

## The Lore of the Stars, For Amateur Campfire Sages

by Anders Hove  
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Contrary to the story of the star-counter in *Le Petit Prince*, there aren't unnumerable stars in the night sky, at least so far as we can see with our own eyes. Only about a thousand are visible. Almost all have names or Greek letter designations as part of constellations that anyone can learn to recognize.

Modern astronomers have divided the sky into 88 constellations, many of them fictitious—that is, they cover sky area, but contain no visible stars. About half the modern constellations form a recognizable pattern in the night sky. In the northern hemisphere, the Big Dipper (Ursa Major), Orion, Cassiopeia are the easiest to spot. In the southern hemisphere, Scorpius and the southern cross (Crux) are prominent. These constellations are bright enough to be spotted from urban areas. Of course, no celestial sight can surpass the breathtaking view of a perfectly dark and cloudless sky on a cool summer night in the countryside.

### BEGINNINGS

No doubt humans first grouped stars into constellations long before the advent of civilization or history. The origins of the modern constellations—as established by the Greeks and embellished by modern astronomers—are

obscure. Various claims have been made about Babylonian innovations and the similarity between the Greek zodiac and the stories, dating from the third millennium BCE, of Gilgamesh, a legendary Sumerian hero who encountered animals and characters similar to those of the zodiac. Some of the Babylonian constellations may have been popularized in the Greek world through the conquest of Alexander in the fourth century BCE. Alexander himself sent captured Babylonian texts back to Greece for his tutor Aristotle to interpret. Even earlier than this, Babylonian astronomy would have been familiar to the Persians, who occupied Greece several centuries before Alexander's day.

Although we may properly credit the Greeks with completing the Babylonian work, it is clear that the Babylonians did develop some of the symbols and constellations later adopted by the Greeks for their zodiac. Cuneiform tablets using symbols similar to those used later for constellations may have some relationship to astronomy, or they may not. Far more tantalizing are the various cuneiform tablets outlining astronomical observations used by the Babylonians for tracking the moon and developing a calendar. One of these is the MUL.APIN, which describes the stars along the paths of the moon and elsewhere in the sky. The MUL.APIN, or "plough stars," apparently dates from the time of Sargon II Assurbanipal (667-626 BCE), and is a copy of an earlier work of unknown date.

Drawing on earlier work, Gary Thompson describes the following 18 constellations the Babylonians saw along the path of the moon:

- MUL.LU.HUN.GA, the hired man (parts of Aries and Perseus);
- MUL.MUL, the stars (now the Pleiades);
- MUL.GUD.AN.NA, the bull of heaven or Anu (Taurus);
- MUL.SIPA.ZI.AN.NA, the shepherd of Anu (Orion);
- MUL.SHU.GI, the old man (Perseus);
- MUL.GAM, the hooked staff (Auriga);
- MUL.MASH.TAB.BA.GAL.GAL, the twins (Gemini);
- MUL.AL.LUL, the crab (Cancer);
- MUL.UR.GU.LA, the lion (Leo);
- MUL.AB.SIN, the barley-stalk (Virgo, holding wheat);

MUL.ZIB.BA.AN.NA, the scales (Libra);  
MUL.GIR.TAB, the scorpion (Scorpius);  
MUL.PA.BIL.SAG, the grandfather (Sagittarius);  
MUL.GU.LA, the great one (Aquarius);  
MUL.ZIBBATI.MESH, the tails (part of Pisces);  
MUL.SIM.MAH, the swallow (part of Pisces);  
MUL.A.NU.TI.TUM, a goddess (parts of Pisces and  
Andromeda).

The above list suggests that a number of the constellations adopted by the Greeks did indeed arise from Babylonian forebears. However, translating cuneiform symbols and matching them to what the ancients saw in the sky (or believed they were seeing) is a highly specialized discipline notoriously troubled by differences in interpretation. Others have arrived at different conclusions, and this author is not qualified to express any view other than abstract wonder at the intriguing mysteries presented by this ancient material.

The earliest known written account of the Greek constellations is contained in the *Phaenomena*, by Aratus of Solis working in the third century BCE. In his poetry, Aratus described 43 constellations and named many individual stars, apparently using the stories of the poet Hesiod as inspiration. In 129 BCE, Hipparchus helped popularize these earlier Greek stories with a catalogue of constellations and stars; only fragments of this work now remain, along with some of his commentary on Aratus. Still later, in the second century of the common era, Ptolemy of Alexandria penned a star atlas containing 48 constellations, along with other writings that together have been passed on by the Arabs as *Almagest*, the greatest.

These Greek stories color and dominate our understanding of the historical development of astronomy and astrology in Babylonia. The cachet posthumously enjoyed by the Babylonians owes partly to their careful celestial observations and well-developed calendar system, and partly to the high regard the Greeks held for Chaldean fortune-tellers, which in turn was either due to legend or the presence of fortune-tellers in Greek towns.

