

Perceptions of Comets Among Aboriginal Australians

Duane W. Hamacher¹ and Ray P. Norris^{1,2}

¹Warawara – the Department of Indigenous Studies, Macquarie University, NSW, 2109, Australia
duane.hamacher@mq.edu.au

²CSIRO Astronomy & Space Science, P.O. Box 76, Epping, NSW, 1710, Australia
ray.norris@csiro.au

Abstract

We present 25 accounts of comets from 40 Australian Aboriginal communities, citing both supernatural perceptions of comets and historical accounts of Great Comets from various Aboriginal communities. Historical descriptions include the Great Comets of 1807, 1843, 1861, 1901, 1910, and 1927. We describe the perceptions of comets in Aboriginal societies and show that they are typically associated with fear, death, omens, malevolent spirits, and evil magic, consistent with many cultures around the world. We also provide a glossary of words for comets in 16 different Aboriginal languages.

Keywords: Comets, Aboriginal, Australia, Ethnoastronomy, History of Astronomy

1.0 Introduction

Cometography is the study of comets from both from a scientific and historic perspective (Kronk 2003). Recorded sightings of comets date back to the second century BCE, with the possibly earliest written recording of a comet by the Chinese in 1059 BCE (Yeomans and Kiang, 1981; Xu et al, 2000:107-125). While historic accounts of comets and their role in mythology have been widely described in the literature (e.g. Levy, 1994; Schechner, 1999; Burnham and Levy, 2000; Kronk, 2003; Donnelly, 2005; Baillie and McCafferty, 2005), little research has been conducted regarding Aboriginal Australian accounts of comets. Ethnographic literature on Aboriginal communities reveals several perceptions of comets and accounts of historic comets. In some cases the comet is described but the author does not specify to which comet the account is referring (e.g. Morrill, 1864; Roth, 1908:8), although the description and dates provided allow the comet to be identified in some cases. In other cases, perceptions of a comet are described, but do not correspond to any particular one. The description of the object, combined with the dates of the vent, allow us to identify the particular comet discussed, providing a more complete historical account. Evidence shows that Aboriginal Australians were astute astronomers (see Norris and Hamacher, 2009), having a complex social and religious economy associated with the night sky. A similar study relating to Aboriginal perceptions of meteors and cosmic impacts is presented in Hamacher & Norris (2010a; 2010b), respectively.

This paper presents various Aboriginal perceptions of comets and well as descriptions of historic bright comets, including the Great Comets of 1807, 1843, 1861, 1901, 1910, 1927 and Comet Halley. We begin by introducing the reader to basic information about Aboriginal Australians, the concept of the Dreaming, and a description of comets as a celestial phenomenon. We then present our data collection methods and describe the various perceptions of comets, then dividing up identifiable comets by the date of the recorded account.

1.1 Aboriginal Cultures

The cosmic and terrestrial landscapes were an inseparable and integral component of daily life to the hundreds of Aboriginal communities in Australia and played a vital role in the structure and evolution of oral traditions and ceremonies. Objects and phenomena in the sky were believed to be intricately tied to events on the earth. Because of this, rare cosmic events, such as a bright meteor, comet, or eclipse, had great significance and meaning to those people who witnessed them. These events were often recorded in

oral tradition and art, and were integral to the preservation and dissemination of both general and sacred knowledge within the community.

When anthropologists and ethnographers began visiting and studying Aboriginal communities and recording oral traditions in the early 19th century, very little was known about the diverse Aboriginal hunter/gatherer societies that not only survived, but thrived in some of the world's harshest climates for over 40,000 years. After the British colonised Australia in the late 18th century, Aboriginal communities were devastated by disease, limited access to resources, and outright genocide. As a result, the total Aboriginal population reduced from over 300,000 in 1788 (Jupp, 2001:93) to just 93,000 by 1900 (Australian Bureau of Statistics, 2002). In many places, especially near British colonies, entire cultures, including their language, customs, and mythology, were virtually destroyed.

Despite the damage to many Aboriginal cultures, several Aboriginal communities still thrive and retain their collective knowledge, while a substantial amount of information about other Aboriginal communities has been recorded in the literature. Although this information represents a tiny fraction of the knowledge originally possessed by Aboriginal communities, it can help non-Aboriginal people understand Aboriginal beliefs and perceptions of natural phenomena.

1.2 The Dreaming

Common among most Aboriginal cultures is the concept of 'The Dreaming', an English term coined by Francis Gillen in 1896 and adopted by Spencer and Gillen (1899) to refer to the period in the religious oral traditions of the Northern Arunta people of the Northern Territory (Dean, 1996). The Dreaming is not a universal, homogeneous concept spanning all Aboriginal groups, but instead possesses substantial variations in the way it is viewed and understood by various Aboriginal groups across Australia. The Dreaming is viewed by some Aboriginal groups (e.g. the Tiwi and Wuradjeri) as the period during the creation of the world when totemic ancestors came into being, representing a past reality. For other groups, it represents a past, current and future reality, either concurrently parallel to our own reality (e.g. the Ooldea and Warrabri), or within our own reality (e.g. the Murinbata and Mardudjara). It should also be emphasized that the Dreaming does not necessarily represent a linear progression of time. In some cases, such as during ritual ceremonies, the past can become the present, so the term "Dreamtime" used in an all-encompassing sense is not accurate, as it denotes a linear timeline, separating past, present, and future. The Dreaming is part of a diverse and complex social structure that has been an integral aspect of Aboriginal cultures for thousands of years (see Stanner, 1965, 1976, 1979; Bates, 1996; Rose, 1996, 2000).

1.2 Comets

The term comet comes from the Latin *cometes*, which is derived from the Greek word *komē*, meaning "hair of the head". Comets, which consist of dust, ice, frozen gas, and rocky particles, range in size from a few kilometres to tens of kilometres, and orbit the Sun. Short period comets ($P < 200$ years) are believed to originate in the Kuiper Belt beyond the orbit of Neptune while long period comets ($P > 200$ years) are believed to originate in the Oort cloud, a spherical region extending nearly a light-year into space. Far from the sun, a comet consists only of a solid body, called the nucleus, appearing much like an asteroid. As it nears the sun, solar radiation evaporates the ice and frozen gasses, ejecting them into the surrounding space. This creates a halo of heated gas called the coma, which is then blown by solar wind in the direction opposite the sun, creating a large dust tail. For large comets with a diameter larger than 50 km, the coma can be larger than the sun with a dust tail extending over 150 million km in length (Yeomans, 2005). Short period comets typically orbit the sun until the nucleus has evaporated. About 90% of short period comets will evaporate after approximately 50 cycles (Whitman et al, 2006). Some comets break apart because of tidal forces from large solar system objects, such as planets or the sun, such as Comet Shoemaker-Levy which broke apart and struck Jupiter in 1994. Some long period comets may pass through the inner solar system only once before they are ejected into interstellar space. Comets can appear in the skies during the day or night, depending on their brightness, and may be visible from weeks to months. Brighter comets (greater than magnitude +2) are generally deemed "Great Comets", although there is no official definition (see Table 1 in the Appendix).

