

Week and Sabbath in Judaeen Desert Documents

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I

The attachment of Jews to the sabbath during the period of Roman rule¹ is well known from literary sources both Jewish and gentile.² Recently published papyri from the Judaeen Desert now provide some documentary evidence as well.³

In the deed of gift *P.Yadin 7*,⁴ written in Aramaic in 120 CE in Mahoz Eglatain, or Mahoza as it is more commonly called in the documents,⁵ in the

¹ It is with a sense of both sadness and privilege that we dedicate this study to the memory of Professor Addi Wasserstein, in the finest senses of the words a gentleman and a scholar. The first author hopes that, notwithstanding the published disputes between them on the Jewish nature of these documents, Professor Wasserstein would be pleased with the results of this inquiry.

The first author also wishes to express his gratitude to the National Science Fund of the Israel Academy of Sciences and Humanities, in Israel, and to the National Endowment for the Humanities, in the United States, for their support of the project of which the present study is a product, and to the Department of Classical Studies of the University of Michigan, Ann Arbor, where, during his sabbatical leave from Bar Ilan University, it was written.

In the following, the abbreviation *DJD XXVII* stands for the newly published volume, Hannah M. Cotton and Ada Yardeni, *Aramaic, Hebrew and Greek Documentary Texts from Naḥal Hever and Other Sites, with an Appendix Containing Alleged Qumran Texts (The Seiyâl Collection II) (Discoveries in the Judaeen Desert XXVII)* (Oxford 1997).

² See, e.g., Robert Goldenberg, 'The Jewish Sabbath in the Roman World up to the Time of Constantine the Great', *ANRW* II 19.1 (1979) 414-47. For recent archaeological evidence of a somewhat later date for rigorous sabbath observance, see Hanan Eshel and Dina Avshalom-Gorni, 'A Sabbath Lampstand from H. Uza', *Atiqot* 29 (1996) 57*-61* (Hebrew) (English summary at 111). See also Varda Sussman, 'A Shabbat Lamp', *Atiqot* (Hebrew Series) 6 (1970) 80-1 (Hebrew) (English summary at 10*-11*).

³ For documentary evidence from the fifth century BCE, see Bezalel Porten, *Archives from Elephantine: The Life of an Ancient Jewish Military Colony* (Berkeley and Los Angeles 1968) 126-7.

province of Arabia, by which Simon ben Menahem, familiar as the father of Babatha, the central figure in *P. Yadin*, gives his wife Miriam all his property in Mahoza, four agricultural properties are specified. For each there is a characterization of the property, specification of the borders, and a statement concerning watering rights. The statements of watering rights in the case of three of the properties is remarkable, for the rights are stated in terms of hours on specific days of the week.

Lines 6-7, 38: לעילא חמשא בשבוע שעה ופלג מן שעין חלה: 'and their watering period, the night of the fifth day of the week for an hour and a half out of three hours'.

Lines 9-10, 43: וענימיה יום חד בשבוע פלגות שעה: 'and its watering period on the first day of the week for a half-hour'.

Lines 12, 46-47: ענימיה יום ארבעה בשבוע שעה ולייל ארבעה בשבוע שעה: 'its watering period, on the fourth day of the week for one hour and on the night of the fourth day of the week for one hour'.

The designation of the days of the week, in our language Thursday, Sunday and Wednesday, is literally stated as the fifth, first and fourth days, respectively, of the *sabbath*,⁶ used here by metonymy for the week, as commonly used in rabbinic literature.

A second deed of gift, *DJD XXVII 64*,⁷ this one written in Greek in 129 CE, also from Mahoza in Arabia, documents the gift from a mother to her daughter, both named Salome, of a date orchard and a house. The orchard comes 'with its water', a half hour every Wednesday. The notion of 'Wednesday' is expressed in a curious circumlocution,

lines 8-9: ἐφ' ἡμερῶν ἑπτὰ εἰς ἑπτὰ ἡμέρας (l. ἀφ' ... ἡμέρας) τετάρτη, 'from seven days to seven days, on the fourth'.

Note that the provision is not for water for a half-hour 'once in seven days', but on the fourth of those seven days.

⁴ Published by Yigael Yadin, Jonas C. Greenfield, and Ada Yardeni, 'A Deed of Gift in Aramaic Found in Nahal Hever: *Papyrus Yadin 7*', *Eretz-Israel* 25 (1996) 383-403 (Hebrew).

⁵ For the identification of Mahoz Eglatain with Mahoza (or Maoza), see Hannah M. Cotton and Jonas C. Greenfield, 'Babatha's Patria: Mahoza, Mahoz 'Eglatain and Zo'ar', *ZPE* 107 (1995) 126-34.

