

Celestial Harmony: Exploring the Analogy of Greek, Indian, South East Asian and Mizo Astronomy

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Abstract—This brief research explores the historical accounts and traditions of astronomy in Greece, India, Southeast Asia, and the Mizo people. We search to discover the common intellectual fabric that these civilisations share across space and time by examining their astronomical works. This research investigates the impact of Indian mathematical expertise on astronomical computations, from the discovery of zero to the development of trigonometric functions. As we shift our focus to Southeast Asia, we learn about the lesser-known but no less fascinating astrological traditions that were common in this area. Through the combination of Buddhism, Hinduism, and indigenous belief systems, a unique system emerged. The sky temples of Angkor and the ancient observatories are two instances of how Southeast Asian astronomy merges religious and scientific constituents.

Most importantly, this research includes the perception of the Mizo people, an indigenous group with a rich cultural history. Following Mizo's historical astrological customs, we find interesting similarities and divergences with the larger Greek, Indian, and Southeast Asian traditions. The way that the stars are connected throughout Mizo rites, agriculture, and folklore provides an insight into the relationship between cosmic and everyday life. The investigation goes past listing commonalities to investigate how the Mizo people have modified and customised astronomical knowledge. The Mizo contribution offers a lively notion of humanity's relationship with the skies, whether through cosmic narratives, celestial navigation methods, or traditional star lore.

INTRODUCTION

The study of stars and their movements has fascinated human civilisations across the globe for millennia. From the ancient Greeks to the cultures of India, Southeast Asia, and the Mizo people, the observation and exposition of the night sky have played a pivotal role in shaping worldviews, religious practices, and social structure. (Kak, 2009)

The foundation of Western astronomy in ancient Greece was built upon the accomplishments of earlier civilisations like the Babylonians and Egyptians. However, other cultures, such as those in India and Southeast Asia, developed revolutionary astronomical traditions. Ancient Indian astronomy, rooted in Vedic texts contains references to the heavenly bodies and their movements which

suggests Indians were already at work in observation and documentation as early as 1500. (Kak, 2009)

A BRIEF HISTORY OF MIZORAM

Mizoram, one of the seven states in northeastern India, has a rich history and cultural heritage shaped by its unique geography and resilient people. The Mizo people believed to have migrated from China in the mid-1600s, have fiercely preserved their traditions. After periods of British rule (1858-1947) and political unrest, Mizoram attained statehood in 1986. Before the arrival of British Christian missionaries in the late 19th century, the Mizo people were head-hunters. Despite facing challenges, the state continues

to develop, driven by the enduring spirit of the Mizo people. (Lalthansanga, 2018; Joshi, 2005).

GREEK ASTRONOMY: FROM MYTHICAL TO MATHEMATICAL UNDERSTANDING

Early Greek literature, including Homer's epics and Hesiod's "Works and Days" (Frank, 2014) highlights awareness of constellations and their practical use in agriculture and navigation. While initially less advanced than Egyptian and Babylonian astronomy, Greek understanding evolved with the application of geometry. Aristotle argued for Earth's spherical shape, Eratosthenes calculated its circumference, and Aristarchus pioneered methods to determine celestial distances. (Aaboe, 1974) Eudoxus developed an early model of planetary motion. This shift from mythical to mathematical interpretations marked a crucial development in scientific thought. (Qi *et al.*, 2022)

ASTRONOMY CONNECTION WITH MYTHOLOGY, RELIGION

The Greek's understanding of the celestial realm was deeply intertwined with various aspects of their cultural and intellectual landscape, from mythology and religion to time-keeping and agricultural practices. The ancient Greek worldview was profoundly shaped by their rich mythological traditions, which personified the celestial bodies and phenomena. The gods and goddesses of the Greek pantheon were believed to inhabit the heavens, and their movements and interactions were seen as influencing the lives of mortals on Earth. (Qi *et al.*, 2022) This belief in the interconnectedness of the divine and the earthly realms was a driving force behind the Greeks' desire to comprehend the workings of the universe.