Comets and meteors are often confused. For example, although the Spanish words for comet and meteor are *cometa* and *meteoro*, respectively, the word *cometa* is preferred by rural Mexicans to describe both phenomena (Köhler, 1989:289). In some Australian Aboriginal languages, the word for comet and meteor are reported to be the same, such as *nilgoolerburda*, in the Bindel language of northern Queensland (Morrill, 1864:61) and *binnar* in a Western Australian language (Moore, 1842:126,145). In some cases, the description of one seems to indicate the other. For example, the Yolngu word for meteor, *ngarrpiya*, is also the word for octopus (Lowe, 2004:116). Octopi do not generally resemble meteors, but do resemble multi-tailed comets. This is probably the result of the linguist or anthropologist confusing the two phenomena. There are cases, however, of multi-tailed meteors, so this conclusion is not definitive. Tindale (1983:376) categorizes comets and fireballs (bright meteors) together, despite them being different phenomena, though he only discusses the former. Haynes (2000:86) describes comets as flaming spears hurled across the heavens by a celestial Pitjantjatjara being named *Wurluru*. Comets, unlike meteors, are not fiery and do not “fly” across the sky - they appear as “fuzzy stars” that slowly and gradually brighten, move across the sky, and fade away from night to night over a period of weeks to months. To some Arrernte clans, a comet was a sign that a person in a neighboring community had died with the tail pointing to the direction of the deceased (Spencer and Gillen, 1899:549). A nearly identical description is given by Piddington (1932:394) about the Karadjeri of coastal Western Australia, but is attributed to the trajectory of meteors instead of the tails of comets. In this paper, we note instances where confusion arises and identify the likely phenomenon that is being described.

2.0 Data Collection

The available literature, including books, journals, magazines, audio and video sources were reviewed for references to comets or descriptions that may refer to comets but do not explicitly identify them as such (e.g. “fuzzy stars” or “stars with tails”). Most of the data are taken from ethnographies collected in the 19th and early 20th centuries. 41 accounts were collected, including 16 Aboriginal words for comets, representing 40 Aboriginal groups from all Australian states except Tasmania (eight from Victoria, Queensland and the Northern Territory, seven from Western Australia, six from South Australia, and four from New South Wales).

3.0 Results

3.1 Aboriginal Perceptions of Comets

When Western ethnographers began studying Aboriginal communities in the early 1800s, they noted that the Aboriginal people viewed extraordinary or unusual natural events with great dread (e.g. Eyre, 1845:358-359; Palmer, 1885:174). The unexpected arrival of a bright comet often triggered fear and were associated with death, spirits, or omens – a view held by various cultures around the world (e.g. Andrews, 2004; Bobrowsky and Rickman, 2007; McCafferty and Baillie, 2005). Such views include those of the Tanganeakald of South Australia who perceived comets as omens of sickness and death (Tindale, n.d.), Mycoolon of Queensland who greet comets with fear (Palmer, 1884:294), Kaurna of Adelaide who believed that the sun father, called Teendo Yerle, had a pair of evil celestial sisters who were “long” and probably represented comets (Clarke, 1997:129, Schurmann, 1839) and Euahlayi of New South Wales saw comets as evil spirits that drank the rain-clouds causing drought¹, with the cometary tail representing a large thirsty family that draws the river into the clouds (Parker, 1905:99). Moporr (a Gundidjmara clan) of Victoria describe a comet as *Puurt Kuurnnuuk* - a great spirit (Dawson, 1881:101), and an omen that lots of people will die by the larger Gundidjmara group (Howitt and Stähle, 1881). Aboriginal people in the Talbot District of Victoria likened comets, called “*Koonk cutrine too*”, where “*too*” means “*to smoke*” (Smyth, 1878:200). This is similar to a report from Cape York Peninsula, where an Aboriginal community saw a comet as the smoke of a campfire (Roth, 1983:8).

The Rainbow Serpent, a much-feared evil spirit found in the Dreamings of many Aboriginal groups across the continent, was sometimes associated with comets (e.g. Healy, 1978:194)². Trezise (1993:107) speculated that the origins of the Rainbow Serpent lay in transits of Halley’s comet, which was seen every 76 years, reinforcing stories handed down by Kuku-Yalanji law-carriers and custodians of the Bloomfield River, Queensland.

A common view among Aboriginal communities of the Central Desert links comets to spears (e.g. Spencer, 1928:409). Peter Kunari (Anon, 1986:20) describes comets as the manifestation of a Pitjantjatjara being named Wurluru who lives in the sky and carries spears that he occasionally throws across the heavens (which seem to be a reference to meteors). A similar association is shared by the Kaitish, which discussed further in Section 3.3.

Spencer and Gillen (1899:550; 1904:627-628; 1927:415–417) describe a form of evil magic called Arungquilta, which involved meteors and produced comets and was used to punish unfaithful wives in Arunta communities. If a woman ran away from her husband, he would summon men from his group and a medicine man to perform a ceremony intended to punish her. In the ceremony, a pictogram of the woman was drawn in the dirt in a secluded area while the men chanted a particular song. A piece of bark, representing the woman's spirit, was impaled with a series of small spears endowed with Arungquilta and flung into the direction of where they believed the woman to be, which would appear in the sky as a comet (bundle of spears). The Arungquilta would find the woman and deprive her of her fat. After the emaciated woman died, her spirit appeared in the sky as a meteor. Strehlow (1907:30) cites a nearly identical ceremony. However, in Strehlow's account, the man felt pity for his wife and decided to revive her by rubbing fat into her body. As she healed, the comet faded from view. Among some Aranda and Luritja communities, comets are spears thrown by an ancestral hero to make his wife obedient to him (Strehlow, 1907:30). To some Arrernte clans, a comet was also a sign that a person in a neighbouring community had died, usually because of infidelity, and pointed to the direction of the deceased (Spencer and Gillen 1899:549). A similar description is given by Piddington (1932:394) about the Karadjeri of coastal Western Australia, but is instead attributed to meteors. Given the two accounts by Spencer and Gillen of the same ceremony, they are obviously confusing comets with meteors.

