

## THE ABORIGINAL AUSTRALIAN COSMIC LANDSCAPE. PART 2: PLANT CONNECTIONS WITH THE SKYWORLD

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**Abstract:** In the recorded mythology of Aboriginal Australia there is frequent mention of the Skyworld as the upper part of a total landscape that possessed topography linked with that of Earth and the Underworld. The heavens were perceived as a country with the same species of plants and animals that existed below. In Aboriginal tradition, large trees were seen as connecting terrestrial space with the sky above, while the movements of celestial bodies were linked to seasonal changes observed with plants on Earth. This paper describes the links between the floras of Earth and the Skyworld.

**Keywords:** ethnoastronomy, cultural astronomy, ethnobotany, seasonal calendars, Aboriginal Australians

### 1 INTRODUCTION

In the Australian ethnographic literature, the ‘Skyworld’ refers to an Aboriginal concept of the heavens as having an existence as a country, upon which human spirits and ancestors exist along with the plants and animals familiar on Earth (Clarke, 1997; 2008b; 2009a; 2014b; Fredrick, 2008; Hamacher, 2012; Haynes, 1992; 2009; Isaacs, 1980; Johnson, 1998; 2005; Norris, 2007; Norris and Hamacher, 2009; 2014; Tindale, 2005). While the mythological details pertaining to the Skyworld vary widely across Aboriginal Australia, there is much consistency with the main elements of the Skyworld, in particular its physical structure and its acknowledged influence over Earth. Aboriginal hunter-gatherers were keen observers of change within their environment, with the passage of seasons signaled by such things as the movement of celestial bodies, weather shifts and the flowering of calendar plants (Clarke, 2009b; Davis, 1989; 1997).

This paper is the second installment of a study that aims to draw out major ethnobotanical themes from the corpus of ethnoastronomical records garnered from a diverse range of Australian Aboriginal cultures. While the first paper (Clarke, 2014a) focused on the aesthetics behind the Indigenous perception of the heavens, this paper investigates the connectedness of the Skyworld with Earth. Australian localities mentioned in the text are shown in Figure 1.

#### 1.1 Data Sources

A description of the sources of ethnographic data utilised in the current paper is given in the previous part of the study, as is an account of the Aboriginal aesthetic that determines what is seen in the sky (*ibid.*). While there is a wealth of ethnoastronomical and ethnobotanical data available in Australia, there are major biases. For many areas scholars must chiefly rely upon anecdotal

accounts from settlers and colonial officials of the late eighteenth and early nineteenth centuries who were able to compile information from Aboriginal people who were the survivors of the first wave of European settlement.

Early missionaries, who generally arrived some years behind the first colonists in most areas, were more thorough with their recordings of Indigenous culture, although they were working before academic anthropology had begun in Australia. A generation of scholars who had developed close relationships to Aboriginal communities emerged in the late nineteenth century, although they were restricted to working with the few elderly informants who could remember when they had lived as hunter-gatherers.

By the early twentieth century, scholars realised that Aboriginal people possessed a wealth of knowledge and experience about Australian environments. In 1904 a newspaper writer observed in an article on weather forecasting that:

It is astonishing, however, how much weather wisdom has been developed in the world merely as the result of long-continued observations by unscientific people. The man whose life has been passed in certain localities has by reason of long intimate personal communion with nature become endowed with a “gift” that is not to be despised. There are some who would even prefer to trust the instinct of the brute creation or the intuitive perception of aboriginals, whose traditions of the sky are not the least remarkable features of their native knowledge of the ways of nature. All this is only another way of emphasising the value of observation and deduction as the stepping-stones to knowledge. (Anon., 1904b).

Alfred William Howitt (1830–1908; Figure 2; Stanner, 1972) was born in Nottingham, England, and in 1852 emigrated to Australia, settling in Melbourne. He was briefly the manager of a sheep station and a prospector, prior to becoming an explorer. In later life, Howitt became a natural

