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RECONSTRUCTING THE STAR KNOWLEDGE OF ABORIGINAL TASMANIANS

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Abstract: The canopy of stars is a central presence in the daily and spiritual lives of Aboriginal Tasmanians. With the arrival of European colonists, Tasmanian astronomical knowledge and traditions were interrupted and dispersed. Fragments can be found scattered in the ethnographic and historical record throughout the nineteenth century. We draw from these ethnohistorical documents to analyse and reconstruct Aboriginal astronomical knowledge in Tasmania. This analysis demonstrates that stars, the Milky Way, constellations, dark nebula, the Sun, Moon, meteors and aurorae held cultural, spiritual and subsistence significance for the Aboriginal cultures of Tasmania. We move beyond a monolithic view of Aboriginal astronomical knowledge in Tasmania, commonly portrayed in previous research, to lay the groundwork for future ethnographic and archaeological fieldwork with Aboriginal elders and communities.

Keywords: Cultural Astronomy; ethnoastronomy; Indigenous Knowledge Systems, Aboriginal Australians, Tasmania

Warning to Australian Aboriginal Readers: This paper contains the images of Aboriginal people who have died.

"Aboriginal Tasmanians spoke of the subject of stars with great zest." (George Augustus Robinson, 13 March 1834).

1 INTRODUCTION

The study of Indigenous Knowledge Systems can reveal a wealth of information about how scientific information is encoded into oral tradition and material culture (Agrawal, 1995), particularly with respect to astronomical knowledge (Cairns and Harney, 2003; Fuller et al., 2014; Hamacher, 2012; Norris, 2016). The continued study of Aboriginal and Torres Strait Islander astronomical knowledge, and the traditions though which this knowledge is passed to successive generations, has led to a more detailed understanding of how the Sun, Moon and stars aided navigation, seasonal calendars, food economics, animal behaviour, social structure, sacred law, and relationships between the land and the sky (Johnson, 1998). This is done through the various methodologies and theoretical frameworks of cultural astronomy, an interdisciplinary academic field that seeks to understand the role and use of the stars in culture (Ruggles, 2015).

Ethnohistorical literature is one of the primary sources for studying and reconstructing Indigenous astronomical knowledge (Hamacher, 2012). Aboriginal Australians are considered to be among the oldest continuous cultures, and *the* most researched Indigenous people on the Earth (Smith, 1999: 3), with records of language, customs, and traditions going back to before European colonisation in 1788. However, these records are highly biased, as Aboriginal people were considered to be among the lowest rung of human cultures by the colonists. This false position, and the rapid decimation of Aboriginal people and culture after British colonisation, lead to the practice of 'salvage anthropology', where ethnographers sought to record Aboriginal traditions before the people and cultures 'disappeared', sometimes with minimal regard for the secrecy or sacredness of that knowledge. This led to a rather large body of published information about Aboriginal cultures. Unfortunately, much of the astronomical knowledge from these records is highly fragmented and incomplete. A lack of formal training or understanding of astronomy by these ethnographers means much of the recorded information is filled with conflated terminology, misidentifications, incorrect assumptions, and transcription errors.

Aboriginal Tasmania has long been a place of contrasts, contention and devastation (Ryan, 1996). Colonialism, dispossession, genocide, and disease nearly wiped out Tasmania Aborig-

inal people (who call themselves 'Palawa', the name of the first man created from a kangaroo by a creator spirit). Before the arrival of Europeans, it is believed Aboriginal people arrived in Tasmania over 40,000 years ago (Pope and Terrell, 2007) when the island was connected to mainland Australia by a land bridge (see Orchiston, 1979a, 1979b; Murray-Wallace, 2002).

Approximately 8,000 years ago, rising sea levels created the island of Tasmania, separating the Palawa from mainland Aboriginal people. It is believed that the Palawa remained relatively isolated until European contact and subsequent colonisation (Johnson et al., 2015: 16). Groups were spread across about nine territories (Johnson et al., 2015: 36): Northeast, Ben Lomond, North Midlands, Oyster Bay, Southeast, Big River, North, Northwest, and Southwest (Figure 1). Within each of these territories existed smaller groups tied through marriage, kinship, and language, led by a respected male elder (ibid).

Relatively little is known about Palawa cultures prior to colonisation. Ethnographic studies were limited and the focus of colonial presence in Tasmania became one of complete Aboriginal removal from the island. Following a series of conflicts between colonists and Aboriginal Tasmanians in the early nineteenth century—a period known as the Black War—a builder and evangelist named George Augustus Robinson was hired from 1829 to 1834 to find the remaining Palawa living in Tasmania, facilitate their 'peaceful surrender', then relocate them to Flinders Island. This 'Friendly Mission' was accomplished by 1835 and many of the 200 relocated Palawa died from poor health and the prison-like conditions in which they were held. This had a devastating impact, resulting in the near decimation of Palawa culture, traditions and languages. In the time since, a cultural revival has taken hold and a resurgence of Palawa language, archaeology, history and culture is rapidly growing.

Because of colonisation, disease, dispossession, and genocide, we know relatively little about Palawa astronomical knowledge. Most of the archival information is ethnohistorical in nature, having been recorded by colonists and missionaries from their Aboriginal contacts. And much of that is fragmented, incomplete, sometimes ambiguous, and always recorded through the lens of the coloniser. Some traditional knowledge has survived with the Aboriginal people, who continue to pass their traditions on to successive generations.

This paper attempts to sort through the fragments of astronomical knowledge from Aboriginal Tasmanians scattered throughout the ethnohistorical literature and archives, reanalyze them using established and emerging methodologies from cultural astronomy, and attempt to reconstruct this knowledge to the best of our ability (although we acknowledge our limitations in this endeavor). This will serve as a base for further ethnographic and archaeological studies in the future, with application to education and cultural revival.

2 METHODOLOGY

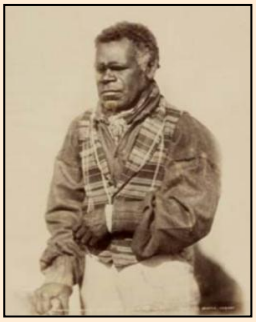
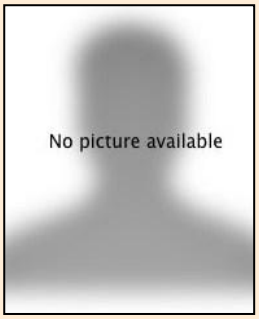
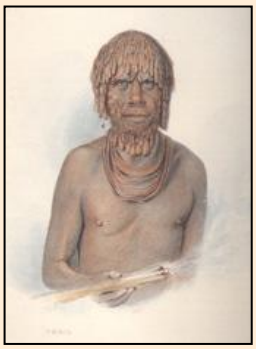
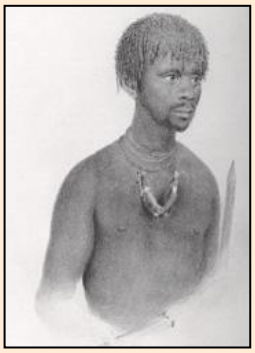
This research draws upon ethnohistorical documents and published material in the literature, including newspapers, library and museum archives, and any associated media that makes any mention of astronomical objects or phenomena with respect to Palawa traditions. No ethnographic fieldwork was conducted for this project.

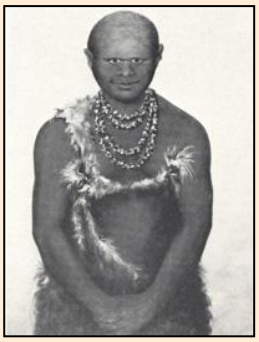
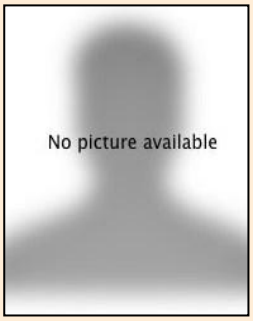
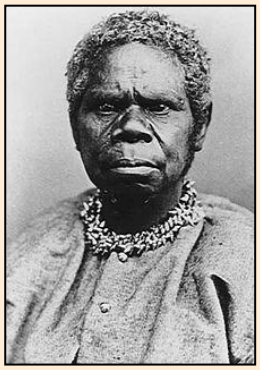
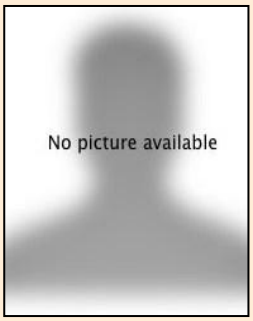
Figure 1: Map of major Tasmanian regions at the time of first European contact (Wikimedia Commons).

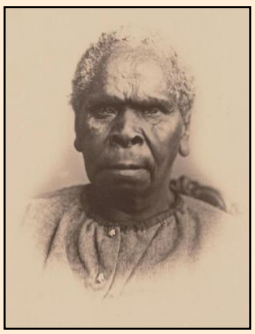
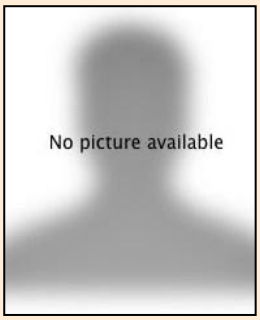
We identify the original Aboriginal sources of information, and link the accounts, narratives or descriptions whenever possible. Two key sources of information were *Mannalargenna*, a leader of the northeast Palawa, and *Woorrady*, a Nuenonne man from Bruny (Brune) Island/ Lunawanna-Alonnah. They guided Robinson through Tasmania in the 1830s. As they spoke of their people's culture, Robinson recorded it in his journals. Much of the cultural knowledge was recorded during a period of rapid growth of the colony. As such, many of Robinson's (and others') records do not name the Aboriginal sources of these oral traditions. Sometimes only the region from which the tradition was recorded is provided.

The people in Table 1 are potential sources of astronomical knowledge despite not being

Table 1: Palawa who accompanied Robinson on his mission and expedition who are likely sources of the recorded information in Robinson's journals. Timler was not part of Robinson's expedition, but is cited as a source of oral traditions by Cotton (1979).

