

A CULTURAL COMPARISON OF THE 'DARK CONSTELLATIONS' IN THE MILKY WAY

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Abstract: Cultures around the world find meaning in the groupings of stars and features in the Milky Way. The striking appearance of our Galaxy in the night sky serves as a reference to traditional knowledge, encoding science and culture to a memory space, becoming part of their overarching cosmologies. This paper examines traditional views of the Milky Way from cultures around the world, primarily in the Southern Hemisphere. These views comprise dark constellations: familiar shapes made up of the dark dust lanes in the Milky Way, rather than the bright stars. Some of the better-known examples include the celestial emu from Aboriginal traditions of Australia, and the llama in Inca traditions of the Andes. We conduct a comparative analysis of cultural perceptions of 'dark constellations' in the Milky Way, examining common cultural themes and meanings at the crossroads of Indigenous Knowledge and Western science with applications to topics ranging from Indigenous Studies to psychology.

Keywords: Milky Way, 'dark constellations', cultural astronomy, Indigenous knowledge, ethnoastronomy, Aboriginal Australians, Torres Strait Islanders, Inca, Moqoit, Maya, Bugis, Tswana, Sotho, Xhosa, Polynesians, Māori

1 INTRODUCTION

Cultures throughout the world have observed and used many phenomena of the night sky. This often included the grouping of stars into constellations or asterisms. Certain cultures also observed and identified features within the dark areas of the Milky Way where dust and gas block the light of the stars that they obscure. As with stellar constellations, these

'dark constellations' typically represent animals of significance within local traditions and cosmologies.

In this paper, we bring together a team of scholars working in the field of cultural astronomy with cultures spread out across the world to better understand the nature of these dark constellations, how they featured in their Knowledge Systems, and their social context and

