

NAVAJO SKIES

AN INTRODUCTORY GUIDE TO
THE NAVAJO SKIES PLANETARIUM SHOW



CREATED BY
INDIGENOUS EDUCATION INSTITUTE

SEEING THE SKIES THROUGH NAVAJO EYES

An Introduction to Cross-Cultural Astronomy

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HOW TO USE THIS BOOK

For generations, the *Diné* People have observed the night sky, from which they developed a sophisticated philosophy and complex astronomy. This guide accompanies the planetarium show that has been created primarily for *Diné* (Navajo) students, teachers and families, so they can begin to understand their rich and complex heritage. It is also written for people of other Indigenous heritages, so they can discover similarities between the Navajo astronomy and their own ways of seeing and knowing the skies. And finally, this guide is written for the general public, of all ages, of all heritages, to share the Navajo ways of knowing the sky. We hope that this guide will help to promote the sense of wonder and awe that we all feel as we gaze at the sky overhead, day and night, summer and winter, following the age-old patterns of the stars and other cosmic energies.

This guide is not a textbook. It has been designed as a resource for planetariums, for teachers, in the classroom as well as a book that families can read together. The guide has been created on a level that is appropriate for middle school, and addresses middle school science and astronomy education standards. This guide is also appropriate for High School and post-secondary classes, featuring Indigenous astronomy. The guide fills a gap because nothing like it exists anywhere. In the guide, stories are told through text, paintings and photographs. The Navajo paintings were created by Melvin Bainbridge, a Navajo artist who lives on the Navajo Nation. We worked closely with him to ensure that the paintings would express the traditional Navajo teachings and that every detail would accurately depict Navajo

constellations as seen by Navajo knowledge holders.

Our knowledge of the Greek astronomy comes primarily from historical writings, and, we have included photographs from the NASA Hubble, SOHO, GALEX, and ISS Missions, and from the Gemini Observatory. These amazing pictures show stars and galaxies one could never see with the unaided eye, showcasing the scientific advances of our times, expanding the boundaries of what is known of the Universe.

We hope this planetarium show and guide will be useful resources for classroom and families. Stargazing can unite all generations of a family, from great grandparents to the smallest child.

NAVAJO PROTOCOL

The planetarium show is designed in accordance with precise Navajo Protocol. Navajo Skies contains contents which are considered Winter Stories among the Navajo. These are properly only told during the winter months, approximately the end of September to the beginning of March. In Navajoland it is the sound of the First Thunder of spring that is the indicator to cease telling Winter Stories. It is so important that it is announced on the local radio, KTNN, when it occurs and where it occurs. In September in Navajoland, the beginning of Winter Stories is often linked to the first of the nine-night Winter Yei Bi Chai ceremonies, which take place in Shiprock, NM. Many Native American tribes follow seasonal restrictions and cultural protocol of Winter Stories. This is a common understanding and practice among Indigenous communities.

Navajo people take this very seriously, even today. If institutions show the Navajo Skies show at an inappropriate time, they may be subject to criticism by Navajos in the community.

We urge all planetariums and classrooms to abide by these indicators. Please do not show Navajo Skies except for the appropriate times, of late September to early March.

INTRODUCTION

Teaching and learning about Navajo astronomy is a considerably different process than studying Western astronomy and space science. The very time and medium in which knowledge can be transmitted is different between Navajo ways of knowing and scientific knowledge transmission. Unlike conventional academic learning, which comes primarily from books, Navajo star knowledge has been passed down for countless generations through oral communication. Native star knowledge comes primarily through oral stories, ceremonies, field work and interviews, which can take years to collect and verify, due to the esoteric nature of the knowledge and the method of communication. Pieces of the stories are held by different families and clans, with acknowledged variations in interpretation. There is no one correct way to tell the star stories, since each version holds its own integrity and is connected to a specific lineage, often related to Navajo healing ways.

Today, very few people, even among the Navajos themselves, have a deep knowledge of Navajo Astronomy. Like many other indigenous nations, much of the traditional knowledge is held by a few, and even this is only a portion of what was once known.

