

An Astronomical Interpretation of a Small Example from Armenian Folklore*

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Abstract

This article examines an individual fragment of Armenian folklore about the Aratsani (Euphrates) River from an astronomical perspective, focusing on the central characters - the dragonfish and the bear. Through this analysis, a wealth of “astronomical knowledge” rooted in ancient mythological perceptions is revealed. Specifically, the mentioned figures in the sky correspond respectively to the modern constellations of the Southern Fish (Piscis Austrinus) and the Great Bear (Ursa Major). The described scenes are correlated with the heliacal rising and setting of the main star of Southern Fish constellations. Furthermore, all defining characteristics of the figures are given precise astronomical and mythological interpretations. The legend also highlights expressions related to the unfolding time, which are thoroughly explained based on celestial phenomena and ancient Armenian calendrical concepts. It is demonstrated that the described celestial events are associated with a 65–70-day period, referred to in the Protohaykian calendar structure as the “extra-annual period.” Additionally, the legend reveals close calendrical and ritualistic connections with the astronomical context of Fish-shaped Dragon Stones (Vishapakars). The comprehensive astronomical analysis enables the dating of the legend described to 18800 BC.

This serves as a small but striking example of how folklore can act as a unique source of rich astronomical information.

Keywords: *Armenian Folklore, Dragon-fish, Vishapakar, Piscis Austrinus, Ursa Major, Ethnoastronomy, Armenian Calendar History, Cultural Astronomy.*

1. Introduction

In recent decades, numerous examples of astronomical analyses of Armenian folklore have been published. Some of these studies focus on the calendrical content included in Armenian fairy tales (Broutian, 2008, 2009, 2010, 2011), others provide astronomical interpretations of specific small episodes or characters from the Armenian epic “Sasnay Tsrer” (The Daredevils of Sassoun) (Broutian, 2020b, 2021a,b,c). However, folklore is often used as a supplementary source of information in the study of astronomical heritage monuments, such as the “Zorats Qarer” megalithic complex (Malkhasyan, 2021, 2022, 2023a, 2024), the Dragon Stones stelae (Vishapakars) (Broutian, 2020a), and other material artifacts with calendrical significance (Broutian, 2007). These studies primarily reveal close connections between Armenian folklore and the fundamental structure of the so-called Protohaykian calendar (Broutian, 2011, 2016). In the references above, a variety of approaches to astronomical interpretation have been employed. However, these approaches are far from forming a standardized methodology. Nevertheless, in all cases, ancient Armenian mythological and calendrical concepts are used as key “tools” for the analysis. This article presents an example of such an analysis. **The challenge posed is to extract the possible maximum astronomical information from a highly concise narrative.** To achieve this, the subject of analysis is a brief traditional legend recorded in the historical Mush province (Bulanykh, Western Armenia) (Bense (1972), p. 48).

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2. Material and Methods

Before proceeding with the analysis, it is essential to provide the full text¹ of the legend in question. The following is told about the Aratsani (Euphrates) River:

“Hunters were pursuing² a bear, which, while escaping, fell into the river. A few minutes later, the bear suddenly resurfaced and its fur plucked. The river becomes bloody, and shortly after that, a dragonfish with a split belly spreads out on the surface of the water. It is placed on a wagon, transported to the city (Manazkert), and distributed part by part among the townspeople.” (Bense (1972), p. 48)

2.1. Identification of Main Characters

For the purposes of astronomical interpretation, the main characters and objects of the legend have been isolated and aligned with the corresponding astronomical concepts (Table 1). The following enumerated list corresponds to the justifications for these associations:

