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On which *tequfa* is the cycle of the moon based?

Abraham bar Ḥiyya's
Sefer ha-ʿIbbur
Book III Chapter 5
A CRITICAL EDITION

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Table of Contents

ABBREVIATIONS

m	*Mishna*
t	*Tosefta*
b	Babylonian Talmud
p	Palestinian Talmud
SI	Abraham bar Ḥiyya's *Sefer ha-ʿIbbur*
Yad	*Mishne Tora*
SA	*Shulḥan Arukh*
[OḤ	*Orakh Ḥayyim*]

TRACTATES

Ar	*ʿArakhin*
BM	*Baba Metsia*
Ber	*Berakhot*
Er	*ʿEruvin*
Me	*Menakhot*
MSh	*Maʿaser Sheni*
Pe	*Pesaḥim*
RH	*Rosh ha-Shana*
Sanh	*Sanhedrin*
Shab	*Shabbat*
Ta	*Taʿanit*
Tem	*Temura*

1 Introduction

This thesis presents a critical edition based on all extant manuscripts, as well as a translation, of one chapter of Abraham bar Ḥiyya's *Sefer ha-ʿIbbur* [1]. This work dates from ca. 1120 CE. *Sefer ha-ʿIbbur* is the earliest systematic work on the calendar that was written in Hebrew; it is also among the earliest original works on any scientific topic composed in Hebrew. We chose to study this particular chapter because of its subject matter: it faces the tension between revealed and scientific knowledge. We further analyzed an addition to the main text, which we found in some of the manuscripts. The critical edition itself, sections 3 and 4, constitutes the main part of our work. We had two additional aims: to ascertain if it would be worth our while to produce a critical edition of the entire *Sefer ha-ʿIbbur*, given that the work has been published previously, and to reflect on Abraham bar Ḥiyya's *Weltanschauung* and his conceivable goals when composing this work. To do the latter we will analyze the chapter's structure, reasoning and arithmetic in sections 5.1 and 5.2; and in section 5.3 we will discuss the existing edition and compare it to our partial critical edition in order to answer the first question.

1.1 Abraham bar Ḥiyya

In order to understand with what intention the work under study could have been written we first explore what is known about its author Abraham bar Ḥiyya, who was also named *ha-Sefardi*, the Spaniard, *ha-Bargeloni*, the Barcelonan, *Ha-Nasi*, the prince, and *Savasorda*, 'chief of the guard'. From the scope of his work we judge that Abraham bar Ḥiyya was an educated person. He translated from Arabic into Hebrew and he wrote original works. His work demonstrates proficiency in as diverse sciences as mathematics *(Yesode ha-Tevuna u-Migdal ha-'Emuna* or *'Encyclopedia')*, astronomy *(Tsurat ha-'Arets, Ḥeshbon Mahalkhot ha-Kokhavim, Luḥot, Sefer ha-ʿIbbur)*, astrology *(Megillat ha-*

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[1] Throughout this thesis, our transcription of Hebrew to Latin script is conform the rules of The Academy of the Hebrew Language (2000). Generally, we followed the simplified transcription rules; only for א, ח, and ע did we use its exact transcription rules. In transcribing names, we applied the transcription rules loosely; alternatively, we used the accepted English equivalent. Citations accord with the widely accepted standard of the American Psychology Association (APA); the abbreviations used in referring to the sources are listed on page 4.

Megalle (Sela, 2001, 2006)*)* and geography *(Yesode ha-Tevuna u-Migdal ha-'Emuna, Ḥibbur ha-Meshiḥa weha-Tishboret)* as well as in ethics and philosophy *(Hegyon ha-Nefesh, Megillat ha-Megalle)*. He was the first to write scientific works in Hebrew, thereby creating a dedicated vocabulary (Efros, 1926, 1927, 1929; Sarfatti, 1968), a specific syntax (Gamli'el, 1997) and using a variety of styles for addressing his various audiences (Baron, 1958, p. 74).

From his writings we infer that Abraham bar Ḥiyya was active in Spain in the first half of the twelfth century CE. Much more has been speculated about his life. Stitskin (1960, pp. 15-26) gives perhaps the most idyllic report, from his birth "in 1065" in "the small southern village of Soria,"[2] which "was marked by a deep simple piety" to his end in France where "he died a martyr's death in 1143." Unfortunately, not a single one of these claims has been substantiated convincingly. That his place of birth would have been Soria, for instance, was first conjectured by Filipowski on account of the astronomical tables for that location in *Sefer ha-'Ibbur* (Filipowski's 1851 edition, pp. vii, 119), and Filipowski's statement has been repeated by a long line of authors ever since. However, the observation was based on the Oxford manuscript and Beit Arié (1994, p. 368) later judged these specific tables to be written in a different hand. This suggests they might not have been part of the original work. Indeed, such tables are not to be found in the two manuscripts we presently have access to in their entirety (V and W, see section 2.1). Steinschneider (1925, p. 337) already pointed out that Filipowski's inference was imaginative rather than factual and that the tables for Soria might well have been added by a copyist.

Perhaps Abraham bar Ḥiyya's epithets can give us more unambiguous clues about his life? His title *ha-Nasi*, the prince, has been taken by some to indicate that he came from an important Jewish family (Sela, 2003, p. 97) or even that he was from royal lineage (Freimann in the 1860 edition of *Hegyon ha-Nefesh*, p. iii); to others it suggests that he performed a judiciary function within the community (Sirat, 1985, p. 98). Steinschneider (1925, p. 335) merely remarks that the title was not uncommon in 12th century Barcelona. The title *Savasorda*, a corruption of *Sahib-al-Shurta*, 'chief of the guard', which again was not unique to Abraham bar Ḥiyya (Baer, 1966, p. 60; Steinschneider & Malter, 1925, p. 335), has led some to claim that he occupied a post at the Christian court of Alfonso I of Aragon and of the Counts of Barcelona (Sirat, 1985, p. 97), others that he was minister of police at a Muslim court (Glick, 1979, p. 16).

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[2] The well-known city of Soria is in fact located in the north, west of Saragossa.

What areas did Abraham bar Ḥiyya visit? He may or may not have lived in Provence for some time (Abraham bar Ḥiyya Savasorda, 1860, pp. x, xxxviii), but one wonders how relevant this issue is since Catalonia and Provence had been united by the marriage of Count Berenguer III of Barcelona to Douce of Provence in 1112 (Chaytor, 1933, p. 57). In Abraham bar Ḥiyya's day Spain was a place in turmoil. The *Reconquista* made headway towards the south, the Almoravids were quickly turning El-Andalus into a monolithic Islamic society, and in the north Christian rulers skirmished. The demarcation between cultures followed the frontline of the *Reconquista* rather than the present border between Spain and France (Glick, 1979, pp. 290-299). The level of expertise Abraham bar Ḥiyya demonstrated in his works has led some to suggest that he was educated in El-Andalus (Stitskin, 1960, p. 19). Others argue that he may as well have studied in northern Spain (Abraham bar Hayya, 1969, p. 2). We just do not know.

What facts remain, then, about Abraham bar Ḥiyya's life? Most of his works were dated in Barcelona before 1136 according to Steinschneider (1925, p. 338). The earliest work we can assign a date to is *Sefer ha-ʿIbbur*, which was composed around 1120. The last unambiguous sign of his activity is found in an 1134 or 1136 colophon of *De horarum electionibus* (the translation of an Arabic work by Enbrani) which mentions that Plato of Tivoli co-operated with *Abram Judeus Ispanus*, qui dicitur *Sauacorda* (Steinschneider & Malter, 1925, p. 361) in producing the translation[3]. It has been suggested Abraham bar Ḥiyya later worked with Rudolph of Bruges on a treatise on the Astrolabe but there is little ground to accept this (Levy, 1942). Still, some people do claim he was active for ten more years after 1136 (e.g., Romano as cited by Rubio (2000, p. 141)). What we can say, then, is that Abraham bar Ḥiyya was a Jew with an extensive knowledge of Arabic science who worked in Christian Spain with Christian colleagues in the first half of the 12th century.

1.2   A VERY BRIEF INTRODUCTION TO THE CALENDAR

Man has probably always been aware of nature's cycles. Darkness and light alternate as we see the sun move through the sky, disappear and return once again.[4] This cycle defines the day. Examination of the moon reveals a different and longer cycle: the

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[3] Such collaboration of two translators was usual at the time: The first, often Jewish, interpreter translated the text from Arabic into the vernacular, and the second, often a Christian priest, from the vernacular into Latin (Glick, 1979, p. 257). Plato of Tivoli also translated parts of Abraham bar Ḥiyya original work into Latin.

[4] Our account will assume a geocentric cosmology throughout.

moon changes from visible to invisible and back again in some 30 days. This cycle of the moon defines the month. The actual 'new' moon or the moment of conjunction of the moon with the sun can only be perceived directly during a solar eclipse. Since eclipses are rare, the beginning of the month is detected either by observing the eastern early morning sky to pinpoint the day of the moon's disappearance or by determining the day of its re-appearance in the western evening sky.[5] Both methods have been used to determine the ending of the previous or the beginning of the new month.[6] A still longer cycle is related to the seasons and the position of the sun among the stars — which can be seen just before sunrise and just after sunset. This cycle defines the year. The number of days in this cycle can be determined by simple means. The length of the shadow of a standard stick is related to the sun's position in the sky and the day of the shortest shadow thus reveals when the sun reaches its highest point in the sky.[7] When this happens again, a year has passed. Alternatively, one can study the point on the horizon where the sun appears in the morning (or disappears in the evening); this reveals a pattern and the time between, for instance, two consecutives northward extremes is again one year. These three cycles, the day, the lunar month and the year, can be observed easily and indeed have been used in all civilisations (Al-Biruni, 1879, p. 11 ff.).[8]

A calendar, then, is a system to represent and name or number the days, months and years. Although the simplest possible calendar would just count the number of days, which everyone can perceive arrive and go since a certain reference day, we generally call a calendar a system that groups the days into months and years. A calendar thus consists of measures for months and years, and an *epoch,* or reference point, typically the coming to power of a specific ruler, to count from. Special occasions and recurring events can be marked on such a calendar. When various groups of people live

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[5] However, counting the days and months between solar eclipses and dividing the number of days by the number of months gives the average duration of a month; similarly — and more accurately because they are independent of the observer's position on earth — between lunar eclipses, which occur with opposition of moon and sun. The so-called *mean lunation* is thought to have been determined in this way.

[6] Observing the morning sky to determine the moon's disappearance will lead to a system in which the day begins in the morning, whereas watching the evening sky for the first visible new moon will lead to days that begin in the evening. This is thought to be the historical basis of the Jewish time-reckoning. In ancient Egypt, for instance, days began in the morning.

[7] In this way the day of the summer solstice is determined. Similarly, finding the longest shadow reveals the day of the winter solstice.

[8] Note that the *week* is not related to any astronomical phenomenon.

together, the calendar of a specific group determines their social events and thus contributes to the identity and coherence of that group.

Some calendars are *observational*: the beginning of a cycle is perhaps roughly known or calculated from experience but only determined precisely on the basis of observations; others are *arithmetic* or *fixed*: established on the basis of calculations alone.[9] The advantage of having a fixed, calculated, calendar lies in being able to establish and distribute it in advance without having to rely on immediate observation and communication. In other words, a fixed calendar makes it possible to plan for certain events or festivities.

Determining a calendar is problematic because the number of days in one month is not an integer number, nor is the number of months in one year, nor, for that matter, the number of days in one year. The numbers are not even constants. They vary over time and their means exhibit slow drifts. Some cultures have partially solved the problem by letting go of any relation with of the cycle of the moon. The Julian, and nowadays the Gregorian, calendar have divided the length of the solar year into twelve more or less equal portions which each hold an integer (but varying) number of days. These portions are not related to the cycle of the moon even if they are still called 'months' for historical reasons. (An extra day can be inserted to ensure the relationship between the year and the cycle of the sun, either based on calculation or on observation.) Another solution is to let go of the year as the natural cycle related to the seasons and the position of the sun in the sky. The Islamic calendar has done so and their so-called lunar year consists of twelve months of alternately 29 and 30 days. This allows the months to follow the cycle of the moon. (Inserting an extra short or long month, i.e., adding or leaving out one day, makes it possible to fine-tune the moon-month-correlation.) One can keep both the month's relation to the cycle of the moon and the year's connection to the cycle of the sun by combining years of twelve lunar months with years of thirteen lunar months, that is, by inserting an extra month in some years. For want of a better term, we will call this a lunar-solar calendar. In essence, though, it is a lunar calendar because there always is a direct and observable relation between the day of the month and the phase of the

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[9] In the last analysis, all calendar systems are observational, since no astronomical theory is exact and complete; in theory, the difference between ancient calendars that determined the beginning of the month by observing the sky and our modern-day astronomical calendar, which was last adjusted by insertion of a leap second at the end of 2005, is quantitative and not qualitative. In practice, of course, we can now reliably (as far as the calendar is concerned) make an appointment for a certain day, month and year in the future.

moon. The Hebrew term for intercalation, the insertion of an extra month into the year, is עבור, *'ibbur,* 'pregnancy', and the intercalated year is called 'pregnant', מעוברת.

A lunar-solar calendar can be observational or fixed: the intercalations can take place according to a fixed schedule or when some authority deems such necessary. The Babylonian calendar had years of 12 or 13 lunar months with the extra months inserted by decree as needed until the fifth century BCE, as did the Hebrew calendar described in the Talmud. In the fifth century BCE the Babylonians began using a system of repeating series of 19 years with 12 years containing 12 months and 7 years containing 13 months (called the *metonic* cycle after the contemporary Greek mathematician-astronomer Meton, who may actually have learned it from the Babylonians). The *metonic* cycle forms the basis of the Seleucid calendar (last centuries BCE) and of the present-day fixed Hebrew calendar.

The traditional view is that the fixed Hebrew calendar, which was described by Abraham bar Ḥiyya in *Sefer ha-'Ibbur* as well as by Maimonides[10], was instituted by a *Hillel the Patriarch* in the fourth century CE. However, neither the institution nor even the existence of the person can be substantiated: No record of such an institution or person is found in either Talmud or other contemporary rabbinical source. The evidence rather suggests that the present-day fixed Hebrew calendar evolved gradually and was in place only in the ninth or tenth century CE (Stern, 2001). Our present study does not deal with the details of the fixed Hebrew calendar nor with its evolution. We will confine ourselves to the particulars that are necessary to follow the discussion in Chapter 5 of Book III of *Sefer ha-'Ibbur.*

1.3   *SEFER HA-'IBBUR*

Abraham bar Ḥiyya composed his *Sefer ha-'Ibbur* before 1122, as we learn from his remark that the 257th *maḥzor* is 'the one we stand in' (see note 31). It is the oldest systematic and complete book on the fixed Hebrew calendar. It most probably served as the source for the middle part (Chapters 6 to 10) of Maimonides' *Hilkhot Qiddush ha-Ḥodesh*, which was composed in Hebrew in 1166 but conceived in Arabic in 1158:[11] Nearly all propositions in Maimonides' text have their equivalent in Abraham bar Ḥiyya's *Sefer ha-'Ibbur*.[12] Maimonides had earlier praised "a scholar residing

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[10] Yad *Hilkhot Qiddush ha-Ḥodesh.*

[11] Cf. Obermann's introduction to *Hilkhot Qiddush ha-Ḥodesh* (Gandz, Obermann, & Neugebauer, 1956).

[12] For example, SI III, 5:

in Spain for his exceedingly excellent book on the calendar"[13]. Almost certainly he was referring to Abraham bar Ḥiyya's *Sefer ha-ʿIbbur*. Both Abraham Ibn Ezra, who wrote a work on the calendar also titled *Sefer ha-ʿIbbur* in 1146, and Isaac ha-Yisre'eli, who composed his *Yesod ʿOlam* in the beginning of the 14th century, refer to Abraham bar Ḥiyya's work on the calendar.

1.3.1 STRUCTURE AND CONTENTS

Sefer ha-ʿIbbur consists of three books (מאמרים), each containing ten chapters or 'gates' (שערים), preceded by an introduction in which astronomy is presented as God's wisdom. It demonstrates the symmetry between the heavens and the earth: these realms are equivalent in that understanding of the one provides knowledge of the second and vice versa. The introduction shows that Scripture is the source of all knowledge about the heavenly bodies and their movements and thus of the calendar. The presented cosmology is geocentric.

The first book provides the astronomical and geographical background against which the workings of the calendar can be understood. The chapters of the first book deal with the division of the inhabitable parts of the earth into climates, the differences between north and south, and between east and west. It describes the division of the heavens and the signs of the Zodiac. It treats the movement of the moon and its relation to the months, and the movement of the sun and its relation to the day. It discusses how the beginning of the day is defined in various cultures, and how the day is divided into hours in the Jewish tradition. It presents the basis for

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ואני אומ׳ כי הכוונה היתה במחזור הלבנה להשוות שנת החמה והלבנה כדי שיכלה המותר אשר ביניהם בחדשי
העיבור. ואנו רואים לדברי רב אדא בר אהבה המותר אשר בין שתי השנים יכלה ויספה בסוף כל מחזור. ויהיו השנים
לחמה וללבנה שווין כאחד. ולדברי שמואל אנו מוצאים ביניהן א׳ [שעה ו]ת׳פ׳ה׳ [חלקים] בכל מחזור שישאר עודף
לחמה.

And Yad *Hilkhot Qiddush ha-Ḥodesh* 10:1 & 9:2:

שנת החמה למי שהוא אומר שהיא פחות מרביע מחכמי ישראל, אומר שהיא שלוש מאות חמישה ושישים יום וחמש
שעות ותשע מאות שבעה ותשעים חלקים ושמונה וארבעים רגע; והרגע, אחד משישה ושבעים בחלק. ולפי חשבון
זה, תהיה תוספת שנת החמה על שנת הלבנה עשרה ימים ואחת ועשרים שעה ומאה ואחד ועשרים חלק ושמונה
וארבעים רגע--סימן להן י׳ כ״א קכ״א מ״ח. ולא תמצא תוספת במחזור של תשע עשרה כלל, אלא בכל מחזור מהם
ישלמו שני החמה עם שני הלבנה הפשוטות והמעוברות.

מי שהוא אומר שהיא שס״ה יום ורביע יום, יישאר מכל מחזור של תשע עשרה שנה, שעה אחת וארבע מאות וחמישה
ושמונים חלקים, כמו שאמרנו. ויהיה בין תקופה לתקופה, אחד ותשעים יום ושבע שעות וחצי שעה; ומשתדע תקופה
אחת באיזה יום ואיזו שעה היא, תחיל למנות ממנה לתקופה השנייה שאחריה, ומן השנייה לשלישית, עד סוף
העולם.

[13] In his commentary on mAr 1:2.

astrology: the connection between the hours and the days of the week and the position of the celestial bodies.

The second book explains the rules of calendation. It discusses the relation between the month and the *molad*, the estimated moment of the 'average' new moon that is calculated from the average time between observable conjunctions (see note 5 and section 1.3.2), and describes how the timing of the *moladot* can postpone the beginning of the month. It examines the length of the months, the calculation of the *moladot* and the determination of the festivals. The second book also addresses the difference between the lunar year and the solar year, and explains normal and leap, or intercalated, years.

The third book concerns the solar year and the *tequfot*, i.e., the solstices and the equinoxes, and the discussion about the length of the seasons and of the year. Chapter 3 presents the *tequfa* of Samuel, and Chapter 4 the *tequfa* of Rav Adda bar Ahava.[14] Both chapters present tables for the *tequfot* in various years. Chapter 5 evaluates the two different *tequfot*. The later chapters of Book III discuss the calculation of the Sabbath years and the Jubilee years and explore the calendars of other peoples, such as Islamic and Christian, their festivals, and the different epochs that have been used in the various traditions.