Traditional stories of the Night Sky were often spoken aloud with the enhancement of vocal performance, movement and animal sounds. Most teaching traditionally took place during the winter months of late September to early March among family and clan members. Teachings associated with the Night Sky were shared within the traditional hogan, which itself was modeled and constructed in alignment with

cosmic directions and principles. Navajo cosmology reflects the emphasis that Navajos place on the Night Sky and its holistic interconnection with the earth.

Navajo ways of knowing, including Navajo astronomy, are based on a sense of the power and significance of place. Navajo astronomy is based on the relationship of the four Sacred Mountains of Navajoland with the celestial bodies above. The movement of the Sun, the four cardinal directions, the colors of the directions (white, blue, yellow and black), the phases of the moon, and the Navajo constellations, all these and more reflect the importance of the relationships of Mother Earth and Father Sky.

According to traditional Navajo protocol, cultural stories of the Night Sky, including stories of the Sun, the Moon and the stars, can be told only during the winter months. However, at midsummer, a shorter version of the stories can be shared for educational or healing purposes, during the time of the Summer Solstice and during the two weeks following the Summer Solstice. Navajos refer to this time as mid-summer *shí íhníí*.

Navajos have been living in the Four Corners region of the American Southwest for hundreds of years. The traditional land of the Navajo, *Diné Bikéyah*, includes parts of Arizona, Colorado, New Mexico and Utah. The Navajo Reservation is approximately the size of West Virginia, or about 27,000 square miles. The population of the Navajo Nation is well over a quarter of a million people. Navajos have always believed that their homeland is geographically and spiritually located within an area delineated by four sacred mountains located in Arizona, Colorado and New Mexico. Today, Navajo land, held in trust by the U.S. government, has been set aside by Treaty and Executive Order as

an Indian Reservation. The Navajo, as a sovereign nation, have a treaty with the United States government.

MAP OF THE NAVAJO NATION



Map courtesy of Rio Nuevo Publishers
Tucson, Arizona
www.rionuevo.com

HISTORICAL AND COSMOLOGICAL ORIGINS

Traditionally and historically, Navajos refer to themselves as the *Diné*, meaning, "The People." Sacred stories passed down from generation to generation tell of earthly and cosmological origins and relationships with continuous historical evolution through four worlds, ultimately leading to an Emergence that brought the Navajos to their present location.

Along with the traditional knowledge of evolution through the four worlds, higher Navajo consciousness acknowledges the origin of life through light, which preceded and gave birth to the evolutionary process. Thus it was a combination of biological and metaphysical processes that manifested as life on earth.

The ancient origin of light provided the seed of consciousness and knowledge that is still acknowledged today in traditional Navajo society.

The origins of the Navajo go far back in time. Stories tell of the beginnings of life coming through interactions of light and darkness. Over thousands of years, insect-like beings inhabited the First World. Later, birds, animals and, finally, human beings inhabited the Second, Third and Fourth Worlds. They eventually emerged into this present world where they live today in their homeland in the Southwest.

Navajos are related to other Athabaskan-speaking peoples from Alaska to Mexico. The language group includes Apaches, Northern Athabaskans, Pacific Coast Athabaskan peoples, and Mexican Athabaskans. There is a distant language relationship to the Haida and Tlingit peoples as well.

ORGANIZATION OF STAR KNOWLEDGE

Navajos have organized their star knowledge from *Diné Bikéyah*, a central location in the American Southwest defined by the four sacred mountains. The order of the Navajo constellations is related to the geographical information provided from the cardinal directions of the sacred mountains. The cardinal directions, in turn, are directly connected to cosmic stellar processes as observed from this position of centrality in *Diné Bikéyah*. For example, East is the place where the Sun rises and West is where the Sun sets. These directions are also related to the equinox and solstice cycles of the Sun.

Embedded in the Navajo language, all directions have a clear relationship with cosmic processes. *Ha'a'aah*, East, means "Where the Sun comes up." *Shádiaah*, South, means, "As the Sun travels with and for me." *Ee'ee'aah*, West, means "Where the Sun goes down." *Náhookqs*, North, refers to the motion of the circumpolar *Náhookqs* constellations as they rotate while traveling around the North Star, Polaris.