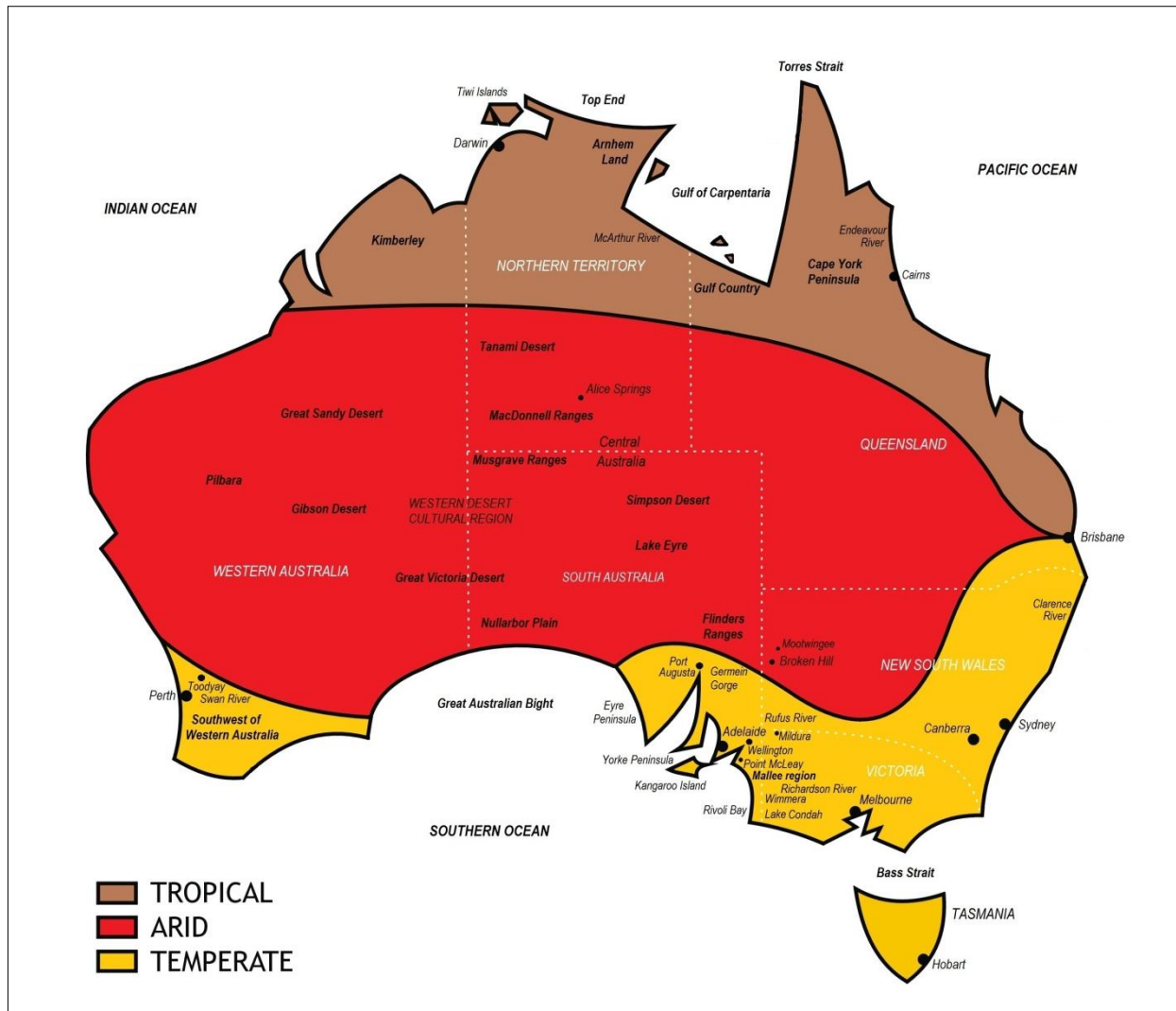


Figure 1: Australian localities or regions mentioned in the text.

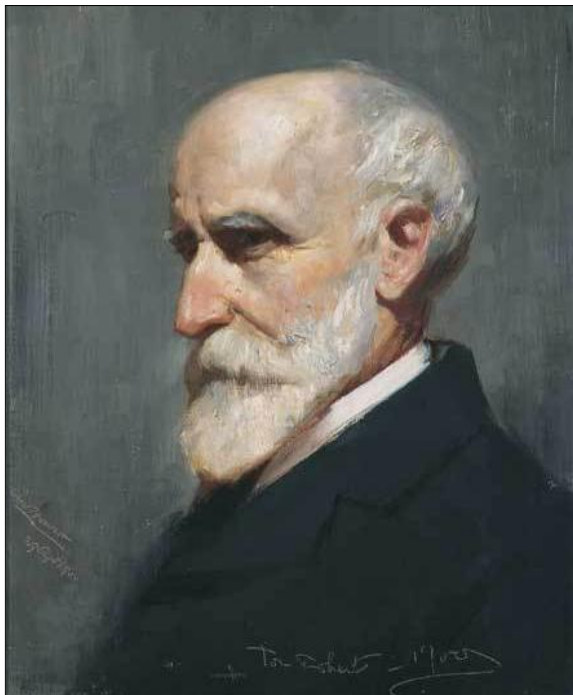


Figure 2: An oil painting of A.W. Howitt by Tom Roberts in 1900 (courtesy: Monash University Collection).

scientist and an authority on the Aboriginal people of southeastern Australia. Howitt (1904: 434) believed that the structure of many Aboriginal astronomical beliefs resonated with that from Western Europe of which he claimed “It seems that such pseudo-beliefs are an inheritance to us from our savage ancestors, and from which we are not able to free ourselves.” In the case of Aboriginal traditions, he went on to remark that

The beliefs as to the stars, which I have noted, and the manner in which they are named, seem to throw some light on the origin of the names, and even of the legends of the constellations of the northern hemisphere. (Howitt, 1904: 434).

During the twentieth century, anthropologists, astronomers, linguists and museum-based scholars recorded Aboriginal ethnoastronomical data.

## 2 TREES THAT CONNECTED THE EARTH WITH THE SKY

For geographers, the cultural landscape is a concept that encompasses both the physical

and cultural aspects of the human construction and perception of space (Baker, 1999; Clarke, 1994). The heavens are part of the space that people experience. In Aboriginal Australia, interpretations of the sky must be understood in terms of the cosmological traditions that explain the making of the world. Fundamental to Aboriginal religious beliefs is the concept that there had been a Creation period when totemic spiritual ancestors performed heroic deeds, moulded and imparted spiritual power to the land, and formulated customs for their descendants to follow (Clarke, 2003; Hiatt, 1975; Sutton, 1988). These ancestors often took the form of animals and birds, but many were also plants, atmospheric and cosmological phenomena or even human diseases. The paths the ancestors made across the land during the Creation became ancestral tracks, or song lines, which connect mythological sites where according to Aboriginal tradition certain events had taken place. When the Creation period drew to a close, it was Aboriginal belief that many of these spiritual ancestors travelled up into the heavens, and for this reason anthropologists have referred to them as 'Sky-heroes' (e.g. Elkin, 1964: 252–254). As ancestors, they were believed to continue influencing life on Earth and for this reason Aboriginal people on Earth looked for omens in the heavens (Clarke, 1997; 2009a; Hamacher and Norris, 2010; 2011a; 2011b; Johnson, 1998).

During the Creation, the regions of the Earth, Skyworld and Underworld were connected to the extent that travel between them all was easily achieved. Ancestors were able to reach the heavens by climbing to the top of large trees or even by walking to the summits of high hills. The stated means for ascent to the Skyworld sometimes involved being helped up by whirlwinds, ropes and fast-growing trees. For instance, in the central northern region of New South Wales, the Kamilaroi people believed that female ancestors became a cluster of stars (the Pleiades) when the two pine (*Callitris* species) trees they were cutting bark from started growing higher and higher, pushing them into the sky (Greenway, 1901). An Aboriginal tradition in this region was that a star cluster they called *Mundewur*, being an S-shaped line of stars in Ophiuchus (formerly Serpentarius) between the Northern Crown and Scorpius, represented "... the notches cut into the bark of a tree to enable a blackfellow to climb it." (Ridley, 1875: 142). In the Creation mythology of the Alawa people who live in southeast Arnhem Land of the Northern Territory, two of their ancestors reached the Skyworld, where they are seen as part of the Pleiades, by climbing a large northern stringybark tree (*Eucalyptus tetradonta*) growing on Earth (Berndt and Berndt, 1989).

On some occasions, the Skyworld was where ancestors escape to after their creative feats on Earth, while in other cases the ancestors were tricked into entering the Skyworld and were there stranded. The British-born missionary, John Bulmer (1833–1913), came to Australia in 1852 and helped establish a mission station at Yalta, west of Mildura, three years later. Soon after, he recorded a detailed version of a myth from the Wimmera district of central western Victoria that explains the connection between terrestrial space and the sky (Bulmer, 1855–1908 [1999]). In his account, people on Earth during the Creation period were able to reach the Skyworld to collect the abundant lerp (sometimes called *manna*) found on trees. This was achieved by climbing the winding steps on a very tall pine tree (*Callitris* species) that grew on the banks of the Richardson River. An elderly man named Jeeon controlled access to the tree, and he had a pack of dogs that he would lend to foragers. On one occasion the men who were gathering lerp in the sky were unsuccessful, and so they secretly killed one of the dogs, which happened to be Jeeon's favourite. Jeeon was not fooled and wanted to punish the guilty party. So, prior to the men venturing again into the Skyworld, Jeeon made an instrument that allowed him to bore into the tap root of the pine tree and there conceal a fire. When these foragers were about to return to Earth, they heard the tree cracking. After two unsuccessful attempts to descend to Earth, they returned to the top of the pine tree just in time to see the main section of it fall. According to Bulmer's informants, the top of the tree can still be seen in the Milky Way towards the south, while the adjacent stars near a dark spot are the men who had to remain in the Skyworld.

