

## SEASONAL DATING OF SAPPHO'S 'MIDNIGHT POEM' REVISITED

**Manfred Cuntz, Levent Gurdemir**

*Department of Physics, 502 Yates Street, University of Texas at Arlington,  
Arlington, TX 76019, USA.*

Emails: cuntz@uta.edu and gurdemir@uta.edu

and

**Martin George**

*National Astronomical Research Institute of Thailand, 191 Huay Kaew Road,  
Suthep District, Muang, Chiang Mai 50200, Thailand, and University of  
Southern Queensland, Toowoomba, Queensland, Australia.*

Email: martingearge3@hotmail.com

**Abstract:** Sappho was a Greek lyric poet who composed a significant array of pristine poetry. Although much of it has been lost, her reputation has endured thanks to numerous surviving fragments. One of her contributions includes the so-called 'Midnight Poem', which contains a line about the Pleiades, setting sometime before midnight, and supposedly observed from the island of Lesbos. This poem also refers to the setting of the Moon. Sappho's Midnight Poem thus represents a prime example of where ancient poetry and astronomy merge, and it also offers the possibility of seasonal dating. Previously, Herschberg and Mebius (1990) estimated that the poem was composed in late winter/early spring, a time frame that is not unusual for lyrics of an amorous nature. The aim of our paper is to revisit this earlier finding by using modern-day software. Our study confirms Herschberg and Mebius' result, but also conveys further information.

**Keywords:** Sappho, Pleiades, Ancient Greece, celestial mechanics, Starry Night software

### 1 SAPPHO: HER LIFE, CULTURE AND POETRY

Sappho (Figures 1 and 2) was a Greek lyric poet, and according to various sources (e.g., Campbell, 1982; Page, 1955) she was born between 630 and 612 BC in either Eressos or Mytilene on the island of Lesbos, and died around 570 BC. In antiquity, Sappho (or 'Psap-

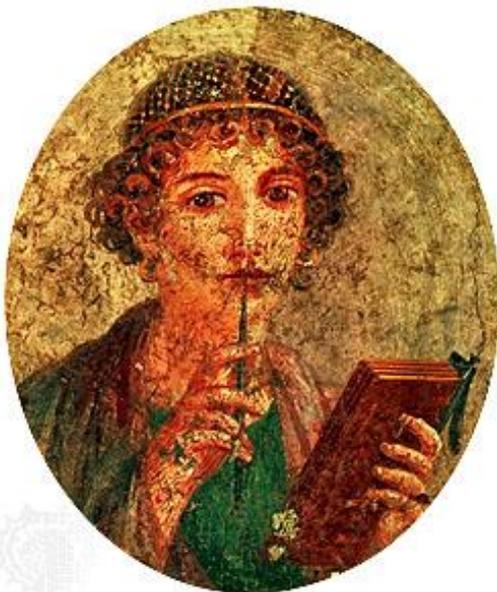


Figure 1: A portrait of Sappho by an unknown first century artist, preserved on a Pompeiian fresco in the National Archaeological Museum, Naples (<http://www.britannica.com/biography/Sappho-Greek-poet>).

pha' in her native Aeolic dialect) was often counted among the greatest of poets, but little is known for certain about her life. Even the names of her family members are inconsistently reported, but she does seem to have had several brothers and to have married and had a daughter named Cleis. Moreover, the bulk of her poetry—which was well known and greatly admired throughout much of antiquity—has been lost, but her reputation has endured thanks to the fragments that have survived. Sappho's poetry is the only contemporary source available that reveals something of her life, but as Lefkowitz (1981) has pointed out, most scholars query whether they should interpret it biographically.

Sappho's poetry was organized into nine books by the Library of Alexandria (Egypt), and was highly acclaimed throughout history. For example, it has been suggested (Henderson, 2004) that

... in antiquity Sappho was regularly counted among the greatest of poets and was often referred to as 'the Poetess,' just as Homer was called 'the Poet.' Plato hailed her as 'the tenth Muse', and she was honored on coins and with civic statuary. Nonetheless, an ancient, scurrilous tradition attacked and ridiculed her for her evident sexual preferences.