1.3.2   BOOK III CHAPTER 5: *ON WHICH* TEQUFA *IS THE CYCLE OF THE MOON BASED?*

We present a text edition of Chapter 5 of Book III of Abraham bar Ḥiyya's *Sefer ha-'Ibbur* (section 3). The chapter explores the differences between the *tequfa* of Samuel and the *tequfa* of Rav Adda. In order to be able to follow the discussion in this chapter, one needs to be familiar with some terminology, measures and conventions.

The term *tequfa* denotes the moment of occurrence of each of the four solstices and equinoxes of the solar year, as well as the season from that solstice or equinox to the next equinox or solstice. We thus have the *tequfa* of Nisan for the spring equinox (in the Northern Hemisphere)[15] as well as for the spring season, and the *tequfa* of Tishri for the autumnal equinox and the time of autumn; the *tequfa* of Tevet for the winter solstice and the winter season, and the *tequfa* of Tammuz for the summer solstice and the summer season. The length of the solar year is directly related to the dura-

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[14] On the historicity of Mar Samuel and Rav Adda bar Ahava, see note 19.

[15] To be politically correct, we should use hemisphere-independent terms such as the Northward equinox. For reasons of clarity we chose not to do so.

tion of a *tequfa* (i.e., season) with the usual, if astronomically only approximate, assumption that the four seasons are of equal length.

An accurate estimate of the length of the solar year, and thus of the *tequfa*, is not that easily determined experientially. A first and second estimate of 365 days, and 365 days and 6 hours, respectively, can be reached smoothly within the span of a few years. To further refine this value, however, one needs a more advanced theory (Ptolemy, 1984, p. 131 ff.) or a longer observation period because the involved measurements are not very precise (except perhaps in the tropics where the shadows can be vertical, i.e., twice a year, when the sun is in its zenith, a vertical stick casts no shadows).

Durations are expressed in days, hours and parts. The day is the average duration of a day (i.e., all days are of equal length) and the day consists of 24 equal hours. The day and thus the first hour of the day begin at sunset. The hour is divided into 1080 equal parts.[16] The lunar year consists of 12 months for regular years, and of 13 months for intercalated years. The lunar years are intercalated according to the 19-year cycle of the fixed arithmetic Hebrew calendar, with 12 ordinary years and 7 intercalated years. This cycle is called: 'the cycle of the moon'.

The new moon in the fixed calendar differs essentially from the Talmudic one in two respects. In the Talmudic system the beginning of the month is declared following the report of sighting of the new moon, or the day after it could have been seen for the first time. Therefore, the beginning of the month is always related to the actual conjunction and begins one or two days after the day of the conjunction. In the fixed system the relation with lunar visibility is completely abandoned and the first day of the month generally is the day of the *molad* or 'mean conjunction'. This is not necessarily the day of the real conjunction, since the times between consecutive conjunctions vary, but using an accurate estimate of the *mean lunation* (the mean time

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[16] Maimonides gives an unlikely explanation of the origin of the part in *Hilkhot Qiddush ha-Ḥodesh* 6:2. Neugebauer (Gandz et al., 1956, p. 171) suggests that this division follows the old Babylonian system: one *she* ('barleycorn') is one sixth of one 'finger'; one 'finger' corresponds to one twelfth of 1°, and 15° is the arc the sun travels across the sky in one hour. Therefore, one part or one 'barleycorn' corresponds to 1/1080 hour. Goldstein (2003) does not concur but does not give an alternative explanation.

between actual consecutive conjunctions) in establishing the calendar will keep the overall relationship between the conjunction and the beginning of the month.[17]

Abraham bar Ḥiyya's *mean lunation* is 29 days, 12 hours and 793 parts, which equals the value both the Babylonians and the Greeks arrived at in the last few centuries before the common era (Abraham bar Ḥiyya Savasorda, 1851, p. 37; Neugebauer, 1936; Ptolemy, 1984, p. 176; Stern, 2001, p. 207; see p. 60). The calculations assume the fixed Hebrew calendar and its 19-year cycle to be an exact representation of reality.

In Chapter 3 we read that the solar year according to Mar Samuel contains 365 days and one quarter of a day and Chapter 4 tells us that the solar year according to Rav Adda is a little shorter: 365 days, 5 hours, 997 parts and 48 instants (with 76 instants to the part)[18]. In Chapter 5 Abraham bar Ḥiyya demonstrates, in a number of ways, that the latter is the more accurate one. The knowledge contained in the calendar is supposed to have been handed down from Sinai. The problem arises, then, why the rabbis used the *tequfa* of Samuel and not Rav Adda's *tequfa* in their Talmudic discussions and halakhic decisions.[19] Abraham bar Ḥiyya gives a series of explanations, which we will examine in section 5.1, and cites a number of works by earlier authors. Although these works have been cited by others as well, the works themselves have not come down to us.

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[17] A theory that predicts the actual conjunctions of the moon and the sun is extremely complicated, but the *mean lunation* is easily determined. See note 5 and Ptolemy (1984, p. 173 ff.).

[18] The division of parts into 76 instants probably follows from calculating the mean *tequfa* length in the 19-year cycle. The 19 years hold 235 months of 29 days, 12 hours, 793 parts each. Dividing the total by 19 gives an integer number of years (365), hours (5) and parts (997) plus 12/19 of a part; dividing this mean solar year length by 4 yields a *tequfa* length of 91 days, 7 hours, 519 parts plus 1/4 of a part, plus 3/19 of a part. 76 is the least common denominator of 1/4 and 3/19. Therefore it makes sense to further divide the part into 76 equal portions. (Gandz et al., 1956, p. 123) This observation also suggests that Rav Adda's *tequfa* was determined mathematically rather than experientially.

[19] In fact, the Talmud does not mention Rav Adda bar Ahava at all. Mar Samuel is mentioned a few times. He is intimated to be an astronomer in bBM 85b; bRH 20b mentions his knowledge of the intercalation. In bEr 56a the season length of 91 days and 7 ½ hour is ascribed to Samuel, but the term *tequfat Shmu'el* is found only later, with Abraham bar Hiyya and Abraham ibn Ezra in the twelfth century and with only some eight halakhists since, as is the term *tequfat Rav 'Adda*.

1.3.3   An addition to *Sefer ha-ʿIbbur*

At the end of *Sefer ha-ʿIbbur* we found a remarkable fragment in some of our manuscripts. Its text edition is found in section 4. It concerns the day Jesus was born according to the Jewish calendar and instructs the reader how to determine on what day of the week the Christian New Year of a specific year will fall. It struck us as remarkable because of its language: it lacks any trace of animosity between Jewish and Christian cultures. The question arose whether this fragment could have been written by Abraham bar Ḥiyya as part of *Sefer ha-ʿIbbur*.

In this addition we read that Jesus was born on the ninth of Tevet. This seems to have been known as the day Jesus was born in the 18th century CE: in Poland, Tosafot Ḥadashim [20] gives this reason for the fast of that day [21]. He does not mention his source, and it could well have been this addition. However, a similar statement about the birth-date of Jesus is also to be found in *Sefer ha-ʿIbbur* proper, in the tenth chapter of the third book. In fact, also in the 18th century but now in Italy, special mention of the ninth of Tevet as Jesus' birth-date is made by Assemanus (1756, p. 442) in his otherwise rather imprecise description of our MS V [22]. Assemanus tells us which folio he found that information on, and this turns out to be the tenth chapter of the third book.

We compared the two statements about Jesus' birth date as they appear in the addition and in *Sefer ha-ʿIbbur* proper, respectively. We found considerable differences in contents and especially in wording. Both in Chapter 10 and in our text the birth date is given as the ninth day of the month Tevet in the year 3761, but in Chapter 10 this day is stated to be a Shabbat, whereas the addition claims this date was a fifth day. (The *addition* mentions that 'they' consider the year of birth to be 3760 – in which the ninth of Tevet is said to have been a Shabbat.) In Chapter 10 various ways of

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[20] Judah Loeb ben Menaḥem ha-Dayyan of Krotoszyn (Poland).

[21] אנציקלופדיה תלמודית כרך יח, [טבת] טור תרמ :

"ח׳ בטבת נמנה בין הימים שתקנו חכמים להתענות בהם[30], שבו נכתבה התורה יוונית בימי תלמי המלך, והחשך בא לעולם שלשה ימים[31]. וכן ט׳ בטבת נמנה בין ימים אלו, ולא כתבו רבותינו על מה הוא[32]. ויש שכתבו שביום זה מתו עזרא הסופר ונחמיה בן חכליה[33]

[33]. בה״ג שם : לא כתבו רבותינו על מה הוא ובו ביום מת עזרא כו׳, ונ׳ מדבריו שעל כך לא תיקנו התענית, ובכלבו שם : לא כתבו אבותינו על מה הוא ונמצא הסוד בו ביום מת עזרא כו׳. (ועי׳ תוספות חדשים למגילת תענית שם בשם גדול אחד שביום זה נולד אותו האיש, ובהערה שם הוכחה ע״פ החשבון)."

In SI III, 10 Abraham bar Ḥiyya also mentions that the reason for the 9 Tevet fast is unknown. *It would have been fitting*, he argues, *if Jesus' birth would have been the reason, but unfortunately this birth date is not historical but was chosen for different reasons.*

[22] See section 2.1.

producing leap years (or centuries) are mentioned, but not the familiar one that is mentioned in the present text: adding a day to the month of February of every fourth year. Under what circumstances and by whom the text of the addition was composed remains unclear.

The most striking difference between the addition and the corresponding part of *Sefer ha-'Ibbur* proper is the way in which the Christians are referred to. Therefore, we compared the terms we encountered in the addition and in Filipowski's 1851 edition of *Sefer ha-'Ibbur*, Book III, Chapter 10 (SI, 1851, p. 109). The corresponding words as found in the two MSS we had at our disposal, are also presented (Table 2, section 5.3).

2 Producing the text edition

The present critical edition of sections of *Sefer ha-ʿIbbur* by Abraham bar Ḥiyya is based on the investigation of all available manuscripts (MSS) as catalogued by the Institute of Microfilmed Hebrew Manuscripts of the Jewish National and University Library in Jerusalem (IMHM) [23]. We studied the microfilms of the nineteen manuscripts that contain Abraham bar Ḥiyya's *Sefer ha-ʿIbbur*. Of these nineteen, twelve include the third book. We obtained printed copies of the parts under study of the twelve MSS. Of two, MSS V and W, we also obtained reproductions in PDF-format of the entire manuscript. Two printed editions of the text exist. The first one by Eliezer Ashkenazi (SI, 1849) covers only Chapter 7 of Book III. It does not mention the origin of its text. It was not included in the present study. Filipowski (SI, 1851) edited the entire text based on the Oxford and Paris MSS, and, as far as we could examine, usually followed Oxford. We will compare our findings with this edition in some instances. For the last one hundred and fifty years, our knowledge of *Sefer ha-ʿIbbur* has generally relied on Filipowski's edition.

2.1   Description of the manuscripts

F   *Firenze - Biblioteca Medicea Laurentiana Or. 491* is a 14th to 15th century MS written in Byzantine script according to the IMHM catalogue. Our chapter is found on folios 84v – 87r. The script is regular and clear.

G   *New York - Jewish Theological Seminary MS 5512* is a 14th century MS in Italian script according to the IMHM catalogue. Meticulous handwriting. It shows embellishments in the margins. Folios 36v – 37v contain our chapter; 47r the addition.

H   *New York - Jewish Theological Seminary MS 2596* is described in the IMHM catalogue as a 17th to 18th century MS, written in Mizraḥi script. The script shows a

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[23] We refer to the computerized catalogue only, since the entire card catalogue of the IMHM has been converted to the computerized catalogue, which is available online at http://jnul.huji.ac.il/imhm/

typical *lamed*, very much like a cursive *shin*. Many abbreviations, some words in the margin. Our text is found on folios 49r – 50v.

I   *New York - Jewish Theological Seminary MS 2500* is listed in the IMHM catalogue as a 15th – 16th century MS in Ashkenazi script. The chapter under study misses its first 40% (lines 1-52 in our edition); folios 80r – 81r contain the extant part of our chapter.

J   *New York - Jewish Theological Seminary MS 2564* is, according to the IMHM catalogue, a 15th to 16th century MS in Ashkenazi script. The script is rather irregular and shows wide blanks between parts of sentences. MS J omits the same part of the chapter under study as does MS I; the chapter's extant part is found on folios 86v – 89r.

L   *London - British Library Add. 26899* was written on vellum in Italian script and is dated 1316 CE, as stated by Margoliouth (1899, p. 436). It has a few fillers and some corrections. We used folios 52r – 53v and 63r.

M   *Moscow - Russian State Library, MS Guenzburg 509* is a 13th to 14th century MS, written in Italian script (IMHM catalogue). The beautiful script is very consistent. It is written on vellum. In various places the vellum is transparent, which makes the text illegible on microfilm. Book III, Chapter 5 is found on folios 61r – 63r.

N   *Moscow - Russian State Library, MS Guenzburg 406* is described by the IMHM catalogue to date from the 15th century and to be written in Italian script. It shows many abbreviations. Our chapter is to be found on folios 77r – 80r.

O   *Oxford - Bodleian Library MS Opp. 183* was catalogued by Neubauer (Bodleian Library, Neubauer, & Cowley, p. 693) as being dated 1376 CE, but this was later corrected to 1476 CE, (Beit-Arié et al., 1994, p. 435). The MS consists of 43 folios, written on paper in Sephardic Provencal cursive handwriting (Neubauer). Each page has two columns, with book and chapter numbers above each column. The script is regular and compact, the characters *waw* and *yod* are many times included in the preceding letters and the end of the line may show an abbreviation or filler. The text contains a few deletions, which are indicated by two parallel short diagonal strokes over the word or strikethrough of a single character. The chapter under study is found on folios 32r – 33r.

P   *Paris - Bibliothèque Nationale héb. 1047* is described by Zotenberg as a 15th to 16th century MS in Byzantine script, missing the final chapter (1866, p. 190-191). Its handwriting is regular but *bet* and *kaf* are hard to distinguish. Many times, the

script is compressed near the end of the lines, with the final letters written above the line. We used folios 51v – 53r.

V *Vatican - Urbinati ebr. 48* dates from the 13th century according to Allony (1968, p. 80) but the IMHM catalogues it as 13th or 14th CE. Both state it was written in Italian script. Assemanus also describes this MS (1756, p. 441) and notes the birth date of Jesus given in *Sefer ha-ʿIbbur* but rather inaccurately omits to mention one of the three works that the MS contains. The MS seems to have been written with great care. Our text is on folios 47v – 49r and 59r.

W *Vatican - Neofiti 30* dates from the 15th century and is written in Sephardic script (Allony & Loewinger, 1968, p. 83). The script is even and the text has some additions in the margins. Chapter 5 of Book III is found on folios 79v – 82v and the addition on 101v.

2.2   EDITORIAL DECISIONS

In this section, we shall explain our editorial decisions. In order to determine a candidate to be used as the base text for our edition, we first need to examine the relationships between the various MSS. We shall decide which MSS to incorporate in the apparatus, and shall explicate what variants will be recorded and which ones will not. We shall conclude this section with an explanation of the syntax used in the apparatus of the edition.

The text under study is at least partly a scientific text. Therefore, we want our edition to be correct with regard to logic and arithmetic. This is the first requirement. Because of Abraham bar Ḥiyya's unique role in the development of the Hebrew language (see section 1.1) we would like to arrive at a text which would reflect his language. Therefor we will prefer readings that occur in multiple MSS that are not immediate family and will avoid readings particular to individual younger MSS.

Firstly then, we examined the possible relationships between the twelve manuscripts. Collation of Chapter 5 of Book III of all manuscripts suggested the existence of two distinct groups of interrelated MSS. The first group consists of V, W, L, M, and G, whereas O, N, I, J and H belong to a second group. In some cases, the differences are variants or synonyms: for instance, the first group reads חושבים and the second מונים (line (l.) 118); the first ימים, the second יום (l. 70). In other instances, they seem to result from errors in the second group, e.g., the first reads ויבטלו, the second לא (l. 103); and a number of times we discerned errors in the first group, e.g., the first reads כל כך, the second בלבך (l. 128); and once the first group omits half a line where

the second group inserts it (l. 86). This might be an omission due to homoioteleuton on the part of (an ancestor of) the first group, but could also be an explanatory insertion by an ancestor of the second group. The two remaining MSS, F and P, show that the boundaries between the two groups are not clear-cut. F generally, but not always, shows the same omissions and errors as does the first group; where it does not this may be due to the restorative creativity of the copyist. P has many unique readings, omissions as well as synonyms, but none of the omissions and errors which are typical of one of the two groups, which may suggest that the copyist had access to different versions of the text.

In four of the five MSS of the first group (V, W, L and G) we discovered the same addition (see section 1.3.3). In V, W and G this addition is in the same hand as *Sefer ha-'Ibbur* proper; in L it may be in the same or it may be in a different hand. Such an addition was not found in any of the others. This finding corroborates the notion that these four belong to one group.

Of the MSS in the first group, MSS L and M are closely related: the two show many variants which are peculiar to the pair of them (e.g., distinctive spelling of אהבא in line 6, על (l. 25), ואם (l. 30)). However, neither is an immediate copy of the other since both show readings that are unique to them individually (e.g., M: ואינו (l. 132); L: מפני (l. 60)). The position of L in the first group remains unclear. Besides the variants it shares with M, L uniquely omits "17 hours" in line 9, which in itself makes it an improbable ancestor of the first group; however, L does have a few readings which the others in this group omit: יבוא (l. 43) and אמר[?] (l. 58). G, V and W share the erroneous reading משישים (l. 80), which seems to group these three together, but an analysis of the *addition* (see p. 46 ff.) reveals two subgroups of V and W on the one hand and G and L on the other, which puts G closer to L. Evidence from other chapters of *Sefer ha-'Ibbur* may shed more light on the interrelatedness of the manuscripts in the first group.

Of the MSS in the second group, MSS I and J not only show numerous corresponding distinctive readings, they also omit exactly the same part of this chapter. This suggests a very close relationship indeed, even if I reads תפילה where J reads המנחה (l. 54) and both have some unique readings (e.g., I: בתקנת (l. 132) and J: קודם (l. 61)). Another close connection seems to exist between O and N. Even though both have many, over a hundred, individual and unique readings — omissions and errors along with variants in the case of N, and changes of word order and paraphrasing in the case of O, as well as symptoms of contamination (in l. 3, it incorporates both the first reading and its correction from MS W: החכמים המחברים) — they share nine read-

ings that distinguish them from all other MSS, among them two mistakes (ll. 50, 104) and three omissions (ll. 37, 46, and 83-84). This suggests that O, in spite of its many individual phrases, does not originate from a unique version of the text that might have been separated from the main branch of copies early on, but rather that its uniqueness results from the copyist's efforts to improve the style of the text.

Overall, the second group presents us with texts in which a few passages make better sense than the text of the first group but it also shows more variation between its group members. When one considers the presumed dates the various copies were produced, one finds that all older, 13th and 14th century, copies belong to the first group. The MSS in the second group might of course be less corrupted as a group, even though they are younger, 15th to 18th century, if they were to descend from a single older and more accurate copy that has not come down to us. Thus, one might consider choosing an MS from this group as the base text. However, their relative youth makes them prone to grammatical and stylistic innovation, undesirable for our edition, which we hope may also contribute to the study of Abraham bar Ḥiyya's language. Indeed, N, O, H and the pair of I and J show many idiosyncratic grammatical or stylistic readings. Furthermore, I and J miss the first 40% of the text, and H is a very late copy and has typical additions, e.g., יאבדו, *may they perish*, when speaking about the heretics (l. 108; also in MS I). Therefore, we decided against choosing an MS from the second group as our base text but instead chose one of the older MSS that showed few mistakes from the first group: MS V. It is one of the earliest extant copies, it has a few erroneous numbers (e.g., l. 69, י׳ז for י׳י; l. 80, שישם for ש׳), very few unique variants (two omissions (ll. 43 and 64) and one illegible character (l. 76)), it has a beautiful script and it seems carefully written.