Other ethnographers from western Victoria recorded accounts of tree connections between Earth and the Skyworld. Robert Hamilton Mathews (1841–1918; McBryde, 1974) was born at Narellan, near Sydney, in New South Wales, and during his working life as a surveyor he travelled widely and studied Aboriginal culture. He recorded that in the Kara Kara district it was an Aboriginal tradition that there was once "... a regular highway between the earth and the upper regions ..." that was formed by a large pine tree growing on Earth whose branches crossed into the sky (Mathews, 1904: 281–282). Similarly, Howitt (1904: 433) stated that in the Wimmera district of the same region:

The Wotjobaluk had a legend of a pine-tree, which extended up through the sky (*Wurrawurra*) to the place beyond which is the abode of Mamen-gorak ['father', 'ours']. The people of that time ascended by this tree to gather manna, which implies that trees grew there like the Eucalypt [such as *Eucalyptus viminalis*].

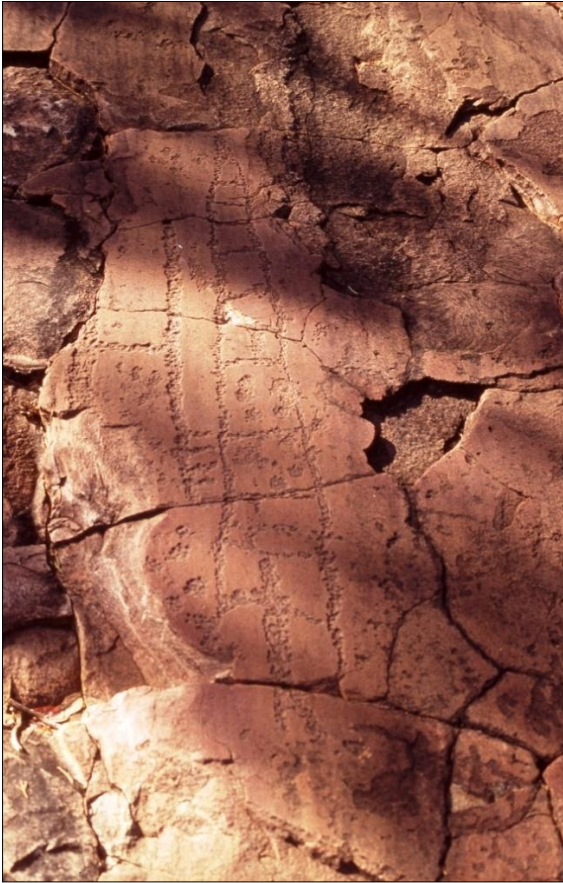


Figure 3 (left): Ancient rock engraving showing what appears to be a man with a ladder-like structure above his head, photographed at Mutawintji (Mootwingee), western New South Wales, 2004 (photograph: P.A. Clarke private collection).

Figure 4 (right): Australian pine (*Callitris glaucophylla*), a species often seen as 'ladders' to the Skyworld, growing at Germein Gorge, southern Flinders Ranges, South Australia, 2008 (photograph: P.A. Clarke private collection).

which in the Wotjobaluk country shed the so-called manna.

The theme of large trees as 'ladders' between Earth and the Skyworld is widespread in Aboriginal Australia (see Figures 3 and 4). From south-eastern Central Australia, Howitt (1904: 433)<sup>1</sup> recorded that:

Another legend of the Dieri [Diyari] and Tirari [Thirrari] accounts for the fossil remains found at Lake Eyre, and called by them Kadimarkara, as having been creatures which, in the old times of the Mura-muras [Creation ancestors], climbed down from the sky to the earth by the huge Eucalyptus trees on which it rested, and which grew on the western side of Lake Eyre.

Palaeontologists have classified some of the fossil remains, for which the region is well known, as species of Pleistocene megafauna like the *Diprotodon* (Pledge and Tedford, 1990).

In the recorded mythology of Aboriginal Australia there are variations with the mechanism that stranded the ancestors in the Skyworld. In some myth narratives they were prevented from returning to Earth at the end of the Creation because a tree being used as a 'ladder' had been either burnt or cut down, sometimes by force or trickery. For example, Mathews (1904:

280) claimed that among the Clarence River people of coastal New South Wales there was a tradition that:

Alpha Tauri [Aldebaran] was a young man named Karam-bal, of the Womboang division, who absconded with another man's wife. He was pursued by the injured husband, and took refuge in a tall tree. His pursuer piled wood around the bole of the tree, which he then set on fire, and Karambal was carried up by the fierce flames into the sky, where he still retains the colour of fire.

On some occasions the tree 'ladder' was a means of escape from Earth. It is a Kamilaroi tradition that during the Creation two girls caught by a man called Wurunna were forced to cut bark for him (Sveiby and Skuthorpe, 2006). The first blow of the stone axe caused the pine tree they had climbed to grow rapidly upwards away from Wurunna, and the girls were saved when their five sisters pulled them up into the Skyworld where together they became the *Mirrai Mirrai* (Pleiades).

The Moon ancestor in some myths had also suffered the fate of being stranded in the Skyworld. According to Charles Percy Mountford (1890–1976; Figure 5; Jones, 2000), the South Australian mechanic turned anthropologist/film-

maker, in Nukunu mythology from the southern Flinders Ranges of South Australia, the Moon was tricked into entering the Skyworld:

The Moon [Pira] was greedy with meat and would not share it with others, crowd decided to get rid of him, coaxed him to climb a tree and get [edible] grubs, coaxed him up higher and higher until they could hardly see him. They cut the tree down, and the Moon hung up in the sky. Moon said 'I'll give the light for people who walk at night. I'll die then come to life again.' (C.P. Mountford, cited Hercus, 1992: 16–17).