Name	Image	Details
Bullrer *Other Names:* Drummernerlooner Rumanaloo Jumbo Louisa		**Life**: ca 1812- ??? (> 1845) **Bio**: Pairrebeenne woman from Tebrikunna in the far northeast of Tasmania. She was regarded as a highly-intelligent woman who spoke English well. Bullrer joined Robinson's expedition in 1830 when she was 18 as one of eight guides, and she also assisted the military with Line operations. She was the daughter of Bullrub/Poolrerrener, a Pairrebeenne clanswoman. She later married Calamarowenye. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/bullrer
Calamarowenye *Other Names:* Kalamaruwinya Tippo King Tippo		**Life**: ca 1812-1860 **Bio**: Man from the Big River region and husband of Bullrer. He participated in guerrilla attacks against the colonists during the Black War. He kept the jawbone of his murdered brother as a protective amulet, but it was taken by Robinson. **Further Reading**: http://tacinc.com.au/wp-content/uploads/2015/11/Mumirimina-People-of-the-Lower-Jordan-Valley-12.9.10.-29.4.12.pdf
Kickerterpoller *Other Names:* Kikatapula Black Tom Tom Birch		**Life**: ca 1803-1832 **Bio**: Paredarererme man kidnapped by colonists at age 9. He broke free in 1822 and joined the Aboriginal resistance against the colonists. He joined the Robinson expedition because of his multi-lingual abilities. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/kickerterpoller
Mannalargenna *Other Names:* Unknown		**Life**: ca 1775-1835 **Bio**: Leader of the Pairrebeenne clan (Cape Portland) in northeast Tasmania. He led guerrilla attacks against the colonists during the Black War and was part of Robinson's team. He was considered a 'clever man' and it is believed that his secret intentions were to lead Robinson away from the people Robinson was trying to find and relocate. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/mannalargenna
Marlapowaynererner *Other Names:* Maulboyheenner Timmy Timme		**Life**: ca 1825–1842 **Bio**: Son of clan leader Raleleeper from Georges Rocks who joined the Robinson expedition in 1830, serving until 1835. He joined Tunnerminnerwait in Victoria and was charged with killing two whalers. He was hanged in Melbourne Gaol on 20 January 1842, along with Tunnerminnerwait. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/timme

Tanleboneyer *Other Names:* Sall Maria		**Life**: ca 1807–1835 **Bio**: A Loontiteermairreloinner clanswoman from Oyster Bay. She became Mannalargenna's second wife in 1830 at age 23. She and Mannalargenna joined Robinson's group in late 1831 and remained until 1835. In August 1835 she fell ill and died at age 28. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/tanleboneyer-sall
Timler *Other Names:* Unknown		**Life**: Unknown. Alive in 1830s **Bio**: Timler was an elder of the Big River people who recounted some of his stories to Joseph and Isobel Cotton in the 1830s. He was regarded as one of the most powerful clansmen in Tasmania, but was not a member of Robinson's expedition. **Further Reading**: Cotton (1979)
Truganini *Other Names:* Lalla Rookh Lydgudggee Trugernanner Trukanini Trucanini		**Life**: ca 1812–1876 **Bio**: A Nuenonne woman from Bruny Island, Trugannini was well versed in English and joined Robinson's party in 1829. She was Woorrady's wife and daughter of Mangana, the Bruny Island leader. Truganini suffered a life of abuse, rape and violence. In 1838, she formed a small band of guerilla fighters against the colonists. She narrowly avoided execution, but was imprisoned for 20 years on Flinders Island and a further 17 at Oyster Cove camp. **Further Reading**: http://australianmuseum.net.au/truganini-1812-1876
Tuererningher *Other Names:* Pagerly		**Life**: Unknown –1837 **Bio**: Bruny Island woman and sister to a female Nuenonne clan leader known as Nelson. She was on Robinson's expedition from 1829 until 1835, before dying in 1837. Kickerterpoller was her second husband (her first was Mangana, who died in 1829). **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/pagerly
Tunnerminnerwait *Other Names:* Peevay Jack of Cape Grim Napoleon		**Life**: ca 1812–1842 **Bio**: Pairelehoinner man from Cape Grim, also known as Peevay. Joined Robinson's expedition in 1830 and served until 1835. Later he was charged with killing two whalers in Victoria, and was hanged on 20 January 1842. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/peevay

Wapperty *Other Names:* Wobberrertee Wonoteah		**Life**: ca 1797–1867 **Bio**: A Pairrebeenne woman and daughter of Manalargenna (one of four). In the 1820s, she was abducted by John Thomas, a sealer, and taken to the Hunter Islands. She lived on Flinders Island for many years and had a child with a Maori sealer named Myetye. Many Palawa today are descendants of Wapperty. **Further Reading**: Lydon (2014: 37)
Woorrady *Other Names:* Mutteellee The Doctor Count Alpha		**Life**: ca 1784–1842 **Bio**: Nuenonne man from Bruny Island who joined Robinson's party as a guide in 1829, along with this wife, Truganini. He joined the team when he was about 45 years old, and showed concern about approaching other clansmen, whom he feared would spear him. He apparently died of 'senility' at age 58. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/woorrady
Woretermoteteyer *Other Names:* Wattermoteer Bung Pung Margaret		**Life**: ca 1797–1847 **Bio**: Woman of the Coastal Plains Nation of the northeast coast. She was abducted by George Briggs and accompanied Straitsmen across the Indian Ocean to Africa. She spent time as a guide in Robinson's expedition in the early 1830s. Woretermoteteyer gave birth to a daughter named Dalrymple (Dolly) Johnson, and she passed away at Latrobe in 1847. **Further Reading**: http://www.utas.edu.au/telling-places-in-country/historical-context/historical-biographies/woretermoteteyer-woretemoeteyenner

specifically identified in the written record. They were members of Robinson's expedition team, guides or close relations to those guides. In addition to Robinson, Palawa information was recorded by Henry Roth (1899), James Walker, Joseph Milligan (1890) and James Bonwick (1870; 1884). These men recorded features of Palawa astronomy, usually within a broader discussion of Western ideas of religion and spirituality. Robinson's journals are frequently regarded as the most detailed written account of Palawa life available. During Robinson's mission from 1829 to 1834, he documented his interactions with Aboriginal people in his journals, which were later published as *The Friendly Mission* (Robinson and Plomley, 2008). It is within these journals that we find a majority of the references to Palawa astronomical knowledge.

One of the problems with examining colonial records is that they are translated into Western terminology by non-Aboriginal recorders, who often had a very limited understanding of the Aboriginal traditions. This was further complicated if the recorder did not have a detailed knowledge of astronomy. Misidentifications, conflated terminology and transcription errors plague colonial records of Aboriginal astronomical knowledge (e.g. Hamacher, 2012; Leaman and Hamacher, 2014). Limited information is provided about the identities of the stars in Palawa traditions, and some seem inconsistent or unlikely. In this paper, we examine the identifications proposed by other researchers, and then offer those we think best fit the information provided. This is aimed at obtaining the best picture of Palawa astronomical traditions in the most rigorous way possible. This will form the basis of future work with Palawa elders.

3 RESULTS AND ANALYSIS

Our survey revealed 42 accounts of Aboriginal astronomy tied to a physical location in Tasmania. The astronomical traditions include stars, constellations, and celestial objects (14), the Moon (5), the Sun (1), planets (2) and ancestral spirits connected to the stars (8). These are divided between Bruny Island (13), the Northwest (8), Cape Portland and Swan Island (7), Oyster Bay (5), the Northeast (5), Port Sorell (1), the Big River (1) and Ben Lomond (1).

Figure 2: “The Creation of Trowenna” (left) and "The Creation of *Parnuen* the Sun and *Vena* the Moon" (right). Paintings byTrawlwoolway artist Lisa Kennedy (http://lisakennedy.me), a descendent of Woretermoteteyer. Used with permission.

We present results on the following themes.

(a) Cosmogony: Palawa traditions that describe the formation of the land and the creation of the first people;
(b) Stingray in the Sky: a Palawa constellation, attempting to identify the celestial objects involved in the tradition, as their Western counterparts are not explicitly named;
(c) Time and Astronomy: different concepts of time and the ways astronomical objects were used to denote time reckoning and seasonal change;
(d) Lunar Traditions: Palawa views of the Moon; and
(e) Transient Phenomena: Palawa traditions of aurorae, meteors and eclipses.

3.1 Cosmogony

In Palawa cultures, the sky, land and people are intricately linked, and the stars form the basis of Palawa cosmogony (the formation of the world). The journals of Robinson indicate that Palawa spirituality was based on ‘star gods’, with a good spirit ruling over the day (*Noiheener*) and an evil spirit ruling over the night (*Wrageowraper*) (Ryan, 1996: 10). The creation of the world occurred when ancestral spirits formed the landscape, animals, vegetation and sea, which are represented in material culture (see Figure 2). Traditions from across the island differed slightly, including the pronunciation of the names and details of the story (Cotton, 1979; Cotton, 2013; McKay, 2001; Robinson and Plomley, 2008: 406–410), but in general they were similar.

Leigh Maynard retold a Neunone story from Bruny Island about the creation of Tasmania (Thompson and Tasmanian Aboriginal Community, 2011). It is unclear if this knowledge was passed to Maynard or if he was drawing from earlier written sources. Maynard described the tradition as a circular story, like the cycles of the Moon and the Sun. Long ago, Tasmania (*Trowenna*) was a small sandbank in southern seas. Ice came and went and as the sea rose, the Sun flashed fire. *Punywin*, the Sun man, and his wife *Vena*, the Moon, moved from horizon to horizon together, creating life and sinking into the seas each evening. But *Venna* could not travel as fast as *Punywin*, and she fell behind. He reflected light on her to encourage her to move across the sky and catch up with him. As *Venna* struggled to keep up with *Punywin* and fell behind, he allowed her to rest on icebergs.

One day the Moon seemed to be permanently on the horizon. The day after, their first son, *Moinee*, was born. He was placed high in the sky, above *Trowenna*, as the Great South Star. The next day came their second son, gentle *Droemerdeene*. *Punywin* and *Venna* placed him in the sky between Moinee and themselves as the star Canopus.

The day after *Droemerdeene* was born, the Sun and Moon rose together again above the

sandbank that was Tasmania. They dropped seeds for the trees and plants. The next day shellfish appeared in the waters and were plentiful. *Trowenna* gradually rose from the seas and icebergs rubbed against *Trowenna*, pushing it from the great south land (mainland Australia) to the island we see today as Tasmania.

The Palawa guides on the Robinson expedition provided the first records of the creation traditions (Robinson and Plomley, 2008: 406). As in the Maynard account, the Sun and Moon were regarded as a man and woman, respectively. They gave birth to two sons: *Moinee* (the elder) and *Droemerdeenne* (the younger). They came together to create the first man, named *Palawa* or *Parlevar* (now the name given to Aboriginal Tasmanians). *Moinee* first created *Palawa* with a tail like a kangaroo and no knee joints, making it impossible for him to sit or lay down. Seeing *Palawa* struggle, *Droemerdeenne* cut off his tail, then used animal fat to rub over the wound and gave him knee joints (ibid). *Droemerdeene* and *Moinee* later got into a fight in the sky. *Moinee* was cast down and lived on the Earth, followed by his wife, who went into the sea, and his children who came down as rain and fell into his wife's womb (Robinson and Plomley, 2008: 409). When *Moinee* died, he was turned into a stone found at Cox Bight. A Toogee elder, Timler, recounts a similar tradition (Cotton, 1979).

