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# Notes on the Pens Collection of Australites in the Tate Museum, University of Adelaide

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## Abstract

The Tate Museum holds a large collection of (tektites) australites including the Pens Collection from the Florieton area in east-central South Australia. Many of these specimens are intact or near-so and have the various forms ascribed to their behaviour as they entered the Earth's atmosphere. However, a significant number, some of which may have been initially fractured and broken by erosional processes on the Earth's surface, were later reworked by Aboriginal Australians to form small tools and hence are important artefacts. Of the Florieton specimens, 6.5% have been reworking into microlithic flakes. This note points to the historical value of the Pens Collection, discusses the nature of the environment in which they were found, and speculates about the collecting and adaptation of australites by Aboriginal Australians.

## Key Words

Australites; tektites; Mawson; Tate Museum; meteorite impacts; Aboriginal culture; Aboriginal artefacts.

# Introduction

Tektites are natural glasses that form from terrestrial sediment that is ejected from the Earth's surface at high temperature during a meteorite impact (Glass, 1984). The origin of tektites in four identified strewnfields across the globe have been suggested as follows: in Australia from a still yet to be confirmed meteorite impact 770ky ago (possibly located in Laos, according to Sieh et al. 2019); in Central Europe from the Nördlinger Ries impact crater 15my ago; in the Ivory Coast from the Lake Bosumtwi impact crater 1my ago; and in North America from the Chesapeake Bay impact crater 34my ago (Glass, 1984). The tektites that are found in the Australasian strewnfield are known as Australites (McCull & Williams, 1970). Australites typically have several distinctive forms, including spheres, ovals, boats, dumbbells, teardrops and cores (Figure 1). The Tate Museum holds a large collection of more than 2500 tektites with an estimated 2,200 Australites. The earliest additions to the collection, dating from 1911, were catalogued as 'obsidianite', based on an original belief that australites were of volcanic origin. Australites are believed to have fallen in a single event in the middle Pleistocene and have a radiometric  $^{40}\text{Ar}/^{39}\text{Ar}$  age of  $770 \pm 20\text{ka}$  (Shoemaker & Uhlherr, 1999) supported by an earlier K/Ar date of 700ka (Gill, 1970). However, these ages are at odds with a stratigraphic age, determined by OSL dating of the sediment in which they are found (Dog Trap Bay Sand,  $420 \pm 40$  to  $230 \pm 15$  ka) at Port Campbell in Victoria (Williams et al, 2013).

[FIGURE 1 HERE]

Professor Ralph Tate, after whom the Tate Museum was named, stated that australites "were held in high esteem by aborigines, a fact which proves inferentially that they are not common" (Tate, 1879).

The use, role, and value placed of australites in Australian Aboriginal cultures has to some extent been explored (Baker, 1957; Clarke, 2018). Australites were often conflated with meteorites (Bevan & Bindon, 1996). Both tektites (australites) and meteorites were used by Aboriginal Australians as 'medicine-stones' and 'magic-stones' (Baker, 1957). Prior to European occupation in 1788 there were around 270 distinct language groups of Aborigines in Australia (Edwards, 1988) and so, apart from varied names to describe australites, their role and use may have varied considerably. There was also

a likelihood of dependence on the location of the major australite strewn fields, most of which occur in southern latitudes (McCall, 2000; Clarke, 2018). Aboriginal groups such as the Kokatha, in the region of Woomera in South Australia, used australites in several different ways in order to hunt emus. For example, they were wrapped up in a ball of ‘emu feathers’ and then thrown out onto the ground to where emus fed Baker, 1957). The inquisitive birds would eventually wander over to investigate this curious parcel whilst camouflaged and concealed hunters would lay in wait to ambush their prey (Baker, 1957). As also reported by Baker, gizzard-stones (gastroliths; rocks held inside a gastrointestinal tract) are frequently black in colour and the greater proportion of them are australites. Colloquially, australites were referred to as ‘emu eyes’ and associated with emus in several different ways.

[FIGURE 2 HERE]

## **Florieton strewnfield**

In 1936, schoolboy Mervyn Pens contacted Sir Douglas Mawson and reported finding numerous australites near Florieton, South Australia (Mawson, 1957; Figure 2), where the Pens family managed three sheep stations (Kungara, Fingerpost and Florieton). The bulk of his specimens came from the Kungara property (Mawson, 1957). More than 1470 were provided to Sir Douglas Mawson and some to the South Australian Museum but the majority were housed in the Tate Museum. Including specimens from later collectors, more than 2,000 australites from an area of ~250 km<sup>2</sup> around Florieton are held in the Tate and South Australian Museums (McColl & Williams, 1970). The Tate Museum currently holds 994 specimens (Figure 3).