An association between comets and death is highlighted by a story from the Kimberleys of a great flood that was brought on by a "star with trails" called "Kallowa Anggnal Kude" (Mowaljarlai and Malnic, 1993:194). Bryant (2001, et al 2007:210-211) contends this account is a description of a comet impact in the Indian Ocean off the northwest coast of Western Australia, which he speculates caused a massive tsunami that devastated the region. Bryant speculates the "star with trails" is depicted in a rock painting at a place called 'Comet Rock' near Kalumburu, Western Australia, which lies on a plain 5 km from the sea that is covered in a layer of beach sand. Kalumburu is home to speakers of the Wunambal and Kwini languages.

3.2 The Great Comets

In much of the literature, ethnographic accounts do not simply describe perceptions of comets, but often refer to particular historic comets, including the Great Comets of 1807, 1843, 1861, 1901, 1910, 1927, and Comet Halley. In some cases, the comet is not identified by name, but is inferred from the description and date. Details of each comet observation or description are presented below.

3.2.1 C/1807 R1 (Great Comet of 1807)

The Kaurna of Adelaide believed that the sun father, called Teendo Yerle, had a pair of evil celestial sisters who were "long" and probably represented comets (Clarke, 1997:129; Schurmann, 1839). Schurmann did not specify whether this view pertained to a specific comet or to comets in general. Given the description as a pair of "long" sisters, it may be that this referred to a comet with distinctive twin tails. As of 1839, the most recent bright comet with distinct twin tails was the Great Comet of 1807 (C/1807 R1). Appearing in the Southern Hemisphere in early September, it would have been about 10 degrees above the western horizon in the evening (see Kronk, 2003:10-16). By mid October, it would have moved to the constellation Serpens Caput appearing in the Adelaide evening sky as a first magnitude comet with a twin tail, the longer tail spanning approximately 10 degrees. This comet serves as a good candidate in explaining this particular view, as most bright comets do not produce distinctive twin tails so easily visible from earth.

3.2.2 C/1843 D1 (Great March Comet of 1843)

The Great Comet of 1843 (C/1843 D1) was a bright, sun-grazing comet visible in the Southern skies from late February until mid-April. It was visible near the sun (within one degree) and became its brightest on 07 March (see Kronk, 2003:129; Sekanina and Chodas 2008). The comet, so frightening in its brilliance (see Figure 1a), prompted Aboriginal people near Port Lincoln, South Australia to run and hide in caves (Schurmann, 1846:242). The Ngarrindjeri of South Australia saw the comet as a harbinger of calamity, specifically to the white colonists. They believed the comet would destroy Adelaide then travel up the Murray causing havoc in its path, as described by Edward Eyre (1845:358-359)³:

In March 1843, I had a little boy living with me [in Moorunde, SA] by his father's permission, whilst the old man went up the river with the other natives to hunt and fish. On the evening of the 2nd of March a large comet was visible to the westward, and became brighter and more distinct every succeeding night. On the 5th I had a visit from the father of the little boy who was living with me, to demand his son; he had come down the river post haste for that purpose, as soon as he saw the comet, which he assured me was the harbinger of all kinds of calamities, and more especially to the white people. It was to overthrow Adelaide, destroy all Europeans and their houses, and then taking a course up the Murray, and past the Rufus [the site of an Aboriginal massacre], do irreparable damage to whatever or whoever came in its way. It was sent, he said, by the northern natives, who were powerful sorcerers, and to revenge the confinement of one of the principal men of their tribe, who was then in Adelaide gaol, charged with assaulting a shepherd; and he urged me by all means to hurry off to town as quickly as I could, to procure the man's release, so that if possible the evil might be averted. No explanation gave him the least satisfaction, he was in such a state of apprehension and excitement, and he finally marched off with the little boy, saying, that although by no means safe even with him, yet he would be in less danger than if left with me.

Le Souëf (in Smyth, 1878:296) recounted events that took place when the Great Comet of 1843 was seen in Victoria (specific location not identified). When it was first seen, it caused “dreadful commotion and consternation” and alarm among the communities. “Spokesmen [presumably Elders or medicine men] gesticulated and speechified far into the night” in an attempt to rid the comet, but with no success. When their actions seemed in vain, they packed-up camp in the middle of the night and moved to the other side of the river and remained huddled together until morning. They believed that the comet had been sent to them by the Aboriginal people near Ovens River in northern Victoria to cause harm. They left the area and did not return until the comet faded away.

3.2.3 C/1844 Y2 (Great Comet of 1844-45, Comet Wilmot)

There were no Aboriginal accounts of this comet in the reviewed literature. However, the explorer Ludwig Leichhardt saw Comet Wilmot in the sky on 29 December 1844 while walking along the banks of a creek in central Queensland (Lang, 1847:315), prompting him to name the site Comet Creek. The town of Comet, Queensland (originally Cometville) takes its name from this creek (now called Comet River).

3.2.4 C/1861 N1 (Great Comet of 1861, Comet Tebbutt)

After surviving a shipwreck in the Pacific Ocean off the coast of Australia in 1846, four members of the crew reached Cleveland Bay on the coast of Queensland near Townsville. One of the survivors, James Morrill, lived among the local Aboriginal people for 17 years, publishing his journals in 1864 (Morrill, 1864). He notes how the Aboriginal people used the same word for comets and stars (*nilgoolerburda*) and explains that comets were believed to be the spirits of men killed far away returning home, making their way from the clouds to the horizon. He described seeing a comet during the previous dry season (June to November) and noted that the Aboriginal people thought it was “one of the tribe who had been killed in war” (*ibid*:61). Morrill does not give a date, but does go on to say that he witnessed a nearly total solar eclipse about six years earlier. From 1846 to 1864, only two nearly total solar eclipses (where the moon covered over 80% of the sun) were visible from this region: 05 April 1856 ($t_e = 17:05:31$) and 18 September 1857 ($t_e = 17:28:04$, where t_e is the time of mid-eclipse), despite Morrill claiming that he only saw one eclipse during his time living among the Aboriginal people. Partial eclipses (covered less than half

of the sun) occurred on 01 February 1851 and 26 March 1857. This gives a period of approximately five years between the eclipse and the comet sighting, revealing the best candidate is Comet Tebbutt (C/1861 N1, see Figure 1b). Comet Tebbutt was discovered in Australia and visible from mid-May through mid-August, during the dry season (see Kronk, 2003:293; Orchiston, 2004), which implies that Morrill's account was recorded in 1862. Comet Tebbutt would have appeared brightly in the northern sky throughout June with the tail extending below the horizon, which may explain why the Aboriginal people told Morrill the comet was a spirit coming down from the clouds onto the horizon (Morrill, 1864:61).