## THE GREEK STORIES

The two most prominent Greek legendary cycles portrayed in the heavens concern the heroes Hercules and Perseus. The PERSEUS group is particularly convenient for stargazers in that it is contained within a fairly compact area of the northern hemisphere sky, and contains mainly bright, well-known constellations. According to the legend, Queen CASSIOPEIA offended Poseidon, the god of the sea, by bragging that her beauty exceeded that of all the nymphs of the sea. The god, eager to punish this new example of hubris, sent a mighty whale, CETUS, against the queen. Cassiopeia and her husband, CEPHEUS, decided to chain their daughter, ANDROMEDA, to a rock to lure the whale and secure their own escape. The hero Perseus, who was returning from slaying the Gorgon Medusa, was equipped with accoutrements that would make any hero proud: the winged sandals of Hermes, the helmet of Hades, and the shield of Athena, who had instructed Perseus to only look at Medusa's reflection in its bronze. Hesiod writes:

On his feet he had winged sandals; his black-sheathed sword was slung across his shoulders by a cross-belt of bronze. He was flying swift as thought. The head of a dreadful monster, the Gorgon, covered the broad of his back, and a bag of silver—a marvel to see—contained it: and from the bag bright tassels of gold hung down. Upon the head of the hero lay the dread cap of Hades which had the awful gloom of night.

Fulfilling the legend, Perseus killed the whale and rescued Andromeda, earning her hand in marriage. Blood from the Medusa dripped into the seas crashing against the rock, uniting with Poseidon's seed to give birth to the winged horse PEGASUS, which emerged from the boiling white froth and mounted to the heavens.

HERCULES' feats were so many that the skies of both hemispheres couldn't contain their myriad characters. He is represented in his own constellation, a surprisingly dim and unmemorable summer asterism that is mainly

notable for containing M13, the brightest northern hemisphere globular star cluster. The legends of the great hero's twelve labors are prominent in the zodiac. LEO, the great lion, is the Nemean Lion, a lunar beast descended to earth whose cloak was impervious to blows and impenetrable to arrows. Hercules strangled the creature, and he is usually portrayed holding the lion's cloak as his shield. CANCER, the crab, famously nipped at Hercules' ankles while he and his cousin were feverishly working to slay the many-headed Lernian HYDRA, also a constellation. Hercules rid himself of the annoyance with a bash of his club, earning Cancer an undeserved spot in the zodiac—at the request of Hera, the organizer of its expedition. The constellation is so dim that Dante joked that if it had a single bright star the calendar would have one month of only a day's length, since such a star would wash out the remainder of the constellation.\*

The tales of Hydra, Leo, and Cancer are well-known. CENTAURUS, AQUILA, SAGITTA, and DRACO played more peripheral roles in the Herculean labors. Centaurus is Chiron, a centaur friend of Hercules with whom the hero supped after outrunning and killing the Eurymanthian Boar, his third labor. During the dinner, a riot erupted among the centaurs after Hercules violated protocol by dipping his own cup into their vat of wine. During the melee that followed, Hercules accidentally struck Chiron with an arrow tipped in poison. An immortal, Chiron petitioned the gods to allow his death. Ultimately, he was permitted to exchange his immortality with Prometheus. He is portrayed in the sky with a dead wolf

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\* The length of the months is not really tied to the size of the respective constellation. The zodiac used in newspaper horoscopes uses equally sized months. If one follows the modern astronomical constellation boundaries, themselves arbitrary, the sun spends more than twice the time crossing in front of large constellations like Virgo, Capricorn, and Leo as it does passing over Cancer or Libra. Indeed, several non-zodiacal constellations also inhabit considerable space along the plane of the earth's orbit.

hanging from his staff—the dim constellation LUPUS, actually added by Renaissance-era printers to fill an apparent void in the map.

Aquila, Sagitta, and Draco are all associated with the eleventh labor of Hercules, in which he was instructed to obtain the sacred Apples of the Hesperides. Since no mortal could remove the apples, Hercules sought the advice of Prometheus, who was known for sharing godly secrets with mortals. Indeed, Prometheus was still chained to a rock in the Caucasus for his crime of giving fire to humans; every night, an eagle preyed on him, tearing out his liver, which grew back each day. According to one story, Hercules killed this eagle with an arrow in return for the advice he sought. The eagle belonged to Zeus, who placed it and the deadly arrow into the sky as Aquila and Sagitta. Aquila is also seen as the eagle Zeus used to retrieve his thunderbolts.

Prometheus advised Hercules to have the Titan Atlas obtain the apples. In return, Hercules agreed to hold up the sky in Atlas' stead. First, however, Hercules had to kill the dragon (Draco) that lay coiled round the tree that held the apples. This he (or perhaps Atlas) accomplished by whirling the dragon into the sky, where its motion about the north pole twisted it into a circle. The constellation is dim and difficult to pick out among the more prominent northern constellations.

In the roster of Greek celestial heroes, ORION ranks at least third. The great hunter's stars are possibly the most recognized in the world, since they are visible to both hemispheres, unlike the Big Dipper or Southern Cross.