## **Landscape**

In the vicinity of Florieton, and in particular around Kungara, the landscape is essentially a gently sloping calcareous plain with broad drainage channels transgressing low angle, calcareous pediment and fan deposits (Eurovale land system; NatureMaps, Enviro Data SA 2023). Calcreted Pleistocene

gravelly alluvium is widespread with younger alluvial deposits in modern creek lines and floodplains. Shallow soils over calcrete are common. Pleistocene clayey sediments underlie the landscape. Typical soil profiles consist of calcareous loam over rubbly calcrete at shallow depth. It is clear from Mawson's description (Mawson, 19580) that the australites were hosted in the soil profile (and possibly originated in underlying Pleistocene sediments) and became exposed at the soil surface due to a combination of wind and water erosion and, potentially, bioturbation. Mawson remarked that many parts of the region had at one stage been extensively cleared of vegetation and ploughed in preparation for wheat production, which failed as an agricultural practice and was abandoned, and it is possible that this turnover of surface soils assisted in exposing the australites found by Pens.

[Figure 3 here]

## Aboriginal history

Florierton was originally named in 1882 after Florence Annie Price, the daughter-in-law of the Governor of South Australia, William Jervois. Historically, this was the traditional homeland of the Ngaiawang people, also known by the name Meru, who are part of a larger grouping which included the Ngawait and Erawirung peoples (Tindale, 1974). The Ngaiawang were eventually assimilated into larger bordering groups like the Ngadjuri. The territory of the Ngadjuri people extended from Angaston and Gawler in the south to Port Pirie and Orroroo in the north. Westward they ranged to Crystal Brook, but they scarcely touched the coast of Spencer Gulf except when on visits to the Narangga people of Yorke Peninsula. In the south their boundaries marched with those of the Kaurna between Hamley Bridge and Gawler. Their eastern boundary was the eastern scarp of the Mount Lofty Ranges" (Tindale, 1937; Warrior et al, 2005). However, in the modern context, there were often disputed land boundaries.

The value and use of australites by the Aboriginal peoples in this region has not been recorded. However, we can speculate on the basis of information from other Aboriginal groups in Australia and overseas. The Wadigali (Wadikali) language lies in the northeast of the state of South Australia, also

crossing the borders of NSW and Queensland. They referred to australites as mindjimindjilpara, which was later translated to mean ‘eyes staring hard’ (Baker, 1957).

## Characteristics of specimens

Table 1 is a summary of the characteristics of some of the Florieton specimens held in the Tate Museum, including details of those clearly modified to produce tools. They include the following:

Form	Number of specimens	%
All Identifiable forms	349	35.1
Broken form	580	58.3
Artefact	65	6.5
Total	994	100

- **13831:** Australites (25) including near complete cores and artefacts: 20 have signs of reworking. Collected by Mervyn Penn (late 1930s), Florieton. Described by D Mawson as ‘broken glass australites’.
- **18319:** Australites described as ‘scraps’. Collected by Mervyn Penn (1930s). 342 pieces with 12 extensively reworked artefacts.
- **20478:** Artefacts from areas near the Burra Creek - Sampsons Well Road intersection, 12k NW of Morgan, South Australia. Collected by DH McColl and R Lippert in 1969. Labelled ‘australites and australite artefacts’. A total of 20 individuals with many being complete cores: 5 had signs of reworking and consistent flaking.
- **21585:** Australites described as ‘fragments and etched forms’. Collected by DH McColl and friends (16/8/1966) from a claypan, ~2k from the northeast corner of the North Paddock of

Fingerpost Station. One specimen is extensively reworked: the others are possibly damaged from natural erosion or transportation.

- **29741:** Artefacts (2.456g) 1km from south-west bore at crossroads, Florieton. Collected by M Mason, 21/03/1965. 2 pieces: 1 small flake, 1 extensively worked piece.

[Figure 4 here]

The ‘tooling’ of australites to produce implements observed in the Florieton specimens (Figure 4) is similar to that in specimens of worked australites found on Earahedy Station, Western Australia (Cleverly, 1995), near Rawlinna in the western desert of Western Australia (Akerman, 1975) and near Calperum, River Murray region, South Australia (Roberts et al, 2020). One example from Florieton is worked on both sides, with two or more distinct fracture points on the ventral side (Figure 5). On the dorsal side, the number of reworking marks is countless and was seemingly flaked to create a sharp edge on the remnant flange. Of the 994 australites collected and logged into the Tate Museum from the Florieton area of South Australia since the 1930s, with consistent additions until the 1970s, 65 specimens, or 6.5% of the collection, are artefacts reworked by Aboriginal people.