3.2.5 C/1901 G1 (Great Comet of 1901, Comet Viscara)

While engaging in ethnographic fieldwork in Queensland from 1901 to 1908, anthropologist and Northern Protector of Aboriginals, Walter E. Roth (1983:8), noted that the Tjungundji people near Mapoon (Marpuna) on the western coast of Cape York Peninsula perceived a comet as a fire lit by two old women. This was probably a reference to the recent Great Comet of 1901, which was visible exclusively in the southern skies from mid-April to late-May and displayed distinctive, bright twin tails (Gill, 1901; Tebbutt, 1901; see Figure 1c). In early May, during its brightest peak, the comet transversed the boundary between Taurus and Eridanus. The head of the comet, of magnitude 0 on 03 May and +2 on 06 May, would have appeared in the western evening skies near the horizon with the twin tails, comprising a 30-degree straight tail and a 10-degree curved tail, pointing upwards towards the star Sirius. By 12 May 1901, the longer tail extended to the star δ -Leporis (Observatory 1901). This would have looked very much like two smoke columns diverging from a single point on the horizon. The comet remained visible until 23 May with the tails increasing in length to 45 and 15 degrees, respectively (Bortle, 1998).

The Kaitish of the Northern Territory believed a comet was a bundle of spears belonging to a star endowed with a very strong magic. The people feared these spears would be thrown to earth, killing many. Spencer and Gillen (1904:629; 1912:327) describe a bright comet visible during their stay in 1901. To avert the evil of the comet, a young, celebrated medicine man named Ilpailurkna was visiting the area from the neighboring Unmatjera clan. Each night he would project his magic stones towards the comet. As the comet faded away, its evil was overcome and the people were very grateful that Ilpailurkna had saved them⁴. In the eyes of the community, had Ilpailurkna not driven the comet away, it would have fallen to earth as a bundle of spears and everyone would have been killed (*ibid*:630).

3.2.6 C/1910 A1 (Great Daylight Comet of 1910) and 1P/1909 R1 (Comet Halley)

In 1910, the world awaited the return of the famous Comet Halley in May. However, the unexpected arrival of a bright comet in mid-January created much fear and awe (e.g. New York Times, 1910; Burnham and Levy, 2000:184). Deemed the Great Daylight Comet of 1910 (see Figure 1d), it was bright enough to be seen during the day and at its peak, was brighter than Venus. It began to fade away in early February, followed a few months later by the arrival of the fainter, but still significant, Comet Halley. When Comet Halley returned in 1986, many of the older people around the world who recalled seeing it in 1910 had clearly described the Great Daylight Comet of 1910 and not Halley⁵ (*ibid*).

In 1985 Jack Butler, a Jiwari man from the Henry River in Western Australia, told of a "star with a tail in the east" he saw early in the year 1910 as a child (Butler and Austin, 1986:85-88). The comet caused fear among the elder men who "questioned what it was". When the comet faded away, then men were confused and wondered where it had gone. According to Butler (*ibid*), the object he saw in 1910 was Comet Halley. However, the Great Daylight Comet of 1910 was prominent in the morning twilight, consistent with the "star with a tail in the east" visible early in the year. Therefore, it is probable that Butler was describing the Great Daylight Comet of 1910 rather than Comet Halley⁶.

3.2.7 C/1927 X1 (Great Comet of 1927, Comet Skjellerup-Maristany)

Paddy Roe, a Nyigina elder, told of the appearance of a comet in the early 20th century by an Aboriginal community on the Roebuck Plains west of Broome, Western Australia (Duwell and Dixon, 1994:80). The comet, which he described as a "star with a tail", was seen as a bad omen. However, after nothing bad happened, the community held a celebratory corroboree. Roe states that the comet was first seen during the

“new moon when the moon was a crescent” (this refers to the time after a new moon when the moon appears as a very thin crescent). These accounts date to the period “between the Wars”, presumably referring to World Wars I and II (between 1918 and 1939). The best candidate is the Great Comet of 1927 (see Figure 1e), co-discovered on 28 November 1927 by the Australian amateur astronomer John Francis Skjellerup. The comet was visible primarily during the day and early evening. By the time it was visible at night, it faded rapidly. Since the comet was nearer to the sun and visible during the day, the sighting of Comet Skjellerup-Maristany is consistent with being seen at the time of a new moon (the day it was discovered, 28 November 1927, was just after new moon, see Makemson, 1928; Seargent, 2009:147-148).

4.0 Discussion and Conclusion

The relatively sudden and effectively unpredictable nature of comets (that is, unpredictable without making detailed observations over long periods of time) are the likely driving force behind their generally negative views not only among Aboriginal Australians, but among most cultures of the world (see Ridpath, 1985). Of the 25 accounts given in this paper, all but two were attributed to negative concepts, namely fear, bad omens, death, malevolent spirits, or evil magic. This is consistent with global views of comets (e.g. Ridpath, 1985; Yeomans, 1991; Bobrowsky and Rickman, 2007). The only non-negative views of comets likened them to smoke (Smyth, 1878:200; Roth, 1983:8), a view shared by the Maori of New Zealand, who sometimes call comets *Auahi-roa* or *Auahi-turoa*, from the words “*auahi*” meaning “smoke” and “*roa*” meaning “long” (Best, 1922) and the Aztecs of Mesoamerica, who called comets “*citlalinpopoca*”, meaning “star that smokes” (Aveni, 1980:27).

It is unclear if comets had always been viewed with fear or whether it was triggered by a coincidental catastrophic event. Clearly, some accounts establish a perceived link between unrelated malign events and the appearance of a comet, such as drought (e.g. Parker, 1905:99), death or disease (e.g. Tindale, n.d.; Spencer and Gillen, 1899:549; Howitt and Stähle, 1881), the presence of a hostile enemy (e.g. Morrill, 1864:61), or a natural disaster (e.g. Mowaljarlai and Malnic, 1993:194) – views shared by many cultures of the world (e.g. Köhler, 1989:292; Andrews, 2004:111-121)⁷. While scientists now know that comets are responsible for a percentage of destructive exploding meteors⁸ (see Napier and Asher, 2009) and cosmic impacts (see Bobrowsky and Rickman, 2007), there is no evidence to link comets with disease outbreaks.

