The Constellations of the Egyptian Astronomical Diagrams

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DEPICTIONS OF THE constellations that the ancient Egyptians observed in the sky first appeared on some coffin lids at the beginning of the 2nd millenium BCE, as inserts into the tables that listed the names of the asterisms signalling the night hours (decans).[1] These early sources only include the representations of four constellations, two in the northern sky, and two in its southern regions: the goddess Nut (*Nw.t*) holding up the sky hieroglyph, the Foreleg (*msḫt.jw*), belonging to Seth according to later descriptions, the striding figure of Sah (*sꜣḥ*), the celestial manifestation of Osiris, and the standing goddess of Sopdet (*spd.t*), who is often associated with Isis [fig. 1].[2] The last three kept being shown in later documents, while the first one disappeared completely after the Middle Kingdom.[3] A more detailed visual catalogue of the constellations has come down to us in the form of the astronomical diagrams that were first recorded at the beginning of the New Kingdom,[4] though these diagrams very possibly existed earlier, as a fragmented and now lost specimen seems to indicate.[5] Although their particular elements vary to a certain degree, these astronomical diagrams continued to be depicted on tomb ceilings, water clocks, temple surfaces, and coffins well into Graeco-Roman times. When towards the end of the first millenium BCE the Egyptians started to represent the zodiacal signs on their monuments, these zodiacs also included the figures of the most salient constellations.[6] It should be noted, however, that according to certain decanal names,[7] and the relevant entries in Amenemipet's onomasticon (Ramesside Period),[8] the Egyptians knew some further constellations for which apparently no pictorial records have survived.

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[1] O. NEUGEBAUER, R.A. PARKER, *Egyptian Astronomical Texts* I. *The Early Decans*, Providence, 1960, pl. 3-8, 17–21 (= *EAT* I).

[2] For the divine identifications, see A. VON LIEVEN, *Der Himmel über Esna: Eine Fallstudie zur Religiösen Astronomie in Ägypten um Beispiel der kosmologischen Decken- und Architravinschriften im Tempel von Esna*, *ÄA* 64, 2000, p. 25-26, 62.

[3] N. BILLIG, *Nut: The Goddess of Life in Text and Iconography*, *USE* 5, 2002, p. 13. See also the discussion in the section *The Harpoon* below.

[4] O. NEUGEBAUER, R.A. PARKER, *Egyptian Astronomical Texts* III. *Decans, Planets, Constellations and Zodiacs*, Providence, 1969, p. 10-38 (= *EAT* III); S. SYMONS, "Classification of Ancient Egyptian Astronomical 'Diagrams'", *JHA* 46, 2015, p. 66-75 .

[5] *EAT* III, p. 8-10.

[6] *Ibid*., p. 38-84; M.A. MOLINERO POLO, "A Bright Night Sky over Karakhamun: The Astronomical Ceiling of the Main Burial Chamber in TT 223", in E. Pischikova (ed.), *Tombs of the South Asasif Necropolis: Thebes, Kharakhamun (TT 223), and Karabasken (TT 391) in the Twenty-fifth Dynasty*, Cairo, 2014, p. 201-238

[7] O. NEUGEBAUER, R.A. PARKER, *Egyptian Astronomical Texts* II. *The Ramesside Star Clocks*, Providence, 1964, p. 3-7 (= *EAT* II).

[8] A.H. GARDINER, *Ancient Egyptian Onomastica* I, Oxford, 1947, p. 4*-5*.

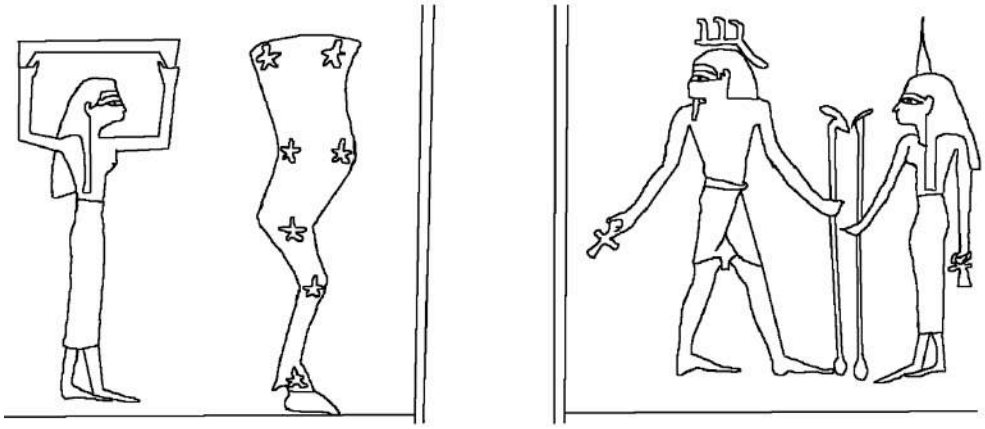

Fig. 1. The constellation figures on Idy's coffin lid (Asyut, Middle Kingdom. Drawing by the author).

The astronomical diagrams put the visual representations of the constellations into a well-ordered context.[9] First of all, they are divided into two main fields, so that one of these is in the south, and the other one in the north [fig. 2]. This is the ideal setup, but some astronomical diagrams display the two fields along an east-west axis.[10] Because of this division, and as two distinct sets of constellations appear in the separate fields, it is customary to talk about the southern and northern constellations of the Egyptians (the latter sometimes called "circumpolar").[11] These are surely appropriate terms given the layout of the astronomical diagrams, but they – as shall become obvious from the present analysis – do not imply that the constellations in question are either to the south or north of an imaginary dividing line in the sky. A better understanding of the grouping of the constellations is that those in the southern panel of the diagrams can be seen when we turn south, i.e. we observe the sky facing southwards, while those in the northern panel can be seen when we turn north.[12] This is so even if on the Middle Kingdom coffins the terms "northern sky" (*p.t mḥ.tjt*) and "southern sky" (*p.t rs.jt*) are used to designate the areas where the Foreleg and Sah-Osiris circle the sky, respectively.[13]

The pictorial representations of the constellations are accompanied by other records of astronomical significance. These may be the listing of the names of the decans, a procession of divine figures corresponding to the decans (southern panel), or to the days of the lunar month (northern panel), the representations of the planets, a tabular display about the observation of the decans, and a list of the months, usually visualised as a series of vignettes evoking the main festival of the particular month.[14] Individual diagrams may omit some of these elements, or may put some emphasis on certain parts of the arrangement, for example

[9] *EAT* III, p. 1-5; S. SYMONS, *Ancient Egyptian Astronomy: Timekeeping and Cosmography in the New Kingdom,* Unpublished PhD dissertation, University of Leicester, 1999, p. 180-206.
[10] *EAT* III, p. 4–5; D.V. ETZ, "A New Look at the Constellation Figures in the Celestial Diagram", *JARCE* 34, 1997, p. 148-150.
[11] *EAT* III, p. 183–202; K. LOCHER, "Probable Identification of the Ancient Egyptian Circumpolar Constellations", *JHA* 16, 1985, p. 152-153; M. CLAGETT, *Ancient Egyptian Science* II. *Calendars, Clocks, and Astronomy*, Philadelphia, 1995, p. 106-127; S. SYMONS, *Ancient Egyptian Astronomy*, p. 194-196.
[12] Cf. S. VON BOMHARD, "Le 'ciel du sud' et le 'ciel du nord'", *ENiM* 5, 2012, p. 73.
[13] *EAT* I, p. 28-29.
[14] S. SYMONS, "Contexts and Elements of Decanal Star Lists in Ancient Egypt", in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge in Ancient Egypt and Mesopotamia: Proceedings of Two Workshops Held at Goethe-University, Frankfurt/Main in December 2011 and May 2012*, Münster, 2014, p. 101-106.

depicting them in a larger scale (see the huge constellation figures in the tomb of Ramesses VI, or the prominent file of the attendant deities of the decans in the tomb of Seti I).[15] These variations may have been dictated by personal preferences, artistic licence, the limitations of the surface where the diagram was going to be displayed, or the combination of all these factors.

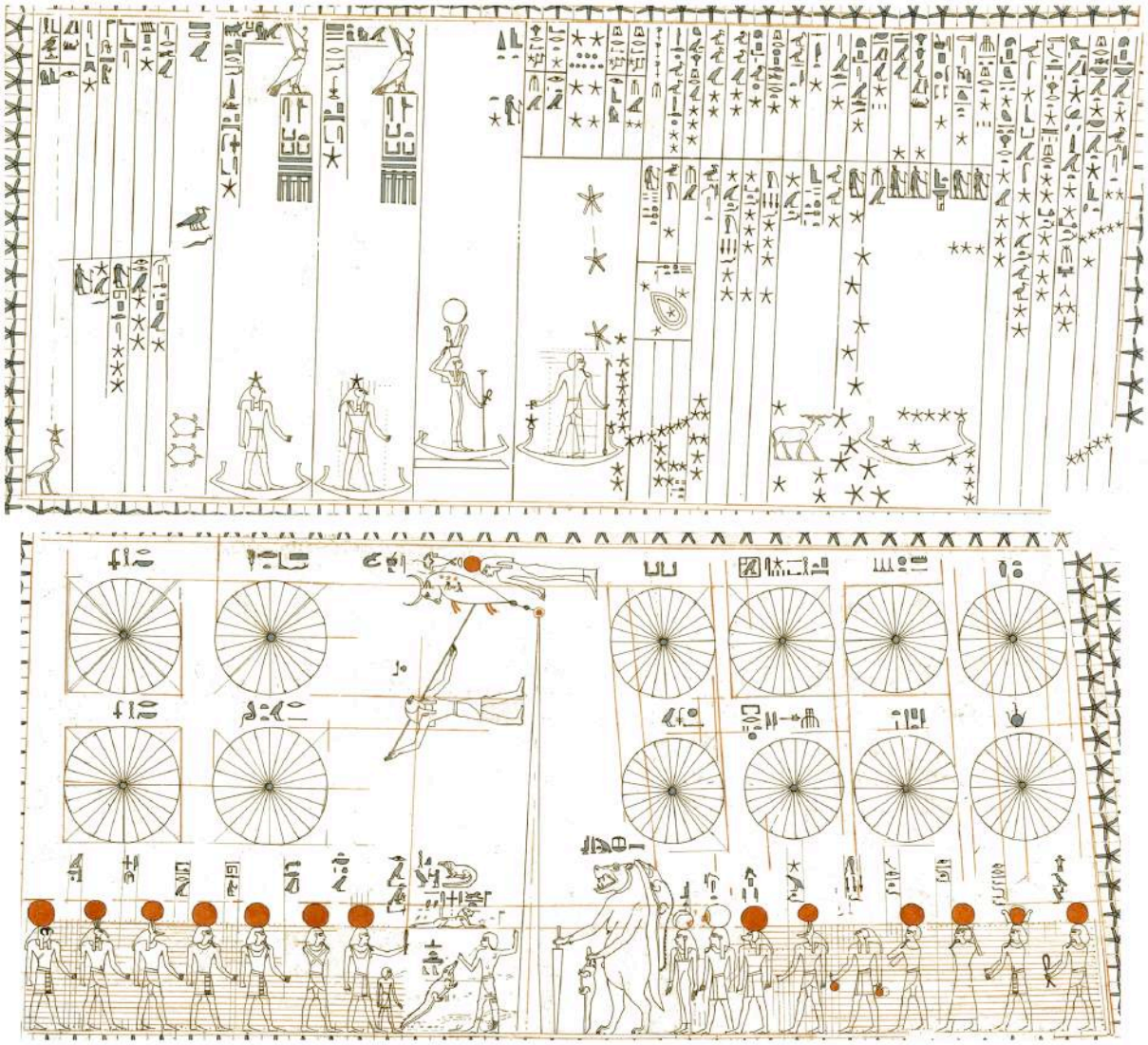

Fig. 2. The southern and northern panels of Senenmut's astronomical diagram.

As for the constellations, two clear strands of tradition can be distinguished with two different renderings of the northern figures, and later diagrams follow the example of either of them with minor variations. These are – if the fragmentary copy on Amenhotep III's waterclock is excluded – the two earliest diagrams: one in the tomb of Senenmut in front of Hatshepsut's temple at Deir el-Bahari (TT 353, *ca*. 1450 BCE) [fig. 2], and the other in the burial chamber of Seti I in the King's Valley (KV 17, *ca*. 1290 BCE) [fig, 3]. The main difference between the two lies with the depiction of *msḫt.jw*, the constellation that was earlier shown on the Middle

[15] *EAT* III, pl. 3, 13.

Kingdom coffin lids as one of the tokens of the northern constellations, as opposed to Sah-Osiris and Isis-Sopdet of the southern sky. For other reasons, too, *msḫt.jw* was probably the most important constellation for the Egyptians, since it was the feature of the sky that was observed during temple foundation rituals to determine the cardinal directions.[16] On the ceiling of Senenmut's tomb *msḫt.jw* is represented by an ovoid shape with a bull's head (in Graeco-Roman times depicted as the combination of a foreleg and bull's head),[17] whereas in Seti I's tomb it is shown as a standing bull. It is also remarkable that in Seti I's monument the southern constellations – especially in contrast to later Ramesside examples – are greatly reduced in size, sometimes being only mere determinatives of decanal names.[18] Further differences between the two types will be pointed out later on in the discussion – the thing to note here is the fact that the study of the astronomical diagrams of Senenmut and Seti I will suffice for the thorough presentation and identification of the Egyptian constellations in these documents.

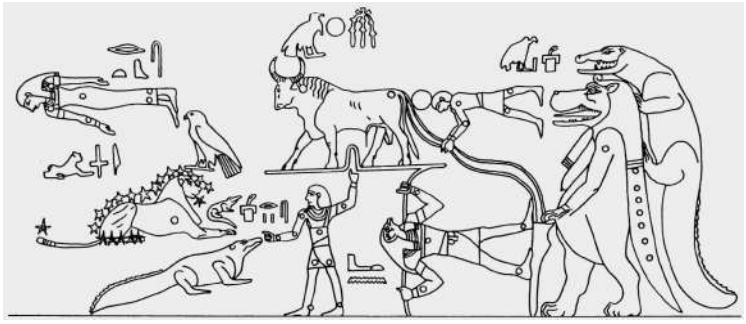

Fig. 3. The northern constellations of Seti I's astronomical diagram (after R.H. Wilkinson, "New Kingdom Astronomical Paintings and Methods of Finding and Extending Direction", *JARCE* 28, 1991, p. 151, fig. 2).

Senenmut's astronomical diagram is also a good starting point for another reason, although it is quite evident that it relies on a master copy which had been developed earlier (in the Middle Kingdom, or possibly even earlier), and either when it was handed down through the generations or when it was being transferred to the surface of the ceiling, numerous mistakes were made.[19] The southern panel of this astronomical diagram contains the most information about the decanal constellations, that is, details which are not included elsewhere, or appear in a much more corrupted form. As a consequence, Senenmut's astronomical diagram will serve as the primary basis for the following catalogue of the Egyptian constellations, both southern and northern.