Moinee is said to have made the first man, the rivers and the islands—attributes also given to *Laller*, a small ant. The interchangeability of the two creator spirits may indicate they are one and the same: a totemic relationship similar to some practiced in mainland traditions (Robinson and Plomley, 2008: 406; Witzel, 2013: 11). It may also simply reflect variations in the story across the island. The stellar identity of *Moinee* is not known. He was called the "… Great South Star … [who] comes out of the sea …" (Robinson and Plomley, 2008: 406). Plomley identifies *Droemerdeenne* as Canopus, the second-brightest star in the night sky. Canopus is circumpolar as seen from Tasmania and can appear to "… come out of the sea …" as it reaches its lowest altitude (~5.5° from southern Tasmania, which is close to the extinction angle) and begins climbing back up into the sky. *Droemerdeenne* was placed between *Moinee* and their parents, the Sun and Moon. This suggests that *Droemerdeene* is between *Moinee* and the ecliptic.

The identity of *Moinee* is unclear, as the star's Western counterpart is not named and the definition of "southern" is not explicit. *Moinee* is a bright star 'in the south', presumably meaning southerly declination, and *Droemerdeene* is a bright star positioned between *Moinee* and the Sun and Moon, presumably referring to the ecliptic. This leaves a number of options open. If we assume that the brothers are represented by the brightest stars in the night sky, then the best fit is *Moinee* as Canopus and *Droemerdeene* as Sirius. These two stars have similar right ascensions. If we connect a straight line between Canopus, Sirius, and the ecliptic, then Sirius lies almost halfway between Canopus and the ecliptic: $\Delta\alpha$ (Canopus-Sirius) = 36°, $\Delta\alpha$ (Sirius-Ecliptic) = 39°. Other combinations are possible, such as Achernar and Fomalhaut, but these stars are not as bright.

Another clue comes from Robinson and Plomley (2008: 425). On 1 August 1831, Robinson wrote that *Droemerdeene's* brothers were two stars sitting south and east of Orion's Belt:

> Tonight the Brune [Bruny Island] natives pointed out two stars to the southward, laying eastward of Orion's belt, which they said was Dromerdeenne and his brother, i.e. Beegerer and Pimerner. They were brilliant stars and appear to move towards the observer, rising as it were in the southern horizon and setting in the north.

Plomley identifies these two stars as Betelgeuse and Sirius. He suggests the text may be in error and should read "… Dromerdeene's *brothers*, i.e. Beegerer and Pimerner …", instead of "… Dromerdeenne and his brother …" (Robinson and Plomley, 2008: 500). The recorded traditions do not mention additional brothers of *Moinee* and *Dromerdeenne*. Robinson's journal indicates a single brother with two variations in name: *Beegerer* and *Pimerner*. The passage is confusing. Did he mean "… *Beegerer* or *Pimerner* ..."? Neglecting small long-term changes due to stellar proper motion, the declination of stars is constant, meaning a star rising in the southeast will set in the southwest, never the northwest. What did he mean? Were the names *Beegerer* and *Pimerner* some variation of *Moinee*?

If we assume Robinson was recording different names of a single brother of *Dromerdeenne*, (whom we identify as *Moinee*) then his description of the two stars "… laying eastward of Orion's belt …" and rising in southward (southeast), best fits Canopus and Sirius. Orion was not visible until the early morning on the day Robinson wrote in his journal (1 August). When it did rise, Sirius and Canopus were clearly visible in the southeastern sky (the former rising at nearly the same time as Orion's Belt and the latter already 16° above the horizon). Both stars moved in a northerly direction until the Sun rose and the stars disappeared. By this time, Sirius was in the northeastern sky while Canopus remained in the southeast.

We suggest the evidence best supports the identities of the star-brothers as Canopus (*Moi-*

nee) and Sirius (*Dromerdeenne*). We feel it is a better fit than *Droemerdeene* as Canopus and *Moinee* as an unidentified star, but this remains uncertain. The idea that a bright star appeared in the sky but is no longer visible may hint at a possible nova or supernova, but there is currently no supporting evidence for this interpretation (Hamacher, 2014).

On a final note, Cotton (1979) recorded a story from Timler explaining that the son of Moinee was a little star named *Palana*. *Palana* mixed ashes and blood and rubbed it along the back of a thylacine pup, causing the animal's distinctive stripped feature. The Western counterpart of *Palana* is not given.

3.2 The Gemini Twins and the Origin of Fire

Traditions that describe how fire was brought to the Palawa tend to focus on the actions of two ancestor spirits who can be seen today as two stars near the Milky Way. A tradition from Oyster Bay tells how the two men stood on a mountaintop and "… threw fire, like a star … [that] fell among the blackmen." (Milligan, 1859: 274). The two men lived in the clouds and could be seen in the night sky as the stars Castor and Pollux (the Gemini twins in Greek traditions). On 14 August 1831, Robinson discussed religion with Mannalargenna. Mannalargenna said that two men created fire and now lived in the skyworld. Mars was his foot and the Milky Way his road. According to Mannalargenna, the Cape Portland people believed fire was first made by *Pormpenner*. This name will be mentioned twice more in relation to fire but was spelt differently each time it was recorded: *Pardedar* (Robinson and Plomley, 2008: 872) and *Parpedder* (Robinson and Plomley, 2008: 577). On 15 August 1831, Robinson wrote that Palawa from Bruny Island said two stars in the Milky Way represented two men (Robinson and Plomley, 2008: 433). Woorrady described *Parpedder* as being the one who gave fire to the people of Bruny Island. Why two men were identified, but then referred to in the singular is unclear.

On 16 August 1831, Mannalargenna called the two stars *Pumpermehowlle* and *Pineterrinner*. He described them as the two spiritual ancestors who created people and fire, but the stars' Western counterparts were not named. Later, Milligan (1859: 274) recorded a story called *The Legend of the Origin of Fire* from an unknown Oyster Bay person, who identified Castor and Pollux (the Gemini twins) as the two men who created fire.[1]

There is a problem with setting a planet as the body-part of a celestial ancestor. Planets constantly move relative to the stars. Was the foot of the man (men?) actually Mars, or a red star of similar brightness? During 14–16 August 1831, Castor and Pollux rose heliacally. They set before dusk, so were not visible in the evening sky. Mars was in near conjunction with Saturn (and < 2° distant) at very low altitudes at dawn, with Venus and Mercury above them in the western sky. Since the stars were not in the sky when Robinson was told about them, how did he identify the foot of the man as Mars?

Castor and Pollux are northerly stars, only reaching a maximum altitude of ~16° and ~20°, respectively, as seen from Tasmania. There are no bright (first magnitude) red stars between the Gemini twins and the Milky Way. Orion is on the other side of the Milky Way and the ecliptic passes between them. Mars could appear at the "foot" of the hunters walking on the Milky Way, but this would be (relatively) sporadic. Earlier in May 1831, Mars was visible between the Gemini twins and the Milky Way. Perhaps this is the reason Mars was recorded in this way? The stellar counterparts remain unclear, but this is the only written record of the hunters' identity.

If the recorded information is from Mannalargenna, then from whom did Milligan get his information? Milligan was a doctor on Flinders Island after the Robinson expedition and would have formed relationships with the same Aboriginal people who accompanied Robinson. Mannalargenna died in 1835, nine years before. Sometime between 1843 and 1855, Milligan recorded the *Legend of the Origin of Fire.* Milligan did not specify the gender of the narrator. Still, a census was performed by Robinson in 1836 renaming Aboriginal people with English names (Plomley and Robinson, 1987: 878). It is probable this list contains the name of the person who gave Milligan this story. It is important to note that among this role-call were Wapperty, Calamarowenye, Truganini and Bullrer—all of whom were on the Robinson expedition and originated from the Oyster Bay region (Gough, 2014: 33). Any of the aforementioned people could have been Milligan's source.

3.3 The Coalsack and the Celestial Stingray

Robinson recorded a tradition of a stingray in the sky on 13 March 1834 at 23:00 (Robinson and Plomley, 2008: 895). The stingray was described as a black spot in the Milky Way (or Orion's Belt) that people were spearing. It was called *Larder* in the south (Table 2) and *Larner* on the east coast. Robinson used *Larder* in 1831 to identify the 'dark area' in the Milky Way (ibid: 497). *Larner* was also used in relation to Mars and *Lawway Larner* translates to "Milky Way/road – Stingaree" (Robinson and Plomley, 2008: 895). *Larner* may have been incorrectly linked with Mars, or this word may take on other meanings. Another version of the word for fish is '*Lerunna*', which was recorded by Milligan (1890: 28) as "Flat Fish or Flounder".

Table 2: Notes regarding star names found at the end of Robinson's journals, April–July 1831.

Object	Oyster Bay	Brune/Bruny Island	Cape Portland
Mars		LAW.WAY LAR.NER	LAW.WAY DEVER.ER
Star (1)	PUCK.AR.NE.PEN.NER	PY.LE.BAY	PUM.PER.ME.HOWL.LE
Star (2)	LORE.NE.PEN.NER (wife)	LAW.WAY	PINE.TER.RIN.ER
Black Milky Way		LAR.DER	PY.ER.DREEM.ME TONE.NER.MUCK.KEL.LEN.NER
White Milky Way		LAW.WAY.TEEN.NE	PUL.LEN.NER

Figure 3: The Coalsack, bordering the Southern Cross (Crux) (Image: Wikipedia Commons).

Robinson identified the 'black spot' as being in the Milky Way or Orion's Belt. This was probably the Coalsack (Figure 3), a dark absorption nebula that could be seen clearly with the naked eye and appeared as a dark hole against the backdrop of the otherwise-bright Milky Way.

The Coalsack borders the Western constellations of Centaurus, Musca and Crux, not Orion (which is 90° away on the other side of the sky). On 13 March 1834, Orion was sitting prominently above the western horizon at 23:00 and it did not contain any large or obvious dark nebula visible to the naked eye.

