanc compilationem ad utilitatem omnium in quam potui melius compilavi."

71 See also MS Vat. lat. 3112, fol. 41^{r}: "Istud adiectum est propter partes nostras scilicet Saxonie" vs. MS Florence Plut. 30.24, fol. 90^{r}: "Istud adieci propter partes meas scilicet Saxonie."

does not jibe with any of the names associated with the author of the *Compotus novus* (*Iohannes Alemannus*, *Iohannes de Pulchro Rivo*, *Iohannes de Brunsvic* or *Iohannes de Saxonia*); neither are there any indications that John of Pulchro Rivo was a member of the Franciscan order, as Friar John evidently was. Finally, one has to take into consideration the great gap between the composition of both works, which may amount to nearly 25 years, provided that the *Compotus philosophicus* was already written in 1273, as seems likely. The resulting chronology is particularly troublesome if we assume that John studied in Paris, which would imply that he was still a relatively young man in the late 1280s, when he wrote his *Compotus manualis* in that city. In sum, it seems to best to treat Friar John and John of Pulchro Rivo as two distinct scholars, whose exact relation is difficult to determine. A teacher-student relationship—similar to what has been proposed above (p. 149) for Roger Bacon and Robert of Leicester (both Franciscans)—is certainly imaginable, as are more general lines of influence. In any case, the *Compotus philosophicus* and *Compotus novus* jointly attest to the existence of a previously unnoticed milieu of astronomical and computistical scholarship in late-thirteenth-century Northeastern Germany, whose members regarded studying the Jewish calendar as an important aspect of their field.[72]

72 Another possibility that cannot be completely excluded is that the author of the *Compotus philosophicus* is identical to the Friar John who authored a *Summa astrologiae* in ca. 1276, which contains three chapters dealing with the Jewish calendar (see p. 150 above and p. 617 below). Since, however, there are no obvious verbal parallels between this text and the *Compotus philosophicus*, the matter remains very uncertain. One noteworthy discrepancy is the way the *Compotus* refers to ḥalakim as 'partes', whereas the *Summa* prefers 'puncta'. See MS Paris, BnF, lat. 7293A, fol. 48^{v}: "Et est quantitas unius lunationis 29 dies et 12 hore et 793 puncta secundum quod contendunt nobis Iudeorum compotiste et est quantitas horum punctorum talis quod sicut astrologi dividunt diem in 24 horas et horam in 60 minuta ita Iudei dividunt horam in 1080 puncta, que vocant chelachim." MS Vatican City, BAV, lat. 3112 fol. 3^{vb}: "Iudei etiam fere habent eandem quantitatem lunationis equalis. Ipsi enim computant pro lunatione equali 29 dies et 12 horas et 793 partes, quarum 1080 secundum eos faciunt horam." See also the *Compotus novus* in MS Leiden, UB, Scaliger 66, fol. 10va: "… secundum Iudeos vero in 1080 gelachim, id est partes." A later user of this manuscript underlined the word *gelachim* in this passage and supplemented it with a marginal gloss of the word *ḥalakim* in Hebrew letters (with vowel points).

APPENDIX II

Notes on Further Texts and Manuscripts

As mentioned in Chapter Two of this book (p. 95), the text of the *Liber erarum* in MS P = Paris, Bibliothèque de l'Arsenal, 877, fols. 1r–2v (s. XIII$^{2/2}$) closes with a slightly modified version of the attached calendrical tables, in which the wheel diagram found in some other copies was rearranged into a tabular format (fol. 2v). This is followed on fol. 3r, not by the customary table of eras for 1191, but by a brief text entitled *Inventio annorum Hebreorum per annos Christi*. Upon inspection, this text turns out to reproduce certain parts of Reinher of Paderborn's *Compotus emendatus*, in which Reinher explains how to convert Julian into Jewish dates with the aid of tables. The first half of the text in P (fol. 3ra) reads:

> Cum igitur per has tabulas subsequentes invenire volueris, transactis quodlibet annis romanis, mensibus et diebus ab incarnatione Christi quantum transierit de Hebreorum annis, lunationibus, diebus, horis, partibus, sic facias: per annos Christi collectos, per planos, per menses Romanorum, que omnia preterierunt, intra in tabulas quodque eis ascriptum inveneris et dies mensis Romani presentis preteritos in unam summam collige minora semper in maiora redigendo, id est de partibus est 1080 horam faciendo, de 24 horis diem, de 29 diebus et horis 12 et 793 partibus lunationem, de 12 lunationibus annum, si embolismalis non fuerit, de 13 vero, si fuerit. Quod ergo in summa inventa [tibi occurrerit] in annis, lunationibus, diebus, horis et partibus, ipsum est tempus quod preteriit a principio annorum Hebreorum in meridie diei mensis Romanorum, de quo questio est, si Deus voluerit. Si vero de annis et lunationibus investigare non intendis, sed tantum quantum transierunt presentis lunationis, tunc non intrabis in annos et lunationes Hebreorum, sed tantum in dies, horas et partes. Ex quibus si lunatio aliqua colligi poterit, proicietur et reliquum [Ms. reliquo] quantum transierint presentes lunationes secundum Hebreorum compotum ostendet. Scire autem oportet quod in hac computatione dies singulos a meridie incipimus, id est 6 horis ante eius usualem inceptionem. Sciendum est si annus bissextilis fuerit infra quem hec investigatio fit, transacto bissexto ei quod mensibus ascriptum invenisti unum semper diem addicias. Propter quod etiam qui anni sint bissextiles annotavimus per B litteram.

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Up to this point, the text is largely identical with ch. I.18 of the *Compotus emendatus*.[1] It is immediately followed (fol. 3^{ra-b}) by a passage dealing with the identification of the paschal month, which combines parts of ch. I.20 and I.21:

> Invento autem quot anni Hebreorum lunares et lunationes, dies et hore et partes transierint, patet quot anni, [quot] menses, quot dies transierunt. Unde si bene computaveris, semper invenies annum Hebreorum incipere prope Septembrem, circa equinoctium autumpnale. In hoc ergo mense pasca celebrandum fore videtur, si hic mensis primus mensis anni Hebreorum sit. Pro hoc sciendum est quia sicut [Latini] computationis sue lunaris [et] decemnovenalium circulorum principium ponunt circa equinoctium autumpnale ita et Hebrei annorum suorum, quos a creatione esse dicunt, et decemnovenalium circulorum circa idem equinoctium ponunt, et abinde mense septimo, si non fuit embolismalis annus, octavo vero, si embolismalis fuerit, annum suum incipiunt ex iussione Domini.[2]

The corresponding conversion tables, which are identical to those in Reinher's *Compotus*, can be found on the verso side of the same leaf (fol. 3^{v}). They consist of (1) a table of 'collected years', which starts with the *radix* of the Christian calendar on 1 January 1 CE (= 3760 Jewish years, 3 lunations + 15d 21h 952p) and continues to list the concurrent moment in the Jewish *molad*-system for every 76th year up until 1672; (2) a corresponding table of 'expanded years' which tracks the time difference between the Jewish calendar and the Julian year for four consecutive 19-year cycles, i.e. from 1 to 76; (3) a corresponding table for the twelve months of the Julian year.[3] The same tripartite set of 'Reinherian' conversion tables is preserved in MS Paris, Bibliothèque Nationale de France, lat. 7434, fols. 104^{r}–105^{r} (s. XIII), a codex annotated and once owned by Peter of Limoges.[4] Here, the tables are preceded by a more extensive excerpt

1 van Wijk, *Le comput*, 36.

2 Cf. ibid., 38.

3 Reinher, *Compotus emendatus*, ed. van Wijk, *Le comput*, 34–36; Pedersen, *The Toledan Tables*, 3:928–929. I h.

4 On this manuscript, see Jeremiah Hackett, "The Hand of Roger Bacon, the Writing of the *Perspectiva* and MS Paris BN Lat. 7434," in *Roma, Magistra Mundi: Itineraria Culturae Medievalis*, ed. Jacqueline Hamesse, 3 vols. (Louvain-la-Neuve: Fédération Internationale des Instituts d'Études Médiévales, 1998), 1:323–336 (326). The presence of Jewish calendrical material was already noted by Boncompagni, "Intorno ad un tratatto," 831–832.

from Reinher's *Compotus*, which encompasses all of ch. I.14–17. These chapters, which contain a succinct description of the Jewish *molad* reckoning in relation to the Julian calendar, were all connected to the tables in the original treatise.[5] To these, the manuscript (fol. 105^{r}) adds the same slightly modified text of ch. I.18 and ch. I.20–21 that has just been quoted from MS P (fol. 3^{r}). That these two manuscripts are thus related is confirmed by the fact that MS lat. 7434 follows these excerpts with the same peculiar recension of the *molad* tables from the *Liber erarum* as is found in MS P. In both instances, the first three tables (for cycles from 1 to 1000) appear merged into one, while the wheel diagram is replaced by a vertical table comparing the Jewish and Christian versions of the 19-year cycles (see p. 95 above). Since MS P also contains the text of the *Liber erarum* itself, which is nowhere to be found in MS lat. 7434, whereas the latter has additional text from Reinher's *Compotus* not contained in MS P, it is tempting to suppose that they were both dependent on a common source, which combined all this information. From a brief canon added below the *Liber erarum*'s tables in MS lat. 7434, it can perhaps be inferred that its exemplar dates from ca. 1220.[6]

The mentioned set of 'Reinherian' conversion tables also makes an appearance in MS Florence, Biblioteca Medicea Laurenziana, San Marco 185 (Parchment, 148 fols., 275 × 215 mm), which was copied in Italy in ca. 1278.[7] Like MS P, this codex is host to the Toledan Tables, which here occupy fols. 2^{r}–84^{r}, concluding with a table of geographical coordinates (fol. 84^{r}),[8] to whose original make-up a later scribe added data for the longitude and latitude of Florence in the lower margin. This is followed by Reinher of Paderborns's tables, which are spread out over two pages (fols. 84^{v}–85^{r}). In contrast to MS P, MS Paris, BnF, lat. 7434, and the known manuscripts of Reinher's *Compotus*, the parts of the

5 Reinher, *Compotus emendatus*, ed. van Wijk, *Le comput*, 28–32.

6 MS Paris, BnF, lat. 7434, fol. 105^{rb}: "Si vis scire principium lunationis in qua es vel principium anni in quo es vel revolutionis in qua es, accipe annos mundi et divide per 19 et vide quid venit et remanet et accipe avanxaciones revolutionum venientium et annorum remanentium et anni precedentis annum in quo es et menses precedentis mensem in quo es et iunge illas avanxaciones omnes cum nativitate lune Adar [sic!], qui fuit prima in die Lune, scilicet cum 2 diebus et 5 horis et 204 punctis et proice semper 7. Residuum ostendet tibi quid queris, id est feriam. Et scias quod multe sunt regule abreviate ad hoc inveniendum. Anno Domini 1220 currente erant anni a creatione mundi 4980."

7 Björnbo, *Die mathematischen S. Marcohandschriften*, 43–45; Donatella Frioli et al., *Catalogo di manoscritti filosofici nelle biblioteche italiane*, vol. 2, *Busto Arisizio, Firenze, Parma, Savignano sul Rubicone, Volterra* (Florence: Olschki, 1981), 56–57; Pedersen, *The Toledan Tables*, 1:116.

8 Pedersen, *The Toledan Tables*, 4:1509–1516.

hour (or *ḥalakim*) are here called *puncta* rather than *partes*. But there is even more Jewish calendrical material to be found in this Florentine codex: after an almanac-style table that tracks the approximate position of Venus during its 8-year cycle (fol. 85^{v}),[9] we are treated to an elaborate tabular list of Jewish *molad* dates that stretches from January 1248 CE to December 1295 CE and covers six consecutive pages (fols. 86^{r}–88^{v}). In addition to showing the corresponding Julian calendar dates for each *molad* time, the table also correlates *Anni Domini* and dominical letters with years of the Jewish world era and the lunar cycle. The first line shows the *molad* Adar of 1248 CE, which fell on Monday, 27 January, 12h 73p. It contains the following data (from left to right): (1) *Annus domini nostri Ihesu Christi* 1248; (2) [dominical letter] ED; (3) *aureus numerus* 14; (4) *mensis* Ianuarius; (5) *dies* 27; (6) *feria* 2; (7) *hore* 12; (8) *puncta* 73; (9) *numerus mensium Ebreorum* 6; (10) [Hebrew year] 5008, (11) [year in the Hebrew cycle] 11 emb.[10] The table is accompanied by a canon that is spread over the lower margins of two separate pages. The first portion (fol. 86^{r}) teaches the principles on which the table was constructed:

> Si vis formare has tabulas, accipe coniunctionem alicuius mensis, scilicet feriam, horas et puncta, et illis adde notam unius mensis lunaris, que est una dies et 12 hore et 793 puncta. Et si ex punctis excreverint per aggregationem horum 1080 puncta vel plus, unam horam horis precedentibus adiunge et residuum dimitte; item aggrega omnes horas simul et si excreverint 24 vel plus, unam diem diebus precedentibus adiunge et residuas horas dimitte; item aggrega omnes dies simul et si excreverint ultra 7 reice 7 et residuum retine; et ipsa erit coniunctio sequentis mensis. Cui si addieris predictam notam, scilicet unum diem et 12 horas et 793 puncta, habebis coniunctionem tertii mensis. Et sic facere non cessabis quousque invenias coniunctionem multorum milium annorum. Item videas indirecto illius mensis Latinorum quotus mensis Ebreorum sit, quem numerum perficies quousque ad 12 pervenias, si fuerit annus communis, id est 12 luminationum [sic!], vel procede usque ad 13, si annus fuerit embolismalis, id est 13 lunationum. Sunt autem anni embolismales isti: 3, 6, 8, 11, 14, 17, 19, quorum quilibet est 13 lunationum. Et sic facere non cessabis quantum procedere volueris et ita invenies per ordinem numerum ominum mensium Ebreorum etc.

9 Ibid., 4:1611–1612.

10 See also ibid., 3:943.

The second portion (on fol. 87^{r}) offers further information concerning the table and notifies the reader of the Jewish calendar's evening epoch. It also explains that 1 2/5h = 1h 432p must be subtracted from the conjunction times in the table in order to convert them from the hypothetical meridian of Jerusalem to that of Rome. The mentioned time difference corresponds to a distance in longitude of 21°, which agrees relatively well with the coordinates of Rome (12° 30′ East) and Jerusalem (35° 13′ East), but not with the actual mean conjunction times observable at these places, since the implied meridian of reference of the Jewish calendar lies more than 10° east of Jerusalem (see n. 23 on p. 26 above):

> Nota per istas tabulas invenimus diem et feriam et horam et punctas et menses Ebreorum et annos ab origine mundi, et hoc secundum Ebreos. Intrando tabulas cum annis Christi iam nominat et indirecto cuiuslibet mensis illius anni invenies omnia supradicta. Et nota quod dies incipit in occasu solis et terminatur in occasu solis sequentis diei, quia nox precedit diem et dies est 24 horarum et hora est 1080 puncta. Item nota quod mensis lunaris secundum Ebreos est 29 dierum et 12 horarum et 793 punctarum. Item nota quod iste tabule fabricate fuerunt super Ierusalem, unde debemus subtrahere super Romam 1 horam et 2 quinte unius hore, quia tantum distat Roma a Ierusalem et 2 quinte sunt 432 puncta etc.

The scribe goes on to add that this canon is supposed to appear at the beginning of the present quire, at a spot marked by a cross and the letter A (*Et scias quod iste canon debet esse in principio huius quaterni, ubi est crux cum 'a' littera*). Confusingly, this sign (a cross pattée crowned by the letter A) appears near the bottom of both fol. 86^{r} and 87^{r}. In any case, this scribal intervention makes it plain that the tables in the Florentine codex were copied from an earlier exemplar, whose original date must have been close to 1248 CE, the starting year of the present *molad* list. Indeed, the aforementioned Venus table on fol. 85^{v} originally covered the eight years from 1245 to 1252 CE. These headings were retained for the present copy, but another row was added on top to indicate that the same values are equally valid for the Venus cycle from 1277 to 1284. A marginal gloss links the original line to the time when the present table was constructed (*Inventa est hec tabula*), whilst the second line of the additional row is marked by the scribe as containing his own year of writing 1278 (*Scripsi istam tabulam anni* [sic!] *domini 1278 et currit secunda linea*). In the same codex, the *molad* table on fols. 86^{r}–88^{v} is followed by another six-page tabular list for 48 years, which uses the same basic structure and layout, but instead records the beginnings of the months in the astronomical version of the Muslim or Arabic calendar (*Tabula ostendens numerum mensium Arabum et primam*

lunationem, fols. 89r–91v).[11] This time, the starting year is 1232 CE = 629 AH, in which the fourth month of the Muslim year (Rabīʿ II) began on Sunday, 25 January. The final date listed is Wednesday, 6 December 1279 CE, which is the beginning of Shaʿbān, the eighth month of 678 AH. Once again, the lower margin of certain pages (fols. 89v and 90r) contain explanatory canons that are largely analogous to those for the Hebrew calendar.

Both sets of calendrical tables, those for the *moladot* and those for the beginnings of the Arabic months, have also been jointly preserved in MS Paris, Bibliothèque de l'Arsenal, 879, fols. 10r–15v (Parchment, 55 fols., 236×165 mm, s. XIV).[12] In contrast to the list of Arabic lunations, which again runs from 1232 to 1279 CE, the list of *moladot* (fol. 10r–12r) has been slightly truncated and only reaches up to 1287, but otherwise the tables preserve the same layout. The first part of the canon cited above is here absent, but the second part is preserved in a gloss on fol. 10r. MS Oxford, Bodleian Library, Lyell 52, fol. 75r–v, a fourteenth-century manuscript of Italian provenance, features a stripped down version of the *molad* table, which only shows 'dies', 'ferie', 'hore', and 'puncta' for the years 1280 to 1287.[13] An even shorter version, covering only the years 1262 to 1267 CE, appears on fol. 39r of MS Prague, Národní knihovna České republiky, XIV.A.18, copied at the beginning of the fourteenth century (Parchment, 82 fols., 235×175 mm). A gloss in the upper margin again briefly states that the conjunction times are based on the sunset at Jerusalem and that there is a 1 2/5 hour time difference between that city and Rome.[14] Yet another brief table of this type, this time valid for the period 1270 to 1278 CE, appears in MS Brussels, Bibliothèque Royale, 2910–2920, fol. 101r–v.[15]

More evidence for scholarly interest in the Jewish calendar during the 1270s comes from an obscure *Summa astrologiae* (see p. 150 above), which is attributed to a Franciscan friar named John (*frater Iohannes*) in MS Paris, BnF,

11 Ibid., 3:940–941.

12 Martin, *Catalogue*, 2:149; Pedersen, *The Toledan Tables*, 1:154.

13 The manuscript is described in Albinia de la Mare, *Catalogue of the Collection of Medieval Manuscripts Bequeathed to the Bodleian Library Oxford by James P.R. Lyell* (Oxford: Clarendon Press, 1971), 143–146.

14 MS Prague, NKCR, XIV.A.18, fol. 39r: "Tabule coniunctionis solis et lune secundum Hebreos. Et incipiunt in occasu solis in Ierusalem et terminantur in occasu diei sequentis, quia nox precedens est diei sequentis. Et semper debemus subtrahere differentiam que est inter Romam et Ierusalem, scilicet 1 horam et 2/5 unius hore." See Pedersen, *The Toledan Tables*, 1:171–172; Truhlár, *Catalogus*, 2:280.

15 Chabás and Goldstein, *A Survey*, 140–141.

lat. 7293A, fol. 48r–69r.[16] Friar John divided his treatise into three parts, the first of which is chronological in nature and contains seven chapters. Three of these seven chapters are entirely dedicated to the Jewish calendar, although the author remains mostly fixated on the *molad*-system, which was of particular interest to Christian calendar reformers, without much regard for other elements such as feasts or different year types. In the first of these chapters (*Capitulum tertium: de annis Iudeorum*, fols. 48v–49r), Friar John explains the calendar's astronomical-arithmetical structure, including the individual lengths of the mean lunation (29d 12h 793p), the common (354d 8h 876p), and the embolismic year (383d 21h 589p). In addition, he spells out the monthly (30d 10 ½ h – 29d 12h 793p = 21h 827p) and annual (365d 6h – 354d 8h 876p = 10d 21h 204p) discrepancy between the Jewish and Julian calendars. For the *ḥalakim*, which divide the hour into 1080 parts, he uses the translation *puncta*, but he also knows the Hebrew term *chelachim*. He writes that one lunation lasts 29 days, 12 hours, and 793 puncta "according to what the computists of the Jews pass down to us."[17] A similar reference to Jewish "computists" also occurs in the following passage regarding the twofold beginning of the year:

> And, clearly, according to the Law they must begin their year and cycle at the vernal equinox or close to it, because this was the time when the world was created and then is the first month in which the Passover must be celebrated. Still, their computists ordered it otherwise and put the beginning of the year and cycle in that lunation which falls at the other equinox, namely in September, which, perhaps, they did in order to conform to the nations among which they lived, in particular the Chaldaeans. And thus the first month in their calendar is the seventh month according to the Law and the seventh month in their calendar is according to the Law the first one.[18]

16 A second copy of the treatise, entitled *Summa Alberti*, is preserved in MS Vienna, ÖNB, 5309, fols. 127ra–55va. See n. 74 on p. 150 above.

17 MS Paris, BnF, lat. 7293A, fol. 48v: "Et est quantitas unius lunationis 29 dies et 12 hore et 793 puncta secundum quod tradunt nobis Iudeorum compotiste et est quantitas horum punctorum talis quod, sicut astrologi dividunt diem in 24 horas et horam in 60 minuta, ita Iudei dividunt horam in 1080 puncta, que vocant chelachim."

18 Ibid., fol. 49r: "Et videlicet secundum legem debent incipere annum suum et ciclum in equinoctio veris vel circa, quia tunc fuit creatus mundus et tunc est primus mensis in quo debet facere pascha. Tamen compotiste eorum aliter ordinaverant et posuerunt principium anni et principium cicli in illa lunatione que cadit in altero equinoctio, scilicet in Septembri, quod forte ideo fecerunt ut conformarent se gentibus inter quas habitabant,

Moreover, in the second chapter of the entire work (*De pascha*), the "computists of the Jews" are credited with the invention of the system of postponement rules (*deḥiyyot*), which allow Passover and the beginning of Nisan to only ever fall on uneven weekday numbers (1st, 3rd, 5th, and 7th). According to Friar John, "nobody doubts" (*nullus dubitat*) that the Jews installed this system out of their hatred against Christ, who died when Passover fell on a Friday, which is no longer possible in the present-day calendar.[19] Another opinion he attributes to the Jews in general is that the moon was full at its creation on the fourth day, even though their calendar treats the fourth day of creation as the starting point of a new lunation (of Nisan), with a conjunction at 9h 642p. As Friar John explains, their calendar anticipates this conjunction by another six months, starting in the preceding autumn with a conjunction on Monday, 5h 204p, the "root date of the imaginary year" (*radix anni ymaginati*).[20]

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et maxime Caldeis. Et ita primus mensis in kalendario ipsorum est secundum legem septimus et septimus in kalendario ipsorum est secundum legem primus." A similar statement about the calendrical influence from surrounding nations appears in the *Compotus philosophicus*, written by another 'Friar John'. See n. 61 in Appendix I above.

19 Ibid., fol. 48$^{r–v}$: "Sed ipsi maliciose addiderunt tertium respectum, scilicet ad feriam. Instituerunt ita kalendarium suum compotiste eorum ut numquam pascha possit eis cadere feria secunda, nec quarta, nec sexta, sed semper feria impari, scilicet prima vel tertia, quinta vel septima, quod factum esse in odium Christi nullus dubitat, eo quod tempore Christi incepit pascha eorum et fuit prima dies azimorum feria sexta, in qua Christus fuit passus, et ita in illis annis in quibus pascha caderet in feria numeri paris necesse est quod anticipent pascha vel posteriorent per unam diem et similiter mensem suum lunarem, quod tamen in suo kalendario artificiose constitutum est." A similar view on the origin of the Friday-postponement was later espoused by Peter of Rivo (1488) and Jacob Christmann (1590/93). See Nothaft, *Dating*, 233; Nothaft, "A Sixteenth-Century Debate," 67.

20 MS Paris, BnF, lat. 7293A, fol. 49$^{r–v}$: "Sed Iudei dicunt quod licet luna fuerit creata plena, tamen secundum ymaginationem fuit coniuncta, ita quod prima coniunctio eius cum sole fuit feria IIII post horas 9 et puncta 642. Et ibi deberent incipere cicli, sed ipsi incipiunt ciclum ante per 6 lunationes, quod est in Septembri, et hoc vocant annum imaginatum, cuius principium inveniunt retrocedendo: ciclus enim secundum eos incipit in Septembri cuius principium est principium Tysrim, quod est primus mensis apud eos, et a principio Tysrim procedunt ad omnia tempora posteriora. Prima igitur coniunctio predicta est feria 4 post horas 9 et puncta 642, ut diximus, et hoc est radix certissima ciclorum et annorum Iudeorum et si subtraheres ex hac radice tempus et feria et horas et puncta 6 lunationum et dividentes per 7 invenires simul retrocedendo quod prima lunatio si principium habuisset incepisset feria II post horas 5 et puncta 204, et hoc vocatur radix anni ymaginati vel nota que indicat principium sequentis lunationis."