The North Star itself is called *Náhookqs Bikó*, the Central Fire. The Big Dipper, Ursa Major, is called *Náhookqs Bi'kə'*, the Male Revolving One, and Cassiopeia, is called *Náhookqs Bi'áád*, the Female Revolving One. They are situated on either side of *Náhookqs Bikó*, and their constant circular pattern around Polaris, as seen from earth, is referred to as circumpolar motion. According to Navajo tradition, the *Náhookqs* constellations are thought of as one complete constellation, not three separate star groups.

NAVAJO MODULES

Navajo Module 1:

Seeing the Skies Through Navajo Eyes

The *Diné* (Navajo) people see the skies in a unique and different way from the rest of the world. Their perception of the cosmos is intrinsically tied to every aspect of their life: their language, ceremonies, hunting, planting and more. The *Diné* people observe and record the movement of the cosmos from their homeland *Diné Bikéyah* – therefore their location on the earth is of the utmost importance and relevance. Knowing the cardinal directions and knowing where you are is essential to understanding place-based astronomy. Key teachings from this module include:

- * Stars Are Our Ancient Relations
- * Everything is Profoundly Interconnected
- * We Live in Harmony With Cosmic Energies

Navajo Module 2:

Origins: How the Stars Came to Be

The *Diné* origin teachings include stories of how the stars came to be placed in the sky. In this module the coyote is shown tossing the stars into the sky, creating a myriad of unnamed stars, which is chaos. Key teachings from this module include:

- * Out of Chaos Comes Order

- * Power of Story Carries Knowledge

Navajo Module 3:

The *Náhookqs*: Cosmic Order - Circumpolar Constellations

Module 3 explains the cosmic order of the Navajo constellations with an emphasis on circumpolar constellations. Featured are the Big Dipper and Cassiopeia, which rotate around Polaris. Key teachings from this module include:

- * Our Observation is Place-Based
- * We Live Through Cycles
- * *Náhookqs* Constellations Bring Us Home

Navajo Module 4:

The Pleiades *Dilyéhé* (Sparkling Seeds)

Module 4 tells us the story of a group of boys who are going over a hill out of sight of their parents. This is tied to the Navajo corn planting season which begins when the Pleiades disappear from view in early May. Key teachings from this module include:

- * Stars can teach us how to plant.
- * As Navajos, we are living the cosmic order.

Navajo Module 5:

Orion *Átsé Ets'ózí* (First Slender One)

Corvus *Hastiin Sik'ai'iió* (Man with Solid Stance)

Scorpius *Átsé Etsoh* (First Big One)

This module features the Navajo versions of Orion (First Slender One - *Átsé Ets'ózí*), Corvus (Man with Solid Stance - *Hastiin Sik'aí'íí*, and Scorpius (First Big One - *Átsé Etsoh* and Rabbit Tracks - *Gah Hahat'ee*). Key teachings from this module include:

- * Stars Are Born and Die
- * Corvus illustrates the parting of the seasons between winter and summer.
- * Scorpius features stories of when rabbit hunting can begin and additional teachings of the elders.

Navajo Module 6:

The Milky Way *Yikáisdáhá* (Awaits the Dawn)

This module tells stories of the Milky Way (Awaits the Dawn - *Yikáisdáhá*), Pegasus (Thunderbird - *Ii'ni*) and Canopus (The Coyote Star - *Ma'ii Bizó*). Key teachings from this module include:

- * Milky Way Encircles the Horizon in January
- * Thunderbird Emerges Through Time and Space, Announcing Spring
- * Coyote Star, Canopus, Twinkles in the South

Navajo Module 7:

Sun and Moon

Sun: *Jo'hanaa'éí*

Moon: *Tléhonaa'éí*

Module 7 tells stories of the sun and moon, and explains the phases of the moon. Key teachings from this module include:

- * Stars are our ancient relations
- * Solar and Lunar Cycles
- * Eclipse

Navajo Module 8:

Honoring the Sky

Module 8 highlights calendars and time keeping. It also explains the concept that the Navajo wedding basket is representative of the universe. Key teachings from this module include:

- * Calendar and Time Keeping
- * Milky way

NAVAJO CONSTELLATIONS AND STORIES



***Náhookqs Bi'kq'* — Male Revolving One — Big Dipper**

This constellation can be culturally seen as a male warrior, a leader who protects his people. He is sympathetic and charismatic, as well as a provider for his family and home. As a father he provides spiritual and physical protection to his family.

