

The Day Unit in Antiquity and the Middle Ages

June 10 - June 11, 2018

Speakers:

- Jonathan Ben-Dov (University of Haifa)
- Francois de Blois (University College London)
- Rita Gautchy (University of Basel)
- Gerd Grasshoff (Humboldt-Universität, Berlin)
- Sarit Kattan Gribetz (Fordham University)
- Tzvi Langermann (Bar-Ilan University)
- Mathieu Ossendrijver (Humboldt-Universität, Berlin)
- Sofie Remijns (University of Amsterdam)
- Barbara Sattler (University of St. Andrews)
- John Steele (Brown University)
- Sacha Stern (University College London)
- Sarah Symons (McMaster University)
- Anja Wolkenhauer (Universität Tübingen)
- Ido Yavetz (Tel Aviv University)
- Israel Yuval (Hebrew University)

PROGRAM

Sunday: June 10, 2018

9:15 Registration
9:45-10:00 Greetings
Michal Linial, Director, Israel Institute of Advanced Studies
Sacha Stern, University College London and Israel Institute of Advanced Studies

DAY I - EARLY ANTIQUITY

Chair: Jonathan Ben-Dov (University of Haifa and Israel Institute of Advanced Studies)

10:00 **John Steele** (Brown University)
Seasonal hours in Babylonia

10:45 **Mathieu Ossendrijver** (Humboldt University)
The introduction of the 19-year intercalation cycle revisited

11:30 **Gerd Grasshoff** (Humboldt-Universität, Berlin)
The hour as divine sign: ancient sundials for reading time

12:15-13:30 Lunch at IAS Lobby

Chair: Dan'el Kahn (University of Haifa)

13:30 **Rita Gautschy** (University of Basel)
The daily schedule of workmen in 2nd-millennium Egypt

14:15 **Sarah Symons** (McMaster University)
Lost hours: an ancient Egyptian sundial in Gezer

15:00-15:20 **Break**

Chair: Orna Harari (Tel Aviv University)

15:20 **Ido Yavetz** (Tel Aviv University)
Possible inferences on the state of 4th-century BCE Greek astronomy from the design of the Oropos sundial

16:05 **Barbara Sattler** (University of St. Andrews and Israel Institute of Advanced Studies)
Duration versus point in time. The conceptual complexity of the notion of hour in early Greek thought

17:00 Reception

Monday: June 11, 2018

DAY II - LATE ANTIQUITY AND THE MIDDLE AGES

Chair: Guy Stroumsa (Hebrew University of Jerusalem, Oxford University)

10:00 **Anja Wolkenhauer** (Universität Tübingen)

Divisio diei: the hour in Latin letters, 100 BCE-500 CE

10:45 **Sofie Remijssen** (University of Amsterdam)

The situational significance of hours. The social contexts of hour notations in Greek papyri

11:30 **Francois de Blois** (University College London)

“Nights past, nights remaining”: towards a typology of timekeeping

12:15-13:30 Lunch at the IIAS Lobby

Chair: Steven Fine (Yeshiva University)

13:30 **Sacha Stern** (University College London and Israel Institute of Advanced Studies)

The hours in early rabbinic literature: from natural time-marking to arithmetic sequence

14:15 **Sarit Kattan Gribetz** (Fordham University and Israel Institute of Advanced Studies)

God's daily hours in rabbinic sources

15:00 **Jonathan Ben-Dov** (University of Haifa and Israel Institute of Advanced Studies)

The length of daylight in the Book of Enoch and Ethiopic astronomy

15:45-16:05 **Break**

Chair: Sacha Stern (University College London and Israel Institute of Advanced Studies)

16:05 **Tzvi Langermann** (Bar-Ilan University and Israel Institute of Advanced Studies)

The devotional day of the pious Jew in the writings of some medieval authorities

16:50 **Israel Yuval** (Hebrew University and Israel Institute of Advanced Studies)

“This night is all matza”: the division of the Passover night among Jews and Christians

Abstracts

(In Alphabetical Order)

Jonathan Ben-Dov (University of Haifa)

The length of daylight in the Book of Enoch and Ethiopic astronomy

The manuscript Bibliothèque Nationale de France 64 constitutes a cornerstone of the study of 1 Enoch. Short sections of it were published in 1918 (Grebaut) and again 1967 and 1979 (Neugebauer), but neither of them covered the astronomical background for the teaching of this manuscript. Following Neugebauer, the data on lunar positions in this manuscript is still widely considered as a valid key for explaining the lunar theory of the ‘Astronomical Book’ (1 Enoch 72-82, henceforth AB). However, a study of the manuscript shows it to be a late commentary and paraphrase of AB, whose main aim is to update the ancient material with later Ethiopic calendar and astronomy. In this paper (prepared with the help of Dr Ran Hachohen, Tel Aviv University), I shall survey the various schemes of daylight in BNF 64 and evaluate their background. I shall also present parallels to this section in other Ethiopic writings and their circulation.