Its short but relatively comprehensive description can establish the context that will help to locate the Egyptian constellations in the sky [fig. 2]. The upper parts of the southern panel display the names of the decans in separate columns, and the reading of them goes from right to left, as is indicated by the fact that all the hieroglyphic – and larger – figures face left. In the first six columns on the right the decan names are intermingled with the names of their

[16] D. KURTH, *Edfou* VII, Wiesbaden, 2004, p. 75-76.
[17] S. CAUVILLE, *Dendara* XV. *Traduction. Le pronaos du temple d'Hathor : Plafond et parois extérieures*, *OLA* 213, 2012, pl. viii.
[18] *EAT* III, pl. 3.
[19] *Ibid*., p. 112-114.

attendant deities, whereas in the following columns these elements are usually separated by a horizontal line.[20] The order of the decans, from right to left, implies that the whole scene is oriented along a horizontal west-east axis, meaning that anything that is further to the left in the picture is further to the east: for example, the first decan, *tp.j-ʿ-knm.t*, is followed by the decan called *knm.t*, and when this latter rises ten days after the first one to mark, say, the last hour of the night, the initial decan will already be higher up in the sky (i.e further on its way to the west).[21] This theoretical orientation contradicts the actual layout of the ceiling, since real east is on the right-hand side. The lower part of the southern panel, below the names of the decans and attendant deities, shows larger figures, six of which are constellations (see discussion below). The remaining three, the two Horus figures sailing in boats before the two turtles and the leftmost depiction of a heron, all positioned slightly lower, are the representations of three planets (Jupiter, Saturn, and Venus, respectively).[22]

The middle part of the northern panel, from top to bottom, is devoted to the representations of the other group of constellations. At the bottom they are flanked by the procession of divine figures that correspond to the days of the lunar month. Above them we find twelve circles with the names of the twelve months, four on the left and eight on the right. Each circle consists of twenty-four, roughly equal sections. Their connection with the hours is widely recognised,[23] but – to my knowledge – only Cynthia M. Sheikholeslami has drawn the rather obvious conclusion that they convey the idea that the day is divided into twenty-four equal hours in each month, i.e. regardless the season (equinoctial hours).[24] This view, however, can be backed up by a few documents, dating from the New Kingdom onwards, that list the distribution of the day and night hours in all the months of the different seasons, and thus hint at the existence of a division of diurnal time into equal hours in ancient Egypt.[25] If the twelve uniformly divided circles are also a clue in this direction, then the two panels of Senenmut's astronomical diagram juxtapose not only the north and south directions, and the northern and southern features of the sky, but also two distinct methods of time-keeping: the decans in the south are connected with the seasonal hours of variable length, while the circles relate to the equinoctial hours, most probably through an association with the circumpolar stars.[26]

Although since the birth of Egyptology quite a few attempts have been made to link the Egyptian constellations to certain groups of stars,[27] it still holds true that so far only three

[20] P.F. DORMAN, *The Tombs of Senenmut: The Architecture and Decoration of Tombs 71 and 353*, New York, 1991, p. 140.
[21] Cf. S. VON BOMHARD, *ENiM* 5, p. 78.
[22] P.F. DORMAN, *The Tombs of Senenmut*, p. 143.
[23] M. CLAGETT, *Ancient Egyptian Science* II, p. 120, 162 n. 168; P.F. DORMAN, *The Tombs of Senenmut*, p. 141.
[24] C.M. SHEIKHOLESLAMI, "The Night and Day Hours in Twenty-fifth Dynasty Sarcophagi from Thebes", in L. Bareš, F. Coppens, K. Smoláriková (eds.), *Egypt in Transition: Social and Religious Development of Egypt in the First Millenium BCE*, Prague, 2010, p. 379.
[25] M. CLAGETT, *Ancient Egyptian Science* II, p. 98–106; F. HOFFMANN, "Astronomische und astrologische Kleinigkeiten VII. Die Inschrift zu Tages- und Nachtlängen aus Tanis", in R. Jasnow, G. Widmer (eds.), *Illuminating Osiris: Egyptological Studies in Honor of Mark Smith*, Atlanta, 2017, p. 148.
[26] Similarly to the modern method of telling approximate time by the position of the pointer stars of the Plough, but probably more sophisticated.
[27] For a not comprehensive overview, see D.H. KELLEY, E.F. MILONE, *Exploring Ancient Skies: A Survey of Ancient and Cultural Astronomy*, 2nd ed., New York, Dordrecht, Heidelberg, London, 2011, p. 269-271. Some recent studies on the subject: V.L. DAVIS, "Identifying Ancient Egyptian Constellations", *JHA* 16, 1985, p. 102-104; K. LOCHER, *JHA* 16, p. 152-153; Chr. LEITZ, *Altägyptische Sternuhren*, *OLA* 62, 1995, p. 250-254; D.V. ETZ, *JARCE* 34, p. 143-161; Chr. LEITZ, "Die Sternbilder auf dem rechteckigen und runden Tierkreis von Dendera", *SAK* 34, 2006, p. 285-318; J. LULL, J.A. BELMONTE, "The Constellations of Ancient Egypt", in J.

have been securely identified. Perhaps not accidentally these are – with the exception of Nut – the ones that appeared on the Middle Kingdom coffins: Isis-Sopdet is the star Sirius, Sah-Osiris is around Orion, and the Foreleg is the seven bright stars of Ursa Major (the Plough, Big Dipper).[28] This is not much to go on for associating the remaining figures of the astronomical diagrams with actual stars in the sky, and it will turn out that even one of these almost universally accepted identifications is mistaken in the context of the astronomical diagrams. Then it is not the least surprising that even the best efforts to clarify the subject were doomed to failure. It is not the case, however, that these attempts were fundamentally or methodologically flawed. Most of the contributors to the debate accepted that the ancient Egyptians, just like the majority of other ancient cultures, saw in the different star patterns in the night sky the outlines of people, animals, or objects.[29] Indeed, the depictions on the Middle Kingdom coffins offer proof for such a practice: the Foreleg contains seven stars in an arrangement that resembles the seven bright stars of the Plough.[30]

On the basis of this, even if the evidence – as shall be demonstrated – was partly misunderstood, I still think that the correct methodology to find the constellations of the Egyptian astronomical diagrams is to look for patterns in the sky that can reasonably be shown to correspond to the depicted figures, be they humans, living beings, or objects. If all previous investigations using this principle have failed, there is of course no immediate guarantee that this time better proposals will be put forward. However, my analyses of the round Dendera zodiac and the astronomical diagram of the Ramesseum have established that the decan the Egyptians named *ḥr.j-jb-wjȝ* "the middle of the ship" was identical with the brightest star of the modern constellation Libra.[31] This means that while previously in the southern panel of the astronomical diagrams we only had one "anchor point" – Isis-Sopdet and Sah-Osiris next to each other (Sirius and Orion) – for correlating its constellation figures with the sky, now we have another clue that places the constellation of the ship in Libra. As a consequence, we can narrow down the area of the sky where we should find the constellations placed between the two. The scheme then also implies that the two turtles are found to the east of the star Sirius. In the northern panel, the strict adherence to the criterion of pictorial resemblance leads to the correct identification of *msḫt.jw*, and that unravels the whole design of the northern constellations.

It should be noted that the astronomical diagrams are not scientific documents in the modern sense.[32] With the exception of water clocks, they appear in a funerary setting, that is in memorial temples, tombs, and on coffins. Their primary purpose in all probability was to act as a guide for the deceased to help them find their way among the ethereal beings of the netherworld.[33] Although they must have been based on the observation of stars, they were not

A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order: Selected Essays on Egyptian Archaeoastronomy*, Cairo, 2009, p. 157-194; J. LULL, *La astronomía en el antiguo Egipto*, 3rd ed., Valencia, 2016, p. 221-279.

[28] J. VON BECKERATH, *LÄ* I, 1975, col. 511-514, *s. v.* Astronomie und Astrologie; R.A. PARKER, "Ancient Egyptian Astronomy", *PTRS* 276, 1974, p. 51, 54, 60; Chr. LEITZ, *SAK* 34, p. 294-295, 304, 306; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 161; D.H. KELLEY, E.F. MILONE, *Exploring Ancient Skies*, p. 269.

[29] S. SYMONS, in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge*, p. 103.

[30] S. SYMONS, *loc. cit*.

[31] G. PRISKIN, "The Dendera Zodiacs as Narratives of the Myth of Osiris, Isis, and the Child Horus", *ENiM* 8, 2015, p. 142-144, 166-170; G. PRISKIN, "The Astral Myth of Osiris: The Decans of Taurus and Libra", *ENiM* 9, 2016, p. 92-100.

[32] A. VON LIEVEN, *Der Himmel über Esna*, p. 186-189.

[33] E. HORNUNG, *The Ancient Egyptian Books of the Afterlife*, (transl. D. Lorton), Ithaca, London, 1999, p. 113; S. SYMONS, in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge*, p. 93.

necessarily – or perhaps more appropriately, were most certainly not – edited or copied by people who actually carried out these observations. As a consequence, accuracy in a scientific sense was not the utmost priority of the scribes and artists working with the diagrams.[34] Nevertheless, it is assumed here that they preserved enough material of their original observational basis, so that the practical knowledge underlying them, which we would now call scientific, or – as their name indicates – astronomical, can be recovered. This is of course an assumption that is usually taken for granted by the researchers of Egyptian astronomy. Sharing this supposition, the present analysis is not concerned with the wider context of the diagrams, and their implications in the study of Egyptian funerary practices, but focuses on their presumed scientific content.

What follows is a catalogue-like presentation of the constellations of the astronomical diagrams. I list the southern constellations in the order from right to left, while in the case of the northern ones I discuss first the figures of Senenmut and then those of Seti I. Each entry starts with the most commonly used modern name, or – if such a designation does not exist – with a name that I concocted for the purpose of easy identification. The short description of a particular constellation includes its Egyptian name (if there is one), information about its location in the sky, a list of the most salient stars that make up its shape, and then the reference to the figure or figures where the constellation is drawn as a "stick figure" against the background of the sky. The individual entries close with some comments. In addition, readers are also encouraged to use good planetarium software to recreate and study the images, because these simulations will far better illustrate the arguments than my lamentable stick figures. Better still, if someone happens to be at the right place at the right time, they should look up and seek out the ancient Egyptian constellations in the sky itself.

Southern Constellations

The Ship

Egyptian name:	*wjȝ* "god's ship"
Location:	both to the south and north of the ecliptic, stretching from Pyxis to Ursa Major
Principal stars:	prow: γ Pyx, α Pyx, β Pyx, ζ Pup
	hull: (deck) λ Vel, μ Vel, Cen, θ Cen, α Lib, ε Boo, γ Boo, η UMa, γ UMa; (keel) γ Vel, δ Vel, ι Car, θ Car, α Cru, α Lup, υ Lib, μ Ser, α CrB, β Boo, θ Boo, ε UMa, δ UMa
	middle of the ship (*ḥr.j-jb-wjȝ)*: α Lib
	stern: γ UMa, ψ UMa, μ UMa

[figs. 4-5]

[34] *EAT* III, p. 112–114; S. SYMONS, in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge*, p. 95.

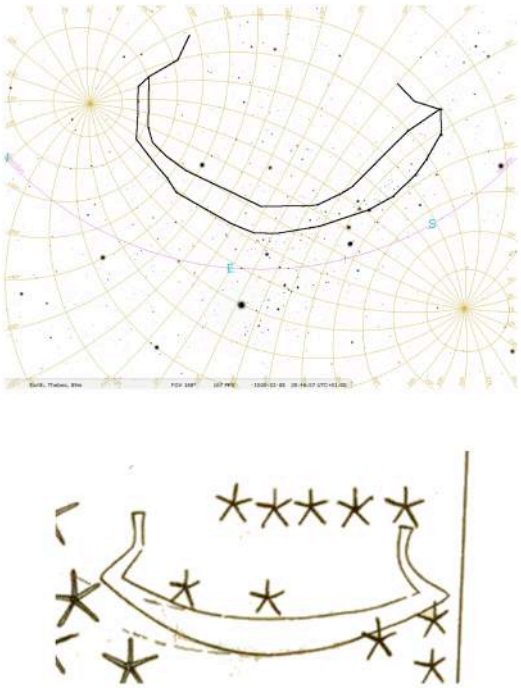

Fig. 4. The constellation of the ship.

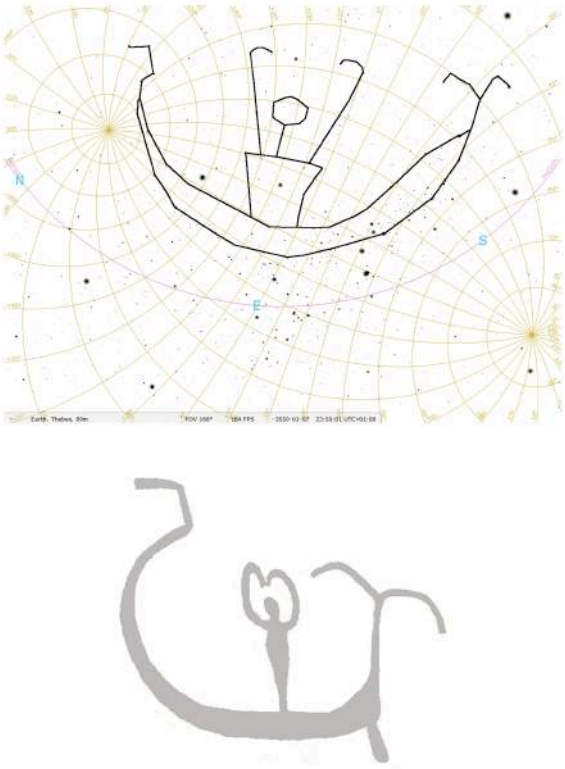

Fig. 5. The constellation of the ship in predynastic times. Bottom: drawing by the author.

In my analysis of the peculiar image of this constellation in the astronomical diagram of the Ramesseum, where it is shown with the sun and the moon on board, I conjectured that it corresponded to the three brightest stars of Libra.[35] At their rising, they form a flat inverted V-shape above the eastern horizon, and in it I saw the basic silhouette of a ship. Now it seems that my thinking was influenced by two factors that resulted from Hellenistic-Babylonian, and consequently, Western sky lore and astronomy, and were not necessarily applied in ancient Egypt. The first one is the level of abstraction by which I deemed three stars sufficient for making the outline of a ship.[36] The second is the size of the constellation: since the most important constellations for Hellenistic and Near Eastern astronomers and astrologers were those of the zodiac (the twelve stages of the sun's journey through the year),[37] our modern constellations are generally in the same order of magnitude as those of the zodiacal signs.

However, the closer inspection of the Egyptian sources reveals that the celestial boat was much bigger than I originally suspected. First of all, the astronomical diagrams of Ramesses VI represent this constellation as a very large vessel.[38] This in itself is of course not compelling evidence, because the size of the boat – in accordance with the Egyptian iconographic conventions – may just indicate its importance to the king, for whatever reason, and not its actual dimensions. A stronger argument for the bigger extent of the ship may be derived from the decan list accompanying the images of the constellation, The asterism 'middle of the boat' is preceded by some other designations that can be understood as describing the front part of the boat as they contain the element "front, forepart" (*ḫnt.jt*).[39] Thus we have *tp.j-ʿ-ḫnt.jt* "the one preceding the forepart", *ḫnt.jt-ḥr.t* "upper forepart", *ḫnt.jt-ḫr.t* "lower forepart", and *ṯms-n-ḫnt.jt* "the red (star) of the forepart".[40]

All this then suggests that the Egyptian constellation of the ship was larger than the figures we normally project to the sky. Indeed, when we look at the vicinity of Libra, we can make out the outlines of a ship that stretches a vast area of the sky from Pyxis to Ursa Major [fig. 4]. While I originally called this constellation "the boat", now the term "ship" is perhaps more appropriate. Elements of its outlines, especially the stern, conform well with the hieroglyphic representation of *wjȝ* "god's ship, processional barque", though the sign is prone to variation.[41] On the other hand, the large scale of the ship may be confirmed by a different sort of evidence, too. An oft-repeated motif of predynastic rock carvings in the eastern desert is a ship carrying a crudely outlined human figure with upraised, incurving arms.[42] Particularly relevant to the present discussion is a drawing from Wadi Mineh [fig. 5].[43] The stern of the ship shows the double frond motif, that is two curving lines at the end. The prow ends in a peculiar inverted L-shape. When we look at the sky around "the middle of the ship", we can

[35] G. PRISKIN, *ENiM* 9, p. 92-100.
[36] Cf. the comments in R.F. FRANK, "Origins of the 'Western' Constellations", in C.L.N. Ruggles (ed.), *Handbook of Archaeoastronomy and Ethnoastronomy*, New York, 2015, p. 149, 159.
[37] J.H. ROGERS, "Origins of the Ancient Constellations II. The Mediterranian Traditions", *Journal of the British Astronomical Association* 108, 1998; R.F. FRANK, in C.L.N. Ruggles (ed.), *Handbook of Archaeoastronomy and Ethnoastronomy*, p. 151.
[38] *EAT* III, pl. 12-13.
[39] *EAT* I, p. 24; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 170.
[40] P.F. DORMAN, *The Tombs of Senenmut*, p. 141.
[41] J.P. ALLEN, *Middle Egyptian: An Introduction to the Language and Culture of Hieroglyphs*, Cambridge, 2000, p. 439.
[42] D. HUYGE, *UCLA Encyclopedia of Egyptology*, 2009, *s. v.* Rock Art [Available from eScholarship.org], <https://escholarship.org/content/qt4qx7k7pz/qt4qx7k7pz.pdf> accessed 8 January 2019.
[43] H.A. WINKLER, *Rock-drawings from Southern Upper Egypt* I, London, 1938, pl. xxxv.

notice that the features of the petroglyphic ship mirror the outline of stars, again in a vast area of the sky that mostly overlaps with my identification of the later constellation of the ship.

Furthermore, the pattern of stars above the ship shows a clear resemblance to the enigmatic "arms raised" figure.[44] This is not the place to explore further the possible celestial connotations of this figure and the boat journey associated with it, appearing in rock art and on pottery at about the middle of the 4th millenium BCE.[45] I just point out the possible heavenly equivalents of these early motifs to strengthen my argument that the constellation of the ship shown in the astronomical diagrams covered a great area of the sky. However, it must be noted that all this evidence suggests that the ship was a very ancient constellation with its roots in the belief systems of the predynastic cultures of the Nile valley. By the time of the New Kingdom, some details had nevertheless changed. Originally the ship, as can be deduced from the petroglyph which most probably shows it as it was observed above the eastern horizon, faced left, whereas in the astronomical diagram of Senenmut it is sailing towards the right, as is indicated by the general direction of the southern panel and the names of the decans to the right.

