

AUSTRALITES. PART 1: ABORIGINAL INVOLVEMENT IN THEIR DISCOVERY

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Abstract: European scholars first believed that australites had been formed either volcanically or through lightning strikes, but they later recognised them as having an extra-terrestrial origin in the form of a meteorite strike. It was believed that since Aboriginal people had carried australites with them as charms, that they may have been transported beyond their natural distribution prior to European settlement. During the historic period australites were often found lying loose on the surface of former Aboriginal campsites. In remote areas Indigenous people gathered these objects for the European trade of gems and museum specimens. A large proportion of the australites in museum collections came directly or indirectly from Aboriginal sources. Due to Indigenous uses of australites, and the later involvement of Aboriginal people in the finding of them, they became popularly known as ‘blackfellow buttons’.

Keywords: australite, tektite, Australia, Aboriginal Australians, museum collections

1 INTRODUCTION

Australites are objects of dark glassy matter that form a category of tektites (tektites), which are associated with one of five main strewn fields across the World (Barrett, 1938; Cassidy, 1956; Fenner, 1946; Matsuda et al., 1993; McCall, 2000; McColl, 2017; Scott and Scott, 1934a, 1934e; Serventy, 1973; Tellurian, 1922, 1928; Vorobyev, 1960). From the Central European strewn field come moldavites (or bottle-stones) typically found in the Moldau River area of Czechoslovakia and are aged 15 million years. The Ivory Coast strewn field in Africa is where ivorites aged about 1 million years are collected. The North American strewn field has bediasites named after a Native American tribe in Texas and georgiites from Georgia, both aged about 34 million years. In addition to australites, the Australasian strewn field is comprised of billitonites from Billiton Island in Indonesia, indochinites from Cambodia, and rizalite from the Rizal province in the Philippines—all aged about 0.793 million years (Ford, 1988; Izett and Obradovich, 1992; Lee & Wei, 2000; McCall, 2000, 2001). From western Tasmania come queenstownites, or Darwin glass, which are part of the Mount Darwin strewn field (Dunn, 1916; Eiby, 1959, Fenner, 1946; Spencer, 1937), but these are no longer regarded as being associated with australites as they were caused by a fifth meteorite impact aged about 0.816 million years (Haines, 2005; Lo et al., 2002).

Australites are found in a variety of shapes (see Figures 1 and 2). These include what has been described as buttons, lenses, ovals, boats, canoes, dumb-bells and teardrops (Bates, 1924; Chapman, 1918; Fenner, 1934, 1935; Grant, 1934; Mawson, 1958; McColl, 1966, 1997, 2001, 2017; McNamara and Bevan, 1991; Scott and Scott, 1934a; Simpson, 1902). They are glassy objects that are high in silica, with alumina and traces of iron, magnesium, calcium, potassium and other minerals (Chapman and Scheiber,

Figure 1: An australite with its core and flange. Drawn from a specimen found by explorer Thomas Mitchell in outback New South Wales. The upper figure shows a bird's eye view and the lower figure a side view (after Darwin, 1890: 191).



1969; Fenner, 1954; Grant, 1934; Simpson, 1902; Summers, 1909; Twelvetrees and Petterd, 1897; Walcott, 1898). Australites are typically <30 mm in size and <3 g in weight (Fenner, 1935; McNamara and Bevan, 1991), although there are some rare specimens >100 g (Cleverly and Scrygmour, 1978; Fenner, 1954; Scrygmour, 1978). Australites are associated with the occurrence of microtektites (micro-australites), which are about 1 mm or less in diameter, in marine sediments to the north and northwest of Australia (Glass and Koeberl, 2006; Haines, 2005; Lee and Wei, 2000). It is the button-shaped australite and its flange that appear in particular to have attracted the attention of Aboriginal people, who variously used them as a source of artefact-making material and as charms (Edwards, 1966; Hamacher and Norris, 2009; McCarthy, 1976).

In the Australian literature from which the data in the current paper is drawn, australites

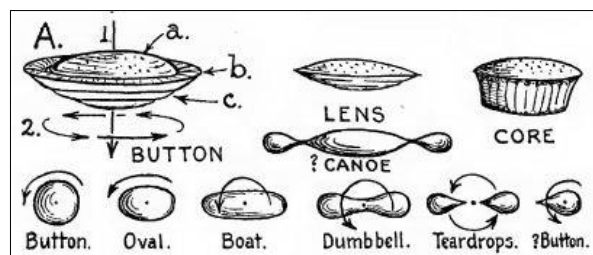


Figure 2: The australite forms (after Fenner, 1935: Figure 2).

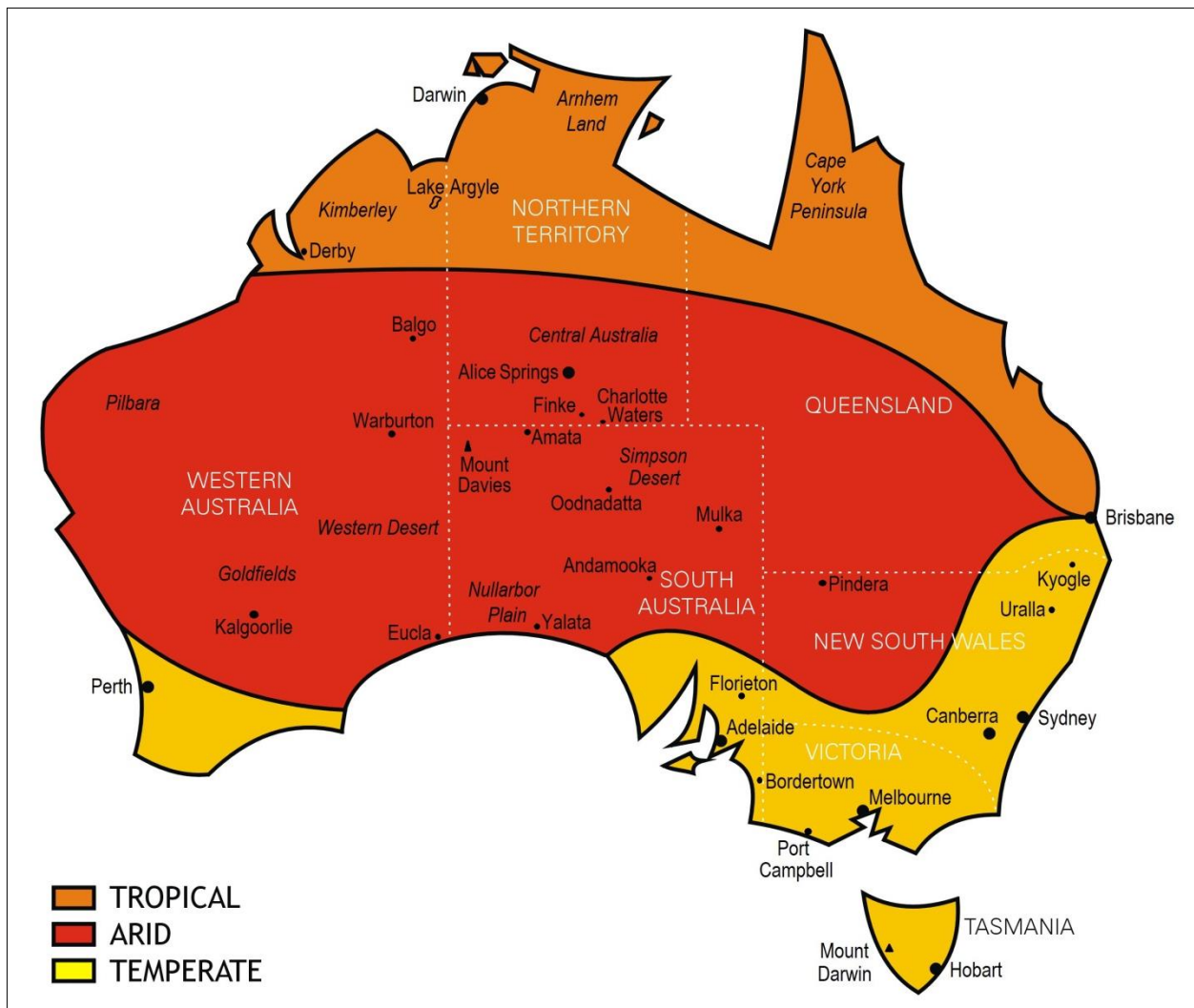


Figure 3: Australian localities and regions mentioned in the text (map: Philip A. Clarke).

