

5 The phenomenology of star phases and their role in considering skyscapes

Bernadette Brady

Introduction

The sky is full of stars, and how they move throughout an evening as well as how the movement is interwoven with the seasons is dependent upon the location of the observer and the location of the star on the celestial sphere. Thus a starry sky, for a given latitude, will produce different star narratives, that is to say, different sequences of rising, setting, being absent from the night sky or, in contrast, climbing high in the heavens each evening and not being seen to set for months at a time. These different ways that a star moves are known as star phases and by taking notice of these phases it is possible to explore the visual narrative that a starry night sky can embed in a landscape.

In the second century AD, Claudius Ptolemy wrote of star phases. In the *Almagest* (Ptolemy 1998, VIII 4.H190-204) he worked with a celestial sphere and was concerned with the geometry of the phases, and in another work, *Phaseis*, he focused on the different visual behaviours of the stars in their relationship to the position of the Sun. This behaviour is still known today as star phases, which was defined by Ptolemy (trans. Jones 2004, 2) as:

By ‘phase’ of a fixed star we mean its first or last apparent configuration taken with respect to the sun and the horizon ... Among the configurations assumed in this manner, there are four kinds that are more significant; for they all involve positions of the sun and the star relative to each other and to the two semicircles of the horizon, the one to the east and the one to the west.

The four kinds of star configurations mentioned by Ptolemy can be divided into two groups. One group consists of the stars that lie further south in declination than the band of the ecliptic and the second consists of those that lie north of the declination of the ecliptic. How each group of stars behaves is dependent on the hemisphere of the observer. Unpacking the visual phenomena of these phases is the aim of this chapter; however, to appreciate

why Ptolemy spent time on this topic one has to first consider the visual palette the stars provided to the culture of his, and indeed earlier, times.

The sky is a reliable primary source, as ancient skies can be recreated and moved with relative ease around human constructions in a landscape. In these types of investigations there is, however, a tendency to privilege the Sun and the Moon over the stars in looking for possible relationships (for examples see Ruggles 2015, 1284; Prendergast 2015). Granted, due to the number of stars and their varied location in the heavens, the problem of indicating intentionality with stars is far more difficult. To the modern eye, the stars are less dramatic and offer a potentially confusing array of points on the horizon. But the modern difficulty of indicating intentionality does not mean that such intentionality was non-existent.

The view of ancient skies which can be found in Classical literature reveals a different view of the sky than our own. In this literature, one meets a world where the stars shone brightly to the observer's eye and their light and movement formed a part of the culture's visual palette. For example, between the twelfth and eighth centuries BC, Homer (Homer, Murray and Wyatt 1999, Bk V L 3–7) used the visual appearance of stars as metaphors so that, relating to Sirius, he described Pallas Athena bestowing Diomedes with strength and courage for a battle by kindling from his helmet and shield,

[a] flame unwearying, like the star of harvest-time that shines brightest of all others when he has bathed in the stream of Ocean. Such flame did she kindle from his head and shoulders; and she sent him into the midst where men thronged the thickest.

It is hard to imagine today that a writer would use such a metaphor to express the brightness of a flame. Here Homer is referring to the first sighting of Sirius after its period of invisibility just rising before the Sun ("the brightest of all others" just emerging from the underworld). Today this would be referred to as the helical rising of Sirius. A similar example used by Homer is that he refers to the way a star can move across a landscape when it rises, as a metaphor for describing the running Achilles as, "all bright as a star ran on the plain, As the autumn star rises with its clear rays" (Homer, Murray and Wyatt 1999, Bk XXII L 26–27). These star metaphors, however, were not the sole domain of Homer, as law makers also used stars. Plato in the fourth century BC listed crimes and their appropriate fines and stated that anyone picking grapes or figs, "whether on his own land or another's, before the rising of Arcturus ushers in the vintage" must pay a fine to Dionysus – fifty drachmas for his own trees, one hundred if picked from his neighbours and sixty-six and two-thirds drachmas if picked from any other field (Plato 1997; Laws, Bk VIII, 844e). This law assumes that all people knew or could see when Arcturus was rising but additionally it indicates, by the very fact that one could be punished for picking one's own

fruit, that there was something divine held by the star, a possible required blessing bestowed by its rising that was detrimental to the whole community if ignored.