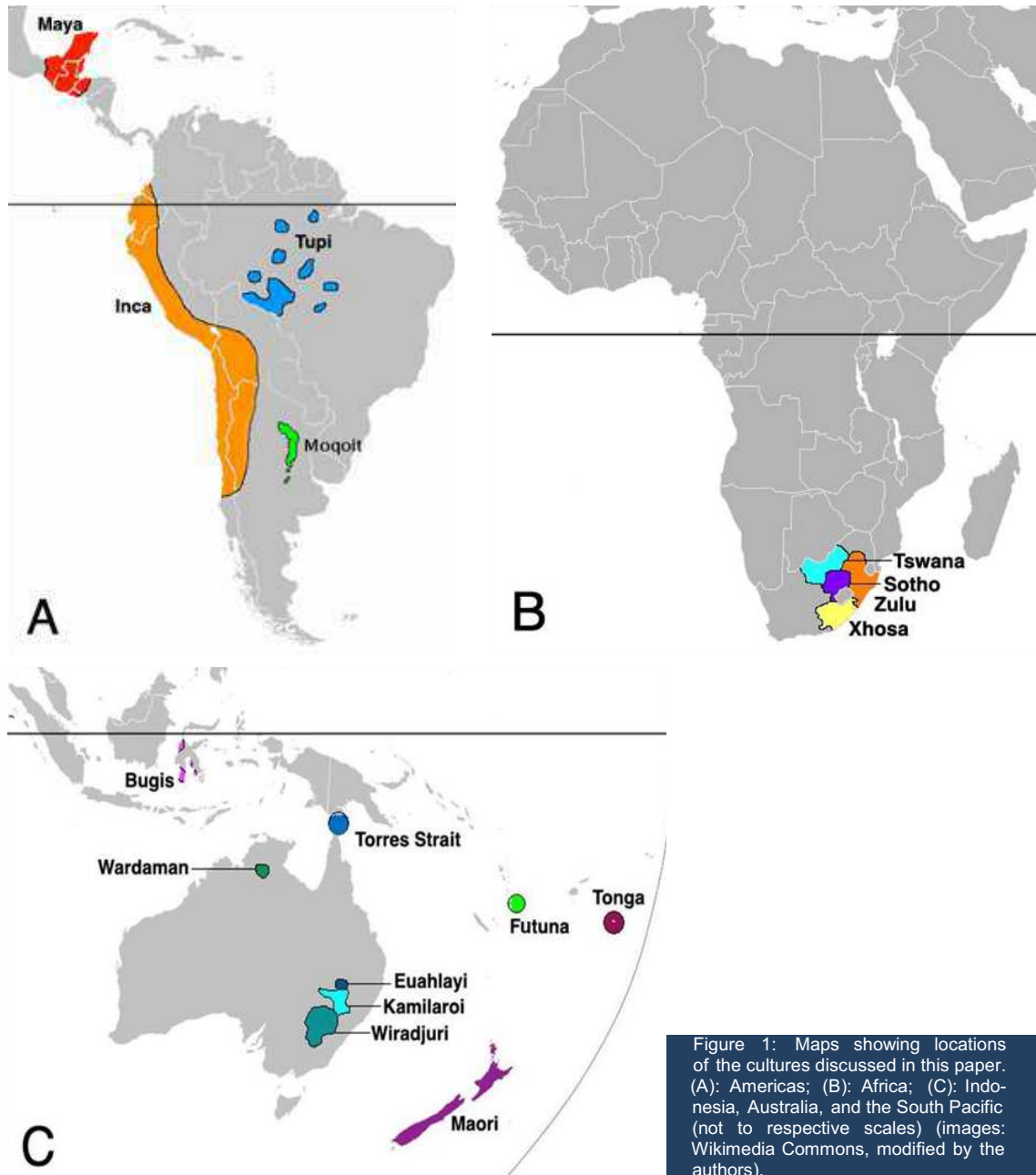


Figure 1: Maps showing locations of the cultures discussed in this paper. (A): Americas; (B): Africa; (C): Indonesia, Australia, and the South Pacific (not to respective scales) (images: Wikimedia Commons, modified by the authors).

use. We discuss seven case studies of cultures across various geographical regions that feature dark constellations in their knowledge and traditions: the Maya (Mesoamerica), Inca (South American Andes), Moqoit (Argentina), Tupi (Brasil), Aboriginal and Torres Strait Islanders (Australia), Bugis (Indonesia), Xhosa, Sotho, Zulu, and Tswana (southern Africa), and Polynesians (Pacific) (see Figure 1).

Dark constellations have previously been examined by team members within individual cultural contexts, but this paper represents the first large-scale comparative examination of dark constellations to gain important insights

to better understand their role in Indigenous Knowledge Systems and answer key questions about pattern recognition and psychological perception (Cropper et al., 2019).

2 ABORIGINAL AND TORRES STRAIT ISLANDERS (AUSTRALIA)

The Milky Way is a prominent feature in the astronomical traditions of a number of Australia's Aboriginal and Torres Strait Islander cultures. Like much of the astronomical knowledge of Indigenous Australia, celestial objects and phenomena held a multitude of functions, including calendric, seasonal, and social as-

pects. Celestial objects that rise and set at dusk and dawn may have particular relevance as seasonal indicators, informing navigation, food economics, ecology, and weather (e.g. Johnson, 1998). They can, and often do, have multiple views and meanings depending on their orientation and visibility at different times of the year (e.g. Cairns and Harney, 2003). The Knowledge Systems of Indigenous Australians attributed culturally specific meaning and agency to the movements of celestial bodies and the appearance of transient phenomena.

In the western Torres Strait, the Milky Way is seen as a cloud of debris kicked up by the shovel-nosed shark as it scours the sea floor in search of food (Green et al., 2010: 350). The Giant Shovelnose Ray (*Rhynchobatus djiddensis*) is called *Kaigas* in the Kala Lagow Ya language, with its celestial counterpart dubbed *Kaigasiu Usu*, referring specifically to the region of the galactic bulge in Scorpius (the stars of which comprise the canoe of the culture figure Thoegay and his first-mate, Kang—the star Antares). *Kaigasiu Usu* is used by the islanders of Boigu as a seasonal indicator. When the head of the shark looks to the east, the people know the currents will be running to the West. When the head is in the South and the tail in the North, the current will be running to the East (*ibid.*).

Dark spaces in the Milky Way are often seen as deep waterholes or caves, sometimes home to beings such as animals or evil spirits. Kaurna traditions of the Adelaide plains in South Australia describe dark spaces in the Milky Way (*Wodliparri*) with bright stars on the edge seen as campfires of huts on the riverbanks (from *woldi* (huts) and *parri* (river)). Dark patches in *Wodliparri* are the dwelling places of a dangerous monster named *Yura* who punishes those who break sacred law. The dark patches are called *Yurakauwe*, meaning monster water (Hamacher, 2015). In Wardaman traditions of the Northern Territory, the Coalsack Nebula is seen as a dark cave in which the evil spirit-being *Utdjungon* lives. If people break traditional Law, *Utdjungon* will bring forth the end of the world by casting down a fiery star to bring death and destruction (Harney and Elkin, 1949: 29–31). The Coalsack is a common feature in Aboriginal traditions across Australia—too numerous to list here.