have been variously, and sometimes incorrectly, described as animated stones, barter-stones, blackfellow buttons, black diamonds, black gold, black stones, button stones, ceremonial-stones, charm-stones, comet stones, cosmic-glass, death-pointers, doctor-stones, emu-eyes, emu-stones, extra-terrestrial gems, glass meteorites, glassy lava, hunting-stones, lethal-stones, lightning-stones, lucky-stones, magic-stones, medicine-stones, message-stones, meteorites, mura-mura stones, novelty-stones, obsidian balls, obsidian bombs, obsidian buttons, obsidian combs (bombs?), obsidian meteorites, obsidian pebbles, obsidianites, pitchstones, punishment-stones, rain stones, rainmaking-stones, sacred-stones, sky-buttons, sky-stones, tachylytes, trans-line meteorites, volcanic bombs, volcanic bubbles and volcanic glass.¹

The past use of some of the above terms has been conflated with other geological categories (Stephens, 1897), particularly with metallic and stony meteorites and the glass produced either volcanically or as fulgurites from lightning strikes. Many of these names refer to Indigenous people, which reflects the close involve-

ment that australite collectors and researchers have had with Aboriginal people. For example, it was said that

They are called blackfellows buttons, partly from their button-like shape, partly because the aborigines treasure them and carry them in their dilly-bags. (Tellurian, 1928).

A few of these australite terms were probably only used locally, like the “King Billy’s buttons” described in reminiscences from the Portland district of southwest Victoria (Portland’s Museum, 1932). This is presumably a reference to the Aboriginal man Waurun Bunyip (Worm Banip) of the Wada wurrung balug group, who Europeans knew as King Billy (Billy Gore, early 1800s–1854; Border notes, 1915; Clark, 1990; Lake Condah ..., 1943). The reference to his ‘buttons’ was possibly because he was a finder of australites for Europeans, as the southwest Victorian region was a place where many were collected. Most Australian localities mentioned in this paper are shown in Figure 3.

The popular reference to australites as ‘emu stones’ puzzled at least one late-nineteenth cen-

tury researcher (Simpson, 1902), but the perception of a connection between australites, Aboriginal people and emus has continued. In the Goldfields of Western Australia during the late-twentieth century a pastoralist family involved with finding australites called them 'moppins', which was said to be

... from an Aboriginal word, probably a variant of corruption of "mappin", meaning "emu stones, a word used by Aborigines for australites in Western Australia. (Cleverly, 1995: 173–174).

A correspondent in a newspaper remarked that

It has been suggested that their distribution over so wide an area may be due to their transport by aborigines or even emus. (Editorial, 1908).

Australian Indigenous people have often referred in English to australites simply as 'meteorites' (Bevan and Bindon, 1996; Greenway, 1973), following the European practice of doing so (Lindsay, 1935), although technically they are not. The glassy composition of australites sets them apart from meteorites, as does their shape (Chapman et al., 1962; Fenner, 1934). The classification of australites as meteorites is also not legally correct, as in several Australian states all meteorites found within their boundaries are covered by heritage legislation that vests their ownership with the trustees of state-funded museums, but to the exclusion of australites (Schmitt, 2002).

This paper is the first instalment of a two-part series that aims to explore the relationships that Australian Indigenous people have had with australites. The initial focus here is on the theorising about the origin and distribution of this category of tektite in relation to the presence of Indigenous people. The paper then documents the historical relationships that australite collectors and researchers have had with Aboriginal people as finders. In the second instalment of this study, the Aboriginal cultural aspects of australites will be considered in detail.

1.1 Tektite Researchers

In the nineteenth century Australian scientists who theorised about the origin of australites and their relationship to other classes of tektites included Ralph Tate (1840–1901) in South Australia; Edward J. Dunn (1844–1937) and Richard H. Walcott (1870–1936) in Victoria; and William H. Twelvetrees (1848–1919) and William F. Petterd (1849–1910) in Tasmania.

A well-published australite researcher from the twentieth century was George Baker (1908–1975; Figure 4), who commenced his scientific career as a geologist assistant in the Geology School at the University of Melbourne in 1925 (Gill and Segnit, 1976). Baker moved to the

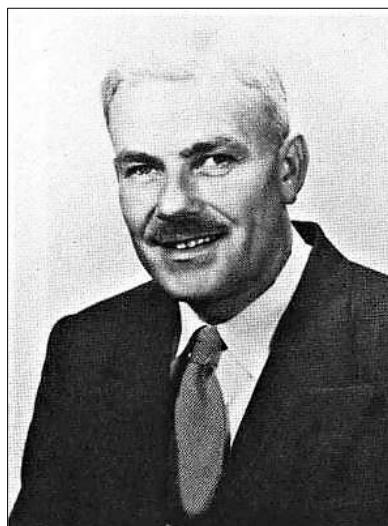


Figure 4: George Baker (after Gill and Segnit, 1976: 519).

CSIRO in 1948, where he stayed for the remainder of his working life and was a Senior Principal Research Officer when he retired in 1968. Another prolific scholar was geochemist William (Bill) H. Cleverly (1917–1997) at the Western Australian School of Mines, and he was an honorary researcher at the Western Australian Museum (Bevan, 1997). In South Australia, Charles Fenner (1884–1955; Figure 5) was a former Director of Education in South Australia, prior to becoming an honorary researcher who studied australites at the South Australian Museum in 1946 (Fenner, 1954, 2006). Geologist/explorer Douglas Mawson (1882–1958) was another South Australian researcher interested in australites, and while working at the University of Adelaide he held various honorary positions at the South Australian Museum, including Chair-



Figure 5: Charles Fenner (courtesy: Ballarat School of Mines Museum).

man of the Board (Ayres, 1999).

Australite researchers who have been active from the late-twentieth century include Dirk Megirian from the Museum and Art Gallery of the Northern Territory, Brian H. Mason from the Smithsonian Institution in the USA, David W. P. Corbett and June Scrymgeour at the South Australian Museum, Donald H. McColl at the Bureau of Mineral Resources (Geoscience Australia) in Canberra, and R. Oliver Chalmers from the Australian Museum in Sydney.

1.2 Ethnographic Sources

The Europeans who compiled records commencing in the mid-nineteenth century pertaining to the Aboriginal perception and use of australites formed a diverse group in terms of their education and research interests. Among them were explor-

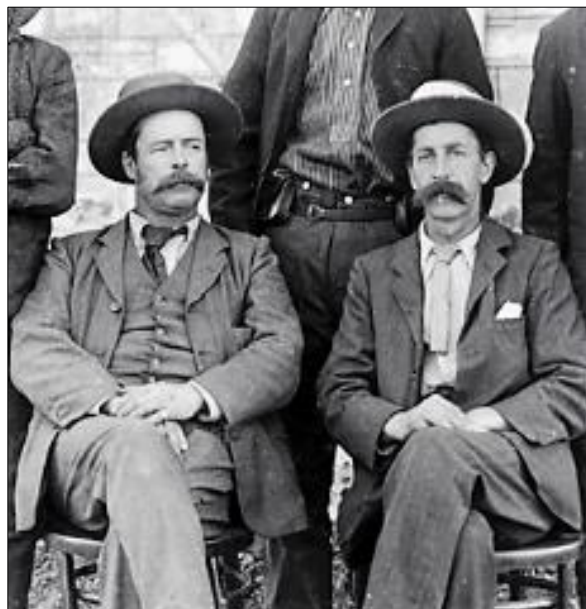


Figure 6: Francis Gillen (left) and Baldwin Spencer (right), Alice Springs, Central Australia, in 1901 (courtesy: South Australian Museum Archives, Adelaide).

ers, settlers, colonists, scientists, geologists, mineralogists and anthropologists. They accumulated much useful ethnographic information on australites, but their records contain major biases and geographically left many gaps. The spatial coverage of the data is such that while there are good records available for Aboriginal people in the arid zone, there is far less for groups in the temperate zone, particularly in the case of Tasmania. Australites were largely absent from the Australian tropics, and therefore are not mentioned in the northern ethnographies.