⁶ For *shaba* as an alternative spelling for *shabbat*, see Michael Sokoloff, *A Dictionary of Jewish Palestinian Aramaic of the Byzantine Period* (Ramat Gan 1990) 539, s.v. *שׁוּבָה*.

⁷ First published by Hannah M. Cotton, 'The Archive of Salome Komaise Daughter of Levi: Another Archive from the "Cave of Letters"', *ZPE* 105 (1995) 171-208 at 183-203.

A third document, *P. Yadin* 3,⁸ written in Nabataean in 99 CE, again in Ma-hoza, documents the purchase by Simon, Babatha's father, of a date-orchard, probably one of those later declared by Babatha in her property-return, *P. Yadin* 16, in 127.⁹ Here too water rights are said to be divided in the same manner as in *P. Yadin* 7.

Nothing of this sort, division of water by days of the week, has been found elsewhere in antiquity, to our knowledge.¹⁰ There are, to be sure, ancient references to division of water by time and measure,¹¹ the former in terms of days¹² or hours,¹³ the latter in terms of number¹⁴ or size¹⁵ of the openings in the pipes. A famous instance is that of the water of the Crabra, a watercourse of some sort, mentioned in Frontinus as being divided by days and measure,¹⁶ and from which Cicero derived water for his estate at Tusculum.¹⁷ An inscription, *CIL* VI 1261, with reference to division of water by daily hours and openings, may actually refer to the same watercourse.¹⁸ Another instance is the inscription from ancient Lamasba, in Algeria, in which water is allocated to farmers on specific hours of specific days of the year, once or perhaps twice a year.¹⁹ In a

⁸ *Non vidimus*. Reported by Cotton (n. 7), 194.

⁹ Hannah M. Cotton and Jonas C. Greenfield, 'Babatha's Property and the Law of Succession', *ZPE* 104 (1994) 211-24.

¹⁰ In her excellent comments to the second document in this list, Hannah Cotton provides a very useful collection of parallels to the clauses on water division.

¹¹ *D.10.3.19.4* (Paul) (*Aquarum iter ... divisum ... aut mensura aut temporibus*); *D.38.3.17.pr.* (Paul); *D.43.20.1.3* (Ulpian); 4-5.pr. (Julian). It should be noted that the Roman jurists do not address rights to water *per se*, but to transporting over another's property. Luigi Capogrossi Colognesi, *Ricerche sulla struttura delle servitù d'acqua in diritto romano* (Milan 1966) 1 ff.

¹² *D.43.20.1.22* (Ulpian).

¹³ *D.8.3.2.1* (Neratius) (*potest etiam ut diversis diebus vel horis ducatur* [sc. *aqua*]). Hours: Pliny, *HN* 18.188; *D.43.20.5.1* (Julian); *h.t.* 2 (Pomponius); *CIL* VI 1261.

¹⁴ *CIL* VI 1261.

¹⁵ *CIL* XIV 3676.

¹⁶ Frontinus, *Aq.* 1.9, *ea namque est quam omnes villae tractus eius per vicem in dies modulosque certos dispensatam accipiunt*.

¹⁷ Cic., *Leg. Agr.* 3.2.9; *Fam.* 16.18.3.

¹⁸ E.g., '*C. Iuli Hymeti | Aufidiano | aquae duae | ab hora secunda | ad horam sextam*'. For bibliography see Pierre Grimal on Frontinus, *de aquis* 1.9 (Budé edition p. 72 note 26).

¹⁹ *CIL* VIII 4440 = 18587. A sample is reproduced in *ILS* 5793. See in particular the elaborate discussion by Brent D. Shaw, 'Lamasba: An Ancient Irrigation Community', *Antiquités Africaines* 18 (1982) 61-103.

Greek-language sale document from Kurdistan, P. Avroman 1,²⁰ dated 88 BCE, watering rights are stated to be for half a day and night every eight, or nine,²¹ days.

In tannaitic literature there is an unambiguous reference to the division of water between neighbors by time, at *Tosefta Shevi'it* 1.2: מוכר²³ אדם עתה²² של [On the intermediate days of a festival] one may sell his watering period to a gentile and may exchange with him a period on the sabbath for a period after the sabbath without concern'.²⁴ From third century Babylonia comes a case in which the water of a certain facility was divided between two people by days (*BT Bava Kama* 27b). In other passages cited in this connection²⁵ which mention watering periods (ענתה מים), *Mishna Shevi'it* 2.9 and its expansion *Tosefta Shevi'it* 2.10 (in Vilna edition 2.8), and *BT Mo'ed Katan* 11b, the reference is to the times in which a prudent farmer waters his crops,²⁶ which of course may or may not be determined in turn by rights of neighbors.²⁷

²⁰ E. H Minns, 'Parchments of the Parthian Period from Avroman', *JHS* 35 (1915) 22-65 = Meyer, *Jur. Pap.* 36.

