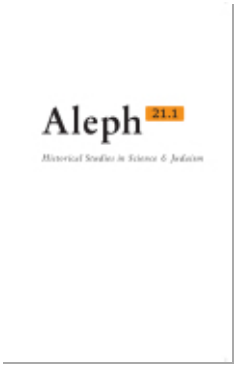
Non-Rabbanite Jewish Calendars in the Works of Jacob al-Qirqisānī and Saadia Gaon



Nadia Vidro

Aleph: Historical Studies in Science and Judaism, Volume 21, Issue 1, 2021, pp. 149-187 (Article)

Published by Indiana University Press

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ABSTRACT The correct way of setting the calendar was a matter of much debate among medieval Jews. While it is well-known that medieval Rabbanite and Qaraite communities practiced different calendars, the Jewish calendar landscape of the ninth–tenth centuries appears to have been much more diverse. Medieval sources suggest that Jewish groups in that period used calendars based on a variety of principles including observation, different calculations, and a combination of observation and calculation. No in-depth examination exists of medieval alternatives to the Rabbanite calendar. This article is a study of non-Rabbanite medieval Jewish calendars described in tenth-century Babylonian works the *Kitāb al-Tamyīz* and the *Commentary on Genesis* by Saadia Gaon, and *Kitāb al-Anwār wal-Marāqib* by Jacob al-Qirqisānī. In addition to analysing the calendation methods described in the sources, I assess the trustworthiness of Saadia and al-Qirqisānī's reports and suggest that they reflect real calendars of the period with some degree of accuracy.

It is well-known that medieval Rabbanite and Qaraite communities practiced different calendars since at least the ninth century CE. Whereas Rabbanites used fixed arithmetical schemes for fixing months and intercalating years, Qaraites relied on observing the new crescent and the ripening of barley crops. However, the Jewish calendar landscape of the ninth–tenth centuries appears to have been

Nadia Vidro, Department of Hebrew and Jewish Studies, University College London

much more diverse. Five other calendars are discussed in sources from the period. Most groups who supported these alternative calendars did not leave behind works that describe them. This notwithstanding, it is possible to learn about them from Qaraite and Rabbanite treatises that followed the dialectical *kalām* approach.[1] In this approach, authors argued for "the correct calendar" by considering calendation methods practiced by Jewish groups throughout history and refuting those that they considered invalid.

The earliest and fullest lists of medieval Jewish calendars that came down to us were compiled in Babylonia in the first half of the tenth century. Two lists are included in Saadia Gaon's works *Kitāb al-Tamyīz* (*Book of Distinction*) and *Commentary on Genesis*, and a third in the legal code *Kitāb al-Anwār wal-Marāqib* (*Book of Lights and Watchtowers*) by the Qaraite Jacob al-Qirqisānī.[2] The lists contain descriptions of calendars supported by the following groups: Sadducees, Baytusians, Maghārians, the factions[3] founded by ʿAnan b. David, Benjamin al-Nahāwandī, Abū ʿImrān (Mūsā) al-Tīflīsī and Ismāʿīl al-ʿUkbarī, Samaritans, Qaraites, Rabbanites, as well as three anonymous groups referred to as "supporters of the disappearance of the old moon," "supporters of Sivan," and "supporters of the moon's true astronomical position." Inasmuch as all three lists of calendars are found in the sections on months of the respective books, only the opinions on how to determine beginnings of months are recorded, but not how to intercalate years.

Together *Kitāb al-Anwār*, *Kitāb al-Tamyīz* and Saadia's *Commentary on Genesis* are an important source on factional Jewish calendars as they were known in tenth-century Babylonia. While *Kitāb al-Anwār* has been used

1 On the *kalām* method see Sarah Stroumsa, "Saadiah Gaon: A Jewish Thinker in a Mediterranean Society," in *Jewish Culture in Muslim Lands and Cairo Genizah Studies*, ed. Mordechai Akiva Friedman (Tel Aviv: Tel Aviv University, 2002), pp. 7–42, esp. pp. 11–22 (Heb.); Josef van Ess, "The Logical Structure of Islamic Theology," in *Kleine Schriften by Josef van Ess*, ed. Hinrich Biesterfeldt (Leiden: Brill, 2018), pp. 238–271, esp. pp. 239–243.

2 For references, see below, "Sources."

3 The word "faction" is used in this article in the neutral sense of "group" or "movement" rather than "sect"; the same holds for the adjective "factional." For a criticism of using the term "sect" to describe the Qaraites, see Marina Rustow, "The Qaraites as Sect: The Tyranny of a Construct," in *Sects and Sectarianism in Jewish History*, ed. Sacha Stern (Leiden/Boston: Brill, 2011), pp. 149–186.

in scholarly literature on some ancient and medieval Jewish calendars,[4] no comprehensive study exists of all factional Jewish calendars in the works of al-Qirqisānī and Saadia Gaon. Elsewhere I edited the list of calendars in *Kitāb al-Anwār* and briefly discussed all calendars as they were presented by al-Qirqisānī.[5] In the present article I investigate in detail medieval non-Rabbanite methods of setting months on Saadia and al-Qirqisānī's lists. These are the methods of ʿAnan b. David, Benjamin al-Nahāwandī, supporters of the conjunction (the calendars of Abū ʿImrān [Mūsā] al-Tiflīsī, Ismāʿīl al-ʿUkbarī, and other groups), Qaraites, "supporters of Sivan" and "supporters of the moon's true astronomical position." Although the Rabbanite calendar is listed by al-Qirqisānī and discussed in great detail by Saadia, I do not deal with it in the article. This is because the Rabbanite way of setting months by a calculation is well known, and its main features were the same in the tenth century as they are today.[6] In line with the general *kalām* methodology, Saadia and al-Qirqisānī present other factions' calendars in order to refute them and build up an argument by elimination for "the correct Jewish calendar." Unlike my medieval sources, I am primarily interested in the calendars *per se*; a discussion of al-Qirqisānī and Saadia's arguments against all but the Qaraite and the Rabbanite ways of setting months respectively is beyond the scope of this article. I assess the trustworthiness of Saadia and al-Qirqisānī's reports on medieval calendars at the end of the article.

4 See, among many others, Sacha Stern, *Calendar and Community: A History of the Jewish Calendar, 2nd cent. BCE–10th cent. CE* (Oxford: Oxford University Press, 2001), pp. 20–21, 104–105, *passim*; Yoram Erder, *The Karaite Mourners of Zion and the Qumran Scrolls: On the History of an Alternative to Rabbinic Judaism* (Turnhout: Brepols, 2017), pp. 9, 117–118, *passim*; Norman Golb, "Who Were the Maġārīya?," *Journal of the American Oriental Society* 80/4 (1960): 347–359. A full review of research literature discussing individual calendar passages from *Kitāb al-Anwār* is beyond the scope of this article.

5 Nadia Vidro, "Al-Qirqisānī's Account of Historical Jewish Calendars and Its Dependence on the Commentary on Genesis by Saʿadya Gaon: A Study of *Kitāb al-Anwār* VII.1," *Ginzei Qedem* 17 (2021, forthcoming).

6 Concise descriptions of the Rabbanite calendar calculation can be found in Stern, *Calendar and Community*, pp. 191–194; idem, *The Jewish Calendar Controversy of 921/2 CE* (Leiden: Brill, 2019), pp. 58–63; Raḥamim Sar-Shalom, *Gates to the Hebrew Calendar* (Netanya: R. Sar-Shalom, 1984) (Heb.).

Sources

1. Saadia Gaon, *Kitāb al-Tamyīz*

Hitherto only a few fragments of Saadia's work *Kitāb al-Tamyīz*, *Book of Distinction* (926/7 CE), have been published.[7] On the basis of these fragments *Kitāb al-Tamyīz* was described either as an anti-Qaraite polemic covering calendar, Sabbath lights and the value of the Rabbinic tradition,[8] or as a work against Qaraite and other calendars.[9] In addition to the published fragments, a number of fragments of *Kitāb al-Tamyīz* are identified in the catalogues of the Firkovitch Collection and of the Cairo Genizah collections, and a few more have been identified in the course of my research for the present article.[10] Although the text of *Kitāb al-Tamyīz* is still incomplete, the identified fragments cover all chapters of the text at least partially.[11] They make it clear that *Kitāb al-Tamyīz* is a treatise on calendar, whereas other matters such as Sabbath lights and the value of the

7 Moshe Zucker, *Saadya's Commentary on Genesis* (New York: Jewish Theological Seminary of America, 1984), Appendix 2, pp. 436–441 (text), pp. 441–447 (translation) (Heb.); Hartwig Hirschfeld, "The Arabic Portion of the Cairo Genizah at Cambridge. (Third Article.): Saʿadyah Fragments," *The Jewish Quarterly Review* 16/1 (1903): 98–112, esp. pp. 98–99, 102–105 (text VIII); Samuel Poznański collected references to and quotations from *Kitāb al-Tamyīz* in later works, especially by the Qaraite exegete Yefet ben ʿEli. See Samuel Poznański, "The Anti-Karaite Writings of Saadiah Gaon," *The Jewish Quarterly Review* 10/2 (1898): 238–276, esp. pp. 244–252. The date of *Kitāb al-Tamyīz* is known from a quotation in Abraham Bar Ḥayya's calendar manual *Sefer ha-ʿIbbur* (twelfth century) that reads: "This year in which we are today is the year 1238 of Alexander, year 4686 of the Creation Era according to our (i.e., Babylonian) counting." See Herschell Filipowski, *Sefer ha-Ibbur le(...) Avraham bar Ḥayya* (London: Longman, Brown, Green, and Longmans, 1851), pp. 96–97. See also Poznański, "The Anti-Karaite Writings," p. 245.

8 Hirschfeld, "The Arabic Portion of the Cairo Genizah (third article)," p. 98; Poznański, "The Anti-Karaite Writings," p. 252; Henry Malter, *Saadia Gaon: His Life and Works* (Philadelphia: Jewish Publication Society of America, 1921), pp. 263–264.

9 Stern, *Calendar Controversy*, p. 99.

10 Altogether, the following fragmentary manuscripts of *Kitāb al-Tamyīz* are currently known to me: RNL Evr Arab II 1189/12, T-S 8Ka10.2, T-S Ar.51.235, T-S AS 144.320, T-S Misc. 35.83, JTS ENA 4021.2, BNU de Strasbourg 4845.11–4845.12.

11 The book's Table of Contents can be reconstructed on the basis of RNL Evr Arab II 1189/12.

rabbinic tradition are integrated into the calendrical discussion. Its contents and tone are not primarily polemical.[12] Rather than anti-Qaraite, *Kitāb al-Tamyīz* is a treatise on the Rabbanite calendar that uses the dialectical *kalām* methodology.[13] It argues for the Rabbanite calculated calendar by analysing and rejecting other possible ways of calendation. In chapter two, which deals with the beginning of the *halakhic* month,[14] Saadia lists and discusses earlier and contemporary opinions on the correct way of setting months in the Jewish calendar. The medieval part of this list is analysed in the present article, based on a fresh reading of the manuscripts.[15]

2. Saadia Gaon, *Commentary on Genesis*

Saadia's *Commentary on Genesis* was reconstructed and published by M. Zucker.[16] The commentary is undated; as I demonstrated elsewhere, it was probably composed in 927 CE.[17] The list of factional calendars is included in the *Commentary on Genesis* 1:14 as part of the discussion of commandments related to heavenly bodies, in particular the sun and the moon. Zuker's edition of the list in the *Commentary on Genesis* 1:14 is lacunose. My analysis is based on a fresh reading of previously known and newly identified Genizah manuscripts of the commentary.[18]

12 See also Poznański, "The Anti-Karaite Writings," pp. 251–252.

13 On this methodology in Saadia's works see Stroumsa, "Saadiah Gaon," pp. 11–22.

14 Saadia makes a distinction between natural (טביעי) months and years and legal or halakhic (שריעי) months and years that are reckoned in the Rabbanite calendar. Halakhic months and years are close to but do not exactly overlap with the natural ones. *Kitāb al-Tamyīz*, RNL Evr Arab II 1189/12, fols 29v, 40r; *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 41, 42 (text), pp. 236–237 (translation; the translation of the passage on p. 41 is incomplete, the lacunose passage on p. 42 is not translated at all).

15 A large part of the list is published in Zucker, *Saadya's Commentary*, pp. 436–441 (text), pp. 441–447 (translation). The entire section on factional calendars in *Kitāb al-Tamyīz* (with a small lacuna in the beginning) can be reconstructed on the basis of Cairo Genizah fragments BNU de Strasbourg 4845.11–4845.12, T-S Misc. 35.83, T-S Ar.51.235 and a fragmentary copy of *Kitāb al-Tamyīz* in RNL Evr Arab II 1189/12, fols 33r–39v.

16 Zucker, *Saadya's Commentary*. For the list of factional calendars in the *Commentary on Genesis* see Zucker, *Saadya's Commentary*, pp. 41–42 (text), pp. 237–238 (translation).