Thus, even today, Sappho's work and personal life remain a topic of lively discussion,<sup>1</sup> and the

history of her reception itself continues to be part of Sappho's enduring significance.

Fortunately, about two hundred fragments featuring her work have survived. Some of these include virtually complete poems, whereas others are incomplete, and often both their beginnings and endings require scholarly educated guesses. All of Sappho's poems are considered highly sophisticated both regarding smoothness and grace of the language used. Two of the fragments are viewed as retelling Homer's epics, for Sappho was very familiar with Homer's poems (Rutherford, 1991).

Many of Sappho's poems include astronomical objects (see *The Divine Sappho*, n.d.), but perhaps the best known is her so-called 'Midnight Poem' (Fragment 52), which contains a line about the Pleiades having set before midnight, when supposedly observed from the island of Lesbos. This poem will be the focus of the present study, and our main interest is to try to date it seasonally on the basis of the position of the Pleiades in the night sky at different times of the year. Our study will make use of Starry Night and other items of software.

## 2 SAPPHO'S 'MIDNIGHT POEM'

Following is the relevant section of Sappho's 'Midnight Poem' (Fragment 52), in Greek:

Δέδυκε μὲν ἃ σελάννα  
καὶ πλειάδες μέσαι δε  
νύκτες, παρὰ δ' ἔρχετ' ὥρα,  
ἔγω δὲ μόνα κατεύδω

Below are English translations by three different well-known scholars,<sup>2</sup> and a German translation:

The Moon hath left the sky;  
Lost is the Pleiads' light;  
It is midnight  
And time slips by;  
But on my couch alone I lie.  
(Symonds, 1873–1876).<sup>3</sup>

The moon has set,  
and the Pleiades;  
it is midnight,  
the time is going by,  
and I sleep alone.  
(Wharton, 1887: 68).<sup>4</sup>

The silver moon is set;  
The Pleiades are gone;  
Half the long night is spent, and yet  
I lie alone.  
(Merivale, 1838: 226).<sup>5</sup>

Untergegangen sind der Mond  
Und die Plejaden. Es ist Mitternacht,  
Die Stunden vergehen.  
Ich aber schlafe allein.  
(see von Schirnding, 2013).



Figure 2: A painting of Sappho (with Alcaeus) on an Attic Red-Figure kalathos made by the 'Brygos Painter' in about 470 BC. This pot is now in the Staatliche Antikensammlungen in Munich (en.wikipedia.org).

## 3 THE MYTHOLOGICAL, CULTURAL AND ASTRONOMICAL SIGNIFICANCE OF THE PLEIADES

Specific mention of the Pleiades in the Midnight Poem is interesting, as this asterism has mythological, cultural and astronomical importance. The Pleiades, also known as the Seven Sisters and Messier 45, is a bright open star cluster in Taurus, and thus is readily visible from the Northern Hemisphere and most populated areas of the Southern Hemisphere. From a cultural and astronomical perspective, for millennia the Pleiades have been closely associated with the winter season in the northern hemisphere.

The most distinctive members of the Pleiades are a group of bright stars (see Figure 3) with apparent visual magnitudes between 2.8 and 5.6. All of those are luminous B-type stars embedded in extended gas and dust shells (Kroupa, 2001). Many of these stars are named, and the brightest is Alcyone (spectral type B7 IIIe) with an apparent magnitude of 2.87. Alcyone is located near the geometrical center of the most prominent part of the cluster. Therefore, it constitutes an adequate object of reference for recording the rising and setting of the Pleiades.



Figure 3: A color-composite image of the Pleiades from the Digitized Sky Survey (courtesy: NASA/ESA/AURA/Caltech).

Table 1: Astronomical Data for the Pleiades.

Parameter	Result/Value	Reference
Right Ascension of Alcyone (epoch 2000.0)	3 <sup>h</sup> 47 <sup>m</sup> 24 <sup>s</sup>	Tirion (2011)
Declination of Alcyone (epoch 2000.0)	+24° 07'	Tirion (2011)
Apparent Visual Magnitude of Alcyone	2.87	Tirion (2011)
Apparent Cluster Dimensions (arcmin)	110	Tirion (2011)
Cluster Distance (pc)	136	Melis et al. (2014)
Cluster Age (Myr)	115	Basri et al. (1996)
Cluster Mass ( $M_{\odot}$ )	800	Adams et al. (2001)
Estimated Number of stars in the Cluster	1200	Adams et al. (2001)
Extrasolar Planets in the Cluster?	Indirect evidence	Rhee et al. (2007)

Additional information about the Pleiades is given in Table 1.