Many other Aboriginal groups view the Milky Way as a celestial river, with the borders between the bright and dark spaces viewed as riverbanks (Norris, 2016). A Yolngu tradition from Arnhem Land describes a man who

sacrificed his life to save his younger brother when a storm capsized their canoe. The older brother later appeared as a bright new star on the banks of the sky river (describing the boundary between the light and dark spaces in the Milky Way). When the younger brother grew old and passed, the ancestors placed them both in the sky as the stars *Shaula* and *Lesath* in Scorpius. This tradition about a bright new star appearing on the banks of the sky river near these two stars might be a description of the supernova of CE 393 (Hamacher, 2014).

In Wiradjuri traditions of central New South Wales (Mathews, 1904), the Milky Way is a river and a sinuous dark nebula in the Milky Way between the Southern Cross and Vela represents a serpent-like creature called *Wāwi*. The *Wāwi* has magical powers and lives in deep waterholes, burrowing into the bank where he makes his den. The den can be found after or during a thunderstorm where the rainbow ends. Clever men are taught to engage with *Wāwi* to teach it new songs. As discussed in the next section, the view of this same sinuous black streak is perceived by Quechua people of South America to be a serpent (*Mach'acua*) in the river of the Milky Way (*Mayu*) (Urton, 1981).

The Emu in the Sky is perhaps the best-known Aboriginal dark constellation (Figure 2). It is the silhouette of an emu traced out by the dark nebulae within the plane of the Milky Way and is featured in the traditions of Aboriginal people across Australia. The Coalsack Nebula, near the Southern Cross, forms the head, and the body extends along the dust lanes through Centaurus in the Milky Way, to the body as outlined by the galactic bulge in Scorpius and Sagittarius (Hamacher and Norris, 2011; Fuller et al., 2014a). Emus are large, flightless birds (similar to an ostrich) found throughout much of Australia. A female lays several clutches of eggs in a season, after which the males incubate them and rear the chicks.

Senior Law Man Ghillar Michael Anderson, and anonymous Kamilaroi and Euahlayi elders of northern New South Wales, shared knowledge about their views of *Gawarrgay*, the celestial emu (Fuller et al., 2014a). The position of *Gawarrgay* in the sky at dusk throughout the year denotes the animal's behaviour patterns, seasonal change, and links to initiation ceremonies (Fuller et al., 2013). When the emu rises at dusk in April and May, it is seen as a female emu running, chasing a male emu to mate. In June and July, the emu is high in the sky, lying roughly horizontal to the



Figure 2: *Gawarrgay*, the Emu in the Sky. Art by Jessica Gullberg, based on constellation art from Ghillar Michael Anderson in Fuller et al. (2014a).

southern horizon. It is seen as a male emu sitting on the nest incubating the eggs (which takes 56–59 days), signifying the time to collect emu eggs. Any delay, and soon it is too late to collect eggs as they will begin getting chicks in them. By August and September, the emu lies perpendicular to the southeastern horizon. At this time, it is seen as a male emu getting up from the nest as the chicks begin hatching. This is when the initiation (Bora) ceremonies are held. Bora ceremonial grounds generally consist of a pair of circles of different sizes, connected by a pathway. The Bora grounds are reflected in the Milky Way as the major dark patches of the emu head and body, oriented to the position of the celestial emu during these months (*ibid.*). When the celestial emu swings to where it is low on the horizon in October and November, the galactic bulge is now seen as the backside of an emu sitting in a waterhole, displacing the water and causing the land to dry up as the hot summer months approach. Thus, the celestial emu informs seasonal change, the behaviour of the bird, food economics, and social practices.

In Kamilaroi and Euahlayi traditions, dark nebulae in the Milky Way south of *Gawarrgay* represent *Bandaar*, a kangaroo (Fuller et al., 2014b). The kangaroo is positioned towards the emu's tail (Figure 3). Beyond the kangaroo, dark spaces in the Milky Way also represent *Gariyas*—crocodiles (*ibid.*). The crocodiles first become visible in late summer.

When the emu and the kangaroo begin to set, the crocodiles are prominently visible instead, with the belly of the emu becoming the first crocodile's head. The people see the crocodiles lying in the river of the Milky Way and use this to time travel for ceremony, in September and October (*ibid.*). It should be noted that freshwater (or saltwater) crocodiles are not endemic to the area, being found over 1000 km to the north.