Robinson's entry states that the stingray was being speared by the men. We suggest the spears may have been the Pointer Stars, α and β Centauri.[2]

Cotton (2013) provides a retelling of the story of *The Legend of the Origin of Fire*, in which the men and their wives were identified as the stars of Crux (the Southern Cross). The original account of the story was recorded by Joseph and Isobel Cotton from Timler, an East Coast Palawa storyteller, in the 1830s, but the records were lost in a house fire in 1959 (Stephens, 2013). Years later, descendent William Jackson Cotton (1909–1981) rewrote the stories from memory and published them as *Touch the Morning* (Cotton, 1979). More recently, William Cotton's daughter, Jane Cooper, published William's recollected stories in Cotton (2013), but without consultation with the local Aboriginal community (Johnson et al., 2015: 14). The republished version of the story, called *Cross of Fire*, evokes substantial Christian imagery.

It identifies the mountain in the story, *Meledna Lopatin* (Mountain of Fire), as Mount Amos in eastern Tasmania (Cotton, 2013: 62). It also names the two men who bring fire as *Una* and *Bura*. Translations of the men's names are found in Roth's (1890) consolidated vocabulary. *Una* or *Une* translates to *fire*. The two words joined —*Une Bura*—is translated to 'lightning' and *Bura* alone is translated as 'thunder' (Roth, (1890: xiv). *Una* and *Bura* differ from the names given to these two stars in Robinson's recordings, and give a literal and direct translation to their intended meaning: fire, lightning and thunder. Similar to *The Legend of the Origin of Fire*, this story ends with the two men and the two women returning to the sky. However, *Cross of Fire* identifies the four stars as the brightest four stars in Crux (the Southern Cross), called *Urapane Lopatin* ('Cross of Fire') in the eastern Palawa language (Roth, 1890: xxiii, xi, respectively). In this account, the stingray joins them in the sky. This is the first account that mentions this. Conversely, the *Cross of Fire* story does not identify the Coalsack or any dark patches in the sky (see Cotton, 2013: 71). It is difficult to ascertain the accuracy of these records, given that they were retold from memory long after they were recorded, and they contain heavy Christian imagery.

Going back to Robinson's journals between April and July 1831, he identified a particular star, *Lorenepenner,* as being female (Table 1). The Oyster Bay word *Lorenepenner* is translated as 'wife' (Robinson and Plomley, 2008: 497). Milligan (1890: 51) identified the women as *Lowanna*, which was a common word for women in Milligan's own collected vocabulary. The presence of a female-star in Robinson's notes supports the idea that a version of *The Legend of the Origin of Fire* could have been relayed to Robinson during his mission, with the names of the stars representing the names of the ancestral protagonists featured in the story.

On 27 June 1831, Robinson wrote:

> In conversation with the natives respecting the stars. These people, like the ancients, have described constellations in the heavens as resembling men and women, men fighting, animals, and limbs of men; together with names for the stars. The Aborigines pointed them out. (Robinson and Plomley, 2008: 497).

Unfortunately, like many of Robinson's entries, it is condensed and short on detail. The excerpt provides a summary of features of Aboriginal interpretations of the stars, many identifiable within Milligan (1890).

This tradition, shared by a member of the Oyster Bay group, can be unpacked beyond that of labels and language. Oral traditions are passed down for (potentially) thousands of years. These traditions are encoded with information significant to the survival and navigation of the physical and social landscape. Reading the canopy of stars above as a form of traditional text informs practice on land, which is evident in *The Legend of the Origin of Fire.* On the surface, this tradition explains how fire came to the people of Tasmania. But this story contains information about seasonal indicators, fishing customs, burial and healing practices, as well as fire attainment.

Palawa women living on coastal environments, like Oyster Bay, spent many hours in the water. Acting as the main hunters of shellfish and being trained from a young age, they could dive considerable depths on a single breath (Robinson and Plomley, 2008: 66–88; Johnson et al., 2015: 39). Due to the significant time people spent in the sea, the oral tradition and the night sky were important for informing cultural practices regarding how to navigate their environment safely.

According to the oral tradition, two women diving for crayfish were 'sulky' due to the actions of their unfaithful husbands. Consequently, the women were speared by the stingray and died. The same wording was used in an earlier recording of a separate incident in Robinson's journals. On 4 November 1830, Robinson described the women returning from diving for crayfish off Swan Island, where they were chased by a shark (Robinson and Plomley, 2008: 302). The women were described as sulky, which made the sharks come.

The Legend of the Origin of Fire also described the women as being 'sulky' when they were speared and killed by the stingray. Afterwards, the two star men arrived and killed the stingray with their spears (Milligan, 1890: 13). This reflects culture practiced on the ground. Lloyd (1862: 52) recorded a personal observation from an Aboriginal hunting trip the morning after a significant corroboree was held during a Full Moon. He describes how up to 300 people surrounded stingrays in a semi-circle, and then the men speared them.

The final section of this tradition (Milligan, 1890: 13) explains the revival of the two women who were speared by the stingray. The dead women were placed on either side of a fire and the men placed 'blue ants' on the breasts of the women. After being bitten severely, the women came back to life. The importance of fire within Aboriginal cultures and its relationship with rejuvenation and healing is described in oral tradition. On the Wellesley Islands in the Gulf of Carpentaria, meteors signal the end of a healing process (Cawte 1974: 110). A disease called *malgri* is treated by lighting a fire next to the patient, encouraging them to heal by sweating.

Similarly, Bonwick (1870) described a Palawa patient drinking lots of cold water then lying by the fire to encourage perspiration.

The blue ant (*Diamma bicolor*) is actually a parasitic wasp found throughout southeast Australia. The female has an ant-like appearance and if disturbed, her stinger can cause burning pain and swelling. Early recordings ascribe large ants or *Diamma bicolor's* eggs as being a delicacy among the Palawa (Noetling, 1910: 281). Blue ants are active in mid to late summer, playing an important role in pollinating native plants, a possible timing component within the tradition that indicates seasonal change (ibid.).

3.4 Time, Navigation and Astronomy

Time-keeping is important for food economics, calendar development and ceremony. Consolidated vocabularies of the language groups of Tasmania (Table 3) reflect words used to indicate time of the day (e.g. sunrise, midday, sunset, twilight), astronomical presence (e.g. starlight, moonlight) and seasons (Milligan, 1890; Plomley, 1976). There are no words for the concept of time itself, a point made by Stanner (2011).

Roth (1890: 146) made a fleeting comment on the understanding of time and astronomy of Aboriginal people. He noted that they pointed out the diurnal motion of the Sun with their hands and held up two fingers to denote two days. He then claimed that "This is the only reference to any knowledge of the movement of the heavenly bodies." Conversely, Robinson wrote on 13 March 1834 that the Palawa were quite familiar with the stars and had names for them all and were aware of their movements (Robinson and Plomley, 2008: 302). This demonstrates knowledge of the movement of heavenly bodies.

On 25 December 1830, Robinson praised the "… considerable knowledge …" of Palawa on meteorology so much so that they had "… attained to such celebrity." As a result, Robinson and other white men would consult them on the subject and be pleased at the information they received as it was seldom wrong (Robinson and Plomley, 2008: 334). The Palawa used the stars and clouds to predict weather and determine when to fish, build huts and travel.

Astronomical knowledge is embedded in Aboriginal traditions, but is not always as obvious as a direct statement. Robinson's manuscripts describe a song from the northwest, north coast, and interior Palawa groups that was possibly used for navigation and travel. The Palawa

> … repeat the words *tonener* (Sun) and point the way the Sun is travelling in her course, and point to where they are stopping for the Sun to be there. (Plomley, 1976: 51).

Tonner also referred to the 'West' (Plomley, 1976: 205) and was part of the word for the Black Milky Way, *tonnermuckkellenner* (Plomley, 1976: 408). The description of the actions that accompanied the repetition of *tonner,* indicated that this song was sung to help with timing and navigation on their journey, serving as an insight into a Tasmanian songline. We suggest that the songline describing "… the way the Sun is travelling … [and indicating] where they are stopping …" in relation to the Sun demonstrates a form of celestial navigation.

Table 3: Vocabulary table of Aboriginal words indicating time of day (after Plomley, 1976).

Term	Bruny Island /Southern TAS	Oyster Bay	Northern TAS	Western TAS
Twilight	nunto neenah	teggrymony keetana narra long - boorack		
Early morning twilight	nunawenapoyla	tuggamarannye		
Sunrise	panubre roeelapoerack	muenattemelar	warkala wetinneger	
Sunrise		puggalena parrack boorack		
Midday	toina wunna	tooggy malangta		
Midday	wer			
Sunset	punubra tongoieerah	wietytongmena		
Sunset		partopelar		
Moonlight	weetapoona	wiggetapoona		weenapooleah
Starlight	oarattih	teahbertyacrackna		

Table 4: Names given to the three stars shown to Robinson on 30 June 1834

Origin	Aboriginal Word	Possible meaning
Bruny Island	PUR	White Edible Berry
Oyster Bay	PARNG.GER.LIN.NER	Wife (Eastern)
Northern	NOE.GO	West Point (place)
Western	LONE.ER.TEN	Wife

3.5 Seasonal Change and Astronomy

A group of three unidentified stars marking seasonal change are mentioned three times in the literature: twice in Robinson's journals (on 20 June 1832 and 30 June 1834) and again in interviews conducted by Ernest Westlake between 1908 and 1910. In all instances, the three stars were used to track time seasonally. In the 1832 account, the dark phases of the Moon were used in conjunction with stars to indicate specific shorter intervals of time. The Western names of these stars remain unknown.

Robinson's 30 June 1834 entry (Robinson and Plomley, 2008: 111) provides the positions and magnitudes of the mystery stars and their use as a seasonal indicator (the names are listed in Table 4):

> AM, calm and clear, fine weather, Sun hot. The natives showed me the three stars which they say is a sign that the fine weather is coming and when those stars are vertical the fine weather is come. They appeared in the heavens to the eastward. No. 1 was large and is called the mother, No. 2 the husband is of lesser magnitude and No. 3 the offspring is hardly visible. They are called by the Brune natives PUR, by the western natives LONE. ER.TEN, by the northern natives NOE.GO, and by the natives of Oyster Bay PARNG.ER. LIN.NER.

The Bruny Island word *Pur* is similar to *Purrar*, a Bruny word given to white edible berries (Plomley, 1976: 340). This association suggests that the star is white, ruling out red stars. The Western group's word *Loneerten* has connections with *Looner*, or 'wife' across many Palawa-language groups (Plomley, 1976: 471). The Northern word *Noego* is quite close to *Nongor*, the Palawa name for West Point in northern Tasmania. *Parnggerlinner*, from Oyster Bay, may be related to the word *Parnuneninger* for 'wife' used by some eastern groups (Plomley, 1976: 321).

Key information provided from this journal which aids in identifying the stars is as follows:

(1) The date visible was 30 June 1834 at dawn (see Figure 4);
(2) The stars appeared eastward (azimuth between 0° and 180°); and
(3) The stars were of different magnitudes: a large (bright) star (presumably first magnitude), a lesser bright star (presumably a second or third magnitude star), and a hardly visible star (presumably of the fifth or fainter magnitude).