17 Vidro, "Al-Qirqisānī's Account."

18 Zucker's edition of the list is based on MS Oxford, Bodleian, Heb.d.61.21 (cited as *Bodl. 161.21*) and MS Paris, AIU VIII.E.35 (cited as *AIU in Paris*). An additional fragment of the *Commentary on Genesis* that contains the list is T-S NS 183.1.

3. Jacob al-Qirqisānī, *Kitāb al-Anwār wal-Marāqib*

Kitāb al-Anwār wal-Marāqib, *Book of Lights and Watchtowers* (henceforth *Kitāb al-Anwār)*, composed by Jacob al-Qirqisānī in 927 CE is one of the earliest Qaraite legal codes.[19] The calendar is described in Discourse VII of *Kitāb al-Anwār*, entitled "On the beginning of months and the *aviv*."[20] Calendars of some Jewish factions are also briefly outlined in Discourse I.[21] In line with the general *kalām* methodology of *Kitāb al-Anwār*, al-Qirqisānī discusses the Qaraite calendar by presenting the opponents' approaches, refuting them, and thus arriving at the correct calendar.[22] This methodology is particularly prominent in the first fifteen chapters of Discourse VII that are dedicated to setting months. Discourse VII, Chapter 1 gives a listing of various schemes for setting months supported by earlier and contemporary Jewish groups. In Discourse VII, Chapters 2–14 al-Qirqisānī expatiates on these different opinions and refutes all except the Qaraite practice of relying on lunar observation at the start of all months. As I demonstrated elsewhere, Saadia's list in the *Commentary on Genesis* served as a source of

19 Edited in Leon Nemoy, *Kitāb al-Anwār wal-Marāqib = Code of Karaite Law*, 5 vols (New York: Alexander Kohut Memorial Foundation, 1939–1943). For the date of *Kitāb al-Anwār* see Bruno Chiesa, "Yaʿqūb al-Qirqisānī come fonte storiografica," in *On Jewish Sects and Christianity: A Translation of Kitāb Al-Anwār Book I With Two Introductory Essays*, eds. Bruno Chiesa and Wilfrid Lockwood (Frankfurt am Main: P. Lang, 1984), pp. 15–47, esp. pp. 17–23. Chiesa convincingly argued that the traditional date of 937 CE arose as a mistake of early twentieth-century scholars of Qaraite literature. See also George Margoliouth, "Ibn Al-Hītī's Arabic Chronicle of Karaite Doctors," *The Jewish Quarterly Review* 9/3 (1897): 429–443, esp. p. 437 and p. 437 n. 1 (the date 927 CE is based on Ibn Al-Hītī's chronicle).

20 Discourse VII is edited in Nemoy, *Kitāb al-Anwār*, vol. 4, pp. 789–850. Nemoy's edition of Discourse VII has major lacunae from the beginning of the discourse up to the middle of Chapter 3. A reconstruction of the missing chapters, and an edition of Discourse VII Chapter 1, are presented in Vidro, "Al-Qirqisānī's Account."

21 Discourse I is edited in Nemoy, *Kitāb al-Anwār*, vol. 1, pp. 1–64; it is translated in Chiesa and Lockwood*, On Jewish Sects and Christianity*.

22 On al-Qirqisānī's dialectical approach see Bruno Chiesa, "A Note on Early Karaite Historiography," *History and Theory* 27/4 (1988): 56–65, esp. pp. 61–63.

Kitāb al-Anwār, Discourse VII, Chapter 1.[23] Al-Qirqisānī borrowed elements in the description of some calendars (e.g., the calendar of ʿAnan b. David) from Saadia's commentary and copied *verbatim* descriptions of others (the calendars of Benjamin al-Nahāwandī, supporters of Sivan, and supporters of the true position of the moon). As such, *Kitāb al-Anwār* is not an entirely independent source for the investigation of medieval Jewish calendars. Despite this, it is important to include *Kitāb al-Anwār* in the present study because some of al-Qirqisānī's material is much more detailed than Saadia's. This is the case in particular with the Qaraite observational calendar and the calendar of the supporters of the conjunction (Abū ʿImrān [Mūsā] al-Tiflīsī, Ismāʿīl al-ʿUkbarī and other groups).

Calendar matters are also discussed in al-Qirqisānī's Bible commentary *Kitāb al-Riyāḍ wal-ḥadāʾiq* (938 CE),[24] and Saadia's *Commentary on Exodus* (especially on Exodus 12:2),[25] *Al-Radd ʿalā ʿAnan* (*Refutation of ʿAnan*),[26] *Al-Radd ʿalā Ibn Sāqawayh* (*Refutation of Ibn Sāqawayh*),[27] and a polemical treatise on the calendar known as "A Disputation concerning 'For Two Months the Sabbath

23 Vidro, "Al-Qirqisānī's Account." That al-Qirqisānī borrowed passages from Saadia's commentary possibly written in the same year highlights how quickly books in tenth-century Babylonia were read and integrated into the scholarly discourse.

24 And possibly al-Qirqisānī's earlier *Commentary on the Torah Portion Berešit*. On these works and their identified manuscripts see Bruno Chiesa, "A New Fragment of al-Qirqisānī's *Kitāb al-Riyāḍ*," *The Jewish Quarterly Review* 78/3–4 (1988): 175–186; David Sklare, "Science and Biblical Exegesis in the Tenth Century: *Tafsīr Bereshit* by Yaʿqūb al-Qirqisānī," *Ginzei Qedem* 15 (2018): 67–88 (Heb.).

25 Partially reconstructed in Yehudah Ratzaby, *Rav Saadya's Commentary on Exodus* (Jerusalem: Mossad Ha-Rav Kook, 1998) (Heb.). For the commentary on Exodus 12:2 see pp. 34–38, 275–277.

26 Edited with a Hebrew translation and analysis in Yehudah Seewald, "*Kitāb al-Radd ʿalā ʿAnan* by Rav Saadia Gaon," *Qovetz Hitzei Giborim* 9 (2016): 1–80 (Heb.).

27 Fragments of this work are edited in Hirschfeld, "The Arabic Portion of the Cairo Genizah 3," pp. 99–102, 105–112 (texts IX and X) and idem, "The Arabic Portion of the Cairo Genizah at Cambridge. (Eleventh Article.)," *The Jewish Quarterly Review* 18/1 (1905): 113–120, esp. pp. 113–119 (text XXVII; this fragment is identified as part of the refutation of Ibn Sāqawayh on the webpage of the Friedberg Jewish Manuscripts Society).

is Desecrated.'"[28] None of these works are preserved in their entirety and only few have been reconstructed. In their current state, these works contain only sporadic references to calendars other than those of the Rabbanites and Qaraites, and the discussion of the latter two calendars is either limited or primarily polemical. For this reason, my study of calendars of medieval Jewish factions in Saadia and al-Qirqisānī's works will focus only on *Kitāb al-Anwār*, *Kitāb al-Tamyīz*, and Saadia's *Commentary on Genesis*.

Non-Rabbanite medieval calendars in *Kitāb al-Anwār*, *Kitāb al-Tamyīz*, and *Saadia's Commentary on Genesis*

Six non-Rabbanite medieval Jewish methods of setting months are discussed by al-Qirqisānī and Saadia. The calendars are arranged in a different order in *Kitāb al-Anwār*, *Kitāb al-Tamyīz*, and the *Commentary on Genesis*. In what follows they are discussed in the order of the methods in *Kitāb al-Anwār* VII.1.[29]

1. The Qaraite method of setting months by sighting the crescent

The Qaraite method of setting months by sighting the crescent (*ru'ya al-hilāl*) is described by al-Qirqisānī as follows (*Kitāb al-Anwār* VII.1, VII.4.1, VII.14.1): The new crescent is sought at the end of the twenty-ninth day of the outgoing month. If it is sighted, that night is the beginning of a new month. If the crescent is not sighted, be it due to astronomical or weather conditions, the month is made thirty days and the next, thirty-first day is fixed as the beginning of a new month without seeking the crescent again. A number of conditions apply. The crescent must be sighted 1) in the west; 2) at the end of the twenty-ninth day after

28 One fragment of this treatise is edited in Solomon Schechter, "Saʿadyana," *The Jewish Quarterly Review* 14/2 (1902): 197–249, esp. pp. 197–203 (text IX). For additional newly identified fragments see Stern, *Calendar Controversy*, p. 98 n. 39.

29 I follow Nemoy's system of referencing *Kitāb al-Anwār*. In this notation the Roman numeral stands for the discourse, the first Arabic numeral for the chapter within the discourse, and the second Arabic numeral (if present) for the paragraph within the chapter. In the following, references to *Kitāb al-Anwār* are given according to discourse, chapter, and paragraph number in Nemoy's edition and not according to volume and page number. *For Kitāb al-Anwār* VII.1, missing in Nemoy's edition, see Vidro, "Al-Qirqisānī's Account."

sunset; 3) after the old moon stopped being visible in the east. These conditions reflect the fact that the old crescent is last visible before sunrise in the east and the new crescent is first visible just after sunset close to the western horizon.

Al-Qirqisānī considers a number of special cases that complicate the general procedure. Suppose that the crescent is not sighted in the thirtieth night (i.e., at the end of the twenty-ninth day of the month) but is seen the next day at the end of the afternoon[30] (*Kitāb al-Anwār* VII.13.16). Should the general procedure be followed or should the thirtieth day of the month be *post factum* announced the beginning of the month? Al-Qirqisānī reports that Qaraites were divided about this issue. The minority approach was to retroactively make this thirtieth day the beginning of the month because this was the day when the new crescent, the indicator of a new month, became visible. In this approach, a part of the day was made profane and another part holy (*Kitāb al-Anwār* VII.13.16). Other Qaraites, including al-Qirqisānī, did not start a new month if the crescent was sighted in the daytime of the thirtieth day, but waited until the next day (*Kitāb al-Anwār* VII.13.17–19).[31]

More complicated is the case when the sky is clouded in the thirtieth night for a number of months in a row. Al-Qirqisānī describes the following situation (*Kitāb al-Anwār* X.12.8): Suppose that two consecutive months are made thirty days long due to clouds. Suppose also that the crescent is sighted in the second night of the second month and is older than one night (this means that the second month should have begun at least a day earlier). Now, if it is cloudy in the thirtieth night of a third month in a row, should that month be made twenty-nine or thirty days long? Astronomically there is a good chance that the crescent would appear in the thirtieth night or earlier still because the previous month started too late, but this assumption cannot be verified by ocular observation due to weather conditions. Al-Qirqisānī advocates using precautions by observing the thirtieth together with the thirty-first day as the beginning of the new month.[32] He advocates similar precautions when the old moon was no longer

30 For cases when this is possible see below, "6. The method of supporters of the true astronomical position of the moon."

31 For an alternative solution to this problem based on astronomical calculations, see below "6. The method of supporters of the true astronomical position of the moon."

32 I assume that while both days were the beginning of the month for liturgical purposes, the count of days of the new month would have started from day thirty-one, the second of the two days. This was the approach of Benjamin al-Nahāwandī (Abraham Harkavy,

visible in the east for two or three days but the new moon could not be observed in the thirtieth night due to clouds (*Kitāb al-Anwār* X.12.8; incidentally, this may mean that Qaraites kept track of when the moon disappeared, not just of when the new moon became visible). The situation became unambiguous after four consecutive thirty-day months. Al-Qirqisānī asserts that it is unusual for more than three months to have thirty days, and while a fourth thirty-day month is possible, a fifth is not (*Kitāb al-Anwār* VII.14.2). The impossibility of more than four months of thirty days is also stated by the Qaraite exegete Yefet b. ʿEli (tenth century, Palestine).[33] As a result, the month following four thirty-day months was always made twenty-nine days long even if the crescent could not be observed due to clouds.[34]

It is important to note that in all special cases discussed by al-Qirqisānī it would have been possible to calculate whether the moon was at a sufficient distance from the sun to be visible in the thirtieth night, eliminating the need for assumptions based on sequences of thirty-day months. Such astronomical calculations were well known in the tenth century when al-Qirqisānī was writing,[35] but mainstream Qaraites in the ninth and tenth centuries avoided calendar calculations as a matter of principle.[36] They argued that since the beginning of a new month was a concealed matter, its indicator could not also be concealed and require an exact calculation known only to the experts, especially when the Scripture does not explain who these experts are. Instead, the indicator of the month should be perceptible by the senses and accessible to all (*Kitāb al-Anwār* VII.3.3–5,[37] VII.8.1–4). Calendar calculations were also

Aus den Ältesten Karäischen Gesetzbüchern [von Anan, Beniamin Nehawendi und Daniel Kummissi] [St. Petersburg: I. Lurje&Co Printing House, 1903], p. 177 [Heb.]) and is the accepted Rabbanite practice in months with two days of *Rosh Hodesh*.