Francois de Blois (University College London)

“Nights past, nights remaining”: towards a typology of timekeeping

A common way to express a date in Classical Arabic is to say (in the first half of the month) how many nights of the month have passed, or (in the second half of the month) how many nights remain. This raises several questions. If the day is considered to begin at sunset, when has the Nth night of the month “passed”? Presumably not until the following sunrise. And if the new month does not begin until the ocular sighting of the new crescent, how does one know in advance how many nights “remain” in the current month? These questions will be discussed in connection with the practice in several Old and Middle Iranian languages (Old Persian, Middle Persian, Parthian, Sogdian, and Bactrian) to date according to “elapsed” days.

Rita Gautschy (University of Basel)

The daily schedule of workmen in 2nd-millennium Egypt

While clearing the entrance of an 18th dynasty non-royal tomb in the Valley of the Kings the remains of slightly younger workmen’s huts were found. They contained pottery and several ostraca, datable to the late 19th dynasty (1202-1190 BCE). Among these ostraca was a vertical sundial. It was probably used to arrange the labour times of the workmen. Contemporary documents about tools and supplies for work such as torches reveal that two working shifts existed: one in the morning and one in the afternoon. Thus, the working day was separated into two parts with a break around noon. Based on the fact that most numbers in the documents are multiples of four, Jaroslav Černý had tentatively suggested that each working day may have consisted of four working hours before noon and of four working hours in the afternoon.

I will compare the potential precision of the sundial with the needs of precision suggested by contemporary documents and discuss possible social implications. The workmen in the Valley of the Kings were esteemed craftsmen who were allowed to work on their own in their free time (normally two days out of ten) and to sell their products. The presence of a sundial provides an additional hint that these workmen had assured rights and that they should not be considered as slaves.

Gerd Grasshoff (Humboldt-Universität, Berlin)

The hour as divine sign: ancient sundials for reading time

[abstract to follow]

Sarit Kattan Gribetz (Fordham University)

God's daily hours in rabbinic sources

This talk centers around a number of rabbinic narratives that imagine God's days and wonder how God divides and spends daily time. One narrative describes how God spent each hour of the final day of the world's creation. A second narrative asks what God has been doing each day since the world's creation. The third and fourth narratives divide up God's days and nights into watches and describes God's daily schedule as well as God's nightlife. What do these narratives teach us about rabbinic practices of dividing the day into subunits, and what can we learn from them about how rabbinic texts conceptualize heavenly time and its relationship to human time and time-frames?

Tzvi Langermann (Bar-Ilan University)

The devotional day of the pious Jew in the writings of some medieval authorities

The day forms a unit in the religious life of the Jew. In particular, there are daily prayers and a daily routine. Indeed, *Seder ha-Yom*, a book written in the sixteenth century—"early modernity" by conventional periodization but absolutely "medieval" as far as Jewish literature is concerned—takes the "order of the day" as an organizing principle for the entire code of Jewish law. I think it likely that many if not most contemporary observers would consider the main issue to be setting aside the necessary time—not just a certain quantity of time, but time at specific parts of the day, for prayer and study. This is indeed an issue in our own time, but as far as I can tell, it was not so in pre-modernity; prayer and study times were naturally and seamlessly worked into the daily sunrise to sunset routine.

My paper, however, will concern a different issue, in some sense the mirror image of the one outlined above. How is the devout Jew, who wishes to devote his entire waking experience to religious works, to organize his day? How ought one to maximize the experience of the prayers, which are recited at specific intervals in the day? What parts of the day are particularly precious with regard to devotional opportunity and efficacy? Why is this so, and how should they be exploited? These and other issues of Jewish piety in its relationship to the organization of the day will be explored in my talk, using source material in the writings of Yehudah Halevi, Moses Maimonides, and others.