Given that Orion is better known for his belt and sword than for his head, it isn't surprising that he met his end through the classical crime of hubris. According to the most colorful legend, Orion was killed by Artemis, the Roman Diana, goddess of the hunt, after he bragged to her that he would slay all the animals of the world. (An alternative version—that of Apollodorus—is that he threatened to kill the maiden Opis.) According to Eratosthenes, Artemis sent a scorpion to kill Orion (SCORPIUS, or "Scorpio" in newspaper

astrology columns), and placed it opposite him in the sky, to always rise as his stars set. It was a fitting posthumous wound to the pride of the great huntsman. CANIS MAJOR and CANIS MINOR are sometimes seen as his hunting dogs, though some interpret the large dog as Myra, the dog of Icarus. At Orion's feet is LEPUS, the hare, poised to flee—supposedly placed in the sky by Hermes in the honor of its speed.

Fourth on the list of heroes is Jason, head of the Argonauts, represented by his ship, the Argo Navis. This ancient constellation took up a vast part of the south equatorial skies before it was broken up in a modern star atlas drawn by Abbe Nicolas Louis de La Caille, to whom we shall return further on.

The purpose of Jason's voyage was to retrieve the legendary Golden Fleece, held by the double-dealing Aetus, king of Colchis in the Caucasus. Jason's voyage came about after his brother usurped the throne of Attica in Greece, offering to share it only if Jason retrieved the fleece, a seemingly impossible task. Word of this injustice spread throughout heaven and earth, attracting heroes such as Castor and Pollux, Asclepius, Hephaestus, and Orpheus. First, Jason had to make his way through the perilous straits leading to the Black Sea. According to the legend, in those times the rocks of the straits crashed together constantly, making navigation impossible. To avoid being dashed against the rocks, Jason released a white dove into the spray surrounding the channel, and ordered his men to row at the moment the bird passed through safely. The tactic proved effective, but even so a part of the Argo was torn off by the rocks; the pieces lodged there permanently, holding the straits open ever since. The white dove, which is also associated with the Biblical legend of Noah's Ark, is seen in the sky near the ship as the constellation COLUMBA. From there the Argo was on to the Caucasus, where Jason wooed Medea, the king's daughter, who then stole the fleece for Jason from the sacred forest where her father had nailed it to a tree.

On its return voyage the Argo sailed down the river ERIDANUS (probably a representation of the River Nile), where, among other things,

they encountered the wreckage of the mythical sun-chariot. The chariot's crash had been the result of Helios' unwise decision to allow young Phaeton to command it. The inexperienced youth misled the horses, which were spooked by Scorpius. How did the Argo get from the Black Sea to the Nile? In the days of ancient Greece, Mediterranean peoples believed that the world was surrounded by Ocean, which was reachable by a number of great waterways. The upper reaches of the Nile were only fully mapped in the late 1800's.

The Golden Fleece had itself arisen from an earlier legendary Greek injustice. Phrixis and Helle, the daughters of King Athamas of Boeotia, were due to be sacrificed to the gods as a result of an oracle received by their father. This drastic oracle was, in fact, a sham arranged by their jealous step-mother Ino, who was eager to place her own offspring on the throne. Sometimes sensible of injustice, the gods sent a golden-fleeced ram to spirit the children away from their evil mother, but somehow things went awry, for Helle fell from the ram and drowned as they were passing over the straits leading to the Black Sea. The Greeks gave the strait the name Hellespont after the girl—Dardanelles is the modern variant. After it reached the Caucasus, the ram was slaughtered and its fleece nailed to a tree, and in death the ram became the zodiacal constellation ARIES.

One imagines that, for Orpheus, being a crewman on the good ship Argo was more of a chore than the main event. As the son of Apollo and the muse Calliope, Orpheus was profoundly skilled at music. Apollo graciously accommodated his son's interests with the gift of a heavenly lyre, originally fashioned by Hermes from a tortoise shell. According to Apollodorus, the music of Orpheus could move not only the souls of humans, but trees and rocks as well: the oak trees of Thrace are said to have migrated there to hear his music. Yet his passions, by most accounts, would be his end, for Orpheus was so stricken with the death of his wife Euridyce that he could not give up her memory, earning him the spite of the Thracian women. Once, in a fury, these

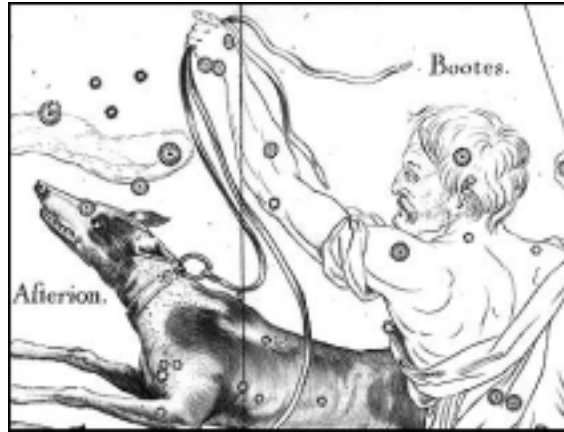
women tore Orpheus limb from limb. Zeus placed his lyre (LYRA) in the sky in his memory. A diamond-shaped constellation headed by one of the sky's brightest stars (Vega), Lyra is a beautiful summer evening constellation that does honor to musicians everywhere.