Most recorded views of comets indicate that the people who saw them were surprised. Although comets are not seen as frequently as other transient celestial phenomenon (such as meteors), they do make an appearance every few years. Eclipses occur less frequently than comets, but appear as a re-occurring phenomenon in the oral traditions of many Aboriginal communities (e.g. Norris and Hamacher, 2009; Bates, 1944; Johnson, 1998; Warner, 1937). However, there are few accounts of comets in the oral tradition (at least to the extent that they can be easily identified as such) and we are curious as to why this is the case.

Are there accounts of comets that we have failed to recognise? Some of these accounts may be found in the form of rock art, such as motifs found in rock engravings of the Sydney region, including the Bulgandry figure near Woy Woy, NSW (see Figure 2). If the objects held by Bulgandry represent the sun and crescent moon (e.g. Norris, 2008), then we may speculate that his “hair” actually represents a comet. The hair or headdress of some culture heroes, such as Daramulan (McCarthy, 1989), has a similar appearance to comets and have been described by Elkin (1949:131) as representing spears, suggesting a possible parallel with the communities from the Northern Territory that associate comets with spears. Numerous other examples of similar motifs are found in rock art of the Sydney region. We are currently looking into the possibility that these engravings represent comets, but any connection at present is simply speculation.

Although nearly all of the descriptions in this paper are second-hand colonist accounts of Aboriginal perceptions of comets, these accounts provide an important historical record of Great Comets from an Aboriginal perspective. We conclude that perceptions of comets amongst Aboriginal societies are associated with fear, death, omens, malevolent spirits, and evil magic, due to their awe-inspiring and relatively unexpected nature, consistent with many cultures around the world. We attribute their generally negative views to their unpredictable and significant appearance in an otherwise well-ordered and

predictable cosmos. However, we remain puzzled by the fact that nearly all accounts are from colonial times, with few accounts in the recorded oral tradition and no trace of comets in pre-colonial Aboriginal art.

Acknowledgements

The authors would like to thank and acknowledge the Aboriginal elders and custodians of Australia, the Darug People (the Traditional Custodians of the land on which Macquarie University is situated), John Clegg, and Kristina Everett. Hamacher was funded by the Macquarie University Research Excellence Scholarship (MQRES) within the Department of Indigenous Studies at Macquarie University in Sydney, Australia.

Notes

¹It is unclear if this view was due to the coincidental arrival of a comet before or during a major drought. One candidate is the Great Comet of 1825 (C/1825 N1), which was visible from late August until the end of December 1825. From 1826-1829, a severe drought hit New South Wales, causing Lake George and the Darling River to completely dry up (Shaw, 1984). Another possible candidate (of many) was the Great Southern Comet of 1880, visible in the evening skies in February (Kirkwood, 1880; Morris, 1880), which preceded a significant drought in New South Wales.

²Additional information regarding the evil of comets can be found in Barker (n.d.) at the Australian Institute for Aboriginal and Torres Strait Islander Studies in Canberra. This item is under restricted access and cannot be copied or quoted (Fredrick, 2008:105).

³Johnson (1998:49) mistakenly attributes this account to the Great Comet of 1811 (personal communication).

⁴A similar description of medicine men throwing magical stones at a comet to drive it away is given by Hambly (1936:23).

⁵There are no reported Aboriginal accounts of the 1986 return of Comet Halley in the literature. However, the comet was adopted as the logo for the Arnhem Land Progress Aboriginal Corporation (2009). Comet Halley's return is also featured in Aboriginal artwork and literature, including Brogus Nelson Tjakamurra's painting 'Halley's Comet' (1986) and Sam Watson's novel 'The Kadaitcha Sung' (1990).

⁶During the joint University of California-Los Angeles/University of Adelaide Expedition into northwestern Australia (1953-1955), Tindale (1983:377) explained how researchers used Comet Halley as an indicator of age for more mature Aboriginal informants. While using either Comet Halley or the Great Comet of 1910 would have been sufficient for their study, it is probable that the informant's descriptions were of the January comet.

⁷Throughout history, people have tried to make a connection between passing comets and destructive events (e.g. Gadbury, 1665), including disease outbreaks (e.g. Bobrowsky and Rickman, 2007: Chap 5) and natural disasters (Bryant, 2001). Comet impacts may have caused environmental change in the past, creating poor environmental conditions where starvation and the spread of disease were more rampant. Others (e.g. Wickramasinghe et al, 2004) have speculated that cometary debris contains microbial bacteria, referred to as Cometary Panspermia, which seeded life on earth and may be responsible for disease epidemics, such as SARS and the Bubonic Plague. This idea has met substantial criticism (see Vaidya, 2009) and is not generally accepted by the scientific community. Scientists, however, more generally accept the hypothesis that amino acids and water were brought to earth via comets, which later evolved into life.

⁸Although the composition of the Tunguska (1908, see Napier and Asher, 2009), Curuçá (1930, see Bailey et al, 1995), and Guyana (1935, see Steel, 1996) bolides have not been well established, they all occurred when the earth passed through major meteoroid streams, which are produced by the dust tails of passing comets.