The Greek author Plutarch (turn of 1st/2nd centuries CE) claims that the Egyptians call the Greek constellation Argo the ship of Osiris,[46] and since it (the modern constellations Carina, Puppis, and Vela) overlaps the front part of the ship of the astronomical diagrams, this statement once again confirms its great size. Plutarch also says that the star Canopus acts as the pilot for Osiris' ship, which on the other hand corroborates its orientation, since before the ship's hull rises above the eastern horizon, the bright star Canopus can be seen hovering low down in the southern parts of the sky, as if it was just in front of the prow. Plutarch identifies the celestial ship as belonging to Osiris, and this may be another reference to the astral myth connected with the god, because when the full moon coincided with the time of the vernal equinox, the complete lunar disc appeared around the middle of the ship,[47] and when at the time of the autumnal equinox the moon was in conjunction with the sun, signalling the birth of Horus according to the testimony of the round zodiac of Dendera,[48] this cosmic encounter also took place in the same region of the sky, "on board" the ship.

Therefore, my original conjecture about the three bright stars of Libra being the ship now seems to be mistaken. However, this partly false identification does not affect my previous reasoning about the round Dendera zodiac and the image in the Ramesseum astronomical diagram. The three stars of Libra did in fact mark the middle of the ship, so they were identical or closely associated with the decan, and this is perhaps also implied by the appearance of three stars on the hull of the ship in one astronomical diagram.[49] On the other hand, it is also entirely clear that for observational purposes, when the decans were actually used to signal the hours, the name 'middle of the ship' was used in a stricter sense, and only meant the central star, α Librae, which rose first above the horizon from the ensemble.[50]

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[44] S. HENDRICKX, D. HUYGE, W. WENDRICH, "Worship without Writing", in W. Wendrich (ed.), *Egyptian Archaeology*, Chichester, 2010, p. 26.
[45] C. GRAVES-BROWN, *Dancing for Hathor: Women in Ancient Egypt*, London, New York, 2010, p. 17-18: J. RELKE, "The Predynastic Dancing Egyptian Figurine", *Journal of Religion in Africa* 41, 2011, p. 396-426.
[46] J.G. GRIFFITHS, *Plutarch's De Iside et Osiride*, Swansea, 1970, p. 151.
[47] G. PRISKIN, *ENiM* 9, p. 92-104.
[48] G. PRISKIN, *ENiM* 8, p. 142-144.
[49] *EAT* III, pl. 13.
[50] G. PRISKIN, *ENiM* 9, p. 100.

The Sheep

Egyptian name:	*sr.t*, *sj.t* “sheep”
Location:	mostly in Scorpius, Sagittarius, and Capricorn
Principal stars:	horns: α Her, κ Oph, λ Oph, μ Ser, β Lib, α Lib
	head: ζ Oph, ε Oph, ξ Sco, θ Lib, π Sco, σ Sco
	body: (back) η Oph, ξ Ser, ν Oph, η Ser, θ Ser; (front) α Sco, τ Sco, ε Sco, μ Sco, ζ Sco, η Sco; (underbelly) θ Sco, ε Sgr, σ Sgr, π Sgr
	front legs: σ Ara, α Ara, β Ara, ε Ara, ζ Ara, η Ara
	hind legs: ρ Sgr, f Sgr, ω Sgr, θ Sgr, α Cap, β Cap, ψ Cap, ω Cap
	tail: δ Aql, η Aql, θ Aql, ε Aqr

[fig. 6]

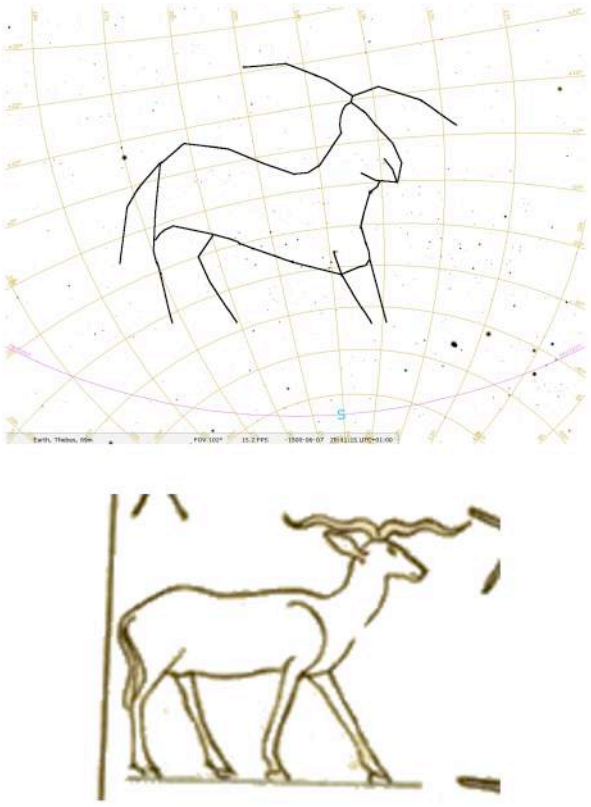

Fig. 6. The constellation of the sheep.

The scheme of the astronomical diagram implies that the constellation of the sheep is further to the east from the ship. In modern terms it means that the right ascension of the stars making up this constellation is higher than those of the ship. On the other hand, the sheep is depicted next to the ship, and it suggests that the two figures must be close to each other in the sky. When we look at the area that is to the east from the ship, we can discover the outlines of a

sheep roughly around the constellations of Scorpius, Sagittarius, and Capricorn [fig. 6]. Following Egyptian iconographic traditions, on Senenmut's ceiling the quadruped is shown with its front legs apart, but the celestial figure should rather be interpreted with parallel front limbs. The horns of this heavenly animal partly overlap the ship, and this detail highlights a fundamental difference between the way the Egyptians viewed the sky and the way modern observers tend to look at it. The Western mind thinks in mutually exclusive categories – if something is A, it cannot be B – whereas the Egyptians often propagated alternative explanations or representations for the same phenomenon, as for example the sky could be the arching body of the goddess Nut, but also a heavenly cow.[51] This applies to their constellations, too: if a star is part of a given constellation, it – when seen from a different angle – can just as well be the constituent part of another one.

The sheep is probably also an ancient constellation. This is suggested by the fact that Senenmut's diagram depicts it as an animal with long straight horns. This is the species that lends its appearance to the ram-headed god Khnum and the hieroglyphic sign showing a ram's head,[52] but it was by the time of the New Kingdom probably quite rare in Egypt. A new breed of sheep with wooly hair and with horns curling downwards and forwards replaced the older species.[53] Besides these domestic varieties, the wild Barbary sheep was also sometimes represented in Egyptian art,[54] and the images of the sheep in the astronomical diagrams of Ramesses II and III quite probably represent this animal with horns curving upwards.[55] Still, these depictions may have been prompted by what the Egyptians saw in the sky. Above the celestial sheep we can see two curved groups of stars (α Ser, κ Ser, β Her on one side, 110 Vir, 109 Vir, κ Vir on the other), which can be taken to inspire the designs of the said Ramesside astronomical diagrams.

In Senenmut's diagram a label is attached to the image of the sheep, though it appears higher up, set within the list of the deities associated with the decans. It says 3-*nw.t* *ḫ.t*, literally meaning "the third body". In Egyptological literature the expression *ḫ.t* "body" is interpreted in the context of the astronomical diagrams to denote star clusters or certain groups of stars that either make up a decan, or are otherwise somehow connected with concentrations of stars in the southern region of the sky.[56] As shall become clear from the reasonings below, there is no need to overcomplicate matters (remember the proverbial razor of Occam!), and the expression is best understood as the word the Egyptians used to name their constellations, i.e. bodies in the sky. Thus the sheep is identified as the third constellation of the southern panel.

[51] E. HORNUNG, *The Ancient Egyptian Books of the Afterlife*, p. 111-135, 148-151.
[52] R.H. WILKINSON, *Reading Egyptian Art: A Hieroglyphic Guide to Ancient Egyptian Painting and Sculpture*, London, 1992, p. 61.
[53] K.A. BARD, *Encyclopedia of the Archaeology of Ancient Egypt*, London, New York, 1999, p. 360.
[54] S. HENDRICKX, H. RIEMER, F. FÖRSTER, J.C. DARNELL, "Late Predynastic/Early Dynastic Rock Art Scenes of Barbary Sheep Hunting in Egypt's Western Desert: From Capturing Wild Animals to the Women of the 'Acacia House'", in H. Riemer, F. Förster, M. Herb, N. Pöllath (eds.), *Desert Animals in the Eastern Sahara: Status, Economic Significance, and Cultural Reflection in Antiquity*, Köln, p. 189-192.
[55] *EAT* III, pl. 5, 11.
[56] *Ibid*., p. 2; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 172-178; S. SYMONS, in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge*, p. 104.

The Tadpole

Egyptian name:	n/a
Location:	on and south of the ecliptic, in the area of Pisces, Sculptor, and Piscis Austrinus; (water) north of the ecliptic, in Andromeda, Perseus, and Cassiopeia
Principal stars:	body: ζ And, γ Peg, ω Psc, 30 Psc, ι Cet, η Cet, θ Cet, o Psc, η Psc, χ Psc, η And
	tail: 2 Cet, α PsA, μ PsA, γ Mic, β PsA, δ PsA, γ Scl, δ Scl, β Cet, η Cet
	water: α And, β And, γ And, β Per, ε Per, α Per, γ Per, ε Cas, δ Cas, γ Cas, α Cas, β Cas

[figs. 7-8]

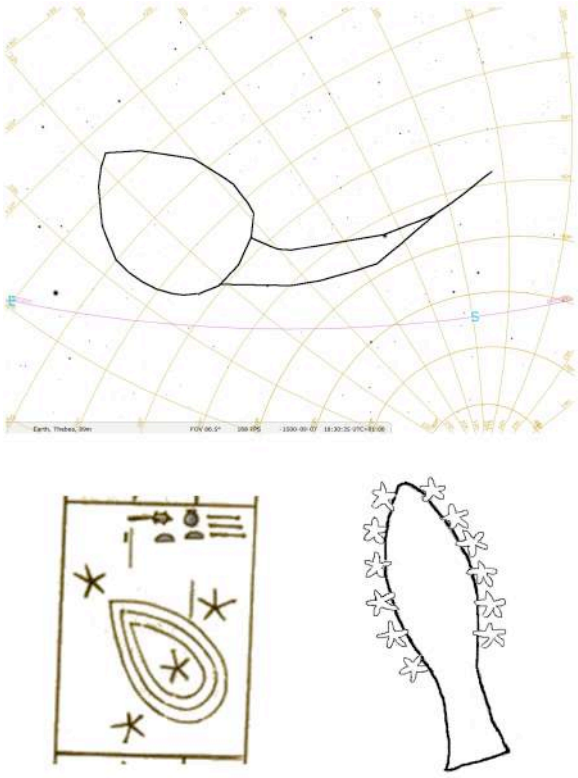

Fig. 7. The constellation of the tadpole (bottom left: Senenmut; bottom right: Ramesses VI, flipped horizontally). Bottom right: drawing by the author.

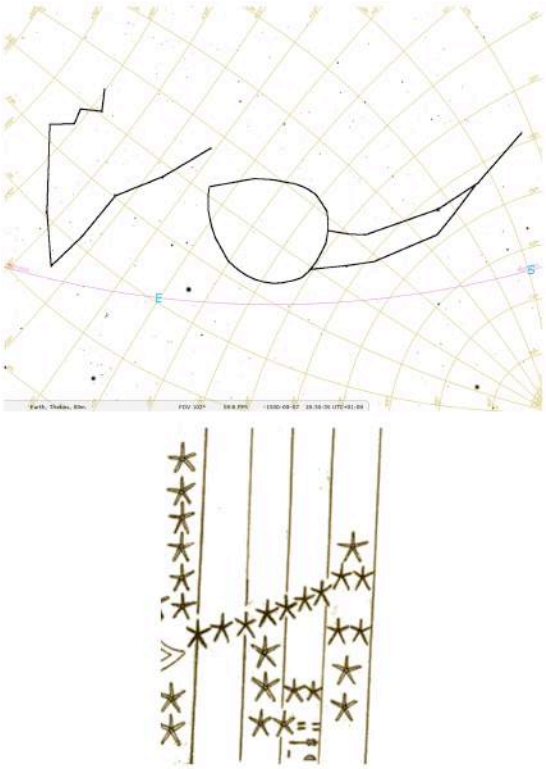

Fig. 8. The constellation of the tadpole and its water.

Seemingly, the next Egyptian figure in the sky is depicted not in the regular row of constellations at the bottom of the southern panel but a bit higher up, in what may be described as a separate compartment. It is an oval drawn with three concentric lines, usually likened to an egg or lemonpip.[57] Since now we know the location of both the preceding constellation, the sheep ending in Capricorn, and the next one, the striding man corresponding to Orion, it is quite evident that the oval must be found in the area between the two, somewhere around Aquarius, Pisces, or Taurus. Indeed, when we look at this segment of the sky, we can quite easily discover the oval around the modern constellation Pisces [fig. 7]. Given its simple shape, it is such a salient – and effortlessly noticeable – feature of the night sky that it is somewhat surprising that no one has so far proposed its equivalence with the oval of the astronomical diagrams.

In the case of the two previous constellations, the reference of the drawings of the astronomical diagrams is obvious, since we can recognise their shapes (a nautical vessel and a particular four-legged ruminant mammal), and they are named in one way or another in the decan list as well. Now we have a simple image of an oval, but the designations of the decans do not offer clues for its decipherment. From the five decan names above the constellation, probably three are closely connected with it: *ḫnt ḥr.w* "upper face", *ḫnt ḫr.w* "lower face", and *qd* "circumference".[58] While the first two may refer to the upper parts of the oval, the third one obviously designates it circular bottom half. Although the shape is simple, it is unlikely that it corresponds to an abstract entity, because all the other constellations in the

[57] *EAT* III, p. 2; K. LOCHER, "Two Further Coffin Lids with Diagonal Star Clocks from the Egyptian Middle Kingdom", *JHA* 23, 1992, p. 205; S. SYMONS, *Ancient Egyptian Astronomy*, p. 214.
[58] P.F. DORMAN, *The Tombs of Senenmut*, p. 142.

astronomical diagram depict something tangible that the Egyptians could see around them. A good starting point is to look at the captions that accompany the oval. One is written next to it on the right side and goes  . It has been interpreted, without any explanation, to be the corrupt form of "the sixth cluster", which supposedly got somehow misplaced in the design.[59] The other caption is at the bottom and reads  , which in fact also seems to be a corrupt form because it lacks the ordinal ending after the number. The simplest – and in my opinion, the most obvious – way to make sense of these legends is to suppose that a copyist, either someone working with the master copy (presumably a papyrus), or Senenmut's artist himself, exchanged their first parts. The great allure of this solution is that now we will have two gramatically correct expressions that fit into the context well: 4-*nw.t ḫ.t* "the fourth constellation", which should obviously come after the third one (the sheep), and the direct genitive *mw ḫ.t* "the water of the constellation".

As for the meaning of this latter label, a further clue is provided by the astronomical diagrams of Ramesses VI and VII, where the constellation coming after the sheep is depicted as an oval having a fishtail.[60] Therefore the fourth constellation is undoubtedly an ovoid creature that has something to do with water and resembles a fish, as has been correctly suspected before.[61] The best candidate, I think, is a tadpole, and the oval shows the contours of its body from above. This is markedly different from the hieroglyphic sign for the tadpole, which shows its profile from the side, and in a much more developed stage, as a "sitting frog" with a tail.[62] Perhaps this is the reason why the artists of Ramesses VI and VII represented the celestial tadpole as an odd mixture of iconographic traditions, the body seen from above combined with the profile of a fishtail. We should note, however that this image reappears in the vignettes of chapter 149 of the Book of Going Forth by Day,[63] and in several mythological papyri.[64] There it is muzzled by a crocodile, and thus the whole scene possibly makes a reference to a young crocodile chasing a tadpole, not a crocodile and some sort of a jar, as has been hitherto hypothesised.[65]

Having understood what the oval figure really shows, we can now realise that the constellation of the tadpole is also represented at the bottom of the south panel. In the column immediately to the right of the oval is an arrangement of seven stars, the top part of which undoubtedly recreates the body of the tadpole (the oval), while the two stars aligned at the lower part are its tail [fig. 8]. Therefore, Senenmut's astronomical diagram also displays the full representation of a tadpole, though unusually not with a line drawing but with a series of five-pointed stars. On the left of this tadpole we can, as reconstructed above, read "the water of the constellation", and can see more stars, some of them appearing in a recognisable V-formation (the left half encroaching on the column showing the striding man in a boat). We can find this V-shape in the sky, formed by a series of bright stars which meaningfully include the five easily noticable stars of Cassiopeia. These stars in fact, in a rudimentary way, write the hieroglyphic sign of water () on the sky.