- 1) In the present case, the celestial parallel for the bear should be considered as the modern constellation of Great Bear. This equivalence has been discussed in more detail in another context (Malkhasyan, 2021), so there is no need to repeat the justification here.
- 2) Although the role of hunters is not highly emphasized in the legend, their presence clearly points to an ancient scene of hunting. The bear was explicitly identified, reflecting hunting practices from ancient times. The hunters actively pursue ‘the bear’, which implies a star or constellation that rises and sets after the stars of the Great Bear. In particular, hunters are described as present when the bear falls into the river, but are not mentioned when the bear emerges. This is logical, as the constellations that ‘follow’ the Great Bear are below the horizon during its rise and are not visible, unlike at the time of their setting. It is also worth noting that in the “Hamatarats Ashkharhacoyc” (Extensive World Map) by Ghukas Vanandeci (1695), the constellation of Boötes (Eznarats), which “follows” Great Bear, is named “Arjapan” (Guard of the Bear). On the other hand, Vanandeci (1695) illustrates another constellation in this region as a man with a club. With some reservation, it is possible to propose that the legend refers to these very constellations, with a higher probability for Boötes (Eznarats).
- 3) The earliest known Mesopotamian cuneiform sources reference a constellation called “Fish” written as ^{mul}KU₆. This star name corresponds to the Southern Fish constellation (Piscis Austrinus), particularly its brightest star, Fomalhaut (α Piscis Austrini) (Hunger & Pingree, 1999, Van der Waerden, 1974). In Mesopotamia, this constellation had significant mythological value, strongly associated with the primary God, Haya. From his shoulders sacred rivers are said to flow, one of which is the Aratsani (Euphrates) River.
- 4) The fall of the bear into the river should be interpreted as its setting below the horizon. In other words, the river here must be understood as the actual visible horizon.
- 5) Similarly, both in Mesopotamian (Van der Waerden (1974) p. 82) and Armenian (Tumanyan (1968) p. 97) sources, the modern constellation of the Great Bear is attested as “The Wagon”. Numerous functional associations between the bear and the wagon are noted in Armenian folklore (Malkhasyan, 2021). Thus, in this particular legend, the celestial parallel for the wagon should again be viewed as the constellation of Great Bear.

Thus, in the legend there were identified several main characters and objects, which have been aligned with the corresponding astronomical concepts (Table 1). Now, let us examine the contexts in which these characters are depicted and correlate the astronomical phenomena associated with these situations.

¹Translated from Armenian and annotated by **Mariam Kurazyan**.

²The following describes the actions of hunters chasing the bear, not just passively following it but actively trying to catch or drive it. Violent measures are being applied to suppress and destroy it.

Table 1. Main characters from the legend and corresponding astronomical concepts.

No.	Characters	Corresponding Astronomical Concepts
1	Bear	Great Bear (Ursa Major) constellation
2	Hunters	Constellations of the Boötes and/or Hercules?
3	River	Actual (visible) Horizon
4	Dragon-fish	Southern Fish (Piscis Austrinus) constellation
5	Wagon	Great Bear (Ursa Major) constellation

2.2. The Actions of the Bear

The bear is described in two situations, each of which corresponds to different positions of the Great Bear (Ursa Major) constellation in the sky. These are as follows:

- A. **Falling into the river:** This corresponds to the descent of the bright stars of the constellation (the position after which the stars set below the horizon and are no longer visible).
- B. **Emerging from the river with plucked fur:** This aligns with the moments when the stars of the same constellation rise above the horizon. The bear's condition—emerging from the river with its fur plucked—likely corresponds to a position in which not all of the constellation's stars are visible above the horizon, meaning part of the constellation has yet to rise (see subtitle 3.3). It is notable that, today, for an observer at the geographical latitude of the Armenian Highlands, six of the seven brightest stars of the Great Bear constellation do not set due to their proximity to the North Pole (Figure 1a). However, in the legend, the bear completely submerged underwater, suggesting that, historically, the settings of the constellation's seven brightest stars could all have been observed.