For accounts of Indigenous beliefs and customs for most of Australia we must chiefly rely upon anecdotal accounts from those Europeans who were in contact with the Aboriginal people who could remember a time before their lives became heavily altered by British settlement in

their country. The settlers and colonial officials who had ethnological interests in australites included William D. Campbell (1849–1938) in the Goldfields of Western Australia, George (Poddy) Aiston (1879–1943) in eastern Central Australia, and Anthony G. Bolam (1894–1966) on the Nullarbor Plain. The early anthropologists who compiled records pertaining to the Aboriginal perception and use of australites were Frank J. Gillen (1855–1912; Figure 6) and W. Baldwin Spencer (1869–1929; Figure 6) in Central Australia, and Daisy M. Bates (1859–1951) along the Nullarbor Plain.

2 ORIGIN

Since the mid-nineteenth century the origin of the australites has puzzled scientists. In 1836 the inland New South Wales explorer Major Thomas Mitchell presented the famous biologist Charles Darwin with a button-shaped australite during the Australian part of the voyage on the *Beagle* (Clarke, 1855; Fenner, 1939, 1946, 1954; McColl, 2017; Scott and Scott, 1934c; Tellurian, 1922, 1928).² Darwin published an image of it in his book, *On the Structure and Distribution of Coral Reefs; Also Geological Observations on the Volcanic Islands and Parts of South America Visited during the Voyage of H.M.S. Beagle* (see Figure 1). In his description of the australite, his 'volcanic bomb', he suggested the possibility of its movement by Aboriginal people accounting for it being in a non-volcanic area. He described the specimen as

... found in its present state, on a great sandy plain between the rivers Darling and Murray, in Australia, and at the distance of several hundred miles from any known volcanic region. It seems to have been embedded in some reddish tuffaceous matter; and may have been transported either by the aborigines or by natural means. (Darwin, 1890: 191).

Darwin favoured the explanation of australites as ejecta from a volcano, which many other early scholars followed (Dunn, 1912; Officer, cited in Royal Society of Tasmania, 1857; Simpson, 1902; Stelzner, cited in Royal Society of South Australia, 1893); Stephens, 1897; Thorp, 1914; Twelvetrees and Petterd, 1897; Walcott, 1898). Geologists Ralph Tate and John Alexander Watt, who were part of the Horn Expedition to Central Australia in 1894 which collected australites (Spencer, 1896), stated that "... obsidian bombs demand volcanic action." (Tate and Alexander, 1896: 70). Another member of the Expedition was scientist/anthropologist W. Baldwin Spencer, who also investigated the origin of the 'obsidian bombs' in Central Australia. The evidence he gathered suggested that they were very old. In 1896 Spencer received a letter from his correspondent the Central Australian telegraph official P.M. (Paddy) Byrne that said:

The obsidians must, I think, be derived from the older rocks – probably an examination of the ranges to the westward of here [Charlotte Waters] would throw some light on their origin. How they were transported with so little erosion is a mystery unless one inflicts an Ice Age on a Country that has already been roasted and boiled. (Cited in Mulvaney et al., 2000: 240).

In 1901 Spencer received correspondence mentioning 'obsidian bombs' from his main ethnographic partner, Frank J. Gillen, who was the telegraph operator in Alice Springs and his co-worker from the Horne Expedition. In relation to australites, Gillen said:

The bombs, as you know, are associated with desert sand stone gibbers right thro to CW [Charlotte Waters] but not, so far as I know, met with North of there." (Cited in Mulvaney et al., 1997: 313).

In 1912 Spencer and Gillen wrote:

Over parts of Central Australia obsidian bombs and agates are met with, lying on the surface of the ground, some of the former being in very perfect in form, others showing clearly the grinding power of wind-borne sand. Messers. Tate and Watt suggest that these indicate the former existence of volcanic action in the area. (Spencer and Gillen, 1912: 92).

A major problem with the volcanic theory for the origin of the australites was that over a large part of their distribution there were no obvious sources of any volcanic activity, with the exception being those found in southwest Victoria (Across Australia ..., 1918; Clarke, 1869; N.Q. Naturalist Club, 1939). By way of explanation, it was argued that volcanic bubbles had carried australites far from their source (Dunn, 1912). It was suggested that the 'obsidian buttons' found along the East-West Line (Transcontinental Trainline) had been blown there by the great Krakatoa volcanic explosion of 1883 in the Sunda Strait between Java and Sumatra (Nomad, 1916), and perhaps had also been carried by winds as far away as Tasmania, New Zealand and Antarctica (Reviews ..., 1898; Twelvetrees and Petterd, 1897). It was noted by Spencer and Gillen (1912: 93), however, that

... it must be pointed out that it is not by any means universally held that obsidian bombs demand volcanic action. Some authorities are inclined to regard them as being very likely of extra-terrestrial in origin. Their origin is certainly a difficult problem to solve.

With the inherent problems with the volcanic theory, a rival explanation given some currency in the newspapers was that lightning was responsible for forming 'obsidian buttons' or australites (Alexander, 1918; Chapman, 1918). It was said that

The dust rained down during a storm has often the composition of the obsidianites, especially that giving rise to "red rain." This dust from the interior of Australia, caught up in a willy-willy and fused by lightning, might easily result in these clearly rotated bodies, the splitting off of rings and peripheral flakes being induced by their falling into streams. (Chapman, 1918).

By the early-twentieth century the explanation of australites having an extra-terrestrial origin had gained favour (To correspondents, 1901). A scholar was cited in the newspaper in 1915 stated that for australites the "... exact nature is still disputed by many, though their meteoric origin is now practically certain." (R.H. Walcott, cited by Physicus, 1915). The origin of the australites was an issue that was not satisfactorily solved in Spencer's time, as he later noted that

Scattered over these open table-lands and on the Gibber fields, [are] agates and obsidian bombs ... The latter, often called Australites, consist of a brownish or dark green coloured vitreous material. In perfect specimens there is a central spherical mass with a flattened rim ... Their origin is a matter of dispute. (Spencer, 1928: 42–43).

A theory of the origin of tektites and obsidian bombs, that was not taken up by most Australian researchers, was that they had been made by a 'pre-historic race' that had developed the technology to make glass (Barrett, 1938: 42). It was suggested that Aboriginal people may have had the technology to make australites using moulds (Berwerth, 1917, cited in Baker, 1957), but this idea had been rejected by others due to their chemical composition and the high temperatures required (Summers, 1909). The melting point of australites is over 1500° C (McColl, 2017). In the industrialised world there were analogous human-made things that hinted at their production. Harold A. Lindsay observed that australites were "... flattened into almost the exact form which one of the old-time round musket balls assumed when fired into sand." (Lindsay, 1935). It was remarked that

Most of the glassy tektites, on the other hand, assume very definite and regular forms, which are precisely those which may be assumed by liquid matter whirling round in a vacuum. Similar forms are assumed by particles of slag in the smoke boxes of locomotive engines. (Sky-stones ..., 1931).

Scientist Charles T. Madigan wrote about the Central Australian australites in 1944, and noted that "Their origin has been the subject of much discussion, but it now generally accepted that they are of meteoric origin ... It seems probable that those found in this area are the results of a single shower." (Madigan, 1944: 293). In spite of this scientific agreement, there was still

a scholarly debate over whether their origins were singular or multiple. In 1945 Quetzal claimed that

Most observers consider that Australites fell in one great meteoric shower right across Australia, while others believe that they did not all fall at one time. They contend that they fell on various occasions, and are still reaching the earth from time to time. Some color is lent to this contention by a specimen in the British Museum from Bulong WA, that bears the label: "Supposed to have been seen to fall".

