

# 2

## The Long Backbone of the Sky

The band of light that crosses the sky, commonly called the Milky Way, has stunned humans since the dawn of time. However, it would take the invention of the telescope before its true nature became apparent.

In 1610 Galileo Galilei (Fig. 2.1) first viewed this band of light through his telescope and discovered that, far from being a band of nebulous, milky-white material, it was in fact comprised of a vast number of individual stars so densely packed that they appeared nebulous to the naked eye. Modern estimates suggest that the number of stars in the Milky Way could be as high as 300 billion.

For the next 400 years, most scientists assumed that all the celestial bodies that we can see in the night sky existed within the Milky Way and that therefore the Milky Way was the full extent of the whole universe. However, by the 1920s a debate arose as to whether certain faint, fuzzy patches of light, known as ‘spiral nebulae,’ actually existed outside of the Milky Way (Fig. 2.2). This debate became so intense that it became known as the ‘Great Debate.’

The Great Debate was ultimately about the true scale of the universe. On one side of the debate was Harlow Shapley, who claimed that all nebulae existed within the Milky Way and that these ‘spiral nebulae’ were simply just one form of them. On the other side of the debate was Heber Curtis, who asserted that these ‘spiral nebulae’ were actually objects of the same form as the Milky Way but lying beyond its bounds. He inferred from this that these spiral nebulae were ‘island universes,’ of which the Milky Way was just one. The debate was only settled when, in 1923, Edwin Hubble photographed what was then known as the ‘Andromeda Nebula,’ using the 100-inch telescope on Mount Wilson, California, and discovered that it was in fact composed of stars. This mirrored the observations made by Galileo 400 years earlier when he discovered that the Milky Way was in fact not nebulous but composed of individual stars. Using measurements of a certain kind of star, known as Cepheid variables, Hubble was able to determine a distance to Andromeda that showed that it had to lie way beyond the Milky Way.

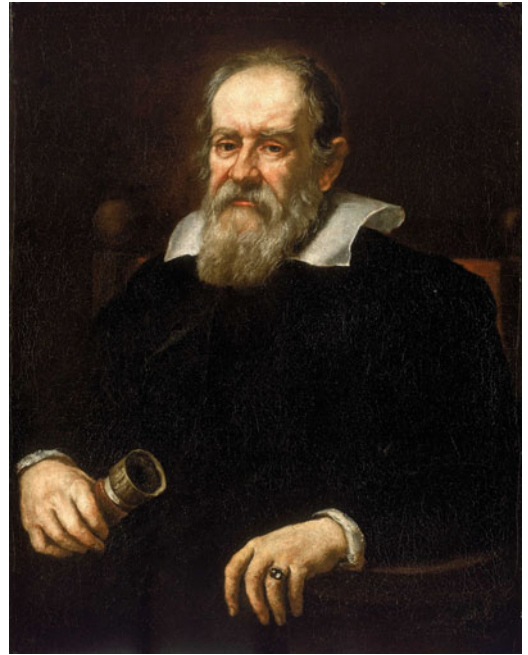
Due to the observations of Hubble the perceived universe grew in size, and it was accepted that the Milky Way was in fact just one island universe among many. The term ‘galaxy,’ which had until that time only referred to the Milky Way, was then extended to include all the spiral nebulae. The Andromeda Nebula therefore became known as the Andromeda Galaxy.

A galaxy can be defined as a large, gravitationally bound system of stars, interstellar dust and gas, nebulae, supernova remnants and dark matter. Likewise, galaxies themselves tend to exist in gravitationally bound clusters such as the one in Fig. 2.2. Galaxies come in many different shapes and sizes, some symmetrical and some highly irregular. In Fig. 2.3 we see an example of a beautiful regular galaxy, known as the Great Barred Spiral.

Sometimes galaxies collide and interact, as has happened with NGC 1531 in the constellation Fornax (Fig. 2.4) and NGC 2992 in the constellation Reticulum (Fig. 2.5).

Because the distances to astronomical objects are so immense, astronomers use a special unit to measure distance, known as the light year. Light travels through space at about 300,000 km a second. A light year is defined as the distance light travels in a year, and so a light year is approximately nine trillion km. So when

**Fig. 2.1** Portrait of Galileo Galilei, Justus Susterman, 1636. (Image courtesy of Wikimedia at [https://commons.wikimedia.org/wiki/File:Justus\\_Sustermans\\_-\\_Portrait\\_of\\_Galileo\\_Galilei,\\_1636.jpg](https://commons.wikimedia.org/wiki/File:Justus_Sustermans_-_Portrait_of_Galileo_Galilei,_1636.jpg))



**Fig. 2.2** The Pavo Galaxy cluster showing a variety of 'spiral nebulae.' (Image © Stephen Chadwick)



we say that Alpha Centauri, the nearest star system to the Sun, is about four light years away we mean that it is about 36 trillion km away.

There is another interesting angle to this statement. As it takes four Earth years for the light from Alpha Centauri to reach us we are actually seeing the star as it was four Earth years ago. Furthermore, the more distant an object is from us the further back in time we are looking. For example, the galaxy NGC 1365 (Fig. 2.3) is 56 million light years away from us, and so when we look at it we are actually seeing it as it appeared 56 million Earth years ago. The distance to the furthest galaxy discovered so far is just over 13 billion light years, and current estimates suggest that there are anywhere between 100 and 200 billion galaxies in the universe. It is important, therefore, to realize that the light year is a unit of distance not time.