From a mythological and cultural perspective, the Pleiades have been known since antiquity to cultures around the world, and not just to the ancient Greeks. Other examples include the Aboriginal Australians, Arabs, Aztecs, Celts, Chinese, Indians, Japanese, Maori, Mayans, Persians, various tribes in northern and southern Africa, the Thais, Ukrainians, and Vikings, as well as Native Americans of the north such as the Blackfoot, Cherokee, Cheyenne, Hopi, Lakota, Navajo, Pawnee and Sioux (e.g., see [en.wikipedia.org/wiki/Pleiades\\_in\\_folklore\\_and\\_literature](http://en.wikipedia.org/wiki/Pleiades_in_folklore_and_literature)).

The Pleiades also have been epitomized by the Babylonians, as conveyed by the astrolobe and a fragment of a circular star list (Evans, 1998). Another prehistoric example of the depiction of the Pleiades is the 3,600-year old 'Nebra sky disk', a 30-cm diameter bronze disk found near Nebra in Germany and associated with the Bronze Age Unetice culture (Meller, 2002).<sup>6</sup>

Galileo Galilei was the first astronomer to view the Pleiades through a telescope, and he quickly discovered that this cluster contains many stars too dim to be seen with the unaided eye. In March 1610 he published his observations in the *Sidereus Nuncius* (see Raphael, 2010), which included a sketch of the Pleiades showing 36 stars.

Among contemporary ethnic populations, the Pleiades are part of the Kaurua (Indigenous Australian) astronomical tradition, and were referred to as *Mankamankarranna*, or "Girls who dig for roots." (Hamacher, 2015: 41). To the Maori of neighbouring New Zealand, the Pleiades were known as *Matariki*, and used to mark the start of the New Year. The appearance of *Matariki* also was intricately associated with cultivation of the *kumara* (a Polynesian dietary staple akin to the potato) and the hunting of certain birds and fish (see Orchiston, 2016: Chapter 2).

From today's perspective, the Pleiades are important to astrophysicists. As an open star cluster, they are an excellent choice for the

study of multi-object dynamics, and for contesting ideas about cluster evaporation and dissolution (Converse and Stahler, 2010). Since the Pleiades consist of numerous hot, luminous, young stars, they also are of prime interest to those studying the early stages of stellar evolution, particularly mass-loss and stellar activity-age relations (Cardini and Cassatella, 2007; Pols et al., 1995; Schröder and Cuntz, 2005). Furthermore, because of the presence of extensive clouds of gas and dust (Gibson and Nordieck, 2003), they offer a window of opportunity to explore the formation of stars and planets. Moreover, the Pleiades received additional attention as part of the 'Pleiades distance controversy', where the distance of the cluster as measured by the Hipparcos mission differed markedly from those obtained earlier. This resulted in a revision of the Hipparcos-based distance determination technique (Basri et al., 1996), which also will have ramifications for future space missions, including GAIA.

#### 4 SEASONAL DATING OF SAPPHO'S POEM

The aim of our study is to take a fresh look at the seasonal dating of Sappho's Midnight Poem. The key information used in this regard is the line indicating that by midnight the Pleiades had already set, even though we do not know the year in which this observation was made. But since Sappho is reported to have died around 570 BC, we have adopted this as the reference year for our analysis.<sup>7</sup> Furthermore, we assume that the observation was made from Mytilene, the capital and primary city of Lesbos at this time, which is where Sappho is presumed to have resided for much of her life. Mytilene, with coordinates of 39° 6' N and 26° 33' E, is located on the eastern side of the island of Lesbos, facing towards the ancient region of Lydia, which is now part of western Turkey.