3 INCA (SOUTH AMERICAN ANDES)

Inca cosmology viewed the Milky Way as a river flowing across the night sky in a very literal sense. They saw 'earthly' waters as being drawn into the heavens and then later returned to Earth after a celestial rejuvenation. The Earth was thought to float in a cosmic sea. When the celestial river's orientation was such that it dipped into the ocean, the water was drawn into the sky. Urton (1981: 60) described the Milky Way as "... an integral part of the continuing recycling of water throughout the Quechua universe." The plane of the Milky Way is inclined between 26° and 30° with the axis of the Earth's rotation. This orientation is 26° toward the South Celestial Pole, and 30° toward the north (*ibid.*). The Milky Way at times will be viewed as rising in the southeast, passing through the zenith, and setting in the northwest. Twelve hours later the horizon positions have shifted, and the band of stars rises instead from the northeast, traveling again through the zenith, but now setting in the



Figure 3: *Bandaar*, the Kangaroo. Art by Jessica Gullberg based on constellation art from Ghillar Michael Anderson in Fuller et al. (2014a).

southwest. This 24-hour rotation cycle creates two zenith-intersecting inter-cardinal axes that divide the celestial sphere into four observable quarters.

The rising of the Milky Way figures prominently in Inca astronomy because of correlations with their inter-cardinal axes and the four points of solstice horizon events. At the time of the December solstice, when the Sun rises at an azimuth of 114° on the Cusco horizon, the evening position of the band of the Milky Way lies similarly to the southeast. During the June solstice sunrise at an azimuth of 64° , the Milky Way is situated in the northeast. The solstices are the only occasions when the Sun rises and travels with the Milky Way (*ibid*). Inca cosmology recognizes that the celestial river and the Sun rise together at the start of the dry season in June and the rainy season in December. This correlation explains the seasonal intensity of the Sun in Inca traditions, which feeds upon the powerful waters (*ibid.*).

The Inca ordered their sky by this celestial quadri-partition. This contrasts with common use of the general path ecliptic travel as a reference marker. Urton (1981) argues that this gave the Incas a nearly 90° difference in their perspective of the heavens, and cosmological constructs were developed accordingly. He asserts that the primary axis for celestial references was east/west, rather than north/

south, as was common in cultural systems in the Northern Hemisphere. The quadri-partition also appears to have influenced orientations on Earth. The pantheon of Inca dark constellations stretches nearly 150° across the Milky Way (Figure 4).

Most are animals that figure prominently in Andean cosmology and traditions (Bauer and Dearborn, 1995). Urton (1981: 176) relates that the Spanish chronicler, Polo de Ondegardo, found the Incas to believe that "... the animal constellations were responsible for the procreation and augmentation of their animal counterparts on the earth." Serpents figure prominently in Inca cosmology and are the creatures representing *Uchu Pacha*, the underworld and lowest of the three worlds of Inca existence. *Machacuay* leads a dark celestial procession as the constellations move diurnally across the night sky. Van de Guchte (1990) says that the *amaru* (serpents) emerge from their underworld environs via rivers and are thought to be related to rainbows and to foretell of rain. *Machacuay* can be seen at the beginning of the rainy season. The serpent's dark figure is long, like a snake, and travels head before the tail across the sky (Urton, 1981). *Hanp'atu* (the toad) follows closely behind *Machacuay*. Toads were thought of as bad omens as they were created by the devil.



Figure 4: The Incan Dark Constellations – right to left: (1) *Machacuay*, (2) *Hanp'atu*, (3) *Yutu*, (4) *Yacana*, (5) *Uñallamacha*, (6) *Atoq*, and (7) *Yutu*. Art by Jessica Gullberg, constellations from Urton (1981).

Hanp'atu is a much smaller dark section of the Milky Way to the left of the snake (Urton, 1981). *Tinamou* are birds indigenous to the Andes and are of very ancient lineage. *Yutu*, the Tinamou (the Coalsack) follows *Hanpatu* in the Milky Way and likewise is much smaller than *Machacuay*.

Yacana, the llama, figures prominently in many aspects of Inca traditions. This celestial figure was thought to animate the llamas on the Earth (Salomon and Urioste, 1991). The cosmic *Yacana* is much larger than *Hanpatu* or *Yutu* and dominates the Incas' dark section of the Milky Way. *Yacana* is situated between Centaurus and Scorpius, and the prominent stars Alpha and Beta Centauri are known as *llamacñawin*, the "... eyes of the llama." (Urton, 1981).