The next question to be answered concerns what MSS to incorporate in the apparatus. Based on our analysis of this one chapter alone, we would suggest including W, L, F, P, N, O, and either I or J. M and L are closely related but L is dated. I and J are closely related. G has few unique readings and H does have unique readings but is a quite recent copy. O and P were used in Filipowski's edition and should be included for that reason, as well as in their own right. However, given that our analysis is based upon only one chapter and that our insights into the connections between the MSS may change from studying a larger section of *Sefer ha-ʿIbbur*, we chose to include all MSS in the apparatus in the present edition of the one chapter.

The present edition of *Sefer ha-ʿIbbur* thus has MS V as its base text. Our text edition preserves the text of MS V with its orthography but it does not indicate deletions or minor emendations that appear to have been made at the time of production (e.g.,

l. 17, אברנא deleted and replaced by חבראי on the same line). Paragraphs, sentences and lineation are the editors'. Text lineation is numbered at the right margin in increments of five. Numeration is sequential within each chapter.

Our policy was to correct or modify the text only where we judged it highly probable that the reading in MS V was erroneous or defective. In such cases we relied on attestations of other witnesses to the text. Once, in the text of the *addition* (l. 19 on p. 48), none of the text witnesses gave an acceptable reading and we amended the text according to our own insights. This is indicated in the text by an asterisk to the left of the word. Also, we supplemented some citations after examination of the possible sources (see Appendix 3). Editors' insertions are given in square brackets ([…], l. 108 ff.).

A number of textual variations were not taken into consideration. We do not report any punctuation, nor do we mention the use of an abbreviated form. We ignored orthographic variations except where they might entail semantic differences. We did not differentiate between the various forms of the masculine plural ending (i.e., ן- vs. ם-) nor between numbers denoted by letters and by their written names. Since it might be relevant (Gamli'/el, 1997), we do report the different conjunctives serving as relative pronoun, ש- vs. אשר, as well as different forms of prepositions (e.g., מ- vs. מן).

The line above the apparatus lists the extant manuscripts for the text on that page of our text edition, or parts thereof. The apparatus presents the variants and remarks in the following way. Bold numbers in the apparatus refer to the lemmas' line numbers. Sometimes the lemma text occurs more than once on the specified line. In those cases, the relevant word is indicated in the apparatus by a superscript index number that counts the recurrent words from the beginning of the line. Composite lemmas consisting of more than two words are shortened by showing only the first and last word, separated by an ellipsis (…). If the last word occurs on the same line as the first, or on the one immediately after, it is not preceded by its line number;[24] otherwise, it is. (The last word of a composite lemma on one or over two lines is, when applicable, indexed as follows. The occurrence of the specific word is counted is from the first lemma word; the first instance does not receive an index,[25] the second

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[24] We chose this representation for reasons of efficiency: a composite lemma is frequently split over two lines.

[25] This convention may seem surprising but it enables unique and unambiguous indexing in case the first and last word of the composite lemma are identical.

one is indexed '2', etc.) A left square bracket ([…) separates the lemma text from its variants. Each variant is followed by the sigla testifying to that reading, with its orthography taken from the siglum directly following the variant. A plus-sign (+) indicates an addition following the lemma text; a minus sign (-) indicates that the lemma text is missing. Colons (:) separate different variants of the lemma text. Lemmas that share line numbers are separated by Sheffer strokes (|) without repetition of the line number. Editor's remarks are enclosed in angle brackets (<…>). Entries that appear in square brackets ([…]) could not be transliterated reliably; each letter or period indicates one character. Where longer fragments were illegible, this is mentioned as a remark. Sigla can be accompanied by one of three superscript letters: ל denotes the reading before an emendation by the copyist; ש denotes an addition in a second or later hand in the margin; and ע denotes an addition in a second or later hand above the line and in one case an emendation by vocalization of the first hand (יוֹדְעִין, l. 19, ‌ᵛV).

Finally, a word about our translation. We strove to keep the translation very close to the Hebrew text and we let understanding of the Hebrew text prevail over elegance of the English. Words added by the editor to facilitate understanding of the translation are enclosed in square brackets ([…]). Supplemented citations are bracketed by angle brackets (<…>) in the translation. Many technical and arithmetical points are explained in the footnotes. The notes also refer to the quoted sources. The Hebrew text and its translation are presented on facing pages. The line numeration follows the Hebrew text.

3 ספר העבור מאמר ג׳ שער ה׳

השער החמישי מפרש על אי זה תקופה ניתקן מחזור הלבנה משני התקופות האלה. יכול
אתה להבין העניין הזה מתוך הטעמים המפורשים למעלה בשערים אשר עברו אלא מפני
שרוב המחברים בעיבור והחוקרים על סודו דיברו בעניין הזה והיה לכל אחד מהן טעם
שאינו כטעם חבירו ראיתי לפרש העניין הזה ולנהוג בו כמנהגם.

5 ואני אומ׳ כי הכוונה היתה במחזור הלבנה להשוות שנת החמה והלבנה כדי שיכלה
המותר אשר ביניהם בחדשי העיבור. ואנו רואים לדברי רב אדא בר אהבה המותר אשר
בין שתי השנים יכלה ויספה בסוף כל מחזור ויהיו השנים לחמה וללבנה שווין כאחד.
ולדברי שמואל אנו מוצאים ביניהן א׳ת׳פ׳ה׳ בכל מחזור שישאר עודף לחמה. ויהיה

WVPONMLHGF

1 מפרש] – O | זה] O | זו] O | תקופה] + משתי תקופות אלה O | ניתקן] + ניתקן O | נתקן F | הלבנה] לבנה N | משני...
האלה] – O | משני] משתי N H F 2 להבין] לדעת N | הזה] H G – | מתוך הטעמים] מהטעמים L | למעלה]
O – | עברו] – W | מפני] מתוך P 3 המחברים] החכמים W : המחברים W ᵃ : החכמים המחברים O
והחוקרים וחוקרים H G 4 שאינו] שלא N | ולנהוג...כמנהגם] לפי עניות דעתי ואחרי כן אודיע את
טעמיהם הבאים על ידי O 5 ואני אומ׳] ואומ׳ N | היתה] – W | והלבנה] עם שנת הלבנה O : ולבנה H
6 אהבה] אהבא M L 7 בסוף כל] בכל N : סוף Nˢ | השנים²] השנה W | וללבנה] ולבנה H | כאחת] כאחת
H – עודף |H ׳א׳ת׳פ׳ה] שעה ות׳פ׳ה O : א׳ ות׳פ׳ה׳ WL 8

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[26] 'The cycle of the moon': the 19-year cycle of intercalation of the fixed arithmetic Hebrew
calendar. In seven of the 19 years a thirteenth month is inserted. Thus there are
19*12+7=235 months in this cycle. The length of the month is assumed to be the mean lu-
nation of 29 days, 12 hours and 793 parts, see section 1.3.2. One cycle thus holds 166552
hours and 595 parts.

3
Sefer ha-ʿIbbur Book III Chapter 5

The fifth gate explains on which *tequfa* of these two *tequfot* [of Mar Samuel and of Rav Adda bar Ahava, respectively,] the cycle of the moon [26] was based.[27] You may [28] understand this matter from the considerations explicated above in the previous chapters but since the majority of those who wrote on the intercalation and explored its secret had individual considerations unlike their colleagues' when speaking on this subject, I saw fit to explain this matter and to treat it according to their custom.

5 And I say that the intention was to equalise the year of the sun and that of the moon by the cycle of the moon such that the excess between them would be cancelled by the inserted months. And we see that the excess between the two [kinds of] years will be completed and will come to an end at the end of each cycle and that the years of the sun and of the moon will be completely balanced [if we reckon] according to Rav Adda bar Ahava.[29] And [if we reckon] according to Samuel we find between them a remainder of one [hour] and 485 [parts] in each cycle in favour of the sun.[30] And from the [end of the cycle of the] Exodus until the end of the

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[27] The chapter begins with the implicit statement that the assessment of the duration of the solar year in combination with the knowledge of the mean lunation — the averaged duration of the lunar month — formed the grounds on which the 'cycle of the moon' was instituted. This does not necessarily describe the historical reality. In fact, it is much more probable that Rav Adda's solar year length was chosen to match the already instituted 19-year cycle than that it should have been determined experientially with such great precision. See also notes 18 and 29. Samuel's solar year is identical to the Julian year and may have been taken from there.

[28] Among Bar Ḥiyya's linguistic peculiarities is the use of יכול for *it may be* (Efros, 1926).

[29] The solar year length according to Rav Adda is 365 days, 5 hours, 997 parts and 48 instants. Nineteen of such solar years amount to exactly 235 lunar months of mean lunation.

[30] The solar year length according to Samuel is 365 days and 6 hours. Nineteen of such years contain 166554 hours, indeed one hour and 485 parts more than the duration of the 19-year cycle (see note 26).

המותר הזה מיציאת מצרים עד סוף מחזור ר/נ/ז׳ אשר אנו עומדים בו ז׳ ימים י׳ז׳ שעות
ת/ק/כ׳ חלקים. והרי המותר הזה יותר מחלק אחד מי׳ב׳ חלקים ממידת התקופה אם אנו
10 חוקרים על החילוף הזה מיציאת מצרים. ואילו היינו חושבים אותו מבריאת עולם היה
בו ט/ו׳ ימים י׳ב׳ שעות ת/מ/ה׳ חלקי׳ שהן יותר ממדת שתות התקופה.

ובידוע שרבותינו ז״ל בזמן שבית המקדש קיים היו מעברים את השנה על סימנים רבים
כמו שאמרו אין מעברין את השנה אלא אם כן צריכה לעבר מפני הדרכים ומפני הגשרים
15 ומפני תנורי פסחים ומפני גליות ישראל שנעקרו ממקומן ועדיין לא הגיעו. וכן אמרו
מהודענא לכון דגוזלייא רכיכין ואימריא דערקין וזימנא דאביבא לא מטא ושפר באנפנא
ואנפי חבראי ואוסיפנא על שתא דא תלתין יומין. על אחד מהעניינים האילו או על שנים
היו מעברין את השנה לרצונם ולפי הנראה להם ואם אינה צריכה לעיבור.

והסימנין אשר היו מצריכין לעיבור והיו ידועים ומפורסמים לכל העם היו ג׳ סימנין
20 בלבד כמו שאמרו על שלשה סימנין מעברים את השנה על האביב ועל התקופה ועל
פירות האילן. והיו סנהדרין מעברין את השנה לפי הנראה להם מכל הסימנין האילו.
ועתה בזמן הזה אין לנו לחקור על אחד מהן כי אם על התקופה בלבד כי אין לנו היום

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9 עומדים...אם] – M | בו] – N | י׳ז׳ שעות] – L | 10 המותר] + המותר F | הזה] הוא P | חלקים[2] – O
אם] אשר L 11 חוקרים...הזה] חושבי אותו O | מצרים] מ[צרים P | ואילו] וא[ו]תר ML אילו | אותו] [וא]תו F
היה] + היה N 12 ימים] יום N | י׳ב׳] י׳ו׳ N | שהן] שהין W | ממדת שתות] משתות מדת O 13 את] – N
14 את] – NML 15 פסחים] הפסחים P 16 מהודענא] מהודעדנא F | וזימנא] וזינאו G | מטא] מטע F
באנפנא] באנפנא F : באנפיא O H : באנפיה N : באנפא L : באפנא P 17 ואנפי] ובאנפי N H | חבראי] חביא N
תלתין] דלתון P | אחד] האחד P | או] – N | שנים] + מהם P O N H 18 השנה לרצונם] [השנה לרצונם N
ולפי...להם] – O 19 מצריכין] צריכין F | והיו...העם] ולא היו יכולים לעכבו O | והיו] וה[ין P | ידועים] ידועים[
ידועים WVNMLHF : ידועים V[ע] | לכל] לכן O L F | סימנין] – O 20 מעברים...והיו] – W H
21 והיון] היו G | סנהדרין] – N | מעברין] + סנהדרין N | מכל...האילו] מן הסימני האלה N | הסימנין]
העניינים O 22 ועתה] ואתה O | אחד L אחת | אחד מהן] אחת מאלו הסמנים O | היום] היו O

[31] The last year of the 257th cycle is 4883; this indicates that *Sefer ha-'Ibbur* was composed between 4864 and 4883. The year 4883 is given as an example in SI III, 3 (1851, p. 83), which has been taken to indicate that SI was written in 4883 or 1120 CE.

257[31] cycle — the cycle we presently live in [31] — this excess is seven days 17 hours
10   and 520 parts.[32] And behold, this excess is more than one twelfth of the length of
the *tequfa* if we examine this difference since the Exodus. And if we compute it since
the Creation of the world it contains 15 days 12 hours [and] 445 parts, which is
more than one sixth of [the length of] the *tequfa*.

And it is common knowledge that, when the Temple was still standing, our Rabbis
of blessed memory would intercalate the year on account of many signs, as they
said: They intercalate a year only when necessary either for [the improvement of]
15   roads or for [the repair of] bridges, or for the [drying of the] ovens [required for the
roasting] of the paschal lambs, or for the sake of exiles of Israel who have been
uprooted from their [distant] places and have not yet arrived [in Jerusalem].[33] Fur-
ther they said: We beg to inform you that the doves are still tender and the lambs
still young, and that the season of the ripening of the grain has not yet arrived. I and
my colleagues have considered the matter and thought it advisable to add thirty days
to this year.[34] On account of one [35] of these matters or on account of two of them
they would intercalate the year as they wished and as they saw fit, even if [36] there
was no [strict] need for the year to be intercalated.

And the signs which would necessitate intercalation and which were known and
20   familiar to the whole nation were three signs only, as they said: On account of three
signs does one intercalate the year, on account of the *'aviv*, on account of the *tequfa*,
and on account of the fruit of the tree.[37] And the Sanhedrin would intercalate the
year as it seemed proper to them from all these signs. But now in the present time
we can only examine the *tequfa*, because in our day we do not, because of our trans-

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[32] This demonstrates that 128 cycles would lie between the end of the 257th cycle and the
end of the cycle of the Exodus, which puts the Exodus in the 129th cycle since Creation, i.e.
the cycle that ends with 2451. This agrees with tradition, which says the Exodus took place in
2448, which is the 16th year of the 129th cycle.

[33] tSanh 2:6; bSanh 11a.

[34] tSanh 2:6; pSanh 1:2, 18d; pMSh 5:4, 56c; bSanh 11a, 11b.

[35] At variance with bSanh which states that the year is intercalated only on account of two or
three of the signs, and not on a single one of them. It may, however, be a reading of the
opinion of R. Shimon ben Gamli'el in tSanh 2:2. See also note 38.

[36] A common Arabism. See also Efros (1927).

[37] tSanh 2:2; pSanh 1:2, 18d; bSanh 11b.

בעוונותינו קרבן שנחוש לו על הגדיים ועל הטלאים ולא חג שנחוש לו על הדרכים ועל
הגשרים ועל העולים לרגל ואין אנו בארץ ישראל שנחוש על האביב ועל פירות האילן.
25   ולא נשתייר לנו דבר שנהיה חוששין לו אלא התקופה בלבד.

ומצאנו רבותי׳ ז״ל מסרו לנו סייגות בתקופה שאין לנו לעבר עליהן. ולא לומר שהם ז״ל
בעת שקבעו לנו המחזור הזה לא חששו בו לסייגיהם אבל ודאי חששו להם. והם אמרו
לנו שלח ליה רב הונא בר אבין לרבא. כי חזית דמשכא תקופת טבת עד שתיסר בניסן
עברה לההיא שתא ולא תיחוש לה דכתי׳ שמור את חדש האביב. שמור את אביב
30   שלתקופה שיהא בחדש ניסן. והם אמרו אין מעברין את השנה אלא אם כן היתה תקופה
חסירה רובו שלחודש וכמה רובו שלחדש י״ו׳ יום. ר׳ יהודה אומ׳ שתי ידות בחודש.
ועלה בידם מכל זה כאשר שמענו מפי רבותי׳ ז״ל וראינו כתוב בספרים הראשונים
שיהיה לעולם יום העומר שהוא יום י״ו׳ מניסן נופל בתקופת ניסן ויום שמיני שלחג
הסוכות שהוא כ״ב׳ מתשרי נופל בתקופת תשרי. ועל השורש הזה קבעו עיבורי המחזור
35   בג׳ו׳ח׳ א׳ד׳ ז׳ט׳.

W V P O N M L H G F

23 בעוונותינו] בעוונתינו P O M F : – H | שנחוש[1] | שניחוש N | ולא...הגשרים] – P | חג שנחוש] חשש
שניחוש N   24 לרגל] ברגל P | ואין] ואינו V | שנחוש] + לו   N   25 שנהיה חוששין] שנחוש H | לו] – N
אלא] + על + ML   26 ז״ל[1]] – O | סייגות] סייגים O | ולא] שלא H | שהם] שר׳ M   27 בעת] + שעת N | בן] –
O | לסייגיהם] לסייגים P | להם] לדבריהם ולהם N | אמרו לנו] אמר H   28 רב] לרב P | לרבא] – N
29 עברה] עברא ML | לההיא] לההוא N H | את[2]] – PNML   30 שלתקופה] שלתקופת M | שיהא] –
ML : שהיא N : שיהיה H : שתהיה O | ניסן] ניסן P | והם] שנין P | כן] ML ואם | כן] – O   31 וכמה...שלחדש]
– M | יהודה] – W | בחודש] חדש N   32 בידם] בידינו O | כאשר שמענו] – N | כאשר] אשר O | ז״ל]
– O H   33 וראינו] וכאשר ראינו N | בספרים] בספרי PNMLHF : בדברי O | הראשונים] ראשונים H F
33 יום[1]] – W : יום[עׄ] W | יום[2]] – PNHGF | מניסן] בניסן ON | נופל] נפלת O   34 המחזור בג׳ו׳ח׳]
+ המחזור בג׳ו׳ח׳ F

gressions, have a sacrifice that we should be concerned about the kids and the lambs, nor a Festival that we should be concerned about the roads and the bridges and the pilgrims, and we are not in the Land of Israel that we should be concerned
25 about the ripening of the grain and the fruit of the tree. And nothing is left to us to be concerned about but the *tequfa*.[38]

And we found that our Rabbis of blessed memory handed down to us boundaries for the *tequfa,* which we must not cross. And do not say that they, of blessed memory, were not concerned about their boundaries at the time when they established this cycle [of intercalation] for us. Truly, they were concerned about them. And they said to us: R. Huna bar 'Avin sent [an instruction] to Rava: When you see that the *tequfa* of Tevet [i.e., the winter season] extends to the sixteenth of Nisan, declare that year a leap year and have no scruples since it is written: Observe the month *[ḥodesh]*
30 of *'aviv*.[39] [This signifies:] See to it that the *'aviv* of the *tequfa* should commence in [the *ḥodesh* of] Nisan.[40] And they said: A year is not to be intercalated unless the [summer] *tequfa* is short of completion by the greater part of the month. And how much is that? — Sixteen days. R. Judah says: two thirds [41] of a month [i.e., twenty days].[42] And on account of all this they achieved, as we heard from our Rabbis of blessed memory and saw written in the earlier books, to keep the day of the *'omer,* which is the sixteenth of the month of Nisan, forever in the *tequfa* of Nisan and the eighth day of the festival of Sukkoth, which is the twenty-second day of Tishri, in the *tequfa* of Tishri.[43] On this ground they established the intercalations of the cycle
35 [such that extra months were inserted] in the third, sixth, eighth, eleventh, fourteenth, seventeenth and nineteenth year.