33 Yefet b. ʿEli, *Commentary on Leviticus* 23:4–8, RNL Evr Arab I 73, fol. 103v. Saadia Gaon, *Commentary on Genesis* 8:3 says that five months of thirty days are unusual. Zucker, *Saadya's Commentary*, p. 104 (text), p. 342 (translation).

34 Yefet b. ʿEli, *Commentary on Leviticus* 23:4–8, RNL Evr Arab I 73, fol. 103v.

35 See references in footnote 114.

36 For a group who may have been Babylonian Qaraites and who relied on astronomical predictions of lunar visibility see below, "6. The method of supporters of the true astronomical position of the moon."

37 A comparison of Chapter VII.3 in Nemoy's edition with newly identified manuscripts of *Kitāb al-Anwār* demonstrates that the text edited by Nemoy as paragraphs VII.3.1–4

rejected on the grounds that they are an aspect of the "science of the stars" (*ʿilm al-nujūm*), denoting both astronomy and astrology. Al-Qirqisānī argued that to claim that God commanded to learn the times of festivals and beginnings of months from astronomers and astrologers (*munajjimūn*) was to treat both the intellect and the service of God with contempt (*Kitāb al-Anwār* VII.8.1). Other Qaraites stressed that astronomers disagree about their calculations, and it is impossible to know which calculation is correct.[38] Qaraites also argued against calendar calculations on the basis of Deuteronomy 18:10, which prohibits

belongs in the middle of Chapter VII.2 (missing in the edition). The beginning of *Kitāb al-Anwār* VII.3 up to the middle of VII.3.5 is, in fact, missing in the edition but can be found in RNL Evr Arab I 717, fols 15v–17v and RNL Evr Arab II 550, fols 52r–54r, 56r–56v. For a full reconstruction of the beginning of discourse VII see Vidro, "Al-Qirqisānī's Account." The following passages from the newly reconstructed *Kitāb al-Anwār* VII.3.3–5 are relevant in the present context:

"וקאלו איצא אנה קד תבת אן אלקמר עלאמה ללשהר ודליל עלי אולה וראסה וראס אלשהר אמר כפי ואדא כאן דלך לם יגב אן יכון דלילה אמרא כפיא אד כאן אלכפי לא ידל עלי כפי [...] ואסתדלו איצא עלי דלך בקול אלכתאב והיו לאותות [...] קאלו פלמא כאן כל אות מדכור פי אלכתאב אנמא הו טאהר מחסוס מראי וכאן אלכתאב קד אכבר אן אלנירין אותות ללאזמאן ואלאעיאד וגב אן יכון כל ואחד מנהמא אנמא יכון אות באן יכון טאהרא מחסוסא מרייא ואיצא פקד וגדנא אלשמס הדה סבילהא והו אנהא אות באנהא מחסוסה מרייה כדלך יגב אן יכון אלקמר עלאמה ואות באן יכון מחסוסא מרייא".

"They also said: it has been established that the moon is the sign of the month and an indicator of its start and beginning. The beginning of the month is a concealed matter. If so, its indicator should not be concealed because a concealed thing cannot be an indicator for [another] concealed thing [...] Furthermore, they inferred this from the saying of the Scripture "Let them be for signs" (Genesis 1:14) [...] They said: Since every sign mentioned in Scripture is visible, perceived by the senses and observable, and since the Scripture reported that the two luminaries are signs for times and festivals, it necessarily follows that each one of them must be a sign by being visible, perceived by the senses, and observable. We have found that this is the way of the sun, i.e., it is a sign in that it is perceived by the senses and observable. Likewise, the moon must be a symbol and a sign in that it is perceived by the senses and observable." For the idea that the indicator of the month should be perceptible by the senses see also Sahl b. Maṣliaḥ (tenth century, Palestine), *Book of Commandments*, RNL Evr Arab I 819, fols 1r–2v, RNL Evr Arab I 823, fols 20v, 22r.

38 Israel b. Daniel (tenth century Maghreb and Palestine), *Book of Commandments*, RNL Evr Arab I 715, fols 10v–11r. See also the quotation from Yefet b. ʿEli's *Book of Commandments* below.

occult sciences. They translated the Hebrew *qosem* ("diviner") in this verse as *munajjim* and interpreted it as "he who makes judgements about auspiciousness and inauspiciousness based on a calculation of the movements of the stars," i.e., an astrologer.[39] Inasmuch as astrologers and astronomers belonged to the same class of *munajjimūn*, Deuteronomy 18:10 was used to argue against the use of astronomical calculations for calendar reckoning, too. Yefet b. ʿEli wrote in his legal work *Book of Commandments*:

> Those who call for calculation can only attain the knowledge of it from the sciences of the astronomers (*munajjimūn*), and this is a calculation based on conjecture. Besides, astronomers do not agree upon one calculation. On what basis should a person declare that the calculation of that astronomer is correct but not of another? Moreover, God forbade that there be among us those who adopt this approach, as it is said "No one shall be found among you who makes a son or daughter pass through fire, or who practices astrology (*munajjim*), or good luck augury, or bad luck augury, or is a sorcerer" (Deuteronomy 18:10).[40]

39 See, for example, Yefet b. ʿEli's translation and commentary on Deuteronomy 18:10, RNL Evr Arab I 1600, fols 3r, 4r. The translation *munajjim* "astrologer" for the Hebrew *qosem* is also given in *Kitāb Jāmiʿ al-Alfāẓ* by David b. Abraham al-Fāsī: Solomon Skoss, *The Hebrew-Arabic Dictionary of the Bible Known as Kitāb Jāmiʿ al-Alfāẓ (Agrōn) of David b. Abraham al-Fāsī the Karaite (Tenth Cent.)* (New Haven: Yale University Press, 1945), vol. 2, p. 560. Al-Qirqisānī himself saw *qosem* as a more general term that included all divination practices listed in Deuteronomy 18:10–11 (*Kitāb al-Anwār* VI.9.33).

40 Yefet b. ʿEli, *Book of Commandments*, RNL Evr Arab I 829, fol. 21r:
"כל מן אדעא חסאב פליס יצל אלי מערפה דלך אלא מן עלום אלמנג'מין והו חסאב באלתכ'מין ומע דאך פליס אלמנג'מין מתפקין עלי חסאב ואחד פמן אין יצחח אחד מן אלנאס חסאב הד'א אלמנגם דון אלאכ'ר: ומע דאך פקד מנענא [רב] אלעאלמין אן יכון פי וסטנא מנתחל הד'א [אל]מד'הב כ'ק לא ימצא בך מעביר בנו ובתו וג".

My English rendering of Deuteronomy 18:10 differs from the standard translation and reflects Yefet b. ʿEli's translation of this verse into Judaeo-Arabic, RNL Evr Arab I 1600, fol. 3r:

"לא יוגד בך מג'ז אבנה ובנתה באלנאר מנגם תנג'ימאת מתפאאל ומתטאיר וסאחר".

See also idem, *Commentary on Deuteronomy* 16:1, RNL Evr Arab I 19, fol. 84v:

"ואללה קד מנענא אן יכון פי וסטנא אלמנג'מין".

"God forbade that there be astrologers (*munajjimūn*) among us."

Compare also to Daniel al-Qūmisī (Palestine, second half of the ninth century), *Book of Commandments*:

> We are not allowed to seek and calculate using the calculation of the astrologers (*ḥešbon ha-qosmim*), as it is said "No one shall be found among you who makes a son or daughter pass through fire, or who practices astrology, or good luck augury, or bad luck augury, or is a sorcerer" (Deuteronomy 18:10). We are not allowed to seek the months of the Lord and his festivals by the calculation of the astrologers and those who divide the heavens (*hovre šamayim*, cf. Isaiah 47:13).[41]

Inasmuch as lunar sighting was considered accessible to "big and small, knowledgeable and ignorant," (*Kitāb al-Anwār* VII.8.5) few conditions appear to have been imposed on witnesses. While some Qaraites required two people to testify,[42] one trustworthy and reliable person was sufficient for al-Qirqisānī (*Kitāb al-Anwār* VII.13.25). Witnesses did not always have to be Jewish. Al-Qirqisānī reported that Daniel al-Qūmisī, the late ninth-century founder of the Qaraite centre in Jerusalem, permitted accepting Muslims' testimony about sighting the crescent (*Kitāb al-Anwār* I.18.1). The interrogation of witnesses, prominent in the rabbinic observational calendar,[43] is absent from *Kitāb al-Anwār*. Saadia confirms in "A Disputation concerning 'For Two Months the Sabbath is Desecrated'" that Qaraites were concerned only with sighting the crescent, without paying attention to its position, width, or other parameters included in the interrogation of witnesses in the rabbinic calendar court.[44]

41 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, p. 189. A similar argument against the calculated calendar on the basis of Deuteronomy 18:10 is also made in Sahl b. Maṣliaḥ's *Commentary on Genesis* 1:14 (RNL Evr Arab I 4760, fol. 11v) and in the *Book of Commandments* by Israel b. Daniel (tenth century Maghreb and Palestine, RNL Evr Arab I 715, fols 10v–11r).

42 This was also the rabbinic practice, see e.g., Mishnah, Roš Hašanah 2:6.

43 Mishnah, Roš Hašanah 2:5–8. On the rabbinic procedure for setting months by sighting the crescent as it is described in Mishnah tractate Roš Hašanah, and some other rabbinic sources see Stern, *Calendar and Community*, pp. 157–158.

44 T-S 10K2, fol. 3v : Schechter, "Saʿadyana," p. 202.

Both the sighting and the decision to start the month were made locally, although some Qaraites were prepared to change their decision on the basis of news of a sighting made elsewhere (*Kitāb al-Anwār* VII.13.16, 21). Since the crescent could be visible to some people but concealed from others, this necessarily led to calendar diversity. While such diversity was rejected by the Rabbanites,[45] it was deemed completely normal by the Qaraites. Comparing local variations in crescent visibility to differences in the time when Sabbath begins, al-Qirqisānī wrote: "Each group of people celebrates according to what is visible to them. And God is pleased with everybody." (*Kitāb al-Anwār* VII.13.1–2)

In Saadia's works, the method of setting months by sighting the crescent is not explicitly associated with the Qaraites. Instead, Saadia ascribes it to the second Temple figure Baytus or to Baytus and "all those who follow his opinion in our times."[46] Nothing is said about the calendar of the Baytusians in the talmudic literature except that they always brought the *ʿomer* offering and celebrated Pentecost on a Sunday.[47] In contrast, Saadia presents in *Kitāb al-Tamyīz* a lengthy description of Baytus's method of setting months together with biblical proofs that Baytus and his followers use to support the method. This description corresponds in all its practical and exegetical details with al-Qirqisānī's report on the Qaraite observational calendar. It is clear that when Saadia engages with the method of Baytus and "all those who follow his opinion in our times" he means the Qaraite calendar. He may have used Baytus as a representative figure of the Qaraite calendar because both factions always celebrated Pentecost on a Sunday.[48] The Qaraites knew perfectly well that Saadia's objections against Baytus's method targeted their calendar. Thus, al-Qirqisānī replied to objections raised in *Kitāb al-Tamyīz* against Baytus's method in a chapter entitled "What they (i.e.,

45 Stern, *Calendar and Community*, pp. 241–247.

46 *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 41 (text), p. 237 (translation); *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, pp. 436–439 (text), pp. 441–445 (translation). The beginning of the passage on Baytus's calendar is missing in Zucker's edition. The full description can be found in BNU de Strasbourg 4845.11 followed by T-S Misc. 35.83.

47 On Baytus and his calendar, see "Boethusians," in *Encyclopaedia Judaica*, 2nd edition, eds. Michael Berenbaum and Fred Skolnik (Detroit: Macmillan Reference USA, 2007), vol. 4, pp. 33–34 (consulted on *Gale eBooks* on 12 November 2020).

48 Erder, *The Karaite Mourners of Zion*, pp. 125–128.

the Rabbanites) and supporters of conjunction and separation ask *us* and a reply to it." (*Kitāb al-Anwār*, Chapter VII.13, especially VII.13.11–12)[49]

2. The calendar of ʿAnan b. David

A modification of the lunar observation method is ascribed by Saadia to ʿAnan b. David, the founder of the ʿAnanite movement who was active in Babylonia in the eighth century and was retroactively adopted as the founding father of Qaraism.[50] In al-Qirqisānī's list ʿAnan is mentioned among proponents of sighting the crescent, but his calendar is not placed in a separate category (*Kitāb al-Anwār* VII.1). According to Saadia, ʿAnan applied two conditions on sighting the crescent that were not part of Baytus's (also known as the Qaraite) calendar.[51] One condition, mentioned only in *Kitāb al-Tamyīz* and not found in the surviving fragments of ʿAnan's *Book of Commandments*,[52] is that a new month is fixed only if the crescent is clearly seen (*yurā bayyinan*) but not if it is faint and hard to see (*yurā khafiyyan*). The second condition is ʿAnan's rule that Passover and Sukkot may not fall on a Saturday and must be postponed. This rule is preserved in ʿAnan's *Book of Commandments* and is also known from *Kitāb al-Anwār*.[53] Postponing Passover and Sukkot does not

49 Similar rejoinders to Saadia's arguments against Baytus were made by other Qaraites, including Yefet b. ʿEli and Sahl b. Maṣliaḥ. For Yefet b. ʿEli see e.g., RNL Evr Arab I 73, fols 109r–109v, 111r–111v; for Sahl b. Maṣliaḥ see RNL Evr Arab I 819, fol. 6r.