[59] *EAT* III, p. 2, 115; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 175.
[60] *EAT* II, pl. 7; *EAT* III, pl. 13.
[61] *Ibid*., p. 2, 115.
[62] J.P. ALLEN, *Middle Egyptian*, p. 433.
[63] P.F. DORMAN, *The Tombs of Senenmut*, pl. 74–75.
[64] A. PIANKOFF, N. RAMBOVA, *Mythological Papyri*, *BollSer* 40, 1957, pl. 3, 8, 16.
[65] *Ibid*., p. 78; P.F. DORMAN, *The Tombs of Senenmut*, p. 129.

The Striding Man (Sah-Osiris)

Egyptian name:	*sꜣḥ* (meaning unclear)
Location:	around Orion
Principal stars:	head: λ Ori, φ1 Ori, φ2 Ori
	shoulders: α Ori, γ Ori
	arms: (figure's left arm, if lowered) ρ Ori, μ Eri; (left arm, if raised) π3 Ori, α Tau; (right arm) 56 Ori, HIP 28413, γ Mon
	sceptre: ε Mon, θ Lep
	kilt: ζ Ori, ε Ori, δ Ori, κ Ori, β Ori
	legs: ζ Lep, δ Lep, 60 Eri, 54 Eri

[figs. 9-10]

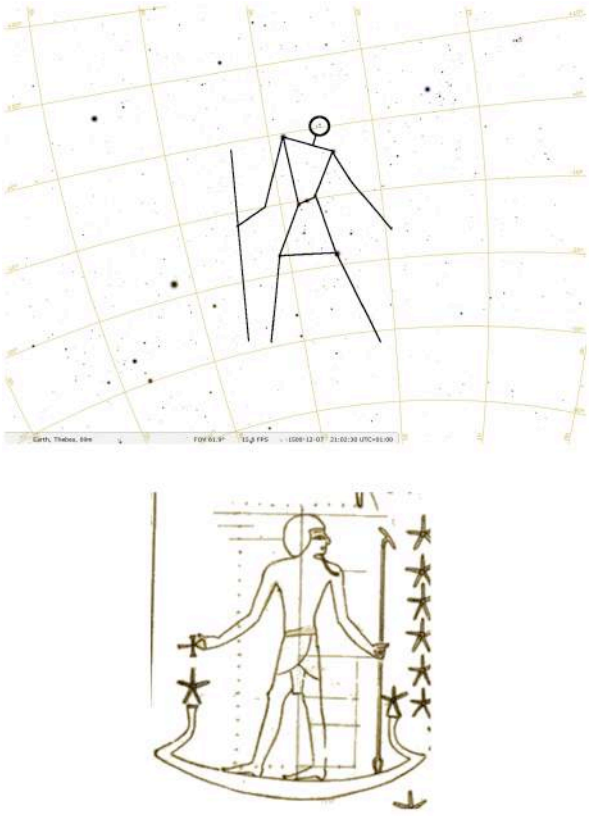

Fig. 9. The constellation of the striding man (Sah-Osiris), left arm lowered.

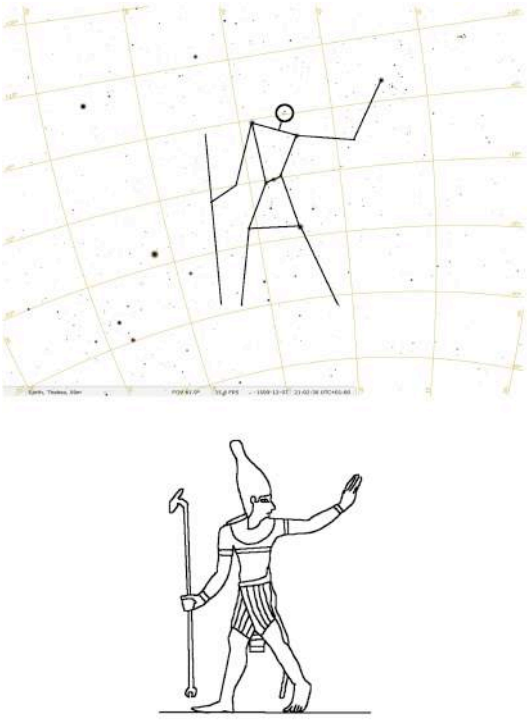

Fig. 10. The constellation of the striding man (Sah-Osiris), left arm raised (bottom: ceiling of the pronaos, Dendera). Bottom: drawing by the author.

It is generally accepted that the Egyptian constellation *sꜣḥ*, shown as a striding man, was closely associated with Osiris (being in fact the *ba* of Osiris), and corresponded in some way with the modern constellation Orion.[66] However, there is no agreement on the precise configuration of the ancient constellation, i.e. it is not entirely clear which stars made up its figure.[67] To my knowledge, currently there are two more or less justifiable views on the appearance of the constellation. One sees the head around λ Orionis, with α and γ Orionis making up the shoulders, the three belt stars forming the hip, and β and κ Orionis signalling the left and right leg, respectively.[68] The other concept is markedly different, because it equates the three belt stars of Orion with the three vertical strokes of the hieroglyph 𓉐, that is with the headdress ("crown") of the striding man, and then imagines his upper body and legs lower down, in the region of Lepus.[69]

Even in ancient sources a certain ambiguity exists in relation to the figure of the striding man because the Egyptians themselves depicted him in various ways. He may walk towards the left or right, may have both of his arms lowered, or may have one arm raised.[70] To arrive at a reasonable reconstruction of the striding man in the sky, the first step is to point out that all of his depictions have one thing in common: he invariably wears a kilt. The celestial equivalent

[66] J. VON BECKERATH, *LÄ* I, col. 511-514; R.A. PARKER, *PTRS* 276, p. 51; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 181.
[67] S. SYMONS, "A Star's Year: The Annual Cycle in the Ancient Egyptian Sky", in J. M. Steele (ed.), *Calendars and Years: Astronomy and Time in the Ancient World*, Oxford, 2007, p. 4, n. 19.
[68] Chr. LEITZ, *SAK* 34, p. 304-306.
[69] K. LOCHER, *JHA* 23, p. 204 fig. 3; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 160, fig. 6.2.
[70] *EAT* I, pl. 3-8, 17-21, 24.

of this piece of clothing can best be identified as the three stars of the belt of Orion (top), and the two stars β and κ Orionis (bottom edge). Since the belt line of this kilt drops towards the left, in accordance with the conventions of Egyptian iconographic representations, the upper body of its wearer must also face left. This implies that whenever for some aesthetic considerations in a particular scene Sah-Osiris is walking towards the right, in order to correlate this figure with his celestial equivalent we have to mirror him horizontally. Applying these rules, we can determine that in the vast majority of depictions Sah-Osiris holds the sceptre in his right arm, while his left arm is either lowered or raised. In most cases he turns his head backwards, and this feature of the depiction perhaps reflects the lack of a clear facial profile of the striding man in the sky. On the Middle Kingdom coffins in the caption to his figure he is entreated to turn back his face so that he could see Osiris;[71] thus, alternatively, the turning head may originate from a wish to iconographically link the east-facing body of Sah with the west, the abode of the dead Osiris. In Senenmut's diagram the striding man is travelling in a boat, but this is generally the means of transport gods use in the sky, so the vessel is not part of the constellation.

The considerations in the previous paragraph provide the guidelines for delineating the figure of Sah-Osiris in the sky. Acknowledging the considerable number of images that show the striding god with his left arm raised, both on Middle Kingdom coffins and in Graeco-Roman astronomical scenes,[72] I present two possible reconstructions [figs. 9-10]. We can see that Senenmut's drawing differs from the "ideal" design: while the man is walking from right to left, he is holding the sceptre in his left arm instead of the usual right one. As noted by Otto Neugebauer and Richard A. Parker, this peculiar arrangement is also somehow manifest in the list of the decans, because the normal order of "upper arm" followed by "lower arm" has been reversed.[73] Undoubtedly, this is yet another example for the imperfections of Senenmut's astronomical diagram. For this particular mistake two possible scenarios may be conjectured: either the decan list was jumbled up first, and then the image of the striding man was adjusted to the list by placing the sceptre in the left hand, or vice versa, the human figure was first drawn incorrectly, and then the decan list was slightly changed to better suit the pictorial reality of the representation.

Finally, two short remarks should be made. In the column left of the representation of Sah-Osiris is written 'the fifth constellation' (5-*nw.t ḫ.t*),[74] and this caption – as the continuation of the earlier designations of this kind – must have originally referred to the figure of the striding man. Its slight misplacement may have again arisen from the insufficient understanding of the original document from which Senenmut's design was copied. Above the striding man we can see three big stars [fig. 2], in all probability representing the three stars of the belt as they appear over the eastern horizon at their heliacal rising at dawn around 1500 BCE (or earlier), although again the directions are possibly reversed (they should slant to the right instead of the left). Their depiction may indicate that the Egyptians attached great importance to these stars, most probably because they pointed in the direction of the star Sirius.

[71] *Ibid*., p. 28-29.
[72] *Ibid*., pl. 9, 17-21; *EAT* III, p. 71, fig. 17; S. SAUNERON, *Esna* IV/1. *Le temple d'Esna, textes n^os 399-472*, Cairo, 1969, fig. 1 (= *Esna* IV); S. CAUVILLE, *Le temple de Dendara* X. *Les chapelles osiriennes*, Cairo, 1997, pl. 260 (= *Dend.* X); S. CAUVILLE, *Dendara* XV. *Traduction*, pl. viii.
[73] *EAT* III, p. 112-114.
[74] P.F. DORMAN, *The Tombs of Senenmut*, p. 142.

The Standing Woman (Isis-Sopdet)

Egyptian name:	*ȝs.t-spd.t* "Isis, the star Sirius" (the Egyptian goddess Isis-Sopdet)
Location:	in the area of Canis Major, Puppis, and Vela
Principal stars:	star above headdress: α CMa,
	headdress: γ CMa, ι CMa, π CMa, o2 CMa, o1 CMa, ν2 CMa, β CMa
	head: κ CMa, ε CMa, δ CMa, η CMa
	body: c Pup, γ Vel, δ Vel, ι Car, θ Car, ω Car, υ Car, ε Car, χ Car, σ Car, π Pup
	arms: (raised) l Pup, ρ Pup, HIP 36795; (left) L2 Pup, H Pup, τ Pup
	sceptre: ν Pup, β Car

[fig. 11]

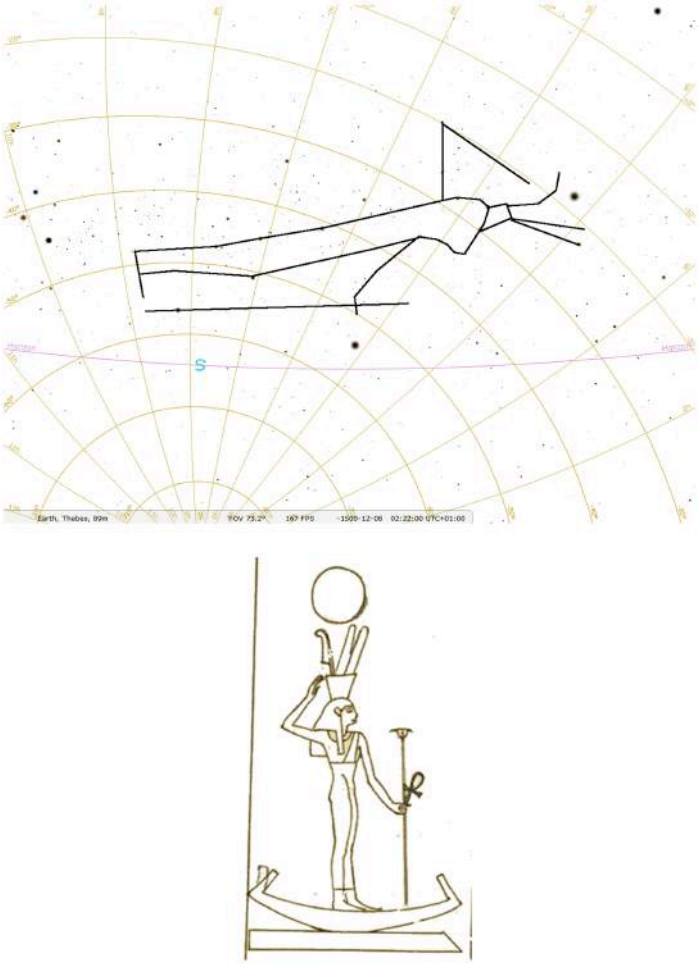

Fig. 11. The constellation of the standing woman (Isis-Sopdet) .

Just like the correspondence of *sȝḥ* with Orion, the equivalence of the star *spd.t* with Sirius (α CMa) is firmly established.[75] This star is the "main building block" of the constellation that is depicted in the astronomical diagrams as a standing woman, the goddess Isis-Sopdet, and is represented as a great disc above her headdress. Since Egyptian texts often associate Isis with the star Sirius, the question may arise whether the presence of the goddess in the column of the decan is simply symbolic, and perhaps does not signal the existence of a corresponding constellation in the sky. Her unusual arm gesture, somewhat reminiscent of Min's poise, possibly indicates that the figure originates from the patterns of stars around Sirius. Also, on the Middle Kingdom coffin lids Isis-Sopdet is shown with a thin isosceles triangle on her head. This triangle no doubt refers to the stars α, δ, and ε Canis Majoris, and – as Sirius forms the pointed end of this formation – offers a good explanation for the star's Egyptian name (*spd* "sharp").[76]

Therefore, as the earlier images of the standing woman were connected with an asterism, and as Isis-Sopdet is situated on the same level as the other constellations in Senenmut's diagram, her figure should match the outline of stars to the south-east of Sirius [fig. 11]. Her headdress of three plumes is significantly different from the pointed triangle, so represents a tradition that was not followed in the region where the majority of the coffin lids originate from (Asyut). Again, the boat and the pedestal beneath the feet of the figure are considered as symbolic elements of the design. The statement cited in the description of the striding man applies here, too: although *spd.t* was beyond any doubt the star Sirius, attempts to match it with the possible constellation or constellations attached to it are not numerous. The few exceptions associate it with a smaller region of the sky than my proposed reconstruction here.[77]

The Two Turtles

Egyptian name:	*st.wj* "two turtles"
Location:	immediately to the south of Leo
Principal stars:	upper turtle: (head and neck) κ Leo, λ Leo, ε Leo, ζ Leo, γ Leo; (carapace) η Leo, o Leo, 2 Sex, ι Hya, α Sex, ρ Leo, 46 Leo
	lower turtle: (head and neck) δ Leo, θ Leo, β Leo; (carapace) ι Leo, χ Leo, c Leo, 58 Leo, p2 Leo, ϕ Leo, e Leo, υ Leo, β Vir, ν Vir, ξ Vir

[fig. 12]

[75] J. VON BECKERATH, *LÄ* I, col. 511-514; R.A. PARKER, *PTRS* 276, p. 52; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 161.
[76] Chr. LEITZ, *SAK* 34, p. 306-307.
[77] *Ibid*., p. 306-307; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 160, fig. 6.2.

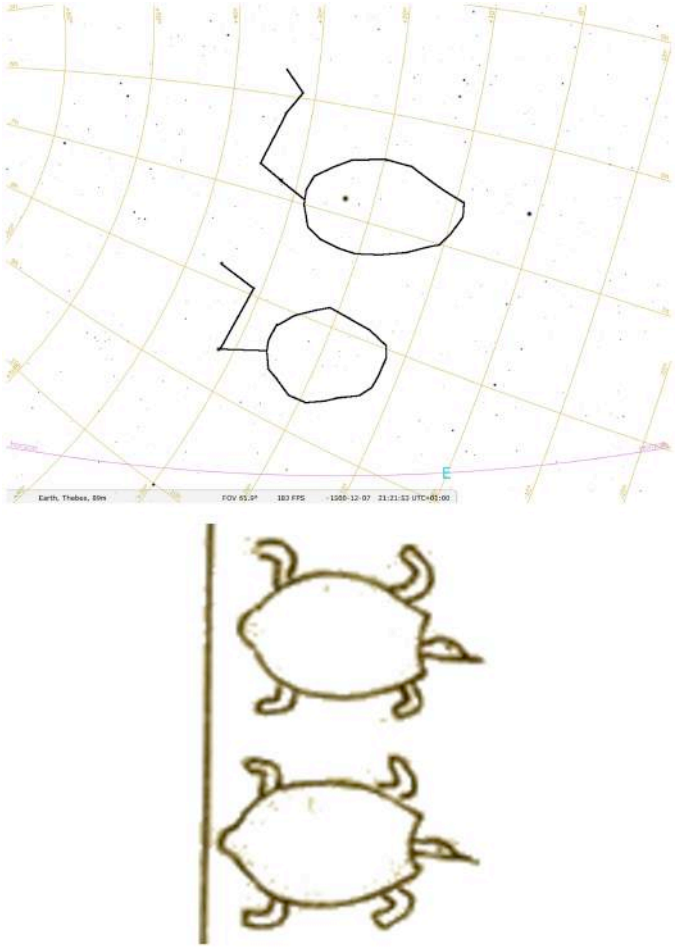

Fig. 12. The constellation of the two turtles.