The term "Náhookqs" refers to the double motion of the constellation as it revolves around the North Star, while rotating at the same time. This constellation is always paired with a female counterpart, *Náhookqs Bi'áád*, in a relationship of complementarity.



***Náhookqs Bi'áád* — Female Revolving One — Cassiopeia**

This constellation is the female partner of *Náhookqs Bi'kq'*. She is a woman who exemplifies motherhood and regeneration. She provides growth, stability in the home and the strength necessary for harmony. Instead of a bow and arrow, her weapons are her grinding stone and stirring sticks, which ensure that she will always be able to feed her family.



***Náhookqs Bikq'* — Central Fire — Polaris, North Star**

This constellation depicts the central fire of a hogan, a Navajo home. This star never moves and

thus provides stability to the cosmic home. The constellation is the central light and eternal fire that brings comfort to the home. It also represents human consciousness. This star provides the relationship that unites the two other Náhookqs constellations into one. The star gives centrality, balance and guidance to all other stars in the sky. It provides dynamic stability within the cosmic process as a star that appears stationary, not wandering.



Dilyéhé — Pin-like Sparkles — Pleiades

Dilyéhé is a constellation of timekeeping and planting for the Navajo people. The name “dilyéhé” is associated with the concept of planting seeds (k’elyéí) and sparkling dancing

movement as seen in the stars themselves.

Dilyéhé is a regulator for planting. It is said “don’t let Dilyéhé see you plant your seeds.” This comment refers to the phenomenon of the Pleiades disappearing in early May and reappearing in late June or early July. The Pleiades disappears in the western horizon in the evening in May and reappears as the helical rise in the morning in the latter part of June or the first part of July. This is the preferred planting time for corn in Navajo country. Along with the disappearance of the Pleiades are other local and seasonal process indicators such as the emergence of certain plants and the runoff of streams from the mountains, as waterfalls. Navajos have lived with seasonal change for centuries and say that if you plant your corn seeds too early they will be destroyed in a late frost. If you plant your seeds too late, the corn

will not ripen before the first frost of autumn. Thus the seasonal cycle of Pleiades was of vital importance.

Other Navajo stories of Dilyéhé tell of seven mischievous young boys who follow the ones who plant too late and snatch the seeds out of the ground. Another story refers to a group of boys followed by a woman with a buckskin slung over her back. When the group goes over a hill, they are no longer seen in the night sky. This is when the Pleiades disappear in early May.

Another story talks of the Hard Flint Boys (Béésh Ashiké) who represent young warriors who are also healers in one of the traditional cultural summer ceremonies.

Other stories refer to the stars as a family: grandparents, parents, kids, and grandchildren, representative of the seeds of generations and regeneration. Incorporated in these stories are principles and values of traditional child rearing.

Átsé Ets'ózí — First Slender One — Orion



This constellation is depicted as a young man in the prime of life. He carries a bow and arrow and is a warrior protecting his people. Like Dilyéhé, this constellation is related to planting and is seen every season except for part of the summer. Átse Ets'ózí is often spoken of as the son-in-law to Átsé Etsoh, which includes part of the constellation of Scorpius. In accordance with Navajo tradition of mother-in-laws and son-in-laws not meeting or speaking, Átsé Ets'ózí and Átsé Etsoh are never seen in the sky at the same time.



Hastiin Sik'aí'í – Man with a Firm Stance with Legs Ajar – Corvus

The constellation is representative of solidarity, strength and the continuity of cycles. At the same time it stands for the parting of the seasons between summer and winter. The constellation emerges in early October as Ghaají, the parting of seasons between hot and cold, and is fully manifest in November.

This constellation includes the Greek constellation Corvus, but in Navajo cosmology it is much larger, containing a total of 32 stars. Hastiin Sik'aí'í is an indicator that the major winter ceremonies can begin.