Mathieu Ossendrijver (Humboldt University)

The introduction of the 19-year intercalation cycle revisited

The Babylonian month began with the first appearance of the lunar crescent. As a consequence, twelve months, which define the lunar year, are about 11 days less than the solar year. If no measures would have been taken to adjust the calendar, the lunar year would have drifted through the seasons. This was prevented by occasionally inserting an intercalary month. Near the reign of Xerxes a 19-year cycle was introduced, with an extra month inserted in 7 out of 19 years, resulting in a total of 235 months.

In this presentation I will present some new results concerning the introduction of the 19-year intercalation cycle.

Sofie Remijns (University of Amsterdam)

The situational significance of hours. The social contexts of hour notations in Greek papyri

About 150 Greek papyri and ostraca contain references to clock time, mostly to full hours. Their distribution over time and space is consistent with the standard patterns of the chronological (300 BC-700 AD) and geographical (Middle and Lower Egypt) distribution of papyrological sources. These references to hours, therefore, document the widespread of clocks and of the concept of clock time across Hellenistic and Roman Egypt. Clearly, the option to refer to the hour was widely available. These fairly precise notations of time, however, also need to be interpreted against the overall picture created by the 10.000s of other documentary papyri that lack such notations of the hour: namely that of a society that did not live by the clock. As is well-known, people did not think in terms of clock time as a matter of habit in Antiquity, and this begs the questions why sometimes they did actively choose to express time in this manner. In a publication of 2007, I already identified the military administration as a sector where temporal precision was so well-established that recording of the hour in which events occurred had become standard procedure – in stark contrast to the civil administration. In this paper, I will survey the other contexts in which hours occur with a certain regularity and examine what people hoped to achieve with this increased level of precision.

Barbara Sattler (University of St. Andrews)

Duration versus point in time. The conceptual complexity of the notion of hour in early Greek thought

Our notion of hour very neatly combines two different tasks: it serves as a measurement unit for a certain duration and as an indication of a certain point in time. In this paper I will analyse some of the reasons that led to the particular way in which days are divided into hours in the ancient Greek context. I will first look at other, earlier ways in which the day was divided up in early Greek times, before I will focus at the development of the Greek notion of *hōra* – the term from which the English “hour” derives – in order to show that the two functions of indicating a point in time and a duration were only gradually brought together.

John Steele (Brown University)

Seasonal hours in Babylonia

Two basic methods for dividing the day are known to have been used in Babylonia: seasonally varying units which divide the periods of daytime into equal parts and night into equal parts (the day and night parts being of different length on all days of the year except the equinoxes), and fixed-length units which divide the whole of the complete day (i.e. daytime plus night) into equal parts. The primary seasonally varying unit of time found in Babylonia is the ‘watch’ (EN.NUN), a division of the day or the night into three parts. The ‘watch’ as a unit of time is attested very widely throughout the corpus of cuneiform texts. Several scholars have also claimed that a second system of seasonally varying time unit was also used in Babylonia: the seasonal hour in which the daytime or night is divided into twelve parts. In this presentation I will review the evidence which has been used to claim that the Babylonians used seasonal hours. It will become apparent that most of this evidence can better be understood in different ways. However, seasonal hours do seem to have been used in a small number of very late (after ca. 120 BC) horoscopes. I suggest that the presence of seasonal hours in these very late texts may be due to Babylonian exposure to the Greek tradition of time reckoning.

Sacha Stern (University College London)

The hours in early rabbinic literature: from natural time-marking to arithmetic sequence

In a previous paper, I have argued that the use of the 12 hour-division (of the day and night) in Jewish literature suddenly and rapidly expanded in the late first century CE. Hours are only sporadically attested in earlier

sources, whereas they are frequently used by Josephus and the New Testament. This sudden change is likely to reflect a wider trend in Hellenistic and Roman literature of the period, as well as a broader social development: the adoption and use of new time reckoning schemes in the early Roman imperial period (comparable to the contemporary adoption of the seven-day week).

By the early third century CE, when rabbinic literature begins to appear, the 12 (or 24-) hour division is already well established. It is frequently used in the Mishnah and subsequent rabbinic works. However, the predilection for 3, 6, and 9 hours, which characterizes late first-century CE sources, is still identifiable in rabbinic literature; as argued for the late first century, this usage betrays an underlying conception of the day as divided into four quarters, even if it is expressed, significantly, in terms of the 12-hour division.