Taking into account only this fact, one can estimate the time period when a person would have been able to witness the setting of all seven bright stars in the Great Bear (Ursa Major) constellation. For the geographical latitude of the Mush region ($38^{\circ}44'$ North), the time interval would be approximately 22000–10000 BC (Figure 1b). This is the period in which it would have been possible to observe the setting of all bright stars of the Great Bear (Stellarium contributors, 2024). Thus, **this legend could have originated only during the following specified time frame.**

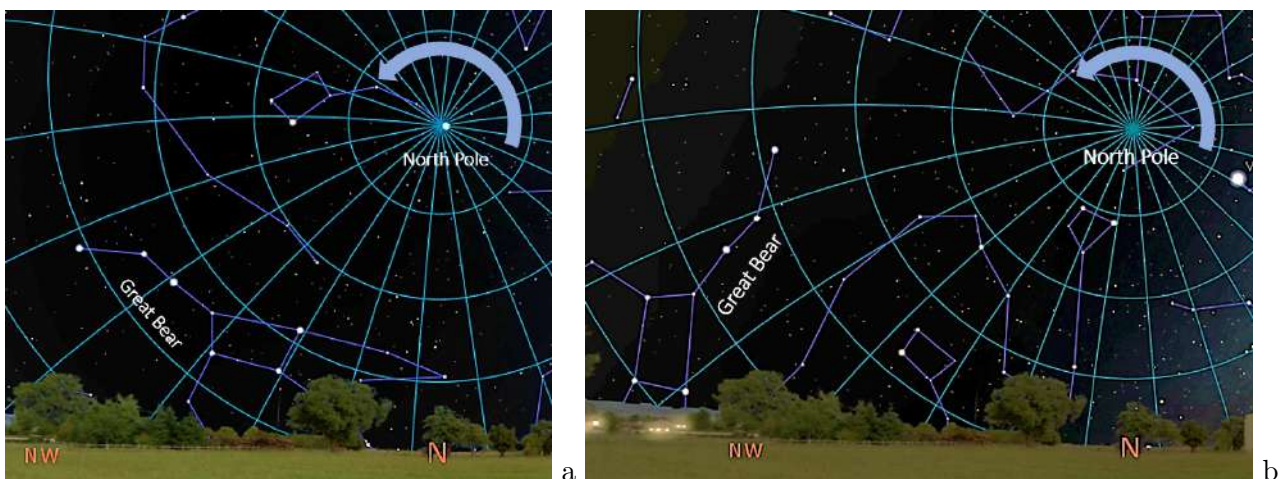


Figure 1. a - The northern sky in 2024 CE, when 6 out of 7 bright stars of the Great Bear constellation do not set; b - The night sky in 10000 BC, from the same latitude ($38^{\circ}44'$ North), when the settings of all 7 stars could be observed. (Stellarium contributors, 2024)

2.3. Descriptions of the Dragon-Fish

The dragon-fish is described in three distinct situations. Let us now explore how these situations are linked to the positions of the Southern Fish constellation in the sky and to mythological concepts.

- a. **With a split belly:** It is evident that the fish is either dead or severely damaged. In such a condition, fish typically surface belly-up³, an orientation opposite to their natural swimming posture. It should be noted that the constellation of Southern Fish is described by Aratus as “*on his back the Fish*” (Allen (1963) pp. 344-347). Additionally, the Southern Fish is depicted on its back in other astronomical maps (Hoffmann (2021) pp. 98-99). Therefore, this depiction of the mythological dragon-fish reinforces its connection to the Southern Fish constellation.
- b. **Spreading out on the surface of the water:** When the river is considered as the horizon, the dragon fish that appear on the surface can be interpreted as the Southern Fish constellation (more specifically, its brightest star, Fomalhaut (Malkhasyan, 2023b)) on the horizon. This suggests either the rising of the star over the eastern or its setting on the western horizon.
- c. **On a wagon:** The fish is divided into parts and distributed to the townspeople on the wagon, while the wagon-Great Bear constellation, as demonstrated on another occasion, at one point also held the meaning of a spread, a funeral wagon and a shroud (Malkhasyan, 2021). This fully explains the depiction of the fish on the wagon (for more details, see subtitle 3.2).

Thus, all the main characters of the legend and their descriptions have been examined and explained through astronomical concepts and established mythological understandings.