50 Yoram Erder, "ʿAnan ben David," in *Encyclopedia of Jews in the Islamic World*, ed. Norman A. Stillman (consulted online on 12 November 2020); Leon Nemoy, *Karaite Anthology: Excerpts from the Early Literature* (New Haven: Yale University Press, 1952), pp. 3–11; Moshe Gil, "The Origins of the Karaites," in *A Guide to Karaite Studies: The History and Literary Sources of Medieval and Modern Karaite Judaism*, ed. Meira Polliack (Leiden: Brill, 2003), pp. 73–118, esp. pp. 73–90; Erder, *The Karaite Mourners of Zion*, pp. 32–64; For the history and doctrines of ʿAnan b. David as they are described by al-Qirqisānī see *Kitāb al-Anwār* I.13.

51 *Commentary on Genesis*: Zucker, *Saadya's Commentary*, pp. 41–42 (text), p. 237–238 (translation). *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, pp. 439–440 (text), pp. 445–446 (translation). It is noteworthy that no mention of these specifics of ʿAnan's calendar is found in Saadia's *Refutation of ʿAnan* as edited in Seewald, "*Kitāb al-Radd.*"

52 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, pp. 1–172.

53 Ibid., p. 72; *Kitāb al-Anwār* I.13.3, VII.12.4. See also Yoram Erder, "Precedents Cited by ʿAnan for the Postponement of Passover that Falls on Sabbath," *Zion* 52 (1987): 153–175 (Heb.).

directly concern beginnings of months; it can also be observed in any type of calendar, be it based on sighting the crescent or on calculation. However, Saadia explicitly links this postponement to the day of the week when the crescent of Nisan and Tišri is observed.[54] In *Kitāb al-Tamyīz* he puts it thus:

> If the crescent of Nisan and Tišri is sighted in the night of Saturday, he counted both day eleven and day twelve as day eleven, so that day fifteen would start in the night of Sunday. [...] When asked why the intercalation should fall specifically on day eleven, he would say: Because it is called עשתי עשרה, which is a word that is used for things that are between eleven and twelve, and it is on the one hand eleven and on the other hand twelve.

The procedure described in *Kitāb al-Tamyīz* is aimed at keeping the festival on the fifteenth day of the month while moving it forward to Sunday in terms of days of the week. This is achieved by inserting an extra day after the eleventh day of the month, which was also numbered day eleven. The procedure described in the *Commentary on Genesis* is somewhat different: "If [the crescent] was sighted in Nisan or in Tišri in the night of Saturday, he made day eleven – day twelve."[55] This wording implies that ʿAnan skipped one day of the month making Passover and Sukkot fall on a Friday instead of a Saturday. This seems to be an error (probably scribal) as Saadia tells us in *Kitāb al-Tamyīz* that ʿAnanites moved the festival forward rather than backward and the same is confirmed by al-Qirqisānī and by the Muslim scholar Abū Rayḥān al-Bīrūnī in his *Chronology of the Ancient Nations*, completed in 1000 CE.[56]

The postponement procedure described in *Kitāb al-Tamyīz* is not attested in other sources known to me. ʿAnan's *Book of Commandments* states that Passover should be postponed when it would otherwise fall on a Saturday, but how this postponement is to be performed is not described.[57] Al-Qirqisānī reports that when the fifteenth of Nisan and Tišri fell on a Saturday, ʿAnanites

54 This connection is not made either in the surviving parts of ʿAnan's *Book of Commandments* or in *Kitāb al-Anwār*.

55 Zucker, *Saadya's Commentary*, p. 41 (text), p. 238 (translation).

56 C. Eduard Sachau, *Chronologie Orientalischer Völker von Alberuni* (Leipzig: F.A. Brockhaus, 1878), p. 284 (text); idem, *The Chronology of Ancient Nations* (London: W.H. Allen & Co., 1879), p. 278 (translation).

57 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, p. 72.

celebrated Passover and Sukkot on Sunday the sixteenth (*Kitāb al-Anwār* I.13.3, VII.12.4). Celebrating on the sixteenth day of the month appears to be more straightforward than intercalating an extra day after the eleventh day of the month, but it explicitly violates the biblical law to celebrate the festival of the unleavened bread on the fifteenth of the first month (Nisan) and Sukkot on the fifteenth of the seventh month (Tišri) (Leviticus 23:6, 34).[58] The opinion that עשתי עשרה means both eleven and twelve, quoted by Saadia as ʿAnan's justification for intercalating an extra eleventh day, is mentioned by al-Qirqisānī in relation to ʿAnan's practice of adding an intercalary month of Ševaṭ (the eleventh month) instead of the traditional Adar: "ʿAnan said that the month of the intercalation is Ševaṭ [...] He gave as a reason that the Scripture called the month of Ševaṭ עשתי עשר (Deuteronomy 1:3) and that this name is used for things that are on the one hand eleven and on the other hand twelve." (*Kitāb al-Anwār* VII.20.2–3).

ʿAnan's setting months by sighting the crescent is a trope in Saadia's works, which are the earliest known sources that ascribe lunar observation to ʿAnan.[59] Recently, M. Rustow suggested that lunar observation was adopted later in the history of Qaraism and only retrospectively projected to ʿAnan b. David.[60] In the section "Veracity of Saadia and al-Qirqisānī's accounts of medieval Jewish calendars" I discuss some evidence that speaks against Rustow's suggestion and may contain a clue about Saadia's sources on ʿAnan's observational calendar.

3. The method of calculating conjunctions

Supporters of the method of "conjunction (*ijtimāʿ*) and separation (*mufāraqa*)" defined the beginning of a month as the time when the moon gets into conjunction

58 According to *Kitāb al-Anwār* VII.12.4 the ʿAnanites found support for their practice in the verse "On the twenty-third day of the seventh month he sent the people away to their homes." (2 Chronicles 7:10) They interpreted "the twenty-third day of the seventh month" as a reference to the eighth day of Sukkot that was postponed and began on the sixteenth of the month because the fifteenth of the month was a Saturday.

59 Saadia's earliest work attributing lunar observation to ʿAnan appears to be the "Refutation of ʿAnan" (Seewald, "*Kitāb al-Radd*," p. 37 (text), p. 54 (translation) datable to 915 CE (Malter, *Saadia Gaon*, p. 263).

60 Marina Rustow, *Heresy and the Politics of Community: The Jews of the Fatimid Caliphate* (Ithaca, NY: Cornell University Press, 2008), pp. 57–63.

with the sun and then separates from it, sometimes calling this moment the *molad* (*Kitāb al-Anwār* I.15.2, I.16, VII.1, VII.7, VII.8).[61] In *Kitāb al-Anwār* VII.1 the method is ascribed to early Qaraites in the Babylonian regions of Baṣra and Khorāsān, to the founder of the Qaraite centre in Jerusalem Daniel al-Qūmisī (second half of the ninth century)[62] in the period before he started advocating lunar observation, to Rabbanites after they gave up lunar observation but before they accepted their present-day calendar with the postponement rule *lo badu pesaḥ*,[63] as well as to leaders of Jewish sectarian groups Ismāʿīl al-ʿUkbarī (early ninth century, Babylonia),[64] and Mūsā al-Tiflīsī (early ninth century, Babylonia and Armenia).[65] Saadia refers to this method as "the calculation of the

61 The terms "conjunction and separation," "conjunction," "separation," and "*molad*" appear synonymous in *Kitāb al-Anwār*. Whereas in *Kitāb al-Anwār* VII.1 al-Qirqisānī talks about "conjunction and separation," elsewhere he refers to the same groups as supporters of separation (*Kitāb al-Anwār* I.15.2, I.16). In *Kitāb al-Anwār* VII.8.8–10 al-Qirqisānī seems to use "conjunction," "separation," and "*molad*" interchangeably. In what follows I will use the term "conjunction."

62 Nemoy, *Karaite Anthology*, pp. 30–31; Barry Dov Walfish, "Daniel al-Qūmisī," in *Encyclopedia of Jews in the Islamic World*, ed. Norman A. Stillman (consulted online on 12 November 2020); Gil, "The Origins of the Karaites," pp. 111–112.

63 In the present-day Rabbanite calendar Tišri and Roš Hašanah usually begin on the day of the *molad* but must be postponed if the *molad* falls on Sunday, Wednesday or Friday. This rule is known as *lo adu roš*, where *aleph* stands for day one (Sunday), *dalet* for day four (Wednesday), and *vav* for day six (Friday). A different formulation of the same postponement rule is *lo badu pesaḥ*, which means that Passover may not fall on Monday (day two, *bet*), Wednesday (day four, *dalet*) or Friday (day six, *vav*) and must be postponed. Tišri is also postponed if the *molad* falls at or after six hours of the day. On the claim that Rabbanites ever used a calendar based on the *molad* but without the postponement *lo badu pesaḥ* see below "Veracity of Saadia and al-Qirqisānī's accounts of medieval Jewish calendars."

64 Yoram Erder, "Ismāʿīl al-ʿUkbarī," in *Encyclopedia of Jews in the Islamic World*, ed. Norman A. Stillman (consulted online on 12 November 2020); Gil, "The Origins of the Karaites," p. 105. For Ismāʿīl al-ʿUkbarī's distinctive practices see *Kitāb al-Anwār* I.15.

65 Yoram Erder, "Abū ʿImrān al-Tiflīsī," in *Encyclopedia of Jews in the Islamic World*, ed. Norman A. Stillman (consulted online on 12 November 2020); Zvi Ankori, *Karaites in Byzantium: The Formative Years, 970-1100* (New York: Columbia University Press, 1959), pp. 369–372. For Abū ʿImrān (Mūsā) al-Tiflīsī's distinctive practices see *Kitāb al-Anwār* I.16.

month (*ḥisāb al-šahr*)" and lists Abū ʿImrān (Mūsā) al-Tiflīsī as the sole Jewish representative of this method.[66] Saadia's information on Mūsā al-Tiflīsī's method is scanty, the following description is based mainly on *Kitāb al-Anwār*.

The conjunction is a moment in time when the moon, moving along its orbit, passes between the sun and the earth.[67] This monthly event, also known as "a true conjunction," cannot be observed (except in case of a solar eclipse) and must be established by calculation. Calculating true conjunctions is a complex procedure that requires a high level of astronomical expertise. This is, among other things, because the time between one conjunction and the next, known as "lunation," changes from month to month. A much simpler procedure is used to calculate mean conjunctions, which are based on the mean lunation, a value established by averaging a large number of true lunations. In Jewish calendar literature the mean lunation is reckoned as twenty-nine days, twelve hours, and 793/1080 parts of an hour (in the Jewish calendar the hour is divided into 1080 parts). In the Rabbanite calendar the mean conjunction is known as *molad*.

Al-Qirqisānī reports that at least two groups that used the method of calculating conjunctions made all lunations twenty-nine days, twelve hours, and 793 parts long (*Kitāb al-Anwār* VII.1). These are the followers of Ismāʿīl al-ʿUkbarī and of Mūsā al-Tiflīsī. Saadia confirms this information for Mūsā al-Tiflīsī (*Commentary on Genesis*).[68] The lunation value of twenty-nine days, twelve hours, and 793 parts

66 *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 41 (text), p. 237 (translation). *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, pp. 440–441 (text), pp. 447 (translation); A similar method is ascribed by Saadia and al-Qirqisānī to the Samaritans. See Zucker, *Saadya's Commentary*, pp. 41, 440–441 (text), pp. 237, 447 (translation), Vidro, "Al-Qirqisānī's Account."