The earliest evidence for the sacred nature of stars exists in the first known religious texts, those of the Pyramid Texts of the Old Kingdom in Egypt in the third millennium BC. Three groups of stars were recognised by the Egyptians and each group played a role in their stellar theology. One such group were the circumpolar stars and these were known as the imperishable stars, (Faulkner 1966, 156–157; Lesko 1991, 99) because they never set. It was with these stars that the king's pharaonic soul was destined to join upon his death; a union considered vital to maintain the cosmic health of the nation (Davis 1977, 164). An utterance from Unis' pyramid (the last pharaoh of the Fifth Dynasty) announces, "The populace will cry out to you once the Imperishable Stars have raised you aloft" Allen 2005, W147). To achieve this ascent the king rose up by becoming a special star. Elsewhere I have considered the naked-eye astronomy of the king's ascension myth in detail (Brady 2012, 2015). In brief, however, the king's soul became a star which visually rose in the early evening. After this visible rising, on subsequent nights, the star steadily "climbed" in the night sky and acted as a circumpolar star – visible at sunset and still visible at dawn. This cosmic journey of the pharaonic soul is an example of theology born from, or reflective of, naked-eye astronomy. However, without understanding the different types of star phases, the significance of such poetic or religious astronomy can be overlooked.

The naked-eye astronomy of star phases

To understand the visual palette of stars today they need to be observed at night or watched using software or even learned by engaging with an astrolabe. If one undertakes such an exercise, then it becomes obvious that different groups of stars move in different ways. There are some stars that are visible every night, all night, as they orbit around the pole. These stars, known today as circumpolar stars, never touch the horizon and were considered the imperishable stars by the Egyptians. In the Egyptian view of the sky these stars never entered the *Duat*, the netherworld, the land of the dead, because they never touched the gateway to the *Duat*, the western horizon. In contrast, for the Egyptians, another group of stars did move into the *Duat*. These stars disappeared as they passed below the earth and did not rise again for a series of many nights. The *Duat* was the place that received the dead and as such these stars were considered to have died only to be reborn some days later (Parker 1974, 55–56). By the time of the New Kingdom (around 1550–1100 BC) these stars were represented as towing the solar barge through the underworld, an occupation that could last weeks or months. At a set time, watched for carefully, as evidenced by the Middle Kingdom diagonal star clocks, these stars would reappear, emerge out of

the *Duat* and be returned to the world of the living. These stars were known by the Egyptians as the unwearying stars, as they never tired of the endless cycle of birth and death (Faulkner 1966, 161). The Egyptians grouped these stars into ten-day periods, later they were given the Greek name “decans”, and they measured the course of their year by their heliacal risings. Thus, for the Egyptians, their view of the sky and the horizon was full of stars – both in their rising and setting.

Arising and Laying Hidden

These stars were defined by Claudius Ptolemy (d.160 AD) as those stars that undergo the phase of Arising and Laying Hidden (1993, 5). To understand this phase consider Figure 5.1. This figure is a view of the sky in the northern hemisphere with an observer looking due north towards the north celestial pole. The annual path of the Sun, the ecliptic, is shown as the red circle, with the arrow indicating the direction of the Sun’s annual movement. The observer has his/her back to the ecliptic which is located in the south and the whole sky moves diurnally in the direction of the blue arrow. In Figure 5.1 (1) the Sun is setting behind and to the west of the observer and a star, located at a declination further south than that of the ecliptic, is also setting. Thus, in this image, the star is seen to set just after the Sun and it will be a faint flicker of light setting in the evening twilight. Figure 5.1 (2) is the next morning and, when the Sun rises, the star is still below the horizon, thus when it does eventually rise later that day it will be, to use Ptolemy’s terms – Arising and Laying Hidden. Figure 5.1 (3) is sunset a few days later and the Sun has moved along the ecliptic and is now next to the star and thus the star is no longer seen setting in the evening. However, as the Sun rises the next morning (not shown), the star and the Sun are still too close together and thus the star is not seen to rise in the morning. The star has disappeared, and its last appearance was on the western horizon (see Figure 5.1 (1)). Eventually, as the Sun keeps moving along the ecliptic, the distance

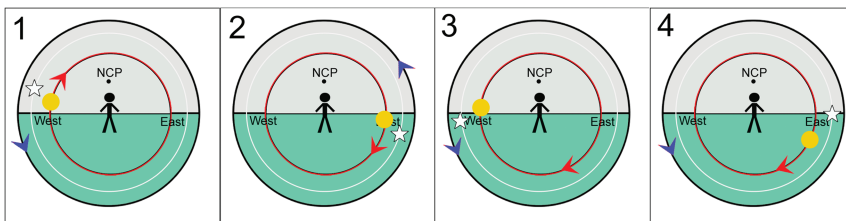


Figure 5.1. The periods of a star which undergoes the phase of Arising and Laying Hidden in the northern hemisphere. The ecliptic is the red circle and the Sun’s yearly movement is marked with a red arrow. The diurnal movement is indicated by the blue arrow.

between the Sun and star becomes great enough so that now (see Figure 5.1 (4)) the star will reappear rising just before the dawn.