Until the late-twentieth century, the scholars who argued that there was one event that produced the australites generally believed the ancestors of modern Aboriginal people were present when they fell to earth, sometime between 4,000 and 20,000 years B.P. (Baker, 1959; Chalmers et al., 1976, 1979; Fenner, 1954; Gill, 1965a, 1965b, 1970; Lovering et al., 1972). As summed up by Fenner, it was believed that they had been produced as a 'parcel' coming "... from one great unique meteoric shower that reached earth in the late Pleistocene." (Fenner, 1933: 45). In other words, they were seen as small meteorites that fell during a single event in a geologically recent, but historically remote, time.

Part of the evidence for a late Pleistocene fall date for australites was their alleged absence as gastroliths (gizzard stones) in the *mihirung* (*Genyornis newtoni*) bird (Baker, 1957). Palaeontologists had named an extinct species the *mihirung* after a giant bird ancestor, recorded as 'meeheeruung parinmall' the 'big emu', from Aboriginal mythology in southwest Victoria (Dawson, 1889: 92). The fossil species was a large goose-like bird that is believed to have died out about 47,000 years ago, possibly due to human predation (Miller et al., 2016). There was speculation that Aboriginal rock engravings of bird tracks at Pimba in western South Australia represented this species (Tindale, 1951). Gastroliths are clusters of stones swallowed by birds for the purpose of grinding hard foods, such as seeds, in the gizzard (Noble, 1991). The preserved skeleton of a *mihirung* was found with 400 g of gastroliths (Rich and Van Tets, 1982), although since the total number of *mihirung* remains found with gastroliths is low, the absence of australites in this context is not surprising to palaeontologists and archaeologists (K. Akerman, pers. comm.; T. Worthy, pers. comm.). A challenge for researchers was explaining why australites found in the field did not match the surrounding geology, and their transportation as gastroliths in birds provided a possible solution. For instance, in New Zealand the gastroliths from the remains of the extinct moa (*Dinornis* species) are often found to be geologically different from the surrounding rocks (Burr-

ows et al., 1981).

Australites are often taken as gastroliths by large birds, such as the emu (*Dromaius novaehollandiae*) and the Australian bustard (wild turkey, *Ardeotis australis*) (Baker, 1957). Fenner (1949: 11) remarked that the high frequency of finding these objects in the gizzards of emus gave them the name 'emu-stones.' He said:

Some Australian folk regarded them as pebbles rounded in the gizzards of emus, and they were called "emu stones." Actually emus and wild turkeys did pick them up sometimes, and I have one from a series of 47 taken from the gizzard or crop of a wild turkey. (Fenner, 1954: 9; see also 1949: 11).

In the case of emus, the stones chosen as gastroliths are typically smooth and between 1 and 4 cm in diameter (Garvey et al., 2011). It has been remarked that australites "... are sometimes also called "emu-stones," because emus swallow them, just as they swallow any other interesting object." (Fenner, 1946: 101). While there is little data available to suggest what stones the *mihirung* would select, in the case of the emu the selection of the type of stones as gastroliths is dependent upon their diet (Noble, 1991). In some areas many gastroliths are found to be australites (Baker, 1959; Fenner, 1949). Baker (1957: 2–3) proposed that

A Recent age is indicated by various lines of evidence, among which is that of their use as gizzard stones by certain living native birds, but not, apparently, by extinct native birds of no great geological antiquity. Living birds such as the emu (*Dromaius novaehollandiae*) and the plain turkey (*Eupodotis australis*), are notable in their collection of australites for utilization as gizzard stones. On the other hand, skeletons of the extinct giant bird *Genyornis newtoni* (Late Pleistocene to Early Recent) discovered at Lake Callabonna, South Australia, were found to be associated with some 14 ounces [397 g] of gizzard stones. All of these stones are of types common to the gibber plains of the interior of Australia, but no australites were among them, even though the site of the discovery lies well within the known australite strewn-field. The conclusion has therefore been reached that the fall of australites was post-*Genyornis*.³

Scholars in the mid-nineteenth century believed that australites were the product of a meteorite strike on the lunar surface (Chapman, 1964, 1971; Chapman et al., 1962; Corbett et al., 1986; Edwards, 1966; O'Keefe, 1975; Serventy, 1973), but more recently the most widely accepted theory for their formation is that they were produced by a meteorite impact on the Earth's crust somewhere in Southeast Asia (Ford, 1988; Goderis et al., 2017; Koeberl, 1994; Wilhelms, 1987). In the laboratory the cosmic ray exposure dating of alluvial diamonds from

the tektite-bearing gravel terraces near Lake Argyle in northern Western Australia has indicated an australite fall date from the meteor strike of at least 0.25 million years B.P. (Fudali, 1993), while it has been more recently argued that this occurred at least 0.77 million years ago (Glass and Koeberl, 2006; Yamei et al., 2000). Dating of the associated Australian microtektites in Southeast Asia establishes this date at 0.793 million years (Lee and Wei, 2000). The analysis of the stratigraphy of the australites from Port Campbell in Victoria was first performed by George Baker and then by Edmund D. Gill, but the reanalysis of this supported the findings for a much earlier fall date (Shoemaker and Uhlherr, 1999). It is now accepted by scientists that the australites were formed during a mid-Pleistocene event, and therefore long before the arrival of the ancestors of the Aboriginal people on the Australian continent and prior to the extinction of the *mihirung*.

3 DISTRIBUTION

The spread of australites is across a wide variety of geological regions within Australia (Scott and Scott, 1934b, 1934d; McColl, 2017), a fact which has given weight to the idea that they were extra-terrestrial in origin. In a summary of the distribution of 'sky stones' Bates (1924) said:

Specimens of these obsidian buttons have been found throughout Australia, in the auriferous detritus of the Turon, thirty feet [9.1 m] below the surface, on the Uralla goldfields in New South Wales, where they were called "button stones" by the miners, in Victoria, near the Wannon River, and over the surface of the basaltic plains round Mount Elephant, and on the tertiary mud plains of the Wimmera, and in the post-pliocene area about Daylesford, and in Tasmania on the Macquarie Plains, the Tamar River, and elsewhere, so that their presence is confined neither to a particular locality nor to any special geological age.

As suggested by Gillen quoted above, australites were apparently absent from the Aboriginal material culture of Arnhem Land (D.F. Thomson, pers. comm., cited in Baker, 1957). The dispersal of australites due to transport as trade items and in the gizzards of emus appears to have been limited. Baker (1957: 5) remarked that

... it is noteworthy that the locations of widely separated tribes using them for these purposes are all within the confines of the australite sprinkled strewnfield.

The concern of scholars that Aboriginal people, through their use of australites, had obliterated the extent of the strewn field appear unfounded. Baker (1959: 23) later observed:

Some certainly have been carried around by aborigines and as gizzard stones by large

native birds, and some have been concentrated into placer deposits by running water, but these are largely of local importance only, and scarcely affect the overall distribution across 2,000 miles [3,200 kms] of the continent.

Many of the earliest australite specimens collected by Europeans came from southern desert regions, which have had their land surfaces largely exposed, with the Northern Goldfields of Western Australia and the Nullarbor Plain stretching across the Western Australian/South Australian border being two early hot-spots for them (Madigan, 1944; McColl, 2017; Scott and Scott, 1934b). Later, large numbers were found in the northern desert areas. It was suggested that the opal mining town of Andamooka in northern South Australia derived its name from *jandarimoko*, in reference to the australites found there (N.B. Tindale, pers. comm., cited in Leechman, 1969). The basis for this appears tentative, as Tindale had recorded the name of this opal-mining town as "*Jantamoka* (wide?) or *Janari* (meteorite or comet?) *moku* (hard round object)." (Tindale, c.1924–c.1991).

