

The Novatian ‘Indifferent Canon’ and Pascha in Alexandria in 414: Hypatia’s Murder Case Reopened

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Abstract

In an earlier paper I suggested that the murder of the Alexandrian philosopher Hypatia by a clique of Bishop Cyril’s zealots resulted from her involvement in the conflict between the Roman and Alexandrian Churches regarding the date of Easter in the year 417. The murder would have been committed in March 416 after she had performed controversial astronomical observations that supported the Roman date over the Alexandrian one.

This version faces severe problems from various sides. Therefore, I suggest here another scenario, where an unorthodox position of the Novatian Church on determining the time of Easter and early Passover celebration in 414 triggered the chain of events leading to Hypatia’s murder. This scenario places the murder in March 415 and offers a unique time frame for all the related events. Here Hypatia displays astronomy skills that justify her subsequent historical reputation. I also shed light on the immediate circumstances of her murder, specifically suggesting it happened on the day she was making the equinoctial observations.

Finally, I propose instituting a memorial day for Hypatia on the day of the vernal equinox.

Keywords

Hypatia of Alexandria – Bishop Cyril – Novatian Church – presbyter Sabbatius – Easter – Passover – vernal equinox – equatorial ring – expulsion of Jews from Alexandria – Alexandrian calendar – Jewish calendar

1 Hypatia of Alexandria: Sources and Latest Conjecture

Hypatia's younger contemporary was Socrates Scholasticus of Constantinople who gave an account of her life and death in his *Historia Ecclesiastica* (HE), completed about 25 years after her murder, asserting (HE 7.15, SK 360.28-361.1)¹

she fell victim to the *jealousy* (φθόνος) which at that time prevailed. For as she had *frequent interviews* (συνετύλλανε συχνότερον) with Orestes [imperial prefect of Alexandria], it was calumniously reported among the Christian populace that it was she who prevented Orestes from being reconciled to the bishop [Cyril of Alexandria].

Sadly, this emotional account is fraught with ambiguities and omissions. For one, Socrates never explains what kind of “jealousy” prevailed. Second, he offers no reason for Hypatia’s “frequent interviews” with Orestes, nor does he clarify the issue between Orestes and Cyril. Further, according to Socrates (HE 7.15, SK 361.9-11), the murder occurred

in the fourth year of Cyril’s episcopate, under the tenth consulate of Honorius and the sixth of Theodosius, in the month of March during Lent.

The fourth year of Cyril’s episcopate, counted from October 412, points to March 416; the joint consulate of Honorius and Theodosius—to March 415. This discrepancy, together with the imperial decree of Sept 29, 416,² opened the door to defend 416 as the year of the murder.³ Although a majority of historians prefer another solution, suggested by Richard Hoche,⁴ that Socrates counted Cyril’s rule from January 412, the true resolution of the conflicting account should come only with understanding the reasons for and circumstances of the murder.

1 The references are to the critical edition (SK page.line) by Hansen, G. Chr., *Socrates. Kirchengeschichte. Die griechischen christlichen Schriftsteller der ersten Jahrhunderte*, N. F. 1 (Berlin, 1995). For English translation I was aided by a professional translator.

2 *Codex Theodosianus*, 16.2.42.1.

3 Wernsdorf, J.C., *de Hypatia, philosopha Alex.* diss. 4, Viteb (1748). Wolf, S., *Hypatia, die Philosophin von Alexandrien* (Vienna, 1879). Seeck, O., *Geschichte des Untergangs der antiken Welt*. Appendix to vol. VI (Stuttgart, 1921), 404-5.

4 Hoche, R., “Hypatia, die Tochter Theons,” *Philologus* 15 (1860), 435-474; esp. pp. 422-23.

The other ambiguities of Socrates are more subtle and will be resolved later, by comparing his account with the one by the Coptic priest John of Nikiu, Egypt (c. 696) extant in Ge'ez.⁵

The omissions of Socrates are even more unfortunate. Speaking of Hypatia's virtues, he focuses attention on her philosophy, where she was only an able *expounder of Plato and Plotinus*, while her greater achievements in the exact sciences—mathematics and astronomy—were not mentioned at all. This is in spite of a strong assertion by Philostorgius of Cappadocia, her contemporary, of Hypatia's "outstanding skills especially in the art of astronomy."⁶ Further to this assertion, the sixth century chronicler Hesychius of Miletus emphasizes that "she suffered for her exceptional skills, especially in astronomy,"⁷ and the tenth century author of *Suda* (Y, 166) elaborates that she composed commentaries on Diophantes and Apollonius, as well as an *Astronomical canon* (τὸν ἀστρονομικὸν κανόνα).⁸ Even John of Nikiu (*Chronicle* 84.87) mentions an "astrolabe" (Ge'ez: 'weleasToor Labaat'⁹) as one of her "enchanting" instruments. According to John Malalas of Antioch, Hypatia was "elderly"¹⁰ when murdered, thus she had time to develop different sides of her genius.

The *Astronomical Canon* mentioned by *Suda* was identified in 1926 after Adolphe Rome discovered in Florence a unique copy of Theon of Alexandria's Commentary to Book III of Ptolemy's *Syntaxis*.¹¹ The Commentary begins with Theon's statement: "the edition had been revised by my daughter the philosopher Hypatia."¹² Whatever her role,¹³ her contribution to the Commentary

5 *Chronique de Jean, évêque de Nikiou* / texte éthiopien publié et traduit par H. Zotenberg—Impr. nationale (Paris, 1883). English translation: Charles, R.H., *The Chronicle of John, Bishop of Nikiu*. (London, 1916).

6 "καὶ μάλιστα γὰρ περὶ τὴν ἀστροθεάσιμον τέχνην." Bidez, J., *Philostorgius. Kirchengeschichte. Die griechischen christlichen Schriftsteller der ersten Jahrhunderte*, 21 (3rd ed., Berlin, 2013), 111, line 5, VIII.9.

7 "Τοῦτο δὲ πέπονθε διὰ τὴν ὑπερβάλλουσαν σοφίαν, καὶ μάλιστα εἰς τὰ περὶ ἀστρονομίας." Mueller, K., *Fragmenta Historicorum Graecorum* (Leipzig, 1848), IV, 176, Y.67.

8 See, e.g., Frost, W., Deakin, M.A.B., and M. Wilkinson, "The *Suda* Article on Hypatia," *Monash University History of Mathematics, Pamphlet No. 61*, May 1995.

9 **ἸΑΝΝΗΣ ΝΙΚΙΟΥ** Zotenberg, 115.7-8.

10 «ἦν δὲ παλαιὰ γυνή». Thurn, J., *Ioannis Malalae Chronographia*. *Corpus Fontium Historiae Byzantinae* 35 (Berlin, 2000), XIV.12, 280, lines 69-70.

11 Florence, Biblioteca Nazionale Medicea Laurenziana, ms. Plutei 28, 18.

12 "ἐκδόσεως παραναγνωσθείσης τῆς φιλοσόφου θυγατρὸς μου Ὑπατίας". Rome, A., "Le Troisième Livre des Commentaires sur l'Almageste par Théon et Hypatie," *Annales de la Société Scientifique de Bruxelles* XLVI, 1926.

13 See the pertinent discussion in Cameron, A., Long, J., & Sherry, L., *Barbarians and Politics at the Court of Arcadius* (Berkeley, CA, 1993), 44-49.

on what was virtually the *astronomy bible* of Antiquity certainly established Hypatia's reputation as an astronomer in the scientific world of her time. This fact was unknown to German historians. Prior to 1926, Hypatia was widely viewed only as a capable mathematician, a commentator on Diophantus, Euclid, and Apollonius.

In recent decades, interest in Hypatia has been rekindled by several academic books dedicated to her¹⁴ and to the city of Alexandria in Antiquity.¹⁵ None of these works, however, provided a reason for her brutal murder, except for an obvious reference to her involvement in the conflict between Cyril and Orestes. Cyril's "systematic persecution of the 'heretical' Neo-Platonists at the University"¹⁶ is purely imaginary. None of Hypatia's contemporaries write about the alleged persecution of Neo-Platonists by Bishop Cyril. The first historically recorded persecution against philosophers was conducted by Emperor Justinian more than one hundred years later. The dark references by some authors that Hypatia was involved in opposition to Christianity are too vague. No author took seriously Hesychius' reference to a link between her murder and her astronomy skills. No author thus far has paid close attention to the fact she was murdered not by "fanatical parabolans possibly aided by Nitrian monks"¹⁷ but by a *clique* of Bishop Cyril's zealots led by an educated man, a lay reader at one of the local churches.