As with his half-brother Orpheus, Argo crew-mate Asclepius is better known for other things, especially his work with medicine. According to the oft-told story, Asclepius came upon a snake that threatened him with its fangs. He crushed it with a staff, extracted the venom, and used it as an antidote for life's illnesses—so effectively that he could even treat the dead. Soon, Asclepius was raising people from the dead wholesale. Naturally, Hades protested to the gods that the underworld was in danger of being depopulated and earth overrun. To return the natural order, Zeus sent down a thunderbolt to kill Asclepius, mollifying the healer's father Apollo by placing his son in the sky. Socrates famously told Crito to pay homage to Asclepius with a the sacrifice of a cock—"pay it and don't let it pass"—and the snake-entwined staff is still the universal symbol of medicine. In the sky, Asclepius is known by his Roman name, OPHIUCHUS, and he is seen wrestling with his snake, the winding constellation SERPENS.

#### THE LEGENDS OF ZEUS

Zeus, the king of the gods who had the largest hand in strewing the heavens with constellations, is himself represented in a number of them. His most colorful legends, of course, involve the seduction of various earthly beauties. The constellation CYGNUS is said to be Zeus on his way to Queen Leda of Sparta. Leda bore twin sons and twin daughters, one of each pair the immortal offspring of Zeus. The

daughters were Helen (of Troy) and Clytemnestra. The sons were Castor and Polydeuces (Pollux). After the mortal Pollux was killed in a sword-fight, Castor pleaded with Zeus, saying that he could not bear to remain alive without his brother. The two were reunited in the sky as GEMINI, the twins.



The philandering Zeus is also responsible for the constellation TAURUS, the bull—the form Zeus assumed on his way to Io. This constellation is one of the oldest known, and is

probably handed down from the Babylonians.

One of Zeus's lovers, Callisto, is represented by URSA MAJOR, the great bear. In one of her customary jealous rages, Hera transformed Callisto into the bear and bewitched Callisto's son, Arcas, into hunting her. Hearing Callisto's cries, Zeus placed both in the sky in such a position that Arcas (BOÖTES) would perpetually chase the bear without ever catching it. Boötes is sometimes seen as leading two dogs, which form the modern constellation CANES VENATICI, the two hunting dogs named Asterion and Chara.

AQUARIUS, the cup-bearer or water-bearer of the gods, was another acquisition of Zeus. Aquarius was Ganymede, a shepherd boy whom the gods found wildly attractive. To retrieve the boy, Zeus sent his thunderbird, Aquila, already mentioned in connection with Hercules, is sometimes portrayed as holding the youth in its claws.

#### THE PANIC

A number of constellations arise from the attack of the great beast Typhon, sent by the Titans to crush the Olympians in their epic war for heavenly supremacy. Apollodorus describes the monster:

As far as the thighs he was of human shape and of such prodigious bulk that he out-topped all the mountains, and his head often brushed the stars. One of his hands reached out to the west and the other to the east, and from them projected a hundred dragons' heads. From the thighs downward he had huge coils of vipers, which when drawn out, reached to his very head and emitted a loud hissing. His body was all winged: unkempt hair streamed on the wind from his head and cheeks; and fire flashed from his eyes. Such and so great was Typhon when, hurling kindled rocks, he made for the very heaven with hissings and shouts, spouting a great jet of fire from his mouth.

It was the god Pan who sounded the alarm—giving rise to the words “panic” and “pandemonium.” This prompted the Olympians to assume earthly disguises to make good their escape. Pan, the goddess Aphrodite, and her son Eros all changed themselves into fish. Aphrodite and Eros are PISCES, the fish, supposedly tied together with a cord so that Aphrodite can keep charge of her son. Pan is CAPRICORNUS, the sea-goat, shown only half transformed into a fish. Pan's carefree nature and his simple music on a flute made of reeds made him a natural god for the countryside. Since the simple country people of the Roman Empire and Europe were the last to adopt Christianity, Pan's cloven goat hoofs came to represent the Christian devil, and his name with that of the non-believers, the pagans. In a sense, then, astrological Capricorn is the devil.

Of course, many years would pass between the mythical Panic and Pan's second, unwilling transformation into Lucifer. In the immediate aftermath of Typhon's attack, Zeus entered into the fray and, after a rampage that altered the landscapes of several Mediterranean countries, crushed the monster under a huge mountain in Sicily, Etna, whose fire and smoke is said to represent Typhon's lingering breaths. One last constellation resulted from this immense war: the altar (ARA) where the lesser Olympian gods gave thanks for their salvation.

#### OTHER ZEUS CONNECTIONS

SAGITTARIUS, the archer, is another famous and bright constellation whose origins certainly predate Greek legend. According to Eratosthenes, Sagittarius is Crotus, the satyr son of the god Pan, who was taken to be raised with the nine muses, the goddesses of the arts. The muses were: Urania (astronomy), Clio (history), Terpsichore (dancing), Calliope, Eurterpe, and Erato (poetry), Melpomene (tragedy), Thalia (comedy), and Polyhymnia (song). Perhaps it was the company of creative geniuses that let Crotus to bend back a piece of wood with a string, inventing the bow and archery. Hyginus credits the invention to inspiration from Zeus, who wanted Crotus to exhibit the best in all human traits. Like Chiron, the centaur friend of Hercules, Crotus adopted a philosophical approach to life despite the warlike qualities of his race. When he listened to the timeless performances of the muses he expressed his delight by striking his hands together, the first applause.