It is worth remembering that the star is fixed in its location and it is the changing relationship that the Sun makes to the star that produces this time of invisibility. How many nights the period of invisibility will last for a particular star will depend on the location of the observer (his/her latitude); the location of the star (its declination); its magnitude and the angle of inclination of the ecliptic to the horizon (Ptolemy 1998, Bk VIII 6). The resulting angle produced by the combination of these factors is known as the *arcus visionis*. Additionally, visibility is dependent on the quality of the observer's eyesight plus the factors of atmospheric refraction and the local viewing conditions (see Schaefer 1990, 1987, 1986). The influence of these combined factors becomes apparent when considering the period of invisibility for the brightest star in the sky, Sirius, at the latitude of Cairo. Sirius geometrically is below the horizon during the night for around 43 to 45 days; however, given all the factors listed earlier, the amount of time that Sirius is not visible at this latitude is closer to 70 days. This period of 70 days was also that used for the length of time of embalmment in the Egyptian burial customs, as the Egyptians saw Sirius as a key component of the rituals aimed at aligning the deceased to the cosmos (Raven 2005, 49).

The Egyptians also used the seasonal rhythm of Sirius to maintain the link between their lunar calendar which tied their religious festivals to their agricultural cycle. The Egyptians maintained two calendars: they had a civil calendar of 365 days which consequently drifted backwards against the seasons by a day every four years. Independent of this calendar, they also used a lunar calendar which began every year on the heliacal rising of Sirius (Neugebauer 1942, 401–403). A letter written in the Twelfth Dynasty (around 2000–1800 BC) reveals the seasonal drift contained in the civil calendar with the need to note the actual date of the heliacal rising of Sirius as the “year opener”. The letter was written in the seventh year of the reign of Senusret III to a priest (Clagett 1995, 321).

Year 7, III Peret, 25 [the 25th day of the third month of the season before summer]. The Prince and Overseer of the Temple Nebkaure has said to the Chief Lector Priest, Pepyhotep: You should know that the Going Forth of Sothis [heliacal rising of Sirius] takes place on IV Peret 16 [the 16th day of the last month of Peret]. You might wish to inform the lay-priests of the Temple of the city called ‘Mighty is Sesostris the Justified’ and of Anubis and of the Crocodile-god. And let this letter be produced of the announcement-board of the Temple.

The three seasons of the Egyptian civil calendar were: *Arket*, the inundation or flooding of the Nile which occurred, in our modern calendar, from mid-July through to mid-November; *Peret*, emergence, which occurred from mid-November to the end of March; and *Shomu*, low water, which occurred

from early April to mid-July. From the period of 2000 BC to 1000 BC the heliacal rising of Sirius took place, for the latitude of Cairo, around 19 to 22 July which, before the Aswān High Dam was built in 1970, marked the beginning of the Nile flooding period, the inundation. This Twelfth Dynasty letter shows that in the civil calendar for that particular year the flooding of the Nile would have been starting around the end of the civil calendar's month of *Peret*, the season which was named for the time of emergences, not of flooding. For the Egyptians, the star Sirius was Sothis, Osiris's sister, and its return to visibility was the return of a divine force to the world which brought the life-giving flooding of the Nile (Penprase 2010, 138). Hence, the heliacal rising of Sirius needed to be noted every year to ensure that the lunar religious calendar was kept in line with the agricultural seasons. If Sirius appeared as the helical rising star in the last 11 days of the lunar calendar year, then an extra lunar month was added to the lunar calendar (Parker 1974, 52). Sirius's return to visibility after travelling through the *Duat* was central for the Egyptian religious calendar; however, all the stars that underwent such a journey, a period of invisibility, were visual evidence that one could return from the *Duat*, and thus they provided a visual surety to the notion of reincarnation or to be born again into a new life.

