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SENENMUT: AN ANCIENT EGYPTIAN ASTRONOMER

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Abstract. The celestial phenomena have always been a source of wonder and interest to people, even as long ago as the ancient Egyptians. While the ancient Egyptians did not know all the things about astronomy that we do now, they had a good understanding of some celestial phenomena. The achievements in astronomy of ancient Egyptians are relatively well known, but we know very little about the people who made these achievements. The goal of this paper is to bring some light on the life of Senenmut, the chief architect and astronomer during the reign of Queen Hatshepsut.

1. INTRODUCTION

As early as several thousand years ago people were interested in astronomy and they had some knowledge about celestial phenomena. This kind of interest existed in almost all ancient civilizations, although it rose from different purposes and motivations. The ancient Egyptians were interested in astronomy, mainly for practical and religious purposes.

This paper is devoted to achievements of the ancient Egyptian astronomy (Section 2.) and to the life of an ancient Egyptian astronomer Senenmut (Section 3.).

2. ASTRONOMY IN ANCIENT EGYPT

Astronomy was very important to the ancient Egyptians and played a different part for that people than it does in many cultures. Although their achievements were far less advanced than those of some other ancient civilizations, many of them are very important and deserve our attention. Here, we will mention some of them.

- *The invention of the 365-days calendar, based on astronomical observation.* The development of this type of calendar probably took place at least as far back as 2,000 B.C., but the first calendar developed in Egypt was a lunar calendar introduced about 3000 B.C – the first measurement of time in human history.

The beginning of the Egyptian year was declared when there was a flood, as they noticed that the flood begins with the star Sirius, the brightest star in the sky. This incident represented the beginning of the agricultural year in Egypt. The year had 365 days divided into 12 months and each month had 30 days. They made the remaining

five days feast days, called the Epagomenal Days, or the days upon the year, and added them at the end of the year. Months of the year were divided into three seasons, namely: the flood season, the planting season, and the harvest season. The year, the season, the month and the day in which a king came to power was usually recorded by the Egyptians in their documents.

- *The development of instruments of quantitative astronomical measurement.* These included the sundial, water clocks, and the merkhet. The ancient Egyptians used instruments or indicators for observing the circumpolar stars. They would then draw a north-south axis line on the ground marking its direction, which was required for the proper orientation of important building projects. One of the instruments used was called "Merkhet," (similar to an astrolabe), which could mean "indicator." It consisted of a horizontal, narrow wooden bar with a hole near one end, through which the astronomer would look to fix the position of the star. The other instrument, called the "bay en imy unut," or palm rib, had a V-shaped slot cut in the wider end through which the priest in charge of the hours looked to fix the star.

- *Telling time by the stars.* Astronomy in ancient Egypt was the best way to tell the time during the night. They recognized a number of constellations and other groups of stars. These groups of stars, called decans, were used for telling time at night. Each group of stars rose forty minutes later each night. Observing the position of a group of stars in relation to the day of the year would tell a person what time it was. Theoretically, there were 18 decans, however, due to dusk and twilight only twelve were taken into account when reckoning time at night. Since winter is longer than summer the first and last decans were assigned longer hours to. Tables to help make these computations have been found on the inside of coffin lids. The columns in the tables cover a year at ten day intervals. The decans are placed in the order in which they arise and in the next column, the second decan becomes the first and so on.

The achievements in astronomy of ancient Egyptians also include:

- Knowledge of stellar constellations - at least 43 constellations were familiar to the Egyptians in the 13th century B.C.
- Knowledge of planetary astronomy - the Egyptians knew five planets; the retrograde motion of Mars was known; the revolution of Mercury and Venus around the Sun was known.
- Astronomy was also used in positioning the pyramids. They are aligned very accurately, the eastern and western sides run almost northwards and the southern and northern sides run almost westwards.

3. SENENMUT

The earliest known star maps in Egypt have been found as a main part of a decor in a tomb (TT 353) at Thebes on the West bank of the Nile (e.g. Leser 2006). The tomb was built during the Egyptian 18^{th} dynasty, and it belonged to Queen Hatshepsut's vizer and calendar registrar Senenmut (also known as Senmut or Senemut).

But, who really was Senenmut? Senenmut was of low birth, born to literate provincial class parents, Ramose and Hatnofer. Despite his non-royal origin Senenmut was

given more prestigious titles and became high steward of the king. There is no doubt that much more is known about Senenmut than about any other non-royal Egyptian.

The list of Senenmut's titles is very long, but first of all he was an architect, government official and tutor of Neferure - Queen Hatshepsut's daughter. Senenmut originally entered the royal court during the reign of Tuthmosis II, under Hatshepsut he would eventually hold over 80 titles (Dorman 1988) during his period as an official and administrator working in the royal court. Other dimensions of his career are suggested by the presence of an astronomical ceiling in his tomb at Deir el Bahari and about 150 ostraca in his tomb at Qurna, including several drawings, as well as lists, calculations, various reports and literary works. No doubt the workmen were instructed to decorate his tomb with items of interest in Senenmut's life.