The orientation of the three stars in his drawing is an illegible number. Plomley interpreted this number to be 30, presumably from looking at the sketch drawn by Robinson in Figure 5. Robinson wrote that the stars indicated fine weather was coming. When they were vertical, fine weather had come. Identifying a period of

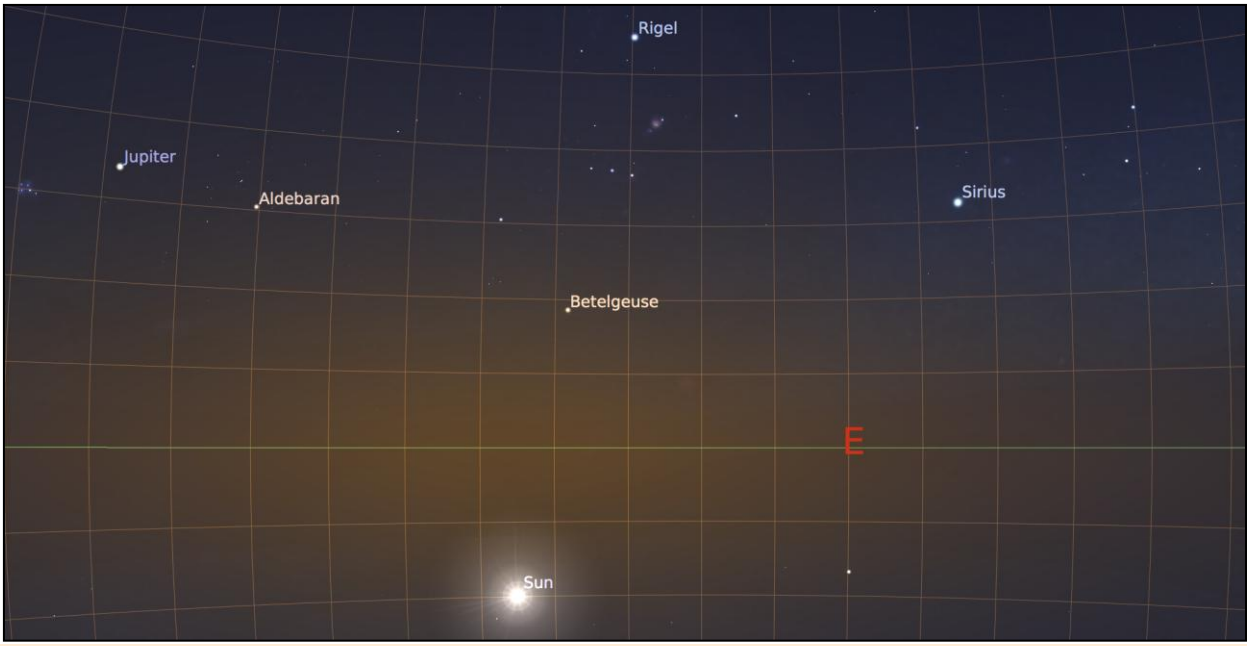


Figure 4: Stars in the eastern sky at dawn (when the Sun is at an altitude of –10°) on 30 June 1834. Notable first magnitude stars are Sirius (right), Rigel (top), Betelgeuse (centre), and Aldebaran (left). The grid is shown in 5° increments in both declination and right ascension, where the green horizontal line is the horizon (Image: Stellarium).

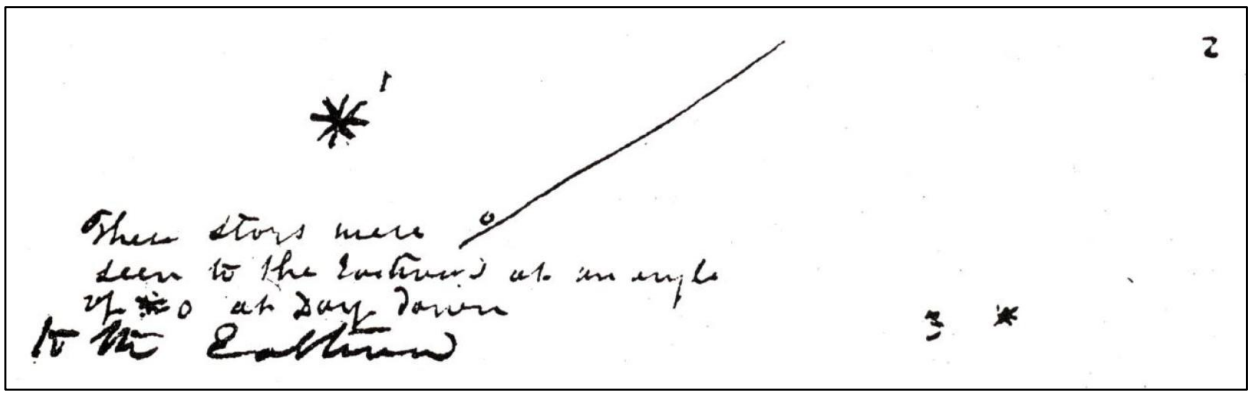


Figure 5: The sketch Robinson made showing the orientation of the three stars described on 30 June 1834.

'fine weather' in the calendar year will approximate a date to then test for stars that are vertical at this time. The clan territories that name the stars are from the North, East, West, and South of the island, indicating that 'fine weather' would (on average) be experienced across the whole of Tasmania. Meteorological data show that Tasmania experiences constant rainfall through the year, with winter having the most, and can experience multiple seasons in one day. Based on these data, 'fine weather' could be considered the 'summer months', most likely January. Since the time when climate records were first kept, January has the least rainfall.[3]

With these variables in mind, Plomley's identification can be tested. Plomley classified the three stars as the Pointer stars, α and β Centauri (Plomley, 1997; Robinson and Plomley, 2008: 953). On the morning of 30 June 1834 (when the Sun was 10° below the horizon; see Hamacher, 2015), the Pointers appeared in the southwest (Az = 185°–190°), not the east. The Pointers were both of similar brightness (V_{mag} = +1.33 and +0.61 for α and β, respectively) and a third barely visible star in a line with these was difficult to identify.

The Pointers are circumpolar as seen from Tasmania, so they can appear to be horizontal on some occasions in the morning and vertical in others: they are vertical (having the same azimuth) in the morning sky in mid-January and are horizontal (having the same altitude) high in the sky a month later in mid-February, or horizontal low in the sky in late July/early August.

Plomley's identification is inconsistent with the information drawn from the journal entry. Despite lining up vertically at certain times of the year, α and β Centauri encircle the South Celestial Pole. Robinson stated that the three stars lay to the east. In subsequent publications, researchers have mis-transcribed Plomley's hypothesis by claiming the stars in question are α and β Crucis (the two brightest stars in the Southern Cross), causing some confusion (e.g., see Coon, 1972: 288).

While it is difficult to accurately label the stars from the description given, there were a number of stars sitting on the eastern horizon on that morning. Many moved to a vertical position on the western horizon, on a mid-January morning. The following stars/star groups appeared prominently in the east at dawn on 30 June 1834: Pleiades (Messier 45), Sirius (α Canis Majoris), Aldebaran (α Taurii), Betelgeuse (α Orionis), Bellatrix (γ Orionis) and Orion's Belt (Mintaka, Alnilam, Alnitak).

This list identifies *the most prominent* stars visible at that time. Canopus is not included in this list as it sat closer to the southeast, never set below the horizon (it was circumpolar), and previously was identified as the creator ancestor *Droemerdeene* (although we question this identification). We attempt to identify the stars recorded by Robinson by examining a suitable list of candidates and comparing them with the information provided in the record, utilising the stars' magnitudes, relative positions, and colours (Tables 5 and 6).

Robinson's sketch does not show the stars in a linear pattern. The third star is described as being "… barely visible". Due to the faint magnitude of the third star there are multiple candidates. When grouping the three stars we take into consideration the orientation of the third star as well as the magnitude; only picking stars that were fifth magnitude or brighter.

Groups 3 and 7 are the only ones that meet all of the criteria. The Group 3 stars (Figure 6) fit the description reasonably well. Of the three stars, Sirius the brightest star in the sky, sat eastward at dawn. Its orientation with Adhara and Wezen was similar to the sketch drawn by Robinson (Figure 5). Sirius, the most northerly of these stars, exceeded an altitude of 5° (the extinction angle) when the Sun was at −10° altitude on 15 June 1832. This is considered the first day the three stars of Group 3 were unambiguously visible in the east at dawn. The relative brightnesses are roughly consistent, although Wezen, with a V_{mag} of 1.2, is not "hardly visible". But when the stellar trio were very low on

Table 5: Seven possible groupings of three stars as recorded by Robinson. The groupings of three stars noting their visual magnitudes (V_{mag}), general spectral type (colour), and the star's coordinates (right ascension and declination in J2000).

Common Name	Bayer Designation	V_{mag}	ST (Colour)	RA (J2000)	DEC (J2000)
Rigil Kent	α Centauri	0.01	G (Yellow/White)	$14^h\ 39^m\ 36.5^s$	–60° 50′ 02.4″
Hadar	β Centauri	0.61	B (Blue)	$14^h\ 03^m\ 49.4^s$	–60° 22′ 22.9″
Hip 70264 A	n/a	4.90	K (Orange)	$14^h\ 22^m\ 38.02^s$	–58° 27′ 36.7″
Mintaka	δ Orionis	2.23	O/B (Blue)	$05^h\ 32^m\ 00.4^s$	−00° 17′ 56.7″
Alnitak	ζ Orionis	1.77	O/B (Blue)	$05^h\ 40^m\ 45.5^s$	−01° 56′ 33.3″
Alnilam	ε Orionis	1.69	B (Blue)	$05^h\ 36^m\ 12.8^s$	−01° 12′ 06.9″
Sirius	α Canis Majoris	−1.46	A (Blue/White)	$06^h\ 45^m\ 08.9^s$	−16° 42′ 58.0″
Adhara	ε Canis Majoris	1.50	B (Blue)	$06^h\ 58^m\ 37.6^s$	–28° 58′ 19.0″
Wezen	δ Canis Majoris	1.82	F (White)	$07^h\ 08^m\ 23.5^s$	−26° 23′ 35.5″
Aldebaran	α Tauri	0.87	K (Orange)	$04^h\ 35^m\ 55.2^s$	+16° 30′ 33.5″
Bellatrix	γ Orionis	1.64	B (Blue)	$05^h\ 25^m\ 07.9^s$	+06° 20′ 58.9″
Meissa	λ Orionis	3.50	B (Blue)	$05^h\ 35^m\ 08.29^s$	+09° 56′ 03.0‴
Betelgeuse	α Orionis	0.42	M (Red)	$05^h\ 55^m\ 10.3^s$	+07° 24′ 25.4″
Mirzane	β Canis Majoris	1.99	B (Blue)	$06^h\ 22^m\ 42.0^s$	−17° 57′ 21.3‴
Beta Monocerotis	β Monocerotis	4.60	B (Blue)	$06^h\ 28^m\ 49.16^s$	−7° 01′ 58.2‴
Rigel	β Orionis	0.12	B (Blue)	$05^h\ 14^m\ 32.26^s$	−8° 12′ 06.0″
Mirzam	β Canis Majoris	1.99	B (Blue)	$06^h\ 22^m\ 42.0^s$	−17° 57′ 21.3″
Saiph	κ Orionis	2.09	B (Blue)	$05^h\ 47^m\ 45.4^s$	−09° 40′ 10.6″
Bellatrix	γ Orionis	1.64	B (Blue)	$05^h\ 25^m\ 07.9^s$	+06° 20′ 58.9″
Saiph	κ Orionis	2.09	B (Blue)	$05^h\ 47^m\ 45.4^s$	−09° 40′ 10.6″
Gamma Monocerotis	γ Monocerotis	3.95	A (White)	$06^h\ 14^m\ 51.10^s$	−06° 16′ 26.0″

Table 6: Possible groupings of three stars using the description recorded by Robinson. The groupings are tested to see if they match the criteria using Robinson's recorded descriptions.