Later, the Greeks similarly relied on stars to mark the passage of a year. Hesiod (Hesiod 2006, 13) in the seventh century BC wrote:

When the Pleiades, daughters of Atlas, are rising, begin your harvest, and your ploughing when they are going to set. Forty nights and days they are hidden and appear again as the year moves around, when first you sharpen your sickle.

When Hesiod wrote these words, people knew where to look for the Pleiades in the night sky, knew when they were hidden and when they were visible. Indeed, the rising of stars was such a part of the visual culture that the Greeks constructed *parapegmata* which listed the star phases throughout the year. These were situated in a public place and had pegs that could be moved to the next star event as the year progressed. These *parapegmata* were, to use Daryn Lehoux's (2005, 125) words, "tracking instruments for the astronomical and meteorological cycles" for the community. Thus, the stars, their risings and settings, were a part of the cultural fabric of a community and with the fixity of their seasonal disappearance and reappearance, they offered the ancient sky watcher not only a reliable seasonal marker, as in the case of Hesiod's *Works and Days*, but they also offered a year marker which could be used to realign a lunar calendar against the solar agricultural year.

There is no reason to assume that the divine nature of stars and the importance of their return to visibility was the sole provenance of the Egyptian or Greek civilisations. Other cultures from earlier periods, or even contemporary with third millennium Egypt, may also have used a star in some way

to help keep their lunar calendar aligned to the agricultural cycle and saw magic and mystery in its never-ending cycle of leaving and return.

Furthermore, one should not assume that the heliacal rising was the only significant event in the cycle. The complete phase of an unwearying star using unambiguous terms (see Brady 2015) consists of four phenomena:

- 1 Heliacal rising star – rising before the dawn and returning to visibility after a time of having disappeared (see Figure 5.1 (4)).

The star then rises earlier and earlier in the night until finally it becomes an

- 2 Evening rising star – rising just after sunset.

A few days later it will become a

- 3 Morning setting star – setting just before sunrise.

The star then rises during the day and is seen to set each evening at an earlier time until finally it becomes the

- 4 Acronychal setting star (Brady 2012, 43, 2015, 82) – setting just after sunset and this is its last appearance before beginning its period of invisibility (see Figure 5.1 (1)).

Stars and precession and place

Precession and proper motion will shift a star's declination which changes the place a star will rise or set on any particular horizon. Proper motion, though, at around 0.1 arcseconds a year for most stars (the exception being Bernard's star at a magnitude +9.5) would require 3,000 years to move a star only five arcminutes (Birney, Gonzalez and Oesper 2006, 72; Dawson and De Robertis 2004, 2909). Precessional shifts, however, are considerably faster than proper motion, nevertheless, these are not noticeable over a single lifetime. Additionally, precessional movement is not consistent across all stars, nor even for a given star. For example, using Stellarium (2018) to observe the precessional motion of Sirius, at 3000 BC Sirius was at a declination of -22.5° and shifted to -17.1° over 2,000 years to 1000 BC, yet in the year 2000 AD this declination had only shifted to -16.7° .

Thinking in declination, however, removes the visual narrative of this event. A particular star in the northern hemisphere, if it is south of the ecliptic, will have a distinct skyscape narrative, a time of return to visibility and a time of endings, its disappearance. This is a narrative of birth and death and it is tied to two distinct places on the horizon. These places on the horizon are represented by a star's azimuth, the compass point on a local horizon where a star will consistently rise or set. Such a location is sensitive to precessional movement and, in returning to the example of Sirius, for Cairo, in 3000 BC it rose at an azimuth of 116.5° and by 1000 BC it was rising at 110° , while 3,000 years later, in 2000 AD, it rose at 109.6° . In 5000 years there was only a 7° shift in azimuth for Sirius's rising location on the horizon and most of that occurred from 3000 BC to 1000 BC. Thus between

3000 BC and 1000 BC Sirius shifted 19.5 minutes (one third of a degree) of azimuth over 100 years.

Consequently, there is visually a spatial relationship between a star and the horizon for a given location. The star's cycle of leaving and returning is embedded in place. The time of the night when a star is seen to touch the horizon, rising or setting, will be associated with the time of the year; and, accepting the slow shift of a degrees or so of azimuth over several hundred years, the place will be constant.