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[38] Similarly, Yad *Hilkhot Qiddush ha-Ḥodesh* 4:2; an example that indicates that SI was Maimonides' source.

[39] Deuteronomy 16:1.

[40] bRH 21a. Rashi interprets *ḥodesh* as the first half of the month, when the moon is waxing, and this interpretation is frequently followed. It poses a condition, however, that cannot be fulfilled in all years; see Appendix 2.

[41] Literally, 'hands'. The interpretation 'two thirds' follows tMe 9:10.

[42] bSanh 13a. The discussion concerns the command that the festival of Sukkoth fall in autumn in order to comply with Exodus 34:22.

[43] From the 16th of Nisan to the 22nd of Tishri is 6 months plus 6 days, or on average 183 days and two Samuel *tequfot* contain 182,625 days. Therefore, the two conditions are nearly equivalent.

ואם אנו אומרים שתקופת שמואל היא העיקר אנו מוצאים בזמן הזה מועד הפסח כולו
נופל בתקופת טבת ברוב השנים. כגון שנה חמישית ושנת י׳ג׳ ושנת י׳ו׳ שאתה מוצא
תקופת ניסן בכולן נופלת אחר כ׳ב׳ יום לניסן ותמצא הפסח בתקופת טבת. וברוב השנים
מן המחזור תהיה התקופה בתוך מועד הפסח אחר יום העומר שלא כהלכה. וכן אתה

40   מוצא חג הסוכות כולו קודם תקופת תשרי בשנת ג׳ ו׳ וי׳ד׳ וי׳ז׳ במחזור שלא כהלכה.
ונמצא בז׳ שנים אילו בכל מחזור עוברים על תקנת רבותינו ז״ל ועושים פסח או סוכות
שלא בזמניהם אם אנו סומכין על תקופות שמואל.

ואם יבא אדם ויאמר אין בהקדמת המועדים על זמניהם שום עבירה אבל שבח הוא
כאשר אמרו זריזין מקדימין למצות ומפני זה לא חששו רבותי׳ ז״ל למותר התקופה אנו

45   אומרין לו אין דבריך בזה נכוחים. כי אין אתה מוצא מצוה בעולם שאדם יכול להקדים
אותה על זמנה אבל הוא מאחר אותה לצורך או לספיקה ואינו מקדים אותה. כי הרי

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36 היא] הוא N O P W | העיקר] + אשר W   37 ברוב השנים] – N O | השנים] שנים P G | י ו׳] י׳ז׳ H
מוצא] + בכלם O   38 בכולן] : O – בכולו] H כולו | לניסן] מניסן O הפסח] + כלו H N O P | השנים] שנים N
39 בתוך מועד] במועד O | מועד הפסח] מועד של פסח N | וכן...כהלכה] – P   40 כולן שלו N | ג׳ ו׳]
ג׳ו׳ח׳ W V P M L G | במחזור] N – ונמצא] 41 N | ונמצא] ואנו בכל מחזור N | בכל מחזור] N | תקנת] דעת N | או
סוכות] וסוכות O   42 בזמניהם] בזמנם O   43 יבא...ויאמר] תאמר : O אדם יאמר G | ויאמר] יבא : V – בא W
44 כאשר אמרו] כמו שאמרו N | זריזין] הזריזין W | ז״ל] – O   45 לו אין] איך O | לצורך או] – N | או
לספיקה] – O : אל ספיקה P | ואינו מקדים] ואנו מקדימי׳ P | הרי] N O – ON

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[44] The *tequfa* of Nisan in year 1, the year preceding creation, was assumed to have occurred
Wednesday 0 hour 0 part (i.e., Tuesday evening), 7 days, 9 hours and 642 parts before the
molad of Nisan, as mentioned in SI III, 3 (on Samuel's *tequfa*). This follows from combining
the two different midrashic views of the time of creation: the months are counted from the
first *molad* of Tishri (at 5 hours, 204 parts, on Monday), and the first *tequfa* was the *tequfa* of
Nisan six months later. We found the spring *tequfa* to follow the *molad* of Nisan by 23, 21, and
23 days in years 5, 13 and 16 of the 257th cycle (which means the *tequfot* took place on day 24,
22 and 24 of Nisan, respectively). See Appendix 1 and 2.

[45] According to our calculation, for the 257th cycle the *tequfa* of Nisan would fall more than
15 days after the *molad* of Nisan, and thus roughly after the 16th of Nisan, in years 2 (19 days),

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Now if we say that the *tequfa* of Samuel is the principle, we find that nowadays the whole festival of Passover falls in the *tequfa* of Tevet [i.e., in the winter season, before the vernal equinox,] in most of the years [of the 19-year cycle]. For instance, the fifth year and the thirteenth year and the sixteenth year [of the cycle which begins with Nisan] — in all these years you find that the *tequfa* of Nisan [the vernal equinox] falls after the 22nd day of Nisan and you will find Passover in the *tequfa* of Tevet.[44] And in most of the years of the cycle the *tequfa* [i.e., the equinox] will fall during the Passover festival after the day of the *'omer*,[45] which is not according to the

40   *halakha*. And similarly you find that all of the festival of Sukkoth will be before the *tequfa* of Tishri in the third, the sixth, the fourteenth and the seventeenth year of the cycle [that begins with Tishri],[46] which is not according to the *halakha*. And we find that we transgress the ruling of our Rabbis of blessed memory and do not make Passover or Sukkoth at their appointed times in those seven[47] years of every cycle if we rely on the *tequfot* of Samuel.

And if someone would come and say there is no transgression in celebrating the festivals earlier than their appointed time, on the contrary, it is praiseworthy, as they say: the diligent come early to the commandments,[48] and therefore our Rabbis of

45   blessed memory were not concerned about the remainder of the *tequfa*, we would say to him: your words on this matter are unsubstantial, for nowhere do you find a commandment that one may fulfil before its time, but one may delay it if needed or when in doubt; however, one must not perform it before its time. For behold, the

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5 (22 days), 10 (17.5 days), 13 (20.5 days), 16 (23.5 days) and 18 (16 days). See Appendix 2, Figure 2.

[46] Samuel's *tequfa* of Tishri would fall more than 21 days after the *molad* of Tishri in years 3 (24.5 days), 6 (27.5 days), 14 (26 days), 17 (29 days) of the 257th cycle, and also in year 11 (22 days). Possibly, Abraham bar Ḥiyya quotes an earlier author who wrote when the eleventh year still had its Tishri *tequfa* on the 22nd of Tishri. See Appendix 2, Figure 3.

[47] The seven violations of the requirement to keep the festivals in their correct seasons will fall in four different one-year periods only. Adjacent year numbers result from the two ways of counting the years. (Passover of year 5 counting from Nisan is about six months after Sukkoth of year 6 counting from Tishri, etc.)

[48] The reference (in bPe 4a) is to Abraham, rising early in the morning (Genesis 22:3). To consider the possibility that a mitzvah could be fulfilled before its time is curious because it denies the concept of time-bound mitzvoth. See, however, note 51. Abraham bar Ḥiyya's choice of examples is unexpected.

המילה אשר נאמר בה וביום השמיני ימול בשר ערלתו אין אדם רשאי למול אותו
בשביעי אבל מפני הספיקה הוא נימול לט׳ לי׳ ולי׳א׳ ולי׳ב׳ ומפני הצורך ממתנין לו עד
שיבריא. וכן הפסח הרחיב הקב״ה על ההולך בדרך לעשות פסח שיני באייר ולא אמ׳

50   הרוצה ללכת בדרך רחוקה יקדים ויעשה הפסח באדר. וילך לדרכו אחר שיעשה פסחו
וקיים את מצוותו. ואין אומרין בזה זריזין מקדימין במצות אבל הזריזות שאמרו הוא
בכוונת הלב שיהא אדם משתמש בצורך המצוה קודם זמנה בכדי שיהא מזומן לקיימה
בזמנה. או שיהיה זמן המצוה ארוך ויהיה הזריז מקדים לעשותה בתחילת זמנה ואינו
מאחר אותה אל סוף זמנה. כגון תפילת המנחה אשר הזריזין מתפללין אותה מבעוד יום

55   והמאחר אותה עם דמדומי חמה אינו עובר על זמנה. אבל אם יהיה קורא קרית שמע
קודם ביאת השמש אין אומרין מקדים למצות אלא קורא אותו עובר על התורה וחוטא.
וכן אנו יכולין לומר על האוכל מצה בתוך תקופת טבת אינו שומר מצות מצה ולא עושה
הפסח בזמנו. ואם יאמר הרי רבותי׳ ז״ל בעת השמד לא היו מעברין נאמר לו לא מפני
שרצונם היה לעבר אבל היו מוכרחים ומוכפים שלא לעבר כאשר היו מוכרחים

60   ואנוסים שלא למול את בניהם ולא לשמור את מועדיהם. ואין מביאין ראייה מתוך

FGHLMNOPVW ‏ | טקסט כ״י JI מתחיל ב׳משתמש׳ [שורה 52]

47 אין] ואין N | אותו] N | עצמו N | 48 הספיקה] הספק ON | לט׳] + או P | לי׳ | ולי׳ P ‏ | ולי׳ OHF | ומפני...שיבריא]
O – | 49 בדרך] + רחוקה O | שיני] N – | 50 שיעשה] שעשה ON | פסח N | פסחו] ON | 51 וקיים...מצוותו]
O – | ואין...שאמרו] ואשר אמרו זריזים מקדימים למצות O | בזה] N | לזה NH | במצות] במצות] WNH | הוא
בכוונת] כונת N | 52 משתמש...המצוה] מתעסק במצוה ובצורכי N | בצורך] בצורכי I | לצורך : W | בצרכי O | קודם]
+ המצוה JI | בכדי] כדי FHIJLMNOP | שיהא] שיהיה[2] J | שיהיו J | לקיימה בזמנה] [ל]זמנה : I : ל[קיימה[ע
53 או...מקדים] P – | 54 אותה[1] JI – | אל] על ML | תפילת המנחה] תפלה I | המנחה J | אשר הזריזין]
שהזריזים JI | אשר] O – | 55 אותה] P – | עם] P | עד O | קורא] קורה N | שמע] W – | שמע]Wע : W | 56 קודם]
N – | אומרין] + לו ONJIH | למצות] N – : + הוא JI | אלא] אלא O | אבל O | קורא אותו] O – | קוראן קורין
PNJIH | התורה] המצות O | דברי התורה N | 57 אינו] אינן O | שאינו O | מצות] מצה I | ולא] ואינו N : אבל O
58 הפסח] פסח J | + : שלא O | יאמר] תאמר O | מעברין] מעברים N | את השנה N | נאמר לו] WVGF – | נאמר]
[?]אמר L | לו] לך O : + : לא היו מעברי MLJI | לא[2]] + נעמנו N | 59 היה] JI – | לעבר[1] JI | לעבור :
+ נמנעו מלעבר O | אבל...לעבר] אלא P | מוכרחים...מוכפים] מוכרחים] N – | ומוכפים] ומוכפים O | לעבר[2]
לעבור JI | כאשר W | אשר W | 60 ואנוסים] O – | מועדיהם] מועדים W | ואין...והצורך] O – | מתוך] מעת
מן : N | מפני JIH | מתוך] מן : L

circumcision, of which is said: And on the eighth day he shall circumcise the flesh of his foreskin,[49] no-one has permission to circumcise him on the seventh day, but because of doubt he may be circumcised on the ninth or the tenth or the eleventh or the twelfth day and if necessary they may wait until he is healthy enough.[50] And similarly the Holy One, Blessed be He, widened the [time for the] Passover for the person who is about to travel so that he may perform a second Passover [offering]
50 in the month Iyyar, but He did not say: the person who wishes to go on a long trip may advance and perform an early Passover [offering] in Adar and go on his way after he has made the Passover and he will have kept his commandment. And by this they do not mean: the *diligent* advance the commandment, but the *diligence*. What they mean is that a man has the intention that he will see to the need of the commandment before its time, so that he will be prepared to keep the commandment in its proper time. Or, that the appointed time for the commandment is a long period and that the diligent [person] hurries to do the commandment at the beginning of its proper time and does not postpone it until the end of its time. For example, the
55 afternoon prayer which the eager pray when it is still day but he who postpones it until the beginning of sunset does not transgress its time. But if he would read the *Shema'* before the sun has set, they do not say that he is eager to fulfil the commandments but they call him a transgressor of the Torah and a sinner[51]. And similarly, we can say about one who eats *matsa* in the *tequfa* of Tevet that he does not keep the commandment of *matsa* and does not perform the Passover in its proper time. And if someone would say, behold, our Rabbis of blessed memory did not intercalate [the year] in a time of destruction, we would say to him: It was not due to their desire that they did not intercalate but they were forced and compelled not to inter-
60 calate, as they were forced and coerced not to circumcise their sons and not to keep their festivals. And one does not bring evidence from compulsion and necessity.

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[49] Leviticus 12:3.

[50] Cf. mSh 19:5.

[51] This is a rather severe interpretation of tBe 1:1. Although the present text was written before the rulings of Rabbenu Tam and the other Tosafists, who allowed the evening *Shema'* to be said much earlier than sunset, the Rif and many of the *Ge'onim* find no fault with the practice of an early *Shema'* (according to *Ḥiddushe* ha-Rashba, Ber 2a). Rashi (on bBer 2a) explains that the reciting of the customary early evening *Shema'* before *ma'ariv* does not fulfil the mitsvah, but that reciting the one paragraph said before retiring does. An extensive search of the *Bar Ilan Responsa Database* (14+-CD) did not unearth any authority who called the early reader a sinner.

הדוחק והצורך. ועתה שאין שם דוחק ולא הכרח איך נוכל להקדים הפסח על זמנו ונעשה אותו בתקופת טבת אחר שאמרו לנו רבותי׳ ז״ל שמור אביב שלתקופה שיהא בחודש ניסן. ואיך נאמר שרבותי׳ ז״ל מסרו לנו מסורת שיהא מביאה עלינו שום ספק עבירה. אין זה כי אם רוע לב.

65   וכל הקושיות האילו והחומרות הגדולות הן באות עלינו אם נאמר תקופת שמואל היא העיקר ועליה אנו סומכין. אבל אם נאמר תקופת רב אדא היא העיקר תמצא כל הקושיות והספיקות נדחות ותמצא העיבורין הולכין כתיקנן וכהילכתן. ולא יוכל אדם לטעון בם שום טענה כי הרי בשנת שמונה למחזור כשהגיע מרחק התקופה מן המולד עד י׳ו׳ ימים י׳ו׳ שעות ת׳ש׳פ׳ג׳ חלקים שהן יותר משיתיסר בחודש עיברנו שנת שמונה. ובשנת י׳ו׳

70   במחזור שהיה מרחק התקופה מן המולד ט׳ו׳ ימים ג׳ שעות ת׳נ׳ז׳ חלקים לא עיברנוה מפני שלא הגיע המרחק לשיתסר בחדש. ואין אתה מוצא לעולם לדברי רב אדא יום העומר נופל לפני תקופת ניסן ולא יום שמיני לחג נופל לפני תקופת תשרי כמסורת אשר מסרו לנו רבותינו ז״ל. ותראה מזה שתקופת רב אדא בר אהבה היא העיקר.

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61 ועתה] אבל עכשו O | שם] + לא N | דוחק] צורך P | ולא הכרח] J – | הכרח] F טרח : H | טורח : כורח P : צורך I | נוכל להקדים] נקדים O | להקדים] O | את N | ועל] על N : – N : קודם J | על N[^ש] 62 אותו] N – | אחר] F – | ז״ל] O – | שמור...ז״ל] N – | אביב] את חודש האביב JI   63 בחודש] בחדושו של O | שיהא מביאה] שהביאה H | שיהא] P O N J I F | ספק] ספיקא H | אם] 64 V –   65 והחומרות הגדולות] והספיקות O | תקופת] שתקופת O | שמואל...תקופת] N – | היא] N | אדא] אדא J רב + | רבן] 66 I – | אהבה] בר H : בר אהבה N | בם] בו N : בה : PJI | בשם O | טענה 68 טענה] + עלינו O | בשנה] בשנת N | מרחק התקופה] JI – | י׳ו׳] + N | י״ז N : ימים] ימי H יום 69 י׳ו׳[^1] | י״ז W V P M L G F | חלקים] M – | שנת שמונה] השנה O | שנת] O –   70 – N | במחזור] למחזור WNJI | שהיה] שהוא W | שיהיה : H | ט׳ו׳ I ימים] P O N J I H F | ת׳נ׳ז׳] ת׳נ׳ז F : ת׳צ׳ז N | עיברנוה] עיברנו N : עברנו O | עיברנום M   71 לעולם] בעולם N | לדברי] לדבר W | אדא] + בר אהבה J | העומר] שני לפסח O | לחג] של חג N J I | כמסורת] במסורת W M H G | אשר מסרו] שמסרו J I H   73 רבותינו ז״ל] אבותינו N | מזה] מכאן O N J : P – : | בר אהבה] P N J I H –

And how could we now, when there is neither necessity nor compulsion, advance the Passover to before its time and perform it during the *tequfa* of Tevet, after our Rabbis of blessed memory said to us: Keep *'aviv* of the *tequfa*, that it may be in the month of Nisan. And how could we say that our Rabbis of blessed memory would have handed down to us a tradition that would bring even a suspicion of transgression over us [if we would keep to that tradition]? That would only be evil-heartedness.

65 And all these difficulties and very serious matters come over us if we say that the *tequfa* of Samuel is the principle we rely on. But if we say that the *tequfa* of Rav Adda is the principle, you will find that all difficulties and uncertainties are pushed aside, and you will find that the intercalations go as they were set and regulated. And no man will find any argument against these regulations, for behold in the eighth year of the cycle, when the distance of the *tequfa* [of Nisan] from the *molad* [of Nisan] reaches 16 days and 16 hours 783 parts, which is more than the 16th day of the

70 month, we intercalate the eighth year.[52] And in the 16th year of the cycle, when the distance of the *tequfa* from the *molad* reaches 15 days three hours and 457 parts,[53] we do not intercalate the year since the distance does not reach the 16th of the month. And you will never find [if you calculate according] to Rav Adda that the day of the *'omer* falls before the *tequfa* of Nisan, nor that the eighth day of the Festival falls before the *tequfa* of Tishri,[54] [and this is] in line with the tradition that our Rabbis of blessed memory handed down to us. And this proves that the *tequfa* of Rav Adda is the principle.

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[52] In fact, a simple calculation demonstrates that in the eighth year of the cycle the *tequfa* of Nisan would lag behind the *molad* of Nisan by 16 days, 16 hours, 783 parts and 32 instants if the year would not be intercalated. This is computed from the duration of the (lunar) years of 12 and 13 months, the duration of the solar year, and the time of the first *tequfa* with respect to its *molad*. See Appendices 1 and 2, Figure 1. Note that the present text presupposes that the objective of the intercalation is to keep the *tequfa* within 16 days from the *molad* and not to keep it before a specific calendar date. According to Loewinger (1986, pp. 20, 21) some later authors, e.g., R. Meir ben R. Todros ha-Levi Abulafia (Spain, ca. 1170–1244), interpreted the intercalation rules in the latter way.