Below *Yacana* is a smaller dark constellation called *Uñallamacha*. It is said to be a baby llama suckling its mother. Following *Yacana* and *Uñallamacha* in the sky from the left is the somewhat smaller constellation of *Atoq*, the fox. *Atoq* lies on the ecliptic between the constellations of Scorpius and Sagittarius. The Sun enters it during the December solstice. Urton (1981: 70) explains that the Milky Way and *Atoq* catch up and rise with the summer solstice Sun in the southeast during the same period of time that terrestrial baby foxes typically are born, around 15–23 December. Urton then lists a second constellation called *Yutu*. This additional tinamou follows *Atoq* and completes the celestial procession.

4 MOCOVÍ/MOQOIT (ARGENTINA)

The *Mocoví* (*Moqoit* in their language) inhabit the southern area of the Chaco region of Argentina. They are part of the *guaycurú* linguistic group. Originally hunter-gatherers, at the time of the first contact with European people the main region they inhabited was the southern riverbank of the Bermejo River (around 24° to 25° S latitude). They started to move in a southerly direction beginning in 1710, due to Spanish pressure (and reached regions near 31° S latitude). They were forced to become sedentary by the Argentinian State at the end of the nineteenth century. Now *Moqoit* people are also present in Buenos Aires and the surrounding area. The *Moqoit* people in Argentina today number approximately 18,000. These groups have always considered the cosmos to be inhabited by a multitude of intentional human and non-human agents organized in societies. This socio-cosmos has a variable topology, which largely reproduces the power relations of the beings inhabiting it. It is a dynamic cosmos criss-crossed by a vast network of connecting, moving tunnels that the beings with enough power are able to traverse (López and Altman, 2017: 64). The sky is seen as an environment populated by especially powerful, fecund, and voracious beings.

Their characteristic features and variations are understood as signs (*netanec*), indications of the presences and intentions of these powerful beings, which must be interpreted in

order to learn to understand these other wills and intentions, and of managing the relations with them. Therefore, these signs are gestures, expressions of powerful people whose actions and interests affect us (López, 2017; López and Altman, 2017: 65). In this kind of society, there are no social mechanisms that can impose a unique version of the meaning about each pattern, although there are certainly basic coincidences. The contrast among bright and dark is in general very meaningful for the *Moqoit* people. In fact, they use two different words to refer to the existential core of any conscious beings (including humans): *lqui'i* and *l'paal*. These terms are used both to refer to manifestations in dreams or in a vision of dead relatives, and to account for the principle that animates the actions of living conscious beings.

The first, *lqui'i*, is usually translated as 'image-soul' and is used also to refer to the image in a mirror. The second, *l'pa'al*, is usually translated as 'shadow-soul' and is also used to refer to the shadow of an object. The first word is used to refer to bright phenomena in the sky interpreted as manifestations of powerful celestial beings (e.g. shooting stars, or asterisms made by stars or bright spots), that stand out against the dark sky background. The second is used to refer to the dark spots in the sky that contrast with bright backgrounds, interpreted too as the manifestation of celestial beings. The important fact seems to be the contrastive effect that allows us to see a form against a background. These manifestations of conscious beings are not simple external appearances, but a manifestation of the core of these beings: their body as a "... set of conditions and ways of being that constitute a habitus." (Viveiros de Castro, 1996: 128; our translation), their principle of action (López, 2013: 115–116). It is in this context that the way in which the *Moqoit* understand the patterns (bright against a dark background or dark against a bright background) that they observe in the sky must be understood.

Among the *Moqoit* the most relevant features of the night sky are structured around and in the Milky Way (López and Giménez-Benítez, 2008), which is thought of as the most important of the tunnels that articulate the different parts of the cosmos. As we have indicated in previous works (López, 2009; López and Giménez Benítez, 2008) and mentioned in this work in the case of the Incas, the Milky Way is the true structuring axis of the *Moqoit* sky. The particular way in which the Milky Way changes its position in the sky over time, already mentioned for the Inca case, and

crosses [the sky] as the *Moqoit* people usually say, is very important for this culture and for other Guaycurú groups. Depending on the circumstances, this important sky structure assumes different manifestations: the World-tree (*Nalliagdigua*), a river, a gigantic whirlwind, or a path (*nayic*).