67 On types of conjunctions and conjunction-based calendars see Stern, *Calendar and Community*, pp. 101–102, 112.

68 Yefet b. ʿEli writes in the Commentary on Leviticus 23:4–8 that the only difference between the Rabbanites and Mūsā al-Tiflīsī was the latter's rejection of the Rabbanite postponement rules. RNL Evr Arab I 73, fol. 99v:
"פתבעהם אלתפליסי פי אן יעמל עלי אלמולד ולם יואפקהם פימא אשתרטו בה מן אלדחויות פהדא אלפרק בין מדהב אלתפליסי ומדהב אלרבאנין".
"Al-Tiflīsī followed them [the Rabbanites] in that he used the *molad* but did not agree with them with regard to their postponement rules. This is the difference between the approach of al-Tiflīsī and the Rabbanite approach." However, it is uncertain if Yefet refers here only to the principles of their calendars or also to the lunation values. In his earlier

indicates that the calendar of Ismāʿīl al-ʿUkbarī and Mūsā al-Tiflīsī was based on the mean rather than the true conjunction. It is likely that Ismāʿīl al-ʿUkbarī and Mūsā al-Tiflīsī calculated the same mean conjunctions as the Rabbanite *moladot*. The Rabbanite calculation has two essential components – the epoch (a starting point of the calculation) and the mean lunation equal to twenty-nine days, twelve hours, and 793 parts. To calculate the *molad* of any month means to add to the epoch as many lunations as the number of months that passed since the epoch. Since Ismāʿīl al-ʿUkbarī and Mūsā al-Tiflīsī accepted the standard mean lunation and nothing is said about them using a different epoch, they must have calculated the same mean conjunctions as the Rabbanites. It seems reasonable to assume that the same mean conjunctions were also calculated by other groups to whom this method is assigned.

The calculated conjunction values were used by supporters of the method in two different ways. The groups of Ismāʿīl al-ʿUkbarī and Mūsā al-Tiflīsī started the month on the day of the conjunction, regardless of the time when the conjunction occurred (*Kitāb al-Anwār* I.15.2, I.16, VII.1, VII.8.9; on al-Tiflīsī see also Saadia's *Commentary on Genesis*). They believed that inasmuch as the conjunction is the reason for beginning a month, the day of the conjunction must always be part of the new month. Ismāʿīl al-ʿUkbarī started the month from the actual time of the conjunction (*Kitāb al-Anwār* I.15.2). Since the conjunction can occur at any time of the day, this must have often led to parts of the day belonging to different months. In contrast, Mūsā al-Tiflīsī's group began the month from the start of the day on which the conjunction was due to occur (*Kitāb al-Anwār* I.16).[69] A separate

works, *Book of Commandments* and the *Commentary on Genesis* 1:14, Yefet claims that Mūsā al-Tiflīsī's calendar was based on a mean lunation which he obtained by averaging out true lunation values found in four astronomical handbooks (*zījes*):

"פאמא אלתפליסי פחסאבה מבני עלי אלתמאע ודלך אנה גמע ד זיגאת ואכד מן וסטהא חסאבא עמל עליה".

"As for al-Tiflīsī, his calculation is based on the conjunction. He collected four *zījes* and derived from their mean [value] a calculation for setting [the calendar]." (Yefet b. ʿEli, *Book of Commandments*, RNL Evr Arab I 829, fol. 17r).

69 For a similar Muslim debate at the time of the caliph al-Ḥākim (reigned 996–1021 CE), see D. de Smet, "Comment déterminer le début et la fin du jeûne de Ramadan? Un point de discorde entre Sunnites et Ismaéliens en Égypte Fatimide," in *Egypt and Syria in the Fatimid, Ayyubid and Mamluk Eras*, eds. Urbain Vermeulen and D. de Smet (Leuven: Peeters, 1995), pp. 71–84, esp. p. 82.

unnamed group postulated that in order for a new month to begin, the conjunction should occur no later than six hours and 641 parts of the day (i.e., 641 parts after midday). This limit took liturgical considerations into account: the group argued that after this time it would be too late for the new moon sacrifice (and when sacrifices were no longer possible, for the new moon prayer). The limit of six hours and 641 parts of the day is known from the Palestinian tradition of the Rabbanite calendar.[70] However, it is unlikely that the group discussed here by al-Qirqisānī were Rabbanites (in a hypothetical period when they practiced a calendar based on the *molad* but without the postponement *lo badu pesaḥ*). It is more probable that the reference is to a non-Rabbanite faction who relied on the conjunction for setting months but applied the same limit as Palestinian Rabbanites. Indeed, Palestinian Rabbanites applied this limit only to the *molad* of Tišri. In contrast, in *Kitāb al-Anwār* VII.1 the limit is not linked to a particular month but seems to apply in all months. We do not know what opinion the group held about the time of the new moon sacrifice and prayer.[71] However, in a calendar based on calculation the conjunction can be calculated and the beginning of the month established on its basis well in advance eliminating the risk of missing the time of the new moon sacrifice or prayer.[72] The explanation that an afternoon conjunction would be too late for the sacrifice makes most sense if the group began months not from the start of the day (in the evening) but from the time of the conjunction. This was the practice of Ismāʿīl al-ʿUkbarī (*Kitāb al-Anwār* I.15.2) but it may have been supported by other groups, too. In such a calendar a conjunction that occurred after the time of the new moon prayer as determined by this group would be too late to begin a month.

While supporters of the conjunction method appear to have calculated the same *moladot* as the Rabbanites, they may have adjusted them to their own meridian when setting months. In the Rabbanite calendar the times of *moladot* are traditionally

70 The Babylonian limit was at six hours of the day, i.e., noon. On these Rabbanite limits see, e.g., Stern, *Calendar Controversy*, pp. 65–67.

71 On Rabbanite and Qaraite opinions concerning the time of sacrifices and prayers see Yoram Erder, "Daily Prayer Times in Karaite Halakha in Light of the Time of Islamic Prayers," *Revue des études juives* 153/1–2 (1994): 5–27.

72 This would have been different in the calendar based on sighting the new crescent as it is described in rabbinic literature. If witnesses were delayed and the new month declared by the calendar court very late in the afternoon, it may have been too late for offering the new moon sacrifice.

given as a single universal value and are not adjusted to the local meridian.[73] Dates are determined on the basis of the *molad* and calendar limits without adjustment to the local meridian. This may have been different in the method of the supporters of the conjunction. When challenged about calendar diversity caused by the Qaraite observational calendar al-Qirqisānī retorted that the same applies to the method of conjunction and separation (*Kitāb al-Anwār* VII.13.1, VII.13.4). Namely, if the moon and sun separate at the end of the day (lit. daytime, *nahār*) when the sun is still visible in one place but has set in another, the day (*yawm*) would be over in the second place but not in the first. People in whose place the sun has not set would make the beginning of the month on that day, and those in whose place it set would make it on the following day. This objection targets the groups of Ismāʿīl al-ʿUkbarī and Mūsā al-Tiflīsī, who had no limit other than the end of the day itself. A similar objection is raised against the group who used the limit of "six hours of the day":[74] when for some people six hours have passed, for others it is seven, and for yet others less than five hours. What al-Qirqisānī argues here is that calendar limits do not occur at the same time for people in different locations. Unless al-Qirqisānī did not understand or, for polemical purposes, chose to ignore the schematic nature of hours in the *molad* calculation, his argument suggests that supporters of the conjunction method adjusted conjunction times to the local meridian[75] and took into account local sunset times when setting months.

Saadia highlights an important structural difference between the calendar of Mūsā al-Tiflīsī and the Rabbanite calculated calendar: "Unlike the Rabbanites, their calendar does not have ten fixed months."[76] This refers to the fact that in al-Tiflīsī's calendar each month began on the day of its mean conjunction and the previous month ended the day before. This meant that the length of each month was determined by the time of the next month's conjunction so that all months had

73 It is uncertain what location the time of the *molad* is based on. Stern, *Calendar and Community*, p. 207; Stern, *Calendar Controversy*, p. 69 and n. 36; Arnold A. Lasker and Daniel J. Lasker, "642 Parts – More Concerning the Saadya-Ben Meir Controversy," *Tarbiz* 60/1 (1990/1): 119–128, esp. pp. 124, 127 and p. 127 n. 44 (Heb.).

74 *Kitāb al-Anwār* VII.13.4. It is not clear whether this is a shorthand for six hours 641 parts or a reference to an actual limit of six hours not mentioned above.

75 To do so they must have made an assumption about the meridian of the *molad*. What this assumption was is not mentioned in any sources known to me.

76 *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, p. 440 (text, missing in the translation on p. 447).

variable lengths. This structural feature was not limited to the calendar of Mūsā al-Tiflīsī but was characteristic of all calendars based solely on the conjunction. In contrast, in the Rabbanite calendar ten out of twelve months (eleven out of thirteen in an intercalated year) have a fixed length of either twenty-nine or thirty days which does not depend on the time of the next month's conjunction.[77]

Al-Qirqisānī and Saadia's description of the conjunction method may throw some light on a puzzling Jewish group, the *Mīlādiyyah*, described by the Muslim polymath Abū Rayḥān al-Bīrūnī in the *Chronology of the Ancient Nations*.[78] Al-Bīrūnī states that Jews are divided into two factions with regard to setting months.[79] The first faction are the Rabbanites, who rely on a calculation of the mean motion of the sun and the moon. The second faction are the *Mīlādiyyah* who begin months from the conjunction (*ijtimāʿ*). Al-Bīrūnī writes about the *Mīlādiyyah*:[80] "The second faction are the *Mīlādiyyah* who make the beginnings of the months from the conjunction; they are also called *al-qurrāʾ* and *al-išmaʿiyyah*...".

The name *Mīlādiyyah* must derive from *mīlād* for the Hebrew *molad*, a technical term for the mean conjunction. Some scholars saw *molad* here as a reference to the first sighting of the new crescent.[81] This interpretation is inaccurate because the term for the first visibility of the crescent is not *molad* but *reʾiyyat ha-yareaḥ* in Hebrew or *ruʾya al-hilāl* in Arabic. The term *molad* is generally associated with the Rabbanite calculated calendar. However, al-Bīrūnī cannot be referring here to the Rabbanites – he discusses the Rabbanites as his first faction, and it is unlikely that they are also the second. It is equally problematic to assume that the *Mīlādiyyah* are Qaraites. While the *Mīlādiyyah* began their

77 The remaining two months, Marḥešvan and Kislev, have variable lengths.

78 Sachau, *Chronologie*, p. 58 (text). Idem, *The Chronology*, p. 68 (translation).

79 Idem, *Chronologie*, pp. 57–59 (text). Idem, *The Chronology*, pp. 67–69 (translation).

80 Idem, *Chronologie*, p. 58 (text), Idem, *The Chronology*, p. 68 (translation). Sachau translates الميلادية الذين يعملون مبادئ الشهور من عند الاجتماع "The Milādites, who derive the beginning of the month from the conjunction."

81 See Camilla Adang, "The Karaites as Portrayed in Medieval Islamic Sources," in *A Guide to Karaite Studies: The History and Literary Sources of Medieval and Modern Karaite Judaism*, ed. Meira Polliack (Leiden: Brill, 2003), pp. 179–197, esp. p. 185: "*Molad*, the new moon, the sighting of which marked the beginning of the month according to the Karaites"; Haggai Ben Shammai explains *Mīlādiyyah* as "those who calculate the calendar on the basis of lunar observation." Haggai Ben Shammai, "Between Ananites and Karaites: Observations on Early Medieval Jewish Sectarianism," *Studies in Muslim-Jewish Relations* 1 (1993):19–29, esp. p. 24.

months at the conjunction, the most common Qaraite method was to set months by sighting the lunar crescent, which occurs a day or two after the conjunction. The observation method is discussed in the *Chronology* after the method of the *Mīlādiyyah* and is attributed to the ʿAnanites.[82] Calendar lists discussed in this article suggest that the *Mīlādiyyah* followed neither the Rabbanite calculation nor the Qaraite observational calendar but were supporters of the conjunction method.[83] Al-Qirqisānī tells us that supporters of this method begin the month when the moon gets into conjunction (*ijtimāʿ*) with the sun and then separates from it, sometimes calling this moment the *molad*. This description fits well with al-Bīrūnī's statement that the *Mīlādiyyah* "make the beginnings of the months from the conjunction" and could be the source of the group's name. The second part of al-Bīrūnī's statement, namely that the *Mīlādiyyah* are also called *al-qurrāʾ* and *al-išmaʿiyyah,* appears confused.[84] The term *al-qurrāʾ* must be a reference to the Qaraites. *Al-išmaʿiyyah*, on the other hand, is a variant of *ašmaʿth*, a term used in Muslim sources for the Rabbanites.[85] While it is difficult to understand how *al-išmaʿiyyah* can be the same group as *al-qurrāʾ*, a clue might be found in al-Qirqisānī's list of groups who supported the method of calculating conjunctions. Indeed, al-Qirqisānī associates this method with Babylonian Qaraites and with Rabbanites at a certain stage in the development of their calendar (among other groups). This or a similar statement might be reflected in al-Bīrūnī's imprecise appellation "*al-qurrāʾ* and *al-išmaʿiyyah*."

82 Although al-Bīrūnī claims that Jews are divided into two factions with regard to setting month, he describes three methods – the Rabbanite calculation, the method of the *Mīlādiyyah*, and the observational calendar of the ʿAnanites.