For example, Sirius in the year 2000 AD, at the latitude of 30° north, will be seen setting at azimuth 250° (see Figure 5.2). It will set just after the Sun in late May (the exact date will depend on the darkness of the sky and the eyesight of the observer) and will then not be visible at any stage of the night from late May till early August. At the end of the first week of August it will be seen rising at azimuth 110° just before the light of the rising Sun floods the sky.

When standing in a landscape considering the way that the sky relates to a structure, these special points on the horizon of where a star returns after its period of invisibility, and where it is located when it begins its invisibility, will all be located in the area which is south of the ecliptic – for the northern hemisphere. But this is also the solar azimuth range of a northern hemisphere site. Hence a site with such an orientation towards the south could not necessarily be to a solar or lunar event but instead could be to a stellar event. My point here is that the Sun and Moon should not automatically and exclusively be considered the only option in this zone. A star's movement against a landscape may, for that location or structure, have held far greater meaning for a people than the luminaries.

Fabio Silva (2014) found just such a case concerning the orientations of a cluster of dolmens in the Mondego River basin, Portugal. He noted that the dolmens were oriented to the eastern horizon, which was also the location

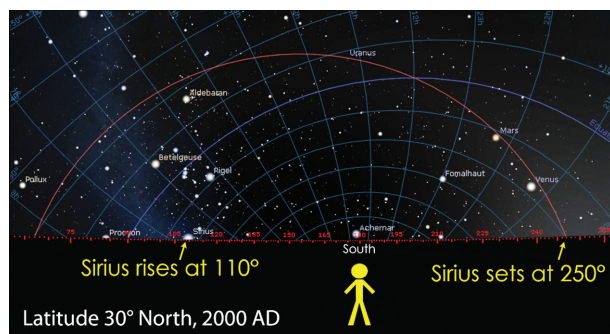


Figure 5.2. Sirius at a latitude of 30° north for the year 2000 AD; it will reappear at an azimuth of 110° and later disappear at an azimuth of 250° (image created using Stellarium [2018]).

of a mountain. Stepping back from the assumption of a possible equinox event, he realised that it was, in the period from 4300 cal BC to 3700 cal BC, the location of the place of the rising of Aldebaran, a red star with magnitude of 0.85. The mountain is known as Serra da Estela (Star Mountain) and the local folklore was that the return of Aldebaran to visibility, rising over the mountain, was the marker for shepherds to take their sheep up into the mountains for the summer grazing. Silva also pointed out that there was archaeological evidence that suggested that the dolmen builders also summered on the mountain. Hence Silva could provide some cultural flesh to the bare bones of the converging alignments of the dolmens to a star.

The other phase – Curtailed Passage

There is a third group of stars. These stars lie between the ecliptic and the pole, north for the northern hemisphere or south for the southern hemisphere. In the northern hemisphere these stars rise in the north-east and set in the north-west. Ptolemy (1993, 5–6) labelled this group as the stars that went through the period of Curtailed Passage, or as Alexander Jones (Jones 2004, 3) translated it, ‘those [that are reported as] having evening rising anticipating morning setting [belong to] the “curtailed-travelling” [stars]’. These are the stars, mentioned earlier, that the Egyptians associated with the pharaoh’s soul; the stars that could appear to journey between the earth and the imperishable stars.

Figure 5.3 shows the movement of the stars that undergo this period of curtailed passage. In Figure 5.3 (1) the star is first observed setting just after the Sun. If this star belonged to the Arising and Laying Hidden phase this would signal the beginning of its period of disappearance; however, in contrast, this star does not disappear but rather it rises again later in the same evening (see Figure 5.3 (1)). To the Egyptian eye this would have been a defiance of death. Over the course of subsequent nights, the star is seen to rise earlier and earlier in the night, until finally, as shown in Figure 5.3 (2), it is observed to rise just after sunset. This is the acronychal rising of the star. On subsequent sunsets (see Figure 5.3 (3)), the star now appears low

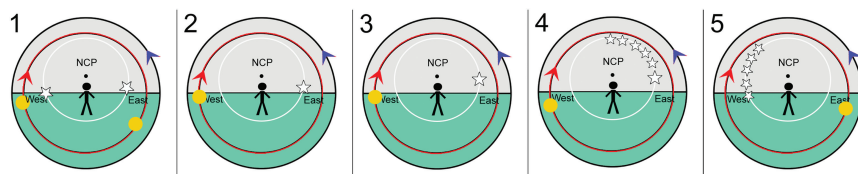


Figure 5.3. The periods of a star which undergoes the phase of Curtailed Passage in the northern hemisphere. The ecliptic is the red circle and the Sun’s yearly movement is marked with a red arrow. The diurnal movement is indicated by the blue arrow.

in the west having already risen, and, importantly, it is visible from sunset to the following dawn – Curtailed Passage. The phenomenon of this process is shown in Figure 5.3 (4) as each evening the star appears in the night sky higher than before, giving the appearance of climbing into the circumpolar stars. The apparent circumpolar-like activity of the star finally ends (see Figure 5.3 (5)) when the star is observed to set just at dawn. This is called the heliacal setting of the star (Brady 2015, 82).