In my earlier (2010) paper¹⁸ I argued that Hypatia was murdered in March 416, becoming a casualty of the Roman vs. Alexandrian Churches' dissent over the correct date for Easter 417. Indeed, Easter is the *nexus* that could readily explain three important facts: the brutal murder accomplished by a clique of *educated* Christians; a reference to astronomy as the reason for Cyril's envy of Hypatia; and the involvement of the Roman Empire's top representative, the imperial prefect. The logic behind the murder involved the astronomical phenomenon that defines Easter—the vernal equinox. For many years the

14 Dzielska, M. and F. Lyra, *Hypatia of Alexandria* (Cambridge, MA, 1995). Deakin, M.A.B., *Hypatia of Alexandria: Mathematician and Martyr* (Bristol, 2007). Watts, E.J., "The Murder of Hypatia: Acceptable or Unacceptable Violence?" In: *Violence in Late Antiquity*. Edited H.A. Drake (Farnham, 2006), 333-42.

15 Haas, C., *Late Antiquity: Topography and Social Conflict*, (Baltimore, MD, 1997). Hahn, J., *Gewalt und religiöser Konflikt: Studien zu den Auseinandersetzungen zwischen Christen, Heiden und Juden im Osten des römischen Reiches von Konstantin bis Theodosius II.* (Berlin, 2004). Watts, E.J., *City and School* (Berkeley, CA, 2006). Watts, E.J., *Riot in Alexandria* (Berkeley, CA, 2010).

16 Alic, M., "Women and Technology in Ancient Alexandria: Maria and Hypatia," *Women's Studies International Quarterly* 4 (3), (1981), 305-312.

17 Alic (1981); also Dzielska (1995), 96.

18 Belenkiy, A., "An Astronomical Murder?" *Astronomy & Geophysics* 51 (2), (2010), 2.09-2.13.

Alexandrian Church computed the time of the equinox using a simple calculus from Alexandrian astronomer Claudius Ptolemy's *Syntaxis*. As we now know, Ptolemy's equinox calculus was wrong, lagging in 410s two days behind the true equinox, a fact that perhaps was not that obvious to the astronomy community until the late fourth century. I conjectured that as an eminent astronomer, Hypatia was called on by the imperial prefect, Orestes, to establish the time of the equinox, hence their "frequent interviews." Hypatia's answer, decisive for establishing Easter, favored Roman Church views against those of the Alexandrian Church. At the end of Lent 416, in the wake of deliberations about the date of Easter 417, upon which Cyril and Orestes could not agree, Hypatia was murdered by a clique of Cyril's zealots. The concurrence of the Passover Seder in 417 with the date of the Roman Paschal (first vernal full) moon, March 17, easily could have aggravated the situation, since Cyril viewed himself as besieged on three sides—by Rome, the Orestes-Hypatia duo, and the Jews—and therefore acted ruthlessly.

However, several threads in this version—political alignment, the astronomical method and tools used to establish the time of the vernal equinox, and the year of conflicting Easter dates—are left dangling and cause a number of serious objections.

True, observing sunrises and sunsets, coupled with ignorance of atmospheric refraction, could produce a three-day difference in the position of the equinox, erroneously pointing to March 16/17 as the time of the equinox instead of the correct March 19/20,¹⁹ which could be interpreted as favoring the Roman Church rather than the Alexandrian Church's Easter calculus. However, this method seems improbable for fifth century Alexandria as it requires high precision of clocks, within 2-3 minutes, which was only achieved for the first time in seventeenth-century Europe.²⁰ More importantly, this method renders Hypatia an amateur astronomer. In my 2010 paper, citing evidence from Hesychius of Miletus, Suda and John of Nikiu, I questioned whether she was a *practical* astronomer capable of finding the day of the equinox by observing the sun directly with the help of standard astronomical instruments rather than computing its position from *Syntaxis*. Only after reading Rome's 1926 paper was I convinced.

19 According to modern ephemerides, e.g., Guide 9 (www.projectpluto.com), the vernal equinox in 416 fell on March 19, 13:15 AT (local Alexandrian Time); on March 19, 19:04 AT, 417; on March 20, 1:37 AT, 414; and on March 20, 7:26 AT, 415. The timing is liable to uncertainty by up to 30 minutes.

20 Bennett M., Schatz M.F., Rockwood H., Wiesenfeld K., "Huygens's Clocks," *Proceedings of the Royal Society: Mathematical, Physical and Engineering Sciences*, 458, No. 2019 (Mar. 8, 2002), 563-79.

The earlier (2010) version has other difficulties—political and chronological. After the division of the Roman Empire in 395, the Roman Church could hardly challenge the Alexandrian Church's authority over calendar matters in the Eastern Empire.²¹ Thus, this line of conflict seems to lead to a dead end. Besides, if the murder is placed in 416, it is impossible to arrange the sequence of events related to the murder strictly according to Socrates' narrative. And while a certain ambiguity in the matter of counting the fourth year of Cyril's episcopate (started in October 412) may suggest 416, a majority of historians favor 415 as the year of the murder.

To remedy all these faults, I propose focusing on the events of the year 414, rather than of 417. First, I show that a Paschal vs. Passover conflict between Cyril and the local Jewish community in 414 may come to the foreground and substitute for the Rome vs. Alexandria Paschal feud. Next, I point to the most plausible reason behind the conflict, hidden inside the early Catholic Church. The roles of Orestes and Hypatia in this conflict from March 414 until March 415 become completely transparent. Then I discuss the particular circumstances of the murder. In the summary I briefly reiterate the whole story and conclude with a proposal to commemorate Hypatia.

2 When Could the Equinox Problem Have Loomed in History?

As an experienced astronomer, Hypatia would not have used the simplistic method of observing sunsets and sunrises if, of course, other methods were available. Moreover, observing the sun with classical instruments of Greek astronomers, a *meridian quadrant* at noon or an *equatorial ring*, would not require precise clocks, and, besides, would remove atmospheric refraction of sunlight as a potential source of error.²² Observing with these instruments would help to identify March 19/20 correctly as the dates of the equinox in 414-417 within a margin of error of a third of a day.²³ But when could March

21 See the decision of the Third Synod of Carthage of 397 regarding the Festal letters, Hefele, Ch. J. *A History of the Councils of the Church. From the original documents*. Vol. II. (Edinburgh, 1876), 408.

22 Evans, J., *The History and Practice of Ancient Astronomy* (Oxford, 1998), 206. Toomer, G.J., *Ptolemy's Almagest* (Princeton, NJ, 1998), 133-5.

23 The 7-hour error is the average error in observing the equinoxes by Hypatia's predecessor, the Greek astronomer Hipparchus of Rhodes. The reason for the error was an imprecise alignment of the equatorial ring. See Newton, R.R., *The Crime of Claudius Ptolemy* (Baltimore, MD, 1977), 99.

19/20 have been the centre of attention in the Christian world? The answer is 414—when March 20 was the date of the Roman Paschal moon, with Roman Easter falling on March 22.²⁴

What date was the Alexandrian Easter in 414? Otto Neugebauer²⁵ laid a claim that the Alexandrian Church calendar in the fourth century, or at least during the tenure of Bishop Athanasius (328-373), coincided with the *Ethiopic Easter Tables* (see Fig. 1), a set of 19-year-long tables. These tables have March 21 as the earliest date for the Alexandrian Paschal moon in 338, 357 and other years separated from these two by multiples of 19 years. Athanasius' x Festal letter for year 338 indeed sets the Paschal moon (14th Lunae) on March 21.²⁶

Extending this calendar periodically into the fifth century would bring the Alexandrian Paschal moon in 414 to March 21 with Easter Sunday on March 22.