For our study we used Starry Night version 7.3 (see <http://astronomy.starrynight.com>), JPL's Horizons web interface (see <http://ssd.jpl.nasa.gov>) and methods published by Meeus (1991), allowing for the precession of the equinoxes.

Our approach was to identify (a) the earliest date on which the Pleiades would have set at midnight or earlier in local time, and (b) the

latest date on which the Pleiades would have been visible *at some time* during the evening.

During our investigation we could not establish precisely what type of time-keeping device was used on Lesbos around 570 BC., although we assumed that it was the clepsydra (water clock). Simple outflow clepsydra certainly were in use in Athens in the fourth century BC (Landels, 1979), and in other parts of the world much earlier (Lewis, 2000). However, a related consideration is the interpretation of 'midnight'. The modern time zone of Lesbos is UT + 2h, but in 570 BC time zones did not exist. Therefore, because of the specific mention of midnight, we have assumed a local time based on the exact longitude of Mytilene. At a longitude of 26° 33' E this corresponds to UT + 1h 46m, even though this is itself based on the modern prime meridian of the world.

For this analysis we used Alcyone, since it was the brightest star in the Pleiades and was located near the center of the cluster. Also, we assumed a theoretical horizon, but because Mytilene was located on the lower eastern slopes of a mountain range at an altitude of between 200 m and 900 m the Pleiades would have set a few minutes earlier than if Mytilene were at sea level. Thus, if inspected for a given time of day, the Pleiades' setting would correspond to a slightly earlier date in that year. Alternatively, Sappho's poem could have been composed at Eressos, which has been named as an alternative birthplace and place of residence of Sappho (Campbell, 1982; Page, 1955). Because Eressos was on the western coast of Lesbos, in this case a theoretical horizon as reference would be appropriate.

An important consideration is the phenomenon of *extinction*, in which the light of astronomical objects is dimmed as a function of their altitude above the horizon. The lower in the sky an object is seen, the greater the amount of atmosphere through which its light passes, and the dimmer it appears. We have utilized standard formulae for this effect. Of note is that when at an altitude of only 3°, Alcyone—which is normally of magnitude 2.87—would be only a little brighter than sixth magnitude (which is the limit of naked-eye visibility). Therefore, we regarded the Pleiades as 'setting' when Alcyone's altitude reached 3°.

In our study we found firstly that in 570 BC the Pleiades set at midnight (as defined above) on 25 January, representing the earliest date to which the poem could relate (on earlier dates, the Pleiades would have set after midnight).

As the year progressed, the Pleiades set progressively earlier. An intermediate step in the calculations was to determine the latest date

on which the Pleiades would have been seen at the end of astronomical twilight, which is the moment when the Sun's altitude is  $-18^\circ$  and the sky is regarded as being perfectly dark. This date was 31 March.

After this date, the period of visibility of the Pleiades in the evenings would have become progressively shorter, and the next stage of the investigation was to find the last date on which the Pleiades would have been *at all* visible, given that twilight would have steadily encroached from night to night.

For this we referred to the method outlined by Belokrylov et al. (2011) of determining the visibility of stars during twilight, which is used to calculate the minimum altitude of the Sun that is required for a star to be visible. This takes into account the extinction of the star's light and the additional sky brightness when the star is  $<58^\circ$  from the Sun. We found that the latest date on which these conditions were suitable for Alcyone to be visible was 6 April.

In summary, these results indicate that Sappho's Midnight Poem was written sometime between mid-winter and early spring, but no statement can be made about the year in which it was composed. We explored these results both numerically and by inspecting Starry Night screen shots,<sup>8</sup> and for the sake of comparison we also created night sky snapshots for 570 BC using the Digistar 5 planetarium software.

Sappho's Midnight Poem also mentions that the Moon had set, but considering that we chose the year 570 BC somewhat arbitrarily for our study, information on the Moon's nightly motion across the celestial sphere remains ambiguous and cannot be used to further constrain the time-frame of this poem.

Our findings also can be compared with the results derived earlier by Herschberg and Mebius (1990), where they reached a similar conclusion to us. However, their work was largely based on descriptive arguments and did not employ modern astronomical software. Precession of the equinoxes also was taken into account by them, although no explicit reference to it is made. Herschberg and Mebius also rightfully concluded that the presence of the Moon could not be used to further constrain the date of the Midnight Poem, although

... the moon's age lies between two and six days ... [and therefore would have appeared] as a crescent over the westerly horizon in the evening. (Herschberg and Mebius, 1990: 150).