Researchers considered that the type of country where australites landed determined whether or not they were shattered. After an australite specimen was found in the Pooginagoric sandhill near Bordertown in the South East of South Australia, it was reasoned that australites falling from the sky to land in sand dune country were less likely to be shattered on impact (Lindsay, 1935). This only made sense if the australites fell, or were still falling, in relatively recent times, as the local geomorphology would have been altered significantly from more ancient periods. In western South Australia it was noted that australites were often found in swamps and on clay pans and salt lakes (Bates, 1924). This is possibly where emus with gizzards full of australites among their gastroliths (gizzard stones) are more likely to have perished, although it is also possible that australites were washed there or brought in by Aboriginal people who were camping near these water sources.

Some Europeans incorrectly believed that australites were still falling from the sky, and therefore were a constantly renewed resource (Open-air yarns ..., 1924). Others believed that it was more likely that erosion was exposing more of them over time (Kennett, pers. comm. Cited in Fenner, 1940). Ernestine Hill was a person who considered that australites were meteorites and to still be falling. In 1937 she wrote:

... on the Nullarbor Plain, a constant shower of tiny meteorites, ranging from rice grain to pigeon's-egg size, is alleged to be still falling. The blacks [Aboriginal people] of the

Centre will find you a handful out in the spinifex in half a day, and sometimes they will tell you they picked them up on a path they have just travelled without seeing a trace.

The occurrence of australites in the vicinity of Aboriginal stone tool sites in dunes has led scholars to speculate on their association. Gill (1970) reported that he had found 29 australites in dunes at Stanhope Bay in southwest Victoria, but since they were small he regarded their presence as due to natural processes rather than human agency. This finding was not supported by more recent researchers, who have argued that within small areas Aboriginal people have played a major role in relocating australites in pre-European times (Shoemaker and Uhlherr, 1999). In the case of Gill's finding above, it was remarked that

Whether the interests of these ancient people can be fully ascertained is doubtful but, in any case, all aborigines were once children, and children pick up and carry stones and other attractive objects to play with. Moreover, there were abundant tektites near their camps. (Shoemaker and Uhlherr, 1999: 378–380).

The presence of prolific australite fields in the western and northern parts of South Australia has meant that the South Australian Museum in Adelaide has been ideally placed for gathering a large collection of them (Hale, 1956). Here, australites were studied by in-house researchers William A. Cassidy (1956) and Charles Fenner (1933, 1934, 1935, 1937, 1938a, 1938b, 1939, 1940, 1949, 1955). From the mid-twentieth century, the South Australian Museum was actively acquiring australites for its Earth Science collections. For instance, in 1938 anthropologists, Thomas D. Campbell and Charles P. Mountford, from that institution were on a State Government expedition to investigate a possible site for the lost Leichhardt Expedition in the Simpson Desert of northeast South Australia (Kinnear, 1938). The trip, although unsuccessful in its main aim, nevertheless yielded a collection of australites for Fenner's examination. There were

... about 100 excellent specimens of australites – small, glassy bodies thought to be meteorites. They are about the size of pigeons' eggs, and are about three times as large as specimens found on the Nullarbor Plain. (Scientists examine relics ..., 1938).

In 1938 geologist/explorer Douglas Mawson visited australite collector Mervyn Pens at Kungara Station near Florieton, northeast of Adelaide (Hale, 1956; Mawson, 1958). Here he inspected a collection of 1,475 australites and fragments, which was eventually deposited in the South Australian Museum. Mawson later noted that the collector had informed him that they were constantly appearing in areas already sur-

veyed, which suggested that different ones were coming to the surface through the effects of erosion. With this happening it is apparent how someone might think that australites were still falling from the sky. In his last publication, just prior to his death, Mawson (1958: 162) said:

Having sifted the evidence available at Kungara we concluded that Australites are embedded mainly at some depth within the surface mantle of deposited sand and dust. They can be brought to the surface by burrowing animals, but undoubtedly the plough is a most effective agent. Where removal of surface vegetation has permitted wind erosion, buried Australites are eventually brought to the surface. Where wind erosion has entirely removed the surface mantle of dust and sand, the Australites are to be found among the residual gravel.

The Museum of Victoria was another institution that gained a large collection of australites, many of which came from another 'hotspot', which was the area around Port Campbell in southwest Victoria where Baker (1936, 1940, 1944, 1946, 1956a, 1956b, 1957, 1958, 1959, 1960, 1962, 1963a, 1963b, 1963c, 1968a, 1968b, 1969a, 1969b, 1972, 1973; Mutt, 1941) concentrated his fieldwork. In the 1960s, the work by Baker and his colleagues on australite morphology was considered particularly important by NASA for their development of heat-resistant nose cones for space vehicles intended for a lunar landing (Corbett et al., 1986; Gill and Segnit, 1976). Australites recovered from Tasmania had earlier been studied by W.H. Twelve-trees and W.F. Petterd (1897) and by T. Stephens (1897, 1902). It was estimated that by the early-twentieth century there were some tens of thousands of these objects already collected, with most government-funded museums in Australia possessing large collections, and many others owned privately (Fenner, 1935; Tellurian, 1922, 1928).

Australites are generally not found in the geographical region above what Fenner described as the Kyogle-Derby line (see Figure 7), running from Kyogle near Coolangatta in northeast New South Wales across to Derby in the coastal west Kimberley of Western Australia (Fenner, 1934: Figure 3; 1946). This was slightly modified by Baker (1957: Figure 1) on his australite distribution map, which was drawn with the northern limit on the east coast side about 250 kilometres north from where Fenner had placed it, which meant it was now not at Kyogle but north of Brisbane. Therefore, the region outside the associated strewn field for finding australites includes most of the Australian tropics. Accordingly, australites are not documented as having come from most of eastern Queensland, all of northern Queensland and Arnhem Land, and the northeastern part of the Kimberley. More re-

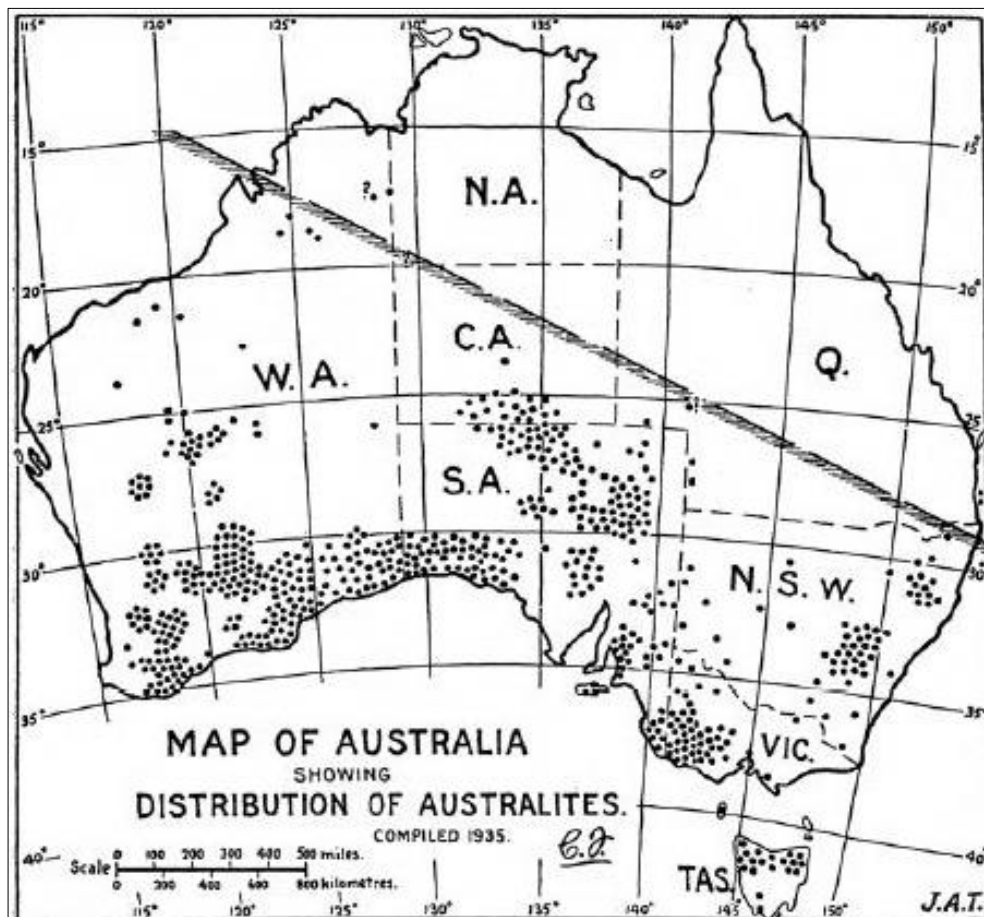


Figure 7: The australite strewn field as drawn by C. Fenner (1935: Figure 3). Note that the distribution of australites is now considered to be larger.