[53] Actually, in year 16 of the cycle Rav Adda's spring *tequfa* falls 15 days, 3 hours, 457 parts and 36 instants after the *molad* of Nisan, which usually is the 16th of Nisan. This implies that the day of the *'omer* and the first day of the spring *tequfa* coincide in the 16th year of the cycle. See note 52 and Appendix 2.

[54] See Appendix 2.

ועוד מדרך אחרת אנו אומ׳ מצאנו רבותי׳ ז״ל חקרו על חודש הלבנה והיה מסור בידם

75   מהר סיני השער הנכון והמדה הנאמנה בחודש הלבנה כאשר נתפרש במאמר השיני. ולא
היו כל חכמי גוים וקדמוניהן יכולים להגיע אל אמיתת המדה הזאת אלא אחר טורח
גדול וחקירה ארוכה וקשה ובסוף כל חקירתם סמכו על המדה המסורה בידינו. ומכאן
יתברר לך שרבותי׳ ז״ל חקרו על מדת שנת החמה ונמסר להם מהר סיני מדתה הנכונה
כאשר נמסרה מדת חדש הלבנה. ואנו מוצאים מדת שנת חמה לדברי חכמי האומות
החוקרים עליה כל ימיהם היא ש׳ס׳ה׳ יום ורביע יום חסר חלק אחד מש׳ ביום בקירוב

80   מעט. כך אמרו חכמיהם. והמדה הזאת לחשבונינו היא ש׳ס׳ה׳ יום וה׳ שעות ת׳ת׳ק׳צ׳ג׳
חלקים וכגון מ׳ו׳ רגעים. ובין המדה הזאת ודברי רב אדא ד׳ חלקים וב׳ רגעים בכל שנה.
והשייור הזה אשר ביניהם לא יקבץ ממנו יום אחד אלא אחר ששת אלפי שנה וכגון ד׳
מאות וארבעים שנה. וראוי הוא השיעור הזה להבטל במיעוטו. ומפני שלא יכלו חכמי
האומות לעמוד עליו אמרו פחות כך וכך בקירוב מעט. ויראה לך שהמדה אשר אין בה

85   שום ספיקה היא כדברי רב אדא. היא העיקר בסוד העבור ועליה היו סומכין רבותינו
ז״ל.

W V P O N M L J I H G F

74 אנו אומ׳] O – | הלבנה] לבנה N | והיה] יהיה N 75 השער] השעל F G L M P V : השעה W : השועל
O : שכל N 76 חכמי] L – | גוים] הגוים H I N O P | להגיע אל] לעמוד על O | אל] אם N | המדה הזאת]
חודש הלבנה O | המדה הזן].[ר : המדה Vˢ | אחר] לאחר N 77 ובסוף כל])ובסוף כל[N | המדה]
+ הזאת N | ומכאן...לך])וכן אנו ראוים לומר על הענין הזה הזה לך(O 78 לנו] Gˡ H I J M N | חקרו] F –
שנת] W – | החמה] חמה N | ונמסר] אבל נמסר O | מהר] על הד N 79 נמסרה] נמסרת N | + להם O
חדש הלבנה] החדש O :)חדש ה[לבנה N | הלבנה] לבנה J I | חמה] חמה P O | חכמי] N – | האומות]
)הא...[I 80 החוקרים] האומרים M L | עליה] עליה F | ימיהם] ימותם O | יום¹] יום¹[F | יום²] N – | חסר]
פחות N | חלק] H – | מש׳] משששם W V G 81 מעט] P – : מועט O | חכמיהם] בדבריהם O : חכמים F
יום] ימים F | ת׳ת׳ק׳צ׳ג׳] ות׳ת׳ק׳צ׳ג׳ O : ות׳ת׳ק׳צ׳ז׳ J : ת׳ת׳ק׳צ׳ד׳ N 82 מ׳ו׳] מ׳ N | ובין] P וכן | ודברי]
ובין דברי H | ד׳] ר׳ח׳ M | שנה] השנה N 83 והשייור] והשאר Jˡ : והשיור Jˢ : יקבץ ממנו] יכנס בו O
אחד...שנה²])לא ברור< M | אחד] I – | אחד] + יותר מן J I | אלפי שנה] אלפים J I | אלפים שנה O
אלפי׳ אלפים P | וכגון...שנה[I – N O 84 הוא...יכלו[ )לא ברור< M | הוא[הלזה N | הזה] N –
שלא] + שלא O | חכמי] חכמים מן J האומות[+ אמרו J | ויראה לך[ותראה O | לך[לי W | אשר אין]
שאין N O 86 היא¹[N : היא O : + היא N | אדא[הוא N | + בר אהבה J : + ודי היה לנו בכל הטעמים האלו להראות
שתקופת רב אדא N J I : + ודי היה לנו בכל הטעמים האלו להראות שתקופת רב אדא בר אהבה O H : + וכי
היה בעל הטעמים האלו להראות שתקופת רב אדא P | היא²[היה N : הוא I | בסוד[בסוף P

And in yet a different way I say that we found that our Rabbis of blessed memory
examined the [duration of the] lunar month and that the correct measure and the
75 reliable extent of the lunar month were handed down to them from Mount Sinai as
was explained in the second book. And all the sages of the gentiles and their ancest-
ors could only reach the truth of that measure after great toil and prolonged and
difficult research, and in the end of all their research they relied on the measure that
was handed down to us.[55] And hence it will be clear that our Rabbis of blessed
memory investigated the measure of the solar year and that its correct length was
handed down to them from Mount Sinai as was the length of the lunar month. And
80 we find that the measure of the solar year according to the sages of the gentiles who
studied it all their lives is 365 and a quarter day minus approximately one three
hundredth of a day.[56] Thus said their sages. And in our system of measurement this
is 365 days and 5 hours and 993 parts and about 46 instants. And between this
measure [of the gentiles] and the words of Rav Adda there are four parts and two
instants per annum. This difference between them amounts to one day only after six
thousand and about 440 years.[57] And this quantity is negligible. And because the
85 sages of the gentiles could not calculate it exactly, they said minus very nearly such
and such. This demonstrates that the measure about which there is no doubt is
according to the words of Rav Adda. It is the principle of the secret of intercalation
and our Rabbis of blessed memory used to lean on it.

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[55] In lines 75-77 two *topoi* are found: the gentiles' 'theft' of knowledge from the Jews (Sela,
2003, p. 307 ff.), and the inability of the gentiles, despite their hard work, to arrive at the
truth that the Jews received without any effort when it was revealed to them. E.g., Abraham
Ibn Daud's introduction to *ha-'Emuna ha-Rama:*

ושמרתם ועשיתם כי היא חכמתם ובינתכם לעיני העמים ...ואמנם אמר זה על הפלה האומות שעמדו עליו אחר
הפלגת חקירתם ותכלית חריצותם להוציא האמת לאמיתתו אחר רוב המשה ומתן שעשו בזה אלפי שנים, ולנו אנחנו
נתן בלי עמל בפילוסופיא האמתית...

[56] Ptolemy (1984, p. 138) attributes this result to Hipparchus. See also note 61.

[57] Four parts and two instants per year add up to one day after a little less than 6438 years.

ואמ׳ ה׳ר׳ ר׳ יצחק בר׳ ברוך נ׳ב׳ע׳ דומה הוא לרוב בני אדם שרבותינו ז״ל היו מונין
לחמה כדברי שמואל. והמבין רוב חכמתם וחקירתם על סוד העניין הזה ידע כי לא נשאר
במחזור הלבנה שום מותר לחמה כאשר ישאר לדעת שמואל. וראיה על זה דבריהם
שאמרו. שתי תקופות הן. תקופת רב אדא בר אהבה בצנעה ותקופת שמואל בפרהסיא.
ואתה רואה מכאן כי תקופת רב אדא אשר היו מצניעים אותה ולא רצו לגלותה היא
היתה המדוייקת ועל סודה תיקנו את העיבור. וגילו את תקופת שמואל ופירסמוה מפני
שרוב האומות חושבין את שנותיהם עליה. ואין אנו צריכין היום לדקדק שעת התקופה
אחר שנתקן מחזור העיבור על הדרך המחוכם אשר אנו חושבין אותו ואין לנו צורך
בתקופה כי אם לתקן יום השאילה. ואינו דבר מצוה גדולה שנחוש לה. ולא עוד אלא
שדעת רבותי׳ ז״ל לא הסכימה בו על זמן קצוב שאינו מתחלף בכל הארצות אבל יש
ביניהם מחלוקת כאשר הוא מפורש בפרק מאימתי שואלין את הגשמים.

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W V P O N M L J I H G F

88 ואמ׳] וכן אמ׳ O : ואף J I | ר׳] ר״ן J I | WMLGF – [נ׳ב׳ע׳ | ז״ל] NH | הדיין ז״ל] O : נ׳ע׳ אמ׳ J : נ׳כ׳ע׳
אמ׳ I | הוא] N – | לרוב בני] לבני I[ל   89 כדברי] בדברי W | רוב] – N | חכמתם] חכמיהם J I   90 לחמה]
+ בתקופת רב אדא J I | ישאר] – H | וראיה] H | לך] + NJH | זה] העניין הזה O   91 בר אהבה] – NJH
ותקופת] תקופה רב N : תקופ׳ I | בפרהסיא] בפרהסיא O   92 רואה] למד H | אשר] – M   93 היתה] – P :
העיקר והיא J | ועל] על H | את[1] | את[2] – J I | סוד] O : – N | ופירסמוה] ופירסמוה P : ופרהסוה O :
בפרהסיא J I   94 צריכין היום] היום נצרכים O : היום צריכים J I | שעת] שעות N   95 אחר] אחרי O
העיבור] – N | המחוכם] המסוכם H   96 אם] אין VMLG | גדולה] – N | לה] עליה J | ולא עוד] + ולא
עוד M | אלא] – N   97 שדעת רבותי] שרבותינו H | הסכימה] הסכימו H | בו] + בו O | זמן] דבר N
שאינו] שאנו F   98 ביניהם] + בו PNI : + כן J | כאשר] + כאשר I | בפרק] VP – | מאימתי] ממתי N :
+ קורין W | הגשמים] הגשם H

And Rabbi Yitsḥak son of R. Barukh,[58] his soul is in Gan Eden, said: That our Rabbis of blessed memory used to count [the year of] the sun according to Samuel is comparable to [the reckoning of] most of mankind. And he that understands most of [our Rabbis'] wisdom and inquiries into the secret of this matter will know

90 that [in reality] there remains no excess in the cycle of the moon in favour of the sun as it does according to Samuel. And the proof for this lies in the words they spoke: These are two *tequfot*. The *tequfa* of Rav Adda is used secretly and the *tequfa* of Samuel is used in public.[59] And this shows that the *tequfa* of Rav Adda, which they concealed and did not want to reveal,[60] was the exact one and that they determined the intercalation based on its secret. And they revealed the *tequfa* of Samuel and made it public because most of the gentiles computed their years based on this [measure].[61] And nowadays we need not be meticulous about the hour of the *tequfa*

95 since the cycle of intercalation has been established in the ingenious way we compute it and we only need the *tequfa* to determine the day of the asking [for rain]. And this is not a matter of a massive commandment in which we must be scrupulous. Moreover, our Rabbis of blessed memory did not agree on a fixed and unchangeable time for all countries but there was a difference of opinion between them as is exposed in chapter 'and from what time does one ask for rain' [62].

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[58] Rabbi Yitshak ben Barukh Albalia, b. 1034 Cordoba, d. 1094 Granada, was a protégé of Samuel ha-Nagid and the grandfather of Abraham Ibn Daud. His work on the calendar is lost, but it is also cited by Abraham Ibn Ezra (*Sefer ha-ʿIbbur* 10b; written ca. 1146) and by Isaac ha-Yisre'eli (*Yesod ʿOlam* IV, 3, 6, 14 & 18; written ca. 1310). He maintained that the fixed calendar was based upon Rav Adda's *tequfa* (IV, 14).

[59] This quote is not to be found in the familiar sources, nor, indeed is any mention of the *tequfa* of Rav Adda bar Ahava. See also Stern (1996). It was, however, repeated by later writers, e.g., Judah ha-Levi, *Kuzari* IV, 29:

אמר החבר: ...וכְבָר טָעֲנוּ (הַנּוֹצְרִים) עַל הַיְּהוּדִים וְחָשְׁבוּ כִּי עִקַּר תּוֹרָתָם אָבַד, וְשֶׁאֵינָם עַל שֹׁרֶשׁ אֶחָד, בַּעֲבוּר שֶׁיִּפֹּל לָהֶם פֶּסַח קֹדֶם הַכְּנֵס פֶּרֶק הָאָבִיב כְּפִי חֶשְׁבּוֹנָם בַּתְּקוּפָה שֶׁהִיא בְּפַרְהֶסְיָא, וְלֹא שָׂמוּ לֵב אֶל תְּקוּפַת חַמָּה הַבְּרוּרָה הָאֲמִתִּית שֶׁהִיא בְּצִנְעָה בִּלְתִּי מְפֻרְסֶמֶת, וְשֶׁעַל חֶשְׁבּוֹנָה לֹא יִפֹּל פֶּסַח בְּשׁוּם פָּנִים אֶלָּא עַד שֶׁתָּחוּל הַשֶּׁמֶשׁ בְּרֹאשׁ טָלֶה וַאֲפִלּוּ יוֹם אֶחָד...

[60] Secrecy about the calendar was common practice in antiquity. See section 5.1.

[61] Despite its discrepancy with Hipparchus' more accurate value for the solar year, the Julian year, consisting of 365 days and 6 hours, was widely used. Only in 1582 CE did Pope Gregory XIII decree its correction; at that time 10 days were dropped to bring the calendar back into synchronization with the seasons, and the intercalation rules were changed slightly: since, not every fourth year is a leap year.

[62] Taʿanit, Chapter 1.

And I saw in one book of the books of the ancestors that they say: I asked my
teachers why they said: the *tequfa* of Rav Adda in secret. And they said to me: be-
cause all hunger and plenty and all life and death in the world depend on the *molad*
and the *tequfa*, and the sages were afraid that a man who is not decent would acquire
knowledge of them and [use that power to] destroy the world. And I agree whole-
heartedly with this and I know that it is an evident matter and a clear proof of the
wisdom of the *tequfa* of Rav Adda bar Ahava, which does not leave any remainder or
excess at the end of the cycle, and this is the truth. And this may put a stop to the
words of the heretics and the erring, who differ with us and say about our festivals
that sometimes they come before the *tequfa* and sometimes after the *tequfa*, and that
they do not have a fixed time.[63] These are the words of Rabbi Yitsḥak son of Rabbi
Barukh, his soul is in Gan Eden. And similar were the words of the old man Rabbi
Ḥas'an son of Master Ḥas'an, his soul is in Eden, in his book.[64]

But the great Ga'on our Rabbi Sa'adya, may the memory of the righteous be for a
blessing, spoke on this matter in a different way in a book of his that he wrote to
answer one of the heretics:[65] One of the heretics argued about the following
episode[66]. Our Rabbis have taught [in a *baraita*]: They intercalate a year only when
the [summer] *tequfa* is short of completion by the greater part of the month [Tishri].
And how much is that? Sixteen days. <…[67] R. Jose said: Twenty-one days…> R.

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[63] See also note 59.

[64] *Ha-Yashish* Ḥas'an ben mar Ḥas'an ha-Dayyan from Cordoba wrote this book, which is lost
to us, around 972 CE. His work on the calendar is criticised by ha-Yisre'eli (*Yesod ʿOlam* IV, 3)
and by Abraham Ibn Ezra (*Sefer ha-ʿIbbur* 10b); the latter tells us Ḥas'an wrote three books on
the calendar. Both Abraham Ibn Ezra and Isaac ha-Yisre'eli relate that Rabbi Yitshak ben
Barukh did not agree with Ḥas'an; the topic of that discussion differs from the present one:
the location on earth for which the *molad* is to be determined when calculating the calendar.

[65] Sa'adya Ga'on (882-942) maintained that the fixed calendar had been revealed to Moses on
Sinai, cf. Obermann quoting Al-Qirqisani's *Kitâb al-Anwâr wa-l-marâqib* (Gandz, Obermann, &
Neugebauer, 1956, p. lii). Sa'adya Ga'on wrote several works against individual Karaites, who
did not accept the fixed calendar. The work mentioned here is probably *not* his best known
anti-Karaite book *Sefer ha-Hekhre-ah*, which Bar Ḥiyya mentions explicitly in SI III, 7, but a
different work that is lost to us (Poznański, 1898).

[66] Use of the term *halakha* may suggest that the quotation is from *Tosefta* or Palestinian
Talmud; however, the citation is both incomplete and a contamination and the Babylonian
Talmud is the only source that explicitly mentions four measures. We completed the frag-
ment in agreement with bSanh 12b/13a. See Appendix 3.

[67] The following text from the Talmud is omitted: "These are the words of R. Judah."

ידות בחדש. עשרים יום.] ר׳ יוסי אומ׳ מחשבין י׳ו׳ לפני החג ומעברין. אחרים אומ׳
מיעוטו. וכמה מיעוטו י׳ד׳. ואמ׳ המין הזה אתה מוצא מן ההלכה הזאת ד׳ שיעורין והן
י׳ד׳ י׳ו׳ כ׳ כ׳א׳. מה המחלוקת אשר היה בין החכמים ואיך יהיו נחלקים בדבר שהן אותו
חושבין בכל שנה ושנה ביניהן. השיבו רבינו סעדייה ז״ל ואמ׳ אין זה מחלוקת ביניהם

115 אבל השיעורין האלה היה לכל אחד מהן זמן ידוע שהיו חושבין עליו. בראשונה כשיצאו
ממצרים היתה תקופת תשרי אינה עוברת י׳ד׳ בתשרי והוא השיעור הראשון ועליו היו
חושבין עד בניין בית ראשון שעלה המותר משעה ות׳פ׳ה׳ בכל מחזור עד שני ימים.
חזרו למנות מבית ראשון לי׳ו׳ מן החודש. הוא השיעור השני ועליו היו חושבין עד
שנכתבה המשנה בכדי ק׳ל׳ שנה לפי חרבן בית שיני והגיע מותר שעה ות׳פ׳ה׳ עד

120 עשרים בחודש והוא השיעור השלישי. והוסיפו לנו שיעור רביעי עד כ׳ב׳ בחודש אשר
הוא סוף ימי החג. ולא הוצרכו להוסיף שיעור חמישי כי בוטחים אנו בצורינו שהוא
יחיש את גאולתינו ויקבץ את גלותינו קודם שלא תעבור התקופה את ימי החג. אילו הן

WVPONMLJIHGF

111 י׳ו׳] + יום G | יום] + W – לפני החג] | ומעברין] מעברים O N I   112 מיעוטו ידʹ] מין[עוטו ידʹ] מ[| י ד׳]
+ יום J I | הזה] N – | מוצא] P – | הזאת] הזו J I H | והן] O   113 ידʹ] – J I | כ׳] כ׳א׳ N : כף I
י׳ו׳] N | המחלוקת] + הזה PONJH : הזו I | אשר היה] J I H שהיה | ואיך] N | יהיו] אנו N : היו M
בדבר] – W | אותן] O   114 חושבין] + אותו PO J I H : + אותם N | בכל...ושנה] – O
ואמ׳] – J I   115 אבל] J : וכל J | לכל...מהן] לו O | זמן...חושבין] <לא ברור>M | שהיו] שהיה
J I | כשיצאו] + ישראל J   116 ממצרים] מצרים L | היתה] היה W | אינה...היו] <לא ברור>M | אינה...
י ד׳] בי׳ד׳] O | אינה] ואינה J | עוברת] מעוברת P | בתשרי] לתשרי P | היון] הם O   117 עד¹] על M L | בית
ראשון] הבית הראשון F : <לא ברור>M | ראשון] שני J I : שני Pˡ | שעלה] שעליה N | משעה] מעשה G :
שעה W | בכל מחזור] – I | בכל] ובכל N | שני ימים] + שני ימים P   118 למנות] + הבית שני N | ראשון]
הראשון O | לי׳ו׳] – Lˡ | הוא] והוא P O M J I H | חושבין] מונים ON J I H   119 המשנה] + המשנה L
לפין לפני WVPONMLJIG F | בית] הבית I   120 לנן] לו WN | רביעי] שלישי N | כ׳ב׳] + יום
121 הוצרכו] הוצרכנו W N | חמישי] – N | אנו] אנכנו N   122 יחיש] יחוש J | ויקבץ...גלותינו] – N M
את²] – OJ I H | תעבור] + N | את] N | התקופה] + N | הזאת F | את³] על O | אילו] – N | הן] היו W : + ענייני
עניני Oˢᵉ V : WPNMLJIHGF

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68 The following text from the Talmud is omitted: "Passover, they intercalate the year. [If,
however, there are] sixteen [days short of completing the *tequfa*] before".