**Fig. 2.3** The Great Barred Spiral Galaxy. (Image © Stephen Chadwick)



**Fig. 2.4** NGC 1531. (Image © Stephen Chadwick)



**Fig. 2.5** NGC 2992.  
(Image © Stephen Chadwick)



**Fig. 2.6** The Southern Pinwheel Galaxy. (Image © Stephen Chadwick)



## Milky Way

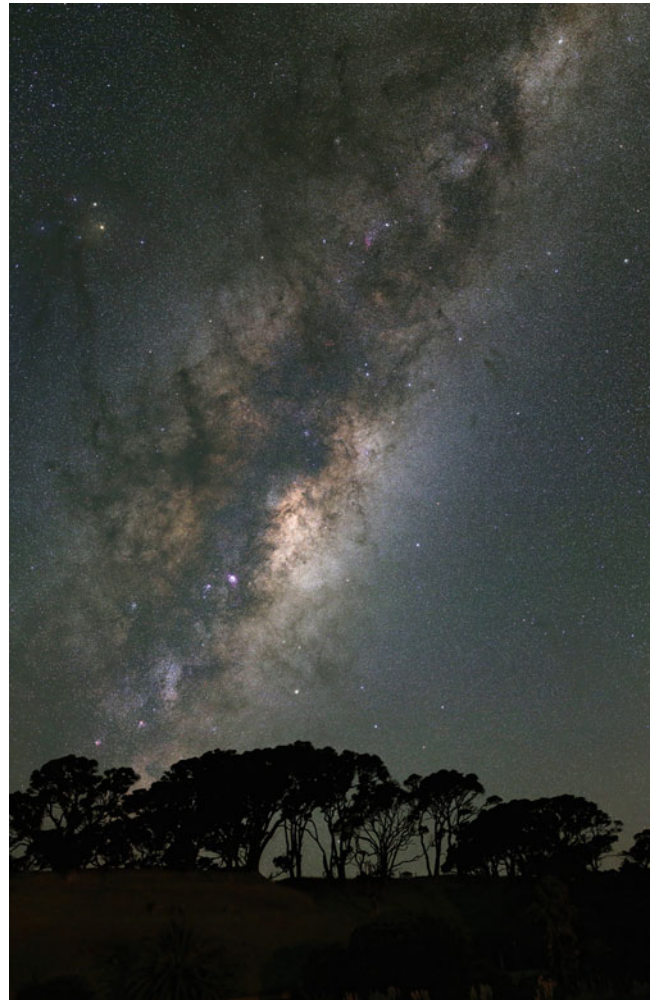
The Milky Way is a spiral galaxy, with a diameter of about 100,000 light years, although we cannot actually see its spiral shape because Earth is within it, some 26,000 light years away from its center. However, a nearby galaxy in the constellation Hydra, known as the Southern Pinwheel Galaxy, has a similar form to the Milky Way and is orientated face-on to us. This, therefore, gives us an idea of what the Milky Way would look like from a similar perspective (Fig. 2.6).

All the stars we see from Earth are actually in the Milky Way Galaxy, but from a dark sky in the Southern Hemisphere we see the central plane of the galaxy arch across the sky, and it is this band of light that is commonly known as the Milky Way. This band of light appears wider as we gaze towards the center of the galaxy, which is in the constellations of Scorpius and Sagittarius, as is obvious from Fig. 2.7.



**Fig. 2.7** The galactic bulge of the Milky Way. (Image © Stephen Chadwick)

**Fig. 2.8** The rising southern Milky Way as seen from the South Pacific. (Image © Jonathan Green. Used with permission)



Although a part of the plane of the Milky Way can be seen from all parts of the world, what makes the Southern Hemisphere so special to sky watchers is that the galactic bulge passes directly overhead during the winter months, affording us a spectacular view of the most interesting and rich part of the whole galaxy. In the Northern Hemisphere it only skirts the horizon and therefore limits observations. It is no surprise, then, that the Milky Way should be so prevalent in the star lore of the South Pacific. In Fig. 2.8 we see a very typical view of the Milky Way as it rises in autumn and winter from the perspective of the South Pacific, and the central bulge of the galaxy is extremely prominent.

The true center of the Milky Way cannot be seen with optical instruments because there is too much dust and gas obscuring the view. However, using radio waves and X-rays, astronomers have peered through this opaque material and discovered that at the center of the galaxy lies an intense radio source known as Sagittarius A\*, which is a black hole with a mass approximately 2.6 million times that of the Sun.

The Milky Way is not stationary but is, in fact, moving at 600 km per second through space, while simultaneously rotating. The time it takes the Sun to complete one revolution of the Milky Way is known as the cosmic year, which is 225 million Earth years. What is fascinating is that the Milky Way does not appear to rotate in accordance with Isaac Newton's universal law of gravitation. According to this law, the further a star is from the galactic center the slower it should orbit. However, measurements have shown that, contrary to this, stars actually orbit the galactic center faster the further out they are. To account for this fact it has been posited that there is a halo of mass surrounding the galaxy having a gravitational effect. This is known as 'dark matter,' the true nature of which is one of the central puzzles facing astronomers today.

## Star Lore of the Milky Way

On a clear southern night, especially in the summer and winter months, the Milky Way is the most dominant feature in the sky. It appears as a long and imposing hazy band of light that turns as the night hours pass. The name comes to us via the classical languages of western antiquity. The ancient Greeks knew this celestial feature as 'the milky circle,' from which the Romans derived the Latin phrase *Via Lactea*, literally the road or way of milk. In fact, the Greek term for milk, *gala*, not only informed the Latin phrase for this amassing of stars, but also the word *galaxy* is derived from it. Given the radiance of the Milky Way in the Southern Hemisphere, it is not surprising that the peoples under the southern sky had a vast array of different names for this celestial wonder. One common theme connects the appearance of the Milky Way with that of water creatures.

## The Milky Way as a Water Creature

The Māori name Te Ikaroa, 'the long fish,' is but one of several names given to the Milky Way, many of which are variants on this fishy theme. Some of these are merely extensions of the above, adding *o te rangi*, 'of the sky,' specifying the celestial location of the fish. Others identify its owners or creators as Te ika a Maui and Te Ika Matua a Tangaroa, which mean the great fish of Tangaroa. Both owners are fitting, as Tangaroa in Māori religion is associated with the sea and is the ancestor to fish, while in the narratives of origin from across the Pacific both Tangaroa and Maui are responsible for fishing up islands.

Other Māori names identify the type of fish in the sky, namely *mango* (the shark) with epithets describing its *roa* (size or length), *matua* (age or importance), or again *o te rangi* (celestial location). Similar names are found across the Polynesian Pacific, though in some cases the fish reference is replaced by a lizard. From Mangaia in the Cook Islands, we hear Te Moko-roa-i-ata, 'the great lizard of dawn,' and from the Marquesas in the eastern Pacific, Vaero o Te Moko, the 'tail of the lizard.'<sup>1</sup> This should not be surprising, given that Polynesians see a likeness between lizards and fish, due to their similarly sinuous bodies and scaly skins. In Māori thought, they share an ancestor.