cent distribution maps have enlarged the area where they are found, but there is still a large part of northern Australia outside the strewn field (McCall, 2000; McColl, 2017; McColl and Williams, 1970). Europeans also apparently relocated some specimens outside the strewn field, such as a reported tektite transported by nineteenth century gold miners from Australia to Central Otago, New Zealand, where it was later found (Warnes et al., 1998).

4 AUSTRALITES AS A COMMODITY

Aside from their scientific and anthropological significance, Europeans coveted australites as gems. In 1937 a newspaper correspondent claimed that they were "... an unexploited gem from which Australia should certainly make a fashion fortune in years to come." (Hill, 1937). In 1941 it was remembered that

During the Great War considerable trade was carried on in australites, as their size and jet-black color was ideal for mourning brooches. (Mutt, 1941).

Many of the largest examples were cut and polished for use in jewellery such as finger-rings, ear-rings and brooches (Fenner, 1954; Lindsay, 1935).

In the Peake district of northern South Australia during the early-twentieth century it was rumoured that the 'obsidian pebbles' were actually 'black diamonds', which "... caused some of the early discoverers to temporarily fancy themselves multi-millionaires." (Meteorites and obsidian, 1910). The gathering of australites for the gem trade was widespread. It was noted in 1922 that a jeweller's shop in Kalgoorlie in the Northern Goldfields of Western Australia had them advertised as "... trans-line meteorites." (Tellurian, 1922). It was speculated that

If they become fashionable, we may see their value suddenly rise, as did that of the Trocha shell when folk found they could adorn themselves with its pearly pellicle. (INO, 1924).

The commercial cutting of australites for jewellery became a well-established practice, with their darkness being an attractive trait (see Figure 8). In 1932 a Tasmanian newspaper published an article about the 'obsidian buttons, or bombs' that had been collected by prospector and miner W. Atkins in the North Pieman district of northwest Tasmania, and as 'Shooting Star Deposits' would be on display in the shop windows of a Hobart jeweller (General news ..., 1932). In 1934 a tourist in Alice Springs was in an opal cutter's workshop when he

... noticed an Australite near his polishing wheel. He called it a "plainer" and mentioned that he cut that class of stone for mourning jewellery – the blackest stuff he knew. He scoffed at the idea that it was a meteorite. (Croll, 1937: 85).

An article on gemstones published in the *Australian Women's Weekly* in 1966 provided a list of the places in Western Australia, South Australia, New South Wales, Victoria and Tasmania where tektites (australites) could be found for lapidary (B. James; cited in Gemstone localities, 1966). According to archaeologist/anthropologist Kim Akerman (pers. comm.),

... in the 1970s at Kalgoorlie there were a number of big time [australite] collections (for sale) as well as local jewellers/gemstone tumblers/lapidarists who were mounting them on cheap bases as pendants/necklaces and bracelets – this was a period when amateur rock hounds were combing the country for material to tumble polish etc.



Figure 8: An australite (12 mm across) cut for mounting as a jewel (photograph: Philip A. Clarke private collection).

As gem material, it was noted that

They can be cut into any desired form, and they polish beautifully. Some cut in diamond shape look very nice in brooches, rings, and so on when set in gold. (Bolam, 1930: 63).

Due to the intense collecting activities driven by European needs, australites became relatively scarce in some areas. In the early-twentieth century the station owner George Aiston exchanged sweets, money and probably tobacco for australites collected by Aboriginal people at Mulka in northeast South Australia (Baker, 1959). When they became rarer due to heavy collecting, older Aboriginal people began asking Aiston for a shilling for each whole specimen (Fenner, 1935). At the turn of the nineteenth century, Assistant Government Geologist William D. Campbell picked up australites from around shallow lakes and salt pans in the Kalgoorlie area of the Northern Goldfields, and he said that he also purchased them from "... aboriginals I enlisted in the search." (cited in Rhodes, 2018: 66). At Kalgoorlie it was noted by K. Ward "... that if a native collector had any doubts of his specimen,

he deftly struck a chip from the dull surface to reveal the reassuring glassy material within." (cited in Baker, 1957: 14).

Writer Charles Barrett claimed in 1938 that at Oodnadatta in northern South Australia he had paid five shillings for a few 'emu eyes', but his "... were obtained from a white man who had picked them up in the desert." (Barrett, 1938: 42). The acute vision of Aboriginal people made them much better collectors than Europeans (Baker, 1959). Barrett (1938) remarked:

I have searched for obsidian bombs [australites] on Sturt's Stony Desert, on the Nullarbor Plain and elsewhere, but without much success. Yet the aborigines find them easily enough among the gibber stones, and regard them as magical objects.

Private collectors amassed large australite collections, often utilising Indigenous people as finders. For instance, it was reported that

[Police] Constable Kennett got his natives to collect many thousands near Charlotte Waters [in Central Australia] when he was stationed there [for four and half years], and another collection of over eight thousand was made in Western Australia along the railway line. (Madigan, 1944: 293).

The John W. Kennett collection of more than 7,000 specimens was later acquired by the South Australian Museum, where it was studied by Fenner (Fenner, 1940; Hale, 1956; Mr. Pim, 1939; The collection ..., 1942). It was a local Aboriginal man who first showed Kennett an australite, which he called an 'emu eye', and then Kennett's 'blacktracker' Mick Doolan explained to him that these "... glassy stones were meteorites." (Kennett, pers. comm.; cited in Fenner, 1940: 307). Kennett had once tried unsuccessfully to obtain a particular specimen that was a very large australite found in the Charlotte Waters area, but this specimen "... was found by a lubra [woman] and sold for a minty [sweet lolly] to Mrs. Child, of Crow[n] Point Station." (Kennett, pers. comm.; cited in Fenner, 1940: 307). Apparently, it eventually ended up being acquired by the South Australian Museum in any case.

From the mining fields of Western Australia, Captain McVicker-Smyth made a noteworthy collection of 'obsidian meteorites' that in 1921 he displayed along with his minerals and Aboriginal artefacts in Perth (W.A. exhibits ..., 1921). In the mid-1930s a collection of 5,000 australites collected from round Kalgoorlie was sold in New Zealand (Mr. Pim, 1937). Then in 1945 the South Australian Museum purchased a large collection of Western Australian australites from Spencer Cook (Hale, 1956). During a geologist's fieldtrip to central Western Australia in 1958 to inspect the Dalgara meteorite crater and to search for tektites, it was noted that many of the Aboriginal people at a camp near Leonora had

gathered australites, which they called 'meteorites', to sell to museums or to European collectors (A.O. Kelly, 1961; cited Hamacher and O'Neill, 2013). Other collections later went further afield, such as those acquired by the tektite researchers E.J. Dunn (Director of the Geological Survey of Victoria) and the geologist C.G. Thorp, which were presented to the British Museum after their deaths (Barrett, 1938).