Judah said: Two thirds of the month. <And how much is that? Twenty days.> R. Jose said: They count sixteen before <…[68]> the Festival [i.e., Sukkoth,] and they intercalate the year. Others say [that the year is intercalated even if the *tequfa* is short of completion] by the lesser part [of the month]. And how much is that? Fourteen days. And this heretic said: You find from this episode four measures and they are 14, 16, 20 and 21. What was the difference of opinion between the sages and how could they be divided in this matter, which they [would] calculate each single year between them? Our Rabbi Saʿadya of blessed memory answered him and said: This

115 is not difference of opinion between them, rather, each of these measures had a certain era when they would base their calculations upon it. At first, when they went out of Egypt, the *tequfa* of Tishri would not be after the 14th of Tishri. This is the first measure and with this they would count until the First Temple was built, when the excess of an hour and 485 parts in each cycle had added up to two days. Next they counted with the 16th of the month, from [the building of] the First Temple. This is the second measure - with this they performed their calculations until the Mishnah was written, in the year 130 after [69] the destruction of the Second Temple, when the excess [had added up] from one hour 485 parts per cycle [to six days and]

120 had reached the 20th of the month. And this is the third measure. And they added a fourth measure for us [which is valid as long as the excess will remain under eight days when it would reach] the 22nd day of the month, which is the last day of the Festival. And they did not need to add a fifth measure for we trust our Rock that He

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[69] An excess of one hour and 485 parts adds up to two full days after about 629 years; with the Exodus in 2448, by 3077. The traditional year of the building of the first Temple is 2928. Four more days are gained in another 1250 years or by the year 4300. The second Temple was destroyed in 3829. On this ground we preferred the reading לפי over לפני: the later date seems more reasonable, both for the time Samuel's *tequfa* would have shifted by six days, and for the time the Mishnah was written. This reasoning is illustrated by the time-axis sketched below. The traditional or historical dates of a number of events are given below the axis; the four periods where the different measures would have been used are indicated above the axis. Note that at the time of the Exodus the Tishri *tequfa* would only have fallen before the 14th of Tishri with epochs different from the ones assumed in SI, see Appendices 1 and 2. The end of this story (ll. 124-127) suggests that Saʿadya's account was not meant to be exact or absolute.

	14			16		20		21	
2500		3000	3500		4000	4500		5000 AM	
Exodus	1st Temple built			2nd Temple destroyed			Saʿadya	SI	

דבריו ז״ל והן לפי תשובת המינין ולדחותם נוהגת מנהג התשובה אשר אדם רשאי
להשיב להם בכל עניין שיראה לו שהוא שובר את דבריהם. אבל המעיין בדבר ידע כי

125 התקופה היתה נופלת בימי רבינו סעדייה בכ׳ה׳ בתשרי ובכ׳ו׳ ואיך יאמר לא תעבור
התקופה על ימי החג אלא שהיה רצונו לדחות את דברי הרשע הזה מעליו ולא אבה
לגלות לו את דעתו ואת סוד העיבור.

ואם תראה לאחד מן החכמים והגאונים דברים כעניין הזה אל יביאו ספיקה בלבך והוי
יודע כי הם נאמרים על דוגמא ולדחות דברי הטועים ולהרחיקם. אבל יהיה מסתבר לך

130 ומוחזק בידך כי אין בחשבון מועדינו ביום הזה שום ספיקה ולא תמורה מהעניין אשר
היו מתוקנין בו בימי משה רבינו יזכר לטובה. וזה החשבון לשעה ות׳פ׳ה׳ אינו מועיל
ולא מזיק לתיקון המועדות.

W V P O N M L J I H G F

123 דבריו] דברינו F ׀ ז״ל] – N G ׀ לפי] לפין H ׀ תשובת] תשוב[ס N ׀ נוהגת] נוהגות O ׀ אשר אדם] שאדם
124   O I ׀ מה] מ – J I : P N H F ׀ התשובה] התשובה O ׀ שיראה] אשר יראה N ׀ המעיין] המעניין M L ׀ כי
התקופה] שהתקופה O   125   סעדייה] + ז״ל P N I H ׀ ובכ׳ו׳] + בתשרי N ׀ יאמר] אומ׳ N : + לו H
126   על] של M L ׀ את N ׀ את דברי] – O ׀ הרשע] המין N : האיש F ׀ הזה] ההוא F ׀ אבה] אבא M L :
רצה P N   127   דעתו ואת] – N ׀ ואת...העיבור] – O ׀ ואת] וזה P   128   תראה] – G ׀ דברים]
מדברי׳ N : דבריהם G ׀ כעניין] בענין W P J F ׀ יביאו] יבואו W V M L G : יביא O ׀ בלבך] כל כך
129   הטועים] הטעניין O N J I H ׀ מסתבר לך] – N   130   ומוחזק] ומוחק M ׀ בידך] – N
בחשבון] בחשבוני N ׀ חשבון O ׀ שום] שוה G ׀ ולא תמורה] – O ׀ מהעניין] מן העניי N ׀ אשר היו] שהיו
J I ׀ היו] אנו P ׀ בימי] מימי W ׀ יזכר לטובה] יזכר לטובה ז״ל N J : ע׳ה׳ O H ׀ יזכר] זכור P ׀ החשבון] + אשר
חושבים O ׀ ות׳פ׳ה׳] +   132   ולא] בכל מחזור O ׀ ואינו M ׀ לתיקון] בתקנת I : בתיקון P O N H F
המועדות] המועדים O J I H

will hasten our redemption and gather our exile before the *tequfa* would exceed the days of the Festival. These are the main points of his words and they were by way of an answer to the heretics and to reject them in the usual way of replying to them whenever one wants to refute their words. But he who studies this matter knows

125 that the *tequfa* would have fallen on the 25th and on the 26th of Tishri in the days of our Rabbi Sa'adya [if they would have relied on Samuel's *tequfa*].[70] And how could he say: The *tequfa* shall not exceed the days of the Festival, if it were not his wish to refute the words of that wicked heretic without disclosing the knowledge and the secret of the intercalation to him?

And if you see that one of the sages and wise men [writes] words like this, let them not bring doubt in your heart and do know that they were spoken as an example and to push aside the words of the erring and to distance them. Quite the opposite,

130 it should be clear to you and definite that there is no doubt whatsoever in the calculation of our festivals to-day, and there is no return from the matter they were established on in the days of Moses our Rabbi,[71] may he be remembered for good; and this reckoning of the hour and 485 does not help nor hurt the setting of the festivals.

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[70] This proves once more that Samuel's *tequfa* is incorrect and that Rav Adda's *tequfa* is the correct one. Sa'adya Ga'on lived from 882-942 CE. On average, the *tequfa* dates will shift to later dates by one hour and 485 parts per cycle (note 30 and Appendix 2). After 246 cycles (913/4 CE) the average *tequfa* of Nisan according to Samuel would be app. 14 days later than in the first cycle, or nearly 7 days after the *molad* of Nisan. The *tequfa* of Tishri would therefore be nearly 13 days after the *molad* of Tishri in the first year, and on 25 and 26 of Tishri in years 6 and 17 of the 248th cycle.

[71] According to *Midrash Sod ha-'Ibbur* Moses was instructed how to intercalate the years in the 19-year cycle (Kasher, p. 45). See also note 65.

4

תוספת לספר העבור

שנת י׳ח׳ למחזור ק׳צ׳ח׳ ישו נולד שנת ג׳ אלפים ת׳ש׳ס׳א׳ יום ה׳ ט׳ בטבת. והם מונים שנת י׳ז׳ למחזור ק׳צ׳ח׳ ג׳ אלפים ת׳ש׳ס׳ יום ז׳ מטעם שכתוב בתוך זה הספר. אבל אלכסנדרוס נצח הרומיים ל׳ח׳ שנה קודם לידת הנעבד וכפה אותם שימנו מאותו יום ראשון והלאה וזה היה ג׳ אלפים ת׳ש׳כ׳ב׳ כי תסיר ל׳ח׳ מג׳ אלפם ת׳ש׳ס׳ ישאר ג׳ אלפים ת׳ש׳כ׳ב׳.

5

לידע מתי מתחיל שנה שלהם תמנה מג׳ אלפים ת׳ש׳כ׳ב׳ ותשליך כ׳ח׳ כ׳ח׳ בעבור כי לכל ד׳ שנים יעבור יום בעבור הרביע יום. כי ש׳ס׳ה׳ יום ורביע יש בשנה ש׳ס׳ד׳ כלים ז׳ ז׳ ישאר יום ורביע. על כן כל ג׳ שנים שבפרסברו הוא מכ׳ח׳ יום לא ידחה יום לידת הנעבד אלא יום אחד.

WVLG

1 למחזור] [ל][מחזור] W   2 ק׳צ׳ח׳] + משנת LG | ז׳] [ז] | ז׳] W   3 נצח הרומיים] נוצח הרומים W | מאותו] מאותן W   7 יום³] ימים LG | יש בשנה] שבשנה W   8 יום³] – W

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[72] Here the abbreviated passive is used, whereas in most of *Sefer ha-ʿIbbur* the active voice is used to refer to earlier chapters.

[73] SI III, 10, about the Christian calendar.

[74] This is a puzzling remark. The traditional account holds that Alexander forced the nations to count from the beginning of his rule, i.e., 311 BCE in Babylonia, which is the epoch of the

4 ADDITION TO *SEFER HA-'IBBUR*

The eighteenth year of the 198th cycle Jesus was born in the year 3761, on a fifth day, on the ninth of Tevet; and they [i.e., the Christians,] count the 17th year of the 198th cycle, that is 3760, a 7th day, for the reason written [72] in this book [73]. But Alexander [74] conquered the Romans 38 years before the birth of the Worshipped [75]. And he forced them to count from that same first day onwards and that was 3722 for subtract 38 from 3760, remains 3722.

5

To know when [i.e., on what day of the week,] their year begins, count from 3722 and subtract 28 again and again since for every four years there is an extra day from the quarter days [which remain each year]. For there are 365 days and a quarter in the year; 364 is a multiple of seven - remain a day and a quarter. Therefore, all three years when February consists of 28 days the birth day of the Worshipped shifts but a single day.

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widely used Seleucid calendar. See SI III, 8; Al-Biruni (1879, p. 32). It is not likely that ל׳ח is a copying mistake, since the further calculations are based upon the year 3722. Perhaps a different ruler is referred to? I am not aware that this year is used as an epoch in any Jewish calendrical system, but it does fit the end of the Ḥasmonean reign and Herod the Great's coming to power in Judea as reported by Flavius Josephus (1998, p. 414 ff.). Another possible candidate as far as timing is concerned is Augustus, of whom Al-Biruni (1879, p. 33) mentions that he forced the people of Alexandria to use his system of reckoning as of possibly 38 BCE, but one would hardly say that he conquered the Romans. Possibly, the computation is an artefact resulting from a later re-translation or re-transcription of '308' in numerals into ל׳ח . Such notation presupposes knowledge of the place-value-system, see note 78.

[75] Despite the Mishnah's definition of *ne'evad:* "and what is meant by *ne'evad?* That which has been used for idolatry" (mTem 6:1) we translated *ne'evad* by 'Worshipped'. The capitalisation reflects its decoration (with a *segol* over the *'ayin*) in MS V. An inventory of terms is given in Table 2: *Terminology used to describe Jesus, his followers, and their festivals in various versions of* Sefer ha-'Ibbur, *Book III, Chapter 10 and in the addition.*

כגון אם יהיה לזאת השנה יום א׳ לשנה הבאה יהיה יום ב׳. אבל לשנת ד׳ שבפריברו הוא   10
כ׳ט׳ יום ידחה ב׳ ימים מיום א׳ ליום ג׳. ובכ׳ח׳ שנים יעלו הרביעיים לז׳ ימים ויכלו עם
הכ׳ח׳ שנים.

תשליך כ׳ח׳ כ׳ח׳ והשנה שאתה עומד בה תמנה גם כן. ומה שיותיר על כ׳ח׳ כ׳ח׳ אם
יעלה בידך שנים שלא יגיעו הרביעיות לג׳ רביעיות כגון ב׳ שנים או ו׳ י׳ד׳ י׳ח׳ כ׳ב׳
כ׳ו׳ אל תמנה הרביעיות שיותירו על יום שלם. אבל שנת ג׳ או ז׳ י׳א׳ ט׳ו׳ ט׳ט׳ כ׳ג׳ כ׳ז׳   15
ימנה אותם בכלל יום. כגון אם יהיה כ׳ב׳ הרי ה׳ ימים וחצי מן הרביעיות ימנה הה׳
ימים ולא ימנה החצי יום. אבל אם יהיו כ׳ג׳ שנים הרי ה׳ ימים וג׳ רביעיות ימנה ו׳ ימים
שלימים מן הרביעיות.

דמיון. הנה יש לנו מבריאת העולם* ה׳ אלפים ונ׳ב׳ שנים. תסיר מהם ג׳ אלפים
ת׳ש׳כ׳ב׳ ישאר אלף וש׳ל׳ שנה .תשליך כ׳ח׳ כ׳ח׳ מאלף ישאר כ׳ ומש׳ל׳ ישאר נ׳ הרי   20
ע׳. השלך נ׳ו׳ ישאר י׳ד׳ .תשליך עליהם ג׳ ימים מן הרביעיות הרי י׳ז׳ כי ב׳ הרביעיות
הנותרים לא תמנה. השלך י׳ד׳ ישאר ג׳ .תמנה א׳ ב׳ ג׳ נמצא כי שנת ה׳ אלפים נ׳ב׳
לפרט יהיה יום מילת הנעבד יום ג׳.

10 שבפריברו] שפריברו L G   11 ימים] – W V   15 על יום] ליום L‎ : על L‎ s   19 מבריאת] – V‎ l
העולם*] – [* W V L G   21 ימים] – L‎ l   22 תמנה[2] המנה W | כן כן] W

10   For example, if it would fall on a first day this year, it would fall on a second day the
      next year. But in the fourth year, when February has 29 days, it would shift two days
      from a first day to a third day. And in 28 years the quarters will add up to seven days
      and there will be no net result after 28 years.[76]

      [Therefore,] you have to subtract 28 again and again and count the year you stand in
      too. And if this division by 28 leaves fewer than three years such that the quarters
15   do not reach three quarters, for instance two years or 6, 14, 18, 22 [or] 26, you must
      not count the quarters that are in excess of a whole day. But year 3, or 7, 11, 15, 23
      [or] 27, you have to count for a whole day. For instance, if it would be 22, thus five
      days and half a day from the quarters, count the five days and do not count the half
      day. But if it would be 23 years, that is five days and three quarters, count six full
      days from the quarters.

      Example. Behold, we have 5052 years since the creation of the world.[77] Subtract
20   from that 3722 remain 1330 years. Take 28 from one thousand again and again,
      remain 20 and from 330 remain 50 [78], gives 70. Take 56 remain 14. Add to this three
      days from the quarters, yields 17; for the two quarters that remain you must not
      count. Subtract 14, remain 3, count 1, 2, 3 and it is found that in the year 5052 of
      our count the day of circumcision of the Worshipped is a third day.[79]

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[76] Because the 28 quarter days add up to one complete week, and the 28 full days to four
complete weeks.

[77] The year 5052 is 1291/2 CE. Although an illustration might use a future date, it is more
likely that this year reflects the time of composition of this fragment.

[78] Note that 50 is a number larger than 28. This demonstrates that 280, or ten times 28, was
subtracted from 330, rather than 28 again and again, even if division is described in that way.
Multiplication by ten is simple only if one is familiar with the place-value-system, which was
most likely introduced to Europe (and definitely to the Hebrew-speaking world) through
Abraham Ibn Ezra's *Sefer ha-Mispar*. That work was composed only around 1142, which once
more suggests that this example was not written as part of *Sefer ha-'Ibbur*.

[79] This example uses for Jesus' circumcision date, and thus for his birth-date, a Shabbat in
the year 3722 (or a multiple of 28 years later). The whole episode could be a corrupted copy.
The key to comprehension may lie in understanding the figure of 'Alexander' of line 4. The
overall meaning of the edition seems to be that the Jews have more accurate knowledge of
the dates of the Christian new year than the Christians themselves.

5 Discussion

5.1 Why use Samuel's *tequfa* if Rav Adda's is more accurate?

In Chapter 5 of Book III of *Sefer ha-ʿIbbur* Abraham bar Ḥiyya shows that Rav Adda's measure of the *tequfa* is more accurate than the one attributed to Samuel. His first argument is its exact fit to the 19-year cycle (l. 6 ff.). This exact fit implies that each cycle repeats the exact temporal relation between the *tequfot* — Rav Adda's solstice and equinox moments — and their respective *moladot* — the calculated solar-lunar conjunctions. Therefore, the dates on which the *tequfot* occur are roughly the same in each cycle.[80] In other words, the average Hebrew dates of Rav Adda's *tequfot* do not vary, whereas Samuel's *tequfot* will drift to later dates at a rate of about an hour and a half per 19 years.[81] Abraham bar Ḥiyya's second reason for preferring Rav Adda's *tequfa* (ll. 26-42) follows directly from this first observation: if the purpose of the intercalation of the years is to keep specific festivals in specific seasons,[82] a system which keeps the relation between the dates and the seasons intact obviously does better. The third proof of supremacy of Rav Adda's *tequfa* is that the cleverest of gentile scholars reached a solar year length very close to Rav Adda's.

What status did Abraham bar Ḥiyya assign scientific knowledge about the length of the year, i.e., knowledge that does not arise from traditional Jewish sources but which is typically of Babylonian or Greek origin? We must discriminate between the

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[80] Over the 19-year cycle, the dates of the *tequfot* vary within a period of about one month. See Appendix 2, Figure 1: *The occurrence of the* tequfot *Nisan according to Rav Adda with respect to the* moladot *Nisan for the 19 years of the cycle. Years counted from Nisan.*

[81] See Appendix 2, Figure 2: *The occurrence of the* tequfot *of Nisan according to Samuel with respect to the* moladot *of Nisan for the 19 years of the first and of the 257th cycle. Years counted from Nisan.*

[82] Passover in spring and Sukkoth in autumn. It has become accepted to think that the objectively correct date of rituals and festivals is crucial and that the calendar was made to fit the natural seasons for that reason. Luzzatto for example claimed that reading a Torah portion at its appropriate time brings about instantaneous divine light (1997, p. 351). It is, however, not at all self-evident that objectively correct timing is relevant; indeed, according to mRH 2:8-9, rabbinic authority would be more important in setting the date of the holidays than astronomical evidence.

knowledge of the widely used Julian year, which equals Samuel's value, and the more accurate 'expert knowledge' of Hipparchus' measure, which is close to, but not equal to, Rav Adda's year. With respect to the expert knowledge we find the following paradox in the chapter under study (ll. 74-77). Expert knowledge is one of the touchstones that can prove the supremacy of a calendaric model, but at the same time its use needs to be legitimized because of its non-traditional origin. This legitimization is effected by the account that this expert knowledge actually is of Jewish origin: the *topos* of the so-called gentiles' theft of knowledge from the Jews (see note 55). This approach shows that Abraham bar Ḥiyya in fact set great store by expert scientific knowledge and did not find a conflict between revealed knowledge and scientific knowledge.