References

- Anon, 1986. Wurluru, *In Future, bi-monthly magazine of the Commission for the future*, 1(July/Aug), 20
- Arnhem Land Progress Aboriginal Corporation, 2009. *FAQ webpage: what is the ALPA logo?* <http://www.alpa.asn.au/pages/FAQ>
- Andrews, T., 2004. *Wonders of the sky, Chapter 6*, Libraries Unlimited, Santa Barbara, CA
- Australian Bureau of Statistics, 2002. *1301.0 - Year Book Australia: Aboriginal and Torres Strait Islander population*. <http://www.abs.gov.au/>
- Aveni, A., 1980. *Sky watchers of ancient Mexico*, University of Texas Press.
- Bailey, M. E.; Markham, D. J.; Massai, S. and Scriven, J.E., 1995. The 1930 August 13 'Brazilian Tunguska' event, *The Observatory*, 115, 250-253
- Baillie, M. and McCafferty, P., 2005. *The Celtic Gods: Comets in Irish Mythology*, NPI Media Group, Exeter, UK
- Barker, J., n.d. *Transcription of AIAS tapes A1950, A1951, A1952, A1953, and A1989*, Unpublished Manuscript, Australian Institute for Aboriginal and Torres Strait Islander Studies, Canberra, Australia
- Bates, D., 1944. *The Passing of the Aborigines*, John Murray, London
- Bates, D., 1996. *Aboriginal Perth and Bibbulmun biographies and legends*, Hesperion Press
- Best, E., 1922. *The astronomical knowledge of the Maori, genuine and empirical*, The Dominion Museum, Wellington, New Zealand
- Bobrowsky, P.T. and Rickman, H., 2007. *Comet/Asteroid Impacts and Human Society: An Interdisciplinary Approach*, Springer Publishers
- Bond, G. P., 1850. On the great comet of 1844-45, *Astronomical Journal*, 1(13), 97-103
- Bryant, E.A., 2001. *Tsunami: the underrated hazard*, Cambridge University Press
- Bryant, E.A.; Walsh, G. and Abbott, D.H., 2007. Cosmogenic mega-tsunami in the Australia region: are they supported by Aboriginal and Maori legends? In *Myth and Geology*, edited by L. Piccardi and W.B. Masse, Geological Society, London, Special Publications 273, 203-214
- Burnham, R., 2000. *Great Comets*, Cambridge University Press
- Butler, J. and Austin, P., 1986. Earthquake and Halley's comet: two Jiwarli texts, *Aboriginal History* 10, 79-88
- Clarke, P.A., 1997, The Aboriginal Cosmic landscape of southern South Australia, *Records of the South Australian Museum*, 29(2), 125-145
- Clube, V. and Napier, B., 1982. *The Cosmic Serpent*, Faber and Faber, UK
- Conway, M.D., 1904. *Autobiography, memories and experiences of Moncure Daniel Conway: with two portraits, Vol I*, Cassell and Company, London

Dawson, J., 1881. *Australian Aborigines: the languages and customs of several tribes of Aborigines in the western district of Victoria, Australia*, George Robertson, Melbourne, re-printed in 1981 by the Australian Institute of Aboriginal Studies, Canberra

Donnelly, I., 2005. *Ancient World Wide Legends of the Comet*, Kessinger Publishing, Whitefish, MT, USA

Duwell, M. and Dixon, R.M.W., 1994. *Little Eva at Moonlight Creek and other Aboriginal song poems*, University of Queensland Press

Elkin, A.P., 1949. The Origin and Interpretation of Petroglyphs in South-East Australia, *Oceania*, 20(2), 119-157

Eyre, E.J., 1845. *Journals of Expeditions of Discovery Into Central Australia and Overland From Adelaide to King George's Sound in the Years 1840-1, Vol 2*, Boone, London
<http://onlinebooks.library.upenn.edu/webbin/gutbook/lookup?num=5346>

Fredrick, S., 2008. *The Sky of Knowledge: a study of the ethnoastronomy of the Aboriginal people of Australia*, Master of Philosophy Thesis, School of Archaeology and Ancient History, University of Leicester, UK

Gadbury, J. 1665. *De cometis, or, A discourse of the natures and effects of comets as they are philosophically, historically, & astrologically considered with a brief (yet full) account of the III late comets or blazing stars visible to all Europe, and what (in a natural way of judicature) they portend: together with some observations on the nativity of the Grand Seignior*, L. Chapman, London

Gill, D.S., 1901. The Great Comet of 1901, as observed at the Royal Observatory, Cape of Good Hope, *Monthly Notices of the Royal Astronomical Society*, 61, 508-512

Goddard, C., 1992. *Pitjantjatjara/Yankunytjatjara to English dictionary, 2nd Edition*, Institute for Aboriginal Development, Alice Springs

Hamacher, D.W. and Norris, R.P., 2010a. Meteor Beliefs Project: Meteors in Australian Aboriginal Dreamings, *WGN – Journal of the International Meteor Organization*, Accepted Feb 2010

Hamacher, D.W. and Norris, R.P., 2010b. Australian Aboriginal Geomythology: eyewitness accounts of cosmic impacts? *Archaeoastronomy* (submitted March 2010)

Hambly, W.D., 1936. *Primitive hunters of Australia*, Field Museum of Natural History, Chicago

Healy, J.J., 1978. *Literature and the Aborigine in Australia*, University of Queensland Press

Howitt, A.W. and Stähle, J.H., 1881. Private Correspondence. Howitt Collection, Box 5, Folder 2, Paper 2d (MS69), Australian Institute for Aboriginal and Torres Strait Islander Studies, Canberra, Australia

Johnson, D., 1998. *Night Skies of Aboriginal Australia: a Noctuary*, University of Sydney Press

Jupp, J., 2001. *The Australian people: an encyclopedia of the nation, its people and their origins*, Cambridge University Press

Kirkwood, D., 1880. On the great southern comet of 1880, *The Observatory*, 3, 590-592

Kronk, G.W., 2003. *Cometography: A Catalogue of Comets, Volume 2, 1800–1899*, Cambridge University Press

Lang, J.D., 1847. *Cooksland in north-eastern Australia: the future cottonfield of Great Britain: its characteristics and capabilities for European colonization. With a disquisition on the origin, manners, and*

customs of the aborigines, Longman, Brown, Green and Longmans, London

Levy, D.H., 1994. *The Quest for Comets: An Explosive Trail of Beauty and Danger*, Plenum Press, New York

Makemson, M.W., 1928. Concerning the identification of comet Skjellerup-Maristany. *Popular Astronomy*, 36, 284-286

McCafferty, P. and Baillie, M., 2005. *The Celtic Gods: Comets in Irish Mythology*, Tempus, UK

McCarthy, F.D., 1989. Records of Rock Engravings in the Sydney District: XXXVIII, *Mankind*, 3(11), 322-329

Mitton, G.E., 2009. *The Children's Book of Stars*, BiblioLife, LLC

Moore, G.F., 1842. *A descriptive vocabulary of the language in common use amongst the Aborigines of Western Australia*, W.M. S. Orr and Co., Patternoster Row, London

Morrill, J., 1864. *17 Years Wandering Among the Aborigines*, Published by David M. Welch, 2006, Virginia, NT, Australia

Morris, S.S.O., 1880. Observations of the Great Southern Comet 1880, from Feb. 1 to Feb. 7, at Monte Video, *Monthly Notices of the Royal Astronomical Society*, 40, 295

Mowaljarlai, D. and Malnic, J., 1993. *Yorro Yorro: Aboriginal creation and the renewal of nature: rock paintings and stories from the Australian Kimberley*, Magabala Books Aboriginal Corporation, Broome, Western Australia

Napier, B. and Asher, D., 2009. The Tunguska impact event and beyond, *Astronomy & Geophysics*, 50(1), 1.18-1.26