One example is Orion, who is a prominent figure in Greek mythology, renowned for his hunting prowess and tragic fate. According to Hesiod's *Astronomy*, as summarized by Eratosthenes, Orion was the son of Poseidon and Euryale. Known for his extraordinary hunting skills, Orion boasted that he could kill every beast on Earth. This angered Gaia, the Earth goddess, who sent a giant scorpion to kill him. After a fierce battle, the scorpion fatally stung Orion. As a tribute to his might, Zeus placed Orion among the stars as a constellation. (Most, 2006)

ASTRONOMY AND AGRICULTURE

In Hesiod's *Works and Days*, he provided an agricultural calendar based on the appearance and disappearance of

constellations. The Pleiades signal the time for harvest when rising and for ploughing when setting. Grape pruning should commence when Arcturus is visible all night, and grapes should be harvested when Arcturus is visible at dawn alongside Orion and Sirius. The setting of Orion, the Pleiades, and the Hyades marks the time for ploughing. Storms are expected when the Pleiades are hidden below the horizon. Fifty days after the solstice is suitable for sailing. Finally, the appearance of Orion signals the time for threshing. (Most, 2006)

VEDIC ORIGINS AND EVOLUTION OF INDIAN ASTRONOMY

The earliest foundations of Indian astronomy are ingrained in the Vedic tradition. The *Rigveda*, one of the earliest religious texts in the world, contains hymns with references to the cosmos, celestial bodies, and the passage of time. For example, the Sun (Surya), Moon (Chandra), and stars are regularly mentioned in Vedic hymns, reflecting their significance in ceremonial practices and agricultural cycles. The Vedic calendar system, which divides the year into 12 months of 30 days each, indicates an advanced comprehension of the solar year and the need to introduce months to keep the lunar calendar aligned with the solar cycle. (Kak, 2009) The *Jyotisa Vedanga*, the first Vedic written work to mention astronomical data, has records of events as early as 4000 BCE, making Indian astronomy one of the oldest known systems of its kind. (Srinivas, 2019).

As Indian astronomy evolved, it began to absorb ideas from neighbouring cultures. The exchange of astronomical knowledge with the Babylonians, Persians, and Greeks became particularly pronounced after the conquests of Alexander the Great in the 4th century BCE. (Springer, 1999; Mak, 2014) Greeks and Indians shared common methods for dividing the sky into constellations and assigning symbolic meanings to celestial bodies. The Greek zodiac system, which divided the sky into 12 equal parts, mirrors the Indian concept of nakshatras or lunar mansions. (Harness, 2004) This similarity has led scholars to believe there was significant cross-cultural interaction between Greek and Indian astronomers, with both civilizations influencing one another's astronomical frameworks. (Subrahmanya, 2020) The concept of epicycles (used to explain retrograde planetary motion) and the heliocentric model, though not initially developed in India, found their way into Indian astronomical texts as a result of this cross-cultural exchange. (Rao, 2017)

Mughal astronomy represents a crucial period in India's scientific history, characterized by the fusion of Persian, Islamic, and Hindu astronomical traditions that motioned innovations during the 16th to 18th centuries. For example, Maharaja Sawai Jai Singh II of Jaipur built one of the grandest astronomical observatories in India, the Jantar Mantar, in the early 18th century, showcasing the lasting legacy of Mughal influence on astronomy. This period fostered a collaborative environment that integrated diverse knowledge systems, leading to significant developments in astronomical practices. (Rudra, 2009; Singhanian, 2009).

ORIGINS AND SOLAR CALENDAR: ANCIENT INDIAN ASTRONOMY AND MYTHOLOGY AND SIMILARITIES WITH THE GREEKS

Ancient Indian and Greek astronomy are deeply intertwined with their respective mythologies and cultural practices. As mentioned before Indian astronomy has its origins in the Vedic period (2000-1000 BCE), where celestial movements were crucial for religious rituals and agricultural cycles. Deities like Surya (the Sun) and Chandra (the Moon) were central to both mythology and astronomy, with concepts like nakshatras (lunar mansions) playing a key role in tracking the Moon's movement and determining auspicious times for rituals. (Thompson, 2007; Pingree, 1963) Similarly, in Greek mythology, celestial bodies like Orion and Aquila were associated with gods and heroes, reflecting divine will through the movements of the stars. (Schwab, 2011) The zodiac in Greek astronomy also had mythological significance, with each sign corresponding to

a mythological figure, demonstrating a connection between celestial patterns and human destiny. (Springer, 1999; Nashkar, 1996)

Both cultures demonstrated remarkable astronomical accuracy within their mythological frameworks. Indian texts like the Surya Siddhanta and Aryabhatiya revealed a sophisticated understanding of planetary positions and celestial mechanics, including the Earth's rotation, long before these concepts were embraced in Europe. (Thompson, 1997; Clark, 1930) Likewise, Greek astronomers like Hipparchus and Ptolemy contributed to astronomy by calculating the precession of the equinoxes and developing planetary models. (Toomer, 1996; Goldstein, 1997). This cross-cultural influence enriched both astronomical traditions, highlighting their shared view of the cosmos as a scientific and spiritual domain.