Although modern astronomers would populate the heavens with tools and implements of the scientific trade, Zeus may have tried his hand at honoring invention in at least one case. AURIGA, the wagoner or charioteer, is sometimes seen as a mortal given eternal life by the gods in return for his invention. The charioteer is, in one story, Myrtilus, the son of Hermes and driver for King Oinomaos. Oinomaos had such confidence in Myrtilus that he made beating the king's chariot the challenge for anyone wishing to wed his daughter. Pelops bribed Myrtilus to throw the race by loosening the pins holding one wheel onto the chariot. Pelops won his race, the king was killed, and Pelops thought it wise to destroy the evidence by drowning the charioteer in a nearby river. The charioteer is typically shown containing the goat that suckled Zeus at birth, and early Christians used the image of the goat to portray the region as Joseph's stable. Auriga's bright circumpolar star, Capella, takes its name from the Latin for she-goat.

Before leaving Zeus we mustn't forget the one constellation associated with his birth, URSA

MINOR, known to us as the Little Dipper of the north pole. The most basic story of Greek legend is perhaps that of Zeus's father Cronus, who ate all of his children to keep any of them from succeeding him. Rhea, Zeus's mother, fed Cronus swaddling clothes to keep him from consuming Zeus in his turn. Since the child could not be raised at home, he was sent to a cave to be raised by a nymph, now seen as the little bear or dipper.

#### THE FERTILITY GODDESS

VIRGO (the virgin) and the nearby LIBRA (the scales) are associated with numerous legends of Western antiquity, including Roman Justicia, who holds the scales of Justice. In Greek legend Virgo is Demeter, goddess of the harvest, whose daughter Persephone was abducted into the underworld, after which Demeter abandoned her fields in grief. Similarly, in ancient Egyptian thought, which drew heavily on Greek myth and inspired Romans, Virgo was Isis, who fled the monster Typhon and scattered wheat in her path. In Mesopotamia, Virgo was Ishtar, who fled her fields after her husband was abducted into the underworld. In the summer months Virgo looms large in the evening sky, its brightest star—Spica, named for the spike of wheat held by Virgo—sets earlier each night until finally it disappears in the sun's glare at harvest time. Perhaps this accounts for the popular story of Virgo's flight from the fields.

#### THESEUS AND ARIADNE

The story of Ariadne is perhaps the most touching of all the tales of love in Greek legend. Theseus, the Greek hero, was tasked with destroying the great Minotaur of Crete, lodged in the original Labyrinth, a maze of subterranean passages. Ariadne caught sight of Theseus on his approach and offered her help, in the form of a ball of twine which Theseus would unroll while entering the maze and by which he could trace his way back upon the completion of the task. In exchange

for the thread, Ariadne extracted a promise of marriage. Alas, on his way home to Athens Theseus abandoned Ariadne, but she gained happiness by marrying the god Dionysus, who in turn lobbed her wedding crown (CORONA BOREALIS) into the sky in joy at their nuptials.

Dionysus is also associated with the crown of myrtle worn by his mother Semele, who was killed by jealous Hera for an affair with Zeus. Hera had told Semele to make Zeus prove his identity by revealing himself in godly form; when he did so, she was incinerated by the glare. Dionysus traveled to the underworld to seek her release, but obtained only the crown of myrtle, seen in the sky as CORONA AUSTRALIS.

#### OTHER GREEK LEGENDS

CORVUS, the crow, is associated with Apollo, who himself became a crow during the great attack of Typhon. However, Corvus is usually seen as the unfortunate bird commanded by Apollo, condemned to wear the color black for having brought news of the infidelity of Apollo's lover Coronis, and condemned also to be forever separated from his drinking cup (CRATER) by the monster Hydra as a punishment for tarrying on the way to fetch Apollo a drink. For this bird's misfortunes, all crows were said to wear black and speak only in discordant squawks.

PISCIS AUSTRINUS is an ancient constellation that is sometimes seen as the parent of the other two fish, Pisces. It is comparatively prominent owing to its bright star, Formalhaut, derived from the Arabic for the fish's mouth. The constellation's mythical origins are obscure, possibly quite ancient, and it is sometimes associated with the end of the Biblical flood. Hence the fish is often portrayed as drinking a large stream of spilled water coming from the gourd of nearby Aquarius.

DELPHINUS, the dolphin, has several stories, but most often it is credited to the roster of Poseidon, who sent a dolphin to help him woo Amphitrite and to bring her back to him. In gratitude he placed the creature in the stars. Like several other summer constellations, the

dolphin is a compact cluster of moderately bright stars easily seen next to Aquila. Modern celestial mapmakers have typically portrayed it as a curled up dolphin, a figure suggested by the arrangement of its stars—a rare constellation that resembles its sign.