Átsé Etsoh – First Big One – Scorpius (upper)

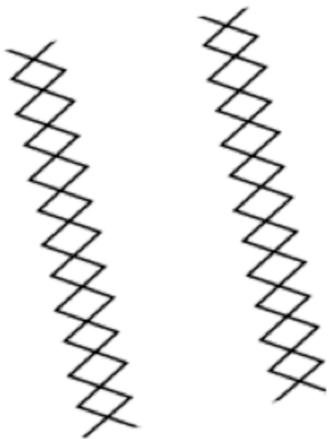
This constellation depicts an elderly man with a cane and a basket of seeds. He represents the wisdom of the elders with a cane that provides strength and stability. The basket signifies the entire cosmos and

regeneration. Átsé Etsoh represents the wisdom and knowledge that come with old age. He is depicted as an elder, strong in assurance and the stability of life. He is located in the upper part of the Greek constellation Scorpius and includes other stars adjacent to Scorpius.



Gah Hahat'ee – Rabbit Tracks – Scorpius (lower curve)

This constellation depicts the tracks of a rabbit running and leaping out. When Rabbit Tracks turns on its side in the early fall, it signifies that deer are old enough to survive without their mothers, and people can begin to hunt them. The constellation thus heralds the beginning of deer hunting season. This constellation is located in the lower curved tail of Scorpius. It is found in the southwest sky in the fall and slowly tilts to the west as the months progress.



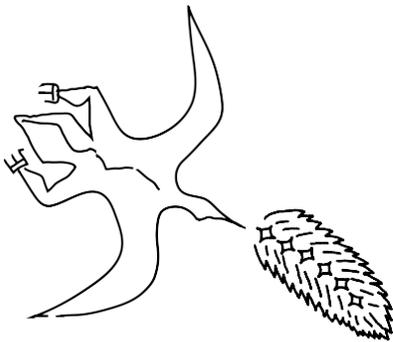
Yikáisdáhá – That Which Awaits the Dawn – Milky Way

Yikáisdáhá, That Which Awaits the Dawn, is related to the annual Milky Way process. The emergence of pre-dawn is determined by the position of the Milky Way that changes with the nights, months and seasons. Yikáisdáhá can be experienced by the full cyclical emergence of the Milky Way in the early pre-dawn hours of mid January. It is during this time the full circle of the Milky Way aligns with the horizon. Thus, a person can observe the full Milky Way in every direction, as it lays on the horizon in a circle. The Milky Way is depicted in Navajo sand paintings as a crosshatched line, indicating the changes of its position in the night sky, from one side to another. Yikáisdáhá is the last of the eight main constellations and signifies completeness and wholeness.



Ma'ii Bizq' — Coyote — Canopus

Ma'ii or Coyote took part in the naming and placing of the star constellations during the Creation. He placed one star directly south, naming it after himself, Ma'ii Bizq', the Coyote Star. This star is Canopus, which from Navajo land appears to be directly south on the horizon. The visible path of Canopus is of very short duration because its position is due south. It comes out and goes down in a semicircular path, as observed from Navajo country. It can be seen from Navajo land in late December near the date of the winter solstice, around midnight. The star is really a supergiant star with a sparkling movement, which Navajos say is a red-orange color. It is the second brightest star in the night sky after Sirius, when it can be seen.



Ii'ni - Thunderbird — Pegasus and Various Stars

The Thunder constellation is similar to the Bear constellation. It is considered a spring and summer constellation and will first appear with the heliacal rise in the pre-dawn hours of early spring. This occurs about the same time that the First Thunder of spring sounds on earth signifying the coming of spring. The emergence of the First Thunder and the appearance of the Thunder constellation in the sky awake the life processes and emergence of spring and moreover signals the rejuvenation of seasonal life cycles on earth. The Thunder constellation manifests the intricate interconnection of all life in the universe,

animals, plants, humans, thunder and lightning.