²¹ See *LSJ* s.v. παρά C.I.9.

²² So the reading of Ms. Erfuhrt, preferred by S. Lieberman, *Tosefta ki-feshuta* V ad loc., p. 1229. Other variants are ענתה (spring) and ענתה (trench).

²³ Or משכיר (lets) as in some text traditions, appropriate only if the object of the verb is ענתה (spring).

²⁴ Though the reading of the word 'period' in the first colon is in doubt, the reference in the second colon to water rights divided by time is not. The content of the rule of the second colon, however, is not clear. It could be that it permits an agreement on exchange to be made on the sabbath itself, dismissing the concern over making a transaction on the sabbath or over giving a gentile instructions to do work on the sabbath (so *Minchat Bikurim ad loc.* and S. Lieberman [supra note 22] 1229). Alternatively, it could be that it permits the agreement on exchange of the sabbath watering period to be made before the sabbath, dismissing concern over sharing profits of sabbath work (so R. Meir of Rothenburg, or a rabbi of Corbeil, quoted in *Hagahot Maimoniot* on Maimonides, *Mishneh Torah, Shabbat* 6.18, for variants of which see Lieberman [supra note 22]), over a gentile doing work on sabbath with a Jew's property (so *Chasdei David*, R. David Samuel ben Jacob Pardo of Venice, Sarajevo and Jerusalem, 1718-90), or over making a transaction on intermediate days of a festival.

²⁵ Rafael Patai, *Hamayim* (Tel Aviv 1936) 84-5; Cotton (n. 7), 195.

²⁶ Otherwise a farmer who was fortunate enough to have his own source of water would suffer unreasonable risks at year ends and when in mourning.

²⁷ That there is little more, if any, evidence for division of water by time reflects the fact that irrigation in general, though practised, was of secondary importance in most of the classical world. It is particularly at the margins, in such places as the inland parts of North Africa and the borders of the Judaean Desert,

It is not, then, a diplomatic tradition of writing up water shares in terms of days of the week which is expressed in the three documents with which we opened, but rather the organization of the time of the writers in weeks. Activity is here organized and denominated in terms of its distance from the sabbath. In the early second century of this era, when the documents were written, this sort of 'rhythmic week' was still uniquely Jewish.²⁸

These three documents, then, are the earliest explicitly dated documentary references to organization of activity by days of the week about the sabbath. They join a group of ambiguously dated ostraca²⁹ which record some recurrent activity, probably delivery or distribution of foodstuffs, mostly before and on the sabbath. There is also a reference there (#4 line 12-14) to a distribution which took place from 'the fourth day of the sabbath, the first of Ab, to the first day of the sabbath, the fifth of Ab'. The ostraca are dated by their editor palaeographically to the first half of the first century CE, approximately. Though these os-

where irrigation became of primary importance. F. Olck, 'Ackerbau', *RE I* (1894) 261-83 at 267 and 278; C. Knapp, 'Irrigation among the Greeks and the Romans', *CW 12* (1919) 73-4, 81-2; Brent D. Shaw, 'Water and Society in the Ancient Maghrib: Technology, Property and Development', *Antiquités Africaines* 20 (1984) 121-73 at 137-9; A. Trevor-Hodge, *Roman Aqueducts and Water Supply* (London 1992) 246-53. The Roman surveyor Agennius Urbicus, quoted in Shaw, p. 138, hardly hides his astonishment that in North Africa earthworks are built to retain water rather than to dispose of it. Even the Greek papyri from Egypt have yielded no evidence for division of water by time, with the exception of one instance, *P.Grenf.* II 69, in which a person put up five days' use of a water facility as security for a loan. See Danielle Bonneau, 'Les servitudes de l'eau dans la documentation papyrologique', in *Sodalitas. Scritti in onore di Antonio Guarino* (Naples 1984) 2273-85 at 2283. Where irrigation was crucial, arguments over use could turn nasty, and authorities even endorsed the resort to violent self-help. In *P.Haun.* III 58, written in 439 CE, one of the last documents to mention the village of Karanis, not long afterwards abandoned because of drought, villagers declare their intention to beat up residents of Karanis who take water from a particular place, and an official of the prefectural office endorsed the declaration. In the case in *Bava Kama* 37a, cited in the text, Rav Nachman justified violent self-help to protect use of water, a decision which became the leading text in the Jewish law on self-help.