3. Analysis of Information on Calendrical Significance

As we have observed, through detailed analyses, certain time-indicating data also emerge (the rising and setting of stars are inherently linked to specific times). In this regard, certain details from the legend are particularly noteworthy, namely:

- **The dragon-fish is divided into parts and distributed among the people.**
- **The river is stained with blood.** The reddening of the river can have two possible meanings: the horizon may take on this hue right before the sunrise or right after the sunset.
- **The time between the bear’s immersion and its emergence is described as very short (only a few minutes).** Here, we observe the following apparent contradiction: there is almost no mention of time between these scenes in the legend, which means that these scenes follow each other almost immediately. However, the time gap between the setting and rising of the bright stars of the Great Bear constellation is quite long - approximately two months. To provide a well-founded interpretation of the mentioned information, we must turn our attention to the structure of the ancient Protohaykian calendar that is known to us.

3.1. The Basic Structure of the Protohaykian Calendar

The Protohaykian calendar consists of two main periods: a 295-300-day primary year (10 lunar synodic months) and a 70-65-day extra-annual period (similar to a Lent period) (Broutian, 1997). The extra-annual period, in this sense, was not perceived as time (Broutian, 2011). In other words, its beginning was considered the end of the year, and its end marked the beginning of the new year. Between these two points, “time is absent,” much like how contemporary people perceive a brief moment of transition between the old year and the new year at midnight on New Year’s Eve. In ancient times, this brief interval was considered to last 65-70 days (Broutian, 2007).

The beginning of the main year was marked close to the summer solstice by observing the heliacal rising of the calendar’s main star. It was demonstrated that this calendar was used in parallel with the development of cereal agriculture, beginning around 9000 BC, when the main star of the calendar was α Virginis (Spica) (Broutian, 2016).

³If “the narrator sees the fish with a split belly,” then it is indeed on the visible surface of the water, with its belly facing upward.

At the same time, astronomical studies of the Fish-shaped Dragon Stones revealed that they represented the cultic manifestations of the Southern Fish constellation and were associated with the heliacal rising of the constellation's main star, Fomalhaut (Malkhasyan, 2023b). According to calculations, this event occurred around 18800 BC, four days before the summer solstice, and was related to the key event of the calendar at that time—the transition to the new year (Malkhasyan, 2023b). Furthermore, the heliacal setting of the same star occurred approximately 70 days before the summer solstice, and this period appears to have also been regarded as “out of the year,” similar to the structure of the Protohaykian calendar (Malkhasyan, 2023b).

3.2. Religious and Ritualistic Interpretation of the Legend

As mentioned above, the ancient Protohaykian calendar (c. 9000 BC) was an agrarian calendar, with its main star, Spica of the Virgo constellation, symbolizing the grain ear (see Subsection 3.1 above). The central event of this calendar revolved around offering the primary “concept” of bread (Broutian, 2016). This brings to mind the Christian story of feeding 5000 people with bread and fish (Matthew 15:32-39; Mark 8:1-10). It is also worth recalling the Last Supper, which features the ritual of breaking bread and the words of Jesus (Matthew 26:26-28; Mark 14:22-24; Luke 22:19-20). Jesus offers his body symbolically as bread, breaking it into pieces, and shares wine as a symbol of his blood. In the legend of the dragon-fish, the river becomes bloodied when its belly is split open, signifying the fish's blood. Indeed, this dragon-fish, which in ancient times was associated with God Haya, the principal deity of the Mesopotamian pantheon (Hoffmann (2021) pp. 93-95; Davtyan (2004) pp. 109-110), is similarly offered “ceremonially” in a wagon (funeral wagon, spread, shroud) (Malkhasyan, 2021), aligning with the above-mentioned religious perceptions. Two notable examples highlight the parallels between Christian imagery and the dragon-fish. First, there exists an icon of Christ's baptism engraved on the skull of a Loko fish (dragon-fish) (Sargsyan (2023) p. 223) (Figure 2a). Second, the lintel of the Armenian early medieval Church of the Holy Mother of God (Katoghike, Tsiranavor) is a Fish-shaped Dragon Stone (Figure 2b). The church door is perceived as a boundary between two worlds (Broutian, 2018), and the stone dragon-fish placed upon it symbolizes the boundary between these realms. Thus, **the offering of the fish's body in the legend should be interpreted as a profoundly significant religious and ritualistic practice of the era, likely tied to the most important annual event of the Protohaykian calendar.**



Figure 2. a - Icon depicting the baptism of Jesus Christ on the skull of a Loko fish. Displayed at the Matenadaran Institute of Ancient Manuscripts, Armenia; b - Fish-shaped Dragon Stone on the door of the Church of the Holy Mother of God (Katoghike, Tsiranavor) (6th century CE). Located in Avan administrative district, Yerevan.