Abraham bar Ḥiyya concludes that Rav Adda's *tequfa* is clearly more accurate than Samuel's (l. 128). What would the halakhic or liturgical relevance of this finding have been in his time? The festivals were by that time already regulated by the fixed calendar (l. 95), intrinsically congruent with Rav Adda's *tequfa*, and thus not influenced by a decision which *tequfa* to follow. In the present time, only two liturgical events are determined according to the Hebrew solar year, which follows Samuel: the day on which *Birkat ha-Ḥama* is said, once every 28 years,[83] and the beginning of the period in which Jews in the Diaspora have to include *ve-ten tal u-matar* in the ninth *berakha* of the weekday *Amida*.[84] (The end of that period is determined by the Hebrew calendar: *Pesaḥ*.)

The source for the mitzvah of *Birkat ha-Ḥama* is Babylonian Talmud *Berakhot* 59b:

> Our Rabbis taught: He who sees the sun at its *tequfa*, the moon in its power, the planets in their orbits, and the signs of the zodiac in their orderly progress, should say: Blessed be He who has wrought the work of creation – '*ose bereshit*. And when [does this happen]? — Abaye said: Every twenty-eight years when the cycle [of the sun] begins again and the Nisan *tequfa* falls in Saturn on the evening of Tuesday, going into Wednesday.

Tosefta [85], the Palestinian Talmud [86] and Yitsḥak Alfasi,[87] the author of the Rif, the only comprehensive legal code available in Abraham bar Ḥiyya's time, all state that he who sees the sun and the other celestial bodies has to bless: '*ose bereshit* but none

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[83] Yad *Hilkhot Berakhot* 10:18; Tur OḤ 229; SA OḤ 229b.

[84] Yad *Hilkhot Tefila u-Nesi'at Kappayim* 2:18; Tur OḤ 117; SA OḤ 117a.

[85] tBer 6:6.

[86] pBer 9:2, 13d.

[87] Rif Ber 43b.

of them mention the period of 28 years. *'Tequfa'* in this context need not be interpreted as related to any natural cycle: it has also been explained as the sun's reappearing after a number of overcast days.[88] In *Sefer ha-'Ibbur* III, 3, on Samuel's *tequfa*, Abraham bar Ḥiyya does demonstrate that the sun's cycle of 28 years is explained by the *tequfa* of Samuel.[89] In Abraham bar Ḥiyya's time, *Birkat ha-Ḥama* may or may not have been said every 28 years.[90] In any case, Abraham bar Ḥiyya twice states explicitly — once in Chapter 3 and once in Chapter 5 of Book III — that the choice of *tequfa* only affects the date from which the prayer for rain is to be said.

When to begin the *She'ela*, the asking for rain, is discussed in *Mishna Ta'anit* 1:3:

> On the third of Marḥeshvan we [begin to] pray for rain. R. Gamli'el says: on the seventh, [that is] fifteen days after the [last day of the] Festival so that the last Israelite may reach the river Euphrates [on the return journey from the pilgrimage to Jerusalem].

R. Gamli'el's opinion becomes the rule for *'Erets Yisra'el*, but the *talmudim* report a different custom in Babylonia: in Babylonia one began the *She'ela* sixty days after the *tequfa* of Tishri,[91] and this becomes the rule for all of the Exile. Accordingly, in present-day prayer books we find the instruction to begin including *ve-ten tal u-matar* on the morning sixty days after the Tishri *tequfa*.[92] What about other parts of the world with possibly different climates? The *Tosefta* seems to allow for weather conditions, since it makes the date from which to pray for rain dependent on the length of the year.[93] Both *talmudim* [94] report that the Jews of Nineveh [95] were in need of rain

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[88] *Haggahot Maimoniot Hilkhot* Ber 10:18.

[89] In fact, a 28-year cycle presupposes a year length of an integer number of weeks plus an integer number of days plus a quarter day, since such a year length constitutes the necessary and sufficient condition for recreating the time of day and the day of the week of an event after 28 years for the first time.

[90] The moment to say *Birkat ha-Ḥama* does not rely on a specific measure for the *tequfa* since the Babylonian Talmud explicitly mentions the frequency of once every 28 years. This unambiguously defines its timing once a reference point has been chosen.

[91] bTa 10a; pTa 1:1, 63d.

[92] Generally, this is explicated as December 4th or 5th, which shows that Samuel's *tequfa* was used in determining the date on the Gregorian calendar. E.g., Tal, 1987, p. 70.

[93] tTa 1:2; Maimonides suggested to adapt the season for *ve-ten tal u-matar* to the local climate in his commentary to the mTa 1:3, but later judged otherwise in his *Mishne Tora* (see note 84). This contradiction may result from the different requirements of logic and halakha, or from a change of heart.

[94] bTa 14b, pTa 1:1, 63d, pBer 5:2, 9b.

outside the in Babylonia accepted period for the *She'ela*, and both conclude that the times of the communal prayer for rain were not to be changed but that a personal prayer for rain could be said as needed. Yitsḥak Alfasi followed all conclusions of the *talmudim*.[96] The first halakhic question ever from the Americas concerned the same issue: Around 1637, Rabbi Ḥayyim Shabtai of Salonika answered the Jews of Recife in Brazil that they could ask for rain in personal prayers when necessary, but not in the communal ninth *berakha* of the *Amida;* however, they were exempted from praying for rain when it would harm their crops.[97] Most of early mediaeval Europe seems to have kept to the Babylonian practice (Lasker & Lasker, 1984), with the sole exception of Provence, where the practice of *'Erets Yisra'el* was observed.[98]

Against this background, Abraham bar Ḥiyya stated that this specific halakhic rule is not a very grave matter. Indeed, it is not from the *Tora*, as is the requirement to hold the festivals at their appropriate times, but it was instituted by the Rabbis, and, as Abraham bar Ḥiyya points out, not very consistently at that. To explain why the Rabbis used the obviously incorrect *tequfa* of Samuel, Abraham bar Ḥiyya cites a number of predecessors, who gave various politic or tactical reasons to do so. Firstly, it was deemed preferable to hide the true details of the calendaric calculations and the underlying motions of the celestial bodies because such astrological knowledge could be used destructively (l. 101). The apparent belief in astrology might strike us as remarkable, but it belonged to the then standard world view and was considered a branch of astronomy (Sela, 2001, 2006). In ancient cultures it was not uncommon to keep knowledge about the calendar secret and *sod ha-'ibbur* ('the secret of intercalation') was indeed a usual term to denote calendaric science (Crown, 1989, p. 693). This reason for secrecy would have ceased to be valid in a more rationalistic time.

The following reason to present less than perfect knowledge about the length of the year has to do with the relations with the gentile surroundings. Note that the gentiles at that time used the Julian year, the length of which equals Samuel's year length.[99] Use of Rav Adda's more accurate value could easily have been interpreted as criticism or ridicule of the gentiles: The Jews would have implied that the gentiles' year

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[95] Klein (1912) put forward that Nineveh should be read Nawe (a city in Transjordan) since no Jews lived in Niniveh at the time. In any event, I suggest that the echo of the fast of Nineveh from the biblical book of *Yona* is intentional.

[96] Rif Ta 2a.

[97] Responsa *Torat Ḥayyim*, Part 3, Siman 3.

[98] Rosh Ta 1,4.

[99] See note 61.

length was incorrect and that they had the superior knowledge. Such provocation was deemed inadvisable.

Another strategic reason not to be explicit about the correct knowledge lies in the troubled relation with heretics. Abraham bar Ḥiyya cites a dispute between Saʿadya Gaon and a heretic (ll. 107-127) and comments that Saʿadya's statements must be understood to have been made for their effect and not for their truthful account, since their purpose was to fend off the heretics.[100]

At the end of Chapter 5 of Book III of *Sefer ha-ʿIbbur* Abraham bar Ḥiyya summarizes: the fixed calendar and Rav Adda's *tequfa* are evidently correct because they were revealed to Moses at Sinai (ll. 130-131); in this he follows Saʿadya Gaon. In the past, there have been tactical reasons not to explicit about the accurate length of the year. Abraham bar Ḥiyya's arguments why Rav Adda's *tequfa* is the better one, however, are rational and scientific: observation, arithmetic and agreement with expert (gentile) knowledge.

5.2   WHY WOULD ABRAHAM BAR ḤIYYA HAVE WRITTEN ON THE CALENDAR?

Why would Abraham bar Ḥiyya have written his *Sefer ha-ʿIbbur?* In its introduction Abraham bar Ḥiyya relates that he was asked to write a work on the calendar. He had to compose an original work — as opposed to translating or copying an existing text — because a similar work did not exist, neither in Hebrew nor in Arabic (1851, p. 4, 5). Abraham bar Ḥiyya is referring to a complete work, which would include a description of the underlying astronomy. There may have been texts that explained how to determine the fixed Hebrew calendar and we know that this calendar was already in place in the early 900's (Stern, 2001, p. 191). Indeed, Al-Biruni had reported many of its particulars, including the two different *tequfot* (p. 163), before 1000 CE.

We suggest that the credibility of the fixed Hebrew calendar was being challenged in Northern Spain and Provence in the early twelfth century and that this formed the incentive for composing *Sefer ha-ʿIbbur*. The challenges concerned two aspects of its foundation — both its rootedness in the revealed tradition and its scientific sophistication were being questioned. Educated Jews were deeply involved in Greek and Arabic science and lived in close contact with Muslims and Christians, who had their

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[100] This is similar to what Maimonides states (about Saʿadya Gaon) in his commentary to mRH 2:7: "He did not believe his own words but he spoke them to *gore* his adversaries…"

calendrical systems in accord with astronomy. This may have strengthened the Jewish desire to be able to present the Hebrew calendar in a similarly well-founded way. More importantly, a considerable sub-group of Jews (Astren, 2004, p. 58), the Karaites, refused to adhere to the fixed Hebrew calendar [101]. Thus the Rabbinites needed to take a stand and demonstrate that the fixed Hebrew calendar was both scientifically correct and the result of divine inspiration. Abraham bar Ḥiyya's *Sefer ha-'Ibbur* does exactly that: its first book declares the divine source of the sublime rhythms of the universe and divisions of the earth and it is largely dedicated to astronomy, which in fact plays no role in the setting of the calendar. Scientific knowledge is introduced as originating from the Jews to whom it was handed down from Sinai; the gentile scholars later received the correct knowledge from the Jews. In the chapter presently studied, both the relations with the gentiles and with the Karaites are addressed, but Abraham bar Ḥiyya's final explanation for seeming inconsistencies between the statements of the Rabbis and the particulars of the fixed calendar is that the raison d'être of those statements was to ward off the heretics.

Abraham bar Ḥiyya would not have been the only scholar writing in order to refute the Karaites in twelfth-century Spain. Sela (2002, pp. 277-280) argues that Abraham Ibn Ezra composed his work about the Hebrew calendar in response to the Karaite threat in Spain in the first half of the 12th century, as did Judah ha-Levi with his *Kuzari*; and Cohen (1967) argues that a generation later Abraham ibn Daud wrote his *Sefer ha-Qabbala* to oppose the Karaites.

Abraham bar Ḥiyya's account is not historically correct in a number of ways. It seems unlikely that Hipparchus took his astronomical insights from the Jews and it is equally unlikely that the exact measure of Rav Adda's *tequfa* was arrived at independently of the 19-year cycle (see notes 18 and 29). Abraham bar Ḥiyya's description of the calendar and its foundations, however, presents a consistent system. His axioms remain unchallenged - even if he may make the details fit his system when necessary: perfect knowledge of the calendar was revealed at Sinai, and the world

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[101] Until the Crusaders gained control of Jerusalem, the Karaites allowed intercalation only on account of *'aviv*, i.e., inspection of the crops in *'Erets Yisra'el*. No later arguments between Rabbanites and Karaites about the intercalation were reported (Ankori, 1956). However, the Karaites did not accept the Rabbanite calendar. Apparently, sighting of the new moon outside of *'Erets Yisra'el* determined the beginning of their month. Indeed, in Spain Judah ha-Levi (*Kuzari* III, 39) writes about the Karaite calendar in ca. 1140:

ואני רואה חכמיהם הולכים אחרי הרבנים בעיבור אדר באדר, והם מקשים להם בראיית ירח תשרי...

can ultimately be known through observation.[102] Many later authors distinguish between the domain of science and the domain of religion, and put one over the other where the two are in conflict.[103] In the present work, Abraham bar Ḥiyya makes no such separation:[104] revealed knowledge concerns the same world we know through our senses and through logic. Observation of the cosmos yields knowledge of the divine world and knowledge of the heavens, from the Bible, leads to knowledge of the earthly phenomena (SI, 1851, p. 3). Divine perfection is reflected in terrestrial symmetry. For example, in areas where day and night are not of equal length, the symmetry is restored by considering a whole year: the length of the days in summer is balanced by the length of the nights in winter (p. 7). Less convincingly, exactly half the surface of the earth is covered by land, and the other half by water (p. 6). Above all, Abraham bar Ḥiyya seems to have been an analytical mind: a theorist who was more concerned with the overall system being correct than with the exactness of its details. This trait he shares with Abraham Ibn Daud, who subtly adapted the chronology in *Sefer ha-Qabbala* to enhance its symmetry and thus make the divine purpose stand out even more clearly (Cohen, 1967, p. 169 ff.).

Abraham bar Ḥiyya respected the rule that rabbinical authority cannot be overruled by a lower authority. Therefore, he did not correct the Rabbis who reckon with Samuel's *tequfa*. Rather, he presented a different solution: Any contradiction we notice is by definition an apparent contradiction. In this instance, the Rabbis must have had a valid reason for using the *tequfa* of Samuel. In this way he keeps the system intact: revealed knowledge is by definition correct, and scientific observation must eventually lead to the same insights. Abraham bar Ḥiyya presents us with a comfortingly consistent worldview, which was not unusual at the time but which cannot be maintained that easily in the present day.

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[102] E.g., in SI III, 3 and 4, we learn that the ultimate criterion for correctness (in this case the superiority of Rav Adda's *tequfa*) is observation: The sun is not in Aries at Samuel's Nisan *tequfa*, and day and night are of equal length at Rav Adda's Nisan and Tishri *tequfot*.

[103] E.g., responsa of the Rosh (R. Asher ben Yekhi'el, Germany ca. 1250 – Toledo 1327), Rule 55, Siman 9:

...כי חכמת הפילוסופיא וחכמת התורה והמשפטים אינן על דרך אחת. כי חכמת התורה היא קבלה למשה מסיני, והחכם ידרוש בה במדות שנתנה לידרש בהם, ומדמה מילתא למילתא; אע״פ שאין הדברים נמשכים אחר חכמת הטבע, אנו הולכין על פי הקבלה. אבל חכמת הפילוסופיא היא טבעית, וחכמים גדולים היו והעמידו כל דבר על טבעו, ומרוב חכמתם העמיקו שחתו והוצרכו לכפור בתורת משה, לפי שאין כל התורה טבעית, אלא קבלה.

[104] According to Freudenthal (2005, p. 27), this phenomenon, related to the appearance of the many Hebrew translations of Greek-Arabic philosophical and scientific works, is a common characteristic of 12th-century Jewish thought on the Iberian Peninsula.

5.3   WHAT COULD WE GAIN FROM A CRITICAL EDITION?

Filipowski created his edition of *Sefer ha-'Ibbur* (1851) from two MSS: Oxford and Paris. He intended to create an astronomically and mathematically reliable text in correct Hebrew, and he used his expertise to correct the many mistakes and corruptions he observed in the MSS and to create some new tables and update existing ones (p. vi). This aim and procedure indicate that his edition cannot enlighten us about the language of Abraham bar Ḥiyya nor about the history of the text.

In his edition, Filipowski usually followed MS Oxford, perhaps because he had easier access to it, or perhaps because he preferred its readings. However, he did not do so consistently. At the end of Chapter 5, for instance, he has added some expressions that are found in Paris but not in Oxford (e.g., לדחות את דברי הרשע הזה l. 126), and he also inserted words that do not occur in either (e.g., ות׳פ׳ה׳ חלקים l. 131). Since such decisions are not mentioned explicitly, they thwart the comprehension of the style of the text. We mentioned in section 2.1 that MS Oxford is atypical in its phrasing and that its copyist probably tried to improve its style. Such rephrasing evidently hinders the study of Abraham bar Ḥiyya's vocabulary and syntax, which were shown to be specific by Efros (1926, 1927, 1929) and Gamli'el (1997). Gamli'el analyzed Abraham bar Ḥiyya's language in *Hegyon ha-Nefesh* and reports a typical use of the words that are employed as relative pronouns: the majority of the non-defining relative clauses were introduced by אשר (and only some 13% by ש-), whereas defining relative clauses were predominantly introduced by ש- (and in some 13% of the cases by אשר). For that reason we distinguished between ש- and אשר in the present text-edition. The occurrence of the relative pronouns in Chapter 5 of Book III (see Table 1) proved congruent with the results reported by Gamli'el. Taking into account that *Sefer ha-'Ibbur* is a scientific and an arithmetical text and *Hegyon ha-Nefesh* a philosophical work, this is a remarkable observation. A critical edition of *Sefer ha-'Ibbur* will enable a more detailed study of its syntax and can contribute to a better understanding of Abraham bar Ḥiyya's language and the development of scientific Hebrew.

TABLE 1: The incidence of each of the two 'relative pronouns' in SI III, 5 (and in brackets: in the addition to SI) in defining and non-defining relative clauses, respectively. Biblical and Rabbinical citations were excluded from this count.

"Relative pronoun"	Non-defining relative clauses	Defining relative clauses
אשר	17 (0)	2 (0)
ש-	8 (0)	13 (6)

Filipowski noted considerable differences between his two MSS. Many times, the phrasing differed while the contents corresponded. Such variation in style did not concern him since he was interested in the substance and not in the form (p. vi). Other differences did concern the contents and Filipowski ascribed those to Abraham bar Ḥiyya's revising the text: After he had completed the text, he looked at it a second time and changed it and corrected the words as he wished. But he did not discard the first version for it was copied by a different copyist in Spain in 5236; that is the copy preserved in the Oxford treasuries of books... (p. xi). The Paris manuscript, Filipowski suggests, is a copy of the revision. The two versions differ in their attitudes towards Christianity and Islam. MS Oxford warns future copyists to be careful not to change a single word of parts of the text that discuss the Islamic influence, and MS Paris does the same but with respect to the impact of Christianity; in both cases, according to Filipowski, for fear of antagonising the government, Islamic and Christian, respectively. For example, he claims, MS Paris omits the entire last chapter of *Sefer ha-ʿIbbur* about the Christian calendar because it is a copy of the revision produced in a Christian surrounding (p. xi).