From the early-twentieth century Aboriginal people who had moved to camps along the East-West Line of the railways through the Nullarbor Plains were heavily engaged in selling australites to train travellers. Here, the "... black-fellows' buttons ... were traded with the whites by the aborigines." (E.H. Ising, cited in Agapetus, 1924). It was also stated that "I believe the aboriginals sell them at the sidings on the East-West railway; they get them further north." (Old Timer, 1928). Bates (1924) remarked:

The scattered human remnants of the Central and Ranges tribes of South and Western Australia, who now roam to and fro along the east-west line, find the white employees and the train travellers ready and willing to buy meteorites, and now and again small groups of women and children or mobs of young boys will wander over plain and swamp and bring in their finds to their menkind to sell for money or tobacco.

For desert people, australites as a commodity were like their boomerangs and wood carvings that were made to be exchanged with Europeans for money and rations.⁴ The advantages for Aboriginal involvement in the australite trade were that everyone in the community could be involved in their finding and gathering, and no special tools were needed—just a sharp eye. In 1928 a tourist haggled for an australite from an Aboriginal man along the East-West Line, and reported that

I offered a bob for mine when the train stopped at Cook, but the abo. [Aboriginal person] was a commercial man. 'Bigger money,' he said. And the size of a two-bob piece pleased him enormously. (Bentley, 1928).

For Indigenous people the market for australites would have been heavily dependent on the number of Europeans who were actively building up their collections. It was recorded that in the Goldfields of central Western Australia when the demand for australites waned, Aboriginal people in this area just discarded their collections (Nininger, 1972). The value of these objects was volatile, and it was earlier recorded in the south that for the australites of the Nullarbor Plain

Before the [First World] war there was a limited market for these fragments from space. A German professor used to buy them, but since he ceased to take them they

have no longer a marketable value. (Dunbabin, 1922).

Through the twentieth century Indigenous people in the western South Australia region continued to be a major source of australites, although their involvement was not always recorded. For example, in the 1960s an Aboriginal person in the vicinity of Yalata on the West Coast of South Australia reportedly found a large tear-shaped australite protruding from the ground and passed it to a European rabbit trapper (Tindale, 1964–1965), who then presumably sold it on to a collector at a profit. It was noted that

Australites are abundant near the South Australian-Northern Territory corner (26° 00', 129° 00'), where many thousands have been collected by the aboriginals and traded through the Department of Aboriginal Affairs in South Australia. (Chalmers et al., 1976: 14).

In South Australia during the 1960s and 1970s, State Government authorities assisted Indigenous people in the australite trade. In the 1960s Bob Verburgt was working for the State's Department of Aboriginal Affairs in the northwest of South Australia as superintendent at Amata. A group at the Aboriginal settlement wanted to return to their homeland at Mount Davies in the Tomkinson Ranges to live, so he

... decided to take some people back and have them make artefacts and collect tektites and I paid them in food and kept up their water supply. (Verburgt, 1999: 27).

About 160 or so people eventually camped at Mount Davies and made artefacts, that were bought from them each week and then sent to the Department in Adelaide for sale. The trade in australites became crucial too. Verburgt said that

Many australites were found around the Mount Davies area and after a few inquiries, I found a good market for them. I sent nine thousand four hundred and thirty three australites to Adelaide in six months; this made the Mount Davies group independent and they preferred to stay in their own country. With money coming in each week and plenty of water they were a very happy group. (Verburgt, 1999: 27).

The Department of Aboriginal Affairs in South Australia apparently had some major clients on the australite supply chain in the 1960s, but the largest appears to have been in the United States. A collection of about 2,000 specimens gathered by Aboriginal people at Mount Davies was obtained by the Smithsonian Institute via the Department (Chalmers et al., 1976). Verburgt explained that

Most of the tektites were sent to America apparently to help the space program. The

tektites had a gas inside that was analysed by cutting them in half in a vacuum chamber. Some were sold through the departments shop in Adelaide. I paid the collectors five shillings for large tektites, three shillings for medium and a shilling for small ones. (Verburgt, 1999: 27–28).

The manner of Indigenous involvement in the finding of australites mitigated against the recording of accurate site data. This fact would have decreased their scientific value for the purposes of mapping subsets of australites within the strewn field, according to their morphology, chemical composition and weathering. In 1972 the South Australian Museum purchased a selection of Central Australian australites from an estimated number of between 10,000 and 12,000 that were on sale from the former Apatula Mission located at Finke in the southern Northern Territory (Cleverley, 1988). Concerning the collection offered for sale, it was recorded that

Mr G. McTavish of the Apatula Mission stated that nearly all the australites were found 'within 30 miles' (48 km) of Finke ..., but the distance is certainly vague, being hearsay from Aboriginal collectors, and the intensity of occurrence and/or collection may have varied greatly with direction from the Mission. (Cleverly, 1988: 41).

Given the role that Aboriginal people had in finding australites, it should not be surprising to discover that they are often mentioned in the recorded provenances of specimens held in state-funded collections. For instance, one of the largest known australites was obtained from an Aboriginal person in 1969, who had found it near the abandoned Charlotte Waters Station (Cleverly and Scrymgeour, 1978). Another large specimen that came from an Aboriginal source was acquired at the Warburton Aboriginal Mission in central Western Australia, although it was said that it could have originally been found a considerable distance away (Cleverley, 1981).⁵ Among the other large australites mentioned in the literature was one allegedly collected by an Aboriginal man at Ernabella in the northwest of South Australia, and another from Pindera in northwest New South Wales, which was documented as "... transported by Aborigines." (Cleverly and Scrymgeour, 1978: 329). Today, Western Desert people living at Yalata in western South Australia are still involved in the commercial collection of australites (E. Grant, pers. comm.).

Many australites in museum collections came from former Aboriginal campsites, whether or not the finders were aware of it. For instance, in 1935 it was reported that the australites sent to the National Museum in Melbourne for analysis were from the "... well-known ancient camping grounds of the natives west of McKenzie Springs ..." in western Victoria (Australites found ...,

1935). Similarly, a 'semi-discoidal scraper' made from what was described as "... the inner portion of a broken australite ...", was found at a large campsite at Willaura in southwest Victoria (Baker, 1957: 10). The finder of an australite at Pindera in northwest New South Wales, or perhaps the same one as mentioned above, said "... it was in an old aboriginal campsite on the edge of a gibber plain." (Chalmers et al., 1976: 15).

In 1937 geologist/archaeologist James E. Johnson found 72 pieces of australite at Moonta on Spencer Gulf in South Australia, which were from old Aboriginal camps in the sand dunes (cited in Fenner, 1938a). In 1942 Johnson presented these artefacts to the South Australian Museum (Hale, 1956). Sometime during the mid-twentieth century, Tom McCourt, who was an Aboriginal artefact collector and owner of a private museum in the southeast of South Australia, made a broad collection of stone tools within a few kilometres of the William Creek Store in northern South Australia, and among them were several complete australites (McCourt, 1975). He also claimed that that he had thumbnail scrapers "... made of opal, and tektites, a type of glass meteorite." (McCourt, 1975: 118).

There were advantages for those looking for australites to target former Aboriginal campsites. The specimens found at such places were often less weathered than those that had been long exposed on the surface. In the case of South Australia, there was no legal impediment to collect australites from most Aboriginal sites as prior to the *Aboriginal Heritage Act*, 1988, there was little or no legislative protection, with similar situations existing in most other states (McCorquodale, 1987). Summing up his findings from an archaeological survey of Aboriginal campsites in the North West of South Australia in the early 1960s, Johnson (1964: 177) remarked:

On the floor of Lake Wilson australites are abundant ... 1,451 were collected for the National Museum of Victoria in 15 man-hours. Although most australites found on aboriginal campsites are bright and deeply etched, those on the lake floor are dull and heavily abraded.

In the mid-1960s visiting American anthropologist/archaeologist John Greenway was on a fieldtrip with Verburgt in the northwest of South Australia when they visited a site known as Wra-kina, which was a large claypan not far off the Gunbarrel Highway. Greenway was retracing the path of explorers, such as Ernest Giles, and among other things he was looking for australites. As with Johnson, he noted that australites were often found in the proximity of Aboriginal sites. Greenway later wrote in the published version of his journal that

My poor luck held on the australites; Bob [Verburgt] found one, I found none. But there

was more here than australites. I found a sherd-bagful of flaked stone tools and two Kartan choppers. (Greenway, 1973: 320).