In a similar account from the Adnyamathanha people of the northern Flinders Ranges, *Vira Wurlka* the Moon man climbed a river red gum to gather witchetty grubs for two nephews (sister's sons), who made the tree grow higher until it touched the sky (Tunbridge, 1988). When the nephews shrank the tree, *Vira Wurlka* was stranded in the Skyworld. The lunar phases are produced when he gradually dies and becomes smaller. In a myth from the Endeavour River area in northern Queensland, *Warigan* the Moon scaled a tree using a climbing cane, only to be burnt when *Ngalan*, the Sun, set the bark ablaze (Tindale, 1938 ms). The Moon received its ash-en face in this way.

For Aboriginal people, large trees are topographic features that represent tangible evidence of the actions of their spirit ancestors during the Creation. Prominent trees were often seen as creations of the ancestors. For example, the sheoak (*Casuarina stricta*) tree is significant in Lower Murray mythology, being the tree that supreme male ancestor *Ngurunderi* created and then sat under before ascending to the Skyworld (Berndt et al., 1993). In temperate regions, the 'ladders' leading to the Skyworld are often specified as tall pine trees (*Callitris* species) (e.g. Bulmer, 1855–1908 [1999]; Greenway, 1901; Howitt, 1904; Mathews, 1904; Sveiby and Skuthorpe, 2006), possibly because of their characteristic of having multiple branch levels from the ground to the crown and due to the fact that they often grow on hilltops.

In arid areas, long-living trees like river red gums growing along creek beds or at waterholes are prominent features of the landscape and therefore attracted significance in the local mythologies (Clarke, 2014c). The Nukunu people of the southern Flinders Ranges in South Australia had a tradition of *Atyilpa* the Western Quoll ancestor carrying an immense tree across their country (Hercus, 1992). The tree, which is symbolic of a giant ceremonial pole, was carried about in a bag before being placed in the land. Hercus (1992: 13) recorded that:

Nukunu country contained the sites which marked the beginning of the longest known continuous song-line, the *Urumbula* which goes from

Pt. Augusta to the Gulf of Carpentaria. The main feature was a huge tree, so high that it was like a great ceremonial pole which in turn represented the Milky Way. This giant tree was located close to the present-day Port Augusta Hospital. According to the oldest singers of the *Urumbula* this tree was destroyed long before their time, in the very early days of European settlement.

In traditions of southeast Arnhem Land in the Northern Territory, it was a large northern stringybark tree connected with the Skyworld (Berndt and Berndt, 1989). At the close of the Creation period, most people were forced to remain on Earth while they were alive, with the Skyworld and Underworld being beyond their reach.

Since the end of the Creation, the order of life on Earth required the maintenance of this gap



Figure 5: C.P. Mountford in 1947 (courtesy: National Archives of Australia, A1200/1).

between the terrestrial and sky regions. In the Lower Murray region, particular large trees and big sand dunes were avoided as malevolent places because they attracted lightning strikes due to their proximity to the clouds (Clarke, 1997; J.C. Harwood, cited N.B. Tindale, 1930–1952). Irish-born self-taught anthropologist Daisy May Bates (1859–1951; Figure 6; De Vries, 2008; Reece, 2007), lived in small settlements in Western Australia and South Australia from 1899 and tirelessly studied Indigenous culture for the next 40 years. Inland from the Great Australian Bight she recorded that the vault of the heavens was supported by a large tree, called *Warda*, that had to be protected at all

times (D.M. Bates, cited Isaacs, 1980).<sup>2</sup> In the Ngaanyatjarra and Ngaatjatjarra languages of the Western Desert, *yilkari warta* (idiom for 'very distant') literally means "...sky tree ..." (Glass and Hackett, 2003: 570). Spirit beings, many of them taking the form of birds with the power of flight, had retained the ability to move freely across all parts of the total landscape (Clarke, 1999; 2007b).

In Aboriginal tradition, 'doctors' and 'sorcerers' who travelled to the Skyworld variously used a 'magic rope', a tree as a 'ladder', or ritual power to pass through space itself (Elkin, 1977). Scottish-born Duncan Stewart (1834–1913) was an early South Australian colonist. When still a child, he emigrated to Victoria with his widowed mother in 1839, and in 1845, after she had remarried, the family moved to Rivoli Bay in the southeast of South Australia where they were supportive of the local Aboriginal population (MacGillivray, 2005). In 1850 Duncan Stewart observed a 'séance' conducted by Bunganditj man Kootwor, who:



Figure 6: Daisy Bates (en.wikipedia.org).

... was supposed to go up into the clouds at night, to induce "those above" to go down and show themselves to the credulous blacks. ... Kootwor – the doctor or medium – obtained from "those above" not only dances to amuse, but food, good damper, tobacco, etc., the latter often being dropped into their camp during the night, or found close by in the morning. (Stewart, c.1870–c.1883 [1977: 67]).

Stewart had to be well hidden among the Aboriginal observers, as it was said he might be struck by lightning from above. To achieve his ascent the 'doctor' climbed a tree and then "... the sky people lowered a rope for him to be hauled up by." (Stewart, c.1870–c.1883 [1977: 90]). In this region, a healer reportedly gained knowledge through crossing into the Heavens by

climbing a tree (Smith, 1880). There are similar accounts from southwestern Victoria of Aboriginal 'doctors' and 'sorcerers' having claimed to be regular visitors to the Skyworld (Dawson, 1881).

### 3 THE FLORA AND CELESTIAL INFLUENCES OVER THE EARTH

European recorders acknowledged the role that heavenly bodies in classical Aboriginal tradition had in the making of the Earth as a terrestrial landscape. For instance, in a Creation account that is not localised in the record but probably relates to the east coast of Australia, an anonymous writer in a newspaper stated that:

In the beginning, black men wore wings and chased winged game; they were prosperous, but grew weary for a place to rest their feet, so they begged help of the stars and other heavenly bodies. Each sent a contribution towards a settlement [Earth]. The stars sent rocks and sand, the moon sent water for sea, rivers, and springs, the evening star [possibly Venus] sent rich soil for growing things, the sun sent animals and plants, and the wings were dropped at once for the 'sole of a foot' to rest on. (Anon., 1904a).

The Skyworld was the acknowledged source of fire. In the Lake Condah area of western Victoria it was recorded that

A blackfellow threw a spear towards the clouds; to the spear a string was attached. The man climbed up with the aid of the string and brought fire to the earth from the sun. (Anon., 1888: 2).

In Tasmania, Aboriginal people believed that "... fire was thrown down from heaven like stars by two blackfellows who were now stars, the twin Stars, Castor and Pollux." (Mercer, 1912).