Hinduism uses both solar and lunar calendars, with the solar calendar (Sauramana) playing a key role in festivals, agriculture, and astrology. The solar year is divided into 12 months, each aligned with a zodiac sign. (Gansten, 2018) Similarly, the Greek solar calendar divides the year into 12 months based on zodiac signs, linking celestial patterns to mythology. Each Greek zodiac sign was associated with specific deities or myths, like Capricorn, linked to Pan, symbolizing winter, and Leo, associated with the Sun and celebrated during summer with feasts and games honouring the gods. (Reingold *et al.*, 2008)

The twelve solar months are given in Table 1.

Table 1: The Solar Months in Greek, Indian and Gregorian Months. (Gansten, 2018; Reingold *et al.*, 2008).

Sl No.	Greek Name	Sanskrit	Sanskrit meaning	Gregorian Months
1	Aries	Meṣa	ram	Mid-April to Mid-May
2	Taurus	Vṛṣabha	bull	Mid-May to Mid-June
3	Gemini	Mithuna	twins	Mid-June to Mid-July
4	Cancer	Karkaṭa	crab	Mid-July to Mid-August
5	Leo	Simha	lion	Mid-August to Mid-September
6	Virgo	Kanyā	girl	Mid-September to Mid-October
7	Libra	Tulā	scales	Mid-October to Mid-November
8	Scorpio	Vṛṣcika	scorpion	Mid-November to Mid-December
9	Sagittarius	Dhanus	archery bow	Mid-December to Mid-January
10	Capricorn	Makara	sea monster	Mid-January to Mid-February
11	Aquarius	Kumbha	water pot	Mid-February to Mid-March
12	Pisces	Mīna	fish	Mid-March to Mid-April

AGRICULTURE AND FESTIVALS: THE SIGNIFICANCE OF THE LUNAR CYCLE IN TIME-KEEPING IN INDIA AND GREECE

The lunar cycle has played a crucial role in timekeeping in various ancient civilizations, including India and Greece. In both cultures, the phases of the moon were closely observed and utilized for agricultural practices and the timing of festivals.

Indian farming practices have long been synchronized with lunar cycles, each lunar month is divided into two fortnights: Shukla Paksha (waxing phase) and Krishna Paksha (waning phase). Farmers use these bright and dark fortnights as a guide for various agricultural tasks. Shukla Paksha, with its increasing moonlight, is often associated with growth and prosperity, making it ideal for sowing and transplanting. Conversely, Krishna Paksha, with its diminishing light, is considered a time for activities like pest control and pruning, as the waning moon is thought to have a calming effect on nature. (Sivasankar and Thimmaiah 2021) . The full moon and new moon (Purnima and Amavasya) are seen as important markers for these activities allowing farmers to work in harmony with nature's rhythms, optimizing their yields. (Fuller, 2004)

Similarly, in ancient Greece, farmers also relied on the lunar cycle for planting and harvesting crops. The lunar calendar helped them determine the best times for sowing seeds and tending to their fields, ensuring a bountiful harvest. They believed the moon's gravitational pull had an effect on the Earth and the growth of crops. (Mayoral *et al.*, 2020) During the new moon, it was common for farmers to rest and prepare for the next cycle of work. Root crops were often planted during this time, as the waning phase of the moon was believed to promote downward growth in the soil. The first quarter moon was associated with the planting of crops that grow above the ground, such as grains and vegetables, as the increasing moonlight was thought to promote upward growth. (Philips, 2012) The full moon was considered a time of abundance, ideal for harvesting, as it was believed to increase moisture content in plants. Lastly, the waning moon was focused on land management activities like pruning and weeding. (Prentice, 2012)

In addition to agriculture, the lunar cycle also played a significant role in the timing of festivals in both India and Greece. Many religious and cultural festivals were by the phases of the moon. For example, in India, the festival of Diwali, also known as the Festival of Lights, is celebrated on the new moon day of the Hindu lunar month of Kartika

(Singh, 2018; Sivananda and Sahajananda 1983). The festivals of Krishna Paksha like Amavasya, were associated with rest or preparatory activities, while Shukla Paksha festivals, such as Purnima, were favourable times for commencing new tasks. (Rinehart, 2004)