The information presented thus far, although fairly accurate, adds relatively little to what could already be found in the *Liber erarum* (see p. 75 above.). Friar John enters somewhat less familiar territory with his remarks on the relation between the Jewish and Julian calendar. As he points out, the Christian version of the 19-year cycle surpasses the Jewish version by 1d 485p per cycle, which account for a discrepancy of roughly one day in 304 years or 16 consecutive cycles. In order to locate the beginning of the Jewish lunation in the Julian calendar, it is necessary to know that 3760 years or 197 cycles + 17 years had passed in the month of Tishri that preceded the beginning of the Christian era. For the calculation of all *moladot*, the fifth chapter (*De tabulis lunationum*, fol. 50$^{r–v}$) offers six different tables. Five of these are familiar from the tables at the end of the *Liber erarum* and from table 3 in Robert of Leicester's *De compoto Hebreorum*: they tabulate the times that have to be added to the first *molad* of creation (a) for individual 19-year cycles (in lines from 1 to 10), (b) for groups of 10 19-year cycles (10 to 100), (c) for groups of 100 19-year cycles (100 to 1000), (d) for individual years in the 19-year cycle (1 to 19), and (e) for individual months within the common or embolismic year. The only new element is the presence of an additional column in Friar John's version of these tables, which tallies the number of lunations that have elapsed after each line. The sixth table is more unusual, in that it was evidently drawn up for the conversion of Jewish *molad* times into Julian calendar dates. For this purpose, the table lists the weekday, hour, *ḥalakim* and corresponding Julian date for the *molad* at the beginning of a select number of 19-year cycles:

Tabula annorum Christi et lunarum ab initio seculi

Cicli	Anni Chr. completi	Annus Iud.	Dies	Ferie	Hore	Puncta
198	Annus Christi	3762	25	2	18	294
265	1275	5035	21	7	23	199
266	1294	5054	21	3	15	794
267	1313	5073	21	6	8	309
268	1332	5092	21	2	0	904
269	1351	5111	21	4	17	419
270	1370	5130	21	7	9	1014

The table starts with the *molad* Tishri in 3763 JE (= 2/3 CE), at the beginning of the 199th lunisolar cycle since creation (the numbers in the first and third

column must be read as completed cycles and years, while those in the second column designate current years), which is the first cycle to start after the birth of Christ, as dated by the Dionysiac *Annus Domini*-era. The equivalent Julian date is accurately indicated as Monday, 25 September, at 18h 294p.[21] In the subsequent lines, the same type of information is offered for six consecutive 19-year cycles, starting from 5036 JE = 1275/76 CE. To judge by the accompanying text, the author composed this chapter at some point during this year, in 1276 or late 1275.[22] Indeed, a note at the end of the table for individual months states *Anni Christi completi 1275, anni Ebreoerum completi ab inictio seculi 5035* ("Years of Christ completed: 1275—Hebrew years since the beginning of the world completed: 5035"), which points to 1276.[23]

The year 5036 JE is also the starting point for a 19-year table included in the astronomical section of the famous *Milḥamot Adonai* (book V, part 1) of Levi ben Gerson (better known as Gersonides, 1288–1344), who was active in Southern France during the first half of the fourteenth century. His table allowed Jewish users to convert Christian dates by finding the equivalent date in the Jewish calendar for the first day of each Julian month. It begins on 1 October 1275 CE, which is accurately marked as 9 Tishri, and runs up to 1 September 1294 CE = 8 Elul 5054 JE, the year in which Robert of Leicester wrote his *De compoto Hebreorum*.[24] Although parts of Levi ben Gerson's astronomical *oeuvre* were translated into Latin within his own lifetime, this particular calendrical table was not among them.[25] What looks like a continuation of it is found among the very extensive set of calendrical and astronomical tables included in the *Yesod olam*, which was written by Levi's contemporary Isaac Israeli in Toledo in 1310. The starting point here is 1 October 1294 CE = 9 Tishri 5055 JE, from where it runs up to 1 September 1313 CE = 9 Elul 5073. Isaac also drew up a reversed version of the same table, which offered Julian dates corresponding to the first day of each Jewish month, starting with 1 Tishri 5055 JE = 23 September 1294 CE and

21 This line is omitted from the table in MS Vienna, ÖNB, 5309, fol. 130^{vb}.

22 MS Paris, BnF, lat. 7293A, fol. 50^{r}: "Ergo addas annos Christi 1273 cum predicto numero in quibus fuerunt cicli 67 perfecti, habebis quod Anno Domini 1275 fuerunt 21 die Septembris in litteram E anni 5035, in quibus sunt cicli lunares 265 a principio seculi. Et isti cicli vel anni Iudeorum sunt perfecti, anni autem Christi imperfecti."

23 Ibid., fol. 50^{v}.

24 Bernard R. Goldstein, *The Astronomical Tables of Levi ben Gerson* (Hamden, CN: Archon Books, 1974), 104–105, 168.

25 Ibid., 79–80. See also José Luis Mancha, "The Latin Translation of Levi ben Gerson's *Astronomy*," in *Studies on Gersonides*, ed. Gad Freudenthal (Leiden: Brill, 1992), 21–46.

ending on 1 Elul 5073 JE = 24 August 1313 CE.[26] As in the case of Levi ben Gerson, however, there is no evidence that any of these tables made it into Latin translations.

The situation is different in the case of Abraham Zacut (1452–1515), who was born in Salamanca and authored a set of tables and canons named *ha-Ḥibbur ha-gadol* ("The Great Composition"), finishing it in 1478.[27] While this work was primarily directed at a Jewish audience, a paraphrase of the *Ḥibbur*, known as the *Almanach Perpetuum*, was printed in 1496 in the Portuguese town of Leiria, in both Castilian and Latin editions. Given the different target audience, the Jewish calendrical material contained in the original *Ḥibbur* was omitted from the *Almanach Perpetuum* and partly replaced with material pertaining to the Christian liturgical calendar. In addition, however, there exists a separate Castilian translation of Zacut's explanatory canons, which was produced in 1481 by Juan de Salaya, a one-time a professor of astronomy at the University of Salamanca (1464–1469) who claimed to have been assisted in his translation by Zacut himself.[28] Moreover, Latin versions of the original *Ḥibbur*'s tables survive in at least three manuscripts, one of which (MS Madrid, Real Academia de la Historia, Heb. 14, fols. 1^{r}–116^{r}) retains all the tables for the Jewish calendar. These include a table listing the corresponding Julian date for the beginning of the Jewish month for a complete 19-year cycle, which is structurally identical to the 'reverse table' found in the *Yesod olam*, mentioned previously. The table itself does not indicate the range of years for which it is valid, but the Madrilene MS identifies its *radix* or starting year as 5226 JE = 1465/66 CE. This is correct for the first date (1 Tishri on 21 September in year 1), but other years in the table show slight deviations.[29] Towards the end of the collection, there is an

26 Isaac Israeli, *Liber Jesod Olam seu Fundamentum Mundi*, ed. B. Goldberg and L. Rosenkranz, 2 vols. (Berlin: Sumtibus Editorum, 1846–1848), 1:17, 30 (tables XIII and XL).

27 See José Chabás and Bernard R. Goldstein, *Astronomy in the Iberian Peninsula: Abraham Zacut and the Transition from Manuscript to Print* (Philadelphia: American Philosophical Society, 2000).

28 This translation was printed in Francisco Cantera Burgos, *El judio salmantino Abraham Zacut* (Madrid: Bemejo, 1931), 97–182. The Jewish calendar is treated at great length in ch. 18, ibid., 171–180. A modern Spanish translation of the original Hebrew is provided ibid., 286–303.

29 Chabás and Goldstein, *Astronomy*, 58. This table was supplemented by one for determining the dates of the movable feast days of the Christian liturgical year. See ibid., 58–59. A more sophisticated table for conversion from Jewish to Julian dates, based on a 76-year period and likely to have been drawn up by Zacut, is described and edited in Bernard R. Goldstein, "A Table of New Moons from 1501 to 1577 in a Hebrew Fragment Preserved in the John Rylands Library," *Aleph* 13 (2013): 11–26.

extensive set of tables for the Jewish *molad* reckoning. Among these is a table that converts numbers of cycles, years, and months into equivalent sums of days. It is followed by a group of three tables that list the value of the first *molad* for cycles from 1 to 320, for years within the cycle from 1 to 19, and for months from 1 to 12. Next, there are three supplementary tables for days, hours, and parts that map out in great detail the cyclical recurrence of the same *molad* values after 772 cycles and 20 lunations (see p. 98 above).[30]

In the Madrilene MS, the set is completed by two further tables for the *tekufot* of Samuel and Rav Ada (fol. 115^{r}) and a large table of year types or *kevi̇yyot*, which takes up two facing pages (fols. 115^{v}–116^{r}). This latter table is particularly noteworthy for containing a 'perpetual' calendar, which allowed its user to find the three letters that define the 'character' of a particular year (the initial weekday of Tishri, the length of the year—defective, regular, or perfect—, and the initial weekday of Nisan) for each of the 61 possible types of 19-year cycle in the fixed Jewish calendar. To each of these 61 cycles, the table assigns a lower and an upper limit of the time of the *molad* Tishri in the first year. Each *molad* Tishri that falls within these limits will always be followed by the exact same sequence of year types.[31] A table of precisely this format is also described in a report on the correction of the calendar that was drawn up in 1515 by a group of anonymous experts from the University of the Salamanca, who responded to a request made by Pope Leo X and King Ferdinand II in the context of the Fifth Lateran Council (1512–1517).[32] After discussing various ways of reforming the ecclesiastical calendar, they close their report with an appendix dedicated to the Jewish calendar, which consists of a series of canons or operational instructions for a set of tables that has not been preserved.[33] In justification of this appendix, the authors state:

> Yet if those find acceptance, who, troubled by the intricate difficulty of Easter computation, want the purity of this paschal observance to be governed by the method of the Arabic calendar, why should not [the

30 Chabás and Goldstein, *Astronomy*, 76–80.

31 Ibid., 80–81. A table of this type is printed in Burnaby, *Elements*, 294–295, and explained in detail ibid., 154–174. See also table VI in Isaac Israeli, *Liber Jesod Olam*, ed. Goldberg and Rosenkranz, 1:9–10.

32 MS Salamanca, BGH, 97, fols. 11^{r}–35^{v}. A facsimile of this manuscript can be found at the end of Ana María Carabias Torres, *Salamanca y la medida del tiempo* (Salamanca: Ediciones Universidad de Salamanca, 2012). The report is also preserved in MSS Vatican City, BAV, lat. 7049, fols. 10^{r}–31^{v}.

33 For an edition of these passages, see Carabias Torres, *Salamanca*, 309–316.

> Jewish calendar] find even greater favour (as we hope), given that the reason for this ecclesiastical custom goes back to the observance of the Jews, from which it is known to have first originated?[34]

The introduction to the Jewish calendar that follows these words is based around five different tables, the first of which is described as a 19-year cycle that correlates the beginnings of the Jewish months with dates in the Julian calendar.[35] As an example, the author refers to 1 Nisan in the *annus praesens* 1515 CE, which was the 12th year of the Jewish cycle. For this date, the table is said to signal 15 March, but the correct date for 1515 should have been 17 March. This raises the suspicion that the table was strictly valid only for an earlier 19-year cycle. An answer is provided by the second table mentioned (*Numerus revolutionum lunarium*), which lists the exact value of the first *molad* of 40 consecutive 19-year cycles, from the 277th cycle since creation to the 316th cycle. To this are joined a table for expanded years within the cycle (*Anni expansi*) and a table for months (*Superactio mensium*). According to the standard way of counting, the 277th cycle since creation began with the year 5245 JE = 1484/85 CE, but the opening section of the present text clearly states that the 277th 'revolution' of the cycle, "which supplies the present computation with its beginning, takes its start from the 1466th year of Christ, which the Hebrews imagine to be the 5226th since the origin of the world."[36] It thus appears that the tables described in this text were really founded on the 276th decemnoval cycle, whose starting point of 5226 JE = 1465/66 was

34 Ibid., 309: "Sin illi probantur, qui Ecclesiasticae computationis scrupulosa difficultate vexati, huius Paschalis observantiae sinceritatem ex Arabici calculi ratione dirigendam esse voluerunt, cur non haec potius placitura speremus, ubi ratio Ecclesiastici cultus ad ipsam Judaicae observationis remittitur originem, unde primum noscitur defluxisse?"

35 Ibid., 311: "Ex tabella cuius titulus est *Tabula ad scribendum Hebraicorum mensium* computatio ad nostri calculi rationem dirigetur, si cuiusvis anni propositi aureus numerus Ecclesiasticae usitatae computationis ternario descrescat … In quadrato igitur aut tessellula communi, qui praefati aurei numeri Judaici sedem in prima ad sinistram lineam designatam et propositum mensem in supremo tabulae fronte obtuetur, dies nostrae computationis occuret, a quo sumendum est propositi Judaici mensis initium."

36 MS Salamanca, BGH, 97, fol. 31r–v: "Judaica computatio omnem temporis decursum ab ipsa mundi constitutione in decemnovenales revolutiones partitur, quarum ducentesima septuagesima septima, quae initium praebet praesenti computationi, ab anno Christi millesimo quadringentesimo sexagesima sexta initium accepit, quem Hebrei ab origine mundi ducentesimum vigesimum sextum supra quintum millesimum esse arbitrantur." The rendering of this part of the text in Carabias Torres, *Salamanca*, 309–310, is slightly defective.

identical to that used in the conversion table in the Madrilene MS of Zacut's *Ḥibbur*-tables. The 12th year of this 276th cycle (i.e. 5237 JE = 1476/77 CE) had 1 Nisan fall on 15 March, exactly as mentioned in the example. In order to get correct results for earlier or later cycles, however, this conversion table had to be corrected with the help of tables 2–4 as well as with a fifth table, which is expressly said to "fill up an entire page" (*quae universam cartam implet*). From the description, it is clear that the latter table listed the 'characters' of the years in 61 lines, using a layout that corresponded exactly to that of the 'perpetual' table in Abraham Zacut's *Ḥibbur*.[37] It is thus very likely that the Salmantinian astronomers had a Latin version or adaptation of Zacut's tables at their disposal when they reported to the pope in 1515.[38]

A final text worth mentioning is an anonymous note on Jewish lunisolar computation, preserved in a single manuscript, which was copied in Venice in 1494 by a certain *magister Nicolaus de Ripis*, a member of the Dominican order.[39] The text is preceded by a paraphrasing commentary on the thirteenth-century *Computus metricus manualis* of Anianus, attributed to the Danish astronomer Peter Nightingale (Petrus de Dacia, fl. 1292–1303). Together with the aforementioned note, the commentary was edited by Fritz S. Pedersen on two occasions, in 1979 and 1983. The section on the Jewish calendar, which

37 Carabias Torres, *Salamanca*, 312–313: "Ac postremo quarta, cuius prima inscriptio est *Unus terminorum*, quae ad unum usque et 60 procedit. … Statuatur quarto vero tabella quae universam cartam implet: a sinistris quidem terminos conjunctionum cum diebus, horis ac minutis qui illos comittantur; in fronte vero decemnovenalem numerum Hebraicae computationis; sparsim autem per ipsum tabellae corpus notas designatinesque annorum continet, quibus intelligatur tamen anni conditio quae per mediam notam explicatur, et est semper figura quaedam elementaris: I, C, S aut M; ut C annum communem seu aequalem et regularem denotet, S superfluum, M diminutum. Prima autem atque ultima sunt notae numerorum ab uno ad septem, ferias initiales primi et septimi aut nonnumquam etiam octavi menses, id est Thisiri et Nisam, exprimentes. Exempli gratia, si in quadrato aliquo sic inveniatur insertum: 2 M 3, denotatur quod in anno quaesito primus dies mensis primi, id est Thisiri, sit feria secunda, et primus item dies mensis septimi aut octavi, id est Nisan, sit feria tertia; media autem nota, quae est figura elementaris, scilicet M, innuit annum propositum esse diminutum. Harum igitur tabellarum ope, si quidem in ea ratione quam praecedens canon ostendit peccatum sit, ex sequente mox canone et deprehendetur et emendabitur quam facillime."

38 For another example of the Jewish calendar being studied at the University of Salamanca, this time from ca. 1468, see Nothaft, "Reforming the Calendar," 537–543.

39 MS Venice, Biblioteca Nazionale Marciana, VIII.18 (= 3573), fol. XIv. See Pietro Zoranello, *Catalogo dei codici latini della Biblioteca Nazionale Marciana di Venezia non compresi nel catalogo di G. Valentinelli*, 3 vols. (Trezzano sul Naviglio: Etimar, 1980–1985), 1:305.

follows on the verso side of the final, unnumbered, leaf of this commentary, may have been still composed in Peter's lifetime, because it mentions the conjunctions of January and February in 1300 as if they had only recently occurred, yet the pair of *molad* dates given (Friday, 11 January, 17h 807p, and Sunday, 10 February, 6h 520p) matches neither 1300 CE nor any other year in the vicinity. Moreover, both conjunctions are said to be featured "in the present table included above" (*ut in praesenti tabula continetur superius*), but no such table is found in the manuscript. The remaining contents of the note are straightforward: the author starts by establishing the fact that the Jewish day begins with sunset, using the biblical phrase "and there was evening and morning, one day" (Genesis 1:5). This is then followed by a brief explanation of the *molad* reckoning, which makes use of a mnemonic verse reminiscent of those employed in the fourteenth-century *Computus Judaicus* (see Chapter Five above): *Vicenas nonas luces horas duodenas/ Cum septingentis punctis nonaginta tribusque/ Continet quaeque mensis lunationis/ quaeque hora ex mille punctis et octoginta* ("29 lights of day, 12 hours/ with 700 points and 93/ are contained in any lunation of the month/ every hour consisting of 1000 points and 80").[40]

40 The complete text of the note can be found in Petrus Philomena de Dacia, *A Mediaeval Commentary on Time-Reckoning: Computus metricus manualis cum commento Petri de Dacia*, ed. Fritz S. Pedersen (Odense: Universitet, 1979), 33, and in Petrus Philomena de Dacia, *Opera quadrivialia*, ed. Pedersen, 1:550–551.

Plates

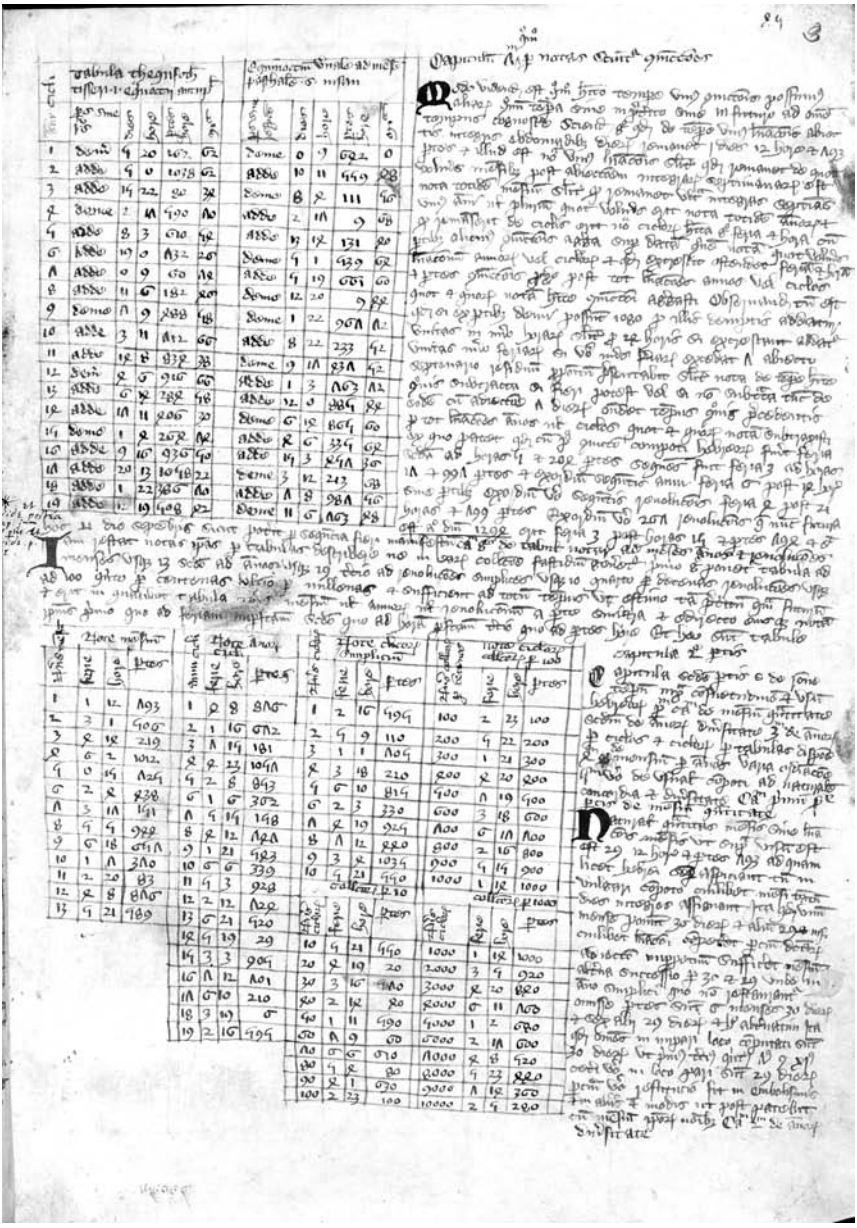

PLATE 1 *MS Oxford, Bodleian Library, Digby 212, fol. 3r (Robert of Leicester, De compoto Hebreorum, tables 2 and 3). Courtesy of Bodleian Library, Oxford.*

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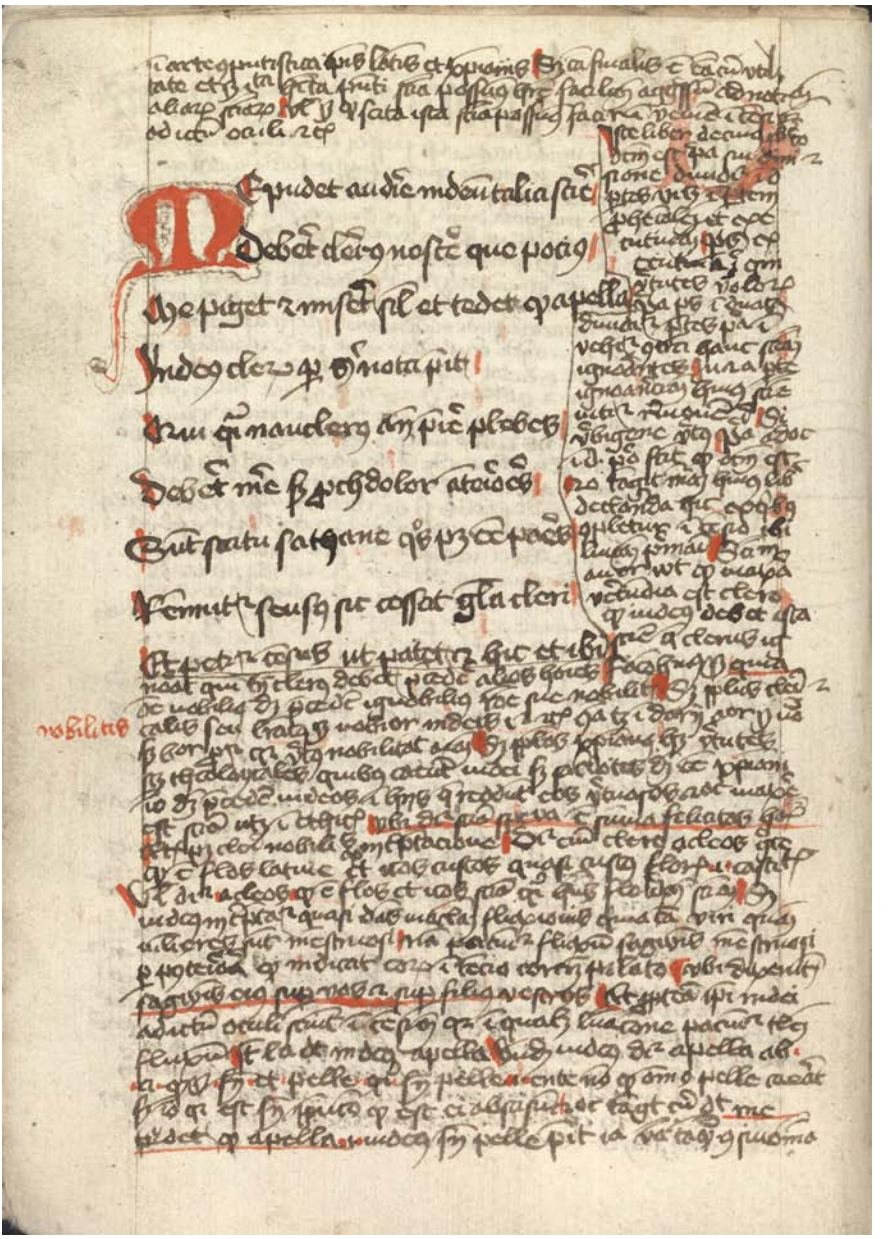

PLATE 2 *MS Uppsala, Universitetsbibliotek, C 655, fol. 14ᵛ (Computus Judaicus, metrical prologue and commentary). Courtesy of Universitetsbibliotek, Uppsala.*

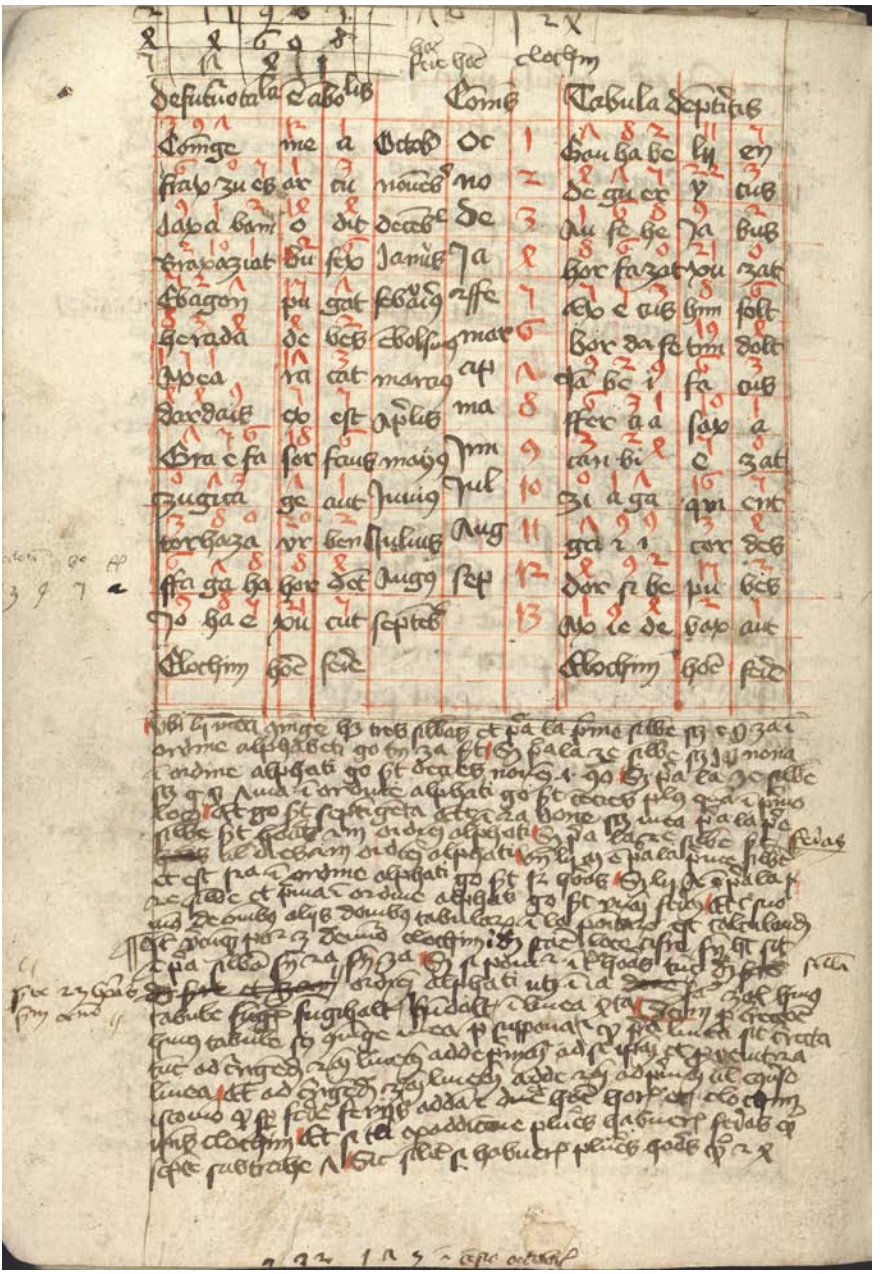

PLATE 3 *MS Uppsala, Universitetsbibliotek, C 655, fol. 20ᵛ (Computus Judaicus, table of months). Courtesy of Universitetsbibliotek, Uppsala.*

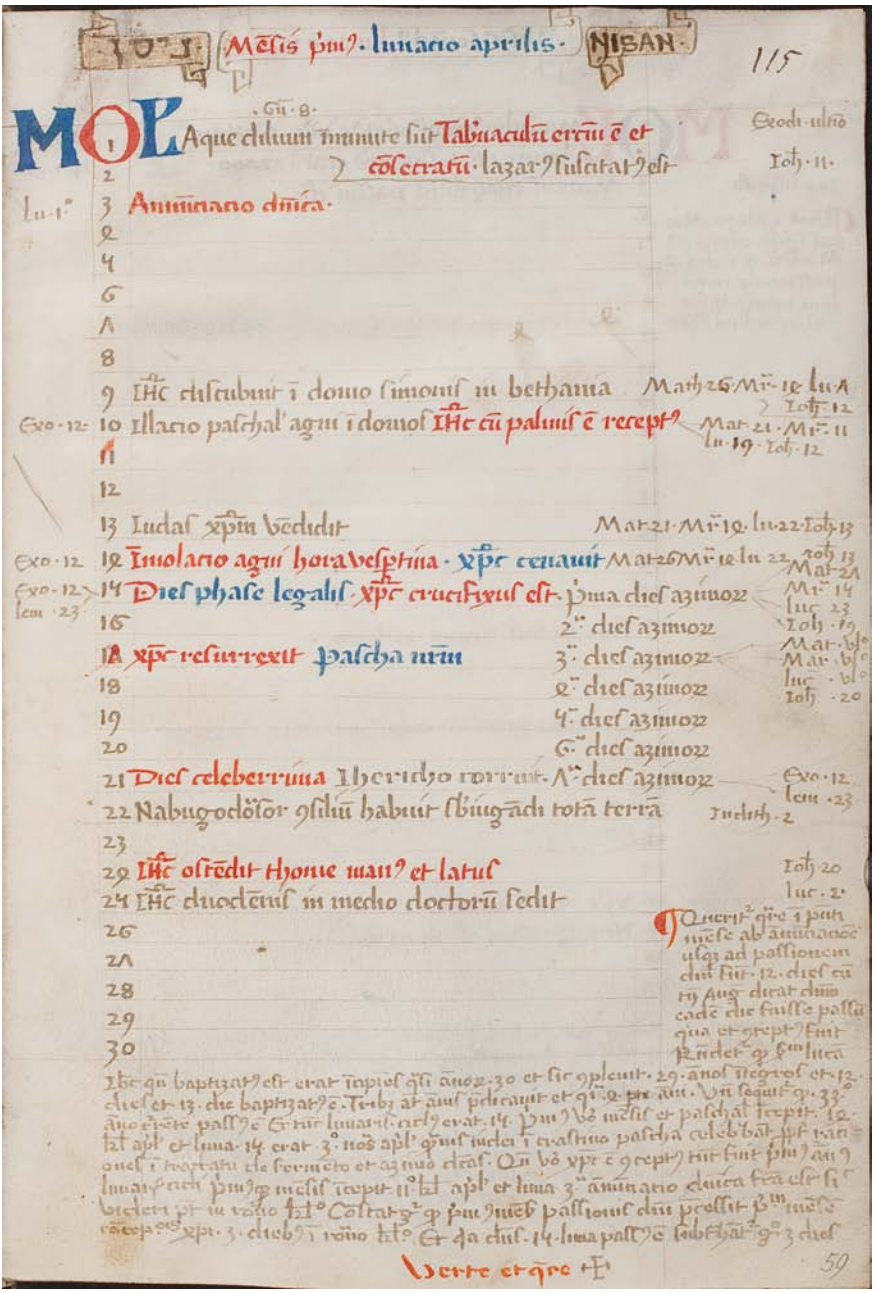

PLATE 4 *MS Wolfenbüttel, Herzog-August-Bibliothek, Cod. Guelf. 206.1 Gud. lat., p. 115 (Hermann Zoest, Calendarium Hebraicum novum, calendar page for Nisan). Courtesy of Herzog-August-Bibliothek, Wolfenbüttel.*

Bibliography

A Catalogue of the Harleian Manuscripts in the British Museum. 4 vols. London: Eyre and Strahan, 1808–1812.