Star Groupings	Non-Red Stars	Eastward	Dawn	Sketch and Magnitude	Vertical in mid-January
Group 1	✔		✔		✔
Group 2	✔	✔	✔		✔
Group 3	✔	✔	✔	✔	✔
Group 4		✔	✔		✔
Group 5		✔	✔	✔	✔
Group 6	✔	✔	✔		✔
Group 7	✔	✔	✔	✔	✔

the horizon at dawn, the background light was enough to sufficiently obscure it and make it appear much fainter.

Group 7, while meeting all of the criteria, seems less likely as they straddled Orion's Belt. Orion's Belt was mentioned by Robinson in earlier entries, indicating that he knew the asterism and was likely to have labeled or located them when describing the three stars. There is one problem: if Plomley is correct in identifying Betelgeuse and Sirius as *Dromerdeene's* brothers, would he not recognise Sirius—the brightest star

Figure 6: A trio of bright stars in Canis Major—Sirius, Adhara, and Wezen (Group 3)—are the best fit for the three stars described and illustrated in Robinson's journals. Sirius has an azimuth of 107.5° at an altitude of 5° at dawn (when all three stars are first visible together above the horizon) on 15 June 1832 (shown) (Image: Stellarium).

in the sky—and realise that it was already identified in Palawa traditions?

An altercation between the Tarkiner group of Northwest Tasmania and the Robinson party occurred, and a fight was scheduled to take place at Nongor (West Point). The two entries below were made by Robinson regarding the timing of this fight (Robinson and Plomley, 2008: 652):

> 19 June 1832: I learnt that the TARKINER natives were to come and fight them when the rest came back from Robbins Island – the TARKINER would come two dark nights after the Moon was gone (it was now moonlight).
>
> 20 June 1832: Learnt that the greater part of the natives had gone to Robbins Island and were engaged in getting spears, that they would return again when two darks or when the three stars come.

The New Moon (denoting the days where less than 3% of the Moon facing the Earth is illuminated) occurred from 26 to 28 June 1832. The fight with the Tarkiner was scheduled for 29 June 1832—two nights after the 'disappearance' of the Moon. This allowed the combatants nine days to prepare. Additionally, the appearance of the stars may have signified the time of day, not the day of the month. This may have been indicated by two dark nights (date) and "… when the three stars come" (time), translating to Friday 29 June 1832 at approximately 05:45.

The reference to "… when the three stars come …" seems to refer to the three stars we are trying to identify in this section. Coincidently, Robinson was shown the three stars that indicated seasonal change exactly two years later, on 30 June 1834, suggesting the same three stars were described in both accounts. The earlier mention of the three stars in 1832 indicates that they had yet to appear in the sky.

In an interview with Ernest Westlake, noted under the heading 'Springtime', Augustus Smith (Fanny Cochrane Smith's grandson) spoke of three stars (Plomley et al., 1991: 63):

> Three little stars in the east on a level only once in a year. Thought a lot of them, justto see them blinking. FS thought it a terrible thing if didn't welcome these three little stars. Would sprinkle the ashes from the hearth very early in the morning before the Sun had risen, when the stars are bright.

Like the two previous entries in Robinson's journals, Smith described the three stars to the east in the early morning 'on a level', and associated them with seasonal change (springtime). The three stars of Orion's Belt (Alnitak, Alnilam, and Mintaka) are seen in the early morning sky rising 'on a level' during the winter months of June, July, and August (Figure 7). The stars of Orion's Belt rise heliacally (at dawn) around 8 June each year, and heliacally set (at dusk) around 19 July. The heliacal rise appears to be premature for a welcoming of Spring, yet the Orion asterism is visible in the sky, just as described in the three literature entries.

The earliest recording of three stars in June 1832 gives timing components (dates, two dark nights, indication of moonlight) to cross check. The emergence of the three stars of Orion's Belt is in line with the description. Orion's Belt ap-

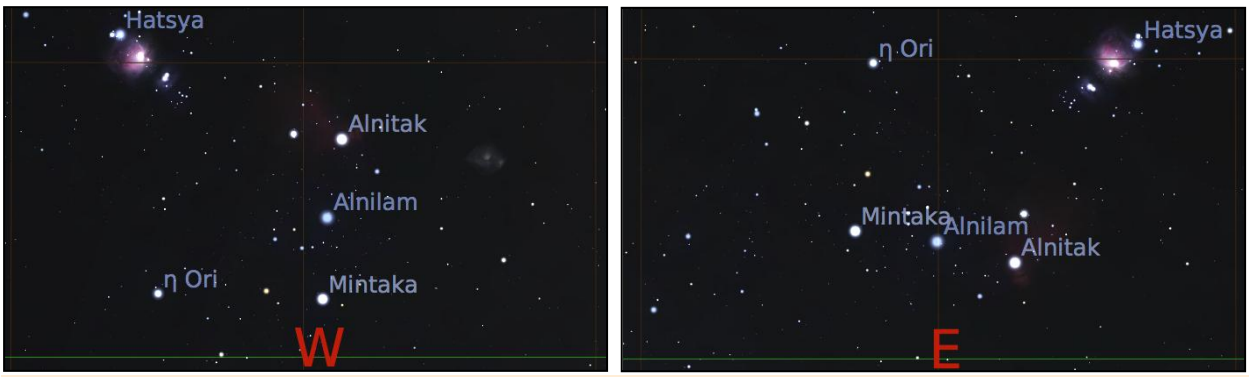


Figure 7: The stars of Orion's Belt rising in the East (right) and setting in the West (left) as seen from Tasmania in the 1830s. The belt stars are 'level' as the rise, and perpendicular to the horizon as they set (Image: Stellarium, but 'without atmosphere' for clearer visibility for the reader).

peared above the horizon early in the morning from 05:30, before setting with the Sun at 07:00. Two years later, nearly to the day, Robinson wrote about three stars again. Accompanying the entry is the sketch placing the stars as 'eastward' at 'day dawn'. The three stars of Orion's Belt were clearly visible on the horizon in the east at that time. The repetition of the position of the three stars at the similar time of year supports the idea that the three stars of Orion's Belt could be the stars recorded in the journal. The constellation of Orion is visible above the horizon during summer nights, supporting the idea that the first appearance of these stars would have been welcomed after a cold Tasmanian winter. This is uncertain, but will be the topic of future ethnographic work.

3.6 Lunar Traditions

As noted in Cotton's (1979; 2013) recording of Toogee elder Timler's tradition, the Sun and Moon are parents of the creation ancestors that became the first stars. Similar traditions exist across Tasmania. The Palawa of Bruny Island told Robinson how the Moon-woman, *Vetea*, got her dark patches (the maria on the Moon):

> The Brune natives affirm that the Moon (VETEA) came from England and that she stopped at the RORE.DAIR.RE.ME.LOW, that is, the country at Oyster Bay, that the kangaroo and mutton fish asked the Moon to stop there, that the Moon was LOONER, woman, that she was roasting mutton-fish when the Sun (PARNUEN) came and swept her away, and she tumbling into the fire was hurt on her side and then rolled into the sea, and afterwards went up into the sky (WARRANGERLY) and stopped there with her husband the Sun. They say the rainbow is the Sun's children. [Woorady] Told me if I looked I would see it black where she had been burnt. (Robinson, 1831: 412).

The Adnyamatana of the Flinders Ranges in South Australia have a tradition in a similar vein. *Vira*, the Moon-man falls off his stick ladder while trying to punish his nephew for stealing his food (Tunbridge, 1988: 68–69). On impact he bursts open, leaving marks on his belly.

The Moon was used by Palawa to tell the time (Robinson and Plomley, 2008: 652) and count (Robinson and Plomley, 2008: 267). The appearance of the Moon could also signal a change in the weather (Robinson and Plomley, 2008: 334):

> … if a circle [halo] is round the Moon it's a sure sign of bad weather. Indeed, they have numerous signs by which they judge and I have seldom found them to err. Thus they are enabled to know when to build their huts, to go to the coast for fish, travel etc. They also judge by the stars and have names by which they distinguish them.

In the weather folklore of cultures around the world, lunar haloes have long been used to predict bad weather (e.g. Guiley, 1991: 22). The halo itself is caused by moonlight being refracted by ice crystals in the atmosphere. These crystals form in cirrus clouds, which often come before a low pressure system, of which rain is a frequent result.

These traditions emulate a constant theme of disruption and restoration that is common in lunar traditions. We argue that the Moon was a symbolic cycle of pain and healing that was reflected on the bodies of Palawa. Scarring was first thought to be unique to each group, as a distinguishing feature between nations. Yet often when there was mention of cicatrices, Robinson offered an astronomical motif in partnership, indicating meaning beyond the cosmetic (Johnson et al., 2015: 35). Sightings of Moon- or crescent-shaped markings on Palawa bodies appeared, but were not limited to the east coast of Tasmania. When they landed on the east coast of Tasmania, Lieutenant Le Paz, a member of French explorer Marc-Joseph Marion Dufresne's expedition in 1772, noticed "… several little scars or black marks in a crescent shape …" on the chest of a young man (Duyker, 1955: 33).