Of course, Athanasius' successors could have used a different Paschal calendar. Though there are no records of the approach taken by his immediate successors, Peter and Timothy, his third successor to the Alexandrian Bishopric, Theophilus, in 387 issued an eloquent warning to the local Christians:

τοῦτο δὲ ποιοῦσιν ἀγνοοῦντες ὅτι τῆς ἐαρινῆς τροπῆς ἀρχομένης ἀπὸ τῆς πρὸ β' καλανδῶν ἀπριλίῳν τυγχάνει, ὃ ἐστι φαμενώθ κε', κατὰ δὲ Σύρους Ἄντιοχέας καὶ Μακεδόνας δύστρου μιᾶ καὶ εἰκάδι κατὰ τὸν ἡλιακὸν δρόμον, ἣν ἐπιτηρεῖν προσήκει μάλιστα, μὴ πως ταύτης κατωτέρω πεπλανημένως τις τὴν τεσσαρισκαιδεκαταῖαν κατὰ σελήνην τάξας διαμάρτη τοῦ πάσχα.²⁷

Don't be ignorant that the spring turning begins from 12 Kalends of April [= March 21], which is Phamenoth 25, or, according to the Antiochean Syrians and Macedonians, Dystros 21, due to the *sun's course*, which day one must especially mark, lest anyone erroneously place the fourteenth of the moon before that date and be mistaken about Easter.²⁸

24 Codex Vaticanus Reg. Chr. 2077. Mommsen, Th., *Chronographus Anni LXXXIII*. Monumenta Germaniae historica auctores antiquissimi 9.1 (Berlin, 1892), 741-2.

25 Neugebauer, O., "Ethiopic Easter Computus," *Oriens Christianus* 63 (4), (1979), 87-102.

26 Schaff, P. and H. Wace, *Festal Letters. Nicene and Post-Nicene Fathers of the Christian Church*. Second Series. Volume IV. *St. Athanasius: Select works and letters* (Grand Rapids, MI, 1991), 503.

27 Dindorf, L., *Chronicon paschale*. Corpus scriptorum historiae Byzantinae (Bonn, 1832), 29. Krusch, B., *Studien zur christlich-mittelalterlichen Chronologie* (Berlin, 1880), 223.

28 In Alexandria the Macedonian month Dystros was aligned with Phamenoth, in Antioch—with March. See E.J. Bickerman, *Chronology of the Ancient World*, revised edition (London, 1980), 48.

Year in the cycle	Rosh Hashanah (acc. Alexandrian calendar)	14th Lunae and Passover Seder (acc. Alexandrian calendar)	14th Lunae and Passover Seder (acc. Roman calendar)
1	30 Thoth	10 Pharmouthi	5 April
2	19 Thoth	29 Phamenoth	25 March
3	8 Phaophi	18 Pharmouthi	13 April
4	27 Thoth	7 Pharmouthi	2 April
5	16 Thoth	26 Phamenoth	22 March
6	5 Phaophi	15 Pharmouthi	10 April
7	24 Thoth	4 Pharmouthi	30 March
8	13 Phaophi	23 Pharmouthi	18 April (20 March *)
9	2 Phaophi	12 Pharmouthi	7 April
10	21 Thoth	1 Pharmouthi	27 March
11	10 Phaophi	20 Pharmouthi	15 April
12	29 Thoth	9 Pharmouthi	4 April
13	18 Thoth	28 Phamenoth	24 March
14	7 Phaophi	17 Pharmouthi	12 April
15	26 Thoth	6 Pharmouthi	1 April
16	15 Thoth	25 Phamenoth	21 March
17	4 Phaophi	14 Pharmouthi	9 April
18	23 Thoth	3 Pharmouthi	29 March
19	12 Phaophi	22 Pharmouthi	17 April (18 March **)

FIGURE 1 *The 19-year calendar cycle of the Alexandrian Church and the Alexandrian Jewish community in the fourth and fifth centuries. The second and third columns come from O. Neugebauer, "Ethiopic Easter Computus," Oriens Christianus, 63 (4), 1979, p. 94. The fourth column is a translation of the third into Roman calendar dates. The Egyptian month Phamenoth relates to March as Phamenoth X = March X-4, while the month Pharmouthi to April as Pharmouthi Y = April Y-5. The earliest Paschal moon falls on Phamenoth 25 = March 21 in line 16 corresponding to year 414 and alike, i.e., ±19 years apart. Line 8 corresponds to years 387, 406, and alike. Line 19 corresponds to year 417 and alike. "Saltus lunae" (a 12-day shift) is applied between lines 19 and 1. The asterisks in the fourth column show the confirmed changes in the Jewish calendar: * since 387, ** since 417.*

The target audience for this statement will become clear later. Here Theophilus argues that thus far, the vernal equinox day had not arrived *earlier* than March 21. More importantly, he makes an explicit reference to the “sun’s course,” which could have been known only from astronomical computations, most likely from Ptolemy’s *Syntaxis*, a major handbook of Alexandrian astronomers in the fourth and fifth centuries as commentaries by Pappus, Theon, and Hypatia witness.²⁹ Therefore, March 21 remained the decisive reference point for the Alexandrian bishops until at least 387 or even 412, the year of Theophilus’ death.

Whatever Theophilus’ opinion about the timing of the vernal equinox, his nephew and successor Cyril could have had a different opinion on this matter. Certainly the two were in conflict at the time of Theophilus’ death—this fact can be inferred from Synesius’ letter to Cyril.³⁰ As will be made clear later, their conflict had a direct relation to the calendar and therefore, on becoming the Alexandrian bishop in October 412, Cyril could have reversed Theophilus’ rules and begun using a different calendar scheme. Indeed, later Cyril composed his own 110-year-long Paschal list, for 403-512, superseding Theophilus’ 100-year-long Paschal list, for 380-479.³¹ The only reason for such a move could be a serious revision of Paschal dates. If Cyril followed Ptolemy, the most problematic would be the earliest Paschal moon on March 21 in 414. Indeed, according to *Syntaxis* 3.1, the vernal equinox in 414 had to fall on March 22, 2:31 AT,³² and thus celebrating Easter in 414 on March 22 would be a violation of the Alexandrian Easter by-laws. Cyril, with his passion for astronomy most likely restricted to studying *Syntaxis*, faced a true challenge!

The easiest way out of Cyril’s predicament would be to shift, without much ado, the Alexandrian Paschal moon by a day to Sunday, March 22, which would require postponing Easter only by a week, to March 29. For the sake of Christian unity, Pope Innocent could perhaps agree to a one-week delay; to legalize the

29 Sarton, G., “Commentaires de Pappus et de Théon d’Alexandrie sur l’Almageste. Tome III by Adolphe Rome: Théon d’Alexandrie,” *Isis*, 36 (3/4), (1946), 255-56. Ptolemy’s equinox in 387 was on March 22, 10:41.

30 PG 66: 675. Fitzgerald, A., *The Letters of Synesius of Cyrene* (Oxford, 1926), 97, letter 12. The letter states that Cyril was *separated*, though not excommunicated, “from his mother Church” for a long period of time.

31 See Mosshammer, A., *The Easter Computus and the Origins of the Christian Era* (Oxford, 2008), 190, 194. The details of both lists are missing.

32 The computation is straightforward using the position of the vernal equinox in 140 set by Ptolemy on March 22, 13:00 AT, and the “fact” that every 300 years the equinoxes occur 1 day earlier in the Julian and Alexandrian calendars. See Toomer (1998), 137-8.

new date for Rome he would need to postpone the Roman Paschal moon to the next day as well.

Or could Cyril have convinced the Pope to appoint the April full moon as the Paschal one and postpone the Easter celebration until April 19 or as late as April 26? There may have been a similar incident exactly 84 years earlier, in 330. According to the *Ambrosian table*, the Roman Paschal moon was on March 20 (Friday), and Rome had to celebrate Easter on March 22. But according to the *Chronograph 354*, which is believed to show the true Easter dates before 354, Rome celebrated Easter in 330 on April 19.³³ Thus, to resolve the conflicting dates, it is plausible to assume that in 330 Rome succumbed to Alexandrian pressure and celebrated Easter on April 19 together with Alexandria.³⁴

Now March 22 was a legitimate Easter date for the Roman Church in 414. What could be a powerful argument to convince the Pope to change the date of Easter? For that we have to look into the calendar of the Alexandrian Jewish community. Indeed, not accidentally, Socrates describes at length the Cyril vs. Jews crisis in 414 that led to the subsequent expulsion of the Jews from Alexandria.

3 **Passover in 414: Starting Point for a Chain of Violence**

What date was Passover in 414? To answer, one has to take a stance on the Jewish calendar; in particular, to decide whether to accept Neugebauer's (1979) assertion that Fig. 1 adequately represented the Jewish calendar intercalation cycle before the changes in lines 8 and 19 affected it, as discussed in the next section. The first documented change occurred in line 8 in 387 and such a move could have been implemented only *after* line 16 (corresponding to year 414) became as it appears in Fig. 1. The dates in Fig. 1 stand for the "14th Lunae" that corresponds to the *daytime* of Passover Seder (Nisan 14).³⁵ Though given in Fig. 1 as Phamenoth 25 = March 21, since the Jewish calendar might have undergone significant changes in year 359, the exact day of the Passover Seder in 414 needs to be ascertained from a historical fact or document. I shall demonstrate the Passover Seder in 414 was indeed on March 21.