²⁸ F.H. Colson, *The Week. An Essay on the Origin and Development of the Seven-Day Cycle* (Cambridge 1926; repr. Westport, CT, 1974). See Eviatar Zerubavel, *The Seven Day Cycle. The History and Meaning of the Week* (New York/London 1985) especially for the significance of the 'rhythmic' week.

²⁹ Ada Yardeni, 'New Jewish Aramaic Ostraca', *IEJ* 40 (1990) 130-52. A Hebrew version appeared in *Tarbiz* 58 (1989) 119-34. Numbering here follows the former. I thank Ze'ev Safrai for bringing these to my attention.

traca do not clearly document organization of activity on a weekly cycle they do display the naming of weekdays by their proximity to the sabbath.

That the documentary evidence begins in the first and second century does not, of course, mean that the phenomenon did. It is just the chance of the find. As it happens, the earliest datable reference to naming days of the week by the sabbath in rabbinic literature is from the same generation as the papyri discussed above.³⁰ An early tanaïtic compilation, *Mechilta d'Rabbi Shimon bar Yochai* 20.8, s.v. *zachor*, records the following in the name of Rabbi Judah ben Beteira, presumably the second, a disciple of Rabbi Eliezer and colleague of Rabbi Akiva: מנין שכשאתה מונה הוי מונה אחד בשבת ושני בשבת ... תלמוד לומר זכור 'Whence is it that when you count [days] you should count "first day of the sabbath", "second day of the sabbath"? ... The Torah teaches, "Remember the sabbath day" (Exodus 20.7)'. A very similar homily on the same verse, recorded in another early tanaïtic compilation, *Mechilta d'Rabbi Yishmael, Yitro, Bachodesh*, s.v. *zachor v'shamor*, in the name of Rabbi Yitzchak, of the generation following that of the Bar-Kokhba revolt, stresses the Jewish uniqueness in this regard: לא תהא מונה כדרך שאחרים מונין אלא תהא מונה לשם שבת 'Do not count [days] as do others, but rather count them in the name of the sabbath'.³¹

II

Twenty-one documents found in the Judaeen Desert caves, two of them written in Judaea and 19 in Arabia, are dated by the Roman calendar.³² In most of these documents the Roman dates are given explicitly; in others a Roman date is not given explicitly but can be derived from the Macedonian date given.³³ The latter

³⁰ It is found in the New Testament as well, e.g. Mark 16:2. On the literary evidence for the Jewish week, see especially Jeffrey H. Tigay, 'Notes on the Development of the Jewish Week', *Eretz Israel* 14 (1978) (H.L. Ginsberg Volume) *111-*121. The statement on page *115, 'it is far from certain that the weekdays were referred to numerically in normal discourse', bears revision in light of the newly published documents discussed here.

³¹ How did Rabbi Yitzchak envision the 'others' counting days, by planetary names of weekdays, or not by weeks at all?

³² We have used as a working hypothesis the Roman dates given in the list of papyri from the Roman Near East provided by H.M. Cotton, W.E.H. Cockle, and F.G.B. Millar, 'The Papyrology of the Roman Near East: A Survey', *JRS* 85 (1995) 214-35. The two documents from Judaea are *P.Yadin* 11 and *P.Mur.* 115.

³³ The determination of the Roman date from the Macedonian date used in Arabia is based on three medieval manuscripts, published by Wilhelm Kubitschek, *Die Kalenderbücher von Florenz, Rom und Leyden* (Denkschriften der Kaiserlichen Akademie der Wissenschaften in Wien, Philosophisch-Historische Klasse, 57. Band, 3. Abhandlung) (Vienna 1915), which provide tables of correspondences

include several Aramaic or Nabataean documents from Provincia Arabia in which the names of the months given are the originally Babylonian names familiar to us from the Jewish calendar, but these appear to be conventional translations for the names of Macedonian months.³⁴ In the following list, where the Roman date is known by inference it is given in parentheses. Where more than one document relate to a single transaction, as is the case with *P.Yadin* 14 and 15, *P.Yadin* 21 and 22, and the two parts of *P.Yadin* 16, we have counted them as one, since

between the Roman Julian calendar and those of a dozen or so other localities within the Roman Empire, including that 'of the Arabs', discussed there on page 91. These tables are said to derive from ancient prototypes. The correspondences are confirmed by other finds including documents found in the Judaeian Desert, though not by *P.Yadin* 14 and 15, and *DJD* XXVII 62, where the Roman and Macedonian dates given do not match.