3.3. The Relative Positions of the Southern Fish and Great Bear Constellations

Taking into account the aforementioned connections (subtitles 3.1 and 3.2), it is entirely logical to examine the period around 18800 BC in order to clarify the interpretations of the “river blooded” episode and the described chronological contradiction in the narrative. Let us observe the positions of the constellation Great Bear in the sky during the heliacal rising and setting of the main star of the Southern Fish.

As shown in Figure 3a, during the heliacal rising of Fomalhaut in 18800 BC, from the geographic latitude of Mush province ($38^{\circ}44'$ North), the position of Great Bear in the sky appears as if it is descending headfirst—creating the impression of plunging into the river. Since the legend describes the fish on the verge of death, it is essential to examine the sky during the heliacal setting (or “death”) of Fomalhaut (Figure 3b).

As depicted in Figure 3b, at the moment of Fomalhaut’s heliacal setting, six of Great Bear’s seven bright stars remain visible above the horizon, while one (η Ursae Majoris) is still below the horizon and is not visible (Figure 3b). This celestial configuration aligns perfectly with the legend’s imagery of a bear with “plucked fur” emerging from the river.

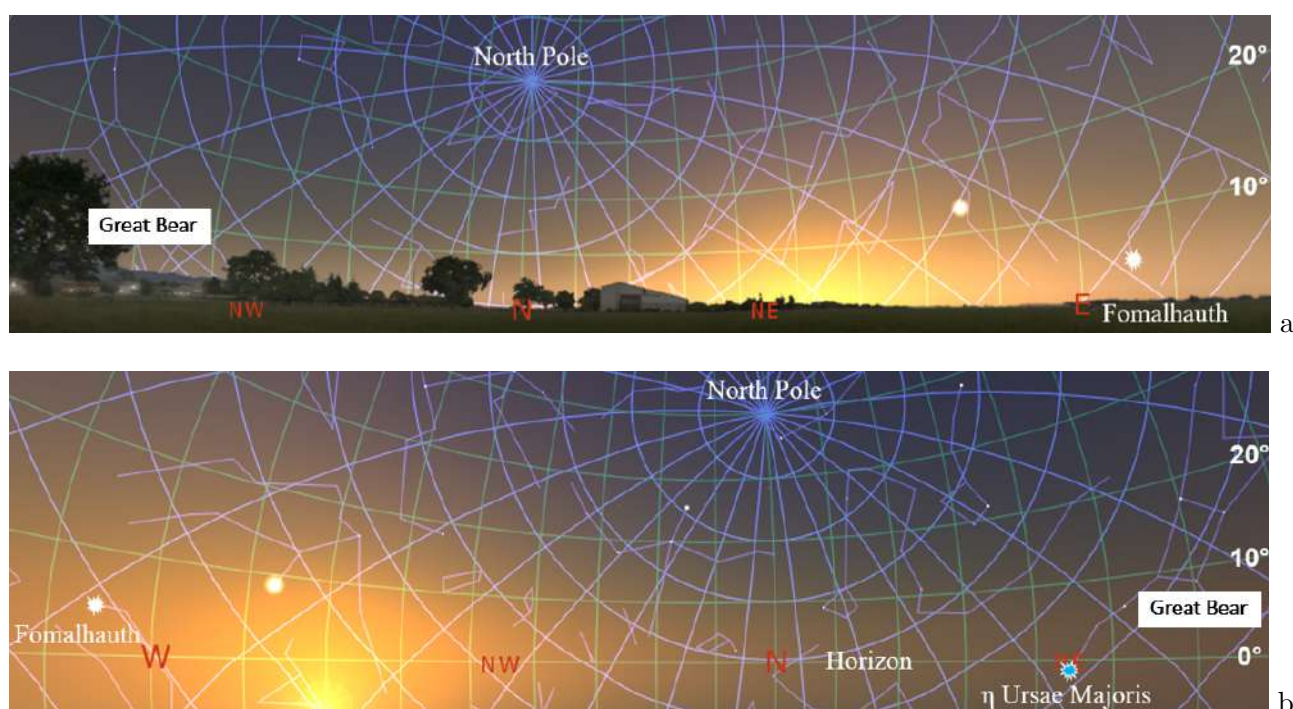


Figure 3. a - The morning sky on the day of Fomalhaut’s heliacal rising, four days before the summer solstice in 18800 BC; b - The evening sky as it appeared 20 days after the vernal equinox in 18800 BC, at the moment of Fomalhaut’s heliacal setting. (Stellarium contributors, 2024)

Let us return to the previously mentioned temporal “contradiction” (Title 3). The legend describes only a few minutes passing between the bear submerging into the water and emerging, while the settings and risings of the Great Bear constellation occur over much longer intervals. A similar contradiction arises with the dragon-fish. It surfaces (heliacal rising) in a lifeless state (heliacal setting). This apparent contradiction is fully resolved when considered within the framework of the Protohaykian calendar’s extra-annual period.

The 65–70-day extra-annual interval was perceived as a single unified event, its beginning and end being understood to occur simultaneously (Broutian, 2011). It is notable that this understanding has also been preserved in the Christian Liturgical Calendar (2024). Specifically, it is reflected in the more than 40-day period between the Crucifixion, the Resurrection, and the Ascension of Christ, which, by the way, aligns quite well with the position of the extra-annual period in the Protohaykian calendar. Furthermore, the extra-annual period represents a calendrical manifestation of the Underworld, with its beginning and end defined by the thresholds of entry and exit (Broutian, 2011, 2018). As discussed