On 1 November 1830, Robinson observed

most of the people from the eastern groups "… had the form of the Moon cut on their flesh." (Robinson and Plomley, 2008: 297). In a note written on the end pages of his journal, Robinson carried on this thought and wrote (ibid.: 613):

> … the Aboriginal females on the islands have round circles cut in their flesh in imitation of the Sun or the Moon. I have seen a woman with four of them on her body; others I have seen with two or three. They are very fond of them, are generally placed on each side of the backbone and about the hips ... The cicatrices of the Sun and Moon is intended to remove inflammation and having the power of those luminaries they imagine it will have the same influence on the part infected.

Similar circular images were reproduced in rock engravings, drawings, huts, stone arrangements (Bonwick, 1870: 192), and on bodies, often involving more than one meaning. Robinson wrote of a surveyor, Mr Hellyer, seeing a circular charcoal drawing and believing it was a representation of the Sun. Robinson corrected him in his journal stating: "Those circles are emblematical devises of men and women …" (ibid.: 575). In regard to this entry, Plomley addresses the conflicting meanings without mentioning the possibility of the circle being a polysemous symbol. The Moon was previously identified as a woman named *Vetea*, indicating a circle can mean both woman and Moon. The multi-layered meanings of man, woman, Moon, and Sun are interchangeable and complex. The power of each is not confined to a singularity, but rather an Indigenous view of well-being, traversing body, environment, and spirit in an ebb and flow of meaning and balance.

Robinson identified women specifically in the above passage, noting their cicatrices were localised around the hips and on either side of the spine. These areas on a woman's body are affected by strain during childbirth and menstruation. The waxing and waning Moon is often linked to the cyclic flow of menstruation (Berndt and Berndt, 1993). The Moon is recorded as both male and female across Aboriginal communities in Australia (usually male), and is often related to fertility, no matter the gender. The Moon man in some traditions, if looked at directly, can impregnate young women (Haynes, 1997: 107) or oppositely render the onlooker barren (Bates, 1972).

In Tasmania, the placement of these cicatrices could have been used as a healing agent in response to back pain and curing issues around fertility. Women were assigned much of the labour, including hunting crayfish and seals, climbing trees for possum, mining ochre, and on Robinson's journeys carrying the bulk of the load while travelling. The men hunted larger game and act as guards for the group (Johnson et al., 2015; Robinson and Plomley, 2008).

Finally, the origin story recounted by Leigh Maynard (Thompson and Tasmanian Aboriginal Community, 2011) in Section 3.1 described the phases of the Moon. In the beginning, the Sun and Moon rose together (New Moon). As each day passed, the Moon woman fell behind the Sun man in their journey across the sky. He encouraged her by lighting more of her up each day, which explained the waxing Moon. Eventually she was on the opposite side of the sky to the Sun (Full Moon). This is one of the rare accounts that explicitly acknowledges that the light of the Moon is a reflection of the Sun's light (a point noted by R.S. Fuller, pers. comm., 2016).

3.7 Transient Phenomena

Transient phenomena, such as meteors, comets, eclipses and aurorae, are featured prominently in Aboriginal traditions across Australia (Hamacher, 2012). Palawa from across Tasmania also have traditions of these phenomena, which are discussed in this section.

3.7.1 Meteors

There are few records of how Palawa perceived or understood meteors in their traditions. In southern Tasmania, a meteor was called *Pachareah* (Milligan, 1866: 426) and Coon (1972: 288) mentions that a falling meteorite one night startled some Palawa, who shrieked and hid their heads.

In Plangermairrener traditions (Noonuccal, 1990: 115–119), a cheeky woman named *Puggareetya* tormented and fought a snake. Their wrestling upheaved the ground, forming the hills and mountains of the landscape. The snake cast the woman into the sky and is held there by the sky spirit *Mienteina*. *Puggareetya* continues to play tricks on the sky deities, who occasionally grow frustrated with her antics and throw her across the sky. She is then seen as a meteor (Hamacher and Norris, 2010).

As discussed in Section 3.1, the star-spirits, *Moinee* and *Droemerdeenne*, battled and *Moinee* fell to Earth at Cox Bight, where he can be seen today as a large standing stone (Coon 1972: 288). It is assumed *Moinee* took the symbolic form of a meteor ('falling star'), but this is inferred, never stated.

3.7.2 Aurorae

Cultural traditions of the *Aurora Borealis* (northern lights), which are commonly visible to cultures at high latitudes, tend to be associated with positive omens (Hamacher, 2013). Where aurorae are less common, such as those in the Southern Hemisphere, traditions err towards

caution and act as warning. The positioning of Australia on the northern edge of the southern auroral zone means that the *Aurora Australis* was rarely seen, compared to areas within the peak of the auroral zones. Aurorae in Aboriginal traditions are often associated with blood, fire and death because of its sometimes reddish appearance (ibid.).

The *Aurora Australis* is well known to the Palawa, as Tasmania lies at the northern edge of the southern auroral zone. There are a few different Palawa names of aurorae, as noted in Robinson's journals. On 19 October 1837, Robinson recorded two names from Rolepa, a leader of the Ben Lomond group, as *Nohoiner* and *Purnenyer*, and two names from the Western Palawa: *Genner* and *Nummergen*.

Nohoiner is nearly identical to the Cape Portland name *Noiheener*, attributed to an 'electric spark' recorded in an entry by Robinson six years earlier. The Ben Lomond Palawa were thought to be linked in trade agreements with the Cape Portland Palawa. It is possible that they shared language and it is possible that the two words meant the same thing with respect to random light phenomena (Ryan, 2012: 32).

The earlier use of the Cape Portland word *Noiheener* was recorded by Robinson on 12 August 1832 and parallels the sentiments of mainland Aboriginal Australia's feelings of apprehension when an aurora was visible (Robinson and Plomley, 2008: 430):

> The natives last night saw an electric spark in the atmosphere, at which they appeared frightened, and one of them told them not to mention it as they would all be sick if they did – the native of Cape Portland call in NOI.HEE.NER and the Port Sorell natives call it NAR.NO.BUN.NER.

It is unclear if the 'electric spark' was referring to an aurora. Similar words with slightly different spelling variations are applied to various forms of light phenomena, including aurorae, lightning and thunder. *Nowhummer* was a word used by Aboriginal people from West Point and Cape Grim in Tasmania's Northwest for an evil spirit (Plomley, 2008: 650). People from Bruny Island are also recorded as believing thunder and lightning is an evil spirit (Plomley, 2008: 321). In Plomley's consolidated word list, *Noiheenner* is a name given by various language groups to represent 'God', good spirit, Sun, Moon, thunder, and lightning. These words may first appear to be different yet they all share attributes of ancestral beings. Robinson, being a religious man, may have translated meanings of thunder and lightning as God or spirits, all of which were taught to be respected and feared.

Records of auroral traditions in Tasmanian languages provide insight into how Palawa paid close attention to properties of natural phenomena. According to Anonymous (1877):

> There was a splendid Aurora in 1847, grand in its-effects at Hobart Town; and an interim one September 4, 1851, at the same place where the vividly shooting streamers of violet, red and other colors, where somewhat marred by the bright moonlight. The Aborigines of Tasmania compared the crackling noise of the curruscation to the snapping of their fingers.

Despite reports of sound associated with aurora, it was not believed an aurora could produce these sounds, as it was too far away. In 2012 researchers from Finland found a direct link between noise and aurorae, and that the auroral sounds actually were generated close to the ground (Laine, 2012).

3.7.3 Eclipses

There are no confirmed accounts of solar eclipses in recorded Palawa traditions, but there is a record of a lunar eclipse. During the Robinson expedition from 1829 to 1834, 11 lunar eclipses were visible from Tasmania, including two total eclipses (both in 1830). [2] But only one was mentioned in any of Robinson's journals and none was identified from the remaining literary sources.

On 24 August 1831, Robinson wrote that two days earlier, Manalargenna, Kickerterpoller, and three women left to make contact with other people in the area. They were away from Robinson's party for five days, and during their absence the guides with Robinson noticed the Moon move into the Earth's shadow. They took this as an ominous sign that harm had come to Kickerterpoller and he had ascended to the Moon. Truganini and Woorrady saw the lunar eclipse from Waterhouse point and read it as a bad sign that Robinson had been speared (Cameron, 2015). We identify this as a reference to a partial lunar eclipse visible on 23 August 1831 that reached mid-eclipse at 22:00. The perception of the eclipse by Truganini, Woorrady, and Robinson's guides is more or less consistent with other Aboriginal views of eclipses from across Australia (Hamacher and Norris, 2011).

4 SUMMARY AND CONCLUSION

This paper explores the fragments of Palawa astronomy recorded in the literature dating back to the early nineteenth century, from which we attempt a partial reconstruction. While variations of knowledge in some cases are evident, there is continuity with many of the traditions, including those relating to the Sun, Moon, the creation brothers, the stingray in the sky, calendars, time keeping, and views of transient phenomena. This suggests that Palawa used the Sun for navigation and developing songlines.

Mainland Aboriginal traditions share fundamental similarities with those of Aboriginal Tasmanians. Locality affects individual groups' astronomical traditions across Australia, as the adaptive nature of the traditions reflects the natural world in which the community lives. Astronomical objects commonly associated with Aboriginal traditions on the mainland of Australia are the Milky Way, Orion, the Pleiades, the Magellanic Clouds, dark nebula (e.g. the Coalsack), the Sun, and the Moon. All are represented in recorded Tasmanian traditions except for the Pleiades and the Magellanic Clouds. The absence of these objects is peculiar. They are incorporated into traditions of nearly all Aboriginal groups across Australia. Johnson (2011: 295) believes it is unlikely there were no Tasmanian traditions about the Pleiades, but for some reason they simply were never recorded.

This paper is a preliminary study into how Palawa constructed and utilised the connection between the landscape and skyscape. This included the diurnal motion of the Sun and its application to navigation, how the movements of the stars were used to denote seasonal change and timekeeping, and how transient astronomical phenomena were associated with death or bad omens. The Moon's importance as a symbol of restoration and healing may have had symbolic representation on cicatrising marks found on people's bodies and explained through oral traditions.

This research shows how the night sky is a blackboard on which traditions are drawn with stars, and retold to educate generations about moral code and law. But it is also only a rudimentary starting point for future research.