Abraham bar Ḥiyya. *Sefer ha-Ibbur* [On the Mathematical and Technical Chronology of the Hebrews, Nazarites, Mahommetans etc.]. Edited by Herschell Filipowski. London: Longman, Brown, Green, and Longmans, 1851.

Abraham Ibn Ezra. *The Sabbath Epistle* (*'iggeret haShabbat*). Translated and annotated by Mordechai S. Goodman. Jersey City, NJ: Ktav, 2009.

———. *Sefer Ha'ibbur: A Treatise on the Calendar*. Translated and annotated by Mordechai S. Goodman. Jersey City, NJ: Ktav, 2011.

Abulafia, Anna Sapir. "The Ideology of Reform and Changing Ideas Concerning Jews in the Works of Rupert of Deutz and Hermannus quondam Iudeus." *Jewish History* 7 (1993): 3–23.

———. *Christians and Jews in the Twelfth-Century Renaissance*. London: Routledge, 1995.

———. *Christians and Jews in Dispute: Disputational Literature and the Rise of Anti-Judaism in the West* (*c. 1000–1150*). Aldershot: Ashgate, 1998.

———. *Christian-Jewish Relations 1000–1300: Jews in the Service of Christendom*. Harlow: Longman/Pearson, 2011.

———. "The Bible in Jewish-Christian Dialogue." In *The New Cambridge History of the Bible*. Vol. 2, *From 600 to 1450*, edited by Richard Marsden and E. Ann Matter, 616–637. Cambridge: Cambridge University Press, 2012.

Abū Ma'shar. *On Historical Astrology: The Book of Religions and Dynasties* (*On the Great Conjunctions*). Edited by Keiji Yamamoto and Charles Burnett. 2 vols. Islamic Philosophy, Theology, and Science 33–34. Leiden: Brill, 2000.

Alberic of Trois-Fontaines. "Chronica." Edited by Paul Scheffer-Boichorst. In *MGH Scriptores*, vol. 23, edited by Georg Heinrich Pertz, 631–950. Hannover: Hahn, 1874.

Albertus Magnus. *Opera Omnia*. Edited by Auguste Borgnet. 38 vols. Paris: Vivès, 1890–1899.

———. *Super Dionysii Mysticam Theologiam et Epistulas*. Edited by Paulus Simon. Alberti Magni Opera Omnia 37.2. Münster: Aschendorff, 1978.

al-Bīrūnī. *The Chronology of Ancient Nations*. Translated by C. Edward Sachau. London: Allen, 1879.

Albohali, Arabis astrologi antiquissimi ac clarissimi, De iudiciis nativitatum liber unus, antehac non editus. Edited by Johannes Schöner and Joachim Heller. Nuremberg: Berg & Neuber, 1546 [^{2}1549].

Alexander, J.J.G., and Elżbieta Temple. *Illuminated Manuscripts in Oxford College Libraries, the University Archives and the Taylor Institution*. Oxford: Oxford University Press, 1985.

al-Farghānī. *Il "Libro dell'aggregazione delle stelle"* (*Dante*, Convivio, *II, vi-134*) *secondo il codice Mediceo-Laurenziano, Pl. 29, cod. 9 contemporaneo a Dante*. Edited by Romeo Campani. Collezione di opuscoli Danteschi inediti o rari 87–90. Città di Castello: Lapi, 1910.

Alfonsi, Petrus. *Dialogue against the Jews*. Translated by Irven M. Resnick. The Fathers of the Church: Mediaeval Continuation 8. Washington: The Catholic University of America Press, 2006.

Allard, André. "The Arabic Origins and Development of Latin Algorisms in the Twelfth Century." *Arabic Sciences and Philosophy* 1 (1991): 233–283.

———. *Muhammad Ibn Mūsā al-Khwārizmī: Le calcul indien* (*Algorismus*). Paris: Blanchard, 1992.

al-Qabīṣī (Alcabitius). *The Introduction to Astrology*. Edited by Charles Burnett, Keiji Yamamoto, and Michio Yano. Warburg Institute Studies and Texts 2. London: The Warburg Institute, 2004.

Altaner, Berthold. "Die fremdsprachliche Ausbildung der Dominikanermissionare während des 13. und 14. Jahrhunderts." *Zeitschrift für Missionswissenschaft* 23 (1933): 233–241.

———. "Die Durchführung des Vienner Konzilsbeschlusses über die Errichtung von Lehrstühlen für orientalische Sprachen." *Zeitschrift für Kirchengeschichte*, 3rd Ser., 52 (1933): 226–236.

———. "Raymundus Lullus und der Sprachkanon (can. 11) des Konzils von Vienne (1312)." *Historisches Jahrbuch* 53 (1933): 190–219.

———. "Zur Kenntnis des Hebräischen im Mittelalter." *Biblische Zeitschrift* 21 (1933): 288–308.

Andersson-Schmitt, Margarete, and Monica Hedlund. *Mittelalterliche Handschriften Universitätsbibliothek Uppsala: Katalog über die C-Sammlung*. Vol. 6, *C 551–935*. Acta Bibliothecae R. Universitatis Upsaliensis 26.6. Stockholm: Almqvist & Wiksell, 1993.

Anheim, Étienne, Benoît Grévin, and Martin Morard. "Exégèse judéo-chrétienne, magie et linguistique: un recueil de *Notes* inédites attribuées à Roger Bacon." *Archives d'histoire doctrinale et littéraire du Moyen Âge* 68 (2001): 95–154.

Arduini, Maria Lodovica. *Ruperto di Deutz e la controversia tra Cristiani ed Ebrei nel secolo XII*, Studi storici 119–121. Rome: Istituto storico italiano per il medio evo, 1979.

———. *Neue Studien Über Rupert von Deutz*. Siegburger Studien 17. Siegburg: Respublica-Verlag, 1985.

Aristotle. *Ethica Nicomachea*. Edited by René Antoine Gauthier. Aristoteles Latinus 26.1–3. Leiden: Brill, 1972.

———. *De sophisticis elenchis*. Edited by Bernard G. Dod. Aristoteles Latinus 6.1–3. Leiden: Brill, 1975.

Aschbach, Joseph. *Geschichte der Wiener Universität im ersten Jahrhunderte ihres Beste-*

hens: Festschrift zu ihrer fünfhundertjährigen Gründungsfeier. Vienna: Verlag der K.K. Universität, 1865.

Ashenden [Eschuid], John. *Summa astrologiae iudicialis de accidentibus mundi*. Venice: Santritter, 1489.

Averroes. *Commentarium magnum in Aristotelis De anima libros*. Edited by F. Stuart Crawford. Corpus Commentariorum Averrois in Aristotelem 6.1. Cambridge, MA: The Mediaeval Academy of America, 1953.

Avvakumov, Georgij. *Die Entstehung des Unionsgedankens: Die lateinische Theologie des Hochmittelalters in der Auseinandersetzung mit dem Ritus der Ostkirche*. Veröffentlichungen des Grabmann-Institutes 47. Berlin: Akademie Verlag, 2002.

Backus, Irena. "John of Damascus, *De fide orthodoxa*: Translations by Burgundio (1153/4), Grosseteste (1235/40) and Lefèvre d'Etaples (1507)." *Journal of the Warburg and Courtauld Institutes* 49 (1986): 211–217.

Bacon, Roger. *Opera quaedam hactenus inedita*. Vol. 1. Edited by John Sherren Brewer. Rerum Britannicarum Medii Aevi Scriptores (Rolls Series) 15. London: Longman, Green, Longman, and Roberts, 1859.

———. *Opus tertium*. In *Opera quaedam hactenus inedita*, 3–310.

———. *Opus minus*. In *Opera quaedam hactenus inedita*, 313–389.

———. *Compendium studii philosophiae*. In *Opera quaedam hactenus inedita*, 393–519.

———. *Opus majus*. Edited by John Henry Bridges. 3 vols. Oxford: Clarendon Press, 1897–1900.

———. *Communia Naturalium, liber secundus: De celestibus*. Edited by Robert Steele. Opera hactenus inedita Rogeri Baconi 4. Oxford: Clarendon Press, 1913.

Bałaban, Majer. *Historja Żydów w Krakowie i na Kazimierzu, 1304–1868*. 2 vols. Kraków: "Nadzieja" Towarzystwo ku Wspieraniu Chorej Młodzieży Żydowskiej Szkół Średnich i Wyższych w Krakowie, 1931–1936.

Bale, John. *Scriptorum Illustrium maioris Brytanniae, quam nunc Angliam et Scotiam vocant: Catalogus*. 2 vols. Basel: Oporinus, 1557–1559.

———. *Index Britannae Scriptorum*. Edited by Reginald Lane Poole and Mary Bateson. Oxford: Clarendon Press, 1902.

Barefield, Laura. "Lineage and Womens Patronage: Mary of Woodstock and Nicholas Trevet's *Les Cronicles*." *Medieval Feminist Forum* 35 (2003): 21–30.

Barker-Benfield, B.C. *St. Augustine's Abbey, Canterbury*. 3 vols. Corpus of British Medieval Library Catalogues 13. London: The British Library, 2008.

Baron, Salo W. *A Social and Religious History of the Jews*. 2nd ed. 18 vols. New York: Columbia University Press, 1952–1983.

Barrow, Julia. "A Twelfth-Century Bishop and Literary Patron: William de Vere." *Viator* 18 (1987): 175–189.

Baumgarten, Elisheva. "'Remember that Glorious Girl': Jephtah's Daughter in Medieval Jewish Culture." *Jewish Quarterly Review* 97 (2007): 180–209.

———. *Practicing Piety: Men, Women and Everyday Observance in the Jewish Communities of Medieval Northern Europe*. Philadelphia: University of Pennsylvania Press, forthcoming.

Baur, Ludwig. *Die philosophischen Werke des Robert Grosseteste, Bischofs von Lincoln*. Beiträge zur Geschichte der Philosophie des Mittelalters: Texte und Untersuchungen 9. Münster: Aschendorff, 1912.

Beaujouan, Guy. "The Transformation of the Quadrivium." In *Renaissance and Renewal in the Twelfth Century*, edited by Robert L. Benson and Giles Constable, 463–487. Cambridge, MA: Harvard University Press, 1982.

Beckwith, Roger T. *Calendar, Chronology, and Worship: Studies in Ancient Judaism and Early Christianity*. Arbeiten zur Geschichte des antiken Judentums und des Urchristentums 61. Leiden: Brill, 2005.

Beit-Arié, Malachi. "The Valmadonna Pentateuch and the Problem of Pre-Expulsion Anglo-Hebrew Manuscripts—MS London, Valmadonna Trust Library 1: England [?], 1189." In *The Makings of the Medieval Hebrew Book: Studies in Palaeography and Codicology*, 129–151. Jerusalem: Magnes Press, 1993.

Beltrán, Evencio, and Gilbert Dahan. "Un Hébraïsant à Paris vers 1400: Jacques Legrand." *Archives juives* 17 (1981): 41–49.

Ben-Dov, Jonathan, and Stéphane Saulnier. "Qumran Calendars: A Survey of Scholarship 1980–2007." *Currents in Biblical Scholarship* 7 (2008): 124–168.

Benjamin, Francis S., Jr., and G.J. Toomer. *Campanus of Novara and Medieval Planetary Theory*: Theorica planetarum. Madison: The University of Wisconsin Press, 1971.

Berger, David. "Mission to the Jews and Jewish-Christian Contacts in the Polemical Literature of the High Middle Ages." *American Historical Review* 91 (1986): 576–591.

Berger, Harald. "Ein bemerkenswerter spätmittelalterlicher Codex zur Philosophie, Astronomie und Medizin: Mainz, Stadtbibliothek, HS I 613." *Traditio* 62 (2007): 237–258.

Berger, Samuel. *Quam notitiam linguae Hebraicae habuerint Christiani medii aevi in Gallia*. Paris: Hachette, 1893.

Berndt, Rainer. *André de Saint-Victor (†1175): Exégète et théologien*. Bibliotheca Victorina 2. Paris: Brepols, 1991.

———. "La pratique exégétique d'André de Saint-Victor: tradition Victorine et influence rabbinique." In *L'Abbaye parisienne de Saint-Victor au Moyen Âge: Communications présentées au XIIIe Colloque d'humanisme médiéval de Paris (1986–1988)*, edited by Jean Longère, 271–290. Bibliotheca Victorina 1. Paris: Brepols, 1991.

Berthier, André. "Un maître orientaliste du XIIIe siècle: Raymond Martin, O.P." *Archivum Fratrum Praedicatorum* 6 (1936): 267–311.

Bezzel, Irmgard. "Joachim Heller (ca. 1520–1580) als Drucker in Nürnberg und Eisleben." *Archiv für Geschichte des Buchwesens* 37 (1992): 295–330.

Biller, Peter. "A 'Scientific' View of Jews from Paris around 1300." *Micrologus* 9 (2001): 137–168.

Binski, Paul, and Patrick Zutshi. *Western Illuminated Manuscripts: A Catalogue of the Collection in Cambridge University Library*. Cambridge: Cambridge University Press, 2011.

Bischoff, Bernhard. "Ostertagtexte und Intervalltafeln." *Historisches Jahrbuch* 60 (1940): 549–580.

———. *Katalog der festländischen Handschriften des neunten Jahrhunderts* (*mit Ausnahme der wisigotischen*). Vol. 1, *Aachen–Lambach*. Wiesbaden: Harrassowitz, 1998.

Björnbo, Axel Anton. *Die mathematischen S. Marcohandschriften in Florenz*. 2nd ed. Edited by Gian Carlo Garfagnini. Pisa: Domus Galilaeana, 1976.

Blackburn, Bonnie J., and Leofranc Holford-Strevens. *The Oxford Companion to the Year: An Exploration of Calendar Customs and Time-Reckoning*. Oxford: Oxford University Press, 1999.

Blaschka, Anton. "Die Gothaer Handschrift X des Speculum stultorum verglichen mit der Breslauer Handschrift T." *Wissenschaftliche Zeitschrift der Martin-Luther-Universität Halle-Wittenberg* 8 (1958/59): 989–1001.

Blatt, Franz. *The Latin Josephus I: Introduction and Text; The Antiquities: Books I–V*. Acta Jutlandica: Aarsskrift for Aarhus Universitet 30.1. Copenhagen: Munksgaard, 1958.

Bodemann, Ulrike, and Hartmut Bleumer. "Die 'Flores grammaticae' Ludolfs de Luco." In *Schulliteratur im späten Mittelalter*, edited by Klaus Grubmüller, 281–301. Münstersche Mittelalterschriften 69. Munich: Fink, 2000.

Boethius. *De consolatione philosophie*. Edited by Claudio Moreschini. Munich: Saur, 2000.

Boncompagni, Baldassarre. "Intorno ad un tratatto d'arithmetica stampato nel 1478." *Atti dell'Accademia Pontificia de' Nuovi Lincei* 16 (1862–1863): 1–64, 101–228, 301–364, 389–452, 503–630, 683–842, 909–1044.

Borst, Arno. *Die karolingische Kalenderreform*. MGH Schriften 46. Hannover: Hahn, 1998.

———. *Der karolingische Reichskalender und seine Überlieferung bis ins 12. Jahrhundert*. 3 vols. MGH Antiquitates 3/Libri memoriales 2. Hannover: Hahn, 2001.

———. *Schriften zur Komputistik im Frankenreich von 721 bis 818*. 3 vols. MGH Quellen zur Geistesgeschichte des Mittelalters 21. Hannover: Hahn, 2006.

Botte, Bernard. *Les origines de la Noël et de l'Épiphanie: étude historique*. Textes et études liturgiques 1. Louvain: Abbaye du Mont César, 1932.

Boudet, Jean-Patrice. "Un prélat et son équipe de travail à la fin du Moyen Âge: remarques sur l'oeuvre scientifique de Pierre d'Ailly." In *Humanisme et culture géographique à l'époque du Concile de Constance: autour de Guillaume de Fillastre*, edited by Didier Marcotte, 127–150. Terrarum Orbis 3. Turnhout: Brepols, 2002.

Bradshaw, Paul F., and Lawrence A. Hoffman, eds. *Passover and Easter*. 2 vols. Two Liturgical Traditions 5–6. Notre Dame, IN: University of Notre Dame Press, 1999.

Brancato, Dario. "Readers and Interpreters of the *Consolatio* in Italy, 1300–1550." In *A Companion to Boethius in the Middle Ages*, edited by Noel Harold Kaylor, Jr. and Philipp Edward Phillips, 357–411. Brill's Companions to the Christian Tradition 30. Leiden: Brill, 2012.

Brown, Raymond E. *The Death of the Messiah: From Gethsemane to the Grave; A Commentary on the Passion Narratives in the Four Gospels*. 2 vols. New York: Doubleday, 1994.

Bryer, Anthony. "Chronology and Dating." In *The Oxford Handbook of Byzantine Studies*, edited by Elizabeth Jeffreys, John Haldon, and Robin Cormack, 31–37. Oxford: Oxford University Press, 2008.

Buffon, Valeria Andrea. "L'idéal éthique des maîtres des arts de Paris vers 1250." PhD Diss., Université Laval, Quebec, 2007.

Burmeister, Karl Heinz. *Sebastian Münster: Versuch eines biographischen Gesamtbildes*. Basel: Helbig & Lichtenhahn, 1963.

Burnaby, Sherrard Beaumont. *Elements of the Jewish and Muhammadan Calendars*. London: Bell, 1901.

Burnett, Charles. "Catalogue: The Writings of Adelard of Bath and Closely Associated Works, together with the Manuscripts in Which They Occur." In *Adelard of Bath: An English Scientist and Arabist of the Early Twelfth Century*, edited by Charles Burnett, 163–196. Warburg Institute Surveys and Texts 14. London: The Warburg Institute, 1987.

———. "Mathematics and Astronomy in Hereford and Its Region in the Twelfth Century." In *Medieval Art, Architecture and Archaeology at Hereford*, edited by David Whitehead, 50–59. Leeds: British Archaeological Association, 1995.

———. "*Algorismi vel helcep decentior est diligentia*: The Arithmetic of Adelard of Bath and His Circle." In *Mathematische Probleme im Mittelalter: Der lateinische und arabische Sprachbereich*, edited by Menso Folkerts, 221–331. Wolfenbütteler Mittelalter-Studien 10. Wiesbaden: Harrassowitz, 1996.

———. "The Works of Petrus Alfonsi: Questions of Authenticity." *Medium Aevum* 66 (1997): 42–79.

———. "The Coherence of the Arabic-Latin Translation Program in Toledo in the Twelfth Century." *Science in Context* 14 (2001): 249–288.

———. "The Strategy of Revision in the Arabic-Latin Translations from Toledo: The Case of Abū Maʿshar's *On the Great Conjunctions*." In *Les traducteurs au travail: Leurs manuscrits et leurs méthodes*, edited by Jacqueline Hamesse, 51–113. Textes et études du Moyen Âge 18. Turnhout: Brepols, 2002.

———. "Scientific Translations from Arabic: The Question of Revision." In *Science Translated: Latin and Vernacular Translations of Scientific Treatises in Medieval Eu-*

rope, edited by Michèle Goyens, Pieter de Leemans, and An Smets, 11–34. Mediaevalia Lovaniensia, Series 1, Studia 40. Leuven: Leuven University Press, 2008.

Burnett, Stephen G. *Christian Hebraism in the Reformation Era (1500–1660): Authors, Books, and the Transmission of Jewish Learning*. Library of the Written Word 19; The Handpress World 13. Leiden: Brill, 2012.

Bushwick, Nathan. *Understanding the Jewish Calendar*. New York: Moznaim Publishing, 1989.

Calcoen, Roger. *Inventaire des manuscrits scientifiques de la Bibliothèque Royale de Belgique*. 3 vols. Brussels: Bibliothèque Royale, 1965–1975.

Candal, Manuel. "El 'De fermento et azymo' del Ottoboniano Latino 718." In *Mélanges Eugène Tisserant*, 7 vols., 6:289–311. Studi e testi 231–237. Vatican City: Biblioteca Apostolica Vaticana, 1964.

Cantera Burgos, Francisco. *El judio salmantino Abraham Zacut: notas para la historia de la astronomía en la España medieval*. Madrid: Bemejo, 1931.

Canty, Aaron. *Light & Glory: The Transfiguration of Christ in Early Franciscan and Dominican Theology*. Washington, DC: The Catholic University of America Press, 2011.

Carabias Torres, Ana María. *Salamanca y la medida del tiempo*. Colección VIII Centenario 4. Salamanca: Ediciones Universidad de Salamanca, 2012.

Carey, Hilary M. *Courting Disaster: Astrology at the English Court and University in the Later Middle Ages*. Houndmills: Macmillan, 1992.

Carlebach, Elisheva. "Palaces of Time: Illustrations of *Sifre Evronot*." *Images* 2 (2008): 21–44.

———. *Palaces of Time: Jewish Calendar and Culture in Early Modern Europe*. Cambridge, MA: Harvard University Press, 2011.

———. "Water into Blood: Custom, Calendar, and an Unknown Yiddish Book for Women." In *Gender and Jewish History*, edited by Marion A. Kaplan and Deborah Dash Moore, 59–71. Bloomington, IN: Indiana University Press, 2011.

Carmody, Francis J. *Arabic Astronomical and Astrological Sciences in Latin Translation: A Critical Bibliography*. Berkeley, CA: University of California Press, 1956.

Casulleras, Josep. "Las tablas astronómicas de Pedro Alfonso." In *Estudios sobre Pedro Alfonso de Huesca*, edited by María Jesús Lacarra, 349–366. Collección de Estudios Altoaragonenses 41. Huesca: Instituto de Estudios Altoaragonenses, 1996.

Catalogue of Additions to the Manuscripts in the British Museum in the Years 1841–1845. London: Woodfall and Son, 1850.

Catalogue of an Exhibition of Anglo-Jewish Art and History: In Commemoration of the Tercentenary of the Resettlement of the Jews in the British Isles; Held at the Victoria and Albert Museum, London. London: East and West Library, 1956.

Catalogue of the Crawford Library of the Royal Observatory, Edinburgh. Edinburgh: Her Majesty's Government, 1890.

Catto, J.I. "Theology and Theologians 1220–1320." In *The History of the University of Oxford*, vol. 1, *The Early Oxford Schools*, ed. J.I. Catto, 471–517. Oxford: Clarendon Press, 1984.

Chabás, José, and Bernard R. Goldstein. *Astronomy in the Iberian Peninsula: Abraham Zacut and the Transition from Manuscript to Print*. Transactions of the American Philosophical Society 90.2. Philadelphia, PA: American Philosophical Society, 2000.

———. *A Survey of European Astronomical Tables in the Late Middle Ages*. Time, Astronomy, and Calendars: Texts and Studies 2. Leiden: Brill, 2012.

Chadwick, Henry. *East and West: The Making of a Rift in the Church; From Apostolic Times until the Council of Florence*. Oxford: Oxford University Press, 2003.

Chazan, Robert. "The Condemnation of the Talmud Reconsidered (1239–1248)." *Proceedings of the American Academy for Jewish Research* 55 (1988): 11–30.

———. *Daggers of Faith: Thirteenth-Century Christian Missionizing and Jewish Response*. Berkeley, CA: University of California Press, 1989.

———. *Barcelona and Beyond: The Disputation of 1263 and Its Aftermath*. Berkeley, CA: University of California Press, 1992.

———. *The Jews of Medieval Western Christendom, 1000–1500*. Cambridge: Cambridge University Press, 2006.

———. *Reassessing Jewish Life in Medieval Europe*. Cambridge: Cambridge University Press, 2010.

Christmann, Jacob. *Muhamedis Alfragani Arabis chronologica et astronomica elementa, e Palatinae bibliothecae veteris libris versa, expleta, & scholiis exposita*. Frankfurt: Wechel, 1590.

———. *Disputatio de anno, mense et die passionis Dominicae: In qua calendarium Hebraeorum iuxta propria canones confirmatur, & solemnitates mensium paschatumque universae ad veras epochas restituuntur*. Frankfurt: Wechel, 1593.

Cochrane, Louise. *Adelard of Bath: The First English Scientist*. London: British Museum Press, 1994.