earlier, the Dragon-fish serves as such a threshold marker (Figure 2a). Similarly, the Great Bear constellation had a symbolic role in guiding transitions to and from the Underworld (Malkhasyan, 2021). The bear's actions in raising the dragon-fish to the water's surface metaphorically represent a passage from one world to another.

Thus, this legend appears to recount the extra-annual period of a calendar likely in use around 18800 BC. The interval begins with the heliacal setting of Fomalhaut and the acronical⁴ rising of Great Bear's brightest stars and concludes at summer solstice with Fomalhaut's heliacal rising and the cosmic⁵ setting (disappearance) of Great Bear's brightest stars.

Concluding Remarks

As we can see, the legend in question, in addition to its condensed astronomical content, also contains clear information about highly structured calendrical and ritualistic concepts passed down from ancient times. The analysis of this information reveals a remarkable parallel between the Fish-shaped Dragon Stones, their period of worship (Malkhasyan, 2023b), and the primary calendrical characteristic of that era—the extra-annual period.

It is important to emphasize that during the estimated time frame of 18800 BC (Upper Paleolithic), fishing was one of the primary activities supporting human livelihood (Sardaryan (1967) pp. 86-87), playing a crucial role in subsistence. The core concept of the extra-annual period is fasting (Broutian, 2016). Interestingly, this time of year corresponds to the spawning and reproductive cycles of the region's major fish species. Hence, it is entirely reasonable that fishing might have been “prohibited” during this period of 18800 BC, perhaps to ensure bountiful harvests in the future.

This legend of the dragon-fish is, of course, not the only Armenian tale with calendrical significance. Similar themes are found in many Armenian folk tales (“AFT” (1959a) p. 407; “AFT” (1959b) p. 39; (“AFT”, 1968) p. 501), where the main character is often the Fish-Boy. However, a detailed astronomical analysis of the following must be reserved for another occasion, as it requires an extensive examination of a significant body of material.

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⁴The rising that occurs immediately after sunset is called acronical rising.

⁵The setting of a star just before sunrise is called cosmic setting.

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