New York Times, 1910. Not much is known of daylight comet; Greenwich Astronomer Thinks It Has Never Been Seen Before and May Never Be Again, *Special Cable to the New York Times*, Sunday, 30 January 1910.
<http://query.nytimes.com/mem/archive-free/pdf?res=9400E7D61730E233A25753C3A9679C946196D6CF>

Norris, R.P. and Hamacher, D.W., 2009. *The Astronomy of Aboriginal Australia*, in *The Role of Astronomy in Society and Culture*, edited by D. Valls-Gabaud and A. Boksenberg, Proceedings IAU Symposium No. 260, 10-17

Norris, R.P. and Hamacher, D.W., 2010. *Crescent moon or boomerang? - Astronomical symbolism in Sydney Aboriginal rock art*, in preparation

Norris, R.P., 2008. Emu Dreaming, *Australasian Science*, 29(4) May, 16-19

Observatory, The, 1901. The great comet of 1901, *The Observatory*, 24, 297-297

Orchiston, W., 2004. John Tebbutt and observational astronomy at Windsor Observatory, *Journal of the British Astronomical Association*, 114(3), 141-154

Parker, K.L., 1905. *The Euahlayi Tribe: a study of Aboriginal life in Australia*, Adamant Media Corporation, Boston

Ridpath, I., 1985. *A Comet Called Halley*, Cambridge University Press

Rose, D.B., 1992. *Dingo makes us human: life and land in Aboriginal Australian culture*, Cambridge

University Press

Ross, M.C., 1986. Australian Aboriginal Oral Traditions, *Oral Tradition*, 1(2), 231-271

Roth, W.E., 1984. *The Queensland Aborigines, Vol. II, Bulletin No. 5 (1903)*, Hesperian Press, Victoria Park, Western Australia

Schurmann, C.W., 1839. *Schurmann Diaries, 5 June 1839*, Anthropology Archives, South Australian Museum

Schurmann, C.W., 1844. *Vocabulary of the Parnkalla Language, Vol II*, Dehane, Adelaide

Schurmann, C.W., 1846. *The Aboriginal tribes of Port Lincoln in South Australia: their modern life, manners, customs...* Reprinted in Schurmann, E. A., 1987, *I'd rather dig potatoes: Clamor Schurmann and the Aborigines of South Australia 1838-1853*, Lutheran Publishing House, Adelaide

Seargent, D., 2009. *The greatest comets in history: broom stars and celestial scimitars*, Springer Publishers

Sekanina, Z. and Chodas, P.W., 2008. A New Orbit Determination for Bright Sungrazing Comet of 1843, *The Astrophysical Journal*, 687(2), 1415-1422

Schechner, S., 1999. *Comets, Popular Culture, and the Birth of Modern Cosmology*, Princeton University Press

Shaw, J.H., 1984. *Collins Australian Encyclopedia*, Collins, Sydney

Smyth, R.B., 1878. *The Aborigines of Victoria: With Notes Relating to the Habits of the Natives...* Published by Government Print
<http://www.archive.org/stream/aboriginesvicto00smytgoog#page/n316/mode/1up>

Spencer, W.B., 1928. *Wanderings in wild Australia, Volume I*, MacMillan and Co., Ltd., London

Spencer, W.B. and Gillen, F.J., 1899. *The Native Tribes of Central Australia*, Reprinted 1968, Dover Pub., New York

Spencer, W.B. and Gillen, F.J., 1904. *The Northern Tribes of Central Australia*, Macmillan and Co., Ltd., New York

Spencer, W.B. and Gillen, F.J., 1912. *Across Australia, Vol II*, Macmillan and Co., Ltd., London

Spencer, W.B. and Gillen, F.J., 1927. *The Arunta: a study of a Stone Age people*, Macmillan and Co., Ltd., New York

Stanner, W.E.H., 1965. Religion, totemism, and Symbolism, in *Aboriginal Man in Australia: essays in honour of Emeritus professor A. P. Elkin*, edited by Berndt, R. M. and Berndt, C. H., Angus & Robertson, Sydney

Stanner, W.E.H., 1976. Some aspects of Aboriginal Religion, in *Religious Business: essays on Australian Aboriginal Spirituality*, edited by Charlesworth, M. (1998), Cambridge University Press

Stanner, W.E.H., 1979. *White Man Got No Dreaming: Essays 1938-1973*, Australian National University Press, Canberra

Steel, D., 1996. A Tunguska event in British Guyana in 1935? *Meteorite Magazine*, February 1996

- Strehlow, C., 1907. *Die Aranda und Loritja-Stämme in Zentral Australien (The Aranda and Loritja Tribes in Central Australia)*, Frankfurt, Germany
- Tebbutt, J., 1901. Observations of a Large Comet (1901a) at Windsor, New South Wales, *Astronomische Nachrichten*, 156, 95
- Tindale, N.B., n.d. *Tanganekald Vocabulary Cards collection*, Anthropology Archives, Museum of South Australia
- Tindale, N.B., 1983. Celestial lore of some Australian tribes, in *Songs from the Sky: Indigenous Astronomical and Cosmological Traditions of the World*, Edited by Von Del Chamberlain, J. B. Carlson and M. J. Young, Ocarina Books, West Sussex, UK
- Treize, P.J., 1993. *Dream Road: a journey of discovery*, Allen and Unwin Ltd., St Leonards, NSW
- Vaidya, P.G., 2009. Critique on Vindication of Panspermia, *Aperion*, 16(3), 463-474
- Warner, W.L., 1937. *A black civilization: a social study of an Australian tribe*, Harper, New York
- Watson, S., 1990. *The Kadaitcha Song*, Penguin Books
- Wickramasinghe, N.C.; Wainwright, M. and Wickramasinghe, J.T., 2004. Panspermia 2003: new horizons. In *Instruments, Methods, and Missions for Astrobiology VII*, edited by Richard B. Hoover and Alexei Y. Rozanov, Proceedings of the SPIE 5163: 222-234
- Whitman, K; Morbidelli, A. and Jedicke, R., 2006. The size frequency distribution of dormant Jupiter family comets, *Icarus*, 183(1), 101-114
- Xu, Z.; Pankenier, D.W. and Jiang, Y., 2000. *East Asian archaeoastronomy: historical records of astronomical observations*, CRC Press, Boca Raton, Florida
- Yeomans, D. K. and Kiang, T., 1981. The long-term motion of comet Halley, *Monthly Notices of the Royal Astronomical Society*, 197, 633-646
- Yeomans, D.K., 1991. *Comets: A Chronological History of Observation, Science, Myth and Folklore*. John Wiley & Sons, Inc. New York
- Yeomans, D.K., 2005. *Comet*, World Book Online Reference Center, World Book, Inc.
<http://www.worldbookonline.com/wb/Article?id=ar125580>

Appendix: Tables

Table 1: Naked Eye Comets that attained brightness greater than magnitude +2 recorded between 1800 and 2000, taken from Seargent (2009). Information regarding the Great Comet of 1844-1845 was taken from Bond (1850). When Comet Halley passed in 1986, it reached a maximum brightness of only +2.6 in early March. Therefore, Comet Halley (1986) is not included.