The essence of the Thunder constellation is depicted as a feather containing six stars. Each star represents a month and can be identified with the morning heliacal rise of the first bright star in the East, following the new crescent moon, for each of the six months. There are more than one calendar system Navajos traditionally used in the past. One is by lunar cycles and seems to be what you are talking about. The crescent moon that happened last week, September 21st, started the Navajo month of Ghaaji (Not October 1st) and it is the old Navajo way of going by moon cycles. Also, about this time the Coyote Star (Canopus) will appear in the south and will only appear very clear for about 3 weeks and won't be seen again until next year the same time. It is about gone if not gone already. So, as done in the past, the Coyote Star and Ghaaji crescent moon were used somewhat together to determine the beginning of the cold winter season, not necessarily New Year as discussed and understood by the western New Year.

Unlike most Navajo constellations, the Thunder constellation covers a major portion of the sky and appears over many months. The first indication of its feather comes in the early morning hours in September/October (Denebola in Leo) and is completed in February/March (tip of Pegasus). The body takes an additional three months to completely appear, March, April and May, and remains visible during the rest of the summer.

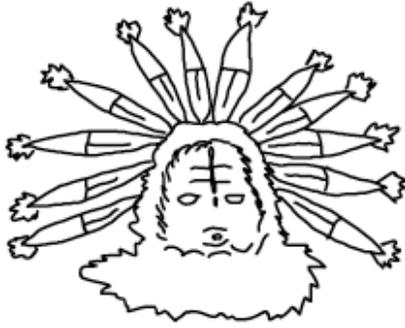


Ma'ii — Coyote Tossing the Stars

The trickster, Ma'ii, or Coyote, is often credited with creating chaos, thus creating a larger order in the universe. One story goes this way. Long ago the Holy Beings were creating precise constellation forms out of crystals, which were stars. Hashch'éshjhiní, Black God, was carefully placing each star with a purpose and location in the Upper Darkness, which we call sky. He created

Náhookqs Bi'kq' and Náhookqs Bi'áád and placed them in the Upper Darkness. He then placed Dilyéhé and Átse' Ets'ózí, then others.

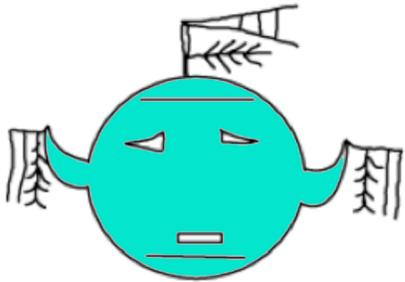
Pretty soon, Coyote came along and asked what they were doing. In many stories the Coyote's curiosity leads him into trouble. The Holy Beings replied that they were creating order and light in the sky. Coyote was immediately enthusiastic and asked to help. He was allowed to participate and he began to take crystals off the buckskin and place them in the sky. He placed one star in the south and exclaimed, "that will be my star, the coyote star." He placed a few other stars, claiming them for himself, including the North Star, thus separating north and south. He soon grew impatient. When no one was looking, he grabbed the buckskin and tossed it high into the sky. All the remaining crystals flew out of the buckskin in all directions. There was no more precision in the placing and naming of the stars. This, Navajos say, is why there are so many stars without names or constellation forms.



Haashch'éeéh Yálti' — Talking God

Haashch'éeéh Yálti' is loosely glossed as Talking God. This is somewhat surprising since Haashch'éeéh Yálti' is really a spiritual being that does not speak in a human sense. The constellation is one of the main Navajo Yeis (holy beings) and is associated with the eastern daily predawn cosmic process. The twelve eagle feathers of his headdress can often be seen in the predawn, just before sunrise. His black and white eagle feathers represent the dawning process, as the upper part of the night sky is dark, and the lower part of the dawn sky, as observed from earth, is light.

Haashch'éeéh Yálti' is considered to be a prominent leader in Navajo culture. He is one of the leaders that took part in the creation of the Navajo constellations.



Jo'hannaa'éeí — Sun

The Sun and the Moon are usually paired together. Together their cycles determine the times of the months and the years. There are usually twelve full moons in a year, but occasionally, every few years, Navajos acknowledge a thirteenth moon around the time of October, according to old Navajo teachings. This resets the calendar system so that the Sun and Moon cycles are harmoniously balanced.

There are many stories about the Sun, including the stories we have referenced about the Twin Girls, the monsters and the Hero Twins. It is said that the Sun built a beautiful home for his wife,

Changing Woman, in the waters of the West. She lived there with him for a long time and raised children who became the foundations of the Navajo clan system.