Cohen, Jeremy. *The Friars and the Jews: The Evolution of Medieval Anti-Judaism*. Ithaca, NY: Cornell University Press, 1982.

———. "The Jews as the Killers of Christ in the Latin Tradition, from Augustine to the Friars." *Traditio* 39 (1983): 1–27.

———. "Scholarship and Intolerance in the Medieval Academy: The Study and Evaluation of Judaism in European Christendom." *American Historical Review* 91 (1986): 592–613.

———. *Living Letters of the Law: Ideas of the Jew in Medieval Christianity*. Berkeley, CA: University of California Press, 1999.

Comings, Jill Burnett. *Aspects of the Liturgical Year in Cappadocia (325–430)*. Patristic Studies 7. New York: Lang, 2005.

Computus Nurembergensis perutilis clerico cum figuris textum pulcerrime declarantibus. Leipzig: Gregor Boettiger, 1494.

Contreni, John J. "Counting, Calendars, and Cosmology: Numeracy in the Early Middle Ages." In *Word, Image, Number: Communication in the Middle Ages*, edited by John J. Contreni and Santa Casciani, 43–83. Micrologus' Library 8. Florence: SISMEL, 2002.

———. "Bede's Scientific Works in the Carolingian Age." In *Bède le Vénérable: entre tradition et postérité*, edited by Stéphane Lebecq, Michel Perrin, and Olivier Szerwiniack, 247–259. Collection "Histoire de l'Europe du Nord-Ouest" 34. Lille: Ceges—Université Charles de Gaulle, 2005.

Conybeare, Frederick C. "Ananias of Shirak (A.D. 600–650 c.), II: His Tract on Easter." *Byzantinische Zeitschrift* 6 (1897): 574–584.

Cordoliani, Alfred. "Abbon de Fleury, Hériger de Lobbes et Gerland de Besançon sur l'ère de l'incarnation de Denys le Petit." *Revue d'histoire ecclésiastique* 44 (1949): 463–487.

———. "Les manuscrits de comput des bibliothèques d'Utrecht." *Scriptorium* 15 (1961): 76–85.

———. "L'activité computistique de Robert, évêque de Hereford." In *Mélanges offerts à Réné Crozet*, edited by Pierre Gallais and Yves-Jean Riou, 2 vols., 1:333–340. Poitiers: Société d'études médiévales, 1966.

Corssen, Peter. *Monarchianische Prologe zu den vier Evangelien: Ein Beitrag zur Geschichte des Kanons*. Texte und Untersuchungen zur Geschichte der altchristlichen Literatur 15.1. Leipzig: Hinrich, 1896.

Cortabarría Beitia, Angel. "Los 'Studia linguarum' de los Dominicos en los siglos XIII y XIV." In *La controversia judeocristiana en España (desde los orígenes hasta el siglo XIII): Homenaje a Domingo Muñoz León*, edited by Carlos del Valle Rodríguez, 253–276. Madrid: Consejo Superior de Investigaciones Científicas, Instituto de Filología, 1998.

Coxe, Henry O. *Catalogus Codicum MSS. qui in Colegiis Aulisque Oxoniensibus hodie adservantur*. 2 vols. Oxford: E Typographeo Academico, 1852.

Craster, H.H.E. "A Hebrew Psalter." *Bodleian Quarterly Record* 3 (1920–1922): 68–70.

Creytens, Raymond. "Les commentateurs dominicains de la Règle de S. Augustin du XIIIe au XVIe siècle." *Archivum Fratrum Praedicatorum* 33 (1963): 121–157.

Cullen, Olive M. "A Question of Time or a Question of Theology: A Study of the Easter Controversy in the Insular Church." PhD diss., St. Patrick's College, Maynooth, 2007.

Curtze, Maximilian. "Ueber eine Algorismus-Schrift des XII. Jahrhunderts." *Abhandlungen zur Geschichte der Mathematik* 8 (1898): 1–27.

Czerny, Albin. *Handschriften der Stiftsbibliothek St. Florian*. Linz: Ebenhöch, 1871.

Dahan, Gilbert. "Les interprétations juives dans les commentaires du pentateuqe de Pierre le Chantre." In *The Bible in the Medieval World: Essays in Memory of Beryl*

Smalley, edited by Katherine Walsh and Diana Wood, 131–155. Studies in Church History, Subsidies 4. Oxford: Blackwell, 1985.

———. "Juifs et Chrétiens en Occident médiéval: la rencontre autour de la Bible (XIIe–XIVe siècles)." *Revue de Synthèse* 110 (1989): 3–31.

———. *Les intellectuels chrétiens et les juifs au Moyen Âge: polémique et relations culturelles en Occident, XIIe–XIVe s*. Paris: Les Éditions du Cerf, 1990.

———. *La polémique chrétienne contre le judaïsme au Moyen Âge*. Paris: Albin Michel, 1991.

———. "La connaissance de l'hébreu dans les correctoires de la Bible du XIIIe siècle: notes preliminaires." *Revue théologique de Louvain* 23 (1992): 178–190. Reprinted in *Rashi 1040–1990: Hommage à Ephraïm E. Urbach*, edited by Gabrielle Sed-Rajna, 567–578. Paris: Les Éditions du Cerf, 1993.

———. "L'enseignement de l'hébreu en Occident médiéval (XIIe–XIVe siècles)." *Histoire de l'éducation* 57 (1993): 3–22.

———. "Lexiques hébreu/latin? Les recueils d'interprétations des noms hébraïques." In *Les manuscrits des lexiques et glossaires de l'Antiquité tardife à la fin du Moyen Âge*, edited by Jacqueline Hamesse, 481–526. Textes et études du Moyen Âge 4. Louvain-la-Neuve: Fédération Internationale des Instituts d'Études Médiévales, 1996.

———. "La critique textuelle dans les correctoires de la Bible du XIIIe siècle." In *Langages et philosophie: Hommage à Jean Jolivet*, edited by Alain de Libera, Abdelali Elamrani-Jamal, and Alain Galonnier, 365–392. Études de philosophie médiévale 74. Paris: Vrin, 1997.

———. "Deux psautiers hébraïques glosés en latin." *Revue des études juives* 158 (1999): 61–87.

———. *Le brûlement du Talmud à Paris: 1242–1244*. Paris: Les Éditions du Cerf, 1999.

———. *L'exégèse chrétienne de la Bible en Occident médiéval, XIIe–XIVe siècle*. Paris: Les Éditions du Cerf, 1999.

d'Ailly, Pierre. *Tractatus de imagine mundi et varia ejusdem auctoris et Joannis Gersonis opuscula*. Louvain: de Westphalia, 1477–1483.

———. "Exhortatio super correctione calendarii." In *Sacrorum conciliorum nova et amplissima collectio*, vol. 28, *Ab anno MCCCCXIV. usque ad MCCCCXXXI.*, edited by Giovanni Domenico Mansi, 370–381. Venice, 1785. Reprint, Paris: Welter, 1903.

Dean, Ruth J. "The Life and Works of Nicholas Trevet, with Special Reference to His Anglo-Norman Chronicle." PhD Diss., University of Oxford, 1938.

———. "The Earliest Known Commentary on Livy Is by Nicholas Trevet." *Medievalia et Humanistica* 3 (1945): 86–98.

———. "Cultural Relations in the Middle Ages: Nicholas Trevet and Nicholas of Prato." *Studies in Philology* 45 (1948): 541–564.

———. "Some Unnoticed Commentaries on the *Dissuasio Valerii* of Walter Map." *Mediaeval and Renaissance Studies* 2 (1950): 128–150.

———. "The Dedication of Nicholas Trevet's Commentary on Boethius." *Studies in Philology* 63 (1966): 593–603.

———. "Nicholas Trevet, Historian." In *Medieval Learning and Literature: Essays Presented to Richard William Hunt*, edited by J.J.G. Alexander and M.T. Gibson, 328–352. Oxford: Clarendon Press, 1976.

de Blois, François. "Some Early Islamic and Christian Sources Regarding the Jewish Calendar (9th–11th Centuries)." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 65–78. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Decaluwe, Michiel. *A Successful Defeat: Eugene IV's Struggle with the Council of Basel for Ultimate Authority in the Church 1431–1449*. Brussels: Belgisch Historisch Instituut te Rome, 2009.

Declercq, Georges. *Anno Domini: The Origins of the Christian Era*. Turnhout: Brepols, 2000.

Decretum magistri Gratiani. Edited by Emil Friedberg. Corpus Iuris Canonici 1. Leipzig: Tauchnitz, 1879.

de la Mare, Albinia. *Catalogue of the Collection of Medieval Manuscripts Bequeathed to the Bodleian Library Oxford by James P.R. Lyell*. Oxford: Clarendon Press, 1971.

de Lange, Nicholas. "Hebrew and Jewish Studies in Great Britain." In *Jewish Studies and the European Academic World*, edited by Albert van der Heide and Irene E. Zwiep, 127–151. Collection de la Révue des études juives 37. Paris: Peeters, 2005.

Delorme, Ferdinand M. "Manuscrit du 'Computus' de Roger Bacon annoté par Guillaume de Saint-Cloud." *Antonianum* 11 (1936): 554–562.

———. "De auctore Compoti sub nomine Rogeri Baconis recenter editi." *Antonianum* 14 (1939): 313–322.

del Valle Rodríguez, Carlos. *Corpus Hebraicum Nebrissense: la obra hebraica de Antonio de Nebrija*. Madrid: Aben Ezra Ediciones, 2000.

de Murr, Christophe Theophile. *Description du Cabinet de Monsieur Paul de Praun de Nuremberg*. Nuremberg: Schneider, 1797.

Depuydt, Leo. "'More Valuable than All Gold': Ptolemy's Royal Canon and Babylonian Chronology." *Journal of Cuneiform Studies* 47 (1995): 97–117.

———. "History of the *ḥeleq*." In *Under One Sky: Astronomy and Mathematics in the Ancient Near East*, edited by John M. Steele and Annette Imhausen, 79–107. Alter Orient und Altes Testament 297. Münster: Ugarit-Verlag, 2002.

———. "Ancient and Medieval Sources and Mechanism of the Calendrical Practice of *Yom Tov Sheni Shel Galuyyot*." In *Life and Culture in the Ancient Near East*, edited by Richard E. Averbeck, Mark W. Chavalas, and David B. Weisberg, 435–470. Bethesda, MD: CDL Press, 2003.

de Solan, Olivier. "La réforme du calendrier dans une question quodlibétique d'Henri de Runen (1444)." *Bibliothèque de l'École des Chartes* 157 (1999): 171–220. Reprinted

in *Construire le temps: Normes et usages chronologiques du Moyen Âge à l'époque contemporaine*, edited by Marie-Clotilde Hubert, 171–220. Paris: Champion, 2000.

Deutsch, Yaacov. *Judaism in Christian Eyes: Ethnographic Descriptions of Jews and Judaism in Early Modern Europe*. Oxford: Oxford University Press, 2012.

de Visscher, Eva. "The Jewish-Christian Dialogue in Twelfth-Century Western Europe: The Hebrew and Latin Sources of Herbert of Bosham's *Commentary on the Psalms*." PhD Diss., University of Leeds, 2003.

———. "'Closer to the Hebrew': Herbert of Bosham's Interpretation of Literal Exegesis." In *The Multiple Meaning of Scripture: The Role of Exegesis in Early-Christian and Medieval Culture*, edited by Ineke van 't Spijker, 249–272. Commentaria 2. Leiden: Brill, 2009.

———. "Cross-Religious Learning and Teaching: Hebraism in the Works of Hebrew of Bosham and Contemporaries." In *Crossing Borders: Hebrew Manuscripts as a Meeting-Place of Cultures*, edited by Piet van Boxel and Sabine Arndt, 123–132. Oxford: Bodleian Library, 2009.

———. "Putting Theory into Practice? Hugh of Saint Victor's Influence on Herbert of Bosham's 'Psalterium cum commento'." In *Bibel und Exegese in der Abtei Saint-Victor zu Paris: Form und Funktion eines Grundtextes im europäischen Raum*, edited by Rainer Berndt, 491–502. Corpus Victorinum: Instrumenta 3. Münster: Aschendorff, 2009.

———. *Reading the Rabbis: Christian Hebraism in the Works of Herbert of Bosham*. Commentaria 5. Leiden: Brill, 2014.

Dickey, Bruce George. "Adelard of Bath: An Examination Based on heretofore Unexamined Manuscripts." PhD Diss., University of Toronto, 1982.

Dictionnaire des auteurs Cisterciens. Edited by Émile Brouette, Anselme Dimier, and Eugène Manning. Rochefort: Abbaye Notre-Dame de St-Remy, 1975.

Dictionnaire de spiritualité ascétique et mystique. Edited by Marcel Viller et al. 17 vols. Paris: Beauchesne, 1937–1995.

Disticha Catonis. Edited by Marcus Boas and Hendrik Johan Botschuyver. Amsterdam: North-Holland, 1952.

The Distichs of Cato: A Famous Medieval Textbook. Translated by Wayland Johnson Chase. University of Wisconsin Studies in the Social Sciences and History 7. Madison, WI: University of Wisconsin Press, 1922.

Dowd, Matthew F. "Astronomy and Computus at Oxford University in the Early Thirteenth Century: The Works of Robert Grosseteste." PhD Diss., University of Notre Dame, 2003.

Drabina, Jan. "Jodok von Ziegenhals und seine Chronik der Augustiner-Chorherren." In *Die Anfänge des Schrifttums in Oberschlesien bis zum Frühhumanismus*, edited by Gerhard Kosellek, 183–191. Tagungsreihe der Stiftung Haus Oberschlesien 7. Frankfurt: Lang, 1997.

Dröge, Christoph. *Giannozzo Manetti als Denker und Hebraist*. Judentum und Umwelt 20. Frankfurt: Lang, 1987.

Duhem, Pierre. *Le système du monde: histoire des doctrines cosmologiques de Platon à Copernic*. 10 vols. Paris: Hermann, 1913–1959.

Dümmler, Ernst. "Sigebert's von Gembloux Passio sanctae Luciae virginis und Passio sanctorum Thebeorum." *Philosophische und historische Abhandungen der königlichen Akademie der Wissenschaften zu Berlin* (1893): 1–125.

Easton, Stewart C. *Roger Bacon and His Search for a Universal Science: A Reconsideration of the Life and Work of Roger Bacon in the Light of His Own Stated Purposes*. Oxford: Blackwell, 1952.

Eastwood, Bruce S. *Ordering the Heavens: Roman Astronomy and Cosmology in the Carolingian Renaissance*. History of Science and Medicine Library 4/Medieval and Early Modern Science 8. Leiden: Brill, 2007.

Ebendorfer, Thomas. *Chronica pontificum Romanorum*. Edited by Harald Zimmermann. MGH Scriptores, n.s., 16. Munich: Monumenta Germaniae Historica, 1994.

Ehrle, Franz. "Nikolaus Trivet, sein Leben, seine Quodlibet und Quaestiones ordinariae." In *Abhandlungen zur Geschichte der Philosophie des Mittelalters: Festgabe Clemens Baeumker zum 70. Geburtstag (16. September 1923)*, 1–63. Münster: Aschendorff, 1923. Reprinted in Ehrle, *Gesammelte Aufsätze zur englischen Scholastik*, edited by Franz Pelster, 303–384. Storia e Letteratura 50. Rome: Edizioni di Storia e Letteratura, 1970.

Einbinder, Susan L. *Beautiful Death: Jewish Poetry and Martyrdom in Medieval France*. Princeton, NJ: Princeton University Press, 2002.

Elizur, Shulamit. *Wherefore Have We Fasted? "Megillat Ta'Anit Batra" and Similar Lists of Fasts*. [in Hebrew.] Sources for the Study of Jewish Culture 11. Jerusalem: World Union of Jewish Studies, 2007.

Emanuel, Simcha. "A Jewish-Christian Debate—France, 1110." [in Hebrew.] *Zion* 63 (1998): 143–155.

———. "Chronology and Eschatology: A Jewish-Christian Debate, France 1100." *Journal of Jewish Studies* 64 (2013): 264–282.

Emden, Alfred B. *A Biographical Register of the University of Oxford to A.D. 1500*. 3 vols. Oxford: Clarendon Press, 1957–1959.

Epstein, Abraham. "R. Schemaja, der Schüler und Sekretär Raschi's." *Monatsschrift für Geschichte und Wissenschaft des Judenthums* 41 (1896–1897): 257–263, 296–312.

Eusebius of Caesarea. *Die Chronik des Hieronymus*. Edited by Rudolf Helm. 2nd ed. Die griechischen christlichen Schriftsteller der ersten Jahrhunderte 47. Berlin: Akademie-Verlag, 1956.

Eustathius. *Ancienne version Latine des neuf Homélies sur l'Hexaéméron de Basile de Césarée*. Edited by Emmanuel Amand de Mendieta and Stig Y. Rudberg. Texte und Untersuchungen zur Geschichte der altchristlichen Literatur 66. Berlin: Akademie-Verlag, 1958.

Evans, James. *The History and Practice of Ancient Astronomy*. New York: Oxford University Press, 1998.

Falkenroth, Christoph. *Die* Musica Speculativa *des Johannes de Muris: Kommentar zur Überlieferung und kritische Edition*. Beihefte zum Archiv für Musikwissenschaft 34. Stuttgart: Steiner, 1992.

Fasbender, Christoph. *"Non sit tibi cura quis dicat, sed quid dicatur*: Kleine Gebrauchsgeschichte eines Seneca-Zitates." In *Anonymität und Autorschaft: Zur Literatur- und Rechtsgeschichte der Namenlosigkeit*, ed. Stephan Pabst, 35–48. Studien und Texte zur Sozialgeschichte der Literatur 126. Berlin: de Gruyter, 2011.

Feldman, William Moses. *Rabbinical Mathematics and Astronomy*. 3rd ed. New York: Hermon Press, 1978.

Feller, Joachim. *Catalogus codicum MSSCtorum Bibliothecae Paulinae in Academia Lipsiensi concinnatus*. Leipzig: Gleditsch, 1686.

Finegan, Jack. *Handbook of Biblical Chronology: Principles of Time Reckoning in the Ancient World and Problems of Chronology in the Bible*. Rev. ed. Peabody, MA: Hendrickson, 1998.

Fingernagel, Andreas, Katharina Hranitzky, Veronika Pirker-Aurenhammer, Martin Roland, and Friedrich Simader. *Mitteleuropäische Schulen*. Vol. 2, (*ca. 1350–1410): Österreich–Deutschland–Schweiz*. Veröffentlichungen der Kommission für Schrift- und Buchwesen des Mittelalters, Reihe I, 11. Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 2002.

Finke, Heinrich. "Westfalica aus der Pariser und Eichstädter Bibliothek." *Zeitschrift für vaterländische Geschichte und Alterthumskunde* 47 (1887): 209–222.

Fischer, Hans. *Die lateinischen Papierhandschriften der Universitätsbibliothek Erlangen*. Erlangen, 1936. Reprint, Wiesbaden: Harrassowitz, 1971.

Floëri, Fernand, and Pierre Nautin, eds. *Homélies pascales*. Vol. 3, *Une Homélie Anatolienne sur la date de Paques en l'an 387*. Sources Chrétiennes 48. Paris: Éditions du Cerf, 1957.

Folkerts, Menso. "Mittelalterliche mathematische Handschriften in westlichen Sprachen in der Berliner Staatsbibliothek: Ein vorläufiges Verzeichnis." In *Mathematical Perspectives: Essays on Mathematics and Its Historical Development; Presented to Professor Dr. Kurt-Reinhard Biermann on the Occasion of His 60th Birthday*, edited by Joseph W. Dauben, 53–93. New York: Academic Press, 1981.

———. "Adelard's Version of Euclid's *Elements*." In *Adelard of Bath: An English Scientist and Arabist of the Early Twelfth Century*, edited by Charles Burnett, 55–68. Warburg Institute Surveys and Texts 14. London: The Warburg Institute, 1987.

———. "Die frühesten lateinischen Texte über das Rechnen mit indisch-arabischen Ziffern." In *Brückenschläge: 25 Jahre Lehrstuhl für Geschichte der exakten Wissenschaften und der Technik an der Technischen Universität Berlin, 1969–1994*, edited by Hans-Werner Schütt and Burghard Weiss, 157–174. Berlin: Verlag für Wissenschafts- und Regionalgeschichte, 1995.

———. "Early Texts on Hindu-Arabic Calculation," *Science in Context* 14 (2001): 13–38.

Franceschini, Ezio. *Studi e note di filologia latina medievale*. Pubblicazioni dell'Università Cattolica del Sacro Cuore, 4th Ser., 30. Milan: Società editrice "Vita e Pensiero," 1938.

Frank, Edgar. *Talmudic and Rabbinical Chronology: The Systems of Counting Years in Jewish Literature*. Jerusalem: Feldheim, 1956.

French, Roger. "Foretelling the Future: Arabic Astrology and English Medicine in the Late Twelfth Century." *Isis* 87 (1996): 453–480.

Friedländer, Michael. "Calendar." In *The Jewish Encyclopedia*, 12 vols., 3:501–508. New York: Funk and Wagnalls, 1901–1906.

Friedman, Jerome. *The Most Ancient Testimony: Sixteenth-Century Christian-Hebraica in the Age of Renaissance Nostalgia*. Athens, GA: Ohio University Press, 1983.

Friedman, Russell L. "Dominican Quodlibetal Literature, ca. 1260–1330." In *Theological Quodlibeta in the Middle Ages: The Fourteenth Century*, edited by Christopher Schabel, 401–491. Brill's Companions to the Christian Tradition 7. Leiden: Brill, 2007.

Frioli, Donatella, G.C. Garfagnini, L. Pinelli, G. Pomaro, and P. Rossi. *Catalogo di manoscritti filosofici nelle biblioteche italiane*. Vol. 2, *Busto Arisizio, Firenze, Parma, Savignano sul Rubicone, Volterra*. Corpus philosophorum Medii Aevi: Subsidia 2. Florence: Olschki, 1981.

Funkenstein, Amos. "Changes in the Patterns of Christian Anti-Jewish Polemics in the Twelfth Century." [in Hebrew.] *Zion* 33 (1968): 124–144.

———. "Basic Types of Christian anti-Jewish Polemics in the Later Middle Ages." *Viator* 2 (1971): 373–382.

Gandz, Solomon. "Studies in the Hebrew Calendar II: The Origins of the Two New Moon Days." *Jewish Quarterly Review*, n.s., 40 (1949–1950): 157–172, 251–277.

———. "The Benediction over the Luminaries and the Stars." *Jewish Quarterly Review*, n.s., 44 (1953–1954): 305–325.

Gehrt, Wolf. *Die Handschriften der Staats- und Stadtbibliothek Augsburg 4° Cod 1–150*. Handschriftenkataloge der Staats- und Stadtbibliothek Augsburg 6. Wiesbaden: Harrassowitz, 1999.

Geiger, Ari. "A Student and an Opponent: Nicholas of Lyra and His Jewish Sources." In *Nicolas de Lyre: Franciscan du XIVe siècle, exégète et théologien*, edited by Gilbert Dahan, 167–203. Collection des Études Augustiniennes: Série Moyen Âge et Temps Modernes 48. Paris: Institut d'Études Augustiniennes, 2011.

———. "*Historia Judaica*: Petrus Comestor and His Jewish Sources." In *Pierre le Mangeur ou Pierre de Troyes, maître du XII^e siècle*, edited by Gilbert Dahan, 125–145. Bibliothèque d'Histoire Culturelle du Moyen Âge 12. Turnhout: Brepols, 2013.

Gelber, Hester Goodenough. *It Could Have Been Otherwise: Contingency and Necessity in Dominican Theology at Oxford, 1300–1350*. Studien und Texte zur Geistesgeschichte des Mittelalters 81. Leiden: Brill, 2004.

Gerlach, Karl. *The Antenicene Pascha: A Rhetorical History*. Liturgia condenda 7. Louvain: Peeters, 1998.

Gill, Joseph. *The Council of Florence*. Cambridge: Cambridge University Press, 1959.

Ginzberg, Louis. *The Legends of the Jews*. 7 vols. Philadelphia, PA: Jewish Publication Society of America, 1909–1938.

Ginzel, Friedrich Karl. *Handbuch der mathematischen und technischen Chronologie: Das Zeitrechnungswesen der Völker*. 3 vols. Leipzig: Hinrichs, 1906–1914.

Glassner, Christine. *Inventar der Handschriften des Benediktinerstiftes Melk*. Vol. 1, *Von den Anfängen bis ca. 1400*. Veröffentlichungen der Kommission für Schrift- und Buchwesen des Mittelalters, Reihe II, 8. Vienna: Verlag der Österreichischen Akademie der Wissenschaften, 2000.

Glick, Leonard B. *Abraham's Heirs: Jews and Christians in Medieval Europe*. Syracuse, NY: Syracuse University Press, 1999.

Glick, Thomas F. "'My Master, the Jews': Observations on Interfaith Scholarly Interaction in the Middle Ages." In *Jews, Muslims and Christians in and around the Crown of Aragon: Essays in Honour of Professor Elena Lourie*, edited by Harvey J. Hames, 157–182. The Medieval Mediterranean 52. Leiden: Brill, 2004.

Glorieux, Palémon. *La littérature quodlibétique de 1260 à 1320*. Kain: Revue des sciences philosophiques et théologiques, 1925.

———. *La faculté des arts et ses maîtres au XIIIe siècle*. Études de philosophie médiévale 59. Paris: Vrin, 1971.

Glückert, Ludwig. "Hieronymus von Mondsee (Magister Johannes de Werdea): Ein Beitrag zur Geschichte des Einflusses der Wiener Universität im 15. Jahrhundert." *Studien und Mitteilungen zur Geschichte des Benediktinerordens* 48 (1930): 99–201.

Goldberg, Sylvie Anne. *La Clepsydre: essai sur la pluralité des temps dans le judaïsme*. Paris: Michel, 2000.

Goldstein, Bernard R. *The Astronomical Tables of Levi ben Gerson*. Transactions of the Connecticut Academy of Arts and Sciences 45. Hamden, CT: Archon Books, 1974.

———. "Ancient and Medieval Values for the Mean Synodic Month." *Journal for the History of Astronomy* 34 (2003): 65–74.

———. "A Table of New Moons from 1501 to 1577 in a Hebrew Fragment Preserved in the John Rylands Library." *Aleph* 13 (2013): 11–26.

Golombek, Harry. *A History of Chess*. London: Routledge & Kegan Paul, 1976.

Gonzalo Maeso, David. "La enseñanza del hebreo en las antiguas universidades españolas." *Miscelánea de Estudios Árabes y Hebraicos* 14/15, no. 2 (1965–1966): 3–23.

Goodblatt, David. *The Monarchic Principle: Studies in Jewish Self-Government in Antiquity*. Texte und Studien zum antiken Judentum 38. Tübingen: Mohr Siebeck, 1994.

Goodwin, Deborah L. *"Take Hold of the Robe of a Jew": Hebert of Bosham's Christian Hebraism*. Studies in the History of Christian Traditions 126. Leiden: Brill, 2006.

Grabmann, Martin. *Mittelalterliches Geistesleben: Abhandlungen zur Geschichte der Scholastik und Mystik*. 3 vols. Munich: Hueber, 1926–1956.

Grabois, Aryeh. "The *Hebraica veritas* and Jewish-Christian Intellectual Relations in the Twelfth Century." *Speculum* 50 (1975): 613–634.

Grafton, Anthony. *Joseph Scaliger: A Study in the History of Classical Scholarship*. Vol. 2, *Historical Chronology*. Oxford: Clarendon Press, 1993.