Now we very much doubt the details of this account, but we subscribe to its mechanism: We imagine that copyists made adaptations in later times according to the political or societal climate. Our tentative study of the last chapter revealed a conspicuous variation in terms used to describe Jesus and his followers (see Table 2). Where Filipowski's edition, or MS Oxford, uses words such as התלוי *(the hanged)* and הרשע *(the evil one)*, which are usual names for Jesus in Ashkenazi Hebrew mediaeval texts, two other MSS have the ambivalent הנעבד *(the worshipped)* and שלהם האלוה *(their god)*. Where MSS V and W have the neutral ההולכים אחר הנעבד *(those who follow …)*, MS O has the negative הטועים אחר התלוי *(those who err …)*. All three have אדום, which has a

TABLE 2: Terminology used to describe Jesus, his followers, and their festivals in various versions of *Sefer ha-ʿIbbur*, Book III, Chapter 10 and in the addition.

Addition	Filipowski 109 (MS O)	MSS V 55r and W 94v/95r
ישו, הנעבד	התלוי	הנעבד
	הטועים אחר התלוי	ההולכים אחר הנעבד
	אידיהם	חגיהם
	אדום הרשעה המונים אחרי התלוי	אדום המחזיקים דת הנעבד
	המטעה אותם	האלוה שלהם
	להולד בו הרשע הזה	להולד בה כנעבד הזה
	כשבאו תלמידי המכעיס להתעות... ולהכניסם בטעות הזה	כשבאו תלמידי הנעבד ללמד... ולהכניסם לדת הזה

negative connotation,[105] but MS Oxford adds הרשע *(the wicked)*. The negative אידיהם *(their idolatrous festivals)*[106] in MS O has the positive equivalent חגיהם *(their festivals)* in MSS V and W; the negative ה[טעות הזה *(that mistake)* in MS O has the positive equivalent ה[דת הזה *(that belief)* in MSS V and W. This shows that some mediaeval Jewish writers, or copyist of their texts, used neutral or positive language when writing about Christians. Perhaps the manuscripts that exhibit a more positive attitude towards Christians were produced by Christian copyists versed in Hebrew, possibly Jews converted to Christianity, or perhaps they were produced by Jewish copyists who were less antagonistic to Christianity. Our hypothesis would be that later copies show more negative terminology. This aspect alone warrants a systematic and comparative study of all extant manuscripts of all of Abraham bar Ḥiyya's *Sefer ha-ʿIbbur*.

Filipowski claimed to present an edition of *Sefer ha-ʿIbbur* without errors. His information being limited to two manuscripts, however, the edition might be inaccurate with regard to calendaric data too. The top lines of p. 82 (SI, 1851), for example, present an instruction on how to count the years when establishing the day of the week on which a specific *tequfa* will fall in a certain year, and this is only one of three different versions that are to be found in the twelve extant MSS. Another questionable reading is found on p. 37 (Book II, Chapter 2): Ptolemy's mean lunation. Goldstein (2003) remarks that the value which Abraham bar Ḥiyya attributes to Ptolemy is not the standard value. Inspection of MSS V and W, however, reveals that these manuscripts do show Ptolemy's standard value [107]. The existing edition thus gives a biased understanding.

In conclusion, a critical edition of *Sefer ha-ʿIbbur* would greatly help our conception of Abraham bar Ḥiyya's times and advance our knowledge of his use of the Hebrew language in scientific writing, and will sharpen our notion of the development of calendaric science.

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[105] Zeitlin (1970) claims that the term Edom for the Roman Church was first used in connection to intercalation of the calendar: in the so-called 'code message' in bSanh 12a.

[106] Literally: disasters.

[107] Filipowski (Abraham bar Ḥiyya Savasorda, 1851, p. 37): mean lunation of 29;31,50,8,9,20 days. Ptolemy's (standard Babylonian) value: 29;31,50,8,20 days (1984, p. 179); and thus in V and W. The notation is sexagesimal: 31 days plus 31/60 day plus 50/(60*60) day plus 8/(60*60*60) etc. (Compare the contemporary time units of minute and second, which equal 1/60 and 1/(60*60) hour, respectively.) Note that 29 days;31,50,8,20 is equivalent to 29 days 12 hours and 793 parts, the mean lunation used in determining the Hebrew calendar.

6 Conclusions

We suggest that Abraham bar Ḥiyya may have written *Sefer ha-ʿIbbur* to oppose the Karaites. His position towards the Christians may have been more open than generally recorded.

Sefer ha-ʿIbbur does not present halakha or new scientific insights. Rather, it is apologetic in character. It explicates existing practices and justifies earlier rulings.

Abraham bar Ḥiyya does not seem to distinguish between domains where revealed knowledge is applicable and areas where rational and scientific understanding are relevant.

A critical edition of the entire text of *Sefer ha-ʿIbbur* will help address scientific, historical and linguistic questions about Abraham bar Ḥiyya's time.

APPENDIX 1: THE EPOCHS

Given the 19-year cycle of intercalation — with twelve years of twelve months and seven years of thirteen months — the duration of a month and the duration of the solar year, one can compute the time of each *molad* and *tequfa* once their *epochs,* the reference points to count from, have been chosen. Samuel and Rav Adda use slightly different epochs. For both, the epochs are thought to reflect the time of creation. Genesis 1:14-19 tells us that the creation of the sun and the moon took place on the fourth day, Wednesday. This has been interpreted to imply that the sun was created in its spring *tequfa* at the beginning of the day, nightfall or 0 hours. The first conjunction of the moon and the sun (the first 'new moon') was thought to have taken place in Tishri, on a second day, Monday, at 5 hours 204 parts or '*bahrad*' of the preceding year. (Note that as a result the counting of the months was began with Tishri and the counting of the *tequfot* with Nisan.) *'Bahrad'* has been explained as follows (Gandz et al., 1956, p. xl): The creation of Adam took place on Friday 8AM or day 6, 14 hours and 0 parts and it coincided with the *molad* of Tishri; in other words, the next day was Rosh ha-Shana of year 2. The year that had just ended — even if it contained only six days since the creation of the world had began the previous Sunday — was year one and the *molad* of Tishri of that year one, the so-called *molad tohu*, was taken as the epoch for the months. To know the day of the week and the time of that *molad*, one has to count backwards 12 standard months (12 times 29 days, 12 hours and 793 parts, or 354 days, 8 hours and 876 parts) from Friday 14 hours; this yields Monday 5 hours and 204 parts or '*bahrad*' as the epoch for the *moladot*.

We now have established the times of the first *tequfa* of Nisan and of the first *molad* of the preceding Tishri. To examine the occurrence of the *tequfa* of Nisan with respect to the *molad* of Nisan, we first determine the *molad* Nisan of year 1. *Molad* Nisan of year 1 is supposed to have occurred six standard months or 177 days, 4 hours and 438 parts since the *molad* epoch, or Wednesday at 9 hours and 642 parts. Thus, Samuel's computation assumes the spring *tequfa* of year 1 to have taken place 7 days, 9 hours and 642 parts before the *molad* of Nisan. In Rav Adda's computation the sun is also supposed to have been created in its *tequfa* and the moon is assumed to have been in its conjunction on that same day; therefore the epoch for Rav Adda's *tequfa* is Wednesday 0 hours 0 parts and this is 0 days, 9 hours and 642 parts prior to the *molad* Nisan of year 1. Abraham bar Ḥiyya sometimes counts the years and the cycles from Nisan of year one, with intercalations in the 3rd, 6th, 8th, 11th, 14th, 17th and 19th year of the cycle (e.g., SI, tables in III, 3 and 4; III, 5, ll. 38-39); and at other times from Tishri of year one, with the 1st, 4th, 7th, 9th, 12th, 15th, and 18th year intercalated (e.g., SI III, 5, ll. 39-40).

APPENDIX 2: THE COMPUTATION OF THE *TEQUFOT* OCCURRENCES

The temporal relation between Rav Adda's *tequfot* and their *moladot* differs for the 19 years of the 19-year cycle. It is, however, identical for each 19-year cycle, i.e., the relation solely depends on the order number of the year in the 19-year cycle. We determined the relation between the *tequfa* of Nisan and the *molad* of Nisan for each of the 19 years in the first cycle as follows. The length of the Rav Adda year is 365 days, 5 hours, 997 parts and 48 instants, and 12 standard months total 354 days, 8 hours and 876 parts (see section 1.3.2); an excess of 10 days, 16 hours, 121 parts and 48 instants. In year 1 the *tequfa* precedes the *molad* by 9 hours and 642 parts (see Appendix 1). We will use positive values to indicate that the *tequfa* occurs later than the *molad*. Thus, in year 1 the *tequfa* occurs -9 hours, -642 parts after the *molad*, and in year 2 (10 days, 21 hours, 121 parts and 48 instants) + (-9 hours -642 parts), that is, 10 days, 11 hours, 559 parts and 48 instants. For year 3, we add to this value the difference of the solar year length 365 days, 5 hours, 997 parts and 48 instants, and 13 times the mean lunation of 383 days, 21 hours and 589 parts since the third year
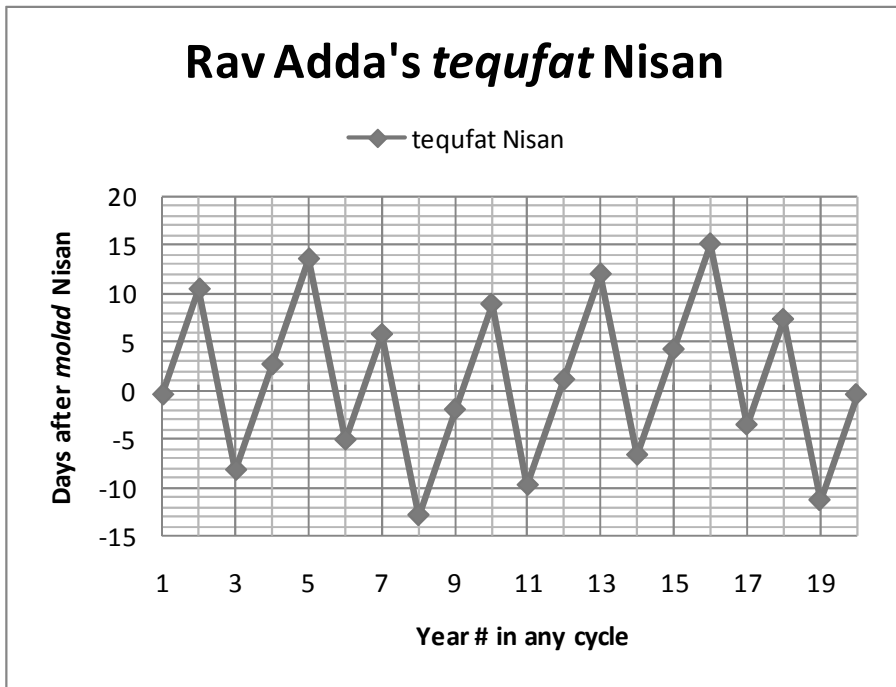

FIGURE 1: The occurrence of the *tequfot* Nisan according to Rav Adda with respect to the *moladot* Nisan for the 19 years of the cycle. Years counted from Nisan.

is intercalated; this gives -8 days -4 hours -111 parts -56 instants. Note that the *tequfa* is now prior to the *molad*: this is the result of the intercalation. Similarly, we calculated the temporal relationships for the remaining 17 years, taking into account the intercalation in the 6th, 8th, 11th, 14th, 17th and 19th year as in the 3rd year. The results are given in Figure 1*.* Note that year 20 is year 1 of the next cycle; the value computed for that year was identical to that of year 1. Year 16 has the latest date for the *tequfa* of Nisan: 15 days, 3 hours, 457 parts and 36 instants after the *molad*, or the 16th day of Nisan.

The temporal relation between Samuel's *tequfot* and their *moladot* was determined in much the same way, but now the values for year 1 (-7 days, -9 hours, -942 parts) and year 20 (-7 days, -8 hours and −157 parts) are not identical: each next cycle starts with the *tequfa* 1 hour and 485 parts later. In other words, the *tequfot* slowly drift towards later dates. Figure 2 shows the *tequfot* for the first as well as for the 257th cycle, the cycle in which *Sefer ha-ʿIbbur* was written. For some cycles in between, around cycle number 116, Samuel's and Rav Adda's *tequfot* are virtually identical.
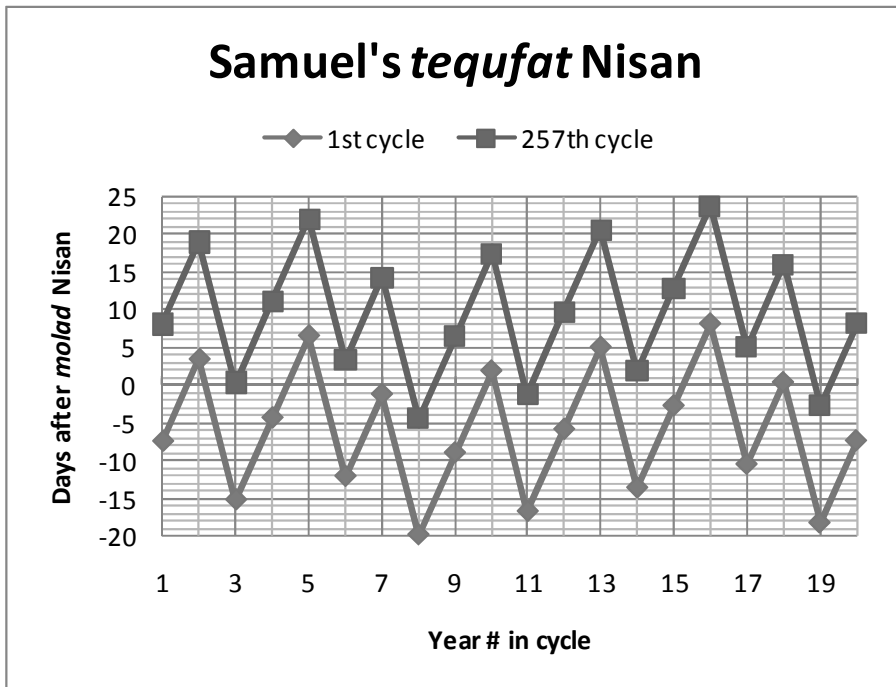

FIGURE 2: The occurrence of the *tequfot* of Nisan according to Samuel with respect to the *moladot* of Nisan for the 19 years of the first and of the 257th cycle. Years counted from Nisan.

Similarly, we determined Rav Adda's and Samuel's *tequfot* of Tishri. Since we now count the years (and cycles) from Tishri, the 1st, 4th, 7th, 9th, 12th, 15th, and 18th year are intercalated. The first Tishri *tequfa* is two *tequfa* durations before the *tequfa* of Nisan and its *molad* is 7 mean lunations before the first Nisan *molad*. The results are presented in Figure 3. Year 17 shows the latest Tishri *tequfa*: in Rav Adda's calculation about 20 days and a half after the *molad* of Tishri, or on the 22nd Tishri — the eighth day of Sukkot — at the latest. Samuel's *tequfot* of Tishri, on the other hand, fall after the 22nd of Tishri in the third, sixth, fourteenth and seventeenth year of the 257th cycle. Note that our data for Rav Adda's *tequfa* of Tishri are in full agreement with the tables Abraham bar Ḥiyya presents in SI III, 4 (where the years are counted from Nisan, so that year 1 in the table is year 2 in Figure 3.
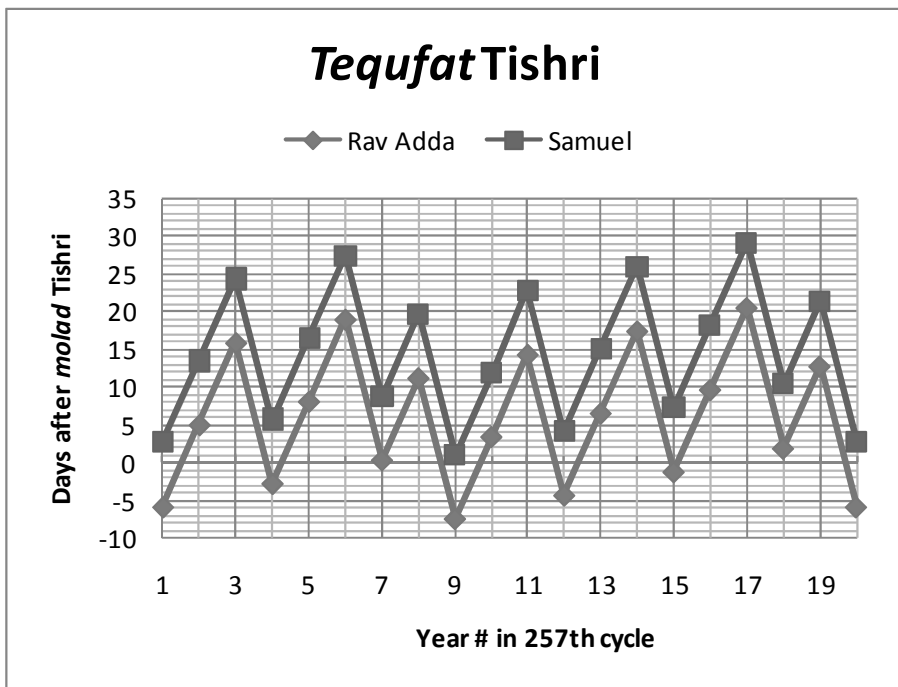

FIGURE 3: The occurrence of the autumn *tequfa* according to Samuel and Rav Adda with respect to the *molad* of Tishri for the 19 years of the 257th cycle. Years counted from Tishri.

APPENDIX 3: THE QUOTATION IN SI BOOK III CHAPTER 5, LINE 108 FF.

Chapter 5 of Book III of *Sefer ha-'Ibbur* contains a citation (line 108 ff.) which is nearly the same in all MSS and which does not make sense. We compared the possible sources: *Tosefta*, Palestinian Talmud and Babylonian Talmud as given on the Bar Ilan Responsa 14+-CD (http://responsa.biu.ac.il/); and we examined the MSS available online (at http://jnul.huji.ac.il/dl/talmud/). We concluded that the quotation is from the Babylonian Talmud and we completed the text accordingly.

tSanh (Zuckermandel, 1975, and MS Berlin Staatsbibliothek Or. 1220 (159)) 2:7

אין מעברין את השנה אלא אם כן היתה תקופה חסירה עד רובו של חודש וכמה הוא
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מחשבין את השנה ואם היתה חסירה ששה עשר יום לפני הפסח מעברין אותה ששה
עשר יום לפני החג אין מעברין אותה ר׳ שמעון אומר אפילו היתה חסירה ששה עשר יום
לפני החג מעברין אותה.

pSanh (Venice, 1523) 18d

אין מעברין לשנה אלא אם כן היתה חסירה רוב החודש וכמה רוב החודש ששה עשר
יום רבי יהודה אומר שתי ידות החודש אחד ועשרים יום.

bSanh (Steinsalz and MSS B, C, Y) 12b/13a

אמר רב יהודה אמר שמואל: אין מעברין את השנה אלא אם כן היתה תקופה חסירה
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אומר: אחד ועשרים יום, ... אין מעברין את השנה אלא אם כן היתה תקופה חסירה רובו
של חודש, וכמה רובו של חדש - ששה עשר יום. רבי יהודה אומר: שתי ידות בחודש.   4
וכמה שתי ידות בחדש - עשרים יום. רבי יוסי אומר: מחשבין, ששה עשר לפני הפסח -
מעברין, ששה עשר לפני החג- אין מעברין. רבי שמעון אומר: אף ששה עשר לפני החג   6
מעברין. אחרים אומרים: מיעוטו, וכמה מיעוטו - ארבעה עשר יום.

B: MS Munich Bayerische Staatsbibliothek 95; C: MS Firenze Bibliotheca Nazionale Centrale II.1.8-9; Y: MS Jerusalem Yad ha-Rav Herzog 1.

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