According to the layout of the southern panel of the astronomical diagram, the constellation of the two turtles is situated further to the east from Sirius. It is also one of the so-called "triangle decans", that is a group of asterisms that were used to keep track of the night hours in the epagomenal days.[78] Since the decan "middle of the ship" corresponds to Libra, the whole setup indicates that the two turtles must be found somewhere in between, around either Leo or Virgo. Interestingly enough, some textual references to the turtle dating from the Graeco-Roman Period may narrow down this choice. At that time the rising of the turtles was strongly linked to the appearance of the star Sirius, the harbinger of the inundation.[79] From Plutarch we also know that the Nile flood arrived, at least ideally, when the sun came into conjunction with Leo.[80] The connection between the inundation and Leo is also apparent in the Graeco-Roman zodiacs, in which the rising waters of the Nile are represented by a whirling snake depicted next to the sign of Leo.[81] All this then implies that the constellation of the two turtles must be located in the vicinity of Leo. Indeed, the outlines of the pair of

[78] *EAT* I, p. 2, 107-113.
[79] A. GUTBUB, "La tortue animal cosmique et bénéfique à l'époque ptolémaïque et romaine", in *Hommages à la mémoire de Serge Sauneron 1927-1976* I. *Égypte pharaonique*, *BdE* 81, 1979, p. 413-425; O.E. KAPER, "The Astronomical Ceiling of Deir El-Haggar in the Dakhleh Oasis", *JEA* 85, 1995, p. 183.
[80] J.G. GRIFFITHS, *Plutarch*, p. 177.
[81] L. KÁKOSY, "The Astral Snakes of the Nile", *MDAIK* 37, 1981, p. 255-260.

chelonians can be discovered in that region of the sky precisely [fig. 12]. There they face left, but in Senenmut's astronomical diagram they of course look into the opposite direction, in compliance with its overall iconographic orientation. Also, in the drawing they have short necks, but the appearance of the asterism – according to my proposed reconstruction, and more in harmony with Graeco-Roman representations[82] – suggests a correspondence with the long-necked Nile softshell turtle.[83]

The position of the constellation of the two turtles may find further support in the enigmatic statements of chapter 161 of the Book of Going Forth by Day: "Re lives, the turtle dies".[84] This formula was often inscribed onto funerary equipment and tomb walls, and wishing the death of the turtle was quite understandable for the Egyptians, as the animal – due to its shadowy existence in murky waters, and notwithstanding its association with the beneficial inundation – was often seen as a representative of disorder and the enemies of the sun god.[85] The spell undoubtedly also has a cosmic character as its title promises to make an opening in the sky, and the four cardinal directions are also invoked in it.[86] Around the middle of the 2nd millenium BCE, when the sun was rising at dawn on the eastern horizon at the time of the winter solstice, the two turtles were simultaneously setting in the west, the realm of the dead. This was of course the period when each year the sun, after the days of the longest nights, was reborn, as it again started its march northwards when seen at its time of rising on the eastern horizon. The magical formula of spell 161 captures this moment in the annual cycle of the sun, and confers its beneficial effects on the deceased by repeatedly stating that "Re lives, the turtle dies" – the sun emerges in the east, and the two turtles go under in the west.[87]

In the column left of the two turtles we can read the caption *ḫ.t pw* "this is a constellation" (literally "this is a body"). Previous researchers believed that its reference is the next decan of the list, *nsr.w*,[88] under which it actually appears, but in my interpretation it is again slightly misplaced and in fact pertains to the almost adjacent image of the two turtles. The wording implies that in a sense this was the first constellation to be looked at (i.e. the first on the left of the central figure of Isis-Sopdet), perhaps on a long-lost prototype of the astronomical diagrams which had a circular layout similar to the water clocks. The phrase with the accompanying image demonstrates to the reader what the word *ḫ.t* means in the particular context of the document, and should obviously count as the first constellation. Then logically the second constellation is the ship, although its caption was lost at some point. The third constellation is the sheep, and it in fact has this designation in the astronomical diagrams.

[82] *EAT* III, pl. 47, 50.
[83] H.G. FISCHER, *Ancient Egyptian Representations of Turtles*, New York, 1968, p. 5-6.
[84] T.G. ALLEN, *The Book of the Dead or Going Forth by Day: Ideas of the Ancient Egyptians Concerning the Hereafter as Expressed in Their Own Terms*, *SAOC* 37, 1974, p. 157.
[85] H.G. FISCHER, *Ancient Egyptian Representations of Turtles*, p. 6-7.
[86] T.G. ALLEN, *The Book of the Dead or Going Forth by Day*, p. 156-157.
[87] For further comments on the two turtles, see the section on the crocodile with straight tail below.
[88] *EAT* III, p. 116-117; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 176.

Northern Constellations

The Ovoid Bull

Egyptian name:	*msḫt.jw* (meaning unclear)
Location:	stretching from Bootes to Lyra (Vega)
Principal stars:	horns: ρ Boo, ε Boo, δ Boo, β Boo, γ Boo
	head: μ Boo, ν Boo, χ Her, τ CrB
	ovoid body (foreleg):, η Her, π Her, ζ Her, ε CrB, δ CrB, γ CrB, α CrB, β CrB
	line of three stars (lower leg): π Her, θ Her, α Lyr

[fig. 13]

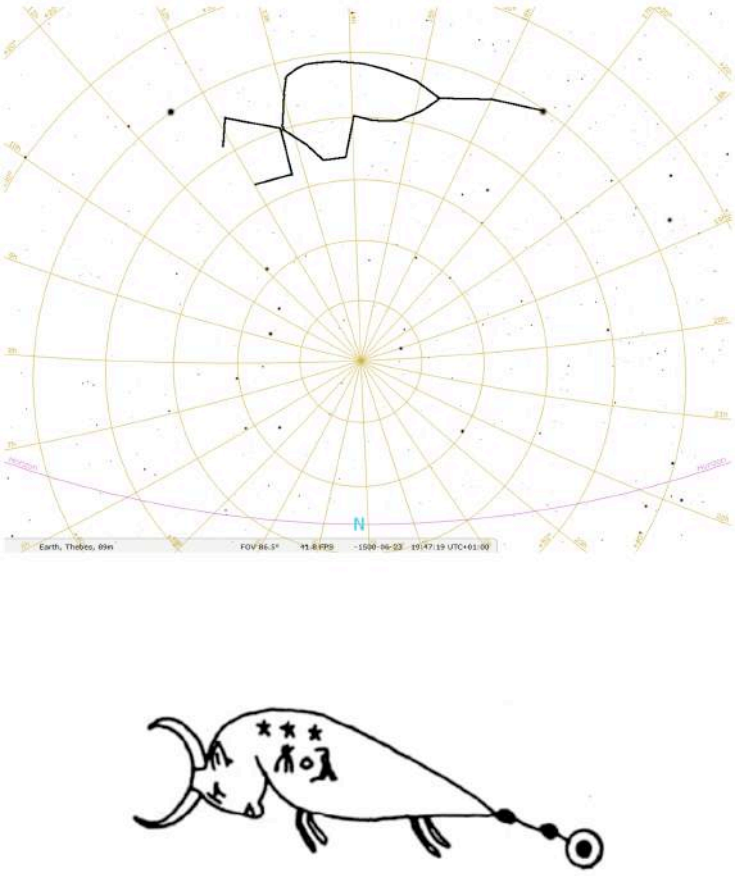

Fig. 13. The constellation of the ovoid bull (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 150, fig. 1).

The key constellation of the northern panel is depicted as an ovoid with a line of three stars at its thin end, tiny legs, and the head of a bull at its other extremity (perhaps inspired by a bull fetus). It dominates the scene because two long vertical lines forming a long narrow triangle emanate from its tail end and reach the ground between the figures of the rest of the constellations. Its name is given in the oval as *msḫt.jw* and this asterism, often understood as the Foreleg of Seth which Egyptian texts claim to have been cut off and thrown to the sky,[89] has for more than a century been almost unequivocally identified as the seven bright stars of Ursa Major.[90] There are indeed some really compelling arguments to support this interpretation. On the Middle Kingdom coffin lids *msḫt.jw* is shown as a bull's foreleg with seven stars inside [fig. 1]. Their arrangement resembles the appearance of the Plough, though the middle star in what we would call the "handle" has a right "kick", rather than a left one, but this may result from the reversion of the image. The form of the constellation is perhaps better reflected by the adze that is used in the "Opening of the Mouth" ritual, itself bearing the homophonous name *msḫt.jw*.[91] The asterism is described as belonging to the "imperishable ones" (*jḫm.w-sk* "those who do not know destruction") in the Pyramid Texts,[92] i.e. being situated among the circumpolar stars that never set below the horizon,[93] or the stars north of the ecliptic that can be seen for some time each night.[94] This concept seems to be reinforced by the much later representations on the sarcophagus of an Apis bull, dated to the reign of Nectanebo II, which show the positions of the Foreleg in all the twelve months of the year,[95] again suggesting that it is always seen in the sky (although the actual positions are not realistic). In addition, in his treatise on Isis and Osiris, Plutarch states that the soul of Seth resides in the constellation of the Bear,[96] which can hardly mean anything else than Ursa Major. The whole statement is thus in unison with the Egyptian sources about Seth's foreleg being fixed in the northern sky.

It is therefore evident that a number of attestations depict or describe *msḫt.jw* as a bull's foreleg, and hint at its identity with the asterism called the Plough. Yet none of the astronomical diagrams represent it as a foreleg. It is either shown as an ovoid bull (Senenmut and derivatives), or a proper bull (Seti I and its later copies). In both variations of the northern panel captions identify these figures with *msḫt.jw*, and this fact itself suggests that the expression had a loose semantic field, or was inherently multivalent (after all, it does seem to be a plural nisbe form). It may be concluded that at least three different traditions existed about *msḫt.jw*. A pertinent later case is the two zodiacs in the Dendera temple. In the circumpolar area of the round zodiac the foreleg is put next to Gemini, Cancer, and Leo, [97] where in fact Ursa Major is roughly located in the sky. In the rectangular zodiac the same area of the sky is invoked by a bull-headed foreleg, chained to the mooring post of the celestial hippopotamus, which is being attacked by the figure called "Horus who strikes the enemies"

[89] J. VANDIER, *Le papyrus Jumilhac*, Paris, 1961, p. 108, 129; A. VON LIEVEN, *Der Himmel über Esna*, p. 21; M. MÜLLER-ROTH, *Das Buch vom Tage*, *OBO* 236, 2008, p. 285.
[90] J. VON BECKERATH, *LÄ* I, col. 511-514; R.A. PARKER, *PTRS* 276, p. 51; Chr. LEITZ, *SAK* 34, p. 294-295; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 161.
[91] A.M. ROTH, "Fingers, Stars, and the 'Opening of the Mouth': The Nature and Function of the *nṯrwj*-blades", *JEA* 79, 1993, p. 70.
[92] *Pyr*. §458a-c.
[93] J. VON BECKERATH, *LÄ* I, col. 511-514.
[94] R. KRAUSS, *Astronomische Konzepte und Jenseitsvorstellungen in den Pyramidentexten*, *ÄA* 59, 1997, p. 86-130.
[95] *EAT* III, pl. 24.
[96] J.G. GRIFFITHS, *Plutarch*, p.151.
[97] *Dend.* X/2, pl. 60.

(*Ḥr.w ḥwj sbj.w*).[98] Earlier I conjectured that the spear-wielding Horus had been left out of the design of the round zodiac for the lack of space,[99] but it is equally possible that the two scenes were never to be mixed: *msḫt.jw* could take the form of a proper foreleg and could be depicted on its own (as also on Middle Kingdom coffins), or could be shown with a bull's head, but if so, it had to be accompanied by its attacker or restrainer (as in the astronomical diagrams).

Previous researchers – prompted by the Graeco-Roman depictions combining the foreleg and the bull's head – have taken it for granted that the foreleg and the ovoid bull were one and the same, and they both corresponded to Ursa Major.[100] This is, despite all appearances, certainly not the case in the astronomical diagrams, because when we apply the method of visual resemblance for identifying the Egyptian constellations, we can see that the celestial equivalent of the ovoid bull does not reside in Ursa Major, but around the modern constellations of Bootes, Hercules, and Corona Borealis [fig. 13]. Several details of the figure confirm this identification. The three five-pointed red stars in the "shoulder" area in all probability want to accentuate the string of stars in the outline of the bulbous end of the ovoid, now making up Corona Borealis. At the opposite end, the rightmost star is given special emphasis, as it is marked by a large red dot surrounded by a circle. This is Vega (α Lyr), the fifth brightest star in the night sky. The small legs possibly stem from the artist's imagination in Senenmut's diagram, though they may be inspired by some brighter stars nearby, especially β and γ Draconis.

All this suggests that whereas later – possibly already in the New Kingdom – the ideas about the foreleg and the ovoid bull may have been conflated, originally they were separate entities whose celestial images were also different. This effectively means that our understanding of ancient Egyptian astronomy was for more than a century based on a false premise, which in fact seriously thwarted the identification of the constellations in the northern panel of the astronomical diagrams. Since three different figures, the foreleg, the ovoid bull, and the standing bull, were all called in various contexts *msḫt.jw*, it was assumed that an inherent quality of this constellation was its "bullness" finding its expression in the different images, and that all three of these referred to the same pattern in the sky, the Plough.[101] This was an absolutely reasonable assumption, but what is reasonable may not necessarily be true. It was not the case that there was one single constellation in the sky that could be symbolically represented in three different ways, but quite the opposite: there were three different constellations in the sky that for some yet to be determined reason could all bear the name *msḫt.jw*.[102] To complicate matters, one of these, precisely the one formed by the seven bright stars of Ursa Major (the Foreleg), could also be part of yet another constellation that was represented figuratively in a totally different way as a spear-wielding man (see discussion below). However odd these statements are, their acceptance provides us with a key to the identification of the northern constellations of the astronomical diagrams.

Having established the true identity of the ovoid bull, we can see that it is positioned in the astronomical diagram in such a way that its brightest star, Vega, one of the most conspicuous features of the summer sky, is at its highest point along its course through the sky; in modern

[98] S. CAUVILLE, *Dendara* XV. *Traduction*, p. 64-65, pl. viii.
[99] G. PRISKIN, *ENiM* 8, p. 174.
[100] *EAT* III, p. 183; V.L. DAVIS, "Identifying Ancient Egyptian Constellations", *JHA* 16, 1985, p. 103; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 161.
[101] V.L. DAVIS, *JHA* 16, p. 103; M. CLAGETT, *Ancient Egyptian Science* II, p. 115.
[102] Though the three constellations are different, the name which links them together, *msḫt.jw*, surely has something to do with bulls.

terms, it culminates along the meridian.[103] This interpretation is of course also prompted by the vertical line that is drawn from it to the ground. Another line, also starting from Vega, touches the ground slightly to the left. The obvious conclusion is that these elements of the design indicate that the vertical line between Vega's highest point (culmination) and the ground somehow shifted towards the right (eastwards) in relation to the other constellations depicted at the bottom. If we translate this into modern parlance, it is clear that the lines drawn from Vega record the wobble of the earth's axis which causes the precession of the equinoxes. The thin right-angled triangle in Senenmut's diagram thus acknowledges the wandering of the north celestial pole. The angle between the two legs of the triangle equals about four degrees, which corresponds to a change that occurs in about 290 years. If the vertical line refers to the time when Senenmut's tomb was built (*ca*. 1480 BCE), then the slant line points to a time three centuries earlier (about 1770 BCE), which signals the demise of the 12th dynasty. In this way, possibly a symbolic connection was sought with the great rulers of the past (the heydays of the Middle Kingdom). On the other hand, it is equally possible that the narrow triangle was present on the master copy in Senenmut's hands, and records the offset of the constellations between any two dates separated by about 290 years.