³⁴ We accept this proposition, put forth by Cotton and Greenfield (n. 9), 214 notes 19 and 24. The equation of the Aramaic names and Macedonian months appears in *P.Yadin* 27, where 1 Panemos and 30 Gorpaios in the Greek body of the document are translated as 1 Tammuz and 30 Elul, respectively, in the Aramaic subscription, as Cotton and Greenfield observe, and in *P.Yadin* 14.3-4, 19 and *P.Yadin* 15.2, 16, where Hyperberetaios is said to be called Tishrei. We do not believe this assumption would be warranted for Aramaic documents written in Judaea, and have therefore not included *P.Mur.* 19 and 20, each of which is dated by a Hebrew/Aramaic date and by a numbered year, but with no indication of the era by which the year is numbered. Cotton, Cockle, and Millar erred, we believe, in assigning Roman dates to these documents, numbers 288 and 289 in their list, and furthermore in following Milik in the suggestion that the unstated era is that of the founding of the province of Arabia. They should rather have rejected Milik's date, following Yadin and Yaron, as cited there, as well as E. Koffmahn, 'Zur Datierung des aramäisch/hebräischen Vertragsurkunden von Muraba'at', *Wiener Zeitschrift für die Kunde des Morgenlandes* 59/60 (1963/64) 119-36 at 127-32; and H. Cotton and J. Geiger, *Masada II: The Latin and Greek Documents* (Jerusalem 1989), 1-2. The notion that a writer in one province would use the era of a different province without indicating the fact strikes us as implausible. The study by P. Freeman cited by Cotton, Cockle, and Millar, note 15, provides no support. Freeman argues that inscriptions, often Nabataean, demonstrably dated by the Arabian era, do not prove that the areas in which they were found were included in the province of Arabia. This is plausible enough. It does not follow, however, that in documents written outside Arabia which are *not* demonstrably dated by the Arabian era, the Arabian era should nonetheless be assumed. The issue has now received a thorough and detailed review, enhanced by fresh arguments, by David Goodblatt, 'Dating Documents in *Provincia Iudaea*: A Note on *Papyri Muraba'at* 19 and 20', as yet unpublished, whose conclusions we wholeheartedly endorse. We thank him for making his paper available to us in advance of publication, and Hannah Cotton for bringing it to our attention.

what is being counted here is transactions rather than documents. We have also refrained from separately counting *P.Yadin* 25 and 26, both written on the same day, even though they are summonses in two distinct litigations, because we suspect that the initiatives for these two litigations may not be entirely independent.³⁵ If they were counted separately, the conclusions from the following tabulation would be further strengthened.³⁶

Now, since the emperor Augustus, and with the exception of the reform of the calendar by Pope Gregory XIII in 1582, the Julian and Gregorian calendars and the cycle of weeks have been perfectly stable. It is a simple matter, then, to determine the day of the week of any Roman date by calculating multiples of 7

³⁵ See Ranon Katzoff, 'Polygamy in P.Yadin?', *ZPE* 109 (1995) 128-32 at 131.

³⁶ We have not included in the tabulation fifteen or so Hebrew or Aramaic documents written in Judaea and dated by the Jewish calendar. It may well be the case that, though at an early stage the Jewish calendar was determined on a month to month basis by the reports of witnesses who had seen the new moon, by the first generation of the second century CE this procedure was only a formality, and determination of the new month was in fact done by the same calculations as form the basis of the present Jewish calendar. See, e.g., Gedaliahu Alon, *Toledot Hayehudim B'eretx Yisrael Bitkufat Hamishna Vehatalmud* (Tel Aviv 1954) I, 66-7 = Gedaliahu Alon, *The Jews in Their Land in the Talmudic Age (70 — 640 C.E.)*, Gershon Levi (ed. and trans.) (Jerusalem 1980) 1, 10-111. Nonetheless, a small but for our purpose crucial part of the calendar calculation for the last millennium and more, the דקיה — by which a year may be adjusted a day forward or backward in order to prevent certain festivals from falling on certain days of the week, may not yet have been in place in the second century. See M.D. Herr, 'The Calendar', *Compendia Rerum Iudaicarum*, I.2 (Assen/Amsterdam 1976) 834-64 at 848-50, especially 849 note 4 and 850 note 4. (The tanaïtic passages cited on page 849 notes 5-7 address the period before the destruction of the Temple, rather than the period under discussion here.) We are indebted to Chaim Milikowsky for instruction on this point. Readers who would persist in the view that the Jewish calendar as known today can be extrapolated to the early second century are invited to calculate the days of the week for those documents. They will find that none of such dates given in Cotton, Cockle, and Millar (corrected by assigning *P.Mur.* 19 to its most probable year, 71/72 CE, and leaving *P.Mur.* 20 indeterminate) fall on Saturday. Anticipating the presentation below, the probability of all this occurring randomly (A) would be on the order of 0.004, and the conditional probability P(S|A) accordingly very high. Such readers as would take this route should be warned that determining the years of those documents can be slippery. See, e.g., Milik on *P.Mur.* 19 line 1 p. 106, on the question of whether the new year began in Tishrei or in Nisan; Manfred R. Lehmann, 'Studies in the Murabbaat and Nahal Hever Documents', *Revue de Qumran* 4 (1963) 53-81; Ben-Zion Wacholder, 'The Calendar of Sabbatical Cycles during the Second Temple and the Early Rabbinic Period', *HUCA* 44 (1973) 153-98; Herr (n. 36), 844-5.