Grafton, Anthony, and Joanna Weinberg. *"I Have Always Loved the Holy Tongue": Isaac Casaubon, the Jews, and a Forgotten Chapter in Renaissance Scholarship*. Cambridge, MA: Harvard University Press, 2011.

Gransden, Antonia. *Historical Writing in England, c. 550 to c. 1307*. London: Routledge and Kegan Paul, 1974.

Grévin, Benoît. "L'hébreu des franciscains: nouveaux éléments sur la conaissance de l'hébreu en milieu chrétien au XIII^e siècle." *Médiévales* 41 (2001): 65–82.

———. "Systèmes d'écriture, sémiotique et langage chez Roger Bacon." *Histoire—Épistémologie—Langage* 24 (2002): 75–111.

Grosseteste, Robert. *Hexaëmeron*. Edited by Richard C. Dales and Servus Gieben. Auctores Britannici Medii Aevi 6. London: The British Academy, 1982.

Grumel, Venance. "Le problème de la date pascale aux III^e et IV^e siècles." *Revue des études Byzantines* 18 (1960): 163–178.

Grünhagen, Colmar. "Annalistische Nachlese, 1227–1450." *Zeitschrift des Vereins für Geschichte und Alterthum Schlesiens* 9 (1868): 182–190.

Gumbert-Hepp, Marijke. *Computus Magistri Jacobi: een schoolboek voor tijdrekenkunde uit 1436*. Middeleeuwse studies en bronnen 7. Hilversum: Verloren, 1987.

Guttmann, Jacob. "Ueber einige Theologen des Franziskanerordens und ihre Beziehungen zum Judenthum." *Monatsschrift für Geschichte und Wissenschaft des Judenthums* 40 (1895–1896): 314–329.

———. *Die Scholastik des dreizehnten Jahrhunderts in ihren Beziehungen zum Judenthum und zur jüdischen Literatur*. Breslau: Marcus, 1902.

Hackett, Jeremiah. "The Hand of Roger Bacon, the Writing of the *Perspectiva* and MS Paris BN Lat. 7434." In *Roma, Magistra Mundi: Itineraria Culturae Medievalis; Mélanges offerts au Père L.E. Boyle à l'occasion de son 75^e anniversaire*, edited by Jacqueline Hamesse, 3 vols., 1:323–336. Louvain-la-Neuve: Fédération Internationale des Instituts d'Études Médiévales, 1998.

Haeberli, Simone. *Der jüdische Gelehrte im Mittelalter: Christliche Imaginationen zwischen Idealisierung und Dämonisierung*. Mittelalter-Forschungen 32. Ostfildern: Thorbecke, 2010.

Haenel, Gustav. *Catalogi librorum manuscriptorum qui in Bibliothecis Galliae, Helvetiae, Belgii, Britanniae M., Hispaniae, Lusitaniae asservantur*. Leipzig: Hinrichs, 1830.

Hagenmeier, Winfried. *Die lateinischen mittelalterlichen Handschriften der Universitätsbibliothek Freiburg im Breisgau (Hs. 1–230)*. Kataloge der Universitätsbibliothek Frei-

burg im Breisgau, Bd. 1: Die Handschriften der Universitätsbibliothek, T. 1 (Wiesbaden: Harrassowitz, 1974).

Hall, Thomas N., and Michael Norris. "The Chrysostom Text in Bodley 516." *Journal of Theological Studies*, n.s., 62 (2011): 161–175.

Halm, Karl, Georg von Laubmann, and Wilhelm Meyer. *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*. Vol. 1.3, *Codices num. 5251–8100 complectens*. Munich, 1873. Reprint, Wiesbaden: Harrassowitz, 1968.

Halm, Karl, Friedrich Keinz, Wilhelm Meyer, and Georg Thomas. *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*. Vol. 2.2, *Codices num. 11001–15028 complectens*. Munich, 1876. Reprint, Wiesbaden: Harrassowitz, 1968.

———. *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*. Vol. 2.3, *Codices num. 15121–21313 complectens*. Munich, 1878. Reprint, Wiesbaden: Harrassowitz, 1969.

Halm, Karl, and Wilhelm Meyer. *Catalogus codicum latinorum Bibliothecae Regiae Monacensis*. Vol. 2.4, *Codices num. 21406–27268 complectens*. Munich, 1881. Reprint, Wiesbaden: Harrassowitz, 1969.

Hamman, Adalbert-Gauthier. *Patrologiae Latinae Supplementum*. 5 vols. Paris: Éditions Garnier Frères, 1958–1974.

Hampson, R.T. *Medii Aevi Kalendarium, or Dates, Charters, and Customs of the Middle Ages, with Kalendars from the Tenth to the Fifteenth Century*. 2 vols. London: Causton and Co., 1841.

Hantzsch, Viktor. *Sebastian Münster: Leben, Werk, wissenschaftliche Bedeutung*. Abhandlungen der Königlich Sächsischen Gesellschaft der Wissenschaften, phil.-hist. Kl., 18.3. Leipzig: Hirzel, 1898.

Harrison, Kenneth. "Luni-Solar Cycles: Their Accuracy and Some Types of Usage." In *Saints, Scholars and Heroes: Studies in Medieval Culture in Honour of Charles W. Jones*, edited by Margot H. King and Wesley M. Stevens, 2 vols., 2:65–78. Collegeville, MN: Hill Monastic Manuscript Library, 1979.

Härtel, Helmar. "Ludolphus Borchdorp de Brunswick." *Braunschweigisches Jahrbuch* 68 (1987): 113–120.

Härtel, Helmar, and Felix Ekowski. *Handschriften der Niedersächsischen Landesbibliothek Hannover*. Vol. 2, *Ms I 176a – Ms Noviss. 64*. Mittelalterliche Handschriften in Niedersachsen 6. Wiesbaden: Harrassowitz, 1982.

Haskins, Charles Homer. *Studies in the History of Mediaeval Science*. Harvard Historical Studies 27. Cambridge, MA: Harvard University Press, 1924.

Haverkamp, Eva. "Martryrs in Rivalry: The 1096 Jewish Martyrs and the Thebean Legion." *Jewish History* 23 (2009): 319–342.

Hayer, Gerold. *Die deutschen Handschriften des Mittelalters der Erzabtei St. Peter zu Salzburg*. Veröffentlichungen der Kommission für Schrift- und Buchwesen des Mittelalters, Reihe III, 1. Vienna: Verlag der österreichischen Akademie der Wissenschaften, 1982.

Hayward, C.T.R., trans. *Saint Jerome's* Hebrew Questions on Genesis. Oxford: Clarendon Press, 1995.

Heilbron, John L. *The Sun in the Church: Cathedrals as Solar Observatories*. Cambridge, MA: Harvard University Press, 1999.

Heimann-Seelbach, Sabina. *Ars und scientia: Genese, Überlieferung und Funktionen der mnemotechnischen Traktatliteratur im 15. Jahrhundert*. Frühe Neuzeit 58. Tübingen: Niemeyer, 2000.

Hellfaier, Detlev. "Von Brügge nach Detmold: Anmerkungen zur Überlieferungsgeschichte der Detmolder Naturen-Bloemen-Handschrift." In *Jacob van Merlants 'Der naturen bloeme' und das Umfeld: Vorläufer—Redaktionen—Rezeption*, edited by Amand Berteloot and Detlev Hellfaier, 119–134. Münster: Waxmann, 2001.

Helssig, Rudolf. *Die lateinischen und deutschen Handschriften der Universitätsbibliothek Leipzig*. Vol. 1, *Die theologischen Handschriften, Teil 1* (*Ms 1–500*). Katalog der Handschriften der Universitätsbibliothek Leipzig 4.1. Leipzig, 1926. Reprint, Wiesbaden: Harrassowitz, 1995.

Hermelink, Heinrich. "*Tabulae Jahen*." *Archive for History of Exact Sciences* 2 (1963): 108–112.

Herold, Werner, ed. *Reinher von Paderborn: Computus Emendatus; Die verbesserte Osterfestberechnung von 1171*. Studien und Quellen zur Westfälischen Geschichte 67. Paderborn: Bonifatius, 2011.

Herr, Moshe David. "The Calendar." In *The Jewish People in the First Century: Historical Geography, Political History, Social, Cultural and Religious Life and Institutions*, edited by S. Safrai and M. Stern, 2 vols., 2:834–864. Compendia Rerum Iudaicarum ad Novum Testamentum 1. Assen: Van Gorcum, 1974–1976.

Heydeck, Kurt. *Die mittelalterlichen Handschriften der Universitätsbibliothek Rostock*. Wiesbaden: Harrassowitz, 2001.

Hinz, Ulrich. *Handschriftencensus Westfalen*. Schriften der Universitäts- und Landesbibliothek Münster 18. Wiesbaden: Reichert, 1999.

Hippolytus. *Refutatio omnium Haeresium*. Edited by Miroslav Marcovich. Patristische Texte und Studien 25. Berlin: de Gruyter, 1986.

Hirsch, Samuel A. "Early English Hebraists: Roger Bacon and His Predecessors." *Jewish Quarterly Review* 12 (1899–1900): 34–88.

———. "Roger Bacon and Philology." In *Roger Bacon: Essays Contributed by Various Writers on the Occasion of the Commemoration of the Seventh Centenary of His Birth*, edited by Andrew G. Little, 101–151. Oxford: Clarendon Press, 1914.

———. "Presidential Address." *Transactions of the Jewish Historical Society of England* 7 (1915): 1–18.

Holford-Strevens, Leofranc. "Review of McCarthy and Breen, *The Ante-Nicene Christian Pasch*." *Peritia* 19 (2005): 359–371.

———. "Paschal Lunar Calendars up to Bede." *Peritia* 20 (2008): 165–208.

———. "Church Politics and the Computus: From Milan to the Ends of the Earth." In *The Easter Controversy of Late Antiquity and the Early Middle Ages: Its Manuscripts, Texts, and Tables*, edited by Immo Warntjes and Dáibhí Ó Cróinín, 1–20. Studia Traditionis Theologiae 10. Turnhout: Brepols, 2011.

Honecker, Martin. "Die Entstehung der Kalenderreformschrift des Nikolaus von Cues." *Historisches Jahrbuch* 60 (1940): 581–592.

Honselmann, Klemens. "Magister Reinher: Schrittmacher für die Kalenderreform und die moderne Rechenkunst." In *Von der Domschule zum Gymnasium Theodorianum in Paderborn*, edited by Klemens Honselmann, 107–126. Paderborn: Verein für Geschichte und Altertumskunde Westfalens, 1962.

Horace. *Opera*. Edited by D.R. Shackleton Bailey. Stuttgart: Teubner, 1985.

Howlett, David. "On the New Edition of Anatolius' *De Ratione Paschali*." *Peritia* 20 (2008): 135–153.

Huemer, Johann. "Iter Austriacum I." *Wiener Studien* 9 (1887): 51–93.

Hughes, Jeremy. *Secrets of the Times: Myth and History in Biblical Chronology*. Journal for the Study of the Old Testament, Supplement Series 66. Sheffield: JSOT Press, 1990.

Huttner, Ulrich. "Kalender und religiöse Identität: Ostern in Hierapolis." *Zeitschrift für antikes Christentum* 15 (2011): 272–290.

Iacopo da Varazze. *Legenda Aurea*. Edited by Giovanni Paolo Maggioni. 2nd ed. 2 vols. Millenio Medieval 6; Testi 3. Florence: SISMEL, 1998.

Irtenkauf, Wolfgang. "Der Computus ecclesiasticus in der Einstimmigkeit des Mittelalters." *Archiv für Musikwissenschaft* 14 (1957): 1–15.

Israeli, Isaac. *Liber Jesod Olam seu Fundamentum Mundi*. Edited by B. Goldberg and L. Rosenkranz. 2 vols. Berlin: Sumtibus Editorum, 1846–1848.

Isserles, Justine. "Some Hygiene and Dietary Calendars in Hebrew Manuscripts from Medieval Ashkenaz." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 273–326. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Jackson, Patrick Wyse. *The Chronologers' Quest: Episodes in the Search for the Age of the Earth*. Cambridge: Cambridge University Press, 2006.

Jacobs, Fr., and F.A. Ukert. *Beiträge zur ältern Literatur; oder Merkwürdigkeiten der Herzogl. öffentlichen Bibliothek zu Gotha*. 6 vols. Leipzig: Dyk, 1835–1843.

Jacobs, Martin. *Die Institution des jüdischen Patriarchen: Eine quellen- und traditionskritische Studie zur Geschichte der Juden in der Spätantike*. Texte und Studien zum antiken Judentum 52. Tübingen: Mohr Siebeck, 1995.

Jacobus de Cessolis. *Liber de moribus hominum et officiis nobilium*. Edited by Ernst Köpke. Mittheilungen aus den Handschriften der Ritter-Akademie zu Brandenburg a. H. 2. Brandenburg a. d. Havel: Matthes, 1879.

Jacquart, Danielle. "Les manuscrits des traductions de Gérard de Crémone: quelques caractéristiques formelles." In *Les traducteurs au travail: leurs manuscrits et leurs*

méthodes, edited by Jacqueline Hamesse, 207–220. Textes et études du Moyen Âge 18. Turnhout: Brepols, 2002.

Jakobson, Roman, and Morris Halle. "The Term *Canaan* in Medieval Hebrew." In *For Max Weinreich on His Seventieth Birthday: Studies in Jewish Languages, Literature, and Society*, 147–172. The Hague: Mouton, 1964.

James, Montague Rhodes. *The Ancient Libraries of Canterbury and Dover*. Cambridge: University Press, 1903.

———. *A Descriptive Catalogue of the Western Manuscripts in the Library of Christ's College, Cambridge*. Cambridge: University Press, 1905.

Jeudy, Colette. "Remigii autissiodorensis opera (Clavis)." In *L'École Carolingienne d'Auxerre: de Murethach à Remi, 830–908; Entretiens d'Auxerre 1989*, edited by Dominique Iogna-Prat, Colette Jeudy, and Guy Lobrichon, 457–500. Paris: Beauchesne, 1991.

John Damascene. *De fide orthodoxa: Versions of Burgundio and Cerbanus*. Edited by Eligius M. Buytaert. Franciscan Institute Publications, Text Series 8. St. Bonaventure, NY: The Franciscan Institute, 1955.

John of Murs. *Epistola super reformatione antiqui kalendarii: Ein Beitrag zur Kalenderreform im 14. Jahrhundert*. Edited by Christine Gack-Scheiding. MGH Studien und Texte 11. Hannover: Hahn, 1995.

John of Sacrobosco. *Libellus de Sphaera. Eiusdem autoris libellus, cuius titulus est Computus, eruditißimam anni & mensium descriptionem continens*. Edited by Philipp Melanchthon. Wittenberg: Clug, 1538.

John of Segovia. *Historia gestorum generalis synodi Basiliensis*. Edited by Ernst von Birk. Monumenta conciliorum generalium seculi decimi quinti 2. Vienna: Typ. Aulae et Status, 1873.

Jones, Charles W. *Bedae Opera de Temporibus*. The Mediaeval Academy of America Publication No. 41. Cambridge, MA: The Mediaeval Academy of America, 1943.

Jørgensen, Ellen. *Catalogus codicum latinorum medii aevi Bibliothecae Regiae Hafniensis*. Copenhagen: Gyldendal, 1926.

Junge, Rebekka. *Nicholas Trevet und die Octavia Praetexta: Editio princeps des mittelalterlichen Kommentars und Untersuchungen zum pseudosenecanischen Drama*. Studien zur Geschichte und Kultur des Altertums, n.s., 1.14. Paderborn: Schöningh, 1999.

Juste, David. *Catalogus codicum astrologorum latinorum*. Vol. 1, *Manuscrits astrologiques latins conservés àla Bayerische Staatsbibliothek de Munich*. Documents, études et répertoires 81. Paris: CNRS Éditions, 2011.

Kaeppeli, Thomas. "Une critique du commentaire de Nicolas Trevet sur le *De civitate dei*." *Archivum Fratrum Praedicatorum* 29 (1959): 200–205.

———. "Opere latine attribuite a Jacopo Passavanti: con un appendice sulle opere di Nicoluccio di Ascoli O.P." *Archivum Fratrum Praedicatorum* 32 (1962): 145–179.

———. *Scriptores Ordinis Praedicatorum Medii Aevi*. 4 vols. Rome: Ad S. Sabinae, 1970–1993.

Kaltenbrunner, Ferdinand. "Die Vorgeschichte der gregorianischen Kalenderreform." *Sitzungsberichte der philosophisch-historischen Classe der kaiserlichen Akademie der Wissenschaften* [Vienna] 82 (1876): 289–414.

Katz, David S. "Shylock's Gender: Jewish Male Menstruation in Early Modern England." *The Review of English Studies*, n.s., 50 (1999): 440–462.

Kentenich, Gottfried. *Beschreibendes Verzeichnis der Handschriften der Stadtbibliothek zu Trier, Sechstes Heft: Ascetische Schriften; 2. Abteilung: Nachträge*. Trier: Lintz, 1910.

Ker, Neil Ripley. *Medieval Manuscripts in British Libraries*. 5 vols. Oxford: Clarendon Press, 1969–2002.

Kern, Anton. *Die Handschriften der Universitätsbibliothek Graz*. Vol. 2. Handschriftenverzeichnisse Österreichischer Bibliotheken: Steiermark 2. Vienna: Österreichische Staatsdruckerei, 1956.

Keßler, Eckhard, ed. *Aristoteles Latine: interpretibus variis edidit Academia Regia Borussica Berlin 1831*. Humanistische Bibliothek: Texte und Abhandlungen, Reihe II: Texte 30. Munich: Fink, 1995.

Kihlman, Erika. *Expositiones Sequentiarum: Medieval Sequence Commentaries and Prologues; Editions with Introductions*. Acta Universitatis Stockholmiensis: Studia Latina Stockholmiensia 53. Sweden: Stockholm University, 2006.

Klein, Thomas A.-P. "Der *Novus Esopus* des Alexander Neckam in der Tradition der spätantiken Phaedrus-Paraphrase *Romulus*." *Maia* 52 (2000): 127–151.

Kleineidam, Erich. *Universitatis Studii Erfordensis: Überblick über die Geschichte der Universität Erfurt*. Vol. 2, *Spätscholastik, Humanismus und Reformation, 1461–1521*. Erfurter Theologische Studien 22. 2nd ed. Leipzig: St.-Benno-Verlag, 1992.

Kleinhans, Arduin. "Nicolaus Trivet O.P. Psalmorum Interpres." *Angelicum* 20 (1943): 219–236.

———. "Heinrich von Cossey O.F.M.: Ein Psalmen-Erklärer des 14. Jahrhunderts." In *Miscellanea Biblica et Orientalia: R.P. Athanasio Miller O.S.B., secretario Pontificiae Commissionis Biblicae, completis LXX annis oblata*, edited by Adalbert Metzinger, 239–253. Studia Anselmiana 27/28. Rome: Herder, 1951.

Klepper, Deeana Copeland. "Nicholas of Lyra and Franciscan Interest in Hebrew Scholarship." In *Nicholas of Lyra: The Senses of Scripture*, edited by Philip D.W. Krey and Lesley Smith, 289–311. Leiden: Brill, 2000.

———. *The Insight of Unbelievers: Nicholas of Lyra and Christian Reading of Jewish Text in the Later Middle Ages*. Philadelphia, PA: University of Pennsylvania Press, 2007.

Kniewasser, Manfried. "Die antijüdische Polemik des Petrus Alphonsi (getauft 1106) und des Abtes Petrus Venerabilis von Cluny (†1156)." *Kairos*, n.s., 22 (1980): 34–76.

Knorr, Wilbur R. "Two Medieval Monks and Their Astronomy Books: Mss. Bodley 464 and Rawlinson C.117." *Bodleian Library Record* 14, no. 4 (April 1993): 269–284.

Kohl, Wilhelm. *Die Zisterzienserabtei Marienfeld*. Germania Sacra, Dritte Folge 2: Die Bistümer der Kirchenprovinz Köln; Das Bistum Münster 11. Berlin: de Gruyter, 2010.

Köhler, Franz, and Gustav Milchsack. *Die Gudischen Handschriften*. Kataloge der Herzog-August-Bibliothek Wolfenbüttel 9. Wolfenbüttel, 1913. Reprint, Frankfurt: Klostermann, 1966.

Koller, Edith. "Die Suche nach der richtigen Zeit—Die Auseinandersetzung um die Autorisierung der Gregorianischen Kalenderreform im Alten Reich." In *Die Autorität der Zeit in der Frühen Neuzeit*, edited by Arndt Brendecke, Ralf-Peter Fuchs, and Edith Koller, 233–255. Pluralisierung und Autorität 10. Berlin: LIT, 2007.

Kowalczyk, Maria, et al. *Catalogus codicum manuscriptorum medii aevi Latinorum, qui in Bibliotheca Jagellonica Cracoviae asservantur*. Vol. 3, *Numeros continens inde a 445 usque ad 563*. Wrocław: Wydawnictwo Polskiej Akademii Nauk, 1984.

Krusch, Bruno. *Studien zur christlich-mittelalterlichen Chronologie: Der 84-jährige Osterzyklus und seine Quellen*. Leipzig: Von Veit, 1880.

———. *Studien zur christlich-mittelalterlichen Chronologie: Die Entstehung unserer heutigen Zeitrechnung*. Abhandlungen der Preußischen Akademie der Wissenschaften, Jg. 1937, phil.-hist. Kl., 8. Berlin: de Gruyter, 1938.

Kuithan, Rolf, and Joachim Wollasch. "Der Kalender des Chronisten Bernold." *Deutsches Archiv* 40 (1984): 478–531.

Kully, Rolf Max. "Cisiojanus: Studien zur mnemonischen Literatur anhand des spätmittelalterlichen Kalendergedichts." *Schweizerisches Archiv für Volkskunde* 70 (1974): 93–123.

Kunitzsch, Paul. *Claudius Ptolemäus: Der Sternkatalog des Almagest; Die arabisch-mittelalterliche Tradition*. Vol. 2, *Die lateinischen Übersetzung Gerhards von Cremona*. Wiesbaden: Harrassowitz, 1990.

Labajos, Alonso, José. *Escritos académicos de Pedro de Osma*. Fuentes documentales 5. Salamanca: Universidad Pontificia de Salamanca.

Lacombe, George. *Aristoteles Latinus*. 2nd ed. Vol. 1. Bruges: Desclée de Brouwer, 1957.

Lang, Albert. "Johann Müntzinger, ein schwäbischer Theologe und Schulmeister am Ende des 14. Jahrhunderts." In *Aus der Geisteswelt des Mittelalters: Studien und Texte Martin Grabmann zur Vollendung des 60. Lebensjahres von Freunden und Schülern gewidmet*, edited by Albert Lang, Joseph Lechner, and Michael Schmaus, 2 vols., 2:1200–1230. Beiträge zur Geschichte der Philosophie und Theologie des Mittelalters: Texte und Untersuchungen, Suppl. 3. Münster: Aschendorff, 1935.

Lasker, Arnold A., and Daniel J. Lasker. "*Birkat Haḥammah*: The Blessing of the Sun," *Conservative Judaism* 34, no. 3 (January/February 1981): 17–28.

———. "The Jewish Prayer for Rain in the Post-Talmudic Era," *AJS Review* 9 (1984): 141–174.

———. "The Strange Case of December 4: A Liturgical Problem," *Conservative Judaism* 38, no. 1 (Fall 1985): 91–99.

———. "Behold, A Moon is Born! How the Jewish Calendar Works." *Conservative Judaism* 41, no. 4 (Summer 1989): 5–19.

Le Glay, André. *Catalogue descriptif et raisonné des manuscrits de la bibliothèque de Cambrai*. Cambrai: Hurez, 1831.

Lehmann, Paul. *Mittelalterliche Bibliothekskataloge Deutschands und der Schweiz*. Vol. 2, *Bistum Mainz, Erfurt*. Munich: Beck, 1928.

Leidinger, Paul. "Die Zisterzienserabtei Marienfeld (1185–1803): Ihre Gründung, Entwicklung und geistig-religiöse Bedeutung." *Westfälische Zeitschrift* 148 (1998): 9–78.

Leino, Marika, and Charles Burnett. "Myth and Astronomy in the Frescoes at Sant' Abbondio in Cremona." *Journal of the Warburg and Courtauld Institutes* 66 (2003): 273–288.

Leinsle, Ulrich G. *Introduction to Scholastic Theology*. Translated by Michael J. Miller. Washington, DC: The Catholic University of America Press, 2010.

Lejbowicz, Max. "Computus: le nombre et le temps altimédiévaux." In *Le temps, sa mesure et sa perception au Moyen Âge: Actes du Colloque Orléans 12–13 Avril 1991*, edited by Bernard Ribémont, 151–195. Caen: Paradigme, 1992.

———. "Des tables pascales aux tables astronomiques et retour: formation et réception du comput patristique." *Methodos: Savoirs et textes* 6 (2006), doi:10.4000/methodos.538.

Leland, John. *De viris illustribus: On Famous Men*. Edited by James P. Carley. Toronto: Pontifical Institute of Mediaeval Studies, 2010.

Lemay, Richard. "The Hispanic Origin of our Present Numeral Forms." *Viator* 8 (1977): 435–462.

Lempire, Jean. "Les dates hébraïques dans le *Computus ecclesiasticus* de Saint Maxime le Confesseur." *Les études classiques* 75 (2007): 447–459.

Leonhard, Clement. *The Jewish Pesach and the Origins of the Christian Easter: Open Questions in Current Research*. Studia Judaica: Forschungen zur Wissenschaft des Judentums 35. Berlin: de Gruyter, 2006.

Lindhagen, Arvid. "Die Neumondtafel des Robertus Lincolniensis." *Arkiv för Matematik, Astronomi och Fysik* 11, no. 2 (1916): 1–41.

Little, Andrew G. *The Grey Friars in Oxford*. Oxford: Clarendon Press, 1892.

———. *Initia operum Latinorum quae saeculis xiii., xiv., xv. attribuuntur*. Manchester: University Press, 1904.

———. *Part of the Opus tertium of Roger Bacon, Including a Fragment Now Printed for the First Time*. Aberdeen: The University Press, 1912.

———. "Records of the Franciscan Province of England." In *Collectanea Franciscana*, vol. 1, edited by A.G. Little, M.R. James, and H.M. Bannister, 141–153. Aberdeen: University Press, 1914.

———. *Franciscan Papers, Lists, and Documents*. Manchester: University Press, 1943.

Little, Andrew G., and Franz Pelster. *Oxford Theology and Theologians, c. A.D. 1282–1302*. Oxford Historical Society 96. Oxford: Clarendon Press, 1934.

Loew, Elias A. *Die ältesten Kalendarien aus Monte Cassino*. Quellen und Untersuchungen zur lateinischen Philologie des Mittelalters 3.3. Munich: Beck, 1908.

Loewe, Raphael. "The Mediaeval Christian Hebraists of England: Herbert of Bosham and Earlier Scholars." *Transactions of the Jewish Historical Society of England* 17 (1953): 225–249.

———. "The Mediaeval Christian Hebraists of England: The *Superscriptio Lincolniensis*." *Hebrew Union College Annual* 28 (1957): 205–252.

———. "Alexander Neckam's Knowledge of Hebrew." *Mediaeval and Renaissance Studies* 4 (1958): 17–34. Reprinted in *Hebrew Study from Ezra to Ben-Yehuda*, edited by William Horbury, 207–223. Edinburgh: T & T Clark, 1999.

———. "Latin *Superscriptio* Manuscripts on Portions of the Hebrew Bible other than the Psalter." *Journal of Jewish Studies* 9 (1958): 63–71.