On Easter Island there is tantalizing evidence that the Milky Way also had connections to aquatic animals. The term *ngo'e* is used for it, and it is said that this is a mythical sea creature or fish.<sup>2</sup> However, no narrative account is available (if indeed one ever existed) to provide details about this *ngo'e*. All that seems to be recorded on the matter was that Ngo'e was fond of human flesh, and that he was lifted into the sky.<sup>3</sup> A more prosaic explanation might link this to a word meaning 'mist.'

<sup>1</sup> Maud Worcester Makemson, *The Morning Star Rises: An Account of Polynesian Astronomy*, p. 185.

<sup>2</sup> E. R. Edwards and J.A. Belmonte, *Megalithic astronomy of Easter Island: A reassessment*, p. 425.

<sup>3</sup> Thomas Barthel, 'Zur Sternkunde der Osterinsulaner', pp. 1–3.

In Australia, too, the Milky Way is often connected to watery animals. These beings are crucial to many Aboriginal cultural themes, weaving together a period of creation—of geographic forms such as hills and rocks—as well as the stars and Moon, of life forms such as the human and animal inhabitants of those created spaces, and of cultural forms such as laws governing marriage and initiation rites. These inseparable ideas are linked to the notion of the Dreamtime or the Dreaming.

Although the words and expressions that capture this idea differ across the continent, they appear to have a common understanding of this time as both past and present. It is a timeless time, which has been poetically called ‘everywhen.’ Acts of creation were performed in the Dreaming by different Dreamtime creatures or heroes. This complex concept shall be discussed in more detail in Chap. 8. Across the continent a being referred to by outsiders as the Rainbow Serpent has played a significant role in many indigenous Australian cultures as a Dreamtime creator being. Taking on many forms and many names, sometimes he or she, or in some cases both he and she, Rainbow Serpents are responsible for the shaping of the land. Elsewhere, they take on the form of large snakes living in deep waterholes, which must be approached carefully so as to avoid disturbing them. In other places, the Rainbow Serpent has no role in the Dreamtime creation narratives but is nevertheless a terrifying animal. The Wiradjuri, a large cultural group of central New South Wales, knew the Rainbow Serpent as Wawi, who lived along the banks of the Darling River. His celestial counterpart is the dark streak in the Milky Way near the Southern Cross.

The Karadjeri people in western Australia occupy the Roebuck Bay district around Broome. As with other Aboriginal groups the Karadjeri make a distinction between public knowledge and knowledge for the initiated. Following are two well-known tales featuring the Water Serpent. In the first story the stars referred to are relatively close to the Milky Way, and there are many references to water. In the second we can see an ambivalent relationship between the humans and the Water Serpent. They are not afraid to joke about this being, despite being terrified of it.

## Two Birds and a Water Serpent

Once two robins were chasing an unusual black and white striped snake, but as they chased the creature it transformed into something bigger and longer and altogether more delicious, namely a Water Serpent. Despite their small size, the two robins chased and at last killed the creature. But when they came to roast it, water came out of the serpent’s body and drowned the birds. Looking up at the night sky we can see the two hunters and their prey in the bright stars forming the head of Scorpius. A semi-circle of stars at the tail of Scorpius represents the hearth upon which the Water Serpent was killed and the robins attempt to roast him. Backtracking through the story, the stars of the constellations Grus and Pavo are an ants’ nest through which the robins chased the snake, while the dimmer stars are the footprints of the two birds.<sup>4</sup>

## The Two Women and the Water Serpent

Once there were two women named Wolabung and Yerinyeri, the latter of which translates in today’s language as ‘a player of practical jokes. The two would go out and collect food together, and Wolabung’s favorite stunt was to call out to Yerinyeri to watch out as a snake was near her foot. Yerinyeri never failed to jump, and Wolabung never failed to laugh. For Yerinyeri, though, revenge would be sweet. One day she found a dead Water Serpent and threw it in a waterhole, knowing that the water had the power to revive the serpent. When Wolabung came upon the scene she got a huge fright as the serpent bore down on her. In the sky, the two brightest stars, Sirius and Canopus, represent the two women, while the stars between them, along the Milky Way, form the long sinuous body of the Water Serpent.<sup>5</sup>

<sup>4</sup> Charles P. Mountford, “The rainbow-serpent myths of Australia,” p. 59.

<sup>5</sup> Ralph Piddington, “The Water-Serpent in Karadjeri Mythology,” pp. 353.

In one origin narrative from Kiribati in Micronesia, the octopus that is said to hold together Earth and sky is replaced with another marine creature. This time it is an eel that must be killed in order to sever the heavens from Earth.

## The Milky Way as a Cosmic Eel

In the beginning there was but one being, Nareau. How he began, and who his ancestors were, nobody knows. He lived in darkness, in an enclosed space, as heaven clung to Earth's face, leaving no room for movement and no room for light. Nareau could only crawl on his hands and knees to find an opening in the world, an opening for light. Crawling north and south, tapping his stick against the solid wall of darkness, he finally found a hole. He went down into the hole and was under the rock of heaven. Here he made the things of this world—he made water and land and caused them to be a couple. Their boy child was Na Atibu, 'Rock,' and their girl was Nei Teakea, 'Void.' They in turn bore six children. The oldest was called Na Ikawai, and was followed by Nei Marena ('the space between'), Te Nau ('the wave'), Na Kika ('the octopus') and Na Riiki ('the eel'). The lastborn was named after his grandfather, Nareau.

Seeing that he had plenty of descendants, Nareau senior said to Atibu, 'This is your world,' after which he departed, never to be seen again. So Nareau the younger took up the work that still needed to be done. Beings were multiplying, trapped between Earth and the rock of heaven, and to Nareau there seemed to be something wrong with them. They were either blind or deaf and mute, as they had not been given senses. He called out their names and they sat up. As they sat up the roots of the rock of heaven stretched. Nareau the younger opened their ears, eyes, and mouths, and then they would respond when he called to them.

Seeing the roots of the rock of heaven, Nareau the younger rocked from side to side, stretching them further, and then in all directions he cut them. He went to his father and asked him what to do with the rock of heaven. Atibu merely redirected him to his brothers, telling him, "Together you can work it out." So Nareau called his brothers and directed them to lift the stone of heaven off Earth to make room for all the living things to come. "Na Kika, wrap your strong arms around the rock! Te Nau, wash the rock from underneath, and you, Na Riiki, lift the rock of heaven on to your snout!" The brothers heaved and gripped the rock and washed away its base. "Higher, Na Kika! Lift that rock higher on your eel's snout." Riiki raised the heaven higher and higher until he had left his brothers behind. Nareau, at the last moment, cut off the eel's legs and they fell to Earth as eels, and this is why no eel to this day has legs.