EQUULEUS is technically a Greek constellation, having been mentioned by Ptolemy (in *Almagest*) and Hipparchus. The dim little horse may simply represent an accident of history borrowed from neighboring constellations such as Aquarius or Pegasus.

TRIANGULUM is perhaps the most boring of the Greek constellations. To some it may represent either the Nile Delta or the island of Sicily, but it is usually interpreted as prominent triangle that somehow escaped notice of classical storytellers. However, given the abstract quality of the night sky, modern city dwellers may wonder that more constellations don't have similarly uninspiring geometric designations. In fact, most amateur Western stargazers are familiar with a handful of important informal geometric figures including the Great Square (Pegasus), the Summer Triangle (Vega, Deneb, and Altair, the bright stars in Lyra, Cygnus, and Aquila respectively), the keystones of Hercules and Cancer, and numerous pointer stars.

#### THE MODERN EUROPEANS

The West's view of the constellations was little changed from that of Ptolemy until the 1500's, when the increased prominence of astronomy, science, printing, and navigation led to rapid change. Continental printers were doing a brisk trade in world maps, each seller trying to out-do the others by including the latest observations obtained from the navigators themselves or purloined from the secret military archives of neighboring states. Maps of the heavens were also in demand, and printers again vied to obtain accurate scientific observations and information about the far southern skies. As happened with terrestrial maps, place names favored by the most

popular atlas printers were accepted into common usage.

Petrus Plancius (1552–1622) was a minister in the Dutch Reformed Church who, fleeing religious persecution in Flanders, moved to Amsterdam and tried his hand in printing, politics, and the young Dutch East India Company. His maps used information from Dutch traders and explorers, as well as charts from the Portuguese. On his own celestial globe, Plancius conjured up the constellations CAMELOPARDUS (the giraffe) and MONOCEROS (the unicorn), both dim northern constellations in previously blank parts of the sky. Plancius' globe also included Columba the dove, mentioned earlier in connection with Jason and the Argo Navis, as well as TRIANGULUM AUSTRALIS and CRUX, the latter the cross already well-known to European navigators of the southern seas.

Plancius had a strong interest in expanding Dutch trading links to Asia, and many of his charts pertained to efforts to explore a Northeast passage through the Arctic north of Siberia. At the same time, Plancius was involved in early voyages around the Cape of Good Hope, the longer route to the East. When the first such expedition, led by the *Hollandia*, set sail for the Indian Ocean in 1595, Plancius charged its pilot with making a catalogue of southern stars. The pilot, Pietr Dirksz Keyser, made observations from Madagascar and Sumatra in what is now Indonesia, but he died during the voyage on the island of Java. His work was ultimately compiled by Frederik de Houtman, the chief of the expedition, and included on globes made by Plancius and Hondius.

Frederik de Houtman, destined to become one of the great Dutch navigators, sought to complete Keyser's observations on his second voyage to the East Indies in 1598-99. On this journey he not only added stars to Keyser's list but improved on some of the data from the earlier catalogue. But the expedition ran into trouble with the sultan of Aceh, where Frederik's brother Cornelis was killed and Frederik himself imprisoned. During his stay he improved still further on Europe's

knowledge of the world by drafting a Malay-Dutch dictionary. Freed from prison, de Houtman returned home, where he ultimately published the first catalogue of southern stars as an appendix to the dictionary, the *Spraeck ende Woord-boeck*. De Houtman would continue his journeys to the East, and ultimately he became the first to chart portions of the western coast of Australia near what is now Perth.

Although Keyser and de Houtman are usually given credit for many of the constellations that arose from their work, the actual formation of the constellations is attributed to Plancius. These are CHAMAELEON, DORADO (the golden fish), GRUS (the crane), MUSCA (the fly or bee), HYDRUS (a female pair for the northern Hydra), TUCANA (the toucan), VOLANS (the flying fish) and PAVO (the peacock). Plancius also may have borrowed three other constellations—PHOENIX, INDUS (the American Indian of Tiera del Fuego) and APUS (the bird of paradise)—from Chinese ideas about the firebird, the Persian, and the wonderbird. The Plancius constellations received wide currency after they were included in Johannes Bayer's *Uranometria* in 1603.

The next new constellation to enter the lexicon came from the legendary astronomer Tycho Brahe (1546–1601), whose early-1600's catalogue included the constellation COMA BERENICES, which had formerly been associated with neighboring Leo or Virgo. Brahe's constellation derives from a story about Queen Berenice II, wife of Ptolemy III Euergenes of Egypt in around 250 BCE. Egypt at that time was deeply embedded in Greek culture, the Ptolemaic dynasty itself a product of Alexander's conquest nearly a century earlier. According to a story of that day, Berenice cut off her golden hair as an offering at the Temple of Aphrodite at Zephyrium during her husband's campaign in Syria. The locks then disappeared from the temple, leaving the queen disconsolate over their loss. Conon of Samos, the court astronomer, diplomatically suggested that the locks had found a new home among the stars. Conon may have himself derived the idea from earlier thinking about the Coma

asterism, and in any case other nearby cultures had thought of the cluster as hair on Leo or shafts of wheat dangling from Virgo. The legend of the queen came down to Brahe through the poems of Catullus of Rome, whose writings borrowed from the earlier Greek Callimachus. Though Coma's origins may seem obscure, the popularity of Greco-Roman poetry in general largely explains the longevity of Greek legends in constellation lore.

