

## DISCUSSION CONCLUDING AAS 13-514

KEN SEIDELMANN said that he was always told that the ancient Egyptians observed the heliacal rising of stars as the way to identify the change of the seasons and when to plant, but was not told that such phenomena were tied to a calendar. PAUL GABOR replied that it is the heliacal rising of Sirius that is usually mentioned in this context. One problem is that this level of astronomical observation is much more accurate than what is needed for those purposes. The other problem is that data gathered since the early 1870's regarding the Nile, primarily by British authors, demonstrate quite clearly that the fluctuations in the timing of those floods is quite large. The standard deviation is something like one week, so GABOR did not see how astronomy could be used to perform that kind of timing. GABOR thought that instead the ancient Egyptians might have monitored the weather somewhere to the south. Of course they did not have access to that region so that must have been quite difficult, so perhaps they really did use Sirius to give them some sort of idea as to when to be prepared, but the exact timing of the flood would not have been accessible that way, so the success rate of such a strategy remains unclear.

JIM KIESSLING noted that peasants in agrarian societies of the past few thousand years were as intelligent as people today, yet "walking behind a plow is not massively stimulating" to one's mindset. KIESSLING's understood that peasants would have deep debates and discussions on topics such as the Trinity and so forth; perhaps this was part of the significance of the symbolic value of the calendar versus something more practical. That is to say, they needed something to think about. GABOR clarified that he was talking about societies like ancient Egypt and Mesopotamia, and in those societies the official stratification was already very obvious. There were people who were specialized timekeepers. This was true even in societies that appear relatively simple in their organization from a modern point of view. GABOR came across a case as late as the 1880's where one of the American Indian tribes in Mexico punished a person responsible for observations of the stars to determine the timing of a ritual. Even a society at the level of Mesoamerican civilization would have had to tackle the problem of a social institution having somebody in charge of taking observations—an astronomer. GABOR asked if KIESSLING's question was about these societies or about even earlier societies. KIESSLING said he was thinking more about the Middle Ages, because insights are better about that era. GABOR replied that timekeeping at that time was done by professionals; the type of work was determined by the landlords and not determined by the farmers themselves.

KEVIN BIRTH asked if GABOR was familiar with some of the recent work with *parapegmata*. GABOR was not familiar with the term. BIRTH explained that it was type of ancient Roman time-keeping tool that was used to reconcile meteorology, astrology, and agricultural science, and that BIRTH would send GABOR more information. BIRTH further commented that, while it is dicey to apply the ethnographic record to the archeological record, one of the things that stymied early ethnographers is that they encountered things that they thought were calendars but did not work the way they thought calendars should work. A classic example of this was found in the Trobriand Islands where they named only ten months. When the Trobrianders reached the end of their count of lunations, they would anticipate the arrival of the Melanesian sea worms which heralded the start of their new year. And when the sea worms did not arrive based on their count of luna-

tions, they then concluded that the Moon had “just gone silly.” So, from the ethnographic record there are many systems that look “sort-of calendrical” but can expand, contract, and be fudged in all sorts of ways.

GABOR said that original date counting aided by lunar cycles is a technique used by many societies in different ways. GABOR agreed that BIRTH’s point was an excellent example of something that is not a calendar as we would understand it. It is definitely a timekeeping scheme from which a more-evolved calendar could have arisen, given time. GABOR felt that calendar development requires consideration of *timelessness* and the significance that brings to the table. *Timelessness* is the idea that a calendar has not been in place since time immemorial; in other words, it has somehow been contemporary to the creation of the world. This is essentially why Egyptian kings had to take an oath to never change the calendar, despite the fact that their 365-day calendar was very obviously wrong. This idea of timelessness needed time to enter into the ideas and mental work of calendars and timekeeping.

With regard to the idea that the calendar is far more precise than is needed for agriculture, GEORGE KAPLAN said that even today there is a general principal that time counting should be at least ten-times more precise than the variation in the phenomenon that is being measured. A one-week variation in the flooding of the Nile is well within the kinds of principles applied today for scientific measurement. GABOR responded that Egyptian record keeping was very meticulous and accurate. They were better capable of monitoring than predicting the lunar cycle very precisely, which was the cycle that was most astronomically conformed. On the other hand, the solar cycle represented by the 365-day Egyptian calendar was very probably used for record keeping. It is a scheme that is excellent for that purpose because there are no irregularities with it, and such a system was in fact maintained by astronomers up until and including Copernicus. It is a very simple calendar that allows one to go back and forth through time without much hassle; it is essentially just another day-numbering scheme useful to astronomy. GABOR did not think that such a calendar was used for predicting the flooding of the Nile at all.

Regarding the notion that the heliacal rising of Sirius was used to predict the flooding of the Nile, GABOR said this would have been much more accurate than counting calendar days. The observational practice had very little to do with the Egyptian calendar, which had other social functions beyond being conformed to astronomy. The link between agriculture and that particular calendar is not very obvious still. What is very clear about the ancient Egyptian calendar was that it was seen as something having to do with the commemoration of the foundation of Egypt. It was, more or less, a sacred artifact useful for record keeping, rather than a practical astronomical calendar.

DANIEL GAMBIS said another aspect regarding the calendar and timekeeping was the domination of the people in terms regulating society. In response, GABOR was sure that calendars had social functions of various sorts, and there was a need to somehow coordinate representation of the ladder of society as a means to control that society as well. GABOR thought that these are intimately linked and it would be quite difficult to separate them, and thus he generally agreed with the premise.