———. "Jewish Scholarship in England." In *Three Centuries of Anglo-Jewish History: A Volume of Essays*, edited by V.D. Lipman, 125–148. Cambridge: Heffer, 1961.

———. "Hebrew Books and 'Judaica' in Mediaeval Oxford and Cambridge." In *Remember the Days: Essays on Anglo-Jewish History Presented to Cecil Roth*, edited by John M. Shaftesley, 23–48. London: The Jewish Historical Society of England, 1966.

Löffler, Klemens. "Zur Biographie des Hermann Zoestius." *Auf roter Erde* 6 (1931/32): 48–50.

———. "Stifts- und Klosterbibliotheken des Bistums Münster." *Auf roter Erde* 7 (1932): 88; 8 (1933): 5–6.

Lohr, Alfred. *Der Computus Gerlandi: Edition, Übersetzung und Erläuterungen*. Sudhoffs Archiv: Beihefte 61. Stuttgart: Steiner, 2013.

Lohr, Charles H. "Aristotelica Berolinensia." *Traditio* 54 (1999): 353–423.

Loi, Vincenzo. "Il 25 Marzo data pasquale e la cronologia giovannea della passione in età patristica." *Ephemerides Liturgicae* 85 (1971): 48–69.

Lorenz, Sönke. *Studium Generale Erfordense: Zum Erfurter Schulleben im 13. und 14. Jahrhundert*. Monographien zur Geschichte des Mittelalters 34. Stuttgart: Hiersemann, 1989.

———. "'Studium Generale Erfordense': Neue Forschungen zum Erfurter Schulleben." *Traditio* 46 (1991): 261–289.

Love, Rosalind. "Bede and John Chrysostom." *Journal of Medieval Latin* 17 (2007): 72–86.

Lucidus Samotheus, Johannes. *Opusculum de emendationibus temporum ab orbe condito ad usque hanc aetatem nostram iuxta veram ac rectam chronographiam ex antiquis ac probatissimis authoribus*. Venice: Giunti, 1537.

Lunn-Rockliffe, Sophie. *Ambrosiaster's Political Theology*. Oxford: Oxford University Press, 2007.

Lutze, Eberhard. *Die Bilderhandschriften der Universitätsbibliothek Erlangen*. Erlangen: Universitätsbibliothek, 1936.

Macray, William D. *Catalogi Codium Manuscriptorum Bibliothecae Bodleianae*. Vol. 9, *Codices a viro clarissimo Kenelm Digby, Eq. Aur., Anno 1634 donatos, complectens*. Oxford, 1883. Reprint, Oxford: Bodleian Library, 1999.

Mahler, Eduard. *Handbuch der jüdischen Chronologie*. Leipzig, 1916. Reprint Hildesheim: Olms, 1967.

Maimonides. *Sanctification of the New Moon* (*The Code of Maimonides 3.8*). Translated by Solomon Gandz. With Supplementation and an Introduction by Julian Obermann and an Astronomical Commentary by Otto Neugebauer. Yale Judaica Series 11. New Haven, CT: Yale University Press, 1956.

Mancha, José Luis. "The Latin Translation of Levi ben Gerson's *Astronomy*." In *Studies on Gersonides: A Fourteenth-Century Jewish Philosopher-Scientist*, edited by Gad Freudenthal, 21–46. Leiden: Brill, 1992.

———. "A Note on Copernicus' 'Correction' of Ptolemy's Mean Synodic Month." *Suhayl* 3 (2002–2003): 221–229.

Mantello, Frank A.C. "The Editions of Nicholas Trevet's *Annales sex regum Angliae*." *Revue d'histoire des textes* 10 (1980): 257–275.

Marchitelli, Simonetta. "Nicholas Trevet und die Renaissance der Seneca-Tragodien." Pts. 1 and 2. *Museum Helveticum* 56 (1999): 36–63, 87–104.

Marianus Scottus. "Chronicon." Edited by Georg Waitz. In *MGH Scriptores*, vol. 5, edited by Georg Heinrich Pertz, 481–562. Hannover: Hahn, 1844.

Markowski, Mieczysław. "Die Beziehungen zwischen der Wiener mathematischen Schule und der Krakauer astronomischen Schule im Licht der erhaltenen mathematisch-astronomischen Schriften in den Manuskripten der österreichischen Nationalbibliothek in Wien und der jagellonischen Bibliothek in Kraków." *Mediaevalia Philosophica Polonorum* 18 (1973): 133–158.

———. "Astronomie an der Krakauer Universität im XV. Jahrhundert." In *Les universités a la fin du Moyen Age: Actes du Congrès international de Louvain, 26–30 mai 1975*, edited by Jacques Paquet and Jozef Ijsewijn, 256–275. Publications de l'Institut d'Études Médiévales, 2nd ser., vol. 2. Louvain: Institut d'Études Médiévales U.C.L., 1978.

———. *Astronomica et Astrologica Cracoviensia ante annum 1550*. Istituto Nazionale di Studi sul Rinascimento: Studi e Testi 20. Florence: Olschki, 1990.

Marks, Richard Bruce. *The Medieval Manuscript Library of the Charterhouse of St. Barbara in Cologne*. 2 vols. Analecta Cartusiana 21–22. Salzburg: Institut für Englische Sprache und Literatur, 1974.

Martin, Henry. *Catalogue des manuscrits de la Bibliothèque de l'Arsenal*. 9 vols. Paris: Plon, 1885–1896.

Martin of Braga. *Opera omnia*. Edited by Claude W. Barlow. Papers and Monographs of the American Academy in Rome 12. New Haven, CT: Yale University Press, 1950.

Martin of Troppau. "Chronicon pontificum et imperatorum." Edited by Ludwig Weiland. In *MGH Scriptores*, vol. 22, edited by Georg Heinrich Pertz, 398–475. Hannover: Hahn, 1872.

Matthäus, Klaus. "Zur Geschichte des Nürnberger Kalenderwesens: Die Entwicklung der in Nürnberg gedruckten Jahreskalender in Buchform." *Archiv für Geschichte des Buchwesens* 9 (1969): 965–1396.

Maza, Otto, and István Németh. *Wissenschaft im Mittelalter: Ausstellung von Handschriften und Inkunabeln der österreichischen Nationalbibliothek, Prunksaal, 22. Mai bis 18. Oktober 1975*. Vienna: Österreichische Nationalbibliothek, 1975.

McCarthy, Daniel. "Bede's Primary Source for the Vulgate Chronology in His Chronicles in *De Temporibus* and *De Temporum Ratione*." In *Computus and its Cultural Context in the Latin West, AD 300–1200*, edited by Immo Warntjes and Dáibhí Ó Cróinín, 159–189. Studia Traditionis Theologiae 5. Turnhout: Brepols, 2010.

———. "The Study and Use of Numbers in Early Irish Monasteries." In *Glendalough: City of God*, edited by Charles Doherty, Linda Doran, and Mary Kelly, 219–233. Dublin: Four Courts Press, 2011.

McCarthy, Daniel and Aidan Breen. *The Ante-Nicene Christian Pasch*—De ratione paschali: *The Paschal Tract of Anatolius, Bishop of Laodicea*. Dublin: Four Courts Press, 2003.

McCluskey, Stephen C. *Astronomies and Cultures in Early Medieval Europe*. Cambridge: Cambridge University Press, 1998.

———. "Martianus and the Traditions of Early Medieval Astronomies." In *Carolingian Scholarship and Martianus Capella: Ninth-Century Commentary Traditions on 'De Nuptiis' in Context*, edited by Mariken Teeuwen and Sinéad O'Sullivan, 221–244. Cultural Encounters in Late Antiquity and the Middle Ages 12. Turnhout: Brepols, 2011.

McEvoy, James. *Robert Grosseteste*. Oxford: Oxford University Press, 2000.

McKane, William. *Selected Christian Hebraists*. Cambridge: Cambridge University Press, 1989.

McLean, Matthew. *The* Cosmographia *of Sebastian Münster: Describing the World in the Reformation*. Aldershot: Ashgate, 2007.

Meerssemann, G.G., and E. Adda. *Manuale di Computo con ritmo mnemotecnico dell'arcidiacono Pacifico di Verona († 844)*. Italia Sacra: Studi e documenti de storia ecclesiastica 6. Padua: Editrice Antenore, 1966.

Mechilta d'Rabbi Ismael cum variis lectionibus et adnotationibus. Edited by Saul Horovitz and Israel Abraham Rabin. 2nd ed. Jerusalem: Bamberger & Wahrman, 1960.

Mekilta de-Rabbi Ishmael: A Critical Edition on the Basis of the Manuscripts and Early Editions with an English Translation, Introduction and Notes. Edited by Jacob Z. Lauterbach. 3 vols. Philadelphia, PA: The Jewish Publication Society of America, 1933–1935.

Mercier, Raymond. "Astronomical Tables in the Twelfth Century." In *Adelard of Bath: An*

English Scientist and Arabist of the Early Twelfth Century, edited by Charles Burnett, 87–118. Warburg Institute Surveys and Texts 14. London: The Warburg Institute, 1987.

———. "Astronomical Tables of Abraham Bar Ḥiyya." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 155–207. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Messahalae, antiquissimi ac laudatissimi inter Arabes astrologis, Libri tres. Edited by Joachim Heller. Nuremberg: Berg & Neuber, 1549.

Metlitzki, Dorothee. *The Matter of Araby in Medieval England*. New Haven, CT: Yale University Press, 1977.

Mews, Constant J., and Micha J. Perry. "Peter Abelard, Heloise and Jewish Biblical Exegesis in the Twelfth Century." *Journal of Ecclesiastical History* 62 (2011): 3–19.

Michel, Henri. "Les manuscrits astronomiques de la Bibliothèque royale de Belgique." *Ciel et Terre* 65 (1949): 199–204.

Milikowsky, Chaim. *Seder Olam: Critical Edition with Introduction and Commentary*. [in Hebrew.] 3 vols. Jerusalem: Israel Academy of Sciences, forthcoming.

Millás Vallicrosa, José María. *Las traducciones orientales en los manuscritos de la Biblioteca Catedral de Toledo*. Madrid: Consejo Superior de Investigaciones Científicas, 1942.

———. *El libro de los fundamentos de las Tablas astronómicas de R. Abraham Ibn Ezra*. Instituto Arias Montano, Ser. D, 2. Madrid: Casa Provincial de Caridad, 1947.

Minnis, A.J. *Medieval Theory of Authorship: Scholastic Literary Attitudes in the Later Middle Ages*. 2nd ed. Aldershot: Wildwood House, 1988.

Minnis, A.J., and A.B. Scott, eds. *Medieval Literary Theory and Criticism, c. 1100–c. 1375: The Commentary Tradition*. Oxford: Clarendon Press, 1988.

Mohan, Gaudens E. *Initia operum Franciscalium*. Offprint from Franciscan Studies 35–38 (1975–1978). St. Bonaventure, NY: The Franciscan Institute, 1957.

Molhuysen, Philipp Christiaan. *Codices Scaligerani* (*praeter Orientales*). Bibliotheca Universitatis Leidensis: Codices Manuscripti 2. Leiden: Brill, 1910.

Molinier, Auguste. *Catalogue général de manuscrits des bibliothèques publiques en France: Departments*. Vol. 17, *Cambrai*. Paris: Plon, 1891.

Mommsen, Theodor. *Chronica minora saec. IV.V. VI. VII*. Vol. 2. MGH Auctores Antiquissimi 11. Berlin: Weidmann, 1894.

Montanos Ferrín, Emma. "'Dies naturalis' y 'dies artificialis'." In *Proceedings of the Eleventh International Congress of Medieval Canon Law*, edited by Manlio Bellomo and Orazio Condorelli, 401–408. Monumenta Iuris Canonici, Series C: Subsidia 12. Vatican City: Biblioteca Apostolica Vaticana, 2006.

Moore, Rebecca. *Jews and Christians in the Life and Thought of Hugh of St. Victor*. South Florida Studies in the History of Judaism 138. Atlanta, GA: Scholars Press, 1998.

Moorman, John R.H. *Church Life in England in the Thirteenth Century*. Cambridge: University Press, 1946.

Moreton, Jennifer. *Compotus ecclesiasticus: A Thirteenth-Century Calendar Treatise in Its Context* (unpublished manuscript, based on a PhD Diss., Dublin, 1992).

———. "John of Sacrobosco and the Calendar." *Viator* 25 (1994): 229–244.

———. "Before Grosseteste: Roger of Hereford and Calendar Reform in Eleventh- and Twelfth-Century England." *Isis* 86 (1995): 562–586.

———. "Doubts about the Calendar: Bede and the Eclipse of 664." *Isis* 89 (1998): 50–65.

———. "The *Compotus* of 'Constabularius' (1175): A Preliminary Study." In *Langage, Sciences, Philosophie au XII^e siècle*, edited by Joël Biard, 61–82. Paris: Vrin, 1999.

———. "On *Not* Editing Grosseteste." In *Editing Robert Grosseteste*, edited by Evelyn A. Mackie and Joseph Goering, 167–184. Toronto: University of Toronto Press, 2003.

Morey, James H. "Peter Comestor, Biblical Paraphrase, and the Medieval Popular Bible." *Speculum* 68 (1993): 6–35.

Morin, Germain. "L'Ambrosiaster et le juif converti Isaac, contemporain du pape Damase." *Révue d'histoire et de littérature religieuses* 4 (1899): 97–121.

Mosshammer, Alden A. *The Easter Computus and the Origins of the Christian Era*. Oxford: Oxford University Press, 2008.

Muczkowski, Joseph, ed. *Statuta nec non Liber promotionum philosophorum ordinis in Universitate studiorum Jagellonica, ab anno 1402 ad annum 1849*. Kraków: Typis Universitatis, 1849.

Müller, Tom. *"Ut reiecto paschali errore veritati insistamus": Nikolaus von Kues und seine Konzilsschrift* De reparatione kalendarii. Buchreihe der Cusanus-Gesellschaft 17. Münster: Aschendorff, 2010.

Munding, Emmanuel. *Die Kalendarien von St. Gallen: Aus 21 Handschriften, neuntes bis elftes Jahrhundert*. 2 vols. Texte und Arbeiten 1.36. Beuron in Hohenzollern: Beuroner Kunstverlag, 1948.

Munk, S. *Philosophy and Philosophical Authors of the Jews: A Historical Sketch*. Translated by Isidor Kalisch. Cincinnati, OH: Bloch, 1881.

Münster, Sebastian. *Kalendarium Hebraicum, opera Sebastiani Munsteri ex Hebraeorum penetralibus iam recens in lucem aeditum: quod non tam Hebraice studiosis quam Historiographis & Astronomiae peritis subservire poterit*. Basel: Froben, 1527.

Murray, H.J.R. *A History of Chess*. Oxford: Clarendon Press, 1913.

Mütz, Karl, ed. *"Computus Chirometralis": Spätmittelalterliches Lehrbuch für Kalenderrechnung*. Tübinger Bausteine zur Landesgeschichte 3. Leinfelden-Echterdingen: DRW-Verlag, 2003.

Muzerelle, Denis. *Manuscrits datés des bibliothèques de France*. Vol. 1, *Cambrai*. Paris: CNRS Éditions, 2000.

Nagl, Alfred. "Ueber eine Algorismus-Schrift des XII. Jahrhunderts und über die Verbreitung der indisch-arabischen Rechenkunst und Zahlzeichen im christl. Abendlande." *Zeitschrift für Mathematik und Physik*, hist.-lit. Abt., 34 (1889): 129–146, 161–170.

Narducci, Enrico. "Sur un manuscit du Vatican, du XIV siècle, contenant un traité de calcul emprunté à la méthode 'Gôbari'." *Bulletin de sciences mathématiques et astronomiques*, 2nd Ser., 7 (1883): 247–256.

———. *Catalogo di manoscritti ora posseduti da D. Baldassare Boncompagni*. 2nd ed. Rome: Tipografia delle Scienze Matematiche e Fisiche, 1892.

Naumowicz, Józef. "La date de naissance du Christ d'après Denys le Petit et les auteurs chrétiens antérieurs." *Studia Patristica* 34 (2001), 292–296.

Nauta, Lodi. "The Scholastic Context of the Boethius Commentary by Nicholas Trevet." In *Boethius in the Middle Ages: Latin and Vernacular Traditions of the* Consolatio Philosophiae, edited by Maarten J.F.M. Hoenen and Lodi Nauta, 41–67. Studien und Texte zur Geistesgeschichte des Mittelalters 58. Leiden: Brill, 1997.

Neugebauer, Otto. "'Years' in Royal Canons." In *A Locust's Leg: Studies in Honour of S.H. Taqizadeh*, 209–212. London: Lund, Humphries & Co, 1962.

———. *The Astronomical Tables of Al-Khwārizmī: Translation with Commentaries of the Latin Version edited by H. Suter, supplemented by Corpus Christi College MS 283*. Kgl. Danske Vidensk. Selskab, Hist.-filos. Skr., 4.2. Copenhagen: Munksgaard, 1962.

———. *A History of Ancient Mathematical Astronomy*. 3 vols. Studies in the History of Mathematics and Physical Sciences 1. Berlin: Springer, 1975.

Nicholas of Cusa. *Die Kalenderverbesserung* (*De correctione kalendarii*). Edited by Viktor Stegemann. Heidelberg: Kerle, 1955.

Nicholas of Lyra. *Postilla super totam Bibliam*. 4 vols. Strasbourg, 1492; repr. Frankfurt: Minerva, 1971.

Niger (Schwartz), Jacobus. *Kalendarium cum vanae, Iudaeorum expectationis refutatione, et ad bellum in omne genus infidelium gerendum exhortatione annexa*. Vienna: Vietor, 1529.

Nolan, Edmond, and Samuel A. Hirsch. *The Greek Grammar of Roger Bacon and a Fragment of His Hebrew Grammar*. Cambridge: Cambridge University Press, 1902.

North, John D. *Richard of Wallingford: An Edition of His Writings with Introductions, English Translation and Commentary*. 3 vols. Oxford: Clarendon Press, 1976.

———. "Chronology and the Age of the World." In *Cosmology, History, and Theology*, edited by Wolfgang Yourgrau and Allen D. Breck, 307–333. New York: Plenum Press, 1977.

———. "Astrology and the Fortunes of Churches." *Centaurus* 24 (1980): 181–211.

———. "The Western Calendar—'Intolerabilis, Horribilis, et Derisibilis': Four Centuries of Discontent." In *Gregorian Reform of the Calendar: Proceedings of the Vatican Conference to Commemorate Its 400th Anniversary 1582–1982*, edited by George V. Coyne, Michael A. Hoskin, and Olaf Pedersen, 75–113. Vatican City: Specola Vaticana, 1983.

———. *Chaucer's Universe*. Oxford: Clarendon Press, 1988.

———. "Astronomy and Mathematics." In *The History of the University of Oxford*, vol. 2, *Late Medieval Oxford*, edited by J.I. Catto and Ralph Evans, 103–174. Oxford: Clarendon Press, 1992.

———. *Cosmos: An Illustrated History of Astronomy and Cosmology*. Chicago, IL: University of Chicago Press, 2008.

Nothaft, C.P.E. "Noah's Calendar: The Chronology of the Flood Narrative and the History of Astronomy in Sixteenth- and Seventeenth-Century Scholarship." *Journal of the Warburg and Courtauld Institutes* 74 (2011): 191–211.

———. "Between Crucifixion and Calendar Reform: Medieval Christian Perceptions of the Jewish Lunisolar Calendar." In *Living the Lunar Calendar*, edited by Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele, 259–267. Oxford: Oxbow Books, 2012.

———. *Dating the Passion: The Life of Jesus and the Emergence of Scientific Chronology (200–1600)*. Time, Astronomy, and Calendars: Texts and Studies 1. Leiden: Brill, 2012.

———. "Nicholas Trevet and the Chronology of the Crucifixion." *The Mediaeval Journal* 2, no. 2 (2012): 37–51.

———. "An Eleventh-Century Chronologer at Work: Marianus Scottus and the Quest for the Missing 22 Years." *Speculum* 88 (2013): 457–482.

———. "A Sixteenth-Century Debate on the Jewish Calendar: Jacob Christmann and Joseph Justus Scaliger." *Jewish Quarterly Review* 103 (2013): 47–73.

———. "*Me pudet audire Iudeum talia scire*: A Late Medieval Latin School Text on the Jewish Calendar." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 327–365. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

———. "Reforming the Calendar at the University of Salamanca ca. 1468: Pedro Martínez de Osma and His *Disputatio de anno* …," *eHumanista* 23 (2013): 522–556.

———. "Robert of Leicester's Treatise on the Hebrew *Computus* and the Study of Jewish Knowledge in Medieval England." *Jewish Historical Studies* (2013): 63–78.

———. "The Meaning of *Judaeus* and the Myth of Jewish Male Menses in a Late Medieval Astronomical School Text." *European Journal of Jewish Studies* 7 (2013): 73–91.

———. "Chronologically Confused: Claudius of Turin and the Date of Christ's Passion." In *Proceedings of the 3rd Galway Computus Conference*, edited by Immo Warntjes and Dáibhí Ó Cróinín. Turnhout: Brepols, forthcoming 2014.

———. "A Tool for Many Purposes: Hermann Zoest (d. 1445) and the Christian Appropriation of the Jewish Calendar." *Journal of Jewish Studies* (forthcoming 2014).

———. "Duking it out in the Arena of Time: Chronology and the Christian-Jewish Encounter (1100–1600)." In *Religious Criticism and the Growth of Knowledge*, edited by Harvey Hames = *Medieval Encounters* Special Volume (forthcoming).

———. "The Reception and Application of Arabic Science in Twelfth-Century Com-

putistics: New Evidence from Bavaria." *Journal for the History of Astronomy* 45 (2014): 35–60.

———. "John of Pulchro Rivo and John of Saxony: A *mise au point*." *Journal for the History of Astronomy* (forthcoming).

Nothaft, C.P.E., and Justine Isserles. "Calendars beyond Borders: Exchange of Calendrical Knowledge between Jews and Christians in Medieval Europe (12th–15th cent.)." *Medieval Encounters* 20 (2014): 1–37.

Nylander, Eva Nilsson. *The Mild Boredom of Order: A Study in the History of the Manuscript Collection of Queen Christine of Sweden*. Bokhistoriska Skrifter 8. Lund: Institute of ALM and Book History, Lund University, 2011.

Ó Cróinín, Dáibhí. "A Seventh-Century Irish Computus from the Circle of Cummianus." *Proceedings of the Royal Irish Academy* 82C (1982): 405–430.

Odenius, Oloph. "Cisiojani Latini: Neue Beiträge zur Bibliographie der metrischen Kalendarien des Mittelalters." *Arv: Tidskrift för Nordisk Folkminnesforskning* 15 (1959): 61–154.

Offenberg, Adri K. "The First Use of Hebrew in a Book Printed in the Netherlands." *Quaerendo* 4 (1974): 44–54.

Ogg, George. *The Chronology of the Public Ministry of Jesus*. Cambridge: Cambridge University Press, 1940.

Olszowy-Schlanger, Judith. "The Knowledge and Practice of Hebrew Grammar among Christian Scholars in Pre-Expulsion England: The Evidence of 'bilingual' Hebrew-Latin Manuscripts." In *Hebrew Scholarship and the Medieval World*, edited by Nicholas de Lange, 107–128. Cambridge: Cambridge University Press, 2001.

———. *Les manuscrits hébreux dans l'Angleterre médiévale: étude historique et paléographique*. Collection de la Révue des études juives 29. Paris: Peeters, 2003.

———. "A Christian Tradition of Hebrew Vocalization in Medieval England." In *Semitic Studies in Honour of Edward Ullendorff*, edited by Geoffrey Khan, 126–146. Studies in Semitic Languages and Linguistics 47. Leiden: Brill, 2005.

———. "Rachi en latin: les gloses latines dans un manuscrit du commentaire de Rachi et les études hébraïques parmi des chrétiens dans l'Angleterre médiévale." In *Héritages de Rachi*, edited by René-Samuel Sirat, 137–150. Paris: Éditions de l'Éclat, 2006.

———. "Robert Wakefield and the Medieval Background of Hebrew Scholarship in Renaissance England." In *Hebrew to Latin, Latin to Hebrew: The Mirroring of Two Cultures in the Age of Humanism*, edited by Giulio Busi, 61–87. Berlin Studies in Judaism 1. Turin: Aragno, 2006.

———. "A School of Christian Hebraists in Thirteenth-Century England: A Unique Hebrew-Latin-French and English Dictionary and Its Sources." *European Journal of Jewish Studies* 1 (2007): 249–277

———. "Christian Hebraism in Thirteenth-Century England: The Evidence of He-

brew-Latin Manuscripts." In *Crossing Borders: Hebrew Manuscripts as a Meeting-Place of Cultures*, edited by Piet van Boxel and Sabine Arndt, 115–122. Oxford: Bodleian Library, 2009.

———., ed. *Dictionnaire hébreu-latin-français de la Bible hébraïque de l'Abbaye de Ramsey* (*XIIIe s.*). Nouveau Recueil des Lexiques Latin-Français du Moyen Âge 4. Turnhout: Brepols, 2008.

Omont, Henri. "Catalogue des manuscrits de Jean et Pierre Bourdelot, médecins parisiens." *Revue des bibliothèques* 1 (1891): 81–103.

Orlando, Thomas A. "Roger Bacon and the 'Testimonia gentilium de secta christiana'." *Recherches de théologie ancienne et médiévale* 43 (1976): 202–218.

Ouy, Gilbert, ed. *Le recueil épistolaire autographe de Pierre d'Ailly et les notes d'Italie de Jean de Montreuil: Cambrai 940, Vat. Reg. lat. 689A, Vat. Reg. lat. 1653*. Umbrae Codicum Occidentalium 9. Amsterdam: North-Holland, 1966.

Ovenden, Richard. "Jaspar Gryffyth and His Books." *British Library Journal* 22 (1994): 107–139.

Page, Christopher. "Biblical Instruments in Medieval Manuscript Illumination." *Early Music* 5 (1977): 299–309.

———. "Early 15th-Century Instruments in Jean de Gerson's 'Tractatus de Canticis'." *Early Music* 6 (1978): 339–349.

Palmer, Nigel F. "Das 'Exempelwerk der englischen Bettelmönche': Ein Gegenstück zu den 'Gesta Romanorum'?" In *Exempel und Exempelsammlungen*, edited by Walter Haug and Burghart Wachinger, 137–172. Fortuna Vitrea 2. Tübingen: Niemeyer, 1991.

Panti, Cecilia. *Moti, virtù e motori celesti nella cosmologia di Roberto Grossatesta: studio ed edizione dei trattati De sphera, De cometis, De motu supercelestium*. Corpus Philosophorum Medii Aevi: Testi e Studi 16. Florence: SISMEL, 2001.

Papias. *Elementarium doctrinae rudimentum*. Venice: Theodorus de Ragazonibus, 1491.

Päsler, Ralf G. "Auf der Suche nach Königsberger Handschriften: Bericht einer Exkursion nach Kaliningrad, St. Petersburg, Wilna und Thorn." *Preußenland* 34 (1996): 1–10.

———. "Die Handschriftensammlungen der Staats- und Universitätsbibliothek und des Staatsarchivs Königsberg." In *Königsberger Buch- und Bibliotheksgeschichte*, edited by Axel E. Walter, 189–249. Aus Archiven, Bibliotheken und Museen Mittel- und Osteuropas 1. Cologne: Böhlau, 2004.

———. "Zum Handschriftenbestand der ehemaligen Staats- und Universitätsbibliothek Königsberg: Quellenrepertorium und neues Standortverzeichnis." *Scriptorium* 61 (2007): 198–217.