83 The same is later confirmed by the Qaraite author Levi b. Yefet (early eleventh century), who writes (RNL, Evr Arab I 983, fol. 277v):
"אלאן מן מדהב אלמילאדה(!) והם אצח[א]ב אלאגתמאע אנה אדא חצל מילאדה ובקי מן אלנהאר דקיקה ואחדה חסבו אליום מן אול קדש".
"Now, it is the approach of the *Mīlādah* (sic!), who are supporters of the conjunction, that if its (a month's) *molad* occurs when just one minute remains of the day, they consider the day to be holy from the beginning." The form אלמילאדה "the *Mīlādah*" is most probably a scribal error for אלמילאדיה "the *Mīlādiyyah*"; the correct form אלמילאדיה appears in RNL, Evr Arab I 983, fol. 38r. See also footnote 135.

84 See also Adang, "The Karaites," p. 185. See also footnote 135.

85 Ibid., p. 181.

For the next three calendars al-Qirqisānī cannot be considered an independent source. As I demonstrated elsewhere, al-Qirqisānī's description of these methods demonstrates a significant *verbatim* overlap with Saadia's *Commentary on Genesis* 1:14.[86] While it is possible that Saadia and al-Qirqisānī borrowed these sections from a shared source or that Saadia borrowed them from al-Qirqisānī, it is more likely that Saadia served as al-Qirqisānī's source. Indeed, al-Qirqisānī's close familiarity with and dependence on Saadia's works have long been known,[87] and Saadia is often quoted in *Kitāb al-Anwār*, either by name or anonymously.[88]

4. The method of Benjamin al-Nahāwandī

The calendar of Benjamin al-Nahāwandī (first half of the ninth century, Babylonia)[89] is known from a short surviving excerpt of his *Book of Commandments*.[90] In this calendar all months followed a sequence of fixed alternating lengths of thirty and twenty-nine days. An exception were Nisan and Tišri, which were set by sighting the new crescent. If the crescent was not sighted in these months, they too were made to follow the order of thirty- and twenty-nine -day months. The need to set some months by observation followed from al-Nahāwandī's rule that the calendar should at some point "return to the principle of the moon," i.e., synchronise with observable astronomical reality.[91] Al-Nahāwandī argued

86 Vidro, "Al-Qirqisānī's Account."

87 Chiesa, "Yaʿqūb al-Qirqisānī come fonte storiografica," p. 22 and p. 39 n. 48; Zucker, *Saadya's Commentary*, pp. יא and בח, 13, 13 n. 65, 29 n. 12, 44 n. 59, 45 n. 62, 50 n. 88, 67 n. 172, 74 n. 232; Chiesa, "A New Fragment." See also Hartwig Hirschfeld, *Qirqisani Studies* (London: Jews' College, 1918), p. 9.

88 Nemoy, *Kitāb al-Anwār*, vol. 5, p. 75 (voc. Saʿadiah al-Fayyūmī), Chiesa, "A New Fragment," p. 182.

89 Yoram Erder, "Benjamin al-Nahāwandī," in *Encyclopedia of Jews in the Islamic World*, ed. Norman A. Stillman (consulted online on 12 November 2020); Erder, *The Karaite Mourners of Zion*, pp. 64–74; Nemoy, *Karaite Anthology,* pp. 21–23; Gil, "The Origins of the Karaites," pp. 107–110. On Benjamin al-Nahāwandī's distinctive practices see *Kitāb al-Anwār* I.14.

90 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, pp. 176–177; See also Stern, *Calendar and Community*, p. 20; Vidro, "Al-Qirqisānī's Account"; Zvi Ankori's assumption that al-Nahāwandī counted thirty-day months except Nisan and Tišri (Ankori, *Karaites in Byzantium*, p. 274) is refuted in Stern, *Calendar and Community*, p. 20.

91 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, p. 178:

that this synchronisation must be performed in Nisan and Tišri because these are the "festival months" (*ḥodše moʿadim*), and the moon was created for the fixing of festivals (Psalms 104:19).[92] It is important to note here that al-Nahāwandī's choice of Nisan and Tišri must have had polemical as well as textual reasons. In the Talmud, Nisan and Tišri were the two months with a fixed beginning because the preceding months of Elul and Adar (or the second Adar) were always twenty-nine days long.[93] Although the Talmud is not mentioned in the surviving text of al-Nahāwandī's *Book of Commandments*, the rule to set Nisan and Tišri by observation, making them the only two months the beginning of which was not known in advance, is almost certainly anti-talmudic.

The basic facts of al-Nahāwandī's calendar, although not the justification, are faithfully represented in *Kitāb al-Tamyīz*, in the *Commentary on Genesis*, and in *Kitāb al-Anwār*.[94] Both Saadia and al-Qirqisānī highlight a peculiarity of al-Nahāwandī's calendar not discussed in the surviving quotation from al-Nahāwandī: "In his approach it can happen that when the crescent is concealed, the month is made twenty-nine [days]."[95] In the standard Qaraite method and in the rabbinic observational calendar if lunar observation in the thirtieth night is impossible due to clouds, the old month is made thirty days and the new month begins on the thirty-first day. In al-Nahāwandī's approach, Saadia and

"לפיכך כל העולם וכל חבילה וחבילה חשבון חדשי שנתה נוהגות מולידה ומוליכה חשבון עבור חדשיה עד שחוזרת לעיקר ירח".

"According to this, all the world and each and every band conduct the counting of their own months of the year. [Each band] initiates and carries out the counting for the intercalation of its months (i.e., adding the thirtieth day in some months), until it returns to the principle of the moon." Note here that al-Nahāwandī argues for a pluralistic approach to the lunar calendar, which was also characteristic of later Qaraites.

92 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, p. 176–177.

93 Babylonian Talmud, *Roš Hašanah* 19b and 32a; Palestinian Talmud, *Roš Hašanah* 3:1 (58c); see Stern, *Calendar and Community*, pp. 165–166. I thank Sacha Stern for drawing my attention to this covert polemic.

94 *Kitāb al-Anwār* I.14.2, VII.1. *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 42 (text), p. 238 (translation). *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, p. 440 (text), p. 446 (translation).

95 *Commentary on Genesis* (Zucker, *Saadya's Commentary*, p. 42 (text), p. 238 (translation). An identical statement is found in *Kitāb al-Anwār* VII.1. A similar statement is given in *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, p. 440 (text), p. 446 (translation).

al-Qirqisānī tell us, if the crescent (of Nisan or Tišri) cannot be observed due to clouds, the old month (Adar or Elul) may end up being twenty-nine days if this is required by the order of alternating month lengths. The following example is given in *Kitāb al-Tamyīz*:[96]

> That is, it can be that the crescent of Tišri was sighted in the evening of the twenty-ninth [day] of Elul (i.e., at the end of this day) and then the crescent of Nisan is not sighted in the evening of the twenty-ninth [day]. Then Adar is made twenty-nine [days] in the case that [the moon] is concealed.[97]

If the crescent of Tišri is sighted in the evening of the twenty-ninth day of Elul, Elul is twenty-nine days long, Tišri–thirty, Marḥešvan–twenty-nine, Kislev–thirty, Ṭevet–twenty-nine, and Ševaṭ–thirty days. The length of the next month, Adar must be determined by sighting the crescent. If, however, sighting is impossible due to clouds, Adar must follow the order of month lengths and will be made twenty-nine days long. This demonstrates the point that unlike in the Qaraite and rabbinic observational calendars, a month can be twenty-nine days long when the sky is clouded.

5. The method of supporters of Sivan

The unnamed supporters of Sivan followed the method of Benjamin al-Nahāwandī with one deviation: instead of setting the festival months Nisan

96 In *Kitāb al-Anwār* and in Saadia's *Commentary on Genesis* the example appears to be corrupt. See Vidro, "Al-Qirqisānī's Account."

97 T-S Ar.51.235r, left:
"כאנה יכון אלהלל לתשרי קד ראי פי עשיה כ"ט מן אלול תם לא ירי הלל ניסן פי עשיה כ"ט פיעמל אדר כ"ט מע אלאסתתאר".
A shorter version of this example, which probably resulted from a homeoteleuton between two instances of פי עשיה כ"ט, is attested in T-S Misc. 35.8r, right, RNL Evr Arab II 1189/12, fol. 34v and Zucker, *Saadya's Commentary*, p. 440:
"כאנה יכון הלאל תשרי קד רי פי עשיה כ"ט פיעמל אדר כ"ט מע אלאסתתאר".
"That is, it can be that the crescent of Tišri was sighted in the evening of the twenty-ninth [day]. Then Adar will be made twenty-nine days in case [the moon] is concealed." Zucker's reading קדרי with the Hebrew meaning "overclouded" for the Arabic קד רי "was sighted" resulted in a mistaken translation (p. 446) כגון שיהיה הירח של תשרי מעונן "That is, it can be that the crescent of Tišri is covered by clouds."

and Tišri by sighting the lunar crescent, they did so in Sivan.[98] The rest of the months were set by following the order of twenty-nine–thirty-day months. The group that supported this method is not identified in the sources and there can be no certainty that it existed. I bring some arguments in favour of its existence in the section "Veracity of Saadia and al-Qirqisānī's accounts of medieval Jewish calendars" below. If it existed, it must have been a medieval and not an ancient Jewish calendar. My conjecture is based on the method's close similarity with the calendar of Benjamin al-Nahāwandī and on the relative position of this method in Saadia's lists. Especially the list in *Kitāb al-Tamyīz* which is arranged chronologically. First comes the Rabbanite calculated calendar, which in Saadia's view was given either to Adam or to Moses.[99] Then come the calendars of ancient Jewish factions (the second Temple Sadoq and Baytus and supporters of the full moon identified in other sources with the Maghārians).[100] This is followed by medieval calendars of ʿAnan b. David

98 *Kitāb al-Anwār* VII.1. *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 42 (text), p. 238 (translation). *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, p. 441 (text), p. 447 (translation). Zucker's edition of the passage in *Kitāb al-Tamyīz* is lacunose and its translation is partially based on the text of the *Commentary on Genesis* 1:14. The full passage is re-edited here on the basis of BNU de Strasbourg 4845.12r:
"ואלמדהב אלט מדהב אצחאב סיון והם קום יעולון עלי אלהלאל אלא אנהם ליס יטלבונה פי כל שהר בל פי שהר ואחד מן אלסנה והו סיון ואוקעו אכתיארהם עליה לאנה אלגו פיה אנקא מנה מן סאיר אלשהור פקאלו נאכד אלאצל מן סיון ונגרי סאיר אלשהור עלי אן שהר ל ושהר כט".
"The ninth approach is the approach of supporters of Sivan. These people rely on the crescent but do not seek it every month. Rather, [they seek it] in one month of the year, namely, Sivan. Their choice fell upon it because the air is clearer in it than in other months. They said: 'We establish a base from Sivan and set other months so that one month is thirty [days] and the [next] month is twenty-nine [days].'"

99 This is the main point of Saadia's polemical treatise known as "A Disputation concerning 'For Two Months the Sabbath is Desecrated'" (see references in footnote 28). This opinion is recorded in *Kitāb al-Anwār* II.13.4 (the same opinion is cited anonymously in VII.11.2, VII.12.14). See also, Poznański, "The Anti-Karaite Writings," pp. 270–271; Malter, *Saadia Gaon*, p. 171.

100 On Sadducees see Menahem Mansoor, "Sadducees," in *Encyclopaedia Judaica*, 2nd edition, eds. Michael Berenbaum and Fred Skolnik (Detroit: Macmillan Reference USA, 2007), vol. 17, pp. 654–655 (consulted on Gale eBooks on 12 November 2020); Erder, *The Karaite Mourners of Zion*, pp. 109–147 and the literature cited there; On the Maghārians see Golb, "Who Were

(eighth century), Benjamin al-Nahāwandī (ninth century), and Abū ʿImrān (Mūsā) al-Tiflīsī (ninth century).[101] The last calendar on the list, based on a calculation of the true astronomical position of the moon, must also have been medieval. Indeed, astronomical procedures necessary for its calculation would not have been known to Jews before the rise of astronomical science in Islam.[102] Positioned between Abū ʿImrān (Mūsā) al-Tiflīsī and supporters of the true astronomical position of the moon, supporters of Sivan must have been a medieval group, too.

Supporters of Sivan chose to sight the crescent in this month due to its favourable weather conditions: the clear sky and lack of clouds in Sivan were best suited for lunar observation.[103] It is clear that the methods of Benjamin al-Nahāwandī and of supporters of Sivan were developed for synchronizing the year of alternating months with the moon. They differed only in when it is best done – in Tišri and Nisan, which are the most important months of the Jewish liturgical year; or in Sivan, when visibility is best.

6. The method of supporters of the true astronomical position of the moon[104]

The last medieval method of setting months discussed by al-Qirqisānī and Saadia is the method of supporters of the true astronomical position of the moon (*taqwīm*).[105] The group is not further identified but al-Qirqisānī tells us that they were *aṣḥāb al-ruʾya* "people of observation" (*Kitāb al-Anwār* VII.1), a term

the Maġārīya?"; Erder, *The Karaite Mourners of Zion*, pp. 147–165; Stern, *Calendar and Community*, pp. 104–105, and further literature cited in these sources. The period of the Maghārians is not entirely clear but al-Qirqisānī puts them between Sadducees and Jesus (*Kitāb al-Anwār* I.7) and Yefet b. ʿEli remarks that no Sadducees or supporters of the full moon remain in his time. Yefet b. ʿEli, *Book of Commandments*, RNL Evr Arab I 829, fol. 20r.