## 5 CONCLUDING REMARKS

Sappho was one of the greatest Greek lyric poets, but her work has been marginalized, re-

written or disregarded due to disrespect for her sexual orientation. Most of her work has been lost, but one of her surviving fragments is the Midnight Poem, which talks about her loneliness and her desire for love, but also contains a line about the Pleiades, which had set prior to midnight.

This line can possibly be used to seasonally date the poem, and to investigate this we employed several different pieces of software. Assuming that Sappho observed from Mytilene on the island of Lesbos, we determined that in 570 BC the Pleiades set before midnight from 25 January on, and were lost to the evening twilight completely by 6 April. Because Lesbos is relatively small and the same phenomena repeat almost exactly from year to year on a given date, altering the observing location to nearby Eressos, or the year of observation by as much as 40 years, made very little difference. Thus, we can conclude that the Midnight Poem was written in late winter or early spring.

Herschberg and Mebius (1990) also examined Sappho's Midnight Poem using a descriptive approximate approach rather than modern software, and they also concluded that it was written in late winter or early spring,<sup>9</sup> which is consistent with our result.

Sappho's poem also includes a reference to the setting of the Moon, but unfortunately this cannot be used for dating purposes.

Sappho was the leading female poet of her time, and closely rivalled Homer. Her interest in astronomy was not restricted to the Midnight Poem. Other examples of her work make reference to the Sun, the Moon and the stars, as the following three fragments illustrate:

The stars about the fair moon  
In their turn hide their bright face  
When she at about her full  
Lights up all earth with silver  
(*The Divine Sappho*: Fragment 3; Wharton).

The moon rose full,  
and the women stood  
as though around an altar.  
(*The Divine Sappho*: Fragment 53; Wharton).

I love delicacy, and for me Love has the sun's  
splendour and beauty.  
(*The Divine Sappho*: Fragment 79; Wharton).

Sappho also needs to be placed in a broader context, as an early example of 'a woman in astronomy' (e.g., see Schmelz, 2014), and as an informal contributor to early Greek astronomy as well as the Greek society at large.

## 6 NOTES

1. A different perspective on Sappho's Midnight Poem is suggested by Reiner and Kovacs (1993). They argue that the standard astro-

nomical interpretation for the celestial position of the Pleiades, as well as for the term "constellation" is not valid, and furthermore that the poem is in fact a Volkslied (folk-song), which was not composed by Sappho after all. They base this view on a linguistic array (i.e., sense, style and grammar) as well as distinct ethnological arguments. However, considering that we are not in the position to verify or falsify these claims through other sources, we accept the standard classification of Sappho's Midnight Poem as previously and subsequently also done by Herschberg and Mebius (1990) and others.

2. According to the 'Internet Sacred Text',

This singularly beautiful fragment is quoted by Hephæstion as an example of metre. With the 'Hymn to Aphrodite' it was the first portion of the Poems of Sappho to be printed in 1554. ([www.sacred-texts.com/cla/sappho/sappho2.htm](http://www.sacred-texts.com/cla/sappho/sappho2.htm)).

3. John Addington Symonds (1840–1893) was an English poet and literary critic. Apart from his *Studies of the Greek Poets* (Symonds, 1873–1876) he wrote books on many other topics (e.g., see Grosskurth, 1986).

4. This is Wharton's Sappho fragment 52 (Bergk), but is also referred to as Voigt 168b and Cox 48, and by Diehl (1936) as fragment 94. In his translations, Wharton uses the terms "sleep" and "reside" interchangeably. Henry Thornton Wharton (1846–1895) was an English scholar who apart from his acclaimed book on Sappho (Wharton, 1887) published on British birds.

5. John Herman Merivale (1779–1844) was an English lawyer and scholar, and

... was Robert Bland's principal collaborator in his 'Collections from the Greek Anthology and from the Pastoral, Eligiac, and Dramatic Poets of Greece,' London. 1813 ... A collective edition of his 'Poems, Original and Translated,' appeared in 1838, London, 2 vols. 8vo, which includes ... some translations from Dante, and other miscellanea ... (Rigg, 1885–1900).