Patschovsky, Alexander. "Der 'Talmudjude': Vom mittelalterlichen Ursprung eines neuzeitlichen Themas." In *Juden in der christlichen Umwelt während des späten Mittelalters*, edited by Alfred Haverkamp and Franz-Josef Ziwes, 13–27. Zeitschrift für Historische Forschung, Beiheft 13. Berlin: Duncker & Humblot, 1992.

Paul of Middelburg. *Epistola apologetica magistri Pauli de Middelburgo ad doctores Lovanienses*. Louvain: Johannes de Westfalia, 1488.

———. *Paulina de recta Paschae celebratione: et de die passionis domini nostri Iesu Christi*. Fossombrone: Ottaviano Petrucci, 1513.

Pedersen, Fritz S. *The Toledan Tables: A Review of the Manuscripts and the Textual Versions with an Edition*. 4 vols. Kongelige Danske Videnskabernes Selskab, historisk-filosofiske Skrifter, 24.1–4. Copenhagen: Reitzel, 2002.

Pedersen, Olaf. "The Corpus Astronomicum and the Traditions of Mediaeval Latin Astronomy." In *Colloquia Copernicana III: Proceedings of the Joint Symposium of the IAU and the IUHPS, cosponsored by the IAHS "Astronomy of Copernicus and Its Background", Toruń 1973*, edited by Owen Gingerich and Jerzy Dobrzycki, 57–96. Studia Copernicana 13. Wrocław: Wydawnictwo Polskiej Akademii Nauk, 1975.

———. *A Survey of the Almagest*. Odense: Odense University Press, 1974.

———. "The Ecclesiastical Calendar and the Life of the Church." In *Gregorian Reform of the Calendar: Proceedings of the Vatican Conference to Commemorate Its 400th Anniversary 1582–1982*, edited by George V. Coyne, Michael A. Hoskin, and Olaf Pedersen, 17–74. Vatican City: Specola Vaticana, 1983.

———. "In Quest of Sacrobosco." *Journal for the History of Astronomy* 16 (1985): 175–221.

Pellegrin, Elisabeth. "Catalogue des manuscrits de Jean et Pierre Bourdelot." *Scriptorium* 40 (1986): 202–232.

Perlbach, Max. "Der Uebersetzer des Wigand von Marburg." *Altpreussische Monatsschrift* 32 (1895): 411–424.

Peter of Auvergne. *Questions on Aristotle's* De Caelo: *A Critical Edition with an Interpretative Essay*. Edited by Griet Galle. Ancient and Medieval Philosophy 29. Leuven: Leuven University Press, 2003.

Petrus de Dacia. *A Mediaeval Commentary on Time-Reckoning: Computus metricus manualis cum commento Petri de Dacia*. Edited by Fritz S. Pedersen. Odense: Universitet, 1979.

Petrus de Dacia and Petrus de S. Audomaro. *Opera quadrivialia*. Edited by Fritz S. Pedersen. 2 vols. Corpus Philosophorum Danicorum Medii Aevi 10. Copenhagen: Gad, 1983–1984.

Pillonel-Wyrsch, Roland-Pierre. *Le calcul de la date de Pâques au Moyen Âge: analyse et commentaires sur "De Temporum Ratione" de Bède*. Fribourg: Academic Press, 2004.

Pingree, David. *The Thousands of Abū Ma'shar*. Studies of the Warburg Institute 30. London: The Warburg Institute, 1968.

Piper, Ferdinand. "Der erste Tag der Welt." In *Königlich Preussischer Staats-Kalender für das Jahr 1856*, 6–35. Berlin: Verlag der Königlichen Geheimen Ober-Hofbuchdruckerei, 1856.

———. *Die Kalendarien und Martyrologien der Angelsachsen; so wie das Martyrologium und der Computus der Herrad von Landsperg*. Berlin: Verlag der Königlichen Geheimen Ober-Hofbuchdruckerei, 1862.

Pitati, Pietro. *Paschales atque noviluniorum mensurni canones*. Venice: Giunti, 1537.

Pitts, John. *Relationum Historicarum de Rebus Anglicis*. Vol. 1. Paris: Thierry & Cramoisy, 1619.

Pizzamiglio, Pierluigi. *Gerardo da Cremona nella tradizione amanuense e tipografica*. Biblioteca Statale e libreria civica di Cremona, Mostra 14. Cremona: Biblioteca Statale, 1988.

———. "Le traduzioni matematiche Gerardiane e la tradizione matematica Cremonese." In *Gerardo da Cremona*, edited by Pierluigi Pizzamiglio, 85–112. Annali della Biblioteca statale e libreria civica di Cremona 41. Cremona: Biblioteca Statale, 1992.

Podlaha, Antonín. *Soupis rukopisů knihovny metropolitní kapitoly pražské*. Vol. 2: *F–P*. Soupis rukopisů knihoven a archivů zemí českých, jakož i rukopisných bohemik mimočeskych 4. Prague: Nákladem České Akademie věd a Umění, 1922.

Popper, Nicholas. *Walter Ralegh's* History of the World *and the Historical Culture of the Late Renaissance*. Chicago, IL: The University of Chicago Press, 2012.

Porphyrio, Pomponius. *Commentarii in Q. Horatium Flaccum*. Edited by Wilhelm Meyer. Leipzig: Teubner, 1874.

Poulle, Emmanuel. "Les astronomes parisiens au XIV^{e} siècle et l'astronomie alphonsine." In *Histoire littéraire de la France*. Vol. 43.1. Paris: Diffusion de Boccard, 2005.

Power, Amanda. "Seeking Remedies for Great Danger: Contemporary Appraisals of Roger Bacon's Expertise." In *Knowledge, Discipline, and Power in the Middle Ages: Essays in Honour of Daniel Luscombe*, edited by Joseph Canning, Edmund King, and Martial Staub, 63–78. Studien und Texte zur Geistesgeschichte des Mittelalters 106. Leiden: Brill, 2011.

———. *Roger Bacon and the Defence of Christendom*. Cambridge: Cambridge University Press, 2013.

Powicke, F.M. *The Medieval Books of Merton College*. Oxford: Clarendon Press, 1931.

Pratt, Robert A. "Chaucer and *Les Cronicles* of Nicholas Trevet." In *Studies in Language, Literature, and Culture of the Middle Ages and Later*, edited by E. Bagby Atwood and Archibald A. Hill, 303–311. Austin, TX: The University of Texas, 1969.

Price, B.B. "The Use of Astronomical Tables by Albertus Magnus." *Journal for the History of Astronomy* 22 (1991): 221–240.

Priebsch, Robert. *Deutsche Handschriften in England*. Vol. 2, *Das British Museum*. Erlangen: Junge, 1901.

Prijs, Joseph. *Die Basler hebräischen Drucke* (*1492–1866*). Edited by Bernhard Prijs. Olten: Graf, 1964.

Pronger, Winifred A. "Thomas Gascoigne." Pts. 1 and 2. *English Historical Review* 53 (1938): 606–626; 54 (1939): 20–37.

pseudo-Acro. *Scholia in Horatium vestustiora*. Edited by Otto Keller. 2 vols. Leipzig: Teubner, 1902–1904.

pseudo-Cyprian. *Adversus Iudaeos: Gegen die Judenchristen; die älteste lateinische Predigt*. Edited by Dirk van Damme. Paradosis 22. Fribourg: Universitätsverlag, 1969.

Ptolemy, Claudius. *Almagestum*. Edited by Petrus Liechtenstein. Venice, 1515.

———. *Almagest*. Translated by G.J. Toomer. New York: Springer, 1984.

Quétif, Jacques, and Jacques Échard. *Scriptores ordinis Praedicatorum recensiti, notisque historicis et criticis illustrati*. 2 vols. Paris: Ballard & Simart, 1719–1721.

Quintilian. *The Lesser Declamations*. Edited by D.R. Shackleton Bailey. 2 vols. Loeb Classical Library 500–501. Cambridge, MA: Harvard University Press, 2006.

Rauner, Erwin. *Katalog der lateinischen Handschriften der Bayerischen Staatsbibliothek München: Die Handschriften aus Augsburger Bibliotheken*. Vol. 1, *Stadtbibliothek: Clm 3501–3661*. Wiesbaden: Harrassowitz, 2007.

Rawlins, Dennis. "Aristarchos and the 'Babylonian' Month." In *Under One Sky: Astronomy and Mathematics in the Ancient Near East*, edited by John M. Steele and Annette Imhausen, 295–296. Alter Orient und Altes Testament 297. Münster: Ugarit-Verlag, 2002.

Regiomontanus, Johannes. *Kalendarium*. Nuremberg, 1474.

Repertorium Fontium Medii Aevi. Vol. 11, *Fontes T–Z*. Rome: Istituto storico italiano per il medio evo, 2007.

Resnick, Irven M. "Medieval Roots of the Myth of Jewish Male Menses." *Harvard Theological Review* 93 (2000): 241–263.

———. *Marks of Distinction: Christian Perceptions of Jews in the High Middle Ages*. Washington, DC: The Catholic University of America Press, 2012.

Rockar, Hans-Joachim. *Abendländische Bilderhandschriften der Forschungsbibliothek Gotha: Ein kurzes Verzeichnis mit 34 Abbildungen*. Gotha: Forschungsbibliothek, 1970.

Roest, Bert. "Later Medieval Institutional History." In *Historiography in the Middle Ages*, edited by Deborah Mauskopf Deliyannis, 277–315. Leiden: Brill, 2003.

Rose, Paul Lawrence. "When Was the Talmud Burnt at Paris? A Critical Examination of the Christian and Jewish Sources and a New Dating: June 1241." *Journal of Jewish Studies* 62 (2011): 324–339.

Rose, Valentin. *Verzeichnis der lateinischen Handschriften der Königlichen Bibliothek zu Berlin, Zweiter Band: Die Handschriften der Kurfürstlichen Bibliothek und der Kurfürstlichen Lande*. 3 vols. Die Handschriften-Verzeichnisse der Königlichen Bibliothek zu Berlin 13. Berlin: Asher, 1901–1905.

Rosińska, Grażyna. *Scientific Writings and Astronomical Tables in Cracow: A Census of Manuscript Sources (XIVth–XVIth Centuries)*. Studia Copernicana 22. Wrocław: Polish Academy of Sciences Press, 1984.

Roth, Cecil. "The Jews in the English Universities." *Jewish Historical Society of England: Miscellanies* 4 (1942): 102–115.

———. "Jews in Oxford after 1290." *Oxoniensia* 15 (1950): 63–80.

Ruf, Paul. *Mittelalterliche Bibliothekskataloge Deutschlands und der Schweiz*. Vol. 3.3, *Bistum Bamberg*. Munich: Beck, 1939.

Rüpke, Jörg. *Zeit und Fest: Eine Kulturgeschichte des Kalenders*. Munich: Beck, 2006.

Russell, Josiah C. "Hereford and Arabic Science in England about 1175–1200." *Isis* 18 (1932): 14–25.

———. *Dictionary of Writers of Thirteenth Century England*. London: Longmans, Green, 1936.

Rustow, Marina, and Sacha Stern. "The Jewish Calendar Controversy of 921–922: Reconstructing the Manuscripts and Their Transmission History." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 79–95. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Sack, Ronald Herbert. *Amel-Marduk, 562–560 B.C.: A Study Based on Cuneiform, Old Testament, Greek, Latin and Rabbinical Sources*. Neukirchen-Vluyn: Butzon & Bercker, 1972.

———. *Images of Nebuchadnezzar: The Emergence of a Legend*. 2nd ed. Selinsgrove, PA: Susquehanna University Press, 2004.

Saenger, Paul. "The Twelfth-Century Reception of Oriental Languages and the Graphic *Mise en page* of Latin Vulgate Bibles Copied in England." In *Form and Function in the Late Medieval Bible*, edited by Eyal Poleg and Laura Light, 31–66. Library of the Written Word 27; The Manuscript World 4. Leiden: Brill, 2013.

Salter, H.E., ed. *The Oxford Deeds of Balliol College*. Oxford Historical Society 64. Oxford: Clarendon Press, 1913.

Samsó, Julio. "El procés de la transmissió científica al nord-est de la península Ibèrica al segle XII: els textos llatins." In *La ciència en la història dels països Catalans*, edited by Joan Vernet and Ramon Parés, 3 vols., 1:269–296. Valencia: Institut d'Estudis Catalans, 2004–2009.

Sandman, Israel M. "Scribal Prerogative in Modifying Calendrical Tables." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 113–153. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Sarton, George. *Introduction to the History of Science*. 3 vols. Carnegie Institution of Washington Publication 376. Baltimore, MD: Williams & Wilkins, 1927–1948.

Saulnier, Stéphane. *Calendrical Variations in Second Temple Judaism: New Perspectives on the 'Date of the Last Supper' Debate*. Supplements to the Journal for the Study of Judaism 159. Leiden: Brill, 2012.

Saxl, Fritz. *Verzeichnis astrologischer und mythologischer Handschriften des lateinischen Mittelalters in römischen Bibliotheken*. Sitzungsberichte der Heidelberger Akademie der Wissenschaften, phil. hist. Kl., Jg. 1915, Abh. 6–7. Heidelberg: Winter, 1915.

Saxl, Fritz, and Hans Meier. *Catalogue of Astrological and Mythological Illuminated Manuscripts of the Latin Middle Ages III: Manuscripts in English Libraries*. 2 vols. London: The Warburg Institute, 1953.

Schabel, Chris. "John of Murs and Firmin of Beauval's Letter and Treatise on Calendar Reform for Clement VI." *Cahiers de l'Institut du Moyen-Âge Grec et Latin* 66 (1996): 187–215.

———. "The Quarrel over Unleavened Bread in Western Theology, 1234–1439." In *Greeks, Latins, and Intellectual History, 1204–1500*, edited by Martin Hinterberger and Chris Schabel, 85–127. Recherches de Théologie et Thilosophie médiévales: Bibliotheca 11. Louvain: Peeters, 2011.

Schabel, Christopher D., Fritz S. Pedersen, and Russell L. Friedman. "Matthew of Aquasparta and the Greeks." In *Philosophy and Theology in the Long Middle Ages: A Tribute to Stephen F. Brown*, edited by Kent Emery, Jr., Russell L. Friedman, and Andreas Speer, 813–853. Studien und Texte zur Geistesgeschichte des Mittelalters 105. Leiden: Brill, 2011.

Scherrer, Gustav. *Verzeichnis des Handschriften der Stiftsbibliothek von St. Gallen*. Halle: Verlag der Buchhandlung des Waisenhauses, 1875.

Schiffman, Lawrence H. "From Observation to Calculation: The Development of the Rabbinic Lunar Calendar." In *Living the Lunar Calendar*, edited by Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele, 231–243. Oxford: Oxbow Books, 2012.

Schild, Maurice E. *Abendländische Bibelvorreden bis zur Lutherbibel*. Quellen und Forschungen zur Reformationsgeschichte 39. Gütersloh: Mohn, 1970.

Schimek, Conrad. "Verzeichniss der Handschriften des Stiftes Lilienfeld." In *Die Handschriften-Verzeichnisse der Cistercienser-Stifte*, 2 vols, 1:481–561. Xenia Bernardina 2. Vienna: Hölder, 1891.

Schipke, Renate. *Die lateinischen Handschriften in Quarto der Staatsbibliothek Berlin Preussischer Kulturbesitz*. Vol. 1, *Ms. lat. quart. 146–406*. Staatsbibliothek zu Berlin Preussischer Kulturbesitz, Kataloge der Handschriftenabteilung, Erste Reihe: Handschriften 6.1. Wiesbaden: Harrassowitz, 2007.

Schmitz, Hans-Georg. *Kloster Prüfening im 12. Jahrhundert*. Miscellanea Bavarica Monacensia 49. Munich: Stadtarchiv.

Schönherr, Alfons. *Die Mittelalterlichen Handschriften der Zentralbibliothek Solothurn*. Solothurn: Zentralbibilothek, 1964.

Schröer, Alois. "Das Tridentinum und Münster." In *Das Weltkonzil von Trient: Sein Werden und Wirken*, edited by Georg Schreiber, 2 vols., 2:295–370. Freiburg: Herder, 1951.

Schuba, Ludwig. *Die Quadriviums-Handschriften der Codices Palatini Latini in der Vatikanischen Bibliothek*. Kataloge der Universitätsbibliothek Heidelberg 2. Wiesbaden: Reichert, 1992.

Schum, Wilhelm. *Beschreibendes Verzeichnis der amplonianischen Handschriften-Sammlung zu Erfurt*. Berlin: Weidmann, 1887.

Schwartz, Eduard. *Christliche und jüdische Ostertafeln*. Abhandlungen der Königlichen

Gesellschaft der Wissenschaften zu Göttingen, phil.-hist. Kl., n.s., vol. 8.6. Berlin: Weidmann, 1905.

Schwarz, Arthur Zacharias. "Aus den Handschriften der Wiener 'Tabulae'." In *Abhandlungen zur Erinnerung an Hirsch Perez Chajes*, 204–236. Veröffentlichungen der Alexander Kohut Memorial Foundation 7. Vienna: The Alexander Kohut Memorial Foundation, 1933.

Secundus the Silent Philosopher: The Greek Life of Secundus, Critically Edited and Restored so far as Possible together with Translations of the Greek and Oriental Versions, the Latin and Oriental Texts, and a Study of the Tradition. Edited by Ben Edwin Perry. Philological Monographs 22. Ithaca, NY: The American Philological Association, 1964.

Seder Olam: The Rabbinic View of Biblical Chronology. Translated by Heinrich W. Guggenheimer. Northvale, NJ: Aronson, 1998.

Segal, Eliezer. *In Those Days, At This Time: Holiness and History in the Jewish Calendar*. Calgary: University of Calgary Press, 2008.

Sela, Shlomo. "Contactos científicos entre judíos y cristianos en el siglo XII: el caso del *Libro de las Tablas Astronómicas* de Abraham Ibn Ezra en su versión latina y hebrea." *Miscelánea de Estudios Árabes y Hebraicos*, Sección de Hebreo, 45 (1996): 185–222.

———. "Algunos puntos de contacto entre el *Libro de las tablas astronómicas* en su versión latina y las obras literarias hebreas de Abraham Ibn Ezra." *Miscelánea de Estudios Árabes y Hebraicos*, Sección de Hebreo, 46 (1997): 37–56.

———. *Abraham Ibn Ezra and the Rise of Medieval Hebrew Science*. Brill's Series in Jewish Studies 32. Leiden: Brill, 2003.

Shalev-Eyni, Sarit. "Cosmological Signs in Calculating the Time of Redemption: The Christian Crucifixion and the Jewish New Moon of Nissan." *Viator* 35 (2004): 265–287.

Sharpe, Richard. *A Handlist of the Latin Writers of Great Britain and Ireland before 1540*. Publications of the Journal of Medieval Latin 1. Turnhout: Brepols, 1997.

Shields, Bruce P. "A Critical Edition of Selections from Nicholas Trivet's *Commentarius literalis in Psalterium iuxta Hebraeos sancti Hieronymi*." PhD Diss., Rutgers University, 1970.

Shooner, H.V. *Codices manuscripti operum Thomae de Aquino*. Vol. 2, *Bibliothecae Gdańsk—Münster*. Rome: Editori di San Tommaso, 1973.

Sibony, Moïse. "Le calendrier juif et ses problèmes." *Revue des études juives* 136 (1977): 139–154.

Sickel, Theodor. "Die Lunarbuchstaben in den Kalendarien des Mittelalters." *Sitzungsberichte der philosophisch-historischen Classe der kaiserlichen Akademie der Wissenschaften* [Vienna] 38 (1861): 153–201.

Sigebert and Godescalc of Gembloux. "Gesta Abbatum Gemblacensium." In *MGH Scriptores*, vol. 8, edited by Georg Heinrich Pertz, 523–564. Hannover: Hahn, 1848.

Signer, Michael A. "Thirteenth Century Christian Hebraism: The *Expositio* on Canticles in MS. Vat. Lat. 1053." In *Approaches to Judaism in the Middle Ages*, edited by David R. Blumenthal, 3 vols., 3:89–100. Chico, CA: Scholars Press, 1984–1988.

———. *"Peshaṭ, Sensus Litteralis*, and Sequential Narrative: Jewish Exegesis and the School of St. Victor in the Twelfth Century." In *The Frank Talmage Memorial Volume*, edited by Barry Walfish, 2 vols., 1:203–216. Haifa: Haifa University Press, 1992–1993.

———. "Polemic and Exegesis: The Varieties of Twelfth-Century Hebraism." In *Hebraica Veritas? Christian Hebraists and the Study of Judaism in Early Modern Europe*, edited by Allison P. Coudert and Jeffrey S. Shoulson, 21–32. Philadelphia, PA: University of Pennsylvania Press, 2004.

Silk, E.T., and Margaret Bolton-Hall. "Exposicio Fratris Nicolai Trevethi Anglici Ordinis Predicatorum super Boecio De consolacione." In *L'"Orpheé" de Boèce au Moyen Âge: Traductions françaises et commentaires latins* (*XIIe–XVe siècles*), edited by J. Keith Atkinson and Anna Maria Babbi, 197–211. Medioevi: Testi 2. Verona: Edizioni Fiorini, 2000.

Silvestre, Hubert. "Incipits des traités médiévaux de sciences expérimentales dans les Mss latins des Bruxelles." *Scriptorium* 5 (1951): 145–160.

———. "Le jour et l'heure de la nativité et de la résurrection pour Rupert de Deutz." In *Pascua Mediaevalia: Studies voor Prof. Dr. J.M. de Smet*, edited by R. Lievens, E. van Mingroot, and W. Verbeke, 619–630. Mediaevalia Lovaniensia, 1st Ser., 10. Leuven: University Press, 1983.

Singer, Samuel, ed. *Thesaurus proverbiorum Medii Aevi: Lexikon der Sprichwörter des romanisch-germanischen Mittelalters*. 13 vols. Berlin: de Gruyter, 1995–2002.

Sittig, Anne C. Kineret. "The Sabbath Epistle by Abraham Ibn Ezra: Its Purpose and Novelty." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 209–219. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Skemer, Don C. "*Armis Gunfe*: Remembering Egyptian Days." *Traditio* 65 (2010): 75–106.

Smalley, Beryl. *Hebrew Scholarship among Christians in XIIIth century England: As Illustrated by Some Hebrew-Latin Psalters; Read to the Society for Old Testament Study*. London: Shapiro, Vallentine & Co, 1939.

———. "Thomas Waleys O.P." *Archivum Fratrum Praedicatorum* 24 (1954): 50–107.

———. "Robert Holcot O.P." *Archivum Fratrum Praedicatorum* 26 (1956): 5–97.

———. *English Friars and Antiquity in the Early Fourteenth Century*. Oxford: Blackwell, 1960.

———. *The Study of the Bible in the Middle Ages*. 3rd ed. Oxford: Blackwell, 1983.

Smith, Alexandra. "Computerised Resources for Historical Research: Calendars, Chronology and the Life of Jesus Christ." In *Bridging the Gaps: Sources, Methodology and Approaches to Religion in History*, edited by Joaquim Carvalho, 29–56. Religion and Philosophy in Society 3. Pisa: Plus—Pisa University Press, 2008.

Smith, David Eugene, ed. *Le comput manuel de Magister Anianus*. Documents scientifiques du XVe siècle 4. Geneva, 1928. Reprint, Geneva: Slatkine, 1977.

Smithuis, Renate. "Abraham Ibn Ezra's Astrological Works in Hebrew and Latin: New Discoveries and Exhaustive Listing." *Aleph* 6 (2006): 239–338.

———. "Science in Normandy and England under the Angevins: The Creation of Abraham Ibn Ezra's Latin Works on Astronomy and Astrology." In *Hebrew to Latin, Latin to Hebrew: The Mirroring of Two Cultures in the Age of Humanism*, edited by Giulio Busi, 23–60. Berlin Studies in Judaism 1. Turin: Aragno, 2006.

Smoller, Laura Ackerman. *History, Prophecy, and the Stars: The Christian Astrology of Pierre d'Ailly, 1350–1420*. Princeton, NJ: Princeton University Press, 1994.

———. "The Alfonsine Tables and the End of the World: Astrology and Apocalyptic Calculation in the Later Middle Ages." In *The Devil, Heresy and Witchcraft in the Middle Ages: Essays in Honor of Jeffrey B. Russell*, edited by Alberto Ferreiro, 211–239. Cultures, Beliefs, and Traditions 6. Leiden: Brill, 1998.

Snedegar, Keith Voltaire. "John Ashenden and the *Scientia Astrorum Mertonensis*, with an Edition of Ashenden's *Pronosticationes*." PhD Diss., University of Oxford, 1988.

Souter, Alexander. *A Study of Ambrosiaster*. Texts and Studies: Contributions to Biblical and Patristic Literature 7.4. Cambridge: University Press, 1905.

Southern, R.W. *Robert Grosseteste: The Growth of an English Mind in Medieval Europe*. Oxford: Clarendon Press, 1986.

Speller, Lydia. "Ambrosiaster and the Jews." *Studia Patristica* 17 (1982): 72–78.

Sphera mundi noviter recognita cum commentariis et authoribus in hoc volumine contentis. Venice: Giunti, 1518.

Spier, Arthur. *The Comprehensive Hebrew Calendar: Twentieth to Twenty-Second Century (5660–5860, 1900–2100)*. 3rd ed. Jerusalem: Feldheim, 1986.

Stadler, Hubert M. "Textual and Literary Criticism and Hebrew Learning in English Old Testament Scholarship, as Exhibited by Nicholas Trevet's *Expositio litteralis Psalterii* and by MS Corpus Christi College (Oxford) 11." MLitt thesis, University of Oxford, 1989.

Staufer, Vinzent. *Catalogus codicum manu scriptorum qui in Bibliotheca monasterii Mellicensis O.S.B. servantur*. Wien: Hoelder 1889.

Steele, Robert, ed. *Opera hactenus inedita Rogeri Baconi*. Vol. 6, *Compotus Fratris Rogeri*. Oxford: Clarendon Press, 1926.

Stegmüller, Friedrich. *Repertorium Biblicum Medii Aevi*. 11 vols. Madrid: Consejo Superior de Investigaciones Científicas, 1950–1980.

Steinmetz, Dirk. *Die Gregorianische Kalenderreform von 1582: Korrektur der christlichen Zeitrechnung in der Frühen Neuzeit*. Oftersheim: Steinmetz, 2011.

Steinschneider, Moritz. *Catalogus librorum Hebraeorum in Bibliotheca Bodleiana*. 2 vols. Berlin: Friedlaender, 1852–1860.

———. "Miscellen." *Hebräische Bibliographie* 11 (1871): 57.

———. *Mathematik bei den Juden*. Berlin, 1893–1899. Reprint, Hildesheim: Olms, 1964.

———. "Miszellen und Notizen." *Zeitschrift für hebräische Bibliographie* 10 (1906): 60–63.

Stemberger, Günter. "Genesis in Rabbinic and Patristic Interpretation." In *The Exegetical Encounter between Jews and Christians in Late Antiquity*, edited by Emmanouela Grypeou and Helen Spurling, 143–162. Jewish and Christian Perspectives Series 18. Leiden: Brill, 2009.

Stern, Sacha. "Fictitious Calendars: Early Rabbinic Notions of Time, Astronomy and Reality." *Jewish Quarterly Review*, n.s., 87 (1996–1997): 103–129.

———. "The Origins of the Jewish Calendar." *Le'ela* 44 (October 1997): 2–6.

———. *Calendar and Community: A History of the Jewish Calendar, Second Century BCE–Tenth Century CE*. Oxford: Oxford University Press, 2001.