101 The calendar of Abū ʿImrān al-Tiflīsī is followed by the nearly identical Samaritan calendar.

102 Bernard R. Goldstein, "Astronomy and the Jewish Community in Early Islam," *Aleph* 1 (2001): 17–57, esp. pp. 20–21.

103 See references in footnote 98.

104 I thank Dr Johannes Thomann (Zurich) for discussing this section with me.

105 *Kitāb al-Anwār* VII.1, VII.10.5. *Commentary on Genesis*: Zucker, *Saadya's Commentary*, p. 42 (text, missing altogether in the translation on p. 238, without that a note is made to this effect). *Kitāb al-Tamyīz*: Zucker, *Saadya's Commentary*, p. 441 (text), p. 447 (translation; Zucker remarked in the translation that the method was not clear to him).

often used for Qaraites. It is possible that this method was practiced by some Babylonian Qaraites.

The word *taqwīm*, a verbal noun of *qawwama*, means "to establish something precisely" and, in the astronomical context "to determine the true positions of the sun, the moon, and the planets."[106] The method of the supporters of the true astronomical position of the moon is described somewhat differently in *Kitāb al-Anwār* and the *Commentary on Genesis* on the one hand, and in *Kitāb al-Tamyīz* on the other hand. Since Zucker's edition of both sources is lacunose, I re-edit and re-translate them here.[107] In the *Commentary on Genesis* Saadia writes:[108]

> The ninth are people of the true astronomical position [of the moon]. They knew that the view of the crescent is different in [different] countries, and so they obligated the following. If it appeared to them correct that it was sighted in some clime, they took it as the beginning of the month. They knew, too, that it might not be visible that evening but could be visible in the afternoon, [but] they imposed upon themselves a

106 Michael Hofelich and Daniel M. Varisco, "Taḳwīm," in *Encyclopaedia of Islam, 2nd edition,* eds. Peri J. Bearman et al (Leiden: Brill, 2012) (consulted online on 12 November 2020); David A. King, Julio Samśo, and Bernard R. Goldstein, "Astronomical Handbooks and Tables from the Islamic World (750–1900): An Interim Report," *Suhayl* 2 (2001): 9–105, esp. pp. 24, 26, 84.

107 The passage in *Kitāb al-Tamyīz* was previously translated into English and discussed on the basis of Zucker's problematic edition by Tz. Largermann, who questioned or corrected some of Zucker's readings. Y. Tzvi Langermann, *The Jews and the Sciences in the Middle Ages* (Aldershot, Hants.: Ashgate, 1999), part II, pp. 4–6.

108 Zucker's edition of the fragment is based on a badly damaged fragment Paris, AIU VIII.E.35. The present edition is based on a re-reading of the fragment from high-quality images now available on the webpage of the Friedberg Jewish Manuscript Society. Lacunae in Paris, AIU VIII.E.35 are filled on the basis of T-S NS 183.1, not used in Zucker's edition of the commentary (in square brackets) and, where T-S NS 183.1 could not be used, on the basis of *Kitāb al-Anwār* VII.1 (in angular brackets):
"ואלטֿ אהל אלתקוים פאנהם למא ע[למו מן] אכֿתלאף <מנאטֿר> אלהלאל פי אלבלדאן ואוגֿבו מע דֿלך אנה אדֿא <צח ענדהם> [אנה קד רי] פי אקלים מא אן יתכֿדֿוה ראס שהר [ועלמו] אינֿא א[נה רבמ]א לם יכֿהר באלעשי פיטֿהר בעד זוא[ל אלשמס אלזמו] אנפסהם אלעמל עלי אלתקוים פיעמלון וסטה [ויעדלונה ויאכֿדֿון] ערכֿה [וגֿמיע מא י]חתאגֿ אליה מן עמל א[לרויה פ]אדֿא [חצ]ל להם אנה ירי פ[י מדינה מא אטֿבתו]ה ראס אלשהר".

> duty to fix [months] in accordance with the true astronomical position. They calculate its [the moon's] mean motion and rectify it and take its latitude and everything that is necessary for him who calculates visibility. If the outcome of their [calculation] is that it can be sighted in some city, they establish it as the beginning of the month.

The text in *Kitāb al-Anwār* repeats this *verbatim* but breaks off after "a duty to fix [months] in accordance with the true astronomical position," omitting the more technical details.[109]

The following description of the method is given in *Kitāb al-Tamyīz*:[110]

> The tenth approach is the approach of the people of the true astronomical position [of the moon]. They say: "We must determine the position of the moon at the time of each conjunction and see at what hour of the day or of the night it is due to appear on its own.[111] The day when we think that it can correctly appear at some time, we make this day holy from the beginning of the night, without waiting until the evening so that we

109 See Vidro, "Al-Qirqisānī's Account."

110 Edited here on the basis of BNU de Strasbourg 4845.12r. See also RNL Evr Arab II 1189/12, fol. 33r (it is not clear to me which manuscript was used by Zucker):
"ואלמדהב אלעאשר מדהב אצחאב אלתקוים יקולון יגב אן נקום מוצע אלקמר ענד כל אגתמאע וננטר פי אית סאעה יחק לה אן יטהר לנפסה מן נהאר או ליל פאי יום צח לנא אנה יטהר פי וקת מן אוקאתה אתכדנא דלך אליום קדש מן אול אלליל ולם נצבר אלי עשיתה פננטרה פיהא ואטהרו אן אלדי דעאהם אלי הדא הו אנהם רבמא טלבו אלהלאל באלעשי פלם ירוה פאדא כאן בעד זואל אלשמס טהר מן נאחיה אלמשרק זאילא עין דאירה וסט אלסמא פקאלו פמא נצנע חיניד אדא טהר הל נקדר נרד דלך אליום ונגעלה קדש ולכן אלואגב אלתחרז קבל דלך".

111 Langermann translates "We examine its elongation (*ittisāʾihi*) [in order to determine] if it is such that it will be visible by itself (*li-nafsihi*) either in the daytime or at night." Largermann, *The Jews and the Sciences*, part II, p. 4. This translation depends on the reading אתסאעה "its elongation" in Zucker's edition where BNU de Strasbourg 4845.12r has אית סאעה "what hour." Zucker's reading is also attested in RNL Evr Arab II 1189/12, fol. 33r and was not questioned by Langermann. While elongation is an important criterion of lunar visibility, it does not seem to fit well in the sentence here. This is reflected by Langermann's translation, where an addition marked by square brackets was found necessary to make the sentence work. Besides, סאעה "hour" fits better with the following phrase מן נהאר או ליל "of the day or night."

> can see it [the moon].” They declared that what induced them to this is that they might seek the crescent in the evening and not see it. If it then appeared in the afternoon,[112] [coming?] from (alt. reading: in) the eastern direction[113] such that it departs from the meridian circle, they would say: “What should we do now that it appeared? Do we decree that we reverse [our decision about] this day and make it holy? But the duty is to be on the guard before this.”

It is clear from the quoted passages that supporters of the moon’s true astronomical position relied on predicted visibility of the crescent rather than on its actual ocular sighting. How to calculate the predicted visibility of the new crescent was an important problem in Muslim astronomy, and a number of algorithms were proposed by the tenth century, when Saadia and al-Qirqisānī worked.[114] The core of all methods was to establish, based on the astronomical position of the moon and the sun at the time of the true conjunction, when the moon will be at a sufficient distance from the sun to be astronomically visible. What constituted this sufficient distance from the sun is known as the visibility criterion. Different visibility criteria were used in different prediction algorithms. It is impossible to know what algorithm was used by the Jewish group discussed here, but one can get a general idea of their procedure by combining information provided in *Kitāb al-Tamyīz* and Saadia’s *Commentary on Genesis* 1:14. A schematic description of the group’s calculation is given in the *Commentary on Genesis*: “They calculate its [the moon’s] mean motion and rectify it and take its latitude and everything that is necessary for him who calculates visibility.” Their visibility criterion is

112 Langermann translates בעד זואל אלשמס here as “after sunset” instead of the expected “after the sun begins to decline (from the meridian)” i.e., “in the afternoon” (Largermann, *The Jews and the Sciences*, part II, p. 4).

113 The reference to “the eastern direction” is not entirely clear. At the beginning of a month the crescent is visible in the western sky.

114 King et al., “Astronomical Handbooks,” pp. 26, 84; Johannes Thomann, “‘Few Things More Perfect’: Ḥabash al-Ḥāsib’s Criterion for the Visibility of the Lunar Crescent and the *Dustūr al-Munajjimīn*,” in *Science in the City of Fortune: The Dustur al-Munajjimin and its World*, eds. Eva Orthmann and Petra Schmidl (Berlin: EB-Verlag 2017), pp. 137–170, esp. pp. 143-146; David A. King, “Ru’yat al-Hilāl,” in *Encyclopaedia of Islam, 2nd edition,* eds. Peri J. Bearman et al (Leiden: Brill, 2012) (consulted online on 12 November 2020) and the literature cited there.

not specified. The moment when the moon gets sufficiently far from the sun to fulfil a visibility criterion can fall in a particular location both during the day and during the night. Although the new crescent is not bright enough to be first visible during the day, supporters of the true astronomical position began the new month on the day when the visibility criterion was fulfilled, independent of the time when this was calculated to occur in their location (*Kitāb al-Tamyīz*). This is because the group did not require visibility in a particular location. It sufficed if the visibility criterion was fulfilled shortly after sunset "in some clime," i.e., in some place in the world as it was known in the tenth century (*Commentary on Genesis* and *Kitāb al-Anwār*). The group did not postpone the beginning of the month until the following evening to ascertain that the crescent could actually be sighted (*Kitāb al-Tamyīz*). This means that when the visibility criterion was fulfilled in their location at a time other than right after sunset, their month began at least one day earlier than the month regulated by ocular sighting.

The group's main goal in relying on predicted rather than actual visibility was to always begin the month from the day when astronomical conditions were met for the crescent, the indicator of a new month, to be visible in the sky. Actual sighting of the crescent depends on astronomical, atmospheric, and geographical conditions. The sighting can be delayed by clouds or dust in the sky, mountains obstructing the horizon, and/or the geographical position of a given location where the crescent is seen a day later than in other places. All this can lead to negative sightings even when the crescent is at a sufficient distance from the moon to be visible. These factors can also create uncertainties. In the Qaraite observational calendar, when the crescent is not sighted in the evening of the twenty-ninth day, the thirtieth day is considered the last day of the outgoing month. It can sometimes happen that the crescent is then seen on the thirtieth day in the afternoon. This is possible if the sky is clouded in the evening but becomes clear during the following day, or if the moon almost but does not quite reach the required distance from the sun to be visible in a given location in the evening of the twenty-ninth day. In such cases the new crescent can be sighted on the thirtieth day shortly before sunset, when the sky is already darkening but the day has not yet ended. This creates a dilemma whether to sanctify a new month retroactively or profane the day on which the crescent, the indicator of a new month, appeared in the sky. As mentioned above, this problem was solved in different ways by Qaraite groups. Some Qaraites declared this day itself as the beginning of the month (*Kitāb al-Anwār* VII.13.16), whereas the majority waited and started the month from the following night (*Kitāb al-Anwār* VII.13.17).

Relying on the predicted visibility of the crescent in any clime allowed the group discussed here to avoid the dilemma by focusing on astronomical conditions and disregarding all other factors.

Veracity of Saadia and al-Qirqisānī's accounts of medieval Jewish calendars

To what extent can Saadia and al-Qirqisānī's accounts of medieval Jewish calendars be considered trustworthy and not just hypothetical opinions put forward by the authors themselves in order to build up an argument by elimination?[115] This question is particularly relevant for calendars for which we do not have descriptions authored by their proponents themselves. These are the calendars of supporters of the conjunction, of ʿAnan b. David, supporters of Sivan, and supporters of the true astronomical position of the moon. The remaining two calendars discussed in this article do not require such verification. There is no doubt that al-Qirqisānī is a reliable source on the Qaraite calendar as it was practiced in his time and place. Benjamin al-Nahāwandī's calendar is known from his own *Book of Commandments*, and Saadia and al-Qirqisānī's accounts agree with what we know of Benjamin's text. Apart from the calendar of supporters of the conjunction, the discussion here has to centre on Saadia because al-Qirqisānī appears to draw on Saadia as far as the calendars of ʿAnan b. David, supporters of Sivan, and supporters of the true astronomical position of the moon are concerned. In contrast, al-Qirqisānī's information on the calendar of supporters of the conjunction is independent and more extensive than that presented by Saadia.