The key periods of this phase type can be summarised as:

- 1 Heliacal setting star– setting just before dawn, this is the star’s return to earth (see Figure 5.3 (5)).
The star then sets earlier each night until it becomes the
- 2 Morning rising star – rising just before the dawn. Importantly this star is not the heliacal rising star as it has never had a period of invisibility.
The star continues to set in the evening and rise before dawn until it becomes the
- 3 Evening setting star – setting in the evening (see Figure 5.3 (1)).
The star is then observed to rise earlier and earlier in the night until finally it rises just after sunset (see Figure 5.3 (3)).
- 4 Acronychal rising star – star rises just after sunset. After this event the star is in the evening sky at sunset and will remain visible all through the night, still being in the night sky at dawn. At sunset each evening the star will appear to be one step higher in the western sky (see Figure 5.3 (4)).

As with the phase of Arising and Laying Hidden, this phase of Curtailed Passage also contains two points on the horizon. The place of rising is the place of ascent, where a star begins its journey to the realm of the circumpolar stars, while the place of setting is the location of where the star returns to earth. Figure 5.4 is set for a latitude of 30° north and shows the way the ecliptic defines these stars. In the figure the observer is looking north and the pole is elevated 30° due north. All the stars contained within the circle of 60° to 90° declination (the white circle) are circumpolar stars. However, all the stars that are located north of the ecliptic (red circle to the right in Figure 5.4) but are outside the circumpolar zone will be subject to the phase of Curtailed Passage. Figure 5.4 shows the place of ascent and descent for Vega. For the year 2000 AD, at this latitude Vega will rise at azimuth 44° and set at azimuth 318°. The timing of these events, taking into account visibility issues, is that in early May, Vega will be seen to be rising just as the Sun sets. This is its acronychal rising. After this, Vega will appear to act like a circumpolar star, as it will be in the sky at sunset and still visible at the following sunrise. It will continue this period of being free from touching the horizon until it is seen to set – heliacal setting – just on sunrise in late August.

The importance of the phenomena of these star events – ascent to the heavens and the descent to earth – is, as mentioned earlier, expressed in

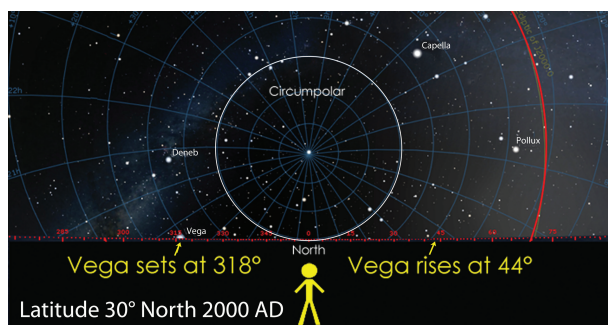


Figure 5.4. Vega at a latitude of 30° north for the year 2000 AD; it will begin its ascent to the circumpolar stars at an azimuth of 44° and later it will return to earth at an azimuth of 318°.

the naked-eye astronomy contained in the Pyramid Texts, which spoke of the ascent of the pharaonic soul. James Allen (2005, 1), suggested that this religious material influenced the later biblical religious themes of the notion of the soul and its eventual ascent to the heavens. Hence one can speculate that, based on the Egyptian evidence and its later influence on Christian religion, this star phase could have planted in the human mind the concept that the gods could descend to earth just as humans could ascend to the gods. As such, this star phase may have also provided the visual foundations for the doctrine of angels or intermediary beings that could traverse between the mortal and the immortal worlds. It is unlikely that these views originated or were the sole creation of the third millennium BC Egyptians. These star phases can be seen by all people living in subpolar regions. Which actual stars undergo which phase type and for how long they will be in the different stages of their phase will vary by latitude; however, all people can observe these stellar events and potentially incorporate them into their cultural stories.