5 NOTES

1. In Boorong traditions of western Victoria (Stanbridge, 1858: 140), Castor (*Yuree*) and Pollux (*Wanjel*) represented two young male hunters who pursued a kangaroo and killed him at the commencement of the 'great heat' (summer).
2. In this context it is interesting that in north-western Victoria the Coalsack was an emu named *Tchingal* in the Wergaia language. The eastern stars of the Southern Cross (α and β Crucis) were the pointy ends of the spears of two warriors who speared the emu through the neck and rump (Stanbridge, 1858: 139).
3. https://en.wikipedia.org/wiki/Climate_of_Tasmania
4. Javascript Lunar Eclipse Explorer, NASA. Eclipse predictions by Fred Espenak and Chris O'Byrne. http://eclipse.gsfc.nasa.gov/JLEX/JLEX-index.html

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7 REFERENCES

Agrawal, A., 1995. Dismantling the divide between Indigenous and scientific knowledge. *Development and Change*, 26, 413-439.

Anonymous, 1877. The Drought. *The Queenslander* (Brisbane: 1866–1939), 08 September 1877, p. 18. Retrieved 26 September 2015 (http://trove.nla.gov.au/ndp/del/article/19761483).

Bates, D., 1972. *Tales told to the Kabbarli: Aboriginal Legends Collected by Daisy Bates, retold by Barbara Ker Wilson*. Sydney, Angus & Robertson.

Berndt, R.M., and Berndt, C.M., 1993. *A World That Was: The Yaraldi of the Murray River*. Melbourne, Melbourne University Press.

Bonwick, J., 1870. *Daily Life and Origin of the Tasmanians.* London, Sampson Low, Son, & Marston.

Bonwick, J., 1884. *The Lost Tasmanian Race*. London, Sampson Low, Marston, Searle, & Rivington.

Breen, D., and Roughley, M., 2015. *Tasmania: A Timeline of the History of First Nations People* (Retrieved 4 October 2015. URL: nationalunitygovernment.org/content/tasmaniatimeline-history-first-nations-people).

Cairns, H.C., and Harney, B.Y., 2003. *Dark Sparklers: Yidumduma's Wardaman Aboriginal Astronomy, Northern Australia*. Merimbula (NSW), H.C. Cairns.

Cameron, P., 2015. *August 21-26 1831 - TPIC - Telling Places in Country (TPIC).* University of Tasmania (Retrieved 5 September 2015; http://www.utas.edu.au/telling-places-in-country/journey-lines/tpic-expeditions/the-emu-hunters/august-21-26).

Cavendish, J.B., and Cavendish, H., 1871. *The Cruise Round the World of the Flying Squadron, 1869–1870: Under the Command of Rear-Admiral G.T. Phipps Hornby.* London, J.D. Potter.

Cawte, J., 1974. *Medicine is the Law: Studies in Psychiatric Anthropology in Australian Tribal Societies.* Honolulu, University Press of Hawaii.

Coon, C., 1972. *The Hunting Peoples*. London, Jonathan Cape.

Coon, C., and Watson, A., 1976. *The Hunting Peoples*. London, Penguin.

Cotton, W.J., 2013. *Land of the Sleeping Gods: Untold History and Mythology of the Tasmanian Aborigines.* Hobart, Wellington Bridge Press.

Cotton, J., 1979. *Touch the Morning: Tasmanian Native Legends.* Hobart, O.B.M.

Duyker, E., 2007. Francois Peron and the Sea. *Tasmanian Historical Studies*, 12, 3–18.

Fuller, R., Norris, R., and Trudgett, M., 2014. The astronomy of the Kamilaroi and Euahlayi peoples and their neighbours. *Australian Aboriginal Studies*, 2014(2), 3–27.

Gough, J., 2014. *The First Photographs of Tasmanian Aboriginal People*. In Lydon, J. (ed.). *Calling the*

Shots: Aboriginal Photographies. Canberra, Aboriginal Studies Press. Pp. 20–52.

Guiley, R., 1991. *Moonscapes: A Celebration of Lunar Astronomy, Magic, Legend, and Lore*. Upper Saddle River (NJ, USA), Prentice Hall Press

Hamacher, D.W., 2012. *On the Astronomical Knowledge and Traditions of Aboriginal Australians*. Ph.D. Thesis (by publication), Department of Indigenous Studies, Macquarie University, Sydney, Australia.

Hamacher, D.W., 2013. Aurorae in Australian Aboriginal traditions. *Journal of Astronomical History and Heritage*, 16, 207–219.

Hamacher, D.W., 2014. Are supernovae recorded in Indigenous astronomical traditions? *Journal of Astronomical History and Heritage*, 17, 161–170.

Hamacher, D.W., 2015. Identifying seasonal stars in Kaurna astronomical traditions. *Journal of Astronomical History and Heritage*, 18, 39–52.

Hamacher, D.W., and Norris, R.P., 2010. Meteors in Australian Aboriginal Dreamings. *WGN – Journal of the International Meteor Organization*, 38(3), 87–98.

Hamacher, D.W., and Norris, R.P., 2011. Eclipses in Australian Aboriginal astronomy. *Journal of Astronomical History and Heritage,* 14, 103–114.

Haynes, R.D., 1997. Dreaming the sky. *Sky & Telescope*, September, 72–75.

Johnson, D.D., 1998. *Night Skies of Aboriginal Australia: A Noctuary*. Sydney, University of Sydney Press (Monograph Series No. 45).

Johnson, D.D., 2011. Interpretations of the Pleiades in Australian Aboriginal astronomies. In Ruggles, C. (ed.). *Archaeoastronomy and Ethnoastronomy*: *Building Bridges between Cultures.* Cambridge, Cambridge University Press. Pp. 291–297.

Johnson, M., McFarlane, I., and Reynolds, H., 2015. *Van Diemen's Land: An Aboriginal history*. Sydney, NewSouth Publishing.

Laine, U.K., 2012. Analysis of clap sounds recorded during the September 9–10 2011 geomagnetic storm. *Proceedings of the the 19th International Congress on Sound and Vibration*, Vilnius, Lithuania. Paper 558, 1-8 (https://www.researchgate.net/publication/258223115_).

Leaman, T.M., and Hamacher, D.W., 2014. Aboriginal astronomical traditions from Ooldea, South Australia. Part 1: Nyeeruna and 'The Orion Story'. *Journal of Astronomical History and Heritage*, 17, 180–194.

Lloyd, G., 1862. *Thirty-three Years in Tasmania and Victoria.* London, Houston & Wright.

Lourandos, H., 1997. *Continent of Hunter-Gatherers: New Perspectives in Australian Prehistory*. Cambridge, Cambridge University Press.

McKay, H. (ed.), 2001. *Gadi Mirrabooka: Australian Aboriginal Tales from the Dreaming*. Edited by Helen F. McKay, retold by Pauline E. McLeod, Francis Firebrace Jones, and June E. Barker. Englewood (CO, USA), Libraries Unlimited.

Milligan, J., 1859. On the dialects and language of the Aboriginal tribes of Tasmania, and on their manners and customs. *Papers and Proceedings of the Royal Society of Tasmania*, 3, 239–282.

Milligan J., 1866. *On the Dialects and Language of the Aboriginal Tribes of Tasmania, and on Their Manners and Customs.* Hobart, James Barnard.

Milligan, J., 1890. *Vocabulary of the Dialects of Some of the Aboriginal Tribes of Tasmania*. Hobart, James Barnard.

Murray-Wallace, C.V., 2002. Pleistocene coastal stratigraphy, sea-level highstands and neo-tectonism of the southern Australian passive continental margin—a review. *Journal of Quaternary Science*, 17, 469–489.

Noetling, F., 1910. The food of the Tasmanian Aborigines. *Papers and Proceedings of the Royal Society of Tasmania*, 1, 279–305.

Noonuccal O., 1990. *Australian Legends and Landscapes.* Sydney, Random House.

Norris, R., 2016. Dawes Review 5: Australian Aboriginal Astronomy and Navigation. *Publications of the Astronomical Society of Australia*, 33, e039.

Orchiston, W., 1979a. Pleistocene sea level changes, and the initial Aboriginal occupation of the Tasmanian region. *Modern Quaternary Research in SE Asia*, 5, 91–103.

Orchiston, W., 1979b. The changing environment of Bass Strait. *See Australia*, 2(2), 3–5.

Plomley, N.J.B., 1976. *A Word-list of the Tasmanian Aboriginal Languages*. Launceston, N.J.B. Plomley.

Plomley, N.J.B., 1997. Contacts with the Tasmanian Aborigines. In Webb, E.K. (ed.). *Windows on Meteorology*. Melbourne, CSIRO Publishing. Pp. 42–45.

Plomley, N.J.B., and Robinson, G., 1987. *Weep in Silence: A History of the Flinders Island Aboriginal Settlement; with the Flinders Island Journal of George Augustus Robinson, 1835–1839*. Sandy Bay (Tas.), Blubber Head Press.

Plomley, N.J.B., Goodall, C., and Westlake, E., 1991. *The Westlake Papers: Records of Interview in Tasmania by Ernest Westlake, 1908–1910*. Launceston, Queen Victoria Museum and Art Gallery.

Pope, K.O., and Terrell, J.E., 2007. Environmental setting of human migrations in the circum-Pacific region. *Journal of Biogeography*, 35, 1–21.

Robinson, G.A., and Plomley, N.J.B., 2008. *Friendly Mission: The Tasmanian Journals and Papers of George Augustus Robinson, 1829–1834, Second Edition.* Hobart, Tasmanian Historical Research Association.

Roth, H.L. 1890. *The Aborigines of Tasmania.* Halifax (UK), F. King & Sons.

Roth, H.L., Walker, J.B., Garson, J.G., and Butler, M.E., 1968. *The Aborigines of Tasmania*. Hobart, Fullers Bookshop.

Ryan, L, 1996. *The Aboriginal Tasmanians*. Sydney, Allen & Unwin.

Ryan, L, 2012. *Tasmanian Aborigines, a History since 1803*. Sydney, Allen & Unwin.

Smith, L.T., 1999. *Decolonising Methodologies: Research and Indigenous Peoples*. London, Zed Books.

Stanbridge, W.E., 1858. On the astronomy and mythology of the Aborigines of Victoria. *Transactions of the Philosophical Institute of Victoria*, 2, 137–140.

Stanner, W.E.H., 2011. *The Dreaming and Other Essays*. Melbourne, Black Inc.

Stephens, J. 2013. Cottoning on to tales that spice up history. *The Examiner*, 23 November 2013 (Accessed 1 May 2016. http://www.examiner.com.au/story/1928188/cottoning-on-to-tales-that-spice-up-history/).

Thompson, L., and Tasmanian Aboriginal Community 2011. *The Creation of Trowenna: A Story from the Neunone People of Tasmania*. Melbourne, Pearson

Australia.
Tunbridge, D., 1988. *Flinders Ranges Dreaming*. Canberra, Australian Studies Press.
Witzel, M., 2013. *The Origins of the World's Mythologies.* New York, Oxford University Press.

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