Year	Common Name	Designation	Duration Visible
1807	Great Comet of 1807 ^a	C/1807 R1	Early September to Late December
1811	Great Comet of 1811	C/1811 F1	Late March to January
1819	Great Comet of 1819	C/1819 N1	Month of July
1825	Comet Pons	C/1825 N1	Late August to Late-December
1830	Great Comet of 1830	C/1830 F1	Mid March to Mid May
1831	Great Comet of 1831	C/1831 A1	Month of January
1835	Comet Halley	1P/1835 P1	Late September to Mid February
1843	Great March Comet of 1843	C/1843 D1	Early February to Mid April
1844	Comet Wilmot	C/1844 Y2	Mid December to Late January

1847	Comet Hind	C/1847 C1	Late February to Late-March
1853	Comet Klinkerfues	C/1853 L1	Early August to Early October
1854	Great Comet of 1854	C/1854 F1	Late March to Mid April
1858	Comet Donati	C/1858 L1	Mid August to Late November
1860	Great Comet of 1860	C/1860 M1	Mid June to Late July
1861	Comet Tebbutt	C/1861 N1	Mid May to Mid-August
1874	Comet Coggia	C/1874 H1	Early June to Late August
1880	Great Southern Comet of 1880	C/1880 C1	Early to Mid February
1881	Great Comet of 1881	C/1881 K1	Late May to Late July
1882	Comet Wells	C/1882 F1	Late May to Early July
1882	Great September Comet of 1882	C/1882 R1	Early September to Early February
1887	Great Southern Comet of 1887	C/1887 B1	Mid to Late January
1901	Comet Viscara ^a	C/1901 G1	Mid April to Late May
1910	Great Daylight Comet of 1910	C/1910 A1	Mid January to Mid February
1910	Comet Halley	1P/1909 R1	Late April to Mid July
1911	Comet Beljawsky	C/1911 S3	Late September to Late October
1911	Comet Brooks	C/1911 O1	Late August to Late November
1927	Comet Skjellerup-Maristany	C/1927 X1	Late November to Early January
1941	Comet de Kock-Paraskevopoulos	C/1941 B2	Mid January to Late February
1947	Southern Comet of 1947	C/1947 X1	Early to Late December
1948	Eclipse Comet of 1948	C/1948 V1	Early November to Late December
1956	Comet Arend-Roland	C/1956 R1	Mid March to Mid May
1957	Comet Mrkos ^a	C/1957 P1	Late July to Late September
1961	Comet Wilson-Hubbard	C/1961 O1	Late July to Early August
1962	Comet Seki-Lines	C/1962 C1	Late February to Late April
1965	Comet Ikeya-Seki	C/1965 S1	Early October to Mid November
1969	Comet Bennett	C/1969 Y1	Mid February to Mid May
1970	Comet White-Ortiz-Bolelli	C/1970 K1	Mid May to Early June
1973	Comet Kohoutek	C/1973 E1	Late November to Late January
1976	Comet West ¹	C/1975 V1	Late February to Mid-April
1996	Comet Hyakutake	C/1996 B2	Early March to Early June
1997	Comet Hale-Bopp	C/1995 O1	July 1996 to October 1997

^a These comets possessed two or more distinctive tails visible to the naked eye.

Table 2: Glossary of Aboriginal terms for comets

Group	State	Term	Source
Bindal	QLD	Nilgoolerburda	Morrill (1864:61,62)
Boiwoorarng	VIC	Jajowerong	Smyth (1878:177)
Gumbaybggirr	NSW	Gumugan	Morelli (2008:160)
Gunditjmarra (Moporr)	VIC	Puurt Kuurnuuk	Dawson (1881:101)
Kayardild	QLD	Burwaduwuru	Evans (1992:196)
Kwini	WA	Kallowa Anggnal Kude	Mowaljarlai and Malnic (1993:194)
Ngiyampaa	NSW	Yangki (Comet Halley)	Thieberger and McGregor (1983:2.8)
Parnkalla	SA	Yandarri	Schurmann (1844:79)
Pitjantjatjara	NT	Wuuluru	Goddard (1992:202)
Djadjawurung ¹	VIC	Koonk cutrine too	Smyth (1878:200)
Wiradjuri	NSW	Muma	Rudder (2005:403)
Wunambal	WA	Kallowa Anggnal Kude	Mowaljarlai and Malnic (1993:194)
Yarra Yarra	VIC	Bullarto tutbyrum	Smyth (1878:136)
Yolngu	WA	Ngarrpiya	Lowe (2004:116)
Unspecified	WA	Binnar (also meteor)	Moore (1842:126)
Unspecified	VIC	Boiwoorarng	Smyth (1878:162)

¹From the Talbot District, Victoria (language group name not specified in text). Language group taken from the AIATSIS map of Aboriginal Languages.

Figure 1: **a)** The Great Comet of 1843 (C/1843 D1) as seen from Tasmania (Van Diemen's Land). Painting by Mary Morton Allport (1806-1895). Reproduced from Wikimedia Commons under Creative Commons License. **b)** A drawing of Comet Tebbutt (C/1861 N1) made on 30 June 1861, drawn with respect to a Northern Hemisphere observer. The image would appear upside-down to observers in the Southern Hemisphere. Reproduced from Wikimedia Commons under Creative Commons License. **c)** The Great Comet of 1901 with bright twin tails, taken from the Royal Observatory, Cape of Good Hope (after Mitton, 2009:120). **d)** The Great Daylight Comet of 1910 appeared just four months before Comet Halley but was brighter than Venus at its peak (image rotated clockwise by 90°). Photograph from Lowell Observatory, reproduced from Wikimedia Commons under Creative Commons License. **e)** Drawing of Comet Skjellerup-Maristany by R.A. McIntosh, 5 December 1927. Image reproduced courtesy of Wayne Orchiston.

Figure 2: The Bulgandry petroglyph near Woy-Woy, NSW (left), and the drawing by W.D. Campbell of 1893 (right). Image © Ray Norris.