Aboriginal people cited cosmological events in order to account for environmental rhythms of their country (see Appendix 1). For instance, the Northern Territory missionary Wilbur Selwyn Chaseling (1910–1989) recorded from northeast Arnhem Land the Yolngu tradition that during the Creation period the ancestor Jurrpan left his sons and their wives on Earth so that he could live in the Heavens as the 'evening star' (Arcturus).<sup>3</sup> From the Skyworld Jurrpan ordered his family to stay below near his former camp and to transform themselves into swamp food. Chaseling (1957: 150–151) stated that:

They did as they were told and changed themselves into the well-known 'rarkai', or swamp rush-corm [*rakay*, *rakai*, *Eleocharis dulcis*]. Rarkai is a favourite food and spreads over great areas of swamp in the wet season, ripening after the water evaporates. Late in the year women gather the corms, and at sunset they can see Jurrpan in the western sky shining down on his ripening swamp-children.

There is a tradition recorded from a Kumbaingiri person in northern coastal New South Wales that incorporates the theme of rejuvenation, both in terms of lunar phases and the regrowth of the vegetation (McDougall, 1901).<sup>4</sup> In this myth the Moon ancestor once lived on the Earth, where as a man he was speared and his bowels spilt out onto the land. Two plant men, Wintarn (blady grass, *Imperata cylindrica*) and Cummin-Guroon (ferns), took pity on the Moon man and carried him home. Due to their kindness, the two plant men never completely die and are always, as plants, the first to regenerate after a fire or drought.

In Aboriginal Australia it was widely believed that certain species of fungi retained power from their connection with the heavens. For instance, in the Adnyamathanha language of the Flinders Ranges in northern South Australia, puffballs (*Podaxon* species) are known as *vudlivuta*, literally 'star-dust'.<sup>5</sup> When a young man deliberately kicks one of these fungi the yellow spores fill the air and people say that he is "... pulling down stars." (McEntee et al., 1986: 13). Here, to 'break the *vudli*' means that he is "... falling in love." In Central Australia, Spencer and Gillen (1904: 627)<sup>6</sup> recorded that:

Falling stars appear to be associated with the idea of evil magic in many tribes. The Arunta [Arrente] believe that mushrooms and toadstools are fallen stars, and look upon them as being endowed with arungquiltha (evil magic) and therefore will not eat them.

Species of fungi have been linked to spirits in other parts of Aboriginal Australia. Scottish-born naturalist and plant collector James Drummond (ca. 1787–1863; Figure 7; Erickson, 1966) emigrated to the Swan River colony in 1829 and subsequently set up a farm at Toodyay. In 1841 Drummond stated that in the southwest of Western Australia he had been shown a glowing fungus; "... to the natives when giving out light ... They called it a *chinga*, their name for spirit, and they were much afraid of it." (J. Drummond, 1841 [cited Clarke, 2008a: 84]).<sup>7</sup> The species involved was a large luminous mushroom (most likely *Omphalotus nidiformis*) that glows naturally for four or five days after it is cut.<sup>8</sup> An association of fallen stars with mushrooms occurs in other cultures outside of Australia (e.g. Beech, 1986; Hamacher and Norris, 2010).

### 3.1 The Seasonal Calendar

Culture shapes the ways people divide the year and how they relate to seasonal changes within the landscape (Clarke, 2009b). The annual cycles recognised by Aboriginal hunter-gatherers varied widely across the continent, ranging anywhere between four and nine distinct seasons (Clarke, 2003; Reid, 1995; Thomson, 1939).

Movements of stars and animals, weather changes and the flowering of certain plants together indicate the onset of each season, during which specific foraging strategies would be employed. Sutton (1998: 371) remarked that while Aboriginal religion is primarily structured around

... places where ancestral events occurred, and their relative locations ... time in the sense of seasons of the year or phases of the day and night carries much symbolic power in Aboriginal classical thought.

With the seasonal calendar in mind, Aboriginal people aimed to hold their ceremonies in honour of the ancestors at specific mythological places

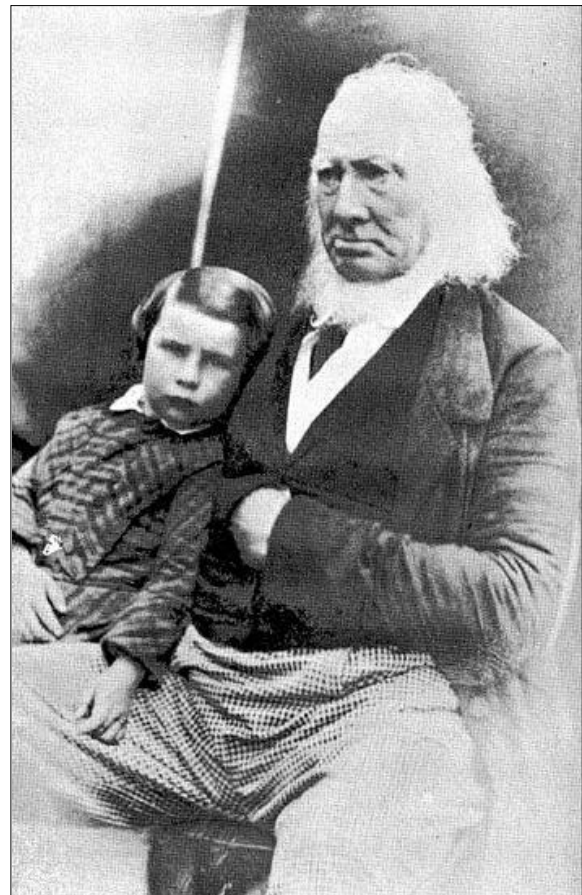


Figure 7: James Drummond with one of his grandchildren (courtesy: en.wikipedia.org).

over many days during a period when there is plenty of food to nourish participants, and to have it end with a Full Moon (Morphy, 1999).

The links Aboriginal people perceived between the movements of heavenly bodies and the onset of seasons was widespread across the Australian continent (e.g. Neidjie et al., 1985; Stanbridge, 1857). Mathews (1904: 279) noted that it was generally recognised that:

... the stars which occupy the northern sky in the cold winter evenings travel on, and are succeeded by others in the following season; and that these are again displaced by different constellations during the warm evenings of summer.

In Tasmania, London-born Aboriginal Protector George Augustus Robinson (1791–1866, Figure 8; Robinson ..., 1967), who arrived in Hobart in 1824 and spent the next 15 years studying the Island's Indigenous people, claimed that:

The Aborigines have considerable knowledge of the signs of the 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 &c. They also judge by the stars and have names by which they distinguish them. (G.A. Robinson, 1830 [Plomley, 1966: 300]).<sup>9</sup>



Figure 8: G.A. Robinson (courtesy: en.wikipedia.org).