The Sun is said to be a male energy, depicted by a perfectly round turquoise disc. It is said to be carried by a Sun Carrier as it makes its daily rounds across the sky. It is often shown being carried by a humanlike person riding a horse.

The energies of the sun are used in healing ceremonies. People are reminded to not look at the Sun during an eclipse. If they forget and look at the sun, they may have eye and digestive troubles. These can be healed by the sun's energies.



TL'éhonaa'éí — Moon

The moon is considered to be a female energy in relation to the male energy of the Sun. There are many stories about the moon, often passed down through the female side of a family.

The moon is usually depicted as a perfect white shell disc, carried by the Moon Carrier as he rides his horse across the sky. The phases of the moon are considered to be very important and there is a Navajo name for each of the 29 nights of the lunar cycle.

Navajos begin the first day of the lunar cycle with Dah hiitá, the first crescent moon visible after the new (dark) moon. The meaning of the moon is life itself, intrinsically connected with the life cycles of all organisms. The moon is a regulator of many things: birth, weather, ocean tides, calendar, life cycles of women, birth control, ceremonial

functions and behavioral influences.



Ts'aa — Basket

The Navajo basket enfolds both Mother Earth and Father Sky. The basket weaves both earthly and celestial physical essences (mountain, rainbow, clouds, zigzag lightning and stars). Náhookqs Bikq', the North Star, is woven into the center of the basket. From this center emerges a spiral anti-sunwise (counterclockwise) process, moving in accordance with the nightly counterclockwise cycle of the circumpolar stars.

NAVAJO CONSTELLATIONS LOCATION AND PRONUNCIATION GUIDE

The locations given are approximations. Most Navajo constellations are larger, or in some cases smaller, than the Greek equivalents. We name the Greek equivalents in order to show where the Navajo locations are located in the sky. In a few instances, we have not located the constellation with precision, in accordance with the wishes of our Navajo elders.

There is a high tone to all vowels that are marked with an accent (á, é, í, ó). There is a nasalization to all vowels that are marked with a hook (ā, ē, ī, ō). There is a glottal stop, a closing of the throat, for all vowels with an apostrophe ('). All pronunciations are approximate. Some sounds do not exist in the English language.

Náhookqs Bi'kq' (Na hoe kos Bih ka) Male Revolving One —
Big Dipper

Náhookqs Bi'áád (Na hoe kos Bih aad)

Náhookqs Bikq' (Na hoe kos Bih kwo) (nasalize kwo)

Dilyéhé (Dil yeh heh)

Átsé Ets'ózí (A tseh Ets osi)

Hastiin Sik'aí'íí (Hasteen Sick eye ee)

Átsé Etsoh (A tseh Etsoh)

Gah Hahat'ee (Gaa ha haat ay)

Yikáísdáhá (Yih kais daahaa)

Ma'ii Bizq' (Mah ee Bihzon)

Dahsani (Daa saa ne)
Sq' Ahóts'íí (Sew aho tsee ee)
Naayéé' Neizghání (Naa yee Nez ghanee)
Tóbájishchíní (Twoo ba jish chinee)
Yé'itsoh (Yay ee tso)
Ií'ni (Ee knee)
Shash (Shaash)
Tsetah Dibé (Tseh tah dibeh)
Hoghan (Ho ghaan)
Tachééh (Ta chay)
Tłish Tsoh (Tli sh tso)
Haashch'éshzhini (Haash ch' esh zhini)
Tiníléí (Tyin il ay)
Jhil Gish (Zhil gish)
Kaalogi (Kah loe gi)
Asdzáán Nádleehé (Ahs dzaan Naad leh eh)
Yoolgai Asdzáán (Yolth guy Ahs dzaan)
Ma'ii (Mah ee)
Haashch'ééh Yálti' (Haash ch' eeh Yalth ti)
Haashch'éé'ooghan (Haash ch'eh oh wan)
Jo'hanaa'éí (Jo haan aa ay)
Tł'éhonaa'éí (Tlay hon aa ay)