The Milky Way is also used as a temporal marker. The *Moqoit* are able to indicate its direction both at several times throughout the year and at different times of night (especially at sunset and dawn). Also, *Moqoit* expectations about the future of the World appear to be connected to astronomical signs (*netanec*) as clues of the intentions of the powerful beings that structure it. A change in the pattern of positions of the Milky Way is the most frequently mentioned of those signs (López and Giménez-Benítez, 2008).

Due to this crucial role of the Milky Way and the fact that it is a huge area of diffuse brightness interrupted by dark spots, it is not surprising that the *Moqoit* pay attention to dark patterns on it. The most important of all of them is the *Mañic*, the master of the South American rheas, a large flightless bird similar to an emu or ostrich shown in (Figure 5). For the *Moqoit* people, each animal or vegetal species has a master, named as father (*leta'a*) or mother (*late'e*) of the species. The master protects the species and regulates the access of humans to this species as a resource. A powerful being has many possible body regimens: a special specimen of their species, a snake-shaped being, a humanoid form, or a meteorologic or astronomical manifestation. We know many *Moqoit* stories mention that in the time of the origins, the master of *Mañic* used to shelter in a number of burrows, under the roots of an *ombú* (a very big tree, seen as the world tree—the Milky Way), and eat humans. *Lapilalaxachi*, a powerful human ancestor of the *Moqoit* people identified with the Pleiades, decided to face the *Mañic*. He chased the *Mañic* throughout the world and the cornered *Mañic* climbed up the *ombú* trunk to the sky.

Today, the shadow-soul (*la 'al*) of the *Mañic* can be seen in the Milky Way's dark clouds, with its head in what we know as the Coalsack (around $-59^{\circ} 50'$ galactic longitude). Alpha and Beta Centauri are the dogs of the man chasing the *Mañic* and bite at its neck (López and Giménez-Benítez, 2008). The *Mañic's* head is the Coalsack. The body extends to Scorpio (around $-7^{\circ} 30'$ galactic longitude). In fact, the legs extend beyond this asterism and reach Sagittarius (around $+14^{\circ}$ galactic longitude). Also, the movement—with



Figure 5: The Mañic. Art by Jessica Gullberg, asterism from Alejandro Martín López and Diego Alterleib in López (2009).

the whole Milky Way—that shows this dark asterism is interpreted as a re-enactment of the mythic story: a rising from the infraworld, then a climbing to the sky, and finally a falling. But this is not the only *Moqoit* dark constellation. They have, for example, an asterism that combines dark spots and individual stars, the *Mapiqo'xoic*, or old algarrobo tree. It is an excellent illustration of the mentioned principle of contrast: a series of stars ($\xi 1$, $\xi 2$, \omicron , π , δ , $\pi 1$ y υ *Sagitarii*; from around $+14^\circ$ to around $+20^\circ$ galactic longitude), in contrast with the dark background of the sky, form the tree foliage; dark spots, in contrast with the bright background of the Milky Way, which are the roots (see Figure 6).

These ideas are very similar to the ideas of other Guaycurú groups, for example *Qom* or Toba people. In a similar view, the Tupi people of central Brazil also perceive a rhea in the sky, making essentially the same shape as the Aboriginal emu. The rhea and the emu are both large, flightless birds with a similar appearance and breeding cycle. Just as in *Moqoit* traditions, the head of the rhea is the Coalsack, and the body is traced out by dust lanes in Centaurus and Scorpius. The Tupi associate the rhea with the end of the world. The stars of Crux are holding the head of this animal. If it escapes, it will drink all the water of the world (Alencar, 2011).

5 MAYA (MESOAMERICA)

The Maya are an ethnolinguistic group of

Indigenous people in Mesoamerica, from southern Mexico to western Honduras and northern El Salvador. The Maya differentiate between the different positions of the Milky Way with respect to the horizon, granting them meanings almost entirely related to cosmogonic traditions. In this case, we focus in the *Xibalbá Be* and the place of creation. The Maya distinguish between the bright zone (*Saki bé*, literally 'white road' in Quiché) and the dark zone of the Milky Way (*Xibalbá be*, path to the Underworld). This *Xibalbá be* extends between the constellations of Sagittarius, Scorpius and Cygnus, occupying the sky from south to north (Milbrath, 1999; Schele and Freidel, 1993). This is interpreted by several Maya groups as an entrance to the underworld—a path the dead travel to another plane of existence.