Nevertheless, a certain evolution in the use of hours can be identified in rabbinic literature from the third century to the end of Antiquity. Natural time-markers of the day that may still be used in third-century works, for example *הצות* ('midday'), are gradually replaced in later centuries with the more abstract, arithmetic 'six hours'; the 'day' itself can sometimes be referred to instead, in later centuries, as '24 hours'. Furthermore, in third-century rabbinic works the hours are identified by cardinal numbers, which suggests that hours were conceived and used as quantities of time (as in Josephus, *Jewish War* 1:79-80, in the direct speech of an Essene; although this is unusual in Josephus). It is only from the Palestinian Talmud (late fourth century) onwards that hours are identified by ordinal numbers (as is normal in earlier Greek sources, such as Josephus). This suggests that in Hebrew and Aramaic Jewish literature, it is only late Antiquity that hours came to be expressed and conceived as points in time in a continuous sequence.

I shall conclude this paper with reflections on how these developments in the use and conception of hours in Jewish tradition might have reflected broader cultural developments, particularly in the context of rabbinic Judaism.

Sarah Symons (McMaster University)

Lost hours: an ancient Egyptian sundial in Gezer

An ivory sundial of Egyptian origin, decorated with a cartouche of the New Kingdom pharaoh Merneptah, was excavated in Gezer around 1905. It was published by R. A. Stewart Macalister in 1912 who described it as an ivory pectoral. The only known depictions of the object come from this work. Its archaeological significance rests in it being the only object Macalister found which bore the name of Merneptah. It thus provided *in situ* corroboration of Merneptah's claim to have conquered Gezer, as recorded on the so-called "Israel Stela", which itself had been discovered only a few years previously in Thebes by Flinders Petrie. With this important context, it is disappointing to find that the object's whereabouts since publication are unknown.

From Macalister's drawings, Ludwig Borchardt (writing in 1920) identified the object as a sundial and compared it with four other examples of vertical semicircular sundials, of which one cannot be dated and the others are all much later. Since then, several other examples of this type of sundial have been found. Here, we will review what is known about the Gezer dial, discuss what we now know about similar and contemporary sundials, and assess the place of Macalister's find in relation to this group of timekeeping objects.

Anja Wolkenhauer (Universität Tübingen)

***Divisio diei*: the hour in Latin letters, 100 BCE-500 CE**

My talk will focus the division of the day by counted hours (*hora secunda, tertia, quarta* etc.). Counted hours were not the only instrument which Romans used when they tried to fix a time during the day: but it's a very interesting one. They could use natural signs, cultural conventions and synchronisms as well, and they realized

for sure that there is a difference inbetween. Saint Jerome had an idea of different kinds of timekeeping, when he says: Petrus Apostolus non exspectat stellam more iudaico, sed hora sexta in solarium pransurus ascendit (“Peter the apostle didn’t wait for the evening star like the jews usually do, but went up to the roof terrace for his meal at the sixth hour of the day”, adv. Iov. 23, 290D).

It was only in the first century BCE, that the Romans started to count their hours. I want to know which kinds of (actually unknown and unstudied) cultural and semantic implications lie behind this phenomenon. I assume that the use of counted hours is restricted to certain chronotopes and shaped by older traditions of timekeeping. Using counted hours implies some thoughts about the value of time measurement and exactness, but probably (and surprisingly) it does not imply necessarily the use of a timepiece. Analysing ancient epistulae (i.e. factual texts near to everyday life) from the first century BCE till late antiquity, I will examine these assumptions.

Ido Yavetz (Tel Aviv University)

Possible inferences on the state of 4th-century BCE Greek astronomy from the design of the Oropos sundial

In 2004, Karlheinz Schaldach described the reconstructed sundial from the Amphiareion of Oropos, judging that its design is inconceivable without the Greek (probably Eudoxan) two-sphere model of the sun. Following a brief description of the device and its functioning mode, I suggest that while Schaldach’s suggested design procedure is perfectly plausible, it is by no means exclusive. This is because (1) the design follows equally well from a far simpler understanding of celestial phenomena, with no recourse to the theoretical two-sphere model of the sun; (2) given the two sphere model, application of the compass and the straight edge offers a design procedure that is significantly more sophisticated than the one suggested by Schaldach. In other words, two further options exist besides Schaldach’s suggested procedure of design – a more primitive one, and a more sophisticated one. This should not come as a surprise considering the paucity of Greek records from the 4th century BC. Therefore, rather than reflecting a specific state of theoretical astronomy that guided the design, the sundial suggests at best a range of equally plausible possibilities.

Israel Yuval (Hebrew University)

“This night is all matza” : the division of the Passover night among Jews and Christians