and their remainders.³⁷ Alternatively one can take a short cut and use a table of Dominical letters, in which the day of the week of 1 January of each year can be ascertained, and hence the rest of the dates generated accordingly.³⁸ There are now, of course, any number of computer programs which will do the task in seconds.³⁹ The results of these calculations are as follows:

Document	Date	Day of Week
<i>P. Yadin</i> 3	2 Tevet (18 December) 99	Wednesday
<i>P. Yadin</i> 5	13 Daisios (2 June) 110	Sunday
<i>P. Yadin</i> 7 ⁴⁰	24 Tammuz (13 July) 120	Friday
<i>P. Yadin</i> 11	6 May 124	Friday
<i>P. Mur.</i> 115	19 October 124	Wednesday
<i>DJD</i> XXVII 60 ⁴¹	14 Peritios (29 January) 125	Sunday
<i>P. Yadin</i> 14 and 15	11 or 12 October 125	Wednesday or Thursday
<i>DJD</i> XXVII 61	25 April 127 ⁴²	Thursday
<i>P. Yadin</i> 16	2 and 4 December 127	Monday and Wednesday
<i>DJD</i> XXVII 62	4 or 11 December 127 ⁴³	Wednesday
<i>P. Yadin</i> 17	21 February 128	Friday
<i>P. Yadin</i> 18	5 April 128	Sunday

³⁷ 365 is a multiple of 7, plus 1. In calculating back from the present to the past, the calendar date recedes one day in the week every year. Thus if 22 August 1997 was a Friday, 22 August 1996 must have been a Thursday. Leap years have an additional day, causing in the calculation pastward an additional recession, so if 22 August 1996 was a Thursday, 22 August 1995 must have been a Tuesday. The number of such recessions in a century is 125, a multiple of 7, minus 1; in other words, an advancement of 1. In calculating dates before 1582 one must also take into account the thirteen calendar days, but not weekdays, which were skipped as a result of the reforms of Pope Gregory, and add one extra regression.

³⁸ These can be found in encyclopedias, e.g., *Encyclopaedia Britannica*¹¹ (1910) IV, 993, s.v. Calendar; *New Encyclopaedia Britannica*¹⁵ (1974-97) IX, 303, s.v. perpetual calendar.

³⁹ We used Alldate, © Joseph Schachter (Jerusalem 1987).

⁴⁰ Yigael Yadin et al. (n. 4).

⁴¹ First published by Cotton (n. 7), 174.

⁴² First published by Cotton (n. 7), 176. The Roman calendar date is given explicitly; the year is known by inference from *P. Yadin* 16 and *DJD* XXVII 63. See Cotton (n. 7), 176, where an alternative date, 25 April 128, is rejected. The latter date, raised as a possibility in the earlier publication of this papyrus by Cotton, would fall on Saturday.

⁴³ The relevant part was first published by Naphtali Lewis, 'A Jewish Landowner in Provincia Arabia', *SCI* 8/9 (1985/88) 132-7 at 133. The text has the Roman date as 'three days before the Ides', that is 11 December, as well as 18 Apellaios, which corresponds to 4 December. Both fall on Wednesday.