Australian-born Brian Gilmore Maegraith (1907–1989; Figure 9; Radford, 2012) carried out anthropological research during university vacations while studying to be a doctor, before leaving Adelaide in 1931 and pursuing post-graduate studies at Oxford. In Central Australia he observed that:

The aborigine has differentiated between the two apparent motions of the stars through the year, namely, the nightly movement from east to west (similar to that of the sun in the day), and the gradual annual shift of the constellations in the same direction. (Maegraith, 1932: 24).

Immediately outside of Aboriginal Australia, Johnson (1998) and Sharp (1993) have outlined the calendars of the horticultural peoples of the Torres Strait, which involve the movements of stars timed to a range of environmental phenomena, such as the fruiting of native apples (*Eugenia* species) and the rampant growth of yams (*Dioscorea* species) that require planting in the gardens.

For the Tiwi in tropical northern Australia, the Upperworld of the sky is similar to Earth with respect to land and the seasons; each having a Dry and a Wet (Sims, 1978). During the Dry, the Upperworld was the home of Pakataringa (Thunderstorm Man), Tomituka (Monsoonal Rains Woman) and Pumaralli (Lightning Woman). At the end of the Dry, these ancestors move further up and into the Skyworld, and when doing so they cause rain to fall upon all the lower levels. Upperworld trees and plants use the rain drops passing through as carriers for spirits that will grow into plants when they hit the parched Earth below. The Skyworld is the abode of the stars and of the Moon and Sun ancestors. In Tiwi cosmology, plants are created by the movement of ancestors who control the weather. Elsewhere in northern Australia, the Rainbow Serpent was perceived as the spirit being in the sky who generated the annual monsoonal weather (Clarke, 2009b).

Hot seasons were in a generalized way associated with the ripening of fruit. For instance, Arrernte people of the Macdonnell Ranges in arid Central Australia linked their hot and wet season, *uterne*, with the availability of edible fruit from the wild passion fruit (*Capparis spinosa* var. *nummularia*), wild oranges (*Capparis mitchellii*), wild bananas (*Marsdenia australis*) and wild tomatoes (*Solanum ellipticum*), because the Sun has "... cooked them ripe." (Henderson and Dobson, 1994: 613–614). It was also a good time here for drying wild tobacco (*Nicotiana* species) leaf. In the Eastern Arrernte language of Central Australia, the term, *ampeme*, has the meanings of "... to burn something ...", "... to experience hot weather ..." and "... to ripen fruit." (Henderson and Dobson, 1994: 121). Similarly, the Kukatja people of the southeast Kimberley in Western Australia recognise that the heat of the Sun is important for ripening edible fruit. Peile (1997: 24) remarked that for Kukatja, "The sun (*tjirntu*) is considered to be close to the earth at dawn and further away at sunset."

In the semi-arid country of central New South Wales, the Wiradjuri people considered that there were six winds controlled by ancestors in the Skyworld (McKeown, 1938).<sup>10</sup> They were said to be divided equally between males and females, with those winds controlled by the former



being responsible for changing the season, which brought on plant responses such as flowering and fruiting of the bumble tree (native orange, *Capparis mitchellii*).

In temperate Australia, Aboriginal people also recognised the Sun as having a strong influence upon themselves and over the plants and animals of their country. For example, in western Victoria, Nyaui the Sun clan had both the Moon and the planet Venus among its set of subordinate totems,<sup>11</sup> which were mainly plants and animals (Mathews, 1904). The Narangga people on Yorke Peninsula in South Australia had a song to ripen the quandongs (wild peaches, *Santalum acuminatum*), which translated meant “Wild peaches hanging in the trees, the sun will burn you (to the colour of fire), we will gather you (for food).” (Tindale, 1936: 58). Aboriginal people used songs and other rituals to help hasten the production of favoured foods.

The association between specific plant phenomena within a local area and the observed changes in the Skyworld produced a diversity of Aboriginal calendars. In northeast Arnhem Land, Yolngu people began to harvest the corms of the spike-rush (water chestnut, *Eleocharis dulcis*) when Arcturus appeared in the dawn sky of late November during the *Rarrandharr Dhuludur* season, which is the build-up to the Wet (Hamacher, 2012; Mountford, 1956).<sup>12</sup> In this region, the season for gathering spike-rush corms was also signalled by the ‘lily star’ (probably Spica), in reference to the lotus (red lily, *Nelumbo nucifera*), when it appeared in the western horizon soon after sunset (Wells, 1973).<sup>13</sup> The spike-rush, which was called *rakia* (*rakay*) in the Yolngu-matha language, is a large fleshy-leaved sedge which is prominent in northern wetlands. It has edible squashed marble-shaped tubers, which were gathered either directly from the swamp beds or opportunistically from the crops of magpie geese killed when hunted (Clarke, 2007a; 2012). The tubers are generally harvested during the monsoonal wet season, when rains have stimulated growth. Spike-rush stems were placed in earth ovens to generate steam for cooking (Clarke, 2012). In northeast Arnhem Land, stars also signal the start of the Dry season, when *Djulpun* (Orion’s Belt) is visible on the western horizon during the early night sky. This is the *Dharratharramirri* season when the tall grasses from the Wet are knocked over by south-east storms (Davis, 1989; 1997).

While Aboriginal hunter-gatherers across arid inland regions connected star movements with the seasons for hunting animals and birds and collecting lizard eggs, in southwest Queensland they also signalled the time for gathering the aged sporocarps of nardoo (*Marsilea drummondii*), which were embedded in the dry mud (E.K.V.,

1884). In southern parts of the Western Desert, the rising of the *Kungkarungkara*, the Pleiades, marks the *nyinninga* season from May to September, which is cold and dry (Clarke, 2003; Munitjulu Community and Baker, 1996). At this time of the year, women previously collected vegetable foods, such as grass seed, to sustain their band. In the Western Desert, the seasonal variation in the warmth of sunlight was explained as the Sun ancestor having different roads to travel along through the Skyworld (Mountford, 1976).

The timing of gathering activities for invertebrate foods was also dictated by the calendar. For instance, in the Mallee region of western Victoria the beginning of the *Gnallew* (‘spring’) sea-



Figure 9: Queen Elizabeth II meeting Professor Brian Maegraith in 1954 ([www.lstm.liverpool.ac.uk/about-lstm/history-of-lstm/lstm-archives/maegraith-archive/](http://www.lstm.liverpool.ac.uk/about-lstm/history-of-lstm/lstm-archives/maegraith-archive/)).

son for gathering the larva of *bittur*, the ‘wood ant’ (termite), was signalled by *Marpeankurrk* (Arcturus) being in the north during the evening (Johnson, 1998; Stanbridge, 1857). Here, it was recorded that the constellation of ‘Tourchinboiong-gherra (Coma Berenices, Berenice’s Hair)’ was “A flock of small birds drinking rain-water, which has lodged in a fork of a tree.” (Stanbridge, 1861: 302).<sup>14</sup> A qualification of this stated that Coma Berenices represented a tree with three main branches, and at the junction with the trunk there was a hollow where birds were drinking (MacPherson, 1881; Johnson, 1998; Massola, 1968). The appearance of this constellation was symbolic of the dry summer weather, when such sources of drinking water



Figure 10: Earthstar (*Geastrum* species), a fungus species that might be the identity of *parnappi* ('mushroom') at Aldgate, Adelaide Hills, South Australia, 1983 (photograph: P.A. Clarke private collection).

were crucial for human survival. For the foraging bands, the seasons dictated the choice of subsistence strategies and influenced movement patterns.