A Welsh example

In contrast to the Egyptian themes of the ascent of the soul, there is a Welsh narrative known as the Mabinogi. This is a collection of Welsh stories that were written down in the fourteenth century but are considered to be older oral material which was held in a collective memory (Davies 2007, xiii). In one section of the Mabinogi, the Fourth Branch, there are two central characters, Gwydion, a druid and a magical being called Lleu.

Lleu enters the story as a small, tiny, non-human thing that only Gwydion can see. He rapidly grows to full strength and becomes an adult. Later in the story he is murdered but instead of falling to the ground he turns into an eagle which ascends into the heavens. Gwydion, however, knows that

eventually Lleu will return, and looks for him at dawn. Time passes, but after much searching, one dawn he sees Lleu, still as the eagle, perched high in a magical oak tree. The oak itself adds to the stellar nature of the story. The oak is a sacred tree and Pliny the Elder in the first century AD wrote that the Druids believed, “anything growing on oak-trees they think to have been sent down from heaven” (1945, Bk.16, 95). The oak in this story is described by Gwydion as:

An oak grows on a high plain, Rain does not wet it, heat no longer melts it; It sustained one who possesses nine-score attributes. In its top is Lleu Llaw Gyffes.

(Davies 2007, 62)

The oak tree in Gwydion’s song, high and in a magical place, is potentially reflecting the celestial pole, the axis on which the world turns. Lleu, as an eagle, is perched at the top of this great oak. Gwydion sees him and sings him down to earth by a set of verses, and with each verse Lleu takes one step closer to earth. Finally, coaxed by song, the eagle perches on Gwydion’s knee. Here Lleu is transformed to his mortal form, weak and faint but once again belonging to the world of flesh and bone – touching the horizon. The Egyptians of the Old Kingdom saw the soul of the pharaoh climbing a ladder to the circumpolar stars or saw the pharaoh’s soul carried by a great bird to the heights of the heavens. Their poetic verses were their prayers about the soaring of the pharaoh’s star to the heavens; however, in this Welsh story of the Fourth Branch the star is sung down to earth. The act of singing, rather than praying, is the magic of the moment, the sacred act. This engagement with Welsh myths demonstrates the potential influence of star phases to any sky-watching culture.

Conclusion

The stars offer a consistent visual palette to all people. Different cultural groups will place varying stories or meanings onto this nightly and annual display of stars and some of these stories may well, for a people, hold more importance or greater value around matters of life and death, than the rhythm of the luminaries. The Egyptians of the Old Kingdom saw the king’s soul becoming a star and being raised by a ladder or by a great bird, to the circumpolar stars, and much later the Greeks used star phases in a more secular fashion for calendars and weather. While, by way of contrast, I have suggested that the Welsh myth of the Fourth Branch of the Mabinogi spoke of singing a star, Lleu, down to earth.

My argument here is that for the builders of tombs or sacred buildings, a particular place marked by a star-rise or -set could be of greater significance than the rising or setting of the Sun or Moon. They may have turned their structure to the north-east or north-west, pointing towards a “gateway”

for a star's ascent to the heavens or the "gateway" to the place of birth of a divine being. Or they may have oriented a structure to what appears today to be a solar or lunar event, but instead the intention could have been to point to the place of a star's heliacal rising, its place of birth, or its acronychal setting, its place of death.

The stars and their phases provide the foundation for a richness of stories, all of which originally would have been embedded in place. To an observer who did not think in celestial spheres and declinations, the stars are mysterious. They switch from being visible in the west to being visible in the east, then high in the sky, or disappearing and months later bursting up before the Sun. All of this behaviour is wedded to the seasons and rooted in place. As such, a local horizon could be studded with star-places. Silva found a Star Mountain, a fragment of oral tradition still intact today, but that is all that is left, just small scraps. Today, this stellar intentionality may be hard to support without the necessary cultural context and some clarity around approximate dating; however, this does not mean that such intentionality did not originally exist.