Riiki's body was left high in the sky as the Milky Way. The task of raising heaven complete, Nareau the younger returned to his father and killed him. Plucking his eyes out and singing, he cast his father's left eye into the sky to become the Sun, and the right eye hung in the sky as the Moon. He then violently smashed his father's skull, and Atibu's brain matter became the stars (Fig. 2.9).<sup>6</sup>

Other sky-raisers are also remembered in the Milky Way. Luanggia or Ontong Java is a very large atoll within the Solomon Islands. Although in Melanesia, it is home to a Polynesian people who arrived from the east after the settlement of Polynesia. They, too, remember a sky lifter, whom they date to a time before their atoll existed. For them the creator being required the help of a giant and a sea monster, perhaps akin to Riiki the eel in the account from Micronesian Kiribati.

## The Giant in the Sky

Long ago on a lonely island, even before Ontong Java atoll was created, people lived with the sky pressing down very close to Earth. They moved about on their hands and knees in perpetual night. Three brothers were tired of living in this dark state and attempted to lift the sky to make life a little easier. The oldest pushed it as hard as he could and managed to raise the dome of the sky so that it was comfortable enough for them to be in

<sup>6</sup> Harry C. Maude and Honor E. Maude, *An Anthology of Gilbertese Oral Tradition*, pp. 34–37.



Fig. 2.9 The Milky Way as a cosmic eel arches across the sky. (Image © Jonathan Green. Used with permission)

a sitting position. The second brother had more success in raising it as high as the coconut palms. But, still, life could be easier. Seeking the help of a Water Serpent, perhaps an eel or a sea snake, the second managed to bore a hole in the sky large enough for him to crawl through. There on the other side lay a sleeping giant. He called to his younger brother to climb through the hole, and together with sharpened sticks they gouged out the giant's eyes. Arching his back in pain, the giant sat up and threw back his head and howled, pushing the sky behind him upwards. Still groaning, he threw his arms out wide, stretching the sides of heaven, and at the same time kicking out with his feet, stretching the sky in all directions. The brothers then placed the giant's eyes in the heavens, creating the Sun and Moon. The giant, Ke Ngiva, is remembered as the Milky Way.<sup>7</sup>

### The Milky Way as a Pathway

The Milky Way may also, as the classical name suggests, be seen as a path or road. In the Polynesian language of Lau, the name for the galaxy, *Tala*, means 'path' and captures this idea directly.<sup>8</sup> The purposes for following the road of the stars might be varied and dependent on who or what is doing the traveling. To the Euhlayli of northern New South Wales the Milky Way is a dried up riverbed, or *warrambool*, in which spirits of the dead camp out as they travel across the sky. The stars are their campfires over which they cook mussels, and the haze of the galaxy is their smoke. The dead are making their way to the sky world of the dead, which lies behind the Milky Way.<sup>9</sup> For some Christian Aboriginals, the notion of a land of the dead in the stars is not inconsistent with Church doctrine. This is evidenced by a statement made by a Yaruga man, who was at one time a priest, commenting on the body and soul of the deceased: "You know that a person's body is there, but their spirit has already gone back to their country somewhere, or up into the sky in the part of the Milky Way."<sup>10</sup>

Many of the descendants of the original migrants to the Pacific have creation narratives that suggest an origin elsewhere. For most Polynesian societies, that place of origin is cognate to the form Havaiki. In Micronesia, a place under a different sky might be named as a homeland. For some of these cultures, the Milky Way is the path followed by ancestors and/or supernatural beings on their journeys and migrations.

<sup>7</sup> Ian H. Hogbin, *The island of Menstruating Men*, p. 211.

<sup>8</sup> Meredith Osmond, "Navigation and the heavens," p. 179.

<sup>9</sup> Katy Langloh Parker, *The Euhlayli Tribe: A Study of Aboriginal Life in Australia*, pp. 71–72.

<sup>10</sup> Patrick Dodson et al. "Leaving culture at the door: Aboriginal perspectives on Christian belief and practice," p. 259.

## How People Came to Chuuk in the Caroline Islands and How They Got Breadfruit

This story tells of the migration into Micronesia of peoples who possibly originated in Melanesia to the south. More importantly it tells of how breadfruit, the staple diet of the Caroline Islands, came to grow there. Breadfruit is a tall, handsome tree that produces abundant crops (Fig. 2.10). Its large globular fruit, covered in a thick skin, is a starchy food that can be cooked in many ways, including boiled, fried or mashed. It can even be buried in pits where it ferments, making a long-lasting food source in times of drought or when cyclones have destroyed other crops. The wood, too, is of great value, as it is light and strong and not susceptible to termites. Across the regions of the Pacific in which it is available, its wood is used for building houses and seagoing vessels.

Long ago people arrived on the Island of Pulusuk. They had traveled from far in the south on their outrigger canoes, which have a main hull as well as a second long ‘float’ the length of the boat attached by beams or poles to provide stability. Much to their chagrin, the new island was low and sandy, with not much in the way of water or food. There was little hope that they could survive there. However, their leader, known as Lord Breadfruit, or Sowumey, had a plan. He ordered the people to bring the outrigger floats from their canoes that happened to be made from the wood of the breadfruit tree, which was plentiful in their island homes. He planted the floats in the ground, as if they were trees, and began a ritual summoning of the spirit or essence of this breadfruit from the south. The breadfruit essence heeded the call of Sowumey and traveled north through the upper realms, following the bright path of stars of the Milky Way. And indeed, the *taam*, the outrigger floats, were transformed into trees, taking root and flourishing there on Pulusuk. To this day, the path of stars that stretches across the sky is called Anenimey, ‘the path of breadfruit.’

Sometime later the people of Pulusuk moved on to Chuuk Lagoon, where there were higher volcanic islands and better soil. But still there were no breadfruit trees there. The one who had summoned the breadfruit performed the same actions of Lord Breadfruit on Pulusuk. He planted breadfruit outrigger floats in the ground and performed the rites that coaxed the essence of breadfruit to follow the Milky Way and inhabit them, and flourish as trees.