When the position of the Milky Way is oriented vertically with respect to the horizon, the shape of the dark regions is also identified as the open jaws of the Star Deer Crocodile (*Way Paat Ahiin*), a creature widely related to the underworld in Maya creation stories (Coronado, 2012). Another depiction of this tradition identifies the dark nebulae with a crocodile-canoe, where the Padlers gods (Stingray and Jaguar) take the Maize god to the place of creation (*Oxib' Xk'ub*). This is delimited by the stars Alnitak, Rigel, and Saiph, where the primordial fire was placed with the smoke represented by the Orion Nebula (M42). This event is dated in mid-August 3114 BCE by the Maya, the period of the year at the time when



Figure 6: The Mapiqo'xoic or old algarrobo tree asterism (left) and an artistic depiction (right) (images from López, 2009).

the Milky Way takes this position in the sky.

6 BUGIS (INDONESIA)

The Buganese (Bugis) people are the largest of three major linguistic and ethnic groups of South Sulawesi in Indonesia, along with Makassar and Toraja. Ammarell (1994) provides a detailed description of the navigational techniques of the Bugis, who apply a complex mix of meteorological, wave pattern, debris, current, and celestial navigation techniques. The celestial techniques include the rise and set times of various constellations and asterisms, and the presence or absence of others in the sky as aids to navigation on sailing craft. They include *bembé' é*, the goat, which is identified as the Coalsack. When sailing, its absence was thought to foretell calm weather ahead.

7 ZULU, XHOSA, SOTHO, AND TSWANA (SOUTHERN AFRICA)

Snedegar (1995) reports that in southern Africa, Xhosa, Sotho, and Tswana cultural associations with the southern Milky Way explicitly include its dark dust lanes. Similarly, he notes that a /Xam informant pictured the Milky Way as a road across the heavens, and that a Khwe informant identified it as the Line. The Milky Way as a pathway through the heavens is a common theme. Snedegar additionally references Zulu terms and cultural linkages for the southern Milky Way. Definitions for the Zulu words *umthala/imlthala* include both the Milky Way and dark stripe (from the navel down) on some of the people (Doke and Vilakazi, 1964). We note that the definitions of the related Zulu words *umlaza/imilaza* also include both a constellation, the Milky Way, and whitish beast with black streaks on the body (Doke and Vilakazi, 1964: 452). Thus, the Zulu cultural meanings of the sky pattern Westerners identify as the Milky Way were adequately complex to require different

words for different purposes, and they explicitly include the presence of dark stripes or streaks in symbolic associations.

8 POLYNESIA (PACIFIC)

Polynesians of the Pacific recognise dark spaces in the Milky Way, focusing on the Coalsack Nebula and relating it to fish or fishing. Polynesian traditions of Tonga describe it as *Humu* (a giant triggerfish). In their traditions (Gifford, 1924), a Tongan chief named Ma'afu took a lizard wife and had twin sons, which they wanted gone as the chief's subjects were afraid of the pair. Ma'afu sneakily instructed the brothers to collect water from a waterhole containing a giant duck that would kill and consume anyone who came too close. They boys were attacked by the duck but grabbed it by the neck and killed it. When the boys returned unharmed, the father instructed them to obtain water from a more distant waterhole, inhabited by *Humu*, a triggerfish (these are large aggressive animals with powerful teeth designed for crushing shellfish). The boys killed the triggerfish and in anger at this, the father blurted out his secret to have the boys killed. The boys walked away and ascended to the stars, each carrying one of the two animals they killed. The twins became the Magellanic Clouds, the duck became the Southern Cross (with the duck's bill as γ Crucis), and *Humu* became the Coalsack Nebula. On Futuna Island (Vanuatu), a "...black space in the Milky Way ..." is *Sumu*, a fish (Williamson 1933: 130, 136), an obvious link to *Humu*, the triggerfish.