References

- Allen, James P., 2005. *The Ancient Egyptian Pyramid Texts*. Atlanta, GA: Society of Biblical Literature.
- Birney, D.S., G. Gonzalez and D. Oesper, 2006. *Observational Astronomy*. Cambridge: Cambridge University Press.
- Brady, Bernadette, 2012. "A Consideration of Egyptian Ascension Mythology as a Reflection of the Mythopoeic Nature of Star Phases and Its Implication for Belief in the Descent of Divine Beings". In *Current Research in Egyptology*, Vol. XII, edited by Heba Abd El-Gawad, Veronica Tamorri, Nathalie Andrews, James Taylor and Maria Correias-Amador, 40–47. Oxford: Oxbow.
- Brady, Bernadette, 2015. "Star Phases: The Naked-Eye Astronomy of the Old Kingdom Pyramid Text". In *Skyscapes: The Role and Importance of the Sky in Archaeology*, edited by Fabio Silva and Nick Campion, 67–86. Oxford: Oxbow.
- Clagett, Marshall, 1995. *Ancient Egyptian Science, a Source Book: Volume II, Calendars, Clocks and Astronomy*. Philadelphia, PA: American Philosophical Society.
- Davies, Sioned, 2007. *The Mabinogion*. Oxford: Oxford University Press.
- Davis, Whitney M., 1977. "The Ascension-Myth in the Pyramid Texts". *Journal of Near Eastern Studies* 36(3): 161–79.
- Dawson, P.C. and M.M. De Robertis, 2004. "Barnard's Star and the M Dwarf Temperature Scale". *The Astronomical Journal* 127(5): 2909–2914.
- Faulkner, R.O., 1966. "The King and the Star-Religion in the Pyramid Texts". *Journal of Near Eastern Studies* 25(3): 153–61.
- Hesiod, 2006. *Works and Days, Theogony and the Shield of Hercules*. New York: Dover Publications Inc.
- Homer, A.T. Murray and William F. Wyatt, 1999. *Iliad*. Cambridge, MA: Harvard University Press.
- Jones, Alexander, 2004. *Provisional Translation of Ptolemy's Phaseis*. Online at <https://www.scribd.com/document/171014780/Ptolemy-Phaseis-Trad-Jones>

- Lehoux, Daryn, 2005. "The Parapegma Fragments from Miletus". *Zeitschrift fur Papyrologie und Epigraphik* 152: 125–40.
- Lesko, Leonard H., 1991. "Ancient Egyptian Cosmogonies and Cosmology". In *Religion in Ancient Egypt*, edited by Byron E. Shafer. New York: Cornell University Press.
- Neugebauer, O., 1942. "The Origin of the Egyptian Calendar". *Journal of Near Eastern Studies* 1: 396–403.
- Parker, R.A., 1974. "Ancient Egyptian Astronomy". *Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences* 276: 51–65.
- Penprase, Bryan E., 2010. *The Power of Stars: How Celestial Observations Have Shaped Civilization*. London: Springer.
- Plato, 1997. *Laws*, trans. Trevor J. Saunders, in *Plato, Complete Works*. Indianapolis, IN: Hackett Publishing Company.
- Pliny the Elder, 1945. *Natural History*, trans. Harris Rackham. Cambridge, MA: Harvard University Press.
- Prendergast, Frank, 2015. "The Great Stone Circle (B) at Grange, Co. Limerick". *Journal of Skyscape Archaeology* 1(1): 65–92.
- Ptolemy, Claudius, 1993. *The Phases of the Fixed Stars*, trans. Robert Schmidt. Berkeley Springs, WV: The Golden Hind Press.
- Ptolemy, Claudius, 1998. *Ptolemy's Almagest*, trans. G.J. Toomer. Princeton, NJ: Princeton University Press.
- Raven, Maarten J., 2005. "Egyptian Concepts on the Orientation of the Human Body". *The Journal of Egyptian Archaeology* 91: 37–53.
- Ruggles, C.L.N., 2015. "Recumbent Stone Circles". In *The Handbook of Archaeoastronomy and Ethnoastronomy*, edited by C.L.N. Ruggles, 1277–1285. New York: Springer Reference.
- Schaefer, Bradley, 1986. "Atmospheric Extinction Effects on Stellar Alignments". *Archaeoastronomy* 10: 32–42.
- Schaefer, Bradley, 1987. "Heliacal Rising Phenomena". *Archaeoastronomy* 11: 19–33.
- Schaefer, Bradley, 1990. "Refraction Near the Horizon". *Astronomical Society of the Pacific* 102: 796–805.
- Silva, Fabio, 2014. "A Tomb with a View, New Methods for Bridging the Gap between Land and Sky in Megalithic Archaeology". *Advances in Archaeological Practice: A Journal of the Society for American Archaeology* 2(1): 24–37.
- Stellarium v.0.18.1. www.stellarium.org/en_GB/ Accessed June 2018.