The Spear-Wielding Man

Egyptian name:	*Ḥr.w* "Horus" (Seti I), *Ḥrw ḫwj sbj.w* "Horus who strikes the enemies" (Dendera), *ʿn.w* "the one who turns back"
Location:	almost entirely overlapping Ursa Major
Principal stars:	torso: γ UMa, δ UMa, α UMa, β UMa
	upper arm: ε UMa, ζ UMa, η UMa
	spear: α Lyn, μ UMa, ψ UMa, χ UMa
	legs: θ UMa, ι UMa, h UMa, o UMa

[fig. 14]

Two very similar figures are depicted below the ovoid bull, left of the slender triangle. One stands on the ground, has a human head, and seems to spear the crocodile in front of him, though the weapon itself is missing from his hands. The other one is falcon-headed, and is shown as if the man on the ground had been flipped and turned around by 90 degrees. He is holding a spear with which he seems to strike the ovoid bull above. When we look at the corresponding area of the sky in the north-west, we cannot fail to realise that at first glance only the outlines of one of these figures, the upright man, is drawn on the sky by the stars of the constellation of Ursa Major [fig. 14]. That this figure is shown twice in the astronomical diagram suggests that the Egyptians viewed it as a double-natured character in the sky. In other words, when seen from the left, the man is piercing the crocodile in front of him, his spear pointing downwards, whereas seen from the right he is poking at the ovoid bull above him, his spear pointing upwards. The rules of Egyptian iconography dictated that a victorious warrior or hunter could never be depicted under their prey, so the designers of the

[103] For the idea that the lines are related to a star's culmination, see A. POGO, "The Astronomical Ceiling-Decoration in the Tomb of Senmut (XVIIIth Dynasty)", *Isis* 14, 1930, p. 310-311.

astronomical diagram overcame this problem by duplicating the figure of the celestial spear-wielding man. Now we can understand why he – i.e. one of his personas – is sometimes identified as Horus, whereas his alter ego bears the name *ʿn.w*, because this expression can be translated as "the one who turns back",[104] or – due to the ambiguities of hieroglyphic writing – something very similar (for example "the one who has turned back", or "the one who is turned back").

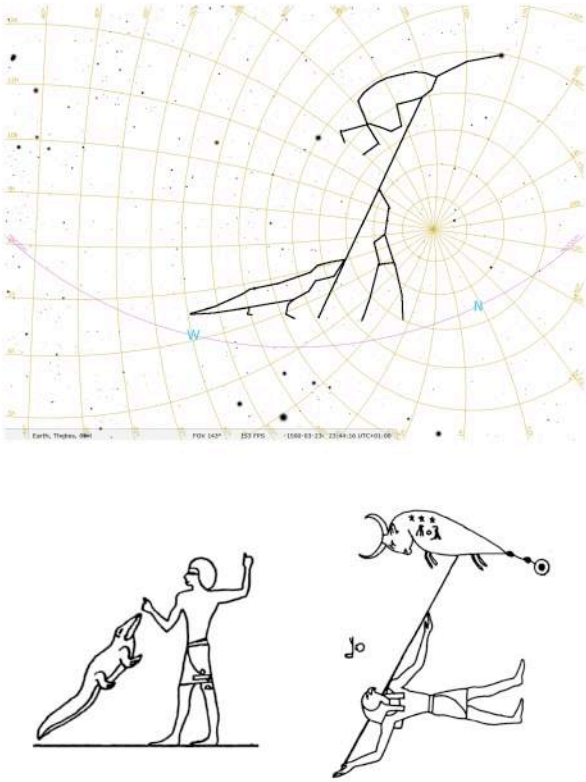

Fig. 14. The constellation of the spear-wielding man (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 150, fig. 1).

Curiously enough, the same asterism, the seven stars of the Plough, as explained in the previous section, can elsewhere represent a foreleg, while in the astronomical diagrams they are equated with the upper body of the spear-wielding man. As I pointed out earlier, the Egyptians could interpret one thing from many different angles, and we can see from my analysis here that the same stars could belong to various constellations depending on the particular viewpoint of the ancient observers. The case is somehow different here, however, because a number of written sources definitely associate the celestial foreleg with Seth,[105] whereas according to the astronomical diagrams the seven bright stars of Ursa Major project the image of his archenemy, Horus, onto the sky. The picture is further complicated by the fact that the foreleg on the Middle Kingdom coffins is called *msḫt.jw*, while this designation

[104] *Wb* I, 188, 13-189, 7.
[105] J. VANDIER, *Le papyrus Jumilhac*, p. 108, 129; A. VON LIEVEN, *Der Himmel über Esna*, p. 21; M. MÜLLER-ROTH, *Das Buch vom Tage*, p. 285.

is used for the ovoid bull (Senenmut) and the standing bull (Seti I) in the astronomical diagrams. The Pyramid Texts classify *msḫt.jw* as part of the circumpolar stars, or the stars north of the ecliptic, and both the foreleg and the ovoid bull lie in that region of the sky; however, the true bull was partly made up of stars that disappeared completely from the sky for some time (see below).

The alternative visualisations of the Plough evoking two opposing gods are matched by the contradictory descriptions of the nature of *msḫt.jw* in the Egyptian sources. In the Pyramid Texts and Coffin Texts it does not have any negative overtones.[106] It is in the Book of the Day in the tomb of Ramesses VI that *msḫt.jw* is first associated with Seth,[107] and this idea is then repeated in Graeco-Roman texts.[108] But even after the New Kingdom, there are a number of attestations in which it appears to have a positive role, for example on the sarcophagus of the Apis bull mentioned above, or in the late composition known as the Book of Overthrowing Apep.[109] We should perhaps also mention that in one episode of the New Kingdom story about the contendings of Horus and Seth they both transform into hippopotami, so it was not unheard of in ancient Egypt that they could have the same "avatar" (for he full astral connotations of this story, see the discussion in the section about the harpoon below).[110]

Having said all this, at present I cannot fully reconstruct how the different concepts about *msḫt.jw*, the spear-wielding man, and the seven conspicuous stars of Ursa Major were developed, whether they deliberately existed side by side due to a unifying narrative (myth), or a misunderstanding on the part of the ancient Egyptians was also at play here. A potentially plausible explanation for the varied representations of the same asterism may be that – at least, originally – it was interpreted differently at its contrasting positions in the sky: when the "handle" of the Plough (ε UMa, ζ UMa, η UMa) pointed south, the whole star pattern was seen as a foreleg, while at the time when it pointed north, the same set of stars were equated with a man holding a spear.[111]

The Crocodile with Straight Tail

Egyptian name:	*ḥtp-rd.wj* "restful of feet"
Location:	from Leo Minor through Leo to Hydra
Principal stars:	head: ψ UMa, ω UMa, HIP 51658, β LMi, 30 LMi, 37 LMi, 46 LMi, 49 UMa
	body: μ Leo, o Leo, π Leo, α Leo, γ Leo
	feet: (front) ε Leo, λ Leo, κ Leo; (back) 6 Leo, ξ Leo
	tail: 10 Leo, τ2 Hya, α Hya, ι Hya, π Leo

[fig. 15]

[106] *Pyr*. §458a-c; *CT* I, 264c; *CT* V, 166d, 167P; *CT* VI, 51c, 318o.
[107] M. MÜLLER-ROTH, *Das Buch vom Tage*, p. 285.
[108] J. VANDIER, *Le papyrus Jumilhac*, p. 108, 129; A. VON LIEVEN, *Der Himmel über Esna*, p. 21.
[109] R.O. FAULKNER, *The Papyrus Bremner-Rhind (British Museum No. 10188)*, *BiAeg* 3, 1933, p. 64.
[110] A.H. GARDINER, *Late Egyptian Stories*, *BiAeg* 1, 1932, p. 48; W.K. Simpson (ed.), *The Literature of Ancient Egypt: An Anthology of Stories, Instructions, Stelae, Autobiographies, and Poetry*, 3rd ed., New Haven, London, 2003, p. 97.
[111] Cf. S. SYMONS, in D. Bawanypeck, A. Imhausen (eds.), *Traditions of Written Knowledge*, p. 103, n. 11.

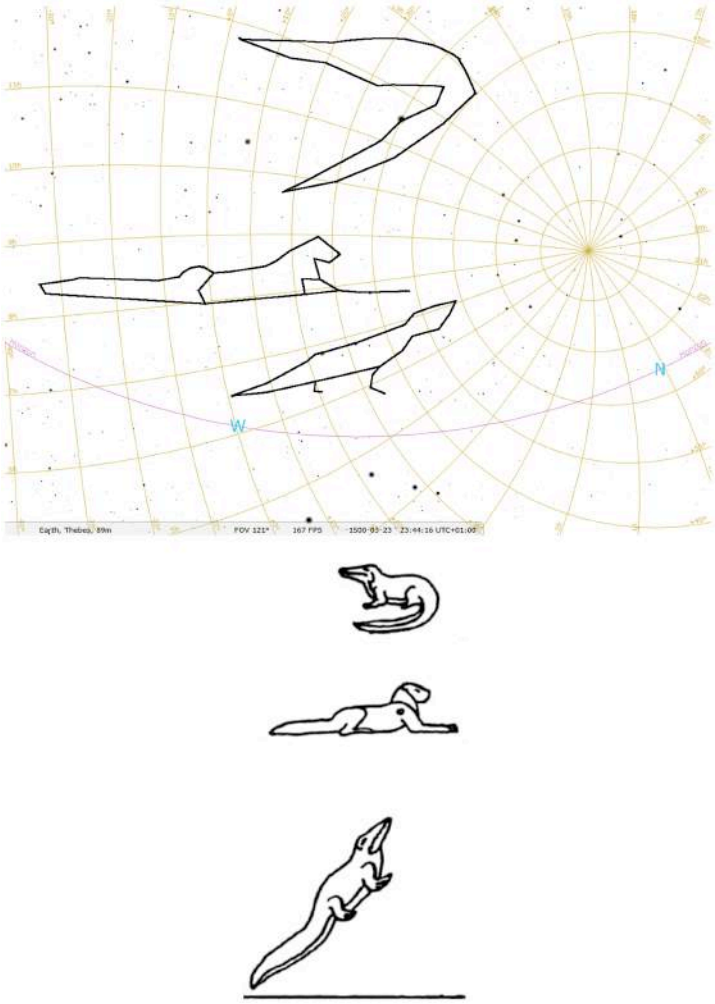

Fig. 15. The constellations of the crocodile with straight tail, the recumbent lion, and the crocodile with curved tail (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 150, fig. 1).

The outlines of the crocodile with straight tail can easily be discovered in front of the spear-wielding man. The positioning of the two figures in Senenmut's diagram – the man being upright, the crocodile depicted at an angle – reflects their appearance in the sky when the ground line is defined by the stance of the man [fig. 15]. The crocodile bears the name *ḥtp-rd.wj* "restful of feet", an epithet of the god Sobek.[112] It should be noted that the body of this celestial reptile overlaps one of the turtles from the leftmost constellation of the southern panel. Thus the spear-wielding man can also be seen as attacking the turtle. Indeed, the astronomical diagram in the now destroyed tomb of Petosiris in Atfih (Ptolemaic Period), which had some other peculiar features, depicted the spear-wielding man thrusting his weapon into a turtle, situated in front of the celestial crocodile.[113] Thus, incidentally, this late scene provides further proof for the identification of the decanal constellation of the two turtles, too.

The image showing the spear-wielding man with the turtle finds its textual and visual echoes outside the astronomical diagrams in the references to the slaying of the turtle by Horus

[112] *LGG* V, 577.
[113] *EAT* III, p. 64-67, fig. 15.

dating from the Graeco-Roman Period,[114] when – as explained above – the turtle, besides its close links with the inundation, continued to be viewed as a token representative of the enemies of divine beings with solar associations. This is of course testimony to the tenacity of the theme about the turtle presented as the enemy of the sun god in chapter 161 of the Book of Going Forth by Day. A fine example of Horus spearing the turtle is found in the tomb of a man also called Petosiris in the Dakhla oasis (beginning of 2nd century CE), where the cosmic connotations of the relevant scene – the falcon-headed god triumphing over the turtle, a fish, and a snake – are created by the zodiacs appearing on the ceilings of the underground edifice.[115]

The Recumbent Lion with Crocodile Tail

Egyptian name:	*rw-nṯr.j-n.tj-jm.jt≠snj* "divine lion that is between the two of them"
Location:	on and south of the ecliptic, from Leo through Crater to Vela
Principal stars:	head: ξ Vir, β Leo, o Vir
	body: (back) β Vir, υ Leo, e Leo, ε Crt, δ Crt, γ Crt; (front leg) ν UMa, δ Leo, θ Leo, ι Leo, σ Leo, χ Leo; (hind leg) ν Hya, α Crt, δ Crt
	tail: p Vel, μ Vel, i Vel, ι Ant, χ Hya, β Crt

[fig. 15]

The recumbent lion lies horizontally when it is seen in relation with the spear-wielding man. The rare dual form of the third person plural suffix pronoun in its name, *rw-nṯr.j-n.tj-jm.jt≠snj* "divine lion that is between the two of them", expresses the fact that the animal is positioned between the two crocodiles belonging to this group of the constellations.[116] In several astronomical diagrams the contours of the animal's body are marked by a series of five-pointed stars,[117] possibly acknowledging the fact that its outline stands out in a well-discernable fashion in the sky. The lion can appear with a crocodile tail, as in Senenmut's diagram, but also with a normal tail, as for example in Seti I's tomb; in both cases the end of the tail can be marked by a single star,[118] which is most probably a reference to μ Velorum.

[114] A. GUTBUB, in *Hommages à la mémoire de Serge Sauneron 1927-1976* I, p. 396, 408-413; R. JASNOW, K.-T. ZAUZICH, *The Ancient Egyptian Book of Thoth: A Demotic Discourse on Knowledge and Pendant to the Classical Hermetica*, Wiesbaden, 2005, p. 333-334.
[115] J. OSING, M. MOURSI, D.O. ARNOLD, O. NEUGEBAUER, R.A. PARKER, D. PINGREE, M.A. NUR-EL-DIN, *Denkmäler der Oase Dachla aus dem Nachlass von Ahmed Fakhry*, *AV* 28, 1982, pl. 26, 32, 38-41.
[116] *EAT* III, p. 192-193; P.F. DORMAN, *The Tombs of Senenmut*, p. 145.
[117] *EAT* III, pl. 3, 7, 9, 19.
[118] *Ibid*., pl. 3, 9.

The Crocodile with Curved Tail

Egyptian name:	*sȝq* "crocodile"
Location:	in Virgo and Bootes
Principal stars:	head: α Lib, 16 Lib, 110 Vir, μ Vir, 109 Vir
	body: α CrB, δ Boo, ζ Boo, ψ Boo
	tail: ρ Boo, ε Vir, γ Vir, δ Vir, η Boo, α Boo, ε Boo

[fig. 15]

In Senenmut's diagram the name of the crocodile appears higher up, next to the scorpion headdress of Serket, reflecting the actual position of the constellation in the sky. The name written next to the crocodile with curved tail, *ḥȝq.w* "the plunderer", does not refer to the reptile, as is often supposed,[119] but clearly belongs to the first small human figure in the procession of the eponymous lunar deities on the left, which is a repetition of the last figure on the right, bearing the same name. This is so, even if the hieroglyphs in the name face the same direction as the crocodile, which is possibly yet another small mistake made by Senenmut's artist. A number of astronomical diagrams omit the constellation of the crocodile with curved tail, or just seem to represent it by its name, in such a way that the small figure of the crocodile is the determinative (as in the tomb of Seti I, see [fig. 3]).[120]

[119] *Ibid*., p. 193; P.F. DORMAN, *The Tombs of Senenmut*, p. 145; M. CLAGETT, *Ancient Egyptian Science* II, p. 117; J. LULL, J.A. BELMONTE, in J. A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 166.
[120] *EAT* III, pl. 9, 13, 15, 19, 25, 28, 50.