Now, the only available historical evidence of that era—a marriage contract from the Egyptian city of Antinoopolis signed on Kislew 20, Wednesday—

33 Both tables can be found in Mosshammer (2008), 210-14.

34 Mosshammer (2008), 209.

35 Since Passover Seder is held at night, while a new Jewish calendar day starts at 18:00, the Seder belongs to Nisan 15.

belongs to year 417.³⁶ Counting back from this date 242 days (236 days that come from eight alternating 29 and 30-day months from Kislew to Nisan and 6 days), S. Stern concluded that Nisan 14 as well as the Passover Seder in 417 was on “c. 17 March.”³⁷ Let me prove the Passover Seder was on March 18, Sunday.

The Alexandrian civil calendar, like the Julian, had 365 days, and, like the Julian, once in four years had a leap year by adding an extra, 366th day on August 29 in the year preceding a Julian leap year with its double February 24.³⁸ To keep an 11-day shift between the dates of the same holiday in two consecutive years, a lunar calendar had to add an extra day in those years. Seven additional 30-day long months were intercalated throughout the 19-year cycle. To lock the lunar cycle to the civil calendar, a 12-day shift (the so-called “saltus lunae”) was made in one single year of the cycle. This was accomplished by dropping one day from the lunar calendar. Which months were responsible for these one-day additions and deletions?

As Neugebauer (1979) pointed out, in the Alexandrian Jewish calendar on Fig. 1 between Rosh Hashanah and Passover Seder there were always 190 days (177 days between Tishrei 1 to Nisan 1, coming from six alternating 30 or 29-day months plus the 13-day interval between Nisan 1 and Nisan 14). This means that the months of variable length were not Cheshvan and Kislew, as it is now, but those between Passover and Rosh Hashanah. In my paper describing the second century rabbinical analogue of the Alexandrian Jewish calendar, I found the variable months to be Nisan and Iyar.³⁹ Iyar 30 was added in the leap Julian years. Dropping the otherwise regular Nisan 30 in one single year of the 19-year cycle accounted for the “saltus lunae.” In the Alexandrian Jewish calendar, the role of Iyar 30 was played by Elul 30 of the preceding year.

According to Fig. 1, the 12-day shift appears between the Jewish holidays in line 19 and line 1, i.e., between Rosh Hashanah 416 and 417 and, simultaneously, between Passover 417 and 418, and thus, by implication, between Passover 417 and Rosh Hashanah 417. Therefore, Nisan 30 was dropped in 417. And, since 417 was not a leap Julian year, Iyar 30 was absent. Elul 30 was absent in 417

36 Sirat, C., Caudelier, P., Dukan, M., and Friedman, M.A. *La Ketouba de Cologne: un contrat de mariage juif à Antinoopolis*. Papyrologica Coloniensia 12 (Opladen, 1986), 20.

37 Stern, S., *Calendar and Community* (Oxford, 2001), 137-9. While Stern was not brave enough to write “March 17”, illogically he insists that “the rule of the equinox was breached.” The latter “rule” was as vague as Stern’s date.

38 Bickerman (1980), 49, correctly gives the sequence of the Alexandrian leap years. Yet he incorrectly claims that the Alexandrian year always began on August 29. See Bagnall, R.S. and K.A. Worp, *The Chronological Systems of Byzantine Egypt* (Zutphen, 1978), 95-102.

39 Belenkiy, A., “‘Shana Meuberet’, ‘Theory of Others’ and the origins of the Christian Ecclesiastical calendar,” *Oriens Christianus* 94 (2010), 147-75.

in Alexandria as well. This implies that in 417, between Nisan 14 and Kislew 20 (Wednesday) there were $235+6=241$ days, i.e., three days over the number of weeks, and thus the Passover Seder was held in Alexandria on Sunday, March 18.⁴⁰

Since the date of the holiday in the lunar calendar usually drops by three days in the solar calendar every three years with only one intercalary year in between, this means that in 414, the Passover Seder indeed was on March 21, Saturday, while the Passover celebration was on Sunday, March 22. This could be a great nuisance for the Church since March 22 was supposed to be Easter Sunday in Rome and Alexandria. As we know, one peculiar feature of the Roman Church's calendar was a purposeful design to avoid close coincidence between Easter and Passover. In cases when the Roman Paschal moon fell on Saturday, to avoid concurrence of Easter Sunday with Passover, the Roman Church postponed their Easter by a week. In 414, unwilling to celebrate Easter on Passover day, it might have considered postponing Easter to March 29 or to April. This could have suited Cyril's intentions. But such a delay presented a serious problem within the Church itself, as we shall see further, and the blame certainly rested on the Jews.

Can we discern the fact that Cyril was irritated by the timing of the Passover in 414? Socrates' narrative (*HE* 7.13, *SK* 357.27-31) of the expulsion of Jews from Alexandria provides some shreds of evidence. Simple-mindedly, Socrates believed the reason of the conflict was the love of Alexandrians for theatrical shows:

So it is that on the Shabbat day they [Jews] get together in a great crowd, as the Jews do nothing on that day, do not even listen to their Law but spend it in theatrical amusements, that day became one of disorder for the people (Ἐπειδὴ γὰρ ἐν ἡμέρᾳ σαββάτου ὄρχούμενος πλείονας ὄχλους συνήθροϊζε, τῷ Ἰουδαίους ἀργούντας ἐν αὐτῇ, μὴ τῇ ἀκροάσει τοῦ νόμου ἀλλὰ τοῖς θεατρικοῖς σχολάζειν, ἐπίμαχος τοῖς τοῦ δήμου μέρεσιν ἢ ἡμέρα κατέστη). Although this was in some degree controlled by the governor of Alexandria, nevertheless the Jews opposed these measures.

It is tempting to understand here the "Shabbat day" as *Passover* as John 19:31 does. One can imagine that Passover week in Alexandria was chosen by the

40 The argument prevents the Passover Seder from being on April 17, Tuesday, as in Fig. 1, line 19. It also precludes the existence in 417 of an extra 30-day month between Nisan and Kislew, which would place the Seder on Friday.

dancers as a kind of a cultural festival. To earn money they had to perform their shows in the Jewish Quarter, located in the city's northeastern corner.

However, there is no specific detail about the Passover in Socrates' description of the "Shabbat day." This lack of detail somewhat undermines the above reading. Moreover, Socrates is not shy in mentioning Passover explicitly in other parts of his narrative. Therefore "Shabbat day" may be taken in its regular meaning, implying that dancers used to gather in Alexandria every Saturday.⁴¹

But this reading also meets our goal, since one of the Saturdays in 414 was followed by the first day of Passover. To earn more money, the dancers could have stayed in the Jewish Quarter for one more day. The Jewish laws of observing festivals are less stringent than the laws that regulate the observance of Shabbat. In particular, dancing (or watching dancing) would have been perfectly appropriate on Passover. Certainly, loudly cheering the dancers and acrobats on Good Friday and Saturday—strict Catholic fasting days in 414⁴²—and also on Easter Sunday could have caused friction between Jewish and Christian neighbors across the boundary of the Jewish Quarter. Therefore Prefect Orestes felt he must regulate dancing on that day. But then there was an unexpected event (*HE* 7.13; *SK* 358.3-12):

When therefore Orestes the Prefect was publishing *an edict*, for so they are accustomed to call public notices, in the theatre for the regulation of the shows, some of Bishop Cyril's followers were present to learn the nature of the orders about to be issued. There was among them a certain Hierax, a teacher of the rudimentary branches of literature and a very enthusiastic listener of the Bishop Cyril's sermons, who made himself conspicuous by his forwardness in applauding. When the Jews observed Hierax in the theatre, they immediately cried out '*he had come there for no other purpose than to provoke people*' (δι' οὐδὲν ἄλλο παραβάλλει τῷ θεάτρῳ, ἢ ἵνα στάσιν τῷ δήμῳ ἐμβάλῃ.).

Why then were Cyril's followers present at the theater? In the fifth century, the Alexandrian Church would not yet have imposed its own rules on the way Passover was celebrated.⁴³ March 21 seemed to be a legitimate day for the Passover Seder in the Church's eyes for years. But in 414 the situation could

41 As did, e.g., Haas (1997), 302.

42 According to Theophilus, it was "not lawful to break the fast before 14th Lunae", see Krusch (1880), 220; Mosshammer (2008), 191.