The sudden surface appearance of fungi may have been important in signifying the change in season across the Adelaide Plains region. Ellis (1976: 120)<sup>15</sup> suggested that here the recorded term for 'mushroom', *parnappi*, was linguistically related to *parna*, "... a star indicating autumn ...", and to *parnatti*, "... the Australian autumn, when



Figure 11: Yam daisy (*Microseris lanceolata*), a staple food in southeastern Australia and possibly a 'calendar plant', at Mount George, Adelaide Hills, South Australia, 2009 (photograph: P.A. Clarke private collection).

the star *Parna* is seen." *Parna* has been identified as Fomalhaut, based upon its heliacal rising in mid-March during a time of increased rainfall on the Adelaide Plains (Hamacher, 2012; 2015). To the Adelaide people, the arrival of *Parna* in early autumn indicated the change of season and was a sign that large and waterproof huts needed to be built in the Adelaide foothills (J.P. Gell, 1842 [cited Clarke, 1990]). The Aboriginal place name for a hilltop campsite at Morphett Vale, south of Adelaide, was Parnangga, which reportedly was a reference to the appearance of *Parna* (Tindale, c.1931–c.1991; see also Hamacher, 2015). To the east, the Murray River people living between Wellington and Rufus River may also have made this seasonal association, with *pidli* recorded as the Ngaiawang term for "... mushroom, a star." (Moorhouse, 1846 [1935]; see Figure 10).

When conducting fieldwork in the Lower Murray during the 1980s, the present author noted that Ngarrindjeri residents of Raukkan (Point McLeay) believed that it was not safe to swim in the nearby lake if what is locally called the 'dandelion' (*Arctotheca calendula*) was still in flower. Those who did so risked contracting 'dandelion-fever', particularly if they were children (Clarke, 1994; 2014c). Ngarrindjeri people were generally unaware that this plant was introduced by Europeans from South Africa, probably in the early nineteenth century. This tradition had some depth, as in the 1960s there was an account recorded from a Ngarrindjeri woman, Annie Rankine, which illustrated a link between the flowering season of this species and the celestial movements of the Seven Sisters (Pleiades) star cluster. She said:

My father [Clarence Long, Milerum] used to tell us children of a special group of stars which is called the Seven Sisters, and before they were moving we weren't allowed to swim because the dandelions were in bloom then, and it was said that when the dandelions are out the water is still chill, and this is why our people are very strict and don't allow us to swim. When the flowers all died off and the stars moved over a bit further, this is when we were allowed to swim because in that time the dandelion flower which would cause a fever to anyone would not be out to make us sick. (A. Rankine, 1969 [cited Clarke 1994: 123]).

It is likely that the 'dandelion' mentioned was originally the yam-daisy (native dandelion, *Microseris lanceolata*), which has become locally scarce since the country was cleared of scrub for farming (Clarke, 2014c; see Figure 11).

While regular patterns of celestial movement were linked to the known behaviour of ancestors, less predictable events in the night sky were seen as malevolent omens. For instance, Bella Charlie of the Yanyuwa people in the McArthur

River area at the Gulf of Carpentaria gave a description of the night sky, and said that:

There is a lot of story here, *wunhaka*. Then there is that dangerous star, shooting star, we call him *Baribari* – he can make you sick, make you die. Dinny and Isaac can block him, have songs to stop him. (B. Charlie, quoted Bradley and Yanyuwa Families, 2010: 161).

Apart from the use of ritual to prevent bad things occurring, there were rituals that were believed to have positive influences, such as affecting short-term changes to the weather generated in the Skyworld. It was Aboriginal tradition that certain individuals were ‘rain-makers’, and had the ritual power to alter the weather and bring rains to their country (Berndt, 1947; Clarke, 2009b; Elkin, 1977; McCarthy, 1953). In central New South Wales the Wiradjuri ‘medicine men’ were believed to have had the ability to climb into the Skyworld to obtain rain (Berndt, 1947).<sup>16</sup>

#### 4 DISCUSSION AND CONCLUDING REMARKS

Across Aboriginal Australia, there were topographical features that were believed to be portals linking the Earth with the Skyworld and Underworld. From Earth, the entry into the Skyworld during the Creation period was often perceived as being via the eastern horizon, although the ancestors generally first travelled to the western horizon and then through the Underworld. In some cases, ancestors made their ascent by climbing tall trees that connected the Earth with the Skyworld. When the existing landscape was set at the close of the Creation period, certain tall trees remained as ‘ladders’ that allowed a variety of spirits and specially-trained humans to travel both ways between these sections of the landscape. Plants can therefore be seen as having physical properties that can be utilised within the psychic realm.

In Aboriginal Australia, celestial changes observed in the Skyworld were an analogue for seasons occurring on Earth. Through the use of calendars that linked together such phenomena as star movements, plant flowering and weather changes, hunter-gatherers were able to position themselves in the landscape to maximize subsistence foraging and comfort. Calendars were also relevant to ceremonial life, within which ancestors responsible for the reproduction of the environment on Earth were honoured.

#### 5 NOTES

1. The names of the ‘Dieri’ and ‘Tirari’ people are today generally written as Diyari and Thirrari respectively (Sutton, 1995).
2. In the Wirangu language of the region, *warda* means “... tree, stick, also object of any kind, thing.” (Miller et al., 2010: 81).