Not satisfied with the accuracy of earlier charts of the stars, Johannes Hevelius (1611–1687) set about making his own stellar atlas in the late 1600's from his home base in Danzig, Poland. Using huge quadrants and sextants, he made what is perhaps the most accurate star catalogue attributed to naked-eye observation. His innovations generally covered dim areas of the sky previously associated with neighboring constellations. The Hevelius constellations are LYNX, LEO MINOR (the little lion), VULPECULA (originally *Vulpecula cum Anser*, the fox with the goose), SEXTANS (Urania's sextant), LACERTA (the lizard), and SCUTUM (the shield). Of these, Scutum is the best known, since it lies in the bright part of the Milky Way known as the Scutum Cloud. Hevelius invented the constellation to honor his patron, Polish King Jan III Sobieski, celebrated throughout Europe for his role in repelling the Turks from the gates of Vienna in 1683.

By the 1700's astronomers were increasingly relying on telescopes and other instruments for their work. Indeed, the 1700's were an era of scientific gadgetry in which enterprising scholar-craftsmen pushed out the boundaries of knowledge by any means available. Many scientists were no doubt just as enthusiastic about their instruments as about the fruits of their new scientific methods. This enthusiasm must serve as an explanation for the plethora of scientific devices that populate the southern skies, at least as far as modern designations are concerned. Many of these constellations are the work of one intrepid astronomer, Abbe Nicolas Louis de La Caille.

La Caille (1713–62) can be regarded as the Hevelius of the southern hemisphere, the man

who completed the earlier surveys by Keyser and de Houtman and the first person to systematically observe the whole sky. During 11 frenetic months of observation in Cape Town (1750–1754), La Caille charted over 10,000 stars with a half-inch telescope. The names of his constellations leave little doubt as to what dominated his thoughts:

ANTLIA (the air pump),  
CAELUM (the engraver's tool),  
CIRCINUS (the geometer's compass),  
FORNAX (after Lavoisier's chemical furnace),  
HOROLOGIUM (the clock),  
MICROSCOPIUM (the microscope),  
NORMA (the carpenter's square),  
OCTANS (Hadley's octant),  
PICTOR (the easel),  
RETICULUM (the telescope reticule, used for centering stars),  
SCULPTOR (the Sculptor), and  
TELESCOPIUM (the telescope).

In addition, La Caille honored Table Mountain with the constellation MENSA, a constellation perpetually enshrouded in the Large Magellanic Cloud just as Table Mountain is so often wreathed in clouds.

Not content with having invented 13 new constellations, mainly named for tools and instruments, La Caille also saw fit to break up the expansive classical constellation Argo Navis, in turn creating CARINA (the keel), VELA (the sail), PUPPIS (the poop deck), and PYXIS (the ship's compass house).

#### BEYOND THE OFFICIAL SYSTEM

In this enlightened era, few will argue that the official constellations as endorsed by international astronomical associations constitute the last word on the outlines of the heavenly storybook. No campfire sage would consider his or her narrative tour of the celestial sphere complete without at least a passing comment on African, Australian, Asian, or American star legends. Many of these stories

are quite beautiful and seemingly more evocative of their home cultures than the Greek legends. I must apologize for not doing them better justice here, and for borrowing so much from sources I cannot verify. These two faults are due to my own relative ignorance of the topic.

#### AMERICANS: NAVAJO, PAWNEE

Perhaps no American culture's stories are more well-known than those of the Dinee. Many American schoolchildren are familiar with the story of Coyote, the constant mischief-maker of the Southwest who contributed to the making of the heavens by flinging a buckskin blanket full of shiny quartz into the sky—the Milky Way—much to the consternation of the People. The chaos sewn by Coyote also explains why so many star groupings appear random.

According to the story of the construction of the heavens, the first work was Náhookos (Ursa Major), the Cold Man of the North, and his wife, Nahookás Ba'áád (Cassiopeia). These two bring constellations perpetually revolve around the pole star, their home fire.

The Pleiades are viewed as the Navajo Flint Boys, who jumped up onto Black God, the ruler of the night sky, when he stamped his foot. The are sometimes portrayed on Black God's face. The tail of Scorpius, which resembles a figure of the letter  $\gamma$ , was seen as rabbit tracks that stand upright in early summer, as a sign for hunting to begin.

Similarly, the Skidi Pawnee of the Kansas prairie saw the tail of Scorpius as swimming ducks whose appearances heralded spring. According to Von del Chamerlain, the Pawnee agreed with the Greeks in seeing a great bear in the bowl of the Big Dipper, followed by three hunters, the dipper's handle.