In the Māori traditions of Aotearoa/New Zealand the Coalsack was known by six different names: *Manako-uri*, *Naha*, *Te Patiki*, *Te Rua-patiki*, *Te Rua ō Māahu* and *Te Whai-a-titipa* (Best, 1910; 1941; 1955; Stowell, 1911: 202–203, 209). However, nowhere do Best or Stowell "... expound on how this distinctive

astronomical feature was interpreted in Maori mythology." (Orchiston, 2016b: 73–74), apart from the fact that *Rehua* (Sirius) originated as a flaming star that emerged from the Coalsack before eventually coming to rest in its present position in the constellation Canis Major (Stowell, 1911: 201–202). We know that the astronomical knowledge base of the ancestral Māori changed dramatically soon after they settled Aotearoa/New Zealand between AD 1250 and 1280, when they had to immediately switch their dietary staple from *taro* to *kumara* (see Orchiston and Orchiston, 2016). Māori astronomy then continued to evolve, and by the time of European settlement (in the nineteenth century) there were marked regional variations in astronomical knowledge. Most of Stowell's astronomical knowledge derived from just two or three localised areas of the North Island (Orchiston, 2016a), as also did Best's data, but from quite different areas (Orchiston, 2016b), and Best's (1955) popular account of Māori astronomy "... is at best no more than a general indication of the overall trends that occurred in specific parts of the North Island of New Zealand at around the end of the nineteenth century." (Orchiston and Drummond, 2019: 523). That said, it is interesting that the Coalsack Nebula features prominently in Māori astronomy, just as it does in the astronomical systems of other Southern Hemisphere cultures. However, this is the only conspicuous dark nebula to receive attention from the Māori.

The Māori also describe the Milky Way as the sea in which the shark (*Māngōroa*) lives, where *Māngō* denotes a shark (Harris et al., 2013). According to Stimson (1933), Polynesians from the Tuamotu Archipelago in French Polynesia hold traditions that the god *Kihotumu* sailed across the sky in a ship he built, called the 'Long Shark'. The dark spaces in the Milky Way are the structure of the Long Shark while the white patches represent waves of water being kicked up by the ship itself (although this view has been contested: see Emory, 1940).

9 COMPARATIVE STUDY

This paper serves as a starting point for ongoing research in cross-cultural studies of ethnoastronomy, with myriad applications, such as understanding processes around pattern recognition and psychological perception regarding celestial objects and phenomena. Such interests to date have manifested primarily with societies in the Southern Hemisphere and, with the exception of the Maya, these are the examples we present. In each case the creatures of the dark constellations

were integral parts of local cosmology and sometimes served temporal functions.

Several major themes emerge from this study, showing similarities in views regarding dark constellations and their use in cultural traditions. The Milky Way is commonly seen as a water course in which live creatures related to the local region. Oceanic cultures, such as the Māori and Torres Strait Islanders, see this as the home of sharks. In Australia, many Aboriginal dark spaces, focusing largely on the Coalsack, are seen as deep holes that are the home of evil creatures, which place an emphasis on social laws regarding behaviour.

The Maya focused on the area between Sagittarius and Cygnus, and many African cultures noted light and dark lanes and a pathway through the sky. The greatest commonality was shared by Aboriginal Australians, the Inca, Tupi, Moqoit, Polynesians and Bugis, all of whom found figures in the same general section of the Milky Way around the Coalsack. The emu in Australia shown in Figure 2 begins with its head at the Coalsack and extends through the dark spaces outlining the body in the Milky Way region of Scorpius. Figure 7 shows the mother and baby llamas of the Inca. The mother's head is located just to the left of the Coalsack and her body extends to the left, but as depicted this is not quite as far as the emu or the *Mañic*. Her baby is located beneath her. The llama is smaller than the emu and the baby is situated where a part of the emu exists. Figure 5 shows the *Mañic* of the *Moqoit* in Argentina. Its head also begins with the Coalsack and its body extends into the Scorpius region.

Thus, these examples show where cultures see a significant figure pertinent to their traditions in the same prominent section of the Milky Way stretching across the sky. This emphasizes that sky-watchers desired to find meaning within the Milky Way and used the same areas of interstellar gas and dust, just as different cultures and civilizations observed different figures in the same section of the sky. Even the *bembé' é* of the Bugis, while smaller, still uses part of the same region of the galaxy, the Coalsack Nebula. What is known regarding the dark constellations of the Aboriginal Australians and the Incas is, of course, quite extensive, with more creatures than those shown here. But even these are located in this same general region of the Milky Way. Thus, the same dark regions of the Milky Way were used to encode knowledge about the emu, llamas, the rhea and the *Mañic*.

In conclusion, these images serve as examples of how different cultures see animals



Figure 7: The Mother and Baby Llama begin just to the left of the Coalsack. Art by Jessica Gullberg, constellation from Urton (1981).

and creatures meaningful to them in the same section of the Milky Way. This was used by the people to inform calendars, ceremony, and social structure. More similarities and insight throughout the world should emerge as research into this area continues.

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