Lord Breadfruit’s summoning rites are still performed each year to ensure an abundance of this staple crop. Although each Chuukese community has at least one breadfruit summoner specialist, the rites are complex and last several months, requiring the involvement of the entire community. It begins in the month of *séeta*, when the star named Alpha Equulei is visible in the eastern sky before dawn. The ceremonies involve the calling of the

**Fig. 2.10** Breadfruit.  
(Image © Hans Hillewaert.  
Used with permission)



breadfruit, which takes place in the meeting house belonging to the summoner's people. In some areas a canoe is buried in front of it, or as Lord Breadfruit did, an outrigger float.

The men of the community, who at this time respect food taboos and abstain from sex, assemble in the meeting house for the calling ritual and perform a seated dance each night for a week. Small model canoes with taro leaf sails are made and raced, perhaps enacting the migration from the south, although it is expected that the breadfruit summoner's own canoe will win. The racing may be repeated for up to two months while women prepare special clothes to be worn by the summoners and the canoe racers. When the breadfruit trees begin to bud, the summoner sprinkles them with medicine made from leaves and flowers. He repeats these actions for a month as the fruit begins to form.

During this time the breadfruit trees are taboo and cannot be touched, and men involved in the rituals all sleep in the summoner's meeting house. When the summoner feels the fruit are abundant, and the harvest secure, men are called to pick the first breadfruit while their wives fish to make a feast for the summoner and the men who had slept in the meeting house during the sprinkling ritual. The feast marks the lifting of all taboos and the opening of the breadfruit season. It is said by some that breadfruit also exist in the skies above this world, and the gods there must perform the summoning rites to ensure its continuance on that plane.<sup>11</sup>

## Morals, the Laws in the Sky, and the Milky Way of the Luritja and Arrernte

While the path of breadfruit joins two places together, one in the heavens and the other on Earth, we also find interpretations of the Milky Way as a river. In one such story the river divides the sky rather than connecting across it. In this case the notion of the Milky Way as a river plays an extremely important social role.

Arrernte, in the heart of central Australia, spreads from the Alice Springs area of Northern Territory into the vast west. This was once home to eight communities speaking closely related languages. Now only three of those languages are relatively strong, with over a thousand speakers each. They share the central Australian night sky with their neighbors to the south and west of Alice Springs. These people in the past were called the Luritja but now are often referred to as Pinup, or simply speakers of the Western Desert language. They must have come to the border of Arrernte lands from the country to the west in previous centuries, as the name Luritja derives from the Arrernte word for foreigner. Whenever this migration occurred its lore got woven into the night sky and the culture of its observers, as their views of what is happening above Earth are remarkably similar. The warp and weft of the weaving of the two cultural groups tightened further when members of both groups came to live on the Mission at Hermannsburg, some 130 km south of Alice Springs.

The German pastor, Carl Strehlow, came to live and work in Central Australia, heading the Lutheran mission to the indigenous people around Hermannsburg in 1894. During the 28 years he lived among the Luritja and the Western Arrernte, he raised his family and, along with his son, the linguist and anthropologist Ted Strehlow, collected detailed ethnographic accounts of their lives and lore.<sup>12</sup> Carl Strehlow gives the following account of their view of heaven.

The Milky Way, called Merawari, i.e., wide creek, or Tulkaba, i.e., winding creek, is lined with gum trees (itára), mulga trees (kurku) and other trees and shrubs. In their branches live parrots and pigeons, while kangaroos (mullu), emus (kalaia) and wildcats (kaninka) roam through Tukura's realm. While Tukura amuses himself in his hunting ground, his wife and son are out gathering edible roots called wapiti [...] and tasty bulbs, neri, as well as grass seeds that grow there in abundance.<sup>13</sup>

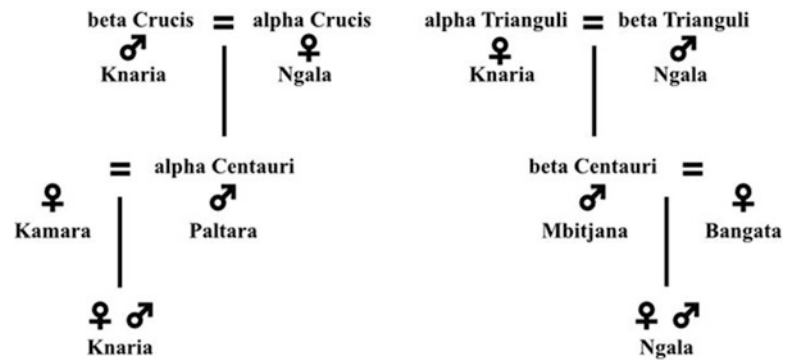
Elders also explained the following: the Milky Way, the creek known as Ulbaia or Merawari, divides the heavens in two. Along the banks of the creek, the many bright stars of the Milky Way are Luritja and Arrernte camps.

<sup>11</sup> Ward Goodenough, *Under Heaven's Brow: Pre-Christian Religious Tradition in Chuuk*, pp.192–202.

<sup>12</sup> Walter F. Veit, "Strehlow, Carl Friedrich Theodor (1871–1922)".

<sup>13</sup> Carl Strehlow, *Die Aranda und Luritja-stämme in Zentral-Australien*, pp. 1–2.

**Fig. 2.11** The marriage sections in the stars



Beyond the creek, the eastern half of the sky belongs to the Arrernte and, fitting with their origins, the Luritja sky lies to the west of Ulbaia creek. The stars, then, are not simply stars but belong to the respective cultures and therefore must abide by the strict marriage rules of central Australian societies. All Luritja and Arrernte people belong to a shared set of named moieties, or divisions of the population.

Moieties are sets of people who feel related to each other. It is a more complex idea than the notion of clan or tribe, as found in other parts of the world, as a moiety determines both a set of appropriate marriage partners and also the moiety membership of any children from such an alliance. This is where clan divisions are simpler, as depending on the matrilineal or patrilineal orientation of the culture a child will inherit clan membership from their mother or father, respectively. In a moiety system, however, the moiety that an individual belongs to is the result of the marriage of their parents, but it usually means they belong to a different named section than either of them. It also restricts them to a particular marriage class, never their own, to find a partner.