———. "Rabbi and the Origins of the Patriarchate." *Journal of Jewish Studies* 54 (2003): 193–215.

———. *Calendars in Antiquity: Empires, States, & Societies*. Oxford: Oxford University Press, 2012.

———. "The Rabbinic New Moon Procedure: Context and Significance." In *Living the Lunar Calendar*, edited by Jonathan Ben-Dov, Wayne Horowitz, and John M. Steele, 211–230. Oxford: Oxbow Books, 2012.

———. "Christian Calendars in Hebrew in Medieval Jewish Manuscripts." In *Religious Criticism and the Growth of Knowledge*, edited by Harvey Hames = *Medieval Encounters* Special Volume (forthcoming).

Stern, Sacha, and Piergabriele Mancuso. "An Astronomical Table by Shabbetai Donnolo and the Jewish Calendar in Tenth-Century Italy." *Aleph* 7 (2007): 13–41. With corrigenda in *Aleph* 8 (2008): 343–344.

Stewart-Sykes, Alister. *The Lamb's High Feast: Melito*, Peri Pascha *and the Quartodeciman Paschal Liturgy at Sardis*. Supplements to Vigiliae Christianae 42. Leiden: Brill, 1998.

Stieber, Joachim W. "The 'Hercules of the Eugenians' at the Crossroads: Nicholas of Cusa's Decision for the Pope and against the Council in 1436/37." In *Nicholas of Cusa in Search of God and Wisdom: Essays in Honor of Morimichi Watanabe*, edited by Gerald Christianson and Thomas M. Izbicki, 221–255. Studies in the History of Christian Thought 45. Leiden: Brill, 1991.

Stökl Ben Ezra, Daniel. *The Impact of Yom Kippur on Early Christianity: The Day of Atonement from Second Temple Judaism to the Fifth Century*. Wissenschaftliche Untersuchungen zum Neuen Testament 163. Tübingen: Mohr Siebeck, 2003.

———. "An Ancient List of Christian Festivals in *Toledot Yeshu*: Polemics as Indication for Interaction." *Harvard Theological Review* 102 (2009): 481–496.

Striedl, Hans. "Geschichte der Hebraica-Sammlung der Bayerischen Staatsbibliothek."

In *Orientalisches aus Münchener Bibliotheken und Sammlungen*, edited by Herbert Franke, 1–38. Wiesbaden: Steiner, 1957.

Strobel, August. *Texte zur Geschichte des frühchristlichen Osterkalenders*. Liturgiewissenschaftliche Quellen und Forschungen 64. Münster: Aschendorff, 1984.

Stummer, Friedrich. "Zwei Bruchstücke aus einer Handschrift des Kommentars des Nicolaus Trevet zum *Psalterium iuxta Hebraeos Hieronymi* im Archiv des Juliuspitals zu Würzburg." In *Festschrift Hans Vollmer zu seinem 70. Geburtstag am 9. Februar 1941*, 153–163. Bibel und deutsche Kultur 11. Potsdam: Athenaion, 1941.

Sudmann, Stefan. *Das Basler Konzil: Synodale Praxis zwischen Routine und Revolution*. Tradition—Reform—Innovation: Studien zur Modernität des Mittelalters 8. Frankfurt: Lang, 2005.

Summa Britonis sive Guillelmi Britonis Expositiones vocabulorum Bible. Edited by Lloyd W. Daly and Bernadine A. Daly. 2 vols. Padua: Editrice Antenore, 1975.

Suter, Heinrich, ed. *Die astronomischen Tafeln des Muḥammed ibn Mūsā al-Khwārizmī in der Bearbeitung des Maslama ibn Aḥmed al-Madjrīṭī und der latein. Übersetzung des Athelhard von Bath*. Kongelige Danske Videnskabernes Selskab, Skrifter, 7th Ser., Hist. og filos. Afd., 3.1. Copenhagen: Høst & Søn, 1914.

Swerdlow, Noel M. "The Length of the Year in the Original Proposal for the Gregorian Calendar." *Journal for the History of Astronomy* 17 (1986): 109–118.

Swetz, Frank J. *Capitalism and Arithmetic: The New Math of the 15th Century; Including the Full Text of the Treviso Arithmetic of 1478, translated by David Eugene Smith*. La Salle, IL: Open Court, 1987.

Szklenar, Hans. *Magister Nicolaus de Dybin: Vorstudien zu einer Edition seiner Schriften; Ein Beitrag zur Geschichte der literarischen Rhetorik im späteren Mittelalter*. Münchener Texte und Untersuchungen zur deutschen Literatur des Mittelalters 65. Munich: Artemis, 1981.

Szpiech, Ryan. *Conversion and Narrative: Reading and Religious Authority in Medieval Polemic*. Philadelphia, PA: University of Pennsylvania Press, 2013.

———. "Translation, Transcription, and Transliteration in the Polemics of Raymond Martini, O.P." In *Translating the Middle Ages*, edited by Karen L. Fresco and Charles D. Wright, 171–187. Aldershot: Ashgate, 2012.

Tabulae codicum manu scriptorum praeter graecos et orientales in Bibliotheca Palatina Vindobonensi asservatorum. 10 vols. Vienna: Gerold, 1864–1899.

Talley, Thomas J. "Liturgical Time in the Ancient Church: The State of Research." *Studia Liturgica* 14 (1982): 34–51.

———. "Further Light on the Quartodeciman Pascha and the Date of the Annunciation." *Studia Liturgica* 33 (2003): 151–158.

Tanner, Thomas. *Bibliotheca Britannico-Hibernica: sive, de scriptoribus, qui in Anglia, Scotia, et Hibernia ad saeculi XVII initium floruerunt*. London: Bowyer, 1748.

Ta-Shma, Israel M. "The Danger of Drinking Water during the Tequfa—The History of an Idea." [in Hebrew.] *Jerusalem Studies in Jewish Folklore* 17 (1995): 21–32.

The Chronicles of Jeraḥmeel; or, The Hebrew Bible Historiale. Translated by Moses Gaster. London: Royal Asiatic Society, 1899.

The Two Targums of Esther. Translated by Bernard Grossfeld. The Aramaic Bible 18. Edinburgh: T & T Clark, 1991.

Thiel, Matthias. *Grundlagen und Gestalt der Hebräischkenntnisse des frühen Mittelalters*. Spoleto: Centro Italiano di Studi Sull'Alto Medioevo, 1973.

Thomas Aquinas. *Summa Theologiae*. Edited by Pietro Caramello. 3 vols. Turin: Marietti, 1948–1950.

———. "De ente et essentia." In *Opera omnia iussu Leonis XIII P.M. edita*, vol. 43, 369–381. Rome: Editori di San Tommaso, 1976.

Thomson, Rodney M. *A Descriptive Catalogue of the Medieval Manuscripts of Merton College, Oxford*. Cambridge: Brewer, 2009.

Thorndike, Lynn. *A History of Magic and Experimental Science*. 8 vols. New York: Columbia University Press, 1923–1958.

———. "Aegidius of Lessines on Comets." In *Studies and Essays in the History of Science and Learning Offered in Homage to George Sarton on the Occaion of His Sixtieth Birthday, 31 August 1944*, edited by M.F. Ashley Montagu, 405–414. New York: Schuman, 1946.

———. *The* Sphere *of Sacrobosco and Its Commentators*. Corpus of Mediaeval Scientific Texts 2. Chicago, IL: The University of Chicago Press, 1949.

———. "Computus." *Speculum* 29 (1954): 223–238.

———. "Unde Versus." *Traditio* 11 (1955): 163–193.

———. "Notes on Some Astronomical, Astrological, and Mathematical Manuscripts of the Bibliothèque Nationale, Paris." *Journal of the Warburg and Courtauld Institutes* 20 (1957): 112–172.

———. "Four British Manuscripts of Scientific Works by Pierre d'Ailly." *Imago Mundi* 16 (1962): 157–160.

Thornton, Timothy C.G. "Problematical Passovers: Difficulties for Diaspora Jews and Early Christians in Determining Passover Dates During the First Three Centuries A.D." *Studia Patristica* 20 (1989): 402–408.

Tibbetts, Gerald R. "The Beginnings of a Cartographic Tradition." In *The History of Cartography*, vol. 2.1, *Cartography in the Traditional Islamic and South Asian Societies*, edited by J.B. Harley and David Woodward, 90–107. Chicago, IL: The University of Chicago Press, 1992.

Timmer, David E. "Biblical Exegesis and the Jewish-Christian Controversy in the Early Twelfth Century." *Church History* 58 (1989): 309–321.

Tobi, Yosef. *The Jews of Yemen: Studies in Their History and Culture*. Études sur le Judaïsme Médiéval 21. Leiden: Brill, 1999.

Tolan, John. *Petrus Alfonsi and His Medieval Readers*. Gainesville: University Press of Florida, 1993.

Tönsmeyer, Josef. "Hermann Zoestius von Marienfeld: Ein Vertreter der konziliaren Theorie am Konzil zu Basel." *Westfälische Zeitschrift* 87 (1930): 114–191.

Toomer, G.J. "A Survey of the Toledan Tables." *Osiris* 15 (1968): 5–174.

Tošnerová, Marie. *Rukopisné Fondy Zámeckých, hradních a palácových knihoven*. Studie o Rukopisech: Monographia 1. Prague: Archiv Akademie věd ČR, 1995.

Trachtenberg, Joshua. *The Devil and the Jews: The Medieval Conception of the Jews and Its Relation to Modern Anti-Semitism*. New Haven, CT: Yale University Press, 1943.

Truhlár, Joseph. *Catalogus codicum manu scriptorum latinorum qui in C.R. Bibliotheca Publica atque Universitatis Pragensis asservantur*. 2 vols. Prague: Sumptibus Regiae Societatis Scientiarum Bohemicae, 1905–1906.

Van Acker, Leonardo. "Nicolas Trevet et son interprétation de quelques passages de Tite-Live." *L'Antiquité classique* 31 (1962): 252–257.

van den Gheyn, J. *Catalogue des manuscrits de la Bibliothèque Royale de Belgique*. 13 vols. Brussels: Lamertin, 1901–1948.

van de Vyver, André. "Hucbald de Saint-Armand, écolâtre, et l'invention de Nombre d'or." In *Mélanges Auguste Pelzer: études d'histoire littéraire et doctrinale de la Scolastique médiévale offertes à Monseigneur Auguste Pelzer à l'occasion de son soixante-dixième anniversaire*, 61–79. Université de Louvain: Recueil de Travaux d'Histoire et de Philologie, 3rd Ser., Fasc. 26. Louvain: Bibliothèque de l'Université/Éditions de l'Institut Supérieur de Philosophie, 1947.

Van Engen, John H. *Rupert of Deutz*. Publications of the UCLA Center for Medieval and Renaissance Studies 18. Berkeley, CA: University of California Press, 1983.

van Liere, Frans. "Gamaliel, Twelfth-Century Christian Scholars, and the Attribution of the Talmud." *Medieval Perspectives* 17, no. 2 (2002): 93–104.

———. "Andrew of St. Victor, Jerome, and the Jews: Biblical Scholarship in the Twelfth-Century Renaissance." In *Scripture and Pluralism: Reading the Bible in the Religiously Plural Worlds of the Middle Ages and Renaissance*, edited by Thomas J. Hefferman and Thomas E. Burman, 59–75. Studies in the History of Christian Traditions 123. Leiden: Brill, 2005.

van Ommen, Kasper. "'*Je suis pauvre en tout, mesmement en livres*': Reconstructing the Legatum Scaligeri in Leiden University Library." In *Writings and Writing from Another World and Another Era: Investigations in Islamic Text and Script in Honour of Dr Januarius Justus Witkam*, edited by Robert M. Kerr and Thomas Milo, 293–329. Cambridge: Archetype, 2010.

van Wijk, Walter Émile. *De Gregoriaansche kalender: een technisch-tijdrekenkundige studie*. Maastricht: Stols, 1932.

———. *Le Nombre d'Or: étude de chronologie technique suivie du texte de la Massa compoti d'Alexandre de Villedieu*. The Hague: Nijhoff, 1936.

———., ed. *Le comput emendé de Reinherus de Paderborn* (*1171*). Verhandelingen der

Koninklijke Nederlandse Akademie van Wetenschappen, Afd. Letterkunde, n.s., vol. 57.3. Amsterdam: North-Holland, 1951.

Verbist, Peter. "Reconstructing the Past: The Chronicle of Marianus Scottus (d. 1082)." *Peritia* 16 (2002): 284–334.

———. *Duelling with the Past: Medieval Authors and the Problem of the Christian Era, c. 990–1135*. Studies in the Early Middle Ages 21. Turnhout: Brepols, 2010.

Vernet, Juan. "Un antiguo tratado sobre el calendario judío en las *Tabulae Probatae*." *Sefarad* 14 (1954): 59–78.

Vetter, Ferdinand. "Neues zu Justinger: Kunrat Justinger als Schüler und Fortsetzer Königshofens und die ältesten Geschichtsschreiber Berns und des Laupenstreites." *Jahrbuch für Schweizerische Geschichte* 31 (1906): 109–206.

Vincent of Beauvais. *Speculum quadruplex sive Speculum maius*. 4 vols. Douai, 1624. Reprint, Graz: Akademische Druck- u. Verlagsanstalt, 1964–1965.

Vogels, Heinrich Joseph. *Beiträge zur Geschichte des Diatessaron im Abendland*. Neutestamentliche Abhandlungen 8.1. Münster: Aschendorff, 1919.

von Bloh, Ute. "Hostis Oblivionis et Fundamentum Memoriae: Buchbesitz und Schriftgebrauch des Mathias von Kemnat." In *Wissen für den Hof: Der spätmittelalterliche Verschriftungsprozeß am Beispiel Heidelberg im 15. Jahrhundert*, edited by Jan-Dirk Müller, 29–120. Munich: Fink, 1994.

von Fichtenau, Heinrich. "Wolfger von Prüfening." *Mitteilungen des österreichischen Instituts für Geschichtsforschung* 51 (1937): 313–357.

von Heinemann, Otto. *Die Handschriften der Herzoglichen Bibliothek zu Wolfenbüttel, Erste Abtheilung: Die Helmstedter Handschriften*. Vol. 2. Wolfenbüttel: Zwissler, 1886.

———. *Die Augusteischen Handschriften*. Vol. 5, *Codex Guelferbytanus 34.1. Aug. 4° bis 117 Augusteus 4°*. Kataloge der Herzog-August-Bibliothek Wolfenbüttel: Die Alte Reihe 8. Wolfenbüttel, 1903. Reprint, Frankfurt: Klostermann, 1966.

von Scarpatetti, Beat Matthias. *Katalog der datierten Handschriften in der Schweiz in lateinischer Schrift vom Anfang des Mittelalters bis 1550*. Vol. 1, *Die Handschriften der Bibliotheken von Aarau, Appenzell und Basel*. Dietikon-Zurich: Graf, 1977.

von Scarpatetti, Beat Matthias, Rudolf Gamper, and Marlis Stähli. *Katalog der datierten Handschriften in der Schweiz in lateinischer Schrift von Anfang des Mittelalters bis 1500*. Vol. 3, *Die Handschriften der Bibliotheken St. Gallen–Zürich*. Zurich: Graf, 1991.

Vrolijk, Arnoud, and Kasper van Ommen, eds. *"All My Books in Foreign Tongues": Scaliger's Oriental Legacy in Leiden 1609–2009*. Kleine publicaties van de Leidse Universiteitsbibliotheek 79. Leiden: Leiden University Library, 2009.

Walde, Bernhard. *Christliche Hebraisten Deutschlands am Ausgang des Mittelalters*. Alttestamentliche Abhandlungen 6.2–3. Münster: Aschendorff, 1916.

Wallis, Faith, trans. *Bede: The Reckoning of Time*. Translated Texts for Historians 29. Liverpool: Liverpool University Press, 1999.

Walmsley, Conrad. "Two Long Lost Works of William Woodford and Robert of Leicester." *Archivum Franciscanum Historicum* 46 (1953): 458–470.

Walsh, Maura, and Dáibhí Ó Cróinín. *Cummian's Letter* De controversia paschali *and the* De ratione conputandi. Studies and Texts 86. Toronto: Pontifical Institute of Mediaeval Studies, 1988.

Walter, Axel E. "Das Schicksal der Königsberger Bibliotheken und Handschriften: Eine Zwischenbilanz." In *Königsberger Buch- und Bibliotheksgeschichte*, edited by Axel E. Walter, 1–68. Aus Archiven, Bibliotheken und Museen Mittel- und Osteuropas 1. Cologne: Böhlau, 2004.

Walther, Hans. *Initia carminum ac versuum medii aevi posterioris latinorum: Alphabetisches Verzeichnis der Versanfänge mittellateinischer Dichtungen*. Carmina medii aevi posteriois latina 1. Göttingen: Vandenhoeck & Ruprecht, 1959.

Ward, Tom R. "Music in the Library of Johannes Klein." In *Music in the German Renaissance: Sources, Styles, and Contexts*, edited by John Kmetz, 54–73. Cambridge: Cambridge University Press, 1994.

Warntjes, Immo. *The Munich Computus: Text and Translation; Irish Computistics between Isidore of Seville and the Venerable Bede and its Reception in Carolingian Times*. Sudhoffs Archiv: Beihefte 59. Stuttgart: Steiner, 2010.

———. "Irische Komputistik zwischen Isidor von Sevilla und Beda Venerabilis: Ursprung, karolingische Rezeption und generelle Forschungsperspektiven." *Viator* 42 Multilingual (2011): 1–31.

———. "Köln als naturwissenschaftliches Zentrum in der Karolingerzeit: Die frühmittelalterliche Kölner Schule und der Beginn der fränkischen Komputistik." In *Mittelalterliche Handschriften der Kölner Dombibliothek: Viertes Symposion der Diözesan- und Dombibliothek Köln zu den Dom-Manuskripten (26. bis 27. November 2010)*, edited by Heinz Finger and Harald Horst, 41–96. Libelli Rhenani 38. Cologne: Erzbischöfliche Diözesan- und Dombibliothek, 2012.

Wartenberg, Ilana. "The Hebrew Calendrical Bookshelf in the Early Twelfth Century: The Cases of Abraham Bar Ḥiyya and Jacob Bar Samson." In *Time, Astronomy, and Calendars in the Jewish Tradition*, edited by Sacha Stern and Charles Burnett, 97–111. Time, Astronomy, and Calendars: Texts and Studies 3. Leiden: Brill, 2014.

Wasserstein, David. J. "Grosseteste, the Jews and Mediaeval Christian Hebraism." In *Robert Grosseteste: New Perspectives on His Thought and Scholarship*, edited by James McEvoy, 357–376. Instrumenta Patristica 27. Turnhout: Brepols, 1995.

Watson, Andrew G. "Thomas Allen of Oxford and His Manuscripts." In *Medieval Scribes, Manuscripts & Libraries: Essays Presented to N. R.* Ker, edited by M.B. Parkes and Andrew G. Watson, 279–314. London: Scolar Press, 1978.

———. *Catalogue of Dated and Datable Manuscripts c. 700–1600 in The Department of Manuscripts, The British Library*. 2 vols. London: British Library, 1979.

Wattenbach, Wilhelm. "Über Hermann von Marienfeld aus Münster." *Sitzungsberichte*

der königlich preussischen Akademie der Wissenschaften zu Berlin, phil.-hist. Kl., 9 (1884): 93–109.

———. "Aus Handschriften der Berliner Bibliothek." *Neues Archiv der Gesellschaft für ältere deutsche Geschichtskunde* 9 (1884): 624–630.

Webb, John, ed. *A Roll of the Household Expenses of Richard de Swinfield, Bishop of Hereford, during Part of the Years 1289 and 1290*. 2 vols. Works of the Camden Society 59 & 62. London: Printed for the Camden Society, 1854–1855.

Weijers, Olga. *Le travail intellectuel à la Faculté des arts de Paris: textes et maîtres (ca. 1200–1500)*. 9 vols. Studia artistarum. Turnhout: Brepols, 1994–2012.

Weinberg, Joanna. "Invention and Convention: Jewish and Christian Critique of the Jewish Fixed Calendar." *Jewish History* 14 (2000): 317–330.

Weinstock, Horst. "Roger Bacon und das 'hebräische' Alphabet." *Aschkenas* 2 (1992): 15–48.

Weiss, Robert. "Notes on the Popularity of the Writings of Nicholas Trevet, O.P., in Italy during the First Half of the Fourteenth Century." *Dominican Studies* 1 (1948): 261–265.

———. "England and the Decree of the Council of Vienne on the Teaching of Greek, Arabic, Hebrew, and Syriac." *Bibliothèque d'Humanisme et Renaissance* 14 (1952): 1–9.

Wellisch, Hans H. *The Conversion of Scripts: Its Nature, History, and Utilization*. New York: Wiley, 1978.

Wenk, Wolfgang. *Zur Sammlung der 38 Homilien des Chrysostomus Latinus*. Wiener Studien: Beiheft 10. Verlag der Österreichischen Akademie der Wissenschaften, 1988.

Whalen, Brett Edward. "Rethinking the Schism of 1054: Authority, Heresy, and the Latin Rite." *Traditio* 62 (2007): 1–24.

Wiener, Leo. "On the Hebrew Element in Slavo-Judaeo-German." *Hebraica* 10 (1893–1894): 175–187.

Wiesenbach, Joachim. *Sigebert von Gembloux: Liber decennalis*. MGH Quellen zur Geistesgeschichte des Mittelalters 12. Weimar: Böhlau, 1986.

Wierschin, Martin. *Handschriften der Ratsbücherei Lüneburg*. Vol. 1, *Miscellanea und Historica*. Wiesbaden: Harrassowitz, 1969.

Wiesenberg, Ernest. "Appendix: Addenda and Corrigenda to Treatise VIII." In *The Code of Maimonides, Book Three: The Book of Seasons*, translated by Solomon Gandz and Hyman Klein, 557–602. Yale Judaica Series 14. New Haven, CT: Yale University Press, 1961.

Willi, Thomas. "Christliche Hebäisten der Renaissance und Reformation." *Judaica* 30 (1974): 78–85, 100–125.

———. "Hebraica Veritas in Basel: Christliche Hebraistik aus jüdischen Quellen." In *Congress Volume Basel 2001* (International Organization for the Study of the Old Testament), edited by A. Lemaire, 375–397. Supplements to Vetus Testamentum 92. Leiden: Brill, 2002.

Willi-Plein, Ina, and Thomas Willi. *Glaubensdolch und Messiasbeweis: Die Begegnung*

von Judentum, Christentum und Islam im 13. Jahrhundert in Spanien. Neukirchen-Vluyn: Neukirchener Verlag, 1980.

Wisłocki, Władysław. *Katalog Rękopisów Biblijoteki Uniwersytetu Jagiellońskiego*. 2 vols. Kraków: Drukarni Uniwersytetu Jagiellońskiego, 1877–1881.

Witter, Johann Jacob. *Catalogus codicum manuscriptorum, in Bibliotheca Sacri Ordinis Hierosolymitani Argentorati asservatorum, confectus*. Strasbourg: Kürsner, 1746.

Wittlin, Curt J. "Tite-Live, Trevet, Bersuire: un exemple de l'importance des commentaires médiévaux pour les premiers traducteurs." *The Humanities Association Review* 28 (1977): 217–231.

Wolny, J., M. Markowski, and Z. Kuksewicz. *Polonica w średniowiecznych rękopisach bibliotek monachijskich*. Wrocław: Zakład Narodowy im. Ossolińskich, 1969.

Wood, Anthony. *Historia et antiquitates universitatis Oxoniensis*. 2 vols. Oxford: Sheldon, 1674.

Wordsworth, Christopher. *The Ancient Kalendar of the University of Oxford: From Documents of the Fourteenth to the Seventeenth Century*. Oxford Historical Society 45. Oxford: Clarendon Press, 1904.

Wormald, Francis. "A Liturgical Calendar from Guisborough Priory, with some Obits." *Yorkshire Archaeological Journal* 31 (1932): 5–35.

———. *English Kalendars before A.D. 1100*. Henry Bradshaw Society 72. London, 1934. Reprint, Woodbridge: The Boydell Press, 1988.

———. *English Benedictine Kalendars after A.D. 1100*. 2 vols. Henry Bradshaw Society 77 & 81. London: Harrison and Sons, 1939–1946.

———. "The Liturgical Calendar of Glastonbury Abbey." In *Festschrift Bernhard Bischoff: Zu seinem 65. Geburtstag dargebracht von Freunden, Kollegen und Schülern*, edited by Johanne Autenrieth and Franz Brunhölzl, 326–345. Stuttgart: Hierseman, 1971.

Wunderle, Elisabeth. *Katalog der mittelalterlichen lateinischen Papierhandschriften: Aus den Sammlungen der Herzog von Sachsen-Coburg und Gotha'schen Stiftung für Kunst und Wissenschaft*. Die Handschriften der Forschungsbibliothek Gotha 1. Wiesbaden: Harrassowitz, 2002.

Yuval, Israel Jacob. *Two Nations in Your Womb: Perceptions of Jews and Christians in Late Antiquity and the Middle Ages*. Translated by Barbara Harshav and Jonathan Chipman. Berkeley, CA: University of California Press, 2006.

Zelzer, Michaela: "Zur Sprache des Ambrosiaster." *Wiener Studien*, n.s., 4 (1970): 196–213.

Zerubavel, Eviatar. *Hidden Rhythms: Schedules and Calendars in Social Life*. Berkeley, CA: University of California Press, 1985.

Ziggelaar, August. "The Papal Bull of 1582 Promulgating a Reform of the Calendar." In *Gregorian Reform of the Calendar: Proceedings of the Vatican Conference to Commemorate Its 400th Anniversary 1582–1982*, edited by George V. Coyne, Michael A. Hoskin, and Olaf Pedersen, 201–239. Vatican City: Specola Vaticana, 1983.

Zinn, Grover A. "History and Interpretation: 'Hebrew Truth', Judaism, and the Victorine Exegetical Tradition." In *Jews and Christians: Exploring the Past, Present, and Future*, edited by James H. Charlesworth, 100–122. New York: Crossroad, 1990.

Zinner, Ernst. *Verzeichnis der astronomischen Handschriften des deutschen Kulturgebietes*. Munich: Beck, 1925.

———. "Aus alten Handschriften." *Bericht der Naturforschenden Gesellschaft Bamberg* 38 (1962): 8–57.

Zoest, Hermann. *Tria Opuscula Theologica*. Edited by Hector Gottfried Masius. Copenhagen: Erythropel, 1701.

Zoranello, Pietro. *Catalogo dei codici latini della Biblioteca Nazionale Marciana di Venezia non compresi nel catalogo di G. Valentinelli*. 3 vols. Trezzano sul Naviglio: Etimar, 1980–1985.

Zuhorn, Karl. "Die Familie des Hermann Zoestius und des Malers Johann von Soest: Zugleich ein weiterer Beitrag zur Geschichte des Münsterschen Honoratiorentums im Mittelalter." *Westfalen* 27 (1948): 20–27.

Zurbonsen, Friedrich. *Hermannus Zoestius und seine historisch-politischen Schriften: Nach handschriftlichen Quellen des fünfzehnten Jahrhunderts*, Beilage zum Programm des Königl. Gymnasiums zu Warendorf. Warendorf: Schnell, 1884.

———. *Das "Chronicon Campi s. Mariae" in der ältesten Gestalt (1185–1422)*. Paderborn: Schöningh, 1884.

———. "Hermann Zoestius von Marienfeld und seine Schriften." *Westdeutsche Zeitschrift* 18 (1899): 146–173.

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