Many Greek festivals were originally timed to coincide with specific phases of the moon. For example, the Eleusinian Mysteries, one of the most important religious festivals in ancient Greece, was held during the full moon in the month of Boedromion (September/October). This timing was believed to enhance the spiritual significance of the rituals and ceremonies performed during the festival. (Parker, 2005) Furthermore, the full moon was often associated with fertility and abundance, while the new moon was seen as a time of renewal and purification. (Papadopoulos, 2017)

SOUTHEAST ASIAN ASTRONOMY

The dissemination of Hindu and Buddhist beliefs throughout East and Southeast Asia served as a conduit for the introduction of Indian astronomical concepts. This cultural exchange had a profound impact on the development of astronomy in these regions. (Ôhashi, 2017) The subsequent sections will delve into the multifaceted aspects of this influence.

ZODIAC: FROM MESOPOTAMIA TO ASIA

Originating in Mesopotamia, the 12-sign zodiac spread throughout the Hellenistic world, eventually reaching India around the 3rd century CE. From India, it was further disseminated to East and Southeast Asia.

While some Southeast Asian regions adopted Arabic names for the zodiac signs due to Islamic influence, others retained Sanskrit names, reflecting the Indian transmission route.

Around the latter half of the 6th century CE, India fixed the zodiacal signs to their sidereal positions. This Indianized system influenced Southeast Asian calendars, such as the Thai "Songkran" festival, which celebrates the Sun's entry into Aries (vernal equinox). Due to precession, this event now falls on the 13th-15th of April, differing from the Western tropical vernal equinox.

The enduring legacy of the zodiac is evident in modern Thailand, where Sanskrit names for the signs are used to represent the 12 months of the Gregorian calendar. This cultural blend is further illustrated by the presence of zodiac signs on contemporary Burmese calendars (Fig. 1) and

Vietnamese postage stamps representing a 12-year animal cycle (Fig.12). (Ôhashi and Orchiston, 2021)

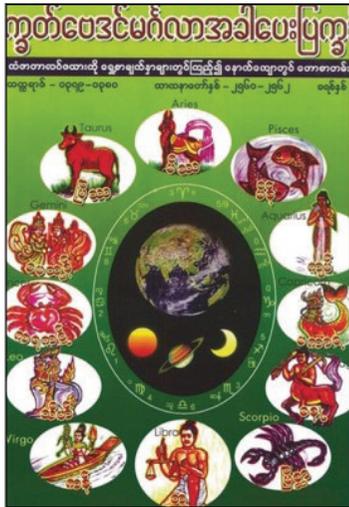


Fig. 1: Figures of Zodiac Signs from the Front Page of Modern Burmese Calendar.
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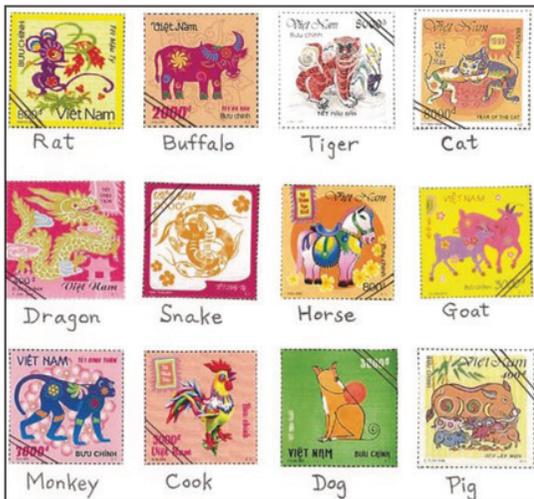


Fig. 2: Figures of the 12-year Animal Cycle used Modern Vietnamese Postage Stamps.
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THE 7-DAY WEEK: A JOURNEY ACROSS CULTURES

The 7-day week, like the 12-sign zodiac, embarked on a journey from its origins in the Hellenistic world to India around the 3rd century CE and spread further eastward into Southeast and East Asia. The 7-day week’s adoption into both the Islamic and Sanskrit traditions resulted in

a fascinating linguistic blend across Asia. Some regions adopted Arabic names for the days of the week, while others retained names derived from Sanskrit.

In Thailand and Myanmar, the day of the week on which one is born carries significant weight. Thailand associates each day with a specific colour: Sunday (red), Monday (yellow), Tuesday (pink), Wednesday (green), Thursday (orange), Friday (blue), and Saturday (purple). (Saibejra, 2012; Segaller, 2005) Interestingly, Wednesday is divided into daytime and nighttime periods, with the latter associated with Rahu and sometimes represented by the colour black.