Let's take the example of the stars Alpha and Beta Crucis in the Southern Cross. Lying west of the Milky Way, they are naturally Luritja. These stars are husband and wife, and are of different moieties. Alpha Crucis, the woman, belongs to the Ngala moiety while her husband is a Knaria man. Their son, the star Alpha Centauri, is neither Ngala nor Knaria but is reckoned to be a member of the Paltara division, as appropriate for the child of this marriage. He is cousin to the other pointer, Beta Centauri, an Arrernte man, whose parents are the stars Alpha and Beta Trianguli. His parents belong to the same moieties as that of his cousin, but his mother is Knaria and his father is a Ngala man. This means he does not belong to Paltara, the moiety of Alpha Centauri. Instead, he is a member of a different division, named Mbitjana. The marriage restrictions mean that the Alpha Centauri must take a wife from the Kamara section, and his cousin, the Mbitjana man, will marry a Bangata section woman. Should Beta Centauri have children, then they will be of the Ngala section, the section of their grandfather. Likewise Alpha Centauri's children will belong to their grandfather's section, Knaria. Figure 2.11 shows this in schematic form.

Apart from constellations representing the spirits of Dreamtime beings, all other stars in the sky, regardless of whether they are named or not, are said to be either Arrernte stars or Luritja stars. The stars in the constellation of Musca, for example, are perceived as fires from a group of Arrernte camps, as are the various bright stars of Arrernte sky country, Archenar, Peacock, Alnair and Beta Gruis.<sup>14</sup>

The Milky Way, and the stars around it, stands as a reminder in the sky above of the social structure of the Arrernte and Luritja societies below. The marriage section system is strictly adhered to, and wrongful marriage arrangements or disallowed sexual contact are considered abhorrent. This profound observance of marriage class systems is a hallmark of many Aboriginal cultures.

The next story comes from the Daly river region in the Northern Territory of Australia and was recorded from speakers of Mulluk Mulluk, a language of Western Arnhem Land. It is unlikely that there are more than a handful of speakers of this language left. This Milky Way story of a father who has inappropriate relations with his daughter and is then punished for this transgression by his wife acts as a moral reminder to the listeners.

<sup>14</sup>Brian G. Maegraith, "The astronomy of the Aranda and Luritja tribes," pp. 19–21.

## The Milky Way as a Rope: PindakPindak and His Daughters

Once, a man called PindakPindak had a wife and two daughters. Every day the man would go fishing while his wives and daughters went out to gather food to accompany the catch. One time, when PindakPindak was fishing, the two girls arrived back at camp long before their mother. Seeing their father arriving home by canoe the younger sister called out, asking to join him. “No,” he responded, “send your sister here to pick up the fish I caught.” The older daughter did as she was asked while her little sister hid in the bushes and watched. But the father had something else in mind and had his way with the girl. This set the pattern for a couple of days until PindakPindak’s wife heard what was happening. It is not recorded how, but the younger daughter was the most likely source of her knowledge. And so she hatched a plan. When the girls returned to camp from digging out roots to eat, she began to collect grass to make into twine. On returning to camp, she hid it in a hole, stuffing the top of it with scraps of paperbark. When the rope was long enough she was ready.

One day PindakPindak announced he was going further off to catch fish. Waiting till he had disappeared around the bend of the river, his wife took her rope, some food and a Banyan tree for shade and bade the girls follow her. Together they climbed up into the sky.

When PindakPindak returned he called out to his daughter, fully expecting to continue his possession of her. But he heard nothing. He called to his younger daughter, who could not keep quiet. “I’m up here,” she cried. Astonished, PindakPindak called up to her, “What am I to do?” And here his wife stepped in. “Nothing,” she shouted down. “Go pick up your fish from the canoe. When you are done I will lower this rope and you too can climb into the sky.”

PindakPindak returned with his fish, grabbed the bottom of the rope, and started to climb. Just then the younger daughter understood everything, including why her mother had brought a mussel shell knife with her on the journey into the sky. Reaching for it, she knocked it out of her mother’s hands just as she tried to cut the rope. It fell clattering to Earth, but not before PindakPindak’s wife pulled a second smaller mussel shell out from where she had hidden it in her hair, behind her ear. Slicing the grass twine rope, they watched one end of it go slack as PindakPindak fell from the sky. As he fell, he let go of the rope his wife had made to punish him. It still hangs there in the night sky as a reminder of the consequences of inappropriate sexual connections. We know it as the Milky Way (Fig. 2.12).<sup>15</sup>

## The Dark Patches of the Milky Way

The Milky Way is often thought of as a hazy band of light against the dark sky, a notion echoed in many of the names given to it, including its classic name, which literally means ‘road of milk.’ However, if you look up at the Milky Way from a dark site, you will see that, once your eyes adjust, this object is far from being a uniform river of light. Rather, it is crisscrossed with inky-black dark lanes, rifts, and patches that break up this hazy band. It is actually the presence of these dark areas that make the Milky Way appear so interesting to the naked eye.

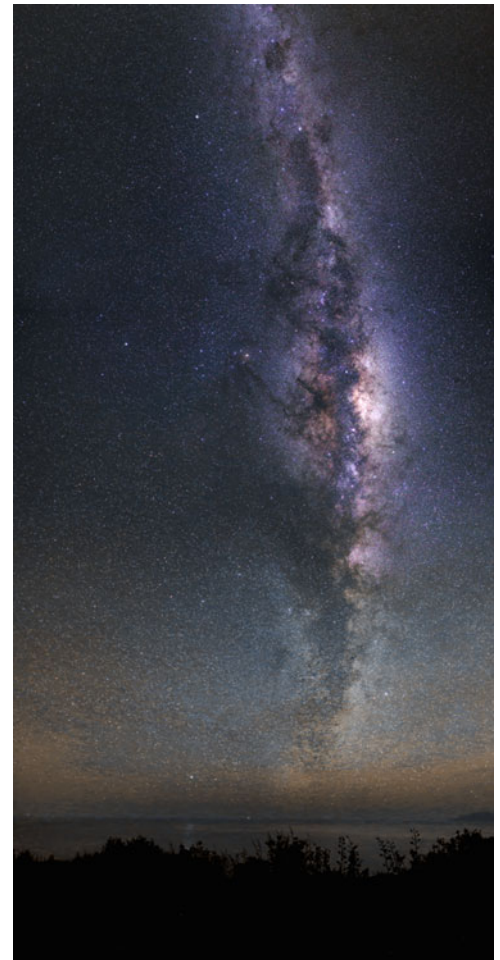
As is particularly obvious in Fig. 2.12, these dark areas appear to be devoid of stars. This is not, however, the case. Rather, these patches are areas of dark nebulae that consist of cold microscopic particles of dust in interstellar space 650 light years away. This dust scatters the light from stars that are actually behind it, making it appear—from our perspective on Earth—that there are no stars in these areas. However, if it were not for the presence of this dust these dark areas would not be there, and the Milky Way would appear as a consistent river of milk traversing the whole sky.