6. In 2013, the Nebra Sky Disk was entered on the registry of the *UNESCO Memory of the World*.

7. This is an arbitrary figure, since we do not know how many years before her death Sappho wrote the Midnight Poem. However, altering this selected date by 20 years, or even as much as 40 years (depending on her actual date of birth), makes no *appreciable* difference to the outcome of our analysis.

8. During this study we identified a minor discrepancy between the different pieces of software, but these did not sensibly affect our result: we interpret the dates given as

being accurate to within 1–2 days. Also, in the starry Night screenshots the Pleiades appeared to be slightly below the horizon when according to the numerical results they had just set. We interpreted this difference either as an inherent limitation of the software's image-rendering process, or because the calculation takes the refraction of the Earth's atmosphere into account whereas the image-rendering does not.

9. Strictly speaking, the seasonal dating of the Midnight Poem by us and by Herschberg and Mebius refers to an astronomical event rather than to the composition of the poem itself. Sappho may have written this poem at a later date, and drawn on her memory when describing the sky at a particular time of night during a particular season. On the other hand, it is more reasonable to assume that she made her astronomical observations and wrote the poem at about the same time.

## 7 ACKNOWLEDGEMENTS

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Dr Manfred Cuntz is a Professor of Physics at The University of Texas at Arlington (UTA). He received his Ph.D. from the University of Heidelberg, Germany, in 1988. Thereafter, he continued his career in the USA, at the University of Colorado and the University of Alabama in Huntsville. He has an active research program in solar and stellar astrophysics, and astrophysics. His observational focus included studies on



the Hubble Space Telescope, FUSE, GALEX, CHANDRA, Newton-XMM, and at McDonald Observatory. In recent years, he has focused on extra-solar planets, including stellar habitable zones and orbital stability analyses, and is a co-identifier of the first planet (if finally confirmed) located in a habitable zone

outside of the Solar System (Gliese 581d). He is the author of over 75 refereed publications and several invited reviews. Additionally, he is committed to quality teaching and student mentorship. Besides his research studies, he pursues a vibrant component of education and public outreach through the UTA's Planetarium. Since 2010, he also has served as the Director of UTA's Astronomy Program.

Levent Gurdemir is the Director of UTA's Planetarium. He is actively engaged in numerous education and public outreach initiatives, notably in conjunction with NASA's SOFIA mission, focused on the Dallas-Fort Worth Metropolitan Area and beyond.

Levent Gurdemir received his M.S. degree in Physics from the University of Texas at Arlington. His research interests include extra-solar planets, particularly star-planet interactions. Levent Gurdemir also had several professional leadership roles in the



community. Currently, he is the President of the South Western Association of Planetariums ([www.swapskies.org](http://www.swapskies.org)) and Co-chair of Western Alliance Conference ([www.wacdomes.org](http://www.wacdomes.org)). He also hosted several academic conferences at his facility, including the Western Alliance Conference in 2014. He interacts with

local schools and delivers talks in addition to setting up telescopes for sky viewing. Beyond serving large numbers of K-12 students and the public at his local facility, he is working to bring research and advanced levels of teaching into planetariums by opening them to other disciplines beyond astronomy. He thinks that advanced planetariums are great assets not only for astronomy, but also for geosciences, biology, chemistry, art, architecture, history and even medicine.

Martin George is the Collections and Research Manager at the Queen Victoria Museum and Art Gallery in Launceston, Tasmania, and also is responsible for the Museum's astronomy collections and the planetarium.



He is a former President of the International Planetarium Society. Martin has a special research interest in the history of radio astronomy, and is completing a Ph.D. part-time on the development of low frequency radio astronomy in Tasmania through the University of Southern Queensland, supervised by Professors

Wayne Orchiston and Richard Wielebinski (and originally also by Professor Bruce Slee). Martin is the Administrator of the Grote Reber Medal. In recent years, Martin also has been researching seventeenth century Jesuit astronomical activities in Thailand.