The social classification of the family has also been a central point of the discussion. Probably at that time about 5% of the population was able to reading and writing. Therefore, Tyldesley (1996) placed the family in the "upper" social class, which mastered these stages of civilization, because in her opinion Senenmut would not have been able to start successfully into his career without these abilities. In this connection it is also unclear, how or where Senenmut started his career. Able to read and write he could have started his career as a low civil servant. However, it is also possible that he started a military career and then changed it into administration. As far as we know, it was quite usual that retiring officers were awarded with an administrative position. The destroyed inscriptions in his monument, TT71, which contain text fragments possibly, give some information about the beginning of his career.

Beside the offices mentioned above, which he surely executed, he also got numerous "courtly titles" - like the one called "Only friend of the Pharao". These titles most likely testify the extraordinary confidence of Hatshepsut.

Concerning the end of Senenmut's life there are more speculations than facts. At least until regnal year 16 of Hatshepsut/Thutmosis III. he held his offices. Apparently thereafter, his tracks are lost. His unfinished monument, TT353, was closed, some his figures therein, and also in TT71, were destroyed. There is no information that he had been buried in one of his tombs.

The astronomical ceiling in Senenmut's tomb (TT 353) is divided into two sections representing the northern and the southern skies. The southern (Fig. 1) is decorated with a list of decanal stars, as well as constellations of the southern sky belonging to it like Orion and Canis Major. Furthermore, the planets Jupiter, Saturn, Mercury and Venus are shown and associated deities who are travelling in small boats over the sky. Thus, the southern ceiling marks the hours of the night. The northern one shows constellations of the northern sky with the Great Bear (Ursa major) at the centre. The other constellations could not be identified. On the right and left of it there are 8 or 4 circles shown and below them several deities each carrying a sun disc towards the centre of the picture. The inscriptions associated with the circles mark the original monthly celebrations in the lunar calendar, whereas the deities mark the original days of the lunar month (Meyer 1982).

The map on the southern panel proves to reflect a specific conjunction of planets around the longitude of Sirius. The four planets Jupiter, Saturn, Mercury and Venus are relatively easily recognizable. The planet Mars is not included in the actual

grouping and at first sight seems to be missing in the map. However, Mars is also pictured in the Senenmut map, but it is represented by an empty boat in the west. This seems to refer to the fact that Mars was retrograde so that in this backward movement (well known phenomenon to the Egyptians) the Mars position was perhaps not consider to be "concrete". Using these facts, Egyptologists were able to date that this particular configuration of planets occurred in the sky in 1534 BC (van Spaeth 2000).

Modern chronologists tend to agree that Hatshepsut reigned as pharaoh from 1479 to 1458 BC, but there is no definitive proof of the beginning date. Some other sources proposed that Hatshepsut could have assumed power as early as 1512 BC. Consequently, it is not clear whether or not the celestial phenomenon, mentioned above, was happened within the lifetime of Senenmut.

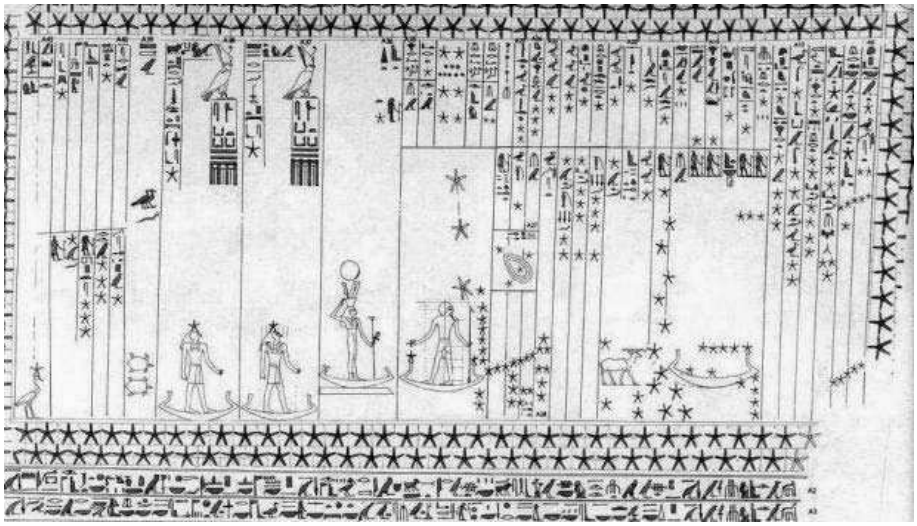

Figure 1: The southern part of the astronomical ceiling in Senenmut's tomb (TT353).

4. CONCLUSIONS

A short review of the achievements in astronomy of ancient Egyptians, presented here, indicates that Egyptian astronomy deserves more attention. Probably, there are a lot of things waiting to be discovered about their astronomy.

The available evidence about the life of Senenmut suggests that he was an astronomer. Although, it may conflict with some other results (e.g. Shaw 2003), the obvious probability exists that when the rare conjunction occurred in 1534 BC it was within the lifetime of Senenmut. However in order to answer this question a further investigation is necessary.

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