Dark nebulae are not unique to the Milky Way. They are found in any galaxy where cold dust and gas obscures our view. In Fig. 2.13 we see the Sombrero Galaxy, 28 million light years from Earth and a third the size of the Milky Way. The Sombrero shape is created because of the dark nebulae that run along the front of the disk.

One particularly prominent dark nebula in the Milky Way is adjacent to the Southern Cross. Known as the Coal Sack, it appears as a circular hole in the Milky Way and it can be seen right at the top of Fig. 2.12 and close

<sup>15</sup> Ronald M. Berndt and Catherine H. Berndt, “The eternal ones of the dream,” pp. 69–70.

**Fig. 2.12** The Milky Way as a rope to the sky.  
(Image © Jonathan Green.  
Used with permission)



**Fig. 2.13** The Sombrero Galaxy. (Image © Stephen  
Chadwick)



up in Fig. 3.14. The names given to this object in each language of the South Pacific reflect the star lore that is inspired by this strange hole. In Tonga it is called Humu, a giant triggerfish, while to some Aboriginal groups it represents an Emu (either the whole bird or only its head in giant form). To some Polynesians it is known as Te Paniwi a Taewa, a black fish.

The importance of these dark patches to the star lore of the South Pacific is evident in the way that many cultures see constellations and figures within these dark lanes, rather than by seeing patterns formed by the juxtaposition of stars (as is the case with the 88 IAU constellations).

## Two Greedy Boys

Earlier, in the story of PindakPindak, we saw how the women used the rope of stars to achieve safety from the father in the sky. However, in some stories, being in the Milky Way can actually act as a form of punishment. In a story from the Kamilaroi people of northern New South Wales we find two boys being enshrined in the sky as punishment for showing a lack of respect and care for their elders. In this story both stars and dark nebulae are important.

There once was a man with two wives, who were sisters. Together they had two sons. The sons were good hunters and spent all their time hunting the goannas and opossums away from the camp. They were very skillful, fast with the chase and accurate with the eye, so much so that every day they feasted out in the bush, cooking their kill and never thinking of bringing home food for their father and his wives. The father, ever hopeful, just waited for them to grow up and understand their responsibilities and spent his day making boomerangs. The boys never learned, however, and one day their father looked around and saw that he had four nets full of his handcrafts. He gave his sons one last chance. He called the boys to him and asked that they bring home some fat from the hunt so he could grease the boomerangs to make them fly more smoothly through the air. This they did, laying some goanna fat at his feet. The father was disappointed, hoping they might think to bring the meat with it.

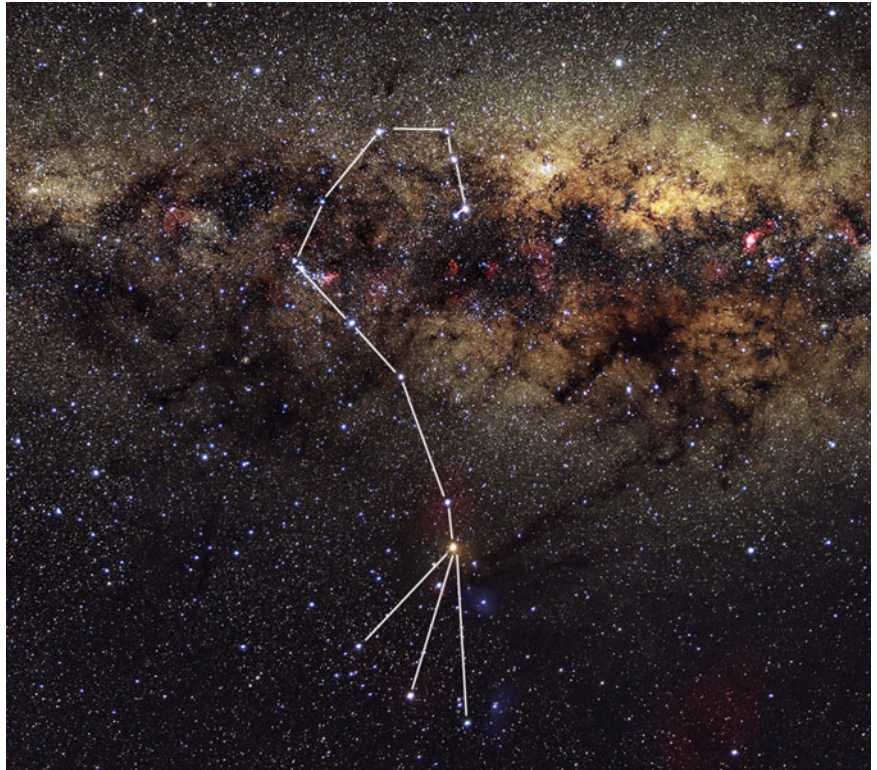
When he had finished greasing all the boomerangs he called his sons again. “Boys,” he said, “I am old and cannot test the flight of my weapons. Take them and try them. Tell me how they fly.” The boys dragged the hunting nets away from the camp and began to try the boomerangs and indeed they flew well. Each one of them flew through the air with speed and grace, but strangely not one fell to the ground at the end of the flight. Rather, they all flew up, disappearing into the air. When they had thrown every one of them, the brothers prepared to return home and consult their father about how the boomerangs might have vanished into the sky. As they turned towards the camp they saw a whirlwind heading straight for them.