43 This had to wait for the Codex of Justinian of 529, see Belenkiy, A., "A unique feature of the Jewish calendar—dekhiyot," *Culture & Cosmos* 6(1), (2002), 3-22.

have been special since, in Cyril's eyes, March 21 belonged to winter, not spring. How could Jews astronomically justify the Passover Seder on March 21 in 414 and an even more problematic one set on March 18 in 417?⁴⁴

In light of the quickly approaching Easter 417, with a potential clash over its date with the Roman Church in view, Cyril certainly sensed danger. Therefore Cyril's follower Hierax aimed to "provoke people" by asking Jews uncomfortable questions pertaining to astronomy. Whatever the "rudimental branches of literature" he taught, certainly he was a relatively educated man, and, as such, could have read *Syntaxis* or at least could understand Cyril's worry. Probably, this was not the first time Hierax had engaged the Jews in such debates. However, this time his attempt triggered the chain of events that led to violence. Orestes seized Hierax and subjected him to torture. Cyril called for the Jewish leaders and threatened them unless they desisted from molesting Christians. Socrates says that the Jewish populace (πλήθος τῶν Ἰουδαίων), on hearing of these menaces, instead of suppressing their violence, only became more furious, and conspired to destroy the Christians. One incident was especially violent (*HE* 7.13, SK 358.23-359.9):

Having agreed that each one of them should wear *on the finger a ring of the bark of a palm branch* (δακτυλίου φόρεμα ἐκ φοίνικος γεγονός φλοιοῦ θαλλοῦ), for the sake of mutual recognition, they determined to make a night attack on the Christians. They therefore sent persons into the streets to raise an outcry that the church named after Alexander was on fire. Thus many Christians on hearing this ran out, some from one direction and some from another, in great anxiety to save their church. The Jews immediately fell upon and slew them; readily distinguishing each other by their rings. At daybreak the authors of this atrocity could not be concealed: and Cyril, accompanied by an immense crowd of people, going to their *synagogues*, for so they call their house of prayer, took them away from them, and drove the Jews out of the city, permitting the

44 As the vernal equinox in 414 fell on March 20, 1:37 AT, it would be easy to justify on astronomical grounds the Passover Seder on March 21 in 414. It is a bit tricky, however, to justify on the same grounds the Passover Seder on March 18 in 417 since the vernal equinox in 417 fell on March 19, 19:04 AT. For justification, one may accept an opinion that the Alexandrian Jewish community followed the rabbinical injunction of the mid-fourth century (see Stern 2001: 168) that the vernal equinox should anticipate not the Seder but the "waving of a barley sheaf"—i.e., end of Nisan 15 (March 19, 18:00 AT). This logic would imply an about two-hour negative error in finding the time of the vernal equinox by the astronomer who consulted the Jewish community—an excellent precision!

multitude to plunder their goods. Thus the Jews who had inhabited the city from the time of Alexander the Macedonian were expelled from it, stripped of all they possessed, and dispersed, some in one direction and some in another.

John of Nikiu (*Chronicle* 84.99) gives a different account of the final stage:

And as for the *Jewish assassins* they expelled them from the city, and pilaged all their possessions and drove them forth wholly despoiled, and Orestes the prefect was unable to render them any help.

John's statement that only "Jewish assassins" (Ge'ez: 'Qetalyan'⁴⁵) were expelled seems illogical since it is unclear how Orestes could possibly "render them any help" while he certainly could do so for innocent citizens. The subsequent story of a Jewish physician, who succeeded in returning to Alexandria only after *converting to Christianity* (*HE* 7.13, *SK* 359.9-12), leaves little doubt that all the Jewish population was expelled and therefore Socrates here is closer to the truth than John.

The church of Alexander, supposedly set on fire by the Jews, may provide a key to finding the exact date for the expulsion.⁴⁶ This Alexander was the Alexandrian bishop in 313-328 and a leader of the Alexandrian delegation to the First Council of Nicaea in 325. He was involved in debates over the timing of Easter at the Council and afterwards composed a tract on the Easter computus. He is believed to have sent the very first Paschal letter in 326—a tradition followed by all Alexandrian bishops after him.

Bishop Alexander was such an authority on calendar matters that his name and his tract on the Easter computus could have been invoked by Alexandrian Christians during debates with Jews over the date of the vernal equinox in 414. It is then only logical to assume that Jewish zealots chose to attack the church named after this bishop. If this is the reason, the decision to attack on the commemorative day of the bishop, April 17, would be most obvious; but since it was Friday, the attack had to be postponed to Saturday night, April 18, the night of a

45 ቅታልዮን Zotenberg, 116.15.

46 Webb, R., *Demons and Dancing: Performance in Late Antiquity* (Cambridge, MA, 2008), 41-43, places the episode in 412 though without any justification. Theophanis in *Chronographia* (PG 108: 225-226) firmly places the expulsion a year before Hypatia's murder (though his dates for both events may be confused by one year).

full moon. As we know, retaliation from Bishop Cyril followed the next day, and thus the expulsion occurred on Sunday, April 19, 414.⁴⁷

4 Who Could Threaten Bishop Cyril's Supremacy?

The Alexandrian bishop was the major figure behind the chain of events that led to the expulsion of Jews from Alexandria in 414. My earlier (2010) paper proposed that Cyril felt threatened by the Jewish collaboration with Rome. But the history of Jewish relations with the Roman Church does not support this assumption. Besides, at that time, the Roman and Alexandrian Churches were never divided on major theological challenges: Arianism, Pelagianism, and Donatism/Novatianism. Nor do well-known political circumstances favor this conjecture. The division of the Roman Empire into two parts in 395 surely weakened Rome's influence on Constantinople, leaving the Alexandrian Church as the sole calendar maker for the Eastern Empire. If not the Roman Church, who else then, in Cyril's opinion, stood behind the Jews?

Certainly, Cyril saw a major threat to his power coming not from Rome, but from other powerful Christian groups, the Arians and Novatians. Arians stood against the principle of *homoousios* advocated by the Orthodox clergy since the First Council of Nicaea. Novatians stood against readmission of Christians who had lapsed from Christianity at the time of anti-Christian persecutions and did not recognize the authority of the Church to grant mercy at her will.

Socrates (*HE* 7.6; *SK* 352.3-5) describes the Arian leaders in Alexandria as learned men; one of the Arian leaders, Timothy, appreciated Hebrew, and probably read not only the Scriptures in Hebrew, but also the rabbinical Mishna and Tosefta. But after winning the Bishopric, however, Cyril did not persecute Arians, but instead attacked the seemingly quiet Novatians, confiscating their property as Pope Innocent had done earlier in Rome. According to Socrates (*HE* 7.7; *SK* 353.6-9),

Cyril immediately therefore shut down the churches of the Novatians at Alexandria, and took possession of all their consecrated vessels and ornaments; and then stripped their bishop Theopemptus of all that he had.

47 A difficulty with this version is that John of Nikiu (*Chronicle* 84.96) says the church of St Athanasius (not Alexander) had been set on fire. The former was a disciple and successor of the latter, and also could be cited as an authority in any calendar dispute, but his commemorative day falls two weeks later, on May 2.

Why such cruelty? The answer comes from another story of Socrates about the Novatian presbyter Sabbatius of Constantinople (*HE* 7.5; SK 351.8-9), who began holding separate meetings from his Bishop Sissinius:

Reading one day at one of these meetings that passage in the Gospel where it is said, 'Now it was the Feast of the Jews called the Pascha,' he added what was never written or heard of before: '*Cursed be he who celebrates Easter*⁴⁸ *out of the days of unleavened bread!*' («Ἐπικατάρατος, φησὶν, ὁ ἐξω ἀζύμων τὸ Πάσχα ποιήσας!») When these words were reported among the people, the most simple of the Novatian laity, deceived by this artifice, flocked to him.

Interpreting Mark 14:1 or Luke 22:1 or John 6:4, Sabbatius, a Novatian presbyter in Constantinople, argued for an obligatory celebration of Easter during the time of the Feast of Unleavened Bread, that is, Passover time! I.e., Sabbatius encouraged celebrating Easter within the same week as Jewish Passover, and therefore endorsed the correctness of Jewish computations of the vernal equinox, thus opening a Pandora's Box of astronomical debates—the area in which Cyril felt himself inferior to secular astronomers.