The Hippopotamus

Egyptian name:	*rr.t* "female hippopotamus" (Book of the Day), *rr.t-wr.t* "the great female hippopotamus" (pJumilhac), *Jp.t* "Ipet" (name of the hippopotamus goddess; Shanhur ceiling)
Location:	roughly parallel with the ecliptic, from Serpens and Ophiuchus to Cepheus, Andromeda, and Pegasus
Principal stars:	head: α Her, β Her, γ Ser, β Ser, α Ser, δ Oph, ζ Oph, η Oph, ξ Ser, ν Oph,
	body: α Sct, λ Aql, θ Aql, α Equ, ε Peg, ι Peg, 1 Lac, α Lac, ζ Cep, α Cep, ι Cyg, α Lyr, α Oph
	feet: ι Peg, λ Peg, β Peg, η Peg, ο And, ι And, λ And, 3 And
	hands: ξ Her, θ Her, θ Dra, ζ Aql, γ Lyr, α Lyr, γ Dra
	mooring post: ι Dra, θ Dra, η Dra, α UMi
	crocodile in hand: ι Her, β Dra, γ Dra, ν Dra, δ Dra, ε Dra, γ Cep, β Cep, ρ Dra, ο Dra
	'hive' on the back (Senenmut): ξ Ser, θ Oph, μ Sgr, ξ Sgr, α Cap, β Aqr, α Aqr, ζ Aqr, θ Peg, ε Peg
	crocodile on the back (Senenmut): θ Oph, γ Sgr, δ Sgr, ζ Sgr, ω Cap, ζ Cap, δ Cap, ι Cap, β Cap, π Sgr, ξ Sgr
	crocodile on back (Seti I): (head) μ Ser, ξ Sco, ψ Oph; (body) θ Oph, λ Sgr, π Sgr, β Cap, ν Oph, λ Aql; (tail) β Aqr, α Aqr, α Peg, ε Peg

[fig. 16-17]

On the right side of the thin triangle in Senenmut's astronomical diagram – and in the other documents of the same kind, opposite the hunter, crocodile, and the recumbent lion – only one large composite constellation is depicted: an upright hippopotamus with a thick "hive" and a crocodile on the back, as it is holding a mooring post and another crocodile in its hands. When we look at the northern region of the sky so that the spear-wielding man is standing on the left, we can in fact discover the silhouette of the stars, stretching over a vast area of the sky on our right, that resemble a hippopotamus and its adjoining features [fig. 16]. In Seti I's asronomical diagram, the same constellation is depicted slightly differently, because the hippopotamus has a long lion's mane, and a significantly larger crocodile rests on its back. The arrangement of the stars behind the hippopotamus may support this rendering of the constellation, too [fig. 17].

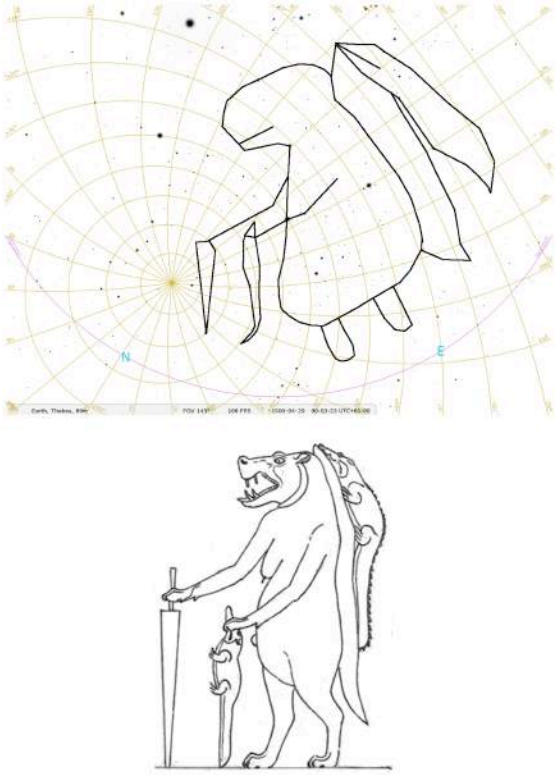

Fig. 16. The constellation of the hippopotamus (Senenmut).

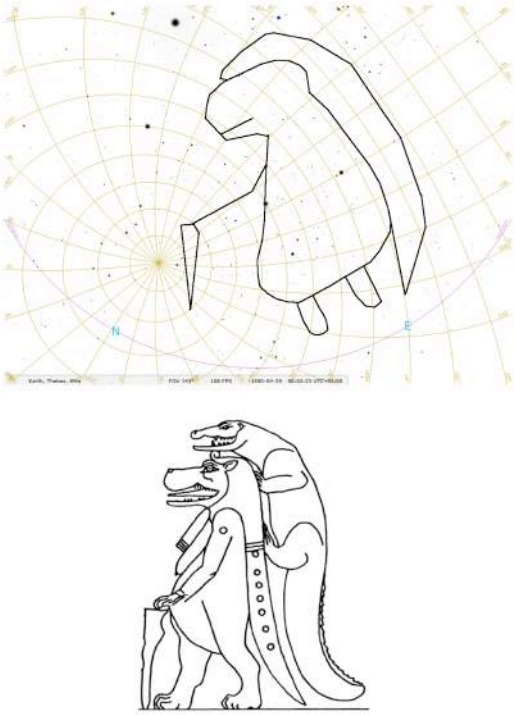

Fig. 17. The constellation of the hippopotamus (Seti I. Bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 151, fig. 2).

The hippopotamus is also variously depicted as holding only one mooring post (Seti I), or a mooring post in the right hand and a crocodile in the left one; the Book of the Day talks about two mooring posts of flint in the hand of the hippopotamus restraining the celestial embodiment of Seth, *msḫt.jw*,[121] so the artistic rendering of the right one as a crocodile, as in Senenmut's tomb, must surely be based on the visual resemblance of the corresponding stars. This device may originally have only comprised the stars β Dra, γ Dra, and β Cep. I reconstruct the other mooring post to have included Polaris (α UMi) at its base, but this is in no way to suggest that the Egyptians of the 2nd millenium BCE were aware of the fact that at some later point in time this star would become the marker of the northern celestial pole. Polaris is a relatively bright star, and was a bright star near the pole (around HIP 66435) when the astronomical diagrams were most probably devised (Middle Kingdom), so it could naturally become part of the "mooring post" constellation in combination with other stars.

It is often stated that the name of the hippopotamus constellation is *ꜣs.t-ḏꜣm.t* (Isis-Djamet), as a legend seemingly spelling out this designation appears next to it.[122] Since the Book of the Day and later textual sources also identify the hippopotamus with Isis,[123] the name may in fact be connected with the large riverine mammal. However, as the figure of Isis leading the eponymous deities of the days of the lunar month appears immediately behind the hippopotamus, the name could belong to her as well, just as on the other side of the procession the name *ḥꜣq.w* relates to the first small human figure. Possibly the reading of the whole hieroglyphic legend is not correct, and I propose a new rendering: *ꜣs.t ḏꜣ(.w) mw.t ḥꜣb(.w) p.t* "Isis of the (moonlit) night, mother of the festivals of the sky".[124] If this reading is correct, and of course the reference to the festivals of the sky in the second part has already been understood,[125] it surely belongs to the female figure of Isis and the lunar procession. What supports it more than anything else is those astronomical diagrams in which the northern constellations and the lunar procession are accompanied by a series of representations of the festivals of the sky, that is those festivals which were governed by the phases of the moon.[126]

[121] M. MÜLLER-ROTH, *Das Buch vom Tage*, p. 285.
[122] *EAT* III, p. 189-190; P.F. DORMAN, *The Tombs of Senenmut*, p. 145; M. CLAGETT, *Ancient Egyptian Science* II, p. 116; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 164.
[123] J. VANDIER, *Le papyrus Jumilhac*, p. 108, 129; A. VON LIEVEN, *Der Himmel über Esna*, p. 21; M. MÜLLER-ROTH, *Das Buch vom Tage*, p. 285.
[124] For *ḏꜣ(.w)* "night, moonlit night", see *Wb* V, 520, 1-2; P. WILSON, *A Ptolemaic Lexikon*, *OLA* 78,1997, p. 1218.
[125] *EAT* III, p. 190.
[126] *Ibid*., pl. 2, 5, 11.

The Scorpion Goddess

Egyptian name:	*Srq.t* “Serket” (the Egyptian goddess, her name meaning “scorpion”)
Location:	from Serpens through Hercules and Cygnus to Pegasus
Principal stars:	headdress (scorpion): β Ser, δ Ser, α Ser, δ Oph, ζ Oph, ξ Sco, ε Oph, λ Oph, γ Her, γ Ser
	head: δ Her, β Her, κ Oph, α Her
	body: α Oph, ζ Aql, ζ Del, ε Peg, θ Peg, 35 Peg, ζ Peg, ξ Peg, 9 Peg, 1 Peg, β Cyg, λ Her
	arms: μ Her, β Lyr, o2 Cyg, o Her, γ Lyr, η Cyg, α Cyg

[fig. 18]

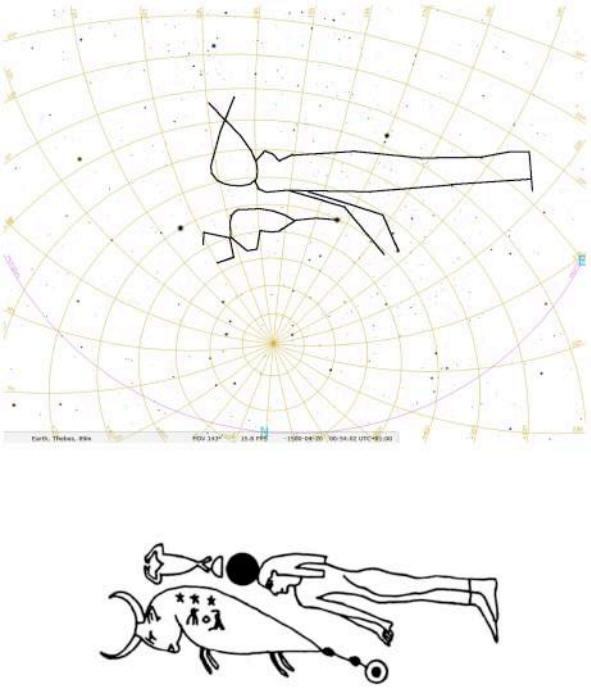

Fig. 18. The constellation of the scorpion goddess (Serket. Bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 150, fig. 1).

The figure of the scorpion goddess, Serket, appears above the ovoid bull in Senenmut’s astronomical diagram. The key to locating this constellation in the sky is to remember that for superstitious reasons the scorpion is often depicted without its tail (metasoma) in hieroglyphic

writing, especially in funerary literature.[127] Indeed, we see this modified sign above the head of the goddess, which is also adorned by a red disc. I take this latter element to be symbolic, expressing the stellar nature of the divine figure. With these considerations in mind, Serket's celestial manifestation can be discovered immediately to the south of the ovoid bull [fig. 18]. While her headdress (the scorpion) and her hands seem to stand out from the surrounding stars, the rest of her body is not so pronounced. Nevertheless, since both the headdress and the body of the goddess conform to standard hieroglyphic and iconocraphic representations that were developed in dynastic Egypt, we may surmise that the constellation of the scorpion goddess Serket entered the inventory of celestial figures later than those less in compliance with commonly used depictions (such as the tadpole, and possibly the ovoid bull). As the strange tailless image of the scorpion is first attested in the Pyramid Texts,[128] this could not have happened earlier than the Old Kingdom.

The Great Bull of the Sky

Egyptian name:	*msḫt.jw* (meaning unclear)
Location:	from the area of Centaurus and Lupus to Lyra and Cygnus, incorporating most of the intervening constellations
Principal stars:	horns: ε Cen, ζ Cen, β Cir, ζ Lup
	head: π Hya, ι Cen, μ Cen, α Lup, ε Lup, γ Lup
	back: α Sco, η Oph, η Ser, δ Aql, β Aql, α Aql
	hind part: α Aql, δ Sge, β Cyg
	underside: π Hya, ι Vir, τ Vir, β Ser, β Her, ξ Her,
	front legs: τ Vir, ε Vir, β Leo, α Com, 109 Vir, ε Boo, γ Boo, β Boo, η UMa, θ Boo, α CrB
	hind legs: θ Her, η Dra, ζ Dra, γ Dra, α Lyr, 13 Lyr, δ Dra, ρ Dra, δ Cyg,
	tail: γ Sge, η Cyg, o1 Cíg

[fig. 19]

[127] P. LACAU, "Suppressions et modifications de signes dans les textes funéraires", *ZÄS* 51, 1914, p. 39, 57.
[128] P. LACAU, *ZÄS* 51, p. 39.

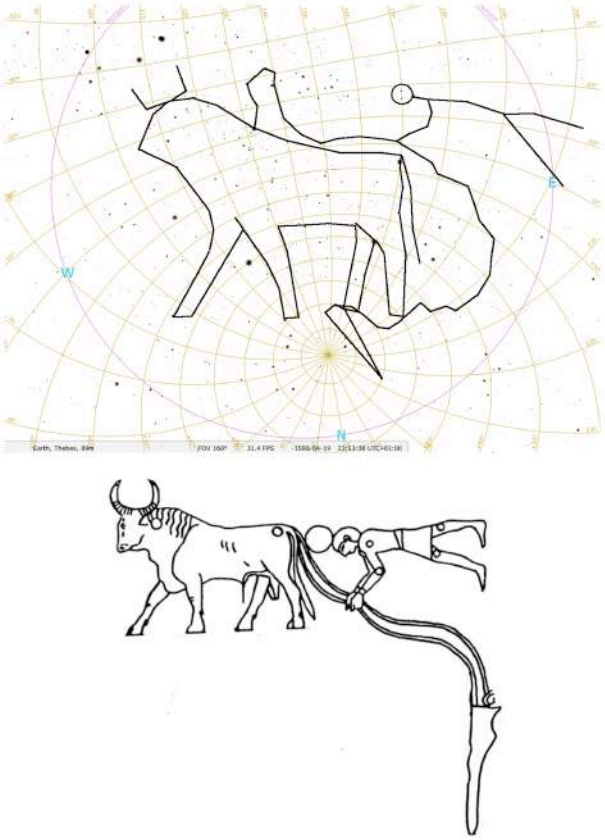

Fig. 19. The constellation of the great bull (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 151, fig. 2).

Seti I's display of the northern panel differs in quite a number of details from Senenmut's, and perhaps the most noticeable is the standing bull replacing the ovoid animal in the centre. As explained above, since this bull is also called *msḫt.jw*, it was previously thought to be the representation of the same constellation as the ovoid figure, but this view is certainly erroneous, because we can find the outlines of the bull in the sky [fig. 19]. In addition, its accompanying figures that make Seti I's astronomical diagram unique also appear in the sky: the man holding the celestial rope, and the turned-back Horus with both of his arms raised up and holding a curiously shaped line (see below). Undeniably, the most pronounced parts of the bull are its horns, head, and front legs, but the rest of it can also be equated with specific points in the vast field of stars north of the ecliptic.

Seti I's vision of the constellations covers almost the whole area of the sky, and this again underlines the difference in scale between the Egyptian and the modern way of conceptualising visible star patterns. This is the reason why I propose to call this constellation "the great bull of the sky" (and also to differentiate it from the other two celestial figures with the name *msḫt.jw*). A corresponding Egyptian expression *kȝ p.t* "bull of the sky" appears in a number of sources, but the designation is primarily used in connection with the moon, because it was seen as a bull with different tempers along its phases (waxing and full moon – fiery bull, waning moon – castrated bull).[129] Through his lunar associations, Osiris can also

[129] A. VON LIEVEN, *Der Himmel über Esna*, p. 86.

appear as the bull of the sky on the day of the full moon.[130] Another use of the term occurred in the Egyptian name of the planet Saturn, as it was called "Horus-bull-of-the-sky".[131] One possible reference to the constellation of the great bull is utterance 262 of the Pyramid Texts, in which the king addresses a number of beings.[132] Since Re and Thoth – the sun and the moon – are named after one another at the beginning of the spell, the later mention of the bull of the sky may refer to the constellation, though not necessarily. In utterance 437 the bull of the sky grasps the hand of the resurrecting king together with Sah (the striding man),[133] and since the two constellations are at the opposite ends of the sky, their combination may allude to the totality of the celestial field of existence for the deceased. However, this is again largely based on conjecture. Even when the bull of the sky is mentioned in connection with *msḫt.jw* on the sarcophagus of the Apis bull from Nectanebo II's time,[134] there may be no direct link between the two, because *msḫt.jw* is represented by a series of forelegs, whereas the appearance of the epithet "bull of the sky" may stem from the close ties of the sacred animal with Osiris.[135] At present, it is difficult to ascertain whether the expression *kȝ p.t* "bull of the sky" that we encounter in funerary literature had anything to do with the constellation depicted in Seti I's astronomical diagram, but its image is just what it is: a great bull of the sky.

Since the bull overlaps the constellation of the scorpion goddess, Serket, in the sky, Seti I's scene of the norhtern constellations depicts her on the left, above the crocodile and the recumbent lion. At the feet of the goddess, and above the head of the lion, we can see a falcon, which is sometimes interpreted as the representation of a constellation ("the bird").[136] It is, however, rather the legend to the spear-wielding man (without the spear) in front of the crocodile, reading *Ḥr.w* "Horus", foreshadowing the naming of the same figure as "Horus who strikes the enemies" on the ceiling of the pronaos of the Dendera temple (see above).