Myanmar connects each day with an animal symbol: Sunday, Monday (tiger), Tuesday (lion), Wednesday (forenoon - elephant with tusks, afternoon - elephant without tusks), Thursday (rat), Friday (guinea pig), and Saturday (dragon). These days also generally correspond to celestial bodies, with Wednesday afternoon linked to Rahu. The first letter of one’s name is often associated with their birthday. (Shway, 1910)

ASTRONOMICAL PRACTICES OF THE DAYAK PEOPLE IN BORNEO

Hose and McDougall (1912) documented the astronomical knowledge of various Dayak groups in Borneo, including the Ibans, Kayans, Kenyahs, Klemantans, Maryts, and Punans. The Kenyahs, for instance, determined the appropriate season for agriculture by measuring the midday shadow cast by a vertical gnomon using a marked stick. Similarly, some Kayans observed the midday sun’s position through a specially designed hole in their roofs.

The Klemantans employed a unique method of using a water-filled bamboo cylinder directed at a specific star to determine planting seasons. They also possessed a rich cosmology, viewing the Great Square of Pegasus as a storehouse, the Pleiades as a well, a constellation containing Aldebaran as a pig’s jaw, and Orion as a human figure.

The Sea Dayaks relied on the Pleiades’ position to guide their understanding of the seasons. Beyond the Dayak people, Ammarell and Tsin highlight the astronomical practices of people in South Kalimantan, who utilise the three stars of Orion’s Belt to determine the direction of Qibla.

VIETNAM’S CHAMPA KINGDOM’S CALENDRIAL SYSTEM

The Champa Kingdom (2nd century CE - 1832) in Vietnam utilised an Indianized calendar based on the Saka Era.

This legacy continues with the modern Cham people, who employ a unique dual calendar system: the 'Ahier' (a lunisolar calendar incorporating Indian and Chinese influences) and the 'Awal' (an Islamic lunar calendar). This blend of traditions exemplifies multiplex astronomy, highlighting the diverse cultural influences on astronomical practices. (Ōhashi and Orchiston 2021)

INDIAN INFLUENCE ON CAMBODIAN CALENDARS: A HISTORICAL PERSPECTIVE

Historical records demonstrate a strong Indian influence on Cambodian timekeeping practices. Inscriptions using the Indian Saka Era, including one from 683 CE featuring an early use of the zero symbol, highlight this connection. Chinese accounts from the Angkor period further reveal the use of a Cambodian calendar with Sanskrit-derived terminology, indicating a blend of cultural influences. (Aczel, 2015; Coëdès, 1931) The Cambodian court even employed specialised astrologers for calendar creation and astrological predictions. (Porée and Maspero, 1938)

MIZO ASTRONOMY

While the Mizo people likely possessed knowledge of the stars as early as the late 1600s, the sole written record available is "Arsi Chanchin" by Rev. Liangkhaia, published in 1975. This discussion will focus on notable aspects of Mizo astronomy, drawing comparisons with Greek and Indian astronomical traditions.

MIZO FOLKLORE AND THE STARS

Mizo astronomical folklore, much like that of the Greeks and Indians, is rich with stories woven around constellations. While numerous stars and constellations are recognised and named based on their position and movement in the sky, eight stand out with particularly popular narratives attached to them. These include Orion, Taurus, Pleiades, Castor and Pollux, Vega, Capella, Ursa Major, and a fascinating tale linked to the interaction of Venus, Jupiter, and Saturn.

For example, Canopus, known as "Sikawlhurut" in Mizo, literally translates to "the star that moves along the horizon," aptly describing its celestial path. The intriguing love story of "Hrangchhuana and Chawngmawii" is intricately connected to the movements of Venus, Jupiter, and Saturn, a tale so complex it warrants a dedicated study.

Let us delve into the captivating story of Ursa Major, known as "Zangkua" in Mizo tradition. The constellation is believed

to be the transformed spirit of Kawlawia, a man from the present-day village of Sihphir. One day, Kawlawia was deeply troubled by a vivid dream, a premonition of his death. Seeking to avert this fate, he journeyed to his grandfather's village, Sairum, to request an animal sacrifice for protection.

The ritual completed, Kawlawia began his journey home, passing through "Berhvakawn," a crossroads known for its abundance of Tlaiberh birds. Tragically, he was ambushed and murdered by head-hunters from a neighbouring village.