<i>P.Yadin</i> 19	16 April 128	Thursday
<i>DJD</i> XXVII 64	9 November 129 ⁴⁴	Tuesday
<i>P.Yadin</i> 20	19 June 130	Thursday
<i>P.Yadin</i> 21 and 22	11 Septmeber 130	Sunday
<i>P.Yadin</i> 23	17 November 130	Thursday
<i>DJD</i> XXVII 12 ⁴⁵	15 Shevat (30 January) 131	Monday
<i>P.Yadin</i> 25 and 26	9 July 131	Sunday
<i>P.Yadin</i> 27	19 August 132	Monday
<i>P.Yadin</i> 37 =	7 August 131	Monday
<i>DJD</i> XXVII 65		

Not one of these documents was dated to a Saturday. Of course, documents do not always tell the truth; people sometimes predate or postdate documents, but such is the nature of the data.⁴⁶ If these transactions were distributed randomly

⁴⁴ Published by Cotton (n. 7). The date is not certain. In lines 1-2 the Roman date is given as the fifth day before the Ides, i.e. the 9th, presumably of November. That ought to correspond in the Macedonian calendar of Arabia to the 23rd of Dios. In line 3, however, the editor reports, it would be difficult to fit an illegible gamma after the kappa in the Macedonian date. If there were nothing at all after the kappa, the date, 20 Dios, would fall on a Saturday. The reading of the Roman date here is more secure than that of the Macedonian.

⁴⁵ Ada Yardeni, *'Nahal Se'elim' Documents* (Jerusalem 1995) 67.

⁴⁶ The probability distribution of random false dates is the same as that of true dates, and we would arrive at similar conclusions concerning the reasons for the selective falsification of dates. The conclusions on awareness of the sabbath would shift from the writers to society at large. For treatment of the reverse situation, see *BT Bava Batra* 171a, at bottom, — שטר שזמנו כתוב בשבת או בעשרה בתשרי — שטר מאוחר הוא וכשר, דברי ר' יהודה, רבי יוסי פוסל 'A document whose date is written as the sabbath or as the tenth of Tishrei [the Day of Atonement] is a post-dated document, and is valid [as in his view are post-dated documents generally] according to Rabbi Judah; Rabbi Yosi declares it invalid [as in his view are post-dated documents generally]'. Both authorities, of the generation immediately following the Bar-Kokhba revolt, assume that violation of the sabbath is less likely than inaccuracy in the date of a document. The language of the following statement, a generation later, אבד רבי פדת: הכל מודים, שאם הווקקנו לעונתו של שטר, — שמער מאוחר הוא וכשר — 'Rabbi Pedat says, "Both agree that if we must address a date on a document, and the date *turns out to correspond* to a sabbath or to the tenth of Tishrei, it is a post-dated document and valid"', implies that the date on the document was written as a non-Jewish date. The assumption must have been that even Jews who would date their documents by gentile calendars would not violate the sabbath. For errors in correspondence of days of the week in documents of late antiquity, see Klaas A. Worp, 'Remarks on Weekdays in Late Antiquity Occurring in Documentary

over the seven days of the week this result might still occur, but it would be unlikely. To be precise, the chance of its occurring randomly is $(6/7)^{21} = 0.039275$, or about 4%. It is, then, more likely that there was something preventing the dating of documents to Saturday than that there was nothing preventing that. For these documents written by Jews and deposited by their holders in the caves into which they fled along with leaders of the revolt against Rome, that 'something' is most naturally attributable to the sabbath. Just how much more likely this tabulation of the dates makes the proposition that the writers of the documents were sabbath observers is determined by what in Statistics is known as Bayes's Rule. It works as follows:

Denote by $P(X|Y)$ the probability that event X occurs, given that you know event Y occurs. If X is an event, let X' denote the complementary event, that is 'not X '. Let A be the event that all 21 transactions take place on days 1-6, the weekdays, and S the event that the Jews who wrote those documents were sabbath observers. Thus $P(A|S) = 1$; that is, the likelihood that all the documents would be written on weekdays, assuming that the writers were sabbath observers, is as great as possible. If the writers were not sabbath observers, and all the days of the week were equal candidates for writing, the likelihood that all the dates would fall on weekdays is $P(A|S')$, which as we determined above = $(6/7)^{21} = 0.04$. We would like to determine the degree to which one can infer S from A , i.e., to estimate $P(S|A)$. The Bayes formula is