## CHINA AND JAPAN

Millions of Westerners are familiar with the Chinese zodiac through placemats at Chinese restaurants. Unlike the Western zodiac, however, these twelve animals are not constellations, but years. This cycle arose from careful observation of the motion of Jupiter, which takes twelve earth years to mark a complete circuit of the sun. Instead of focusing on the ecliptic, the apparent path of the sun and planets through the sky, the Chinese divided up the sky into equal-sized slices or stations. Originally there were only four stations, one per season: Azure dragon (spring, stretching from the Greek Virgo to Sagittarius), Genbu or black tortoise (winter, Sagittarius to Pegasus), white tiger (fall, Andromeda to Orion), and red bird (summer, Gemini to south of Leo). The Chinese houses were associated with stars visible in the evening sky, unlike the Western zodiac, which derives its dates associations from the location of the sun. Within these four season-houses were seven subsidiary divisions, making for 28 total divisions of the sky, a compromise between the 27-day lunar month and the 29-day cycle of lunar phases. This system is handed down at least from the period of the Warring States (480–222 BCE).

Perhaps the best known Chinese constellation lore has to do with the stars of the polar region, in the Greek Ursa Minor, Ursa Major, and Draco. These stars were all associated with the emperor, his staff and the imperial household. The pole star, about which the sky appears to revolve, was the emperor himself, the bright star on the lip of the Little Dipper his chief minister. His queen (cup bottom), imperial guards (the handle), and prince rounded out Ursa Minor. Nearby Draco's stars represented the emperor's daughters, their tutor, various ministers, and the throne and house of the emperor. The stars of the Big Dipper were seen as the emperor's own tutor, his chief guard, and his advisers.

The Japanese adopted a similar 28-station zodiac grouped into four seasonal houses. One particularly well-known celestial tale from Japan involves the oxman and the maiden. As so often happened in ancient times, the oxman noticed the maiden doing her clothes along a stream and, seeing her own garments drying on a tree, he plucked them up and refused to give them back until she danced for him. She is seen as the brilliant white star Vega, which is high in the summer sky, while he is Altair, the yellowish star to the south.

## HINDU NAKSHATRAS

Like the Chinese, the ancient people of India sought to divide up the sky into lunar houses corresponding with the days of a lunar month, either 27 or 28. The Vedas speak of astronomical events such as equinoxes and planetary positions, and from these modern historians have tried to determine the associations between the vedic houses, or *nakshatras*, and individual stars or asterisms. As with the Chinese zodiac and the modern Western list of 88 constellations, many of the Indian asterisms are dim and unspectacular since they were created to fill space rather than to illustrate stories. However, many *nakshatras* are associated with gods of Hindu mythology. Some of the more easily recognized groupings include: Gemini's Pollux, which is Punarvasu nakshatra, representing Aditi, the goddess of abundance; the Pleiades, which corresponds with Kritika nakshatra, representing Agni, the god of fire; and parts of Taurus, which form Rohini Nakshatra, the bride of Chandra, the lunar god.

## AFRICANS

Africa probably bears responsibility for more constellations than we know, since Greek and Egyptian culture and mythology were so closely related. The Greek constellations Eridanus and Triangulum are, as noted, associated with the Nile, and Coma Berenices represents the hair of a Greek-Egyptian queen. More importantly, all of the scientific instruments placed in the heavens by La Caille could be called African, since his work took place in South Africa. La Caille's constellation Mensa, or Table Mountain, is the only modern constellation whose origins can be definitively linked to a geographical place. Be that as it may, it is certainly a pity that La Caille didn't attempt to borrow from rich South African knowledge of the southern skies.

According to Dave Laney, several of the peoples of South Africa, including the Venda, Sotho, and Tswana, regarded the bright stars of the southern cross and Centaurus as a group of giraffes seen from the side, with the cross as the forequarters and the pointers at the neck. Orion and the Pleiades were also prominent constellations for the Southern African peoples, just as spring and summer stars held the most important to ancient North Americans and Europeans. To the Kiswahili, the appearance of the digging stars (the Pleiades) marked the beginning of the rains and the planting season. The Zulu viewed the digging stars as symbols of renewal, since their status as a cluster grows apparent gradually as they rise from the sun's morning glare in the spring. Similarly, the

KhoiKhoi viewed the Pleiades as carriers of rain and lightning.

## AUSTRALIANS

As elsewhere, the Australian peoples developed constellation associations patterned after animals and people found on earth, and imaged that there was a distinct Skyworld. Since ancient Australia, like other continents, was peopled with hundreds of different people of diverse languages and cultures, there was no doubt an equally immense variation in constellations. Pring Adele's brief survey of the different Australian interpretations of the southern cross (Crux) gives some idea of this variation: To some of the peoples of South Australia near Adelaide, the cross was a stingray, and the nearby pointing stars of Centaurus were sharks. To a storyteller in Arnhem Land in the north, the cross is a friendly crocodile and the pointers its night-bird companions. In Victoria, the Boorong people saw the cross as a possum who swivels in position throughout the night. And in the Torres Strait, the Tagai people see the cross as a left hand holding a fish spear, guiding fishing activities throughout the seasons.

One eastern Australian story tells of two brothers preparing two separate campfires to cook recently caught fish while two friends wait nearby. The brothers and their fires are the cross, their friends the pointers, and the fish the dark Coal Sack Nebula in Crux.

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