Days turned into a worrisome period of absence. Then, a lone Tlaiberh bird arrived at Kawlawia's grandfather's house, perching on the porch and singing a haunting song: "Kawlawia has died at Berhvakawn." Initially dismissed as a strange melody, the bird's persistent return and sorrowful song convinced the family that something was amiss. Their worst fears were confirmed when they discovered Kawlawia's mutilated body at Berhvakawn. His head, arms, and one leg had been severed at the knee, the remaining limb already swarming with Khuaidang, a local wasp. As darkness enveloped the gruesome scene, a miraculous transformation occurred. Kawlawia's broken body vanished, ascending into the night sky to become the constellation Zangkua.

Unlike Greek and Indian mythology, where constellations are related to gods and heroes, Mizo star lore focuses on ordinary people's earthly lives and deaths. Upon death, village men, warriors, and animals are believed to ascend to the heavens and become stars, their chronicles inscribed in the sky as celestial objects.

CELESTIAL GUIDES: STARS IN AGRICULTURE AND TIME

To the Mizo people the appearance of the Pleiades cluster, known locally as "Siruk" or "Six Stars" is deeply intertwined with the rhythms of daily life and the natural world. Most observers can only perceive six prominent stars within the cluster, hence the name. A poignant legend recounts the story of six individuals who met an untimely end while digging for clay. Their pit collapsed, burying them alive, but their spirits ascended to the heavens, transforming into the radiant stars of Siruk.

Siruk served as a celestial guide for the Mizo people, dictating their daily rhythms and agricultural practices. During winter months, when village elders gathered under the starlit sky, Siruk's position determined their schedule. Its zenith marked the time to seek the warmth of home, while its fading with the approaching dawn signalled the start of "Jhum cultivation." This traditional farming method,

timed for the end of February when the earth awakened from its winter sleep, involved burning vegetation to create fertile fields, the ashes serving as a natural fertiliser.

When May arrived, Siruk’s setting at dusk heralded another crucial period: the time for sowing rice. This period often

coincided with the arrival of powerful winds, sometimes even cyclones, which would temporarily obscure Siruk from view. These winds, known as “Siruk la” or “Siruk thief,” were both feared and respected, a testament to the star cluster’s perceived power over even the mightiest forces of nature.

Table 2: Summary of Names of Some Stars, Constellations, Planets and Zodiac Names in Greek/Common Name, Indian and Mizo.

Greek/Common Name	Indian	Mizo
Altair	Mesha	Sikawikap
Arcturus	Swati or Svati	Mazzaroth
Betelguese	Thiruvathirai	Sisakei
Canopus	Agastya	Sikawlhrut
Capella	Mithun	Dingdi puan tah
Cassiopeia	Sharmishtha	Darngawnraphak
Comet	dhumaketu	Simeikhu
Crux	Trishanku	Arsi Kraw
Mars	Mangala	Siaia/Sikeisen
Milky Way	Akasaganga	Thlasik kawng
Orion	Nataraja	Chhohhreibung
Pleiades	Krttikā	Siruk
Sun	Surya	Ni
Taurus	Vrsabha	Khiangte zawng zim
Ursa Major	Saptarshi	Zangkhua
Ursa Minor	Laghu Saptarishi	Zangkhawte
North Star(Kynosoura/Polaris)	Dhruv Tara	Hmar Arsi/Sisil
Solar Eclipse	Surya Grahan	Ni awk lem
Lunar Eclipse	Chandra Grahan	Thla awk lem

CONCLUSION

The ancient Greeks substantiated by the works of Homer’s epics, initially perceived celestial phenomena through a mythical lens. Over time, this understanding matured into a more systematic approach, incorporating mathematical principles and evolving into the foundations of scientific astronomy.

Drawing from Vedic texts and precise architectural alignments, ancient Indian astronomy reflects a deep comprehension of the cosmos. This knowledge developed through a synthesis of influences, incorporating insights from Indian, Babylonian, Greek, and Persian traditions.

While Greek and Indian myths often revolve around deities and their actions, Mizo folklore connects the stars to the practical aspects of village life. Despite these differing perspectives, all three cultures—Greek, Indian, and Mizo—utilised celestial observations for essential timekeeping practices, including agricultural planning.

Astronomy in Southeast Asia predominantly developed under the influence of Hinduism and Buddhism. The observation of stars was crucial for establishing accurate calendar systems and astrology. For instance, the Malay people of Borneo relied on celestial navigation and used the stars to guide their agricultural practices.

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