Aboriginal cultural prohibitions for entering parts of their country were an advantage to some australite searchers. In the late-1960s Greenway was with David Hope the superintendent of Amata on an excursion to Lake Wilson. He later wrote:

At Lake Wilson I satisfied one of my nagging ambitions. I found an australite. My good fortune was in their religion; the aboriginal tabu [taboo] excluded most trespassers, and the lake's surface was un hunted. Billy [Anangu guide] escorted me around the lake's crusted perimeter for our half-day fossicking. When we returned to Dave's truck I had my one australite; he had thirty. (Greenway, 1973: 333).

Due to the fact that the Indigenous involvement with the finding of australites was generally not of particular concern to the European collectors, the Aboriginal connections with specific specimens were often not fully recorded. A better documented example of an Indigenous person finding an australite, than most of those mentioned above, occurred in 1981 when Aboriginal man Richard Tax found an australite at Jidirr near Balgo in northern Western Australia, which was passed on to the Western Australian Museum via archaeologist/anthropologist Kim Akerman (Megirian and Mason, 1996).

The circumstances by which Mountford obtained an australite charm, *maban*, during his fieldwork in 1940 with Anangu Pitjantjatjara Yankunytjatjara people in the North West of South Australia are well recorded in his popular book, *Brown Men and Red Sands* (1948). In this publication he outlined why his chief informant, an elderly man named Old Tjalerina, was unable to complete his 'doctor' training, which involved inserting the australite into his body. Tjalerina did not know where australites came from and had apparently never seen one on the ground (Mountford, 1976). Mountford (1948: 551) then wrote:

So, to cut losses, he gave the australite to me, knowing that as all giving in an aboriginal society is reciprocal, he at least would get something from me to offset his bad bargain. He suggested at first that I might push the australite into my own body, but on second thoughts said that he did not think it was really necessary; I was already a 'big fella doctor' because I could make a box (wireless) talk. Nevertheless, he added, an australite might help me to do other wonderful things. Knowing my limitations in those matters – I had not learned conjuring – I thanked the old man, gave him an ample present of food, and suggested that, if he would tell me about the magic stone, I would prefer to take it back to my own country to show it to other 'white fella doctors' even

more powerful than myself.

The vast majority of australites held in government-funded museums are placed in the Earth Science collections, with only a few examples with known Indigenous uses kept within the Ethnographic/Archaeological collections of the same institutions. As relatively small objects, they are easily stored. In the case of the South Australian Museum, it was estimated that in 1966 the australite collection numbered >18,000 (Edwards, 1966; Hale, 1956), and by 1986 it was said to be >20,000 and was considered to be the largest in existence (Corbett et al., 1986).

From the examples given above it is apparent that Aboriginal people well understood what Europeans valued from the desert landscape. In the Northern Territory, members of highly mobile desert communities also appreciated the commercial value of australites. For instance, in 1996 it was remarked that

Members of the Tanami Downs Aboriginal community are familiar with tektites, which were referred to as 'black gold', but they have not found any in that part of country, though they keep an eye out for them when they are out hunting. (Megirian and Mason, 1996: 42).

Due to a high level of Indigenous involvement in the finding of australites beginning in the late-nineteenth century, Aboriginal people have understood why Europeans were fascinated by them. As stated above, the collector Kennett was told about the 'meteorites' by his Aboriginal tracker, Mick Doolan. This understanding by remote Aboriginal people was poignantly observed during a scientific expedition to western South Australia in the early-twentieth century:

All Australian natives are not so simple or superstitious about blackfellows' buttons. I recall a story of Sir Edgeworth David, conducting a geological survey along the shores of the head of the Great Australian Bight. The party was accompanied by an aboriginal woman, Nellie, and they found an australite. Sir Edgeworth turned to Nellie: "What you callem this one, Nellie?" The lady's reply rather started the geologists: "That's an australite, Professor, one of the meteorites." The story was told to me by Dr. Keith Ward, who was one of the party. (Fenner, 1946: 101; see also Dickes Rost and Dickes Rost, 1946).

5 DISCUSSION

The presumed activities of Indigenous people in the late Pleistocene had been used by early scholars to argue for an australite fall having occurred between 2,000 and 4,000 years B.P., but as described earlier in this paper this was proven to be incorrect. Recent research has produced strong evidence that suggests that the australites were formed during a mid-Pleisto-

cene event, about 793 ka, which means that they were present in the landscape long before the ancestors of modern Aboriginal people arrived in Australia. It was earlier suggested that Indigenous people may have relocated many australites outside of the strewn field, although this too was later rejected as a proposition.

In historic times, Aboriginal people in areas such as the Nullarbor Plain and then later in Central Australia have become deeply involved in the finding of australites for Europeans who wanted them as gems and scientific curios. In 1946 an australite researcher remarked that

The Blacks [Aboriginal people] are still the best collectors of australites, and with the grim humour of the outback they are called "black-fellow's buttons." (Fenner, 1946: 101).

As descendants of the people who had foraged in the country for generations prior to European settlement, Aboriginal people possessed intimate knowledge of the landscape and in particular of where things could be found. This is also shown in the role Aboriginal guides had in finding meteorite craters in Western Australia (Bevan, 2006), such as at Dalgarranga (Hamacher and O'Neill, 2013; Nininger, 1972) and Wolfe Creek (Sanday, 2007). Australite researchers have also long recognised the value of Indigenous knowledge when searching for specimens. When conducting fieldwork in the early 1970s in order to establish the limits of the strewn field, it was remarked that

If the local people, especially aboriginals, have never seen australites in their regions, it is a reasonable conclusion that they have not fallen there. (Chalmers et al., 1976: 15).

For Aboriginal people in remote regions the selling of australites to European collectors was part of what has sometimes been described as a 'hybrid economy' (Sanders, 2016). In various parts of Australia this has included Aboriginal seasonal participation in activities such as pastoralism (Head and Fullagar, 1997), mining (Anderson, 1980); opal prospecting (Harding, 2017), trepang fishing (Russell, 2004), sandalwood extraction (Wharton, 2009), dingo hunting (Silberbauer, 1971) and the production of artefacts for sale (Isaacs, 1992). The advantages for Aboriginal people in remote areas when working in such industries are similar to those involved with australite gathering. The small-scale and informal nature of these operations attracted Aboriginal participants because of the high levels of autonomy and it provided for important cultural and social practices.

Indigenous involvement in the collecting of australites, along with the folklore concerning their significance in Aboriginal culture (Clarke, 2019), have added to their iconic Australian status. There is still a strong international market

for australites among hobbyist collectors, much of it conducted over the Internet.

6 NOTES

1. Many of these terms are listed by Baker (1957), Bates (1924), Fenner (1933), Scott and Scott (1934a) and Tellurian (1922).
2. According to Fenner (1946: 100), "... this specimen is religiously preserved in the Geological Museum at South Kensington [London], where I have examined it." McColl (2017) stated that the specimen is now held in the British Natural History Museum (Specimen no. NHMUK 1958, 153).
3. Palaeontologists claim that the wide-spread *Genyornis newtoni* had become extinct by 45,000 years ago, although isolated small populations may have survived until more recent times in refugia (see Garvey et al. 2011; Roberts and Brook, 2010).
4. Refer to Jones (2007, Chapter 7) for a description of the collecting of Aboriginal artefacts along the East-West Line.
5. Obtained by Mr S. Bridgeman.

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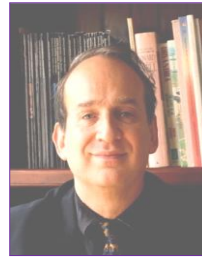
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Dr Philip A. Clarke has an academic background in biology, geography and anthropology. He started working on the Aboriginal ethnographical collections at the South Australian Museum in 1982, where his initial research interests were chiefly focused on

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