3. While both the ‘Evening Star’ and ‘Morning Star’ are often said to be Venus, a planet cannot be an annual seasonal marker because its position constantly changes (D. Hamacher, pers. comm., September 2014). Hamacher (2012) has shown that in north-east Arnhem Land it was the acronycal rising of Arcturus that signalled the commencement of the spike-rush collecting season.
4. McDougall (1901) referred to the ‘Kumbaingiri’, which is the form favoured by Tindale (1974), as ‘Coombangree’.
5. McEntee et al. (1986) use the spelling of ‘Adna-mat-na’ for the people of the northern Flinders Ranges, although generally today this is written as ‘Adnyamathanha’ (Sutton, 1995).
6. For similar accounts, refer to Spencer and Gillen (1899: 566; 1927(2): 500). These authors use the spelling of ‘Arunta’ when referring to the Arrernte people of Central Australia (Sutton, 1995).
7. The term, ‘chinga’, may be a rendering of *djanga* (or *janga*), meaning “... spirits of the dead.” (Bates, 1912 [1992: 16]).
8. The identification of the fungi species is tentative, see <https://www.anbg.gov.au/fungi/aboriginal.html>.
9. See also G.A. Robinson (1834 [Plomley, 1966: 892–893]).
10. McKeown (1938) spelled ‘Wiradjuri’, which is the form favoured by Tindale (1974), as ‘Wiradjurie’.
11. A ‘totem’ is a spirit being, sacred object, a plant, animal or celestial object that serves as the emblem of a group. In Aboriginal Australian culture most clan members in a tribe have a hierarchy of different totems.
12. For an account of Yolngu resource use during this pre-Wet season refer to Davis (1989).
13. Johnson (1998:24) considered the ‘lily star’ to be Venus, but Hamacher (pers. comm., September 2014) thinks that Spica is more likely.
14. See also Stanbridge (1857: 139).
15. Words recorded by Teichelmann and Schürmann (1840(2): 37).
16. Berndt (1947) spelled ‘Wiradjuri’, which is the form favoured by Tindale (1974), as ‘Wuradjeri’.

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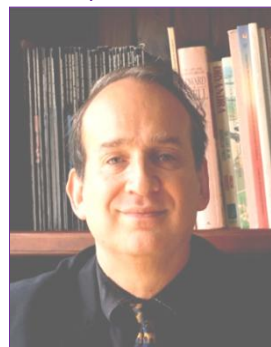
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Dr Philip A. Clarke has an academic background in



biology, geography and anthropology. He started working on the Aboriginal ethnographical collections at the South Australian Museum in 1982, where his initial research interests were chiefly focused on Aboriginal use of plants as foods, medicines and materials for making artefacts. This eventually expanded to Aboriginal perception and use of the land, with a particular focus on the cultural geography of southern Australia. During 1998–2000, Dr Clarke's major task was curating the Australian Aboriginal Cultures Gallery Project at the South Australian Museum. Since permanently leaving the Museum in late 2011, Dr Clarke has worked in private practice as a consultant anthropologist. He took up a half time Senior Research Fellowship at Griffith University from February 2012, to study Indigenous adaptation to climate change in southeastern Australia. In February 2013 he was appointed to an Adjunct Senior Research Fellowship by the University, and continues to do consultancies for government agencies, corporations and Aboriginal organisations.

## APPENDIX 1: SOME EXAMPLES OF PLANT–ASTRONOMICAL ASSOCIATIONS IN AUSTRALIAN ABORIGINAL CALENDARS

Botanical Event	Astronomical Phenomena	Seasonal Association	People/Area	Major References
Mushroom (species?)	Heliacal rising of <i>Parna</i> (Fomalhaut: Alpha Piscis Austrini)	Autumn ( <i>Parnatti</i> )	Kaurna/Adelaide Plains, South Australia	Ellis, 1976: 120; Gell, 1842 [1988: 7, 9]; Hamacher, 2015; Teichelmann and Schürmann, 1840: 2:37
Yam daisy ( <i>Microseris lanceolata</i> ) flowering	The Pleiades at highest altitude in the sky during early morning (meridional crossing)	Late winter/early spring – too cold to swim	Ngarrindjeri/Lower Murray, South Australia	Clarke, 1994: 407; 2014: 32.
Hardest time to obtain food, therefore relying on vegetables	The Southern Cross is high in the sky	Winter ( <i>Babang</i> )	Wiradjuri/central New South Wales	Crackerjack Education (2012)
Time to eat vegetable roots as main food	<i>Dhinawan</i> (emu in the Milky Way, from Crux to Scorpius) rising at sunset	Autumn ( <i>Bangalang</i> )	Wiradjuri/central New South Wales	Crackerjack Education (2012)
Bulrush ( <i>Typha</i> species) rhizomes and wattle ( <i>Acacia</i> species) seeds ready to eat	The Southern Cross is low in the sky after sunset (SE in late October, SW in late December)	Summer ( <i>Yiraybang</i> )	Wiradjuri/central New South Wales	Crackerjack Education (2012)
Wattle ( <i>Acacia</i> species) blooming	Heliacal rising of the Pleiades	Beginning of winter and start of Orca migrating north	Dharawal/southern Sydney area, New South Wales	L. Bursill, 2014
Waratah ( <i>Telopea speciosissima</i> ) blooming	Appearance of meteors	Formation of waratah	Great Dividing Range, New South Wales	Peck, 1925: 1–5.
Vegetable foods, such as grass seed, mainly collected	Heliacal rising of the Pleiades ( <i>Kungkarungkara</i> )	Cold and dry season ( <i>Nyinnga</i> )	Southern parts of the Western Desert	Clarke, 2003: 153; Mutitjulu Community and Baker, 1996: 1.
Wild passion fruit ( <i>Capparis spinosa</i> var. <i>nummularia</i> ), wild oranges ( <i>Capparis mitchellii</i> ), wild bananas ( <i>Marsdenia australis</i> ) and wild tomatoes ( <i>Solanum ellipticum</i> ) fruit ripens	The Sun is dominant	Hot and wet season ( <i>Uterne</i> )	Arrente/Macdonnell Ranges, Northern Territory	Henderson and Dobson, 1994: 613–614.
Spike-rush ( <i>Eleocharis</i> species) corms ready for collecting	Acronychal rising of Arcturus	Pre-Wet ( <i>Rarrandharr Dhuludur</i> )	Yolngu/northeast Arnhem Land, Northern Territory	Hamacher, 2012: 76–77; Mountford, 1956: 495.
Spike-rush ( <i>Eleocharis</i> species) corms ready for collecting	Heliacal setting of unidentified 'lily-star' (incorrectly attributed to Venus in publications); almost certainly Spica	Pre-Wet ( <i>Rarrandharr Dhuludur</i> )	Yolngu/northeast Arnhem Land, Northern Territory	Wells, 1973: 21–30; D.W. Hamacher (pers. comm., 2014)
Tall grasses (such as spear grass, <i>Sorghum</i> species) from the Wet knocked over by southeast storms	Heliacal setting of Orion's Belt ( <i>Djulpun</i> )	Beginning of the Dry ( <i>Dharratharramirri</i> )	Yolngu/northeast Arnhem Land, Northern Territory	Davis, 1989: 53–67; 1997: 32.