Now it is believed by the Kamilaroi people that devils incarnate themselves in these roaring twisting winds—that is why some call them dust devils—and the boys headed for the trees to hide. But the devil caught up with them, and the winds began to rip the trees out of the ground. The boys raced to the next trees hoping they would be stronger, but the whipping winds ripped them apart like grass. The boys’ last chance was in the nubbo trees that they headed for, gripping tight to the trunks as the devil bore down on them. The winds howled around them as the nubbo trees were lifted clear out of the ground and thrown into the sky, where they remain to this day. The boomerangs are there, too. The many stars of the Milky Way are the work of that disappointed father who had disguised himself as a devil to punish his greedy sons.<sup>16</sup> Placed in the sky world, the two sons are called the Wurrawilberoo and are said to be dark spots in the constellation Scorpius (Fig. 2.14). Transformed in the sky into devils, they catch the spirits of the dead and even come to Earth in the form of a whirlwind, which is known in Australian English as a Willy Willy, most likely adopted and adapted from the Kamilaroi name (Fig. 2.15).

More recent ethnographic work on astronomy with these peoples of the northern New South Wales area has revealed that some of the star lore collected in the nineteenth century is still known among the Kamilaroi and other groups of the region. Much of what contemporary members of the community have to say about the night sky confirms or develops aspects of the older information. The Gamilaraay speak not of Wurrawilberoo (as their

<sup>16</sup>Katy Langloh Parker, *Australian legendary tales: Folklore of the Noongabburrahs as told to the Piccaninnies*, Chapter 10.

**Fig. 2.14** The dark nebulae in Scorpius.  
(Image © Stephen Chadwick)



**Fig. 2.15** A Willy Willy or dust devil. (Image courtesy of NASA)



neighbors, the Euahlayi, do) but of Wilbaarr, who is a singular dust devil and likewise resides in the dark nebulae in Scorpius. He is believed to be particularly interested in creating madness and in snatching up the souls of young men. In September, the windiest month and when Scorpius rides high in the night sky, the whirlwind devil is able to return to Earth. It is also the time young men set out to travel for ritual purposes, the wind making it a particularly perilous journey. Pregnant women and children are also in danger of the whirlwinds from the sky. Some say that Bayaami, who put them in the sky, cannot stop them from returning to Earth on occasion, but that he forcefully ensures their return to the dark holes in Scorpius.<sup>17</sup>

In the next story we see how important the dark lanes of the Milky Way are to the significant cultural practice of circumcision. Women in general did not participate in the rituals surrounding the circumcision of boys, and, in many cultures of both Australia and Melanesia, the price a woman might pay for witnessing the men's rites was death. However in a number of celestial narratives women did participate in the ritual in quite unexpected ways. Two stories from central Australia reveal a celestial element to the initiation stories of the Arrernte and Walpiri cultures.

### Arrernte Circumcision and the Dark Lanes in the Milky Way

Once there was a circumcision ceremony held by the Wallaby totem of the Arrernte people. It began in the usual way: the men gathered and beat time for the women's dance, while the two initiates lay on the ground with their faces turned down for the whole night of the dance. When the women removed themselves from the ceremonial place, the men showed the boys some of the secrets that only men should know. The next evening the women returned to dance and, once that was over, they were sent away so that the circumcision could be performed. After that the boys were given the *ngapatjinbi*, a ceremonial ornament to wear in their hair. The men ordered the boys to sit by the fire while they retired.

Two girls, who had been promised in marriage to the boys, had hidden in the bushes, curious to see the forbidden ceremony. When the old men left, the girls appeared and grabbed the boys. They put them on their shoulders and flew up into the skies, where they put the boys down on the Milky Way. The next day, the elders returned to discover the boys had disappeared. The boys remained in the stars with their wives, while their *ngapatjinbi*, the head ornaments, are where the women left them. They are the long dark streaks in the Milky Way.<sup>18</sup>

### The Walpiri Initiation

The first initiation in the Dreamtime came to Warlpiri from the neighboring Mudbara, creator beings that belonged to the star clan. One of the Dreamtime rituals included a re-enactment of a Mudbara creation that saw them hack the Milky Way to pieces, creating the other stars. They brought with them the sacred objects necessary for the circumcision rite, including the string head adornment of a type similar to the *ngapatjinbi*. However, they did not have the stone blades to complete the act and instead used fire, which is a very dangerous method of circumcision indeed. The ceremony took several days and had numerous components, including women's dances, but as elsewhere they were excluded from the men's secret rites. When the boy was burned there was, however, one woman watching. She was high above in the Milky Way and was presumed to be the boy's mother's father's sister, and in that role was looking out for the boy's well-being. However, after surviving until the end of the rites, the boy suddenly died, and the woman in the stars took her revenge. Using magic she killed the two circumcisers and they, the boy and the string cross joined her in the Milky Way in the same dark lanes where the Warlpiri ornaments stand, watching over all Warlpiri initiations ever since.<sup>19</sup>

<sup>17</sup> Robert S. Fuller et al., "The astronomy of the Kamilaroi and the Euahlayi peoples and their neighbours," p. 16.

<sup>18</sup> Carl Strehlow, *Mythen, sagen und märchen des Aranda—stammes in Zentral-Australie*, pp. 23–24.

<sup>19</sup> M. J. Meggitt, "Gadjari among the Warlpiri Aborigines of Central Australia", pp. 127–128.

## Summary

The Milky Way has many cultural associations. It is home to gods and creator beings, and is possibly the land of the dead. The streaks, the dark dust lanes around the Milky Way and the dark nebulae are not black empty parts of the sky to many Pacific peoples but are full of meaning. Their associations in Australia are with the law—in traditions such as circumcision and in the social structures such as the marriage moiety system. There is a curious parallel between Polynesia and Australia with respect to the Milky Way, for in many of the narratives about this great band of stars there is a water motif. For some Australians it is a river of stars, a creek, but for many others it is a water creature, a manifestation of the Rainbow Serpent. Out in the islands of Polynesia, the watery, starry sky is reflected in the names given to the Milky Way, which refer to fish and sharks.

In the next chapter we shall examine three particularly important astronomical objects that are significant both culturally and scientifically. Two of these are, like the Milky Way, naked eye galaxies that ride high in the southern sky, and are known as the Large and the Small Magellanic Clouds. The other is the Southern Cross, a constellation of stars that remains as important to many modern Southern Hemisphere cultures as it ever has been.

The Great Canoes in the Sky

Starlore and Astronomy of the South Pacific

Chadwick, S.R.; Paviour-Smith, M.

2017, XVII, 233 p. 181 illus., 149 illus. in color.,

Hardcover

ISBN: 978-3-319-22622-4