NAVAJO CONSTELLATION LOCATION

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Náhookq̄s Bi'k̄a' Male Revolving One — Big Dipper

Náhookq̄s Bi'áád Female Revolving One — Cassiopeia

Náhookq̄s Bik̄o' Central Fire — Polaris, North Star

Dilyéhé Pinlike Sparkles — Pleiades

Átsé Ets'ózi First Slim One — Orion

Hastiin Sik'aí'íi Man with Legs Ajar — Corvus

Átsé Etsoh First Big One — Scorpius (upper part of Scorpius)

Gah Hahat'ee Rabbit Tracks — Scorpius (lower curved hook of Scorpius)

Yikáisdáhá Awaits the Dawn — Milky Way

Ma'ii Bizq̄ Coyote — Canopus in the south is usually called the Coyote Star. There are actually four Coyote Stars. A second one is Polaris in the north. There are also east and west Coyote Stars.

Dahsani Porcupine — northeastern sky

Sq' Ahóts'í'í Doubtful Stars — Hyades

Naayéé' Neizghání Monster Slayer

Tóbájíshchíní Born For Water

Yé'itsoh Giant

Ii'ni Thunder — Pegasus for the body and stars for the feather,
beginning with Denebola in Leo, (October)

Shash Bear — Sagittarius

Tsetah Dibé Mountain Sheep — Beehive Cluster in Cancer

Hoghan Hogan — northern sky

Tachééh Sweat Lodge

Tłish Tsoh Big Snake — Puppis and Canis Major

Haashch'éshzhiní Black God — Near Pleiades

Tiníléí Gila Monster — Andromeda

Jhil Gish Flash Lighting

Kaalogi Butterfly — southern sky

Asdzáán Nádleehé Changing Woman — Hyades

Yoolthgai Asdzáán White Bead Woman — Hyades

Ma'ii Coyote Tossing the Stars

Haashch'ééh Yaaltí' Talking God

Haashch'éé'ooghan Hogan God

Jo'hanaa'éí Sun

Tł'éhonaa'éí Moon

CLASSROOM ACTIVITIES FROM THE INTERNET

Finding your way without a compass:

<http://www.compassdude.com/no-compass.shtml>

<http://www.almanac.com/content/find-your-way-without-compass>

Measuring the sky with your hand:

<http://www.oneminuteastronomer.com/860/measuring-sky/>

<http://www.fortworthastro.com/beginner1.html>

<http://stars.astro.illinois.edu/celsph.html>

String games:

http://dine.sanjuan.k12.ut.us/string_games/index.html

History of the Crab Nebula:

<http://www.kopernik.org/images/archive/crab.htm>

Ancient Observatories:

<http://solar-center.stanford.edu/AO/>

Pringles Can Viewer and Constellation Slides:

<http://donnayoung.org/science/constellation-slides.htm>

Tracking the Sun's Journey Across the Sky:

<http://maya.nmai.si.edu/sites/default/files/resources/lesson-plans/Observing%20and%20Tracking%20Shadows.pdf>

http://www.carolinacurriculum.com/premium_content/eBooks/Earth+Space/pdfs/Lesson_3.pdf

http://hea-www.harvard.edu/ECT/the_book/Chap1/Chapter1.html

FURTHER RESOURCES

1. Sharing the Skies: Navajo Astronomy

Nancy C. Maryboy, Ph.D. and David Begay, Ph.D.

Rio Nuevo Publishers, Tucson, Arizona

www.rionuevo.com

2. www.indigenouseducation.org

www.sharingtheskies.com

Website for the Navajo Skies planetarium show, tee shirts, posters, and books

3. Indigenous Teachings of Eclipses: 14-minute video produced by the Indigenous Education Institute

<https://vimeo.com/230453732>

4. Stars of the First People

Dorcas S. Miller

Pruett Publishing Co.

Boulder, Colorado

5. Living Life's Circles: Mescalero Apache Cosmology

Claire R. Ferrar

University of New Mexico Press

Albuquerque, New Mexico

6. Earth and Sky: Visions of the Sky in Native American Folklore

Edited by Ray A. Williamson and Claire R. Ferrar
University of New Mexico Press, Albuquerque, New Mexico