$$P(S|A) = \frac{P(A|S)P(S)}{P(A|S)P(S) + P(A|S')P(S')}$$

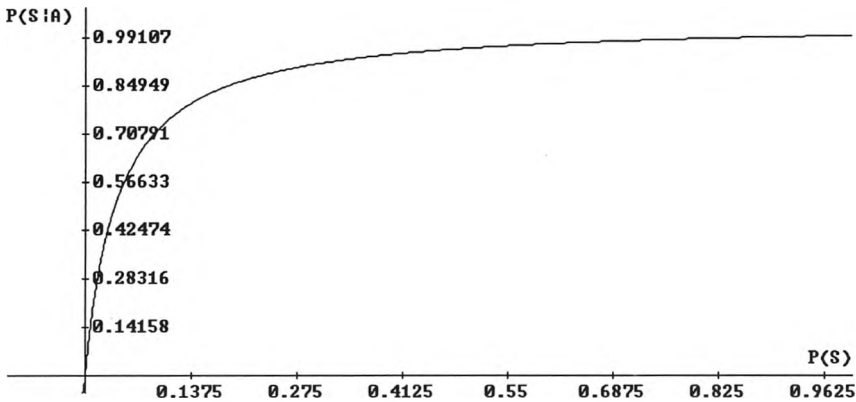
which in our case leads to

$$P(S|A) = \frac{P(S)}{P(S) + 0.04(1 - P(S))} = \frac{P(S)}{0.04 + 0.96 P(S)}$$

Of course, $P(S)$ is unknown; if we knew it we would not need any statistics. As you vary $P(S)$, however, $P(S|A)$ varies. In particular, if $P(S) = 0$, then $P(S|A) = 0$; if $P(S) = 1$, then $P(S|A) = 1$. When $P(S|A)$ is graphed as a function of $P(S)$,

Sources', *Tyche* 6 (1991) 221-230. The documents listed there are nearly all inscriptions, and consequently the dates indicated on them are probably not those of when the letters were inscribed on the stone, a fact that can lead to considerable errors of memory. Indeed, the few papyri listed there show more reliability in the correspondence of weekdays.

as $P(S)$ ranges between 0 and 1, the result is a curve that rises very rapidly near 0 and then flattens out at values close to 1 (see graph).



For instance, if $P(S) = 0.25$, then $P(S|A)$ is about 0.9. Thus, for a person who until now was absolutely certain that the writers of these documents were not sabbath observers, i.e. that $P(S) = 0$, nothing in this finding requires him to alter his opinion, i.e. $P(S|A) = 0$. Of course, another person who was equally certain that the writers were sabbath observers, i.e. that $P(S) = 1$, would not have to change his mind either, i.e. $P(S|A) = 1$. However, one who until now, in light of evidence on the subject from Jewish and gentile literature, inscriptions, Judaean Desert papyri etc., thought it unlikely, on the order of, say, one chance out of four, that these writers were sabbath observers, and hence set $P(S) = 0.25$, logically should reconsider his opinion and conclude that it becomes highly likely, on the order of nine chances out of ten, that they were indeed sabbath observers.

As far as differences between the various non-sabbath days of the week are concerned, Rabbinic literature indicates that Mondays and Thursdays were market days on which villagers would arrive in town,⁴⁷ and on which local courts would be in session.⁴⁸ One may expect under such conditions to have a concentration of documents dated to those two days of the week. Of the documents under consideration, however, only eight or nine are dated to Monday or Thursday — so slightly above the random average of six or seven that it is well within the limits attributable to chance. Whatever may have been happening in Eretz Israel with respect to Mondays and Thursdays, no special significance of these days

⁴⁷ Mishna, Megillah 1.2.

⁴⁸ Mishna, Ketubot 1.1; Babylonian Talmud, Bava Kama 82a.

appears among the Jews of Arabia, where all but two of these documents were written. No doubt this may be explained by the absence of Jewish autonomy there, reflected also in the exclusive use of Roman courts.

Furthermore, the Mishna⁴⁹ instructs that weddings (*nissu'in*) of virgins be held on Wednesday, one day before the court day, Thursday. Only one document in our list⁵⁰ attests the marriage of a virgin, *P.Yadin* 18, and it is dated to a Sunday. This could reflect disregard of the mishnaic instruction, or alternatively a restrictive interpretation of that mishna along the lines of the Babylonian Talmud, in which the rule is conditioned on Mondays and Thursdays being particular court days,⁵¹ which they do not seem to have been in Arabia. More likely *P.Yadin* 18 was written at the *kiddushin* rather than at the *nissu'in*. If we follow Professor Wasserstein's suggestion that the gift to the bride attested in *P.Yadin* 19, which we have determined is dated to a Thursday, was timed to follow immediately on the consummation of the marriage,⁵² the *nissu'in* would have taken place on Wednesday, 15 April 128, in accordance with the instruction of the Mishna.

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⁴⁹ Ketubot 1.1.

⁵⁰ Of the two other marriage documents in our list, *P.Mur.* 115 documents a remarriage, and the marriage in *P.Yadin* 37 is the second marriage of the bride. For the latter, see Cotton (n. 7), 206.

⁵¹ Ketubot 3a at end.

⁵² A. Wasserstein, 'A Marriage Contract from the Province of Arabia Nova: Notes on Papyrus Yadin 18', *Jewish Quarterly Review* 80 (1989) 93-130 at 112.