As Socrates reports, Sabbatius not only called for but soon actually celebrated an early Easter at the Passover time, which sadly resulted in the deaths of his seventy congregants. Socrates is notoriously ambiguous here (*HE* 7.5; SK 351.12-13; the interpolations in brackets are mine):

*For shortly afterwards he celebrated [Easter] in anticipation [of the Orthodox Easter]*⁴⁹ (Μετ' οὐ πολὺ γὰρ τὴν ἐκ προλήψεως ἑορτὴν ἔπετέλει) and many according to their custom flocked to him.

48 All English translations of *Historia Ecclesiastica* I examined: anonymous (1843), attributed to E. Walford, *The Greek Ecclesiastical Historians of the first six centuries of the Christian era in 6 vols.* [Socrates' *HE* forms Vol. III of this series] (London, 1843-46), as well as those copied from it: in Bohn's *Ecclesiastical Library*, 4 vols., 1851 and 1888, and by Bagster in 1868, as well the one by Schaff & Wace 1890—have erroneously translated here the word Πάσχα as *Passover* instead of the correct *Easter*. However, there is no way to celebrate Passover out of the days of Unleavened Bread since these two are practically synonyms! These mistranslations are most surprising since the classical 1668 Latin translation of Socrates by Henricus Valesius (PG 67: 746C) carefully distinguishes between Πάσχα referring to *Easter* and Ἰουδαίων Πάσχα referring to *Passover*.

49 I.e., he celebrated Easter (not a Passover!) a month earlier than the Orthodox did. This cannot be a lapse into Quartodecimanism, as Van Nuffelen, P., "Episcopal Succession in Constantinople (381-450 C.E.): The Local Dynamics of Power," *Journal of Early Christian*

Though the time was not specified by Socrates, this event occurred shortly before Dorotheus, Arian Bishop of Constantinople, died in the “seventh consulate of Honorius and second of Theodosius” (*HE* 7:6; SK 351.22-25), which is the year 407. The only year preceding 407 that could allow for a month-wide gap between Passover and Easter is 406. In fact, this is the year that stands 19 years (a complete calendar cycle) apart from year 387 which is notorious on its own.

Indeed, two different sources at two different locations—Bishop Ambrose of Milan⁵⁰ and John Chrysostom, then a Presbyter in Antioch,⁵¹ reported that local Jewish communities intended to celebrate Passover in 387 a month earlier than usual.⁵²

Theophilus’ warning in 387 could be a similar indication for Alexandria. The early Passover in 387⁵³ in Constantinople is confirmed by another story about Sabbatius who began celebrating Easter privately “in anticipation” soon after Novatian Bishop Agelius ordained his successors in the “sixth year of the reign of emperor Theodosius” (*HE* 5:21, SK 295.1-14), which is year 385.

This story concerning Sabbatius, coupled with Theophilus’ warning and John’s and Ambrose’s testimonies, reinforce the evidence that at least from 387 on all major Jewish communities of the Roman Empire began celebrating Passover Seder in year 8 of the cycle (see Fig. 1) a month earlier than the Church. The Sabbatius story of 406 testifies that this practice continued after 19 years, indicating a permanent change in the Jewish calendar.

But why would a single incident happening with one Novatian presbyter cause such a concern to Cyril? The answer is that it was a part of a general movement in the Novatian Church that began in Phrygia, during the reign of emperor Valens (364-378), of which Socrates presents a first-hand account, (*HE* 4:28; SK 264.31-265.6):

Studies 18:3 (2010), 425-51, asserts on p. 431. Sozomen (*HE* 7.18) clearly states that “Novatians observe the day of Resurrection” (Οἱ δὲ Νουατιανοὶ, τὴν ἀναστάσιμον ἡμέραν ἐπιτελοῦσιν).

50 “The Jews intend to celebrate Passover [Seder] in twelfth [month], not in the first, on March 20” (*Judaei duodecimo, non primo mense celebraturi sunt Pascha, hoc est, decimo tertio Kalendas Aprilis*) (*ep.* 23.15 [PL 16:1031] = *ep.* 13 *extra collectionem* [CSEL 82.2:229.163-178]). Stern (2001), 145-6, correctly admits that “Pascha” here means Seder. His conclusion, however, that the “calendar of Jews of Milan was based on sightings of the new moon” is certainly an aberration.

51 “ἡ πρώτη τῶν ἀζύμων εἰς κυριακὴν ἡμέραν ἐμπίπτει” “The first day of azymes is Sunday” (PG 48: 86g). Thus the first day of Passover fell on Sunday, March 21, 387.

52 The two dates perfectly agree between themselves, though they disagree with the entry in line 8 in Fig. 1 shifted by 30 days earlier. The reason will be discussed elsewhere.

53 And not in 384 as Van Nuffelen (2010), 431 asserts.

But those in Phrygia who are named after him Novatians, about this period changed the day of celebrating Easter, being averse to communion with other Christians even on this occasion. This was implemented by means of a few obscure bishops of that sect convening a Council at the village of Pazum, which is situated near the sources of the river Sangarius; for there they *promulgated a regulation to watch when Jews celebrate the Feast of Unleavened Bread and celebrate Easter with them* (ὄρον ἐκφέρουσιν ὥστε Ἰουδαίους ἐπιτηρεῖν ποιούντας τὰ ἄζυμα, καὶ σὺν αὐτοῖς τὴν τοῦ Πάσχα ἐπιτελεῖν ἑορτήν).

Notice “with them”—*not* on the same day as Passover Seder but *on Sunday* during the Feast of Unleavened Bread. Still, this decision produced a virulent reaction among Novatians of Constantinople that caused the convening of another Council in Sangarum in Bithynia. Since the real force behind the “few obscure bishops” at Pazum was Sabbatius, he was called to answer accusations that he plotted to become a bishop. When Sabbatius vigorously denied this charge and gave an oath not to pursue the bishopric, the rest were satisfied and accepted a so-called “Indifferent Canon” (HE 5:21, SK 296.9-15):

They passed a Canon respecting this feast, which they entitled ‘Indifferent Canon’ (ἀδιάφορον) declaring that a disagreement on such a point was not a sufficient reason for separation from the Church; and that the Council of Pazum had done nothing prejudicial to the catholic canon. That although the ancients, who lived nearest to the times of the apostles, differed about the observance of this festival, it did not prevent their communion with one another, nor create any dissension.

This remarkable document was supported by the Novatians of Rome (HE 5.21, SK 296.15-23):

Though the Novatians at imperial Rome had *never followed the Jewish practice, but always kept Easter after the equinox*⁵⁴ (μηδέποτε ἠκολουθηκέναι Ἰουδαίους· ἀλλὰ ποιούντας ἀεὶ μετ’ ἰσημερίαν τὸ Πάσχα), yet they did not separate from those of their own faith, who celebrated it on a different day. From these and many such considerations, they made the ‘Indifferent Canon’ (ἀδιάφορον), concerning Easter, whereby everyone was at liberty

54 The reference to the *equinox* and *only* to the equinox in this context is another proof that the Novatians did not practice Quartodecimanism, but always followed the Orthodox custom of celebrating Easter on Sunday.

to keep the custom which he had by predilection in this matter, if he so pleased, and that it should make no difference as regards communion, but even though celebrating differently they should be in accord with the [Novatian] Church.

At first Socrates repeats here the standard accusations that Jews allegedly celebrate Passover before the vernal equinox. But the major fact he confides is truly remarkable. Novatians of Constantinople and Rome (and likely also of Antioch and Alexandria!) not only failed to condemn Sabbatius but took an incredibly liberal stance on the touchiest issue—the Easter computus. Moreover, they based their decision on the fact that the issue lacked any authority from the Gospel. This was a time bomb ready to explode again in 406, 19 years later.⁵⁵

Indeed, the tension was in the air. Though Novatians in Rome followed the Orthodox custom of observing Easter, they were still persecuted by Pope Innocent (401-417) who “took away many of their churches” (*HE* 7:9; *SK* 355.6-8). The situation with Alexandrian Novatians’ early Easter celebration already could have presented a challenge to Bishop Theophilus’ authority in 387, as we have seen earlier from his speech, and again in 406. The difference in views on how to treat this challenge was likely a reason for the conflict between Theophilus and Cyril mentioned by Synesius: the former only admonished Novatians, the latter wanted to use harsh measures against them.

Cyril certainly remembered that situation very well and, on learning that Sabbatius attempted to become Novatian Bishop of Constantinople in 412 (*HE* 7:12, *SK* 357.1-8) and foreseeing a similar challenge from the local Alexandrian Novatian Church to his authority in 414 and 417, dealt with it in advance—by confiscating Novatian property soon after his installation as Bishop.