The Man Holding the Celestial Rope

Egyptian name:	*nr* "shepherd"
Location:	roughly parallel with the ecliptic, in the area of Capricorn, Aquarius, Aquila, and Pegasus
Principal stars:	head: α Cap, β Cap
	body: ε Aqr, β Aqr, α Aqr,
	arms: η Aql, θ Aql, l Aql, k Aqr
	legs: θ Peg, ζ Peg, ξ Peg, α Peg, γ Aqr, ζ Aqr, γ Psc

[fig. 20]

[130] J.-Cl. GOYON, "Le cérémonial de glorification d'Osiris du papyrus du Louvre I. 3079 (colonnes 110 à 112)", *BIFAO* 65, 1965, p. 100, 140.
[131] *EAT* III, p. 178-179.
[132] *Pyr*. §§327a-332c.
[133] *Pyr*. §§802c-803ac
[134] *EAT* III, pl. 24.
[135] *Ibid*., p. 191.
[136] *Ibid*., p. 16, 194; J. LULL, J.A. BELMONTE, in J.A. Belmonte, M. Shaltout (eds.), *In Search of Cosmic Order*, p. 169.

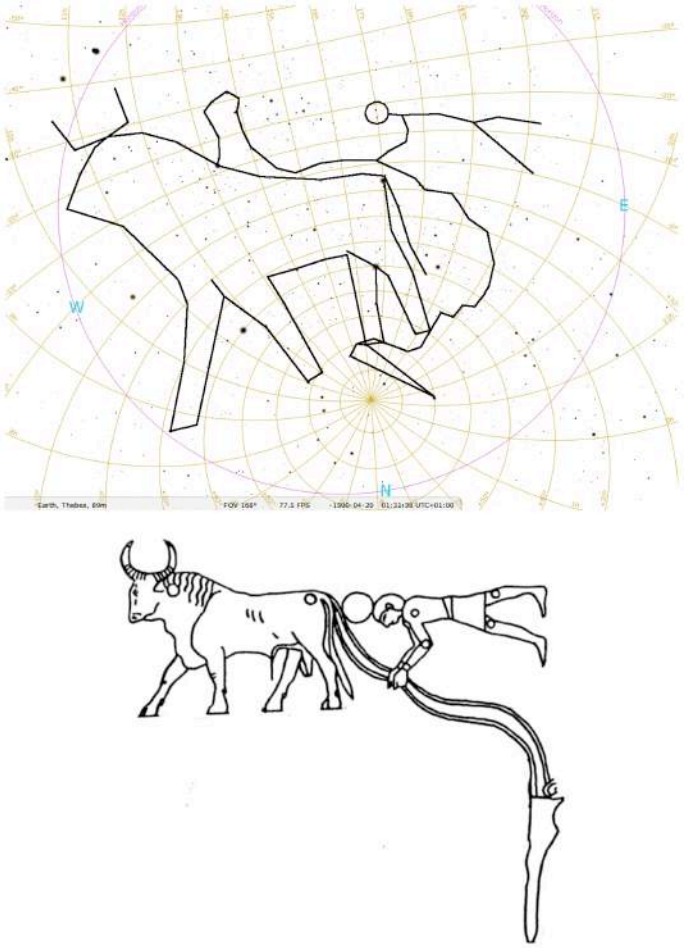

Fig. 20. The constellation of the man holding the celestial rope (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 151, fig. 2).

The bull of the sky occupies such a large expanse of the sky that the man depicted behind it in the celestial diagram, holding the celestial tethering rope, can only be seen in his entirety when the horns of the animal start setting in the west [fig. 20]. The man carries a disc on his head, which may be an allusion to the two bright stars of Capricorn (α Cap and β Cap) making up this part of his body. A legend at his feet gives his name in a corrupt form, since – based on the evidence of some other astronomical diagrams – the initial hieroglyphic sign was omitted.[137] Thus the correct reading of the expression is *ḥsȝ nr*,[138] which can either be a direct genitive, "the thread of the shepherd", or two nouns in apposition, "the thread and the shepherd". If *ḥsȝ nr* is a genitival construction, then obviously only the celestial rope is named directly, so – since both the rope and the shepherd are clearly displayed visually – I believe that the second interpretation is more likely, and the caption identifies both the herdsman and the line he is holding. In the astronomical diagram of Ramesses VI, the different traditions of Senenmut and Seti I are merged, as the man holding the celestial rope is depicted above the ovoid bull, which is tethered at its "neck".[139]

[137] *EAT* II, pl. 2–3.
[138] Not *ḥsȝ mw.t*, referring to the hippopotamus, as in *EAT* III, p. 190.
[139] *EAT* III, pl. 13.

The Celestial Rope

Egyptian name:	*ḥsȝ* "thread"; *nwḥ n ḏ῾m* "golden rope" (Book of the Day)
Location:	from Scorpius through Ophiuchus, Aquila, Delphinus, Pegasus, Lacerta, and Cepheus to Draco
Principal stars:	ε Sco, ζ Sco, θ Sco, λ Sco, θ Oph, ξ Ser, ν Oph, λ Aql, η Aql, ε Del, α Del, 1 Peg, μ Cyg, π Peg, 6 Lac, α Lac, ζ Cep, α Cep, η Cep, χ Dra, ζ Dra, θ Dra

[fig. 19-20]

According to the written descriptions of the northern sky, the celestial equivalent of Seth, the foreleg or *msḫt.jw*, is kept in place by a tethering rope that is fastened to the mooring post (or posts) in the hand of the great hippopotamus.[140] Senenmut's astronomical diagram does not show this feature, but already on Amenhotep III's clepsydra a string of small dots connects the tail end of the ovoid bull with the mooring post.[141] Some Graeco-Roman zodiacs display a similar image of the hippopotamus and *msḫt.jw*, with the modifications that the latter is depicted as the combination of a foreleg and a bull's head, and instead of dots or small circles, the tether is usually represented either as a chain or rope.[142] Since in Seti I's astronomical diagram *msḫt.jw* is a true bull, the rope restricting it is also represented differently. Although in Seti I's scene the rope starts at the rump of the bull, it was obviously attached to the neck of the animal, as is implied by Ramesses VI's mixed diagram (see above), and as it is in fact shown with the true bull in the astronomical diagram of Tausert.[143] Consequently, I reconstruct the rope in that way, and believe it originally included the tail part of modern Scorpius [fig. 19].

The Harpoon

Egyptian name:	n/a
Location:	from Centaurus through Libra, Ophiuchus, Cygnus, Draco, and Ursa Major to Leo
Principal stars:	harpoon: ι Cen, π Hya, α Lib, β Lib, μ Ser, δ Oph, ζ Oph, η Oph, ξ Ser, ν Oph, β Oph, α Oph, 109 Her, β Cyg, 41 Cyg, ζ Cyg, ε Cyg, δ Cyg, β Dra, θ Boo, η UMa, α CVn, δ Leo, α Leo
	harpooner (Horus who turns back): (arms) α CVn, β CVn, χ UMa, ε UMa, ζ UMa, η UMa; (torso) γ UMa, δ UMa, α UMa, β UMa; (legs) θ UMa, ι UMa, h UMa, o UMa

[fig. 21]

[140] J. VANDIER, *Le papyrus Jumilhac*, p. 108, 129; A. VON LIEVEN, *Der Himmel über Esna*, p. 21; M. MÜLLER-ROTH, *Das Buch vom Tage*, p. 285.
[141] *EAT* III, pl. 2.
[142] *Ibid*., pl. 26, 28, 40, 42, 44.
[143] *Ibid*., pl. 9.

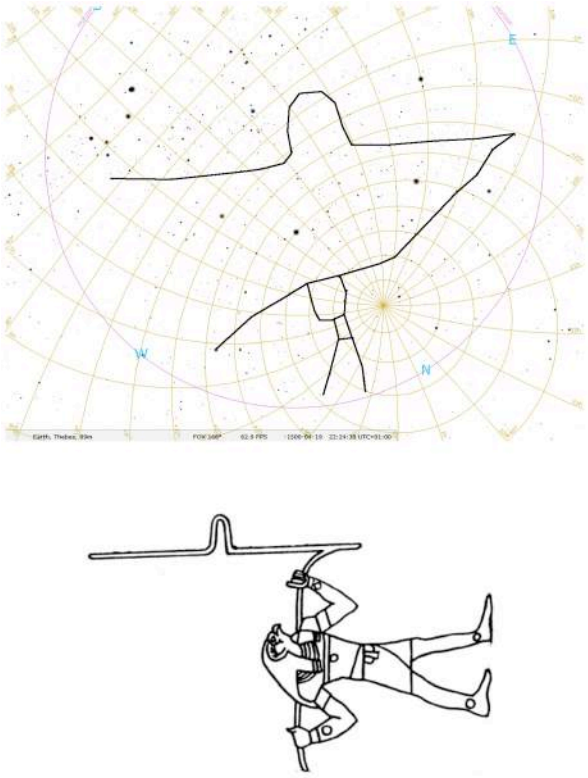

Fig. 21. The constellation of the harpoon (bottom: cropped from R.H. Wilkinson, *JARCE* 28, 1991, p. 151, fig. 2).

In Seti I's scene of the northern panel the falcon-headed figure – Horus who turns back – is shown with both of his arms raised, and he is holding a strangely shaped object, essentially a line with a bulge at the middle of its horizontal section, which is sometimes interpreted as a platform.[144] When we look at the sky, we can discover it overlapping the bull [fig. 21], and this suggests that it does not represent the ground for the animal; it is only drawn under the hooves for aesthetic reasons. In fact, it is a harpoon, and this claim can in the first place again be supported by the principles of visual resemblance,[145] though in the drawing the two "shafts" of the harpoon are at a wider angle than in the sky. Perhaps an equally forceful argument in favour of interpreting this particular arrangement of stars as a harpoon is a story from the New Kingdom tale recounting the fight between Horus and Seth. To recognise the significance of this story, we need to bear in mind two things. First, the point of the large celestial harpoon aims at the area of the sky where the body of the hippopotamus is located. Second, the tale about the contendings of Horus and Seth is a satirical version of the official myth, so it often pokes fun at the concepts that were propagated by authoritative ideology.[146]

At one point during their endless contest Seth suggests to Horus to turn themselves into two hippopotami for an underwater duel, and the one that will first emerge in three months

[144] *Ibid*., p. 187.
[145] Cf. for example the model harpoon (2nd dynasty) in E. Teeter (ed.), *Before the Pyramids: The Origins of Egyptian Civilization*, Chicago, 2011, p. 246–247, no. 111.
[146] J. BAINES, "Myth and Literature", in A. Loprieno (ed.), *Ancient Egyptian Literature: History and Forms*, *PdÄ* 10, 1996, p. 373.

relinquishes his claim to the legacy of Osiris.[147] The period indicated is the first clue to establish a link with the constellation of the hippopotamus. As it is situated roughly parallel to three zodiacal signs along the ecliptic (Sagittarius, Capricorn, and Aquarius), it is not seen in its entirety for about three months. When Horus and Seth plunge into the water, Isis becomes worried that Seth might kill her son, so she makes a rope and a harpoon and tries to disable Seth. However, she first hits Horus. The second time she throws the harpoon in the water, she manages to pierce into the body of Seth, but after his pleas, she removes the weapon and lets go of him. Horus is so enraged by this act of leniency that she cuts off his mother's head. As a consequence, Isis changes herself into a statue of flint without a head. The description of her last action is the second obvious clue to link the story with the northern constellations. Flint was especially associated with the circumpolar regions of the sky.[148] The headless flint statue of Isis – Isis the harpooner – is therefore undoubtedly a reference to the spear-wielding figure in the sky. This is in fact the "punch line" of the story: if the seven bright stars of Ursa Major can in the official astral myth be both the foreleg of Seth and the spear-brandishing Horus, why not also equate it with a third character, Isis? At the end of the story, a response to the enquiry of the sun god about Isis emphasises the headless nature of the statue, highlighting the imperfection of the visual appearance of the celestial hunter.

The identification of the stars of Ursa Major with Isis was perhaps also acceptable for the Egyptian audience of the story about Horus and Seth because the same stars may have been equated with another goddess before. I started this paper by pointing out that the earliest representations of the Egyptian constellations were preserved on the coffin lids of the Middle Kingdom [fig. 1]. In one compartment we can see Sah and Sopdet, representing the southern sky, while in the other the Foreleg and Nut, corresponding to the northern part of the sky. Since Nut is the goddess of the sky par excellence, it is obvious to think that she features in the scene just to make a reference to the heavenly spheres in general. However, all the other three figures are clearly constellations, and Nut with her upraised arms very much resembles how 'Horus who turns back' (*ḫn.w*) appears in Seti I's astronomical diagram. It is therefore not impossible that the particular image of Nut on the coffin lids with diagonal star tables also stands for a constellation, her body being the same as that of the harpooner, while the hieroglyph she is holding perhaps corresponding to a pattern of stars above her. In this case, of course, the images of both the Foreleg and Nut refer to the same asterism (the modern Plough and its environs) seen in its different positions in the sky, possibly providing further evidence for the ultimate source of the ambiguity that characterised this group of stars in ancient Egypt (see above the comments on the spear-wielding man). As stated above in the introduction, the depiction of Nut holding up the sky hieroglyph disappears after the Middle Kingdom, but a similar image shows the supports of the sky, personified as goddesses, in the same pose.[149]

Conclusion

The assumption that the ancient Egyptians based their constellations on the notional identity of star patterns in the sky with living beings and objects bore fruits, because the constellation figures of the astronomical diagrams could be matched with actual asterisms. When we look

[147] A.H. GARDINER, *Late Egyptian Stories*, p. 48-50; W.K. SIMPSON (ed.), *The Literature of Ancient Egypt*, p. 97-98.
[148] C. GRAVES-BROWN, "Flint and the Northern Sky", in T. Schneider, K. Szpakowska (eds.), *Egyptian Stories: A British Egyptological Tribute to Alan B. Lloyd on the Occasion of His Retirement*, Münster, 2007, p. 111-137.
[149] S. CAUVILLE, *Dendara* XV. *Traduction*, pl. vii.

through their constellations, it may be said that the Egyptians were more rigorous in following this principle than we are, with our Hellenistic and Babylonian legacy, because their celestial figures in general displayed a greater degree of visual resemblance than ours do. If this is so, the question may arise: why has the identification of the Egyptian constellations eluded researchers for such a long time, despite the fact that they were quite faithful – and consequently perhaps, quite easily recognisable – "pictures", i.e. shapes and star patterns in the sky?

The understanding of Egyptian astronomical thinking may have been hampered by several factors. Surely, the physical environment of the Nile valley and the surrounding deserts – which was the inspiration for at least some of the constellations – was different from where the Indo-European, Mesopotamian, or Mediterranean sky watchers lived. To put it simply, instead of bears and sea serpents, the stars spelled out crocodiles and tadpoles for the Egyptians. This is, however, something that is expected and should not surprise us. A bigger obstacle for the study of Egyptian constellations has been a fundamental conceptual difference. Our view of the sky and the constellations gives precedence to space: when a series of stars are singled out for a constellation, the area of the sky they occupy becomes their exclusive territory, and no other asterism can encroach on it. This notion underlies our modern star maps, finalised in the 20th century: every constellation has its designated, well-defined area on the celestial globe, and every visible star belongs to one of them. Any ambiguity can only persist in popular thought: the seven bright stars around the northern celestial pole are either a bear or a plough.

The Egyptian vision of the sky, it seems, was driven more by time and aspect. At the beginning of one night, when they looked up the sky turning southwards, the Egyptians could see a large ship, and its middle was marked by a moderately bright star, corresponding to the brightest star in the modern constellation of Libra. Then, as time passed and more stars rose, the Egyptians looked up again, and now they could see the silhouette of a sheep – the same star now being part of the animal's horn. At yet another time they observed the sky turning northwards, and now from the array of stars before their eyes they could make out the body of a crocodile with curved tail. The star α Librae now belonged to the muzzle of the reptile. The same approach – the readiness to accept that a pattern of stars can be one thing at a particular time, but also something else when seen from another angle at another time – also explains the multiplicity of constellations that the Egyptians associated with the stars that make up the modern Plough.

Finally, it should be noted that the prediction of quite a few researchers about the benefits of the application of good planetarium software – namely, that it could greatly advance the study of ancient Egyptian astronomy – has proven right. Such computer programs have become widely available in recent years, and can easily recreate ancient skies. This also means that the validity of my claims can be checked with equal ease, and should any inconsistencies be left in my arguments and identifications, they can be pointed out and refined by anyone using the same technology. At the same time, we can be sure that with the modern aids past researchers could only have dreamt of, and the better understanding of the constellations of the astronomical diagrams, further discoveries will be made in the field of ancient Egyptian astronomy.

Notes

Simulations were run on, and sky charts were produced by Stellarium (www.stellarium.org).

Although surely most of the Egyptian constellations had had a long history by the time of the New Kingdom, for the sake of simplicity the charts show the sky as seen from Thebes, at various dates in the year 1501 BCE (–1500), except for the image of the predynastic ship (– 3550).