The nature of ʿAnan b. David's calendar received some attention in scholarly literature. In a famous twelfth–century story that tells about ʿAnan's contest for the exilarchate and his subsequent founding of a separate movement he is said to have claimed that he set months by sighting the crescent.[116] A shorter version of the same story, which also mentions lunar observation as one of ʿAnan's practices, is recorded by Saadia in his "Refutation of ʿAnan."[117]

115 *Kalām*-style expositions can sometimes include hypothetical opinions not supported by anybody. Saadia in particular is known to have modified opinions of his opponents in *kalām*-style discussions of various problems. Stroumsa, "Saadiah Gaon," pp. 13–14, 17–18.

116 Nemoy, *Karaite Anthology*, pp. 4–5; Gil, "The Origins of the Karaites," p. 77; Erder, *The Karaite Mourners of Zion*, p. 58.

117 Seewald, "*Kitāb al-Radd*," p. 37 (text), p. 54 (translation).

The trustworthiness of this story in general and of the lunar observation claim in particular has been doubted by researchers.[118] M. Rustow suggested that the attribution of lunar observation to ʿAnan b. David is an unhistorical retrojection.[119] If Rustow is correct, Saadia's statement that ʿAnan fixed months by sighting the crescent is anachronistic and may be thought of as purely polemical.[120] Lunar observation is, indeed, not discussed in the surviving portions of and quotations from ʿAnan's legal code.[121] However, the code in its current state is very fragmentary and cannot serve as conclusive evidence. Some terminology in *Kitāb al-Tamyīz* suggests that Saadia's description may have been based on earlier sources that were linguistically close to ʿAnan. The beginning of the section on ʿAnan reads:[122]

> The fifth approach is the approach of ʿAnan. He said that months are [fixed] by the crescent, as those people said, and added to it two other ways. One is that it is not fixed according to the crescent that is hard to see but only according to one that can be clearly seen, as he said "clearly."

The term that Saadia attributes to ʿAnan and that I translated as "clearly" is ברירא֯ית *brīrā'ith* ("purely, clearly, simply").[123] This same word is said twice

118 On the story in general see, e.g., Gil, "The Origins of the Karaites," p. 77–78; Rustow, *Heresy*, pp. 55–56.

119 Rustow, *Heresy*, p. 57–63.

120 Al-Qirqisānī appears to draw on Saadia when including ʿAnan b. David among supporters of lunar observation. Vidro, "Al-Qirqisānī's Account".

121 Harkavy, *Aus den Ältesten Karäischen Gesetzbüchern*, pp. 1–172.

122 Quoted here according to T-S Misc. 35.83v, left. See also RNL Evr Arab II 1189/12, fols 35r–35v, Zucker, *Saadya's Commentary*, p. 439 (text), p. 445 (translation):
"ואלמדהב אלה מדהב ענן פאנה יקול אלשהר באלהלאל כ"ק האולי אלקום ויזיד עלי דלך פנין אכרין אחדהמא אן אלעמל לא יכון עלי אלהלאל אלדי ירא כפיא אלא עלי אלדי ירא בינא כ"ק ברירא֯ית".

123 Zucker, *Saadya's Commentary*, p. 439 has the form twice as ברירא֯ות and once as בראר֯ית. Both these forms appear to be mistakes, either in the manuscript or in the edition (it is not clear to me which manuscript was used by Zucker for this passage). Zucker does not comment on the form. I thank Professor Matthew Morgenstern (Tel-Aviv University) and Professor Geoffrey Khan (University of Cambridge) for discussing this form with me.

more to have been ʿAnan's expression.[124] It is of interest here because it is not in Judaeo-Arabic, the language of *Kitāb al-Tamyīz*, but in Aramaic, the language of ʿAnan's legal code and of his other writings. The form *brīrā'ith* with the adverbial ending *-ā'ith* is not typical of Jewish Babylonian Aramaic and is best known from Syriac. However, post-talmudic Jewish Babylonian Aramaic formed a dialect continuum with other forms of Eastern Aramaic including Syriac and shared with them certain grammatical features and lexicon not attested in talmudic Aramaic.[125] A number of expressions influenced by Syriac were identified in ʿAnan's legal code, among them the form *be-qlīlā'ith* "easily" with the same adverbial ending *-ā'ith*.[126] If so, it is linguistically plausible that the term *brīrā'ith* could have been used in sources linked to ʿAnan. This suggests that Saadia may have had access to some version of ʿAnan's writings and that those writings discussed setting months by the crescent when it can be clearly seen. Alternatively, Saadia could have taken this term from a different source (written or oral) that mentioned ʿAnan and his opinions on calendation To operate with Aramaic terminology this source had to be early and relatively close to the time of ʿAnan b. David since all later proto-Qaraite and Qaraite literature was composed in Hebrew or Judaeo-Arabic.[127] Although further evidence is required to ascertain whether ʿAnan's calendar was indeed based on lunar observation, it seems that Saadia's description of it draws on early sources in Aramaic and is not merely an unsubstantiated polemical claim.

124 אמא עלי קוֹ ברירית "As for what he said 'clearly'" and יטאלב מן אין קאל ברירית ולא דליל לה עלי דֿלך "One should demand of him on what basis he said 'clearly' when he has no textual proof for it" (cited here according to T-S Misc. 35.85r, right; see also RNL Evr Arab II 1189/12, fol. 35r, Zucker, *Saadya's Commentary*, p. 439 (text), p. 445 (translation, the second passage is not translated)).

125 Joshua Blau and Simon Hopkins, "On Aramaic Vocabulary in Early Judaeo-Arabic Texts Written in Phonetic Spelling," *Jerusalem Studies in Arabic and Islam* 32 (2006): 433–471, esp. pp. 444–445.

126 Jacob N. Epstein, "Notes on Post-Talmudic-Aramaic Lexicography," *The Jewish Quarterly Review* 5/2 (1914): 233–251, esp. p. 248.

127 Rina Drory, "'Words Beautifully Put': Hebrew Versus Arabic in Tenth-Century Jewish Literature," in *Genizah Research After Ninety Years: The Case of Judaeo-Arabic: Papers Read at the Third Congress of the Society for Judaeo- Arabic Studies,* eds. Joshua Blau and Stefan Reif (Cambridge: Cambridge University Press, 1992), pp. 53–66, esp. p. 55.

The existence of a calendar based on a calculation of conjunctions but without the Rabbanite postponements is supported by Yefet b. ʿEli, whose account of this scheme appears to be independent from both Saadia's and al-Qirqisānī's.[128] Yefet b. ʿEli also asserts that this calendar was still practiced in his own time.[129] Al-Qirqisānī ascribes this calendar to a number of groups, including Rabbanites after they gave up lunar observation but before they accepted their calendar with postponement rules, the followers of Mūsā al-Tiflīsī and of Ismāʿīl al-ʿUkbarī, Daniel al-Qūmisī before he started advocating lunar observation, Qaraites of Baṣra and Khorāsān, and other unnamed groups. The calendar is also associated with Mūsā al-Tiflīsī by Yefet b. ʿEli and Saadia. The claim that this calendar was supported by Ismāʿīl al-ʿUkbarī, Qaraites of Baṣra and Khorāsān, and by Daniel al-Qūmisī is not confirmed by other sources known to me. That Rabbanites ever followed a calendar based on the mean conjunction without the postponements *lo badu pesaḥ* is unhistorical because the postponements are the earlier element of the fixed Rabbanite calendar. While the postponements are recorded in talmudic literature, first hints to the *molad* calculation appear only in the eighth century and the calculation itself is first described in the ninth century.[130] On the whole it seems reasonable to assume that this calendar was practiced in the ninth–tenth centuries even if the exact groups that followed it cannot always be confirmed.[131]

For the last two calendars, namely the calendar of the supporters of Sivan and the calendar of supporters of the true astronomical position of the moon, no sources other than *Kitāb al-Tamyīz* and the *Commentary on Genesis* are

128 See footnote 68.

129 *Commentary on Leviticus* 23:4–8, RNL Evr Arab I 73, fol. 99v:
"וליס פי זמאננא הדא גיר ג מדאהב והי מדהב אלרבאנין ומדהב אלתפליסי ומדהב אלקאילין באלרויה".
"In our time there are only three approaches [to setting months] – the approach of the Rabbanites, the approach of al-Tiflīsī, and the approach of supporters of observation."

130 Stern, *Calendar and Community*, pp. 165–170, 205; idem, "A Primitive Rabbinic Calendar Text from the Cairo Genizah," *Journal of Jewish Studies*, 67/1 (2016), pp. 68–90, esp. pp. 73–76.

131 A date that is best explained by the use of a calendar based on the mean conjunction alone was recently identified by S. Stern. Eve Krakowski, Sacha Stern, "The 'Oldest Dated Document of the Cairo Genizah' (Halper 331): The Seleucid Era and Sectarian Jewish Calendars," *Journal of the Royal Asiatic Society* (forthcoming).

known to me. It is possible that these schemes were theoretical. Some evidence for the existence of groups that supported these methods can perhaps be gleaned from Saadia's wording in *Kitāb al-Tamyīz*. Indeed, descriptions of both of these groups include what appear to be quotations. Saadia writes about the supporters of Sivan:[132] "They said: 'We establish a base from Sivan and set other months so that one month is thirty [days] and the [next] month is twenty-nine [days].'"

The following is found in *Kitāb al-Tamyīz* in the section on the supporters of the true astronomical position of the moon:[133]

> They say: "We must determine the position of the moon at the time of each conjunction and see at what hour of the day or of the night it is due to appear on its own. The day when we think that it can correctly appear at some time, we make this day holy from the beginning of the night, without waiting until the evening so that we can see it [the moon]."

Further down Saadia quotes them again: "[…] they would say: 'What should we do now that it appeared? Do we decree that we reverse [our decision about] this day and make it holy?' But the duty is to be on the guard before this." These quotations imply that Saadia may have had some contact with representatives of these groups or knew their books.[134]

On the whole it appears that non-Rabbanite medieval calendation methods on Saadia and al-Qirqisānī's lists are not simply hypothetical opinions put forward in order to build an argument by elimination, but reflect real calendars with some degree of accuracy. Nevertheless, it must be noted here that writing in the second half of the tenth century in Palestine Yefet b. ʿEli states that only three calendars were practiced by Jews in his time – the Rabbanite calendar, the

132 For the Arabic original see footnote 98.

133 For the Arabic original see footnote 110.

134 Quotations are also found in the sections on the Qaraite observational calendar (referred to as the calendar of Baytus and "those who follow him in our times") and on the Samaritan calendar. Zucker, *Saadya's Commentary*, pp. 438, 441 (text), pp. 444, 447 (translation; in the passage on the Samaritans Zucker translates the quotation as indirect speech). A term used by ʿAnan is also quoted (see above). None of these quotations are as extensive as the quotations in the sections on supporters of Sivan and supporters of the true astronomical position of the moon.

Qaraite calendar, and the calendar of Mūsā al-Tiflīsī.[135] It is possible that other calendars discussed by al-Qirqisānī and Saadia were no longer practiced by the second half of the tenth century or practiced only in Babylonia.

Concluding remarks

In this article I analysed six non-Rabbanite medieval schemes for setting months as they are described in tenth-century Babylonian works *Kitāb al-Tamyīz* and *Commentary on Genesis* by Saadia Gaon and *Kitāb al-Anwār wal-Marāqib* by Jacob al-Qirqisānī. These calendars were based on different principles, including sighting the crescent in all months (the Qaraite calendar and the calendar of ʿAnan b. David), sighting the crescent in some months with counting months of alternating lengths in others (the calendars of Benjamin al-Nahāwandī and of supporters of Sivan), the calculation of mean conjunctions (the calendars of Abū ʿImrān [Mūsā] al-Tiflīsī, Ismāʿīl al-ʿUkbarī and other groups), and calculation of the astronomical position of the moon in order to predict its visibility (the calendar of supporters of the moon's true astronomical position). Evidence suggests that the non-Rabbanite medieval calendation methods described by Saadia and al-Qirqisānī are not simply hypothetical opinions put forward in order to build a *kalām*-style argument by elimination, but reflect real calendars of the period with some degree of accuracy. This study highlights the diversity of medieval Jewish calendar experience and its removal from the ideal of calendar unanimity developed in ancient and medieval rabbinic Judaism.

Acknowledgements

This article was researched and written as part of the project "Qaraite and Rabbanite Calendars: Origins, Interaction, and Polemic" funded by the Fritz Thyssen Foundation. I am grateful to Professor Sacha Stern (UCL) for commenting on an earlier version of the article.

135 See footnote 129. The same is confirmed by Levi b. Yefet in the early eleventh century (RNL Evr Arab I 1713, fol. 4r): "פאלדי בקי מדהב אלגמאעה ומדהב אלמילאדיה ומדהב אלקראיין" "There remain the majority approach (i.e., the Rabbanite calendar), the approach of the *Mīlādiyyah* and the approach of the Qaraites."