Actually, Cyril acted within the Imperial Code of Laws. Celebrating Easter at the wrong time was outlawed by Theodosius I in 382,⁵⁶ the law being confirmed and the penalties specified by Theodosius II on March 21, 413:

55 The “bomb” actually could have exploded even earlier—in the year 398—but we do not know the Passover date for that year. Socrates (*HE* 5.21, *SK* 296.29) says that Sabbatius “kept [an early Easter] in private during many years” (ἔποιεῖ τε τοῦτο ἐπὶ ἔτη πολλά) but these could be only years 387 and 398.

56 *Codex Theodosianus*, 16.5.9.2: “those who meet together in a day of Pascha, not complying with religion, must be undoubtedly considered as condemned by this law.” However, no punishment was specified.

*Sed si alio die novatiani, quam quo orthodoxorum antistites, praedicandum ac memorabilem saeculis diem paschae duxerint celebrandum, auctores illius conventionis deportatio pariter ac proscriptio subsequatur.*⁵⁷

But if Novatians consider celebrating Pascha on another day than the one established by Orthodox bishops during the centuries, the authors of that course are liable to deportation and subsequent proscription [confiscation of property].

Cyril availed himself of the decree of 413 to strike at his opponents. Though Socrates didn't mention it, the deportation of the Alexandrian Novatian bishop on Cyril's order certainly accompanied the confiscation of his property.⁵⁸ Cyril's strike was either preemptive if before March 22, 414, or *post hoc* if after March 22, 414. If *post hoc*, Cyril indeed succeeded in postponing Easter in 414.

5 Hypatia's Murder Case Reopened

The unexpected expulsion of the Jews from Alexandria in April 414 was the starting point for Orestes to launch his investigation into the reasons behind it, according to Socrates (*HE* 7.13; SK 359.12-17):

But Orestes, the Prefect of Alexandria, was filled with great indignation at these transactions, and was excessively grieved that a city of such magnitude should have been suddenly bereft of so large a portion of its population; he therefore at once communicated the whole affair to the emperor. Cyril also wrote [to the emperor], describing the outrageous conduct of the Jews, and in the meantime sent persons to Orestes to mediate reconciliation.

When Orestes rejected Cyril's attempts at reconciliation, the latter extended toward him the Bible, which the prefect rejected as a *proof*. Since Orestes was a

⁵⁷ *Codex Theodosianus*, 16.6.6.1.

⁵⁸ At the same time, Constantinople Bishop Atticus banished Sabbatius to the island of Rhodes (Socrates, *HE* 7.25; SK 373.21).

Christian, his rejection could only mean that the issue was one where the Bible has but dubious authority, like the question of *when* the spring starts.⁵⁹

Soon the prefect became a victim of violence himself. Five hundred monks from the Nitrian Desert came to Alexandria and attacked Orestes, calling him “Pagan and Greek” (θύτην καὶ Ἑλληνα) and wounding him with a rock (HE 7.14; SK 359.29). Was it but a pointer to the Greeks’ foremost vocation—astronomy—and astronomical observations mockingly or ignorantly understood as “sacrifices to pagan gods”—similar to “satanic wives” (Ge’ez: *SeHtate SeyTan*⁶⁰), as John of Nikiu (*Chronicle* 84.87) described Hypatia’s astronomical skills? This episode happened in the period between the expulsion and the murder of Hypatia, most likely in late 414. Assuming Orestes had realized the timing of the vernal equinox was the true reason for the expulsion, how would he have proceeded? He would have placed the problem into the hands of Hypatia—the expert astronomer of the era.

Being a competent astronomer, Hypatia would have immediately initiated observations with a meridian quadrant and equatorial ring. The ring offers the possibility of observing the equinoxes directly—by catching the moment when the upper part of the ring casts its shadow on the lower part—but it must be set up precisely in the plane of the celestial equator. Though Ptolemy in *Syntaxis* 5.12 set the zenith distance of the celestial equator at Alexandria as 30° 58’,⁶¹ it is exactly this angle that Hypatia had to verify or establish anew. A straightforward way to proceed was to find the sun’s zenith distance at the equinoxes. For that she had to observe with a meridian quadrant the sun’s zenith distance at the summer (in June) and winter (in December) solstices. Next, taking their average, she would establish the sun’s zenith distance at the equinoxes.⁶² Thus, by the end of 414, she would obtain the desired angle.

59 This sentiment was articulated by John Chrysostom in Homily III *Adversus Judaeos* (PG 48: 871): “Nor the Church knows the exactness of time” (Οὐδὲ γὰρ ἡ Ἐκκλησία χρόνων ἀκριβείαν οἶδεν). Orestes was baptized by Atticus (Socrates, HE 7.14; SK 359.31) who became bishop of Constantinople in March 406, soon after deposition of John Chrysostom and is said to adopt many of the latter’s views. Certainly neither Theophilus nor Cyril shared the sentiment.

60 በስጵሳተ ስደግግ Zotenberg, 115.9.

61 Toomer (1998), 247. Here 1’ (arcmin) = 1/60th part of 1°.

62 Evans (1998), 206.

The zenith distance of the celestial equator is equal to the city's geographical latitude. Now, Alexandria's latitude is $31^{\circ} 13'$ —greater by $15'$ than that given by Ptolemy. Exposure of this particular error of Ptolemy alone would have alarmed Cyril's party. Indeed, since near the equinoxes the sun elevates in the sky by $24'$ per day,⁶³ it would have reached the required altitude 15 hours earlier than would have been expected by students of *Syntaxis*.⁶⁴

Armed with the correct equinoctial angle, in spring 415, Hypatia would have been fully prepared to determine the exact time of the vernal equinox, exposing the full extent of Ptolemy's error. Starting observations with an equatorial ring in mid-March, she would have observed shadow from its upper part on its lower part in the early morning of March 20, c. 7:26 AT. Even neglecting the solar parallax,⁶⁵ this fact alone would place the vernal equinox two days earlier than that computed from *Syntaxis*. This outcome would establish March 20 as the correct vernal equinox date in 415 and, by implication, in 414, while March 19 would be the correct date for 416 and 417. The date long favored by the Church, March 21, would be irrevocably compromised not only for the current and future years but for the recent past as well.⁶⁶

This discovery would have had immediate and far reaching consequences for the Alexandrian Church. On one side, it would have reinforced Orestes' arguments in his letter to the emperor and weakened Cyril's. More importantly, the monopoly of the Alexandrian Church in the Easter computus would have been undermined. The fear of such consequences mobilized Cyril's zealots to act.

63 Evans (1998), *ibid.*

64 As maintained by Robert Newton (1977), 98, this wrong expectation could be a major reason why the conspicuous lateness of Ptolemy's equinoxes went undetected for almost three centuries. Another reason could be a sizeable error inherent in observing with non-stationary instruments, like a *hand quadrant* (a "little astrolabe"). This I shall discuss elsewhere.

65 A correction for the solar parallax, derived from *Syntaxis* 5.18 (see Toomer [1998], 265), would place the vernal equinox in 415 about 2 hours earlier. Such a correction, however, could have been disputed by the Church, which might not recognize the concept of the "observer in the center of the Earth."

66 Distrustful of Ptolemy's observations and comparing her observation in 415 with the one made in Alexandria [by Hipparchus?] on March 24, 11:00 AT, 146 BC (see Toomer [1998], 134), Hypatia would have found an excellent tropical year of 365d 5h 49min 20sec and a superior estimate of the slip of the equinoxes in the Julian and Alexandrian calendars of 1 day per 135 years and then could compute the vernal equinox for any year backward.

6 The Circumstances of the Murder

Socrates (*HE* 7.15; *SK* 361.1-7) says:

it was calumniously reported among the Christian populace that it was she [Hypatia] who prevented Orestes from being reconciled to the Bishop [Cyril of Alexandria]. Some of them, therefore, carried away by a fierce and bigoted zeal, whose ringleader was a lay reader named Peter, waylaid her *returning home* (*ἐπανιοῦσαν ἐπὶ οἰκίαν*), and dragging her from her *chair* (*δίφρον*), took her to the church called Caesareum where they *disrobed her* (*ἀποδύσαντές τε*) and then murdered her with *oyster shells* (*ὄστράκοις*). After tearing her body in pieces, they took her mangled limbs to a place called Cinaron, and there burnt them. This affair brought not the least opprobrium, not only upon Cyril, but also upon the whole Alexandrian Church.

Interestingly, while all English writers translated *δίφρον* as “carriage” or “chariot,”⁶⁷ to accommodate for the “returning home,” Henricus Valesius translated it in Latin as “*sella*” (PG 67:770A), meaning a “high seat” or a “mechanical workstool.” The same meaning seems to be given by John of Nikiu (*Chronicle* 84.100-103):

100. And thereafter a multitude of believers in God arose under the guidance of Peter the magistrate—now this Peter was a perfect believer in all respects in Jesus Christ—and they proceeded to seek for the pagan woman who had beguiled the people of the city and the prefect through her enchantments. 101. And when they learnt *the place where she was*, they proceeded to her and found her seated on a (*lofty*) *chair*; and forcing her to descend they dragged her along until they brought her to the great church, named Caesareum. Now this was in the days of the fast. 102. And they *tore off her clothing* and dragged her through the streets of the city until she died. And they carried her to a place named Cinaron, and they burned her body with fire.

John’s *Chronicle* is extant only in a 1602 Ge’ez translation from an Arabic version of the Greek or Coptic original; therefore the Greek equivalent of the “lofty

67 “Carriage” would go as *ἄμαξα*, *καρότσι* (*καρότσα*) etc., not *δίφρον*. Describing the carriage, where Orestes was sitting when attacked by the Nitrian monks, Socrates uses *ῥχημα* (*HE* 7.14; *SK* 359.28), likely a variant of *ἄμαξα*.

chair" (Ge'ez: *'Menber'*⁶⁸) is unknown. A similarity with Arabic *'minbar'*⁶⁹—a *pulpit* in the mosque from which the imam delivers a speech—suggests it could have been indeed a “high seat” or a kind of “sedan chair” carried on a litter or men’s shoulders. I conjecture that it might have been a *seat near an astronomical device*. Indeed, to observe the shadow on the equatorial ring one has to *sit high*—to look down from above. This may indicate that on the day of her murder, Hypatia continued making astronomical observations. According to John of Nikiu, the clique looked for the “place where she was” (Ge'ez: *'Inze tinebr'*⁷⁰)—most likely where Hypatia made her observations from the “sedan chair”. To find the time of the vernal equinox Hypatia had to begin the final observations two to three days before March 20. Therefore, the murder must have taken place on the eve of or on the day of the equinox, March 20.

The similarity between Socrates' and John of Nikiu's narratives indicates they used the same original source. Most likely it was somewhat ambiguous at this point and Socrates concluded that being carried on *δίφρον* meant she was “returning home.” But even so, she could have been returning home from the place of the observations. Elaborating on Socrates, Maria Dzielska adds: “from her customary ride in the city.”⁷¹ But again, for her murderers to figure out her “customary ride” she had to follow the route several times, starting 2-3 days before March 20, as the above scenario suggests.

An alternative explanation that Hypatia was lecturing from a pulpit at the *lecture hall* makes little sense since it is hard to believe that the murderers could have realized their goal so easily in front of a large group of people—her listeners. Indeed, the failed attack on Orestes by a group of Nitrian monks shows that citizens of Alexandria were not easily intimidated and could have effectively defended Hypatia if there was any trouble. Of course, Hypatia could have been lecturing to her disciples or passersby on the procedure she followed—observation of the shadow.

The last puzzle is why the clique first brought Hypatia to Caesareum. This church was the seat of the Alexandrian Patriarch⁷² and thus seemingly the least suitable place for murder. This and the fact she was disrobed suggest the murderers wanted to *baptize* her—in exchange for recognizing Cyril's authority. They might offer a “special” baptism—personally by Cyril.

68 መንበር Zotenberg, 116.22.

69 I owe this insight to the anonymous referee.

70 እንዘ ትነበር Zotenberg, *ibid.*

71 Dzielska (1995), 93.

72 Haas (1997), 283-6.

The result is known from its consequences—Hypatia refused to compromise, thus becoming the first Martyr of Science. Her final moments of life can be recovered taking Socrates' somewhat exotic detail seriously: the clique dragged her to the seashore, arguably to the place where her astronomical device was established or to perform involuntary “baptism” in the sea, until her skin was completely sliced off by sharp oyster shells. Her corpse was burnt at Cinaron, yet to be identified. It is clear that Cyril made the “final decision” about her fate since John of Nikiu duly reports:

103. And all the people surrounded the patriarch Cyril and named him ‘the new Theophilus’—for he had destroyed the last remnants of *idolatry* (Ge‘ez: ‘*Taotat*’⁷³) in the city.⁷⁴

7 Summary

This paper adopts my earlier argument that Hypatia’s murder must be linked to the dating of Easter, but it offers new circumstances of her murder and other, deeper reasons for the Orestes-Cyril conflict in which Hypatia became involved. Again the timing of the vernal equinox is the issue. But, instead of the calendar rivalry between two major Churches, to the forefront steps the calendar rivalry between the orthodox and sectarians, mainly Novatians.

A misleading view of Novatians as Quartodecimans was a major obstacle in identifying the essence of the problem. Novatians always celebrated Easter on Sunday, but since the year 387 or even earlier, following changes in the Jewish calendar, they began celebrating it a month earlier than the Alexandrian Church in two particular years, 8 and 19, of the 19-year Alexandrian Paschal cycle. A punishment prescribed by Theodosius I for celebrating Easter on the wrong day was reinforced in March 413 by Theodosius II specifically targeting the Novatians.

Emboldened by the latter decree, Cyril destroyed the Alexandrian Novatians, since he intended to celebrate Easter in 414 in late March or April but feared they would celebrate Easter on March 22, the first day of Passover. The rejection of March 22 in 414, contrary to the regular practice of the Alexandrian

73 ጣዖታት Zotenberg, 116.29.

74 This phrase is missing in Socrates. Could John have used a local Alexandrian source unknown to Socrates?

Church, was motivated by the fact that the vernal equinox in 414, according to Ptolemy, would occur on March 22, thus forbidding 14th Lunae to be on March 21. Cyril's concern about the legitimacy of March 21 in 414 is indirectly proven by his subsequent revision of the Theophilus' Paschal list. Cyril's envy of Hypatia's astronomy skills, reported by Hesychius and Suda, sprang from his inability to understand practical (geometrical) astronomy. The exact time of Cyril's destruction of the local Novatians would provide more certainty regarding the day of the Easter celebration in Alexandria in 414, and vice versa.

In 414 the Alexandrian Jewish community celebrated the Passover Seder on March 21—in the winter, in Cyril's eyes. The public debates in the Alexandrian theater about which calendar, Christian or Jewish, was astronomically sound resulted in a violent Jewish-Christian clash. If one assumes that the Church of Alexander was targeted by Jewish extremists purposefully, not accidentally, the violence probably occurred on the night of April 18, 414. If so, the subsequent expulsion of the Jewish community from Alexandria happened the next day, on April 19, 414.

Horrified by the expulsion of the Jews, the Prefect Orestes launched an investigation into the time of the vernal equinox, having astronomical instruments erected in a public place convenient for observations. This could be the reason for the attack on the prefect by a crowd of Nitrian monks sometime in 414.

Being invited to conduct the observations, Hypatia followed Hipparchus' method of determining the time of the vernal equinox with a meridional quadrant and equatorial ring. For that, she had to perform three sets of observations—the first two in June and December of 414. In mid-March 415 Hypatia began making the final set of observations to establish the time of the vernal equinox. Rumors circulated in the city that she had found faults in the astronomy bible—*Syntaxis*—and would refute the date favored by the Alexandrian Church. This would have had both immediate and far reaching consequences for Bishop Cyril and the Alexandrian Church. Alarmed by such a possibility, a clique of Cyril's zealots waylaid and murdered her. Since she was still performing the observations, the murder occurred either on or just prior to the day of the vernal equinox, March 20.

Instead of erring in determining the time of the vernal equinox due to ignorance of the atmospheric refraction of sunlight, as I suggested earlier, Hypatia moved astronomy one step further, challenging the authority of *Syntaxis* by correcting Ptolemy's value for the geographical latitude of Alexandria and possibly for the tropical year, and thus allowing more precise calculations of the sun's position for future astronomers.

8 Proposal

I propose remembering Hypatia annually on the day of the vernal equinox, since her last days were dedicated to finding the exact time for it. By Alexandria local time, the vernal equinox in the years 2016-2050 falls on the same date as in 415—March 20—the ideal date in our era to commemorate the first female astronomer.

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