[Figure 5 here]

## Discussion

The abundance of flaked australites in the Florieton collection is unlike that from other areas, including the large Western Australian Museum australite collection of 35,000 specimens within which only 0.5% have been fragmented into tools or man-made scrapers (Baker, 1957). Research on a collection from the Pinjin patrol station found 0.6% were flaked (Cleverly, 1992). Of the Eddudina station australite specimens, 3.5% were flaked, and the Hampton Hill station collection includes 3.5% flaked artefacts (Cleverly, 1990). Some other collections have yielded much larger proportions of worked flakes with estimates for the Earahedy Station material of 15.4% (Cleverly, 1995) and the Western Australian Museum materials from the same location of 16% (Cleverly, 1976). An even higher proportion of australites collected from Glenayle Station (54%) were identified as artefacts

(Cleverly, 1995) whilst of those from the Western Australian goldfields included only 1.1% artefacts (Cleverly, 1995).

According to Cleverly (1976), australites had been used by Aboriginal Australians as tools for at least 18,000ky which represents a long and sustained cultural use. Microliths (small implements) were often made by Aboriginal people of the Mudukian culture, which is estimated to have occurred ~2000 years ago, with these implements existing in sites on Yorke Peninsula (Baker, 1957), along with recent tools from the Moonta area on the Yorke Peninsula made from australites (Fenner, 1938). Aboriginal Australians of the Kartan culture of Kangaroo Island used australites to make scrapers and microliths (Baker, 1957; Howchin, 1909). Although generally flaked into small tools, there is one record of an australite being used in a spear (Dawson, 1881) although it was described as volcanic glass (Baker, 1957). Dawson also suggests that 'obsidian' (now considered to have been australite material) was used for scraping and polishing weapons with samples shown to him by the Aboriginal people of Dunkeld, Victoria.

The glassy nature of australites, when worked, results in conchoidal fractures and the formation of sharp edges. Although australite flakes were not as wear-resistant as some other quartz-rich microliths, the sharpness of the australite tools made them useful for ceremonial cutting, such as circumcision or ceremonial subincisions in aboriginal rites (Baker, 1957; Baker, 1964).

The diverse range in relative abundance of australite tools in tektite collections could have various explanations. For example, access and availability is expected to have been variable depending on the nature and frequency of events that winnowed and eroded the australites from the Pleistocene sediments and soils in which they were encased. A relative scarcity could have made them more likely to be used as important objects, such as magic stones or medicine stones, particularly if the distinctive primary forms of the tektites were preserved. Naturally broken or damaged specimens could have been selected for tool making based on observations of the nature of the fractures.

Naturally fragmented specimens might have been more abundant in one 'strewnfield' than another and so more available for working for toolmaking. Akerman (1974) suggested that australites in the western desert of Western Australia provided the material for the flaking of small artefacts in areas



where other forms of siliceous material was scarce. Australites may have been valued differently by different Aboriginal groups and perhaps were less likely to be worked if their perceived value was particularly high.

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## Authorship Statement

JS co-authored the original manuscript, analyzed physical specimens and provided access to the samples.

PC co-authored the original manuscript

TM co-authored the original manuscript and created figure 2

VG reviewed and assisted with the conceptualisation of this project

## Acknowledgements

The deep long and meaningful relationship to the land of the first nations people is recognised and acknowledged. We thank Frances Williams for her input into original drafted Manuscript. Dr.

Rachelle Kernen is thanked for providing valuable verbal assistance with this project. Kevin Hamdorf is thanked for providing verbal assistance with this project.

## Appendix



*Fig. 1: Australite artefacts from Florieton 'strewnfield' sites near Burra Creek-Sampsons Well Road intersection, 12k NW of Morgan, South Australia. Collected by DH McColl & R Lippert, 1969. (Tate Number, 20478).*



*Fig. 2: Australites described as 'broken glass australites', Florieton, South Australia. Collected by Mervyn Penn, 1930s. (Tate Number, 13831).*





*Fig. 3. Australite artefact (2.456g) from 1km south-west of bore at crossroads, Florieton. Collected by M Mason, 21/3/1965). (Tate Number, 29741).*

## Figures



*Figure 1: Examples of forms of australites held in the Tate Museum. A. Oval - Tate number 3807. B. Boat form - Tate number 18620. C. Core with flange - Tate number 27177. D. Dumbbell form - Tate Number 29718. E. Teardrop form - Tate number 13812.*

Figure 2



Figure 2. Location map showing principal collection sites and soil/landscape view. Base map is 1:100 000 topographic map.



Figure 3: Assemblage of australites collected from the Florieta 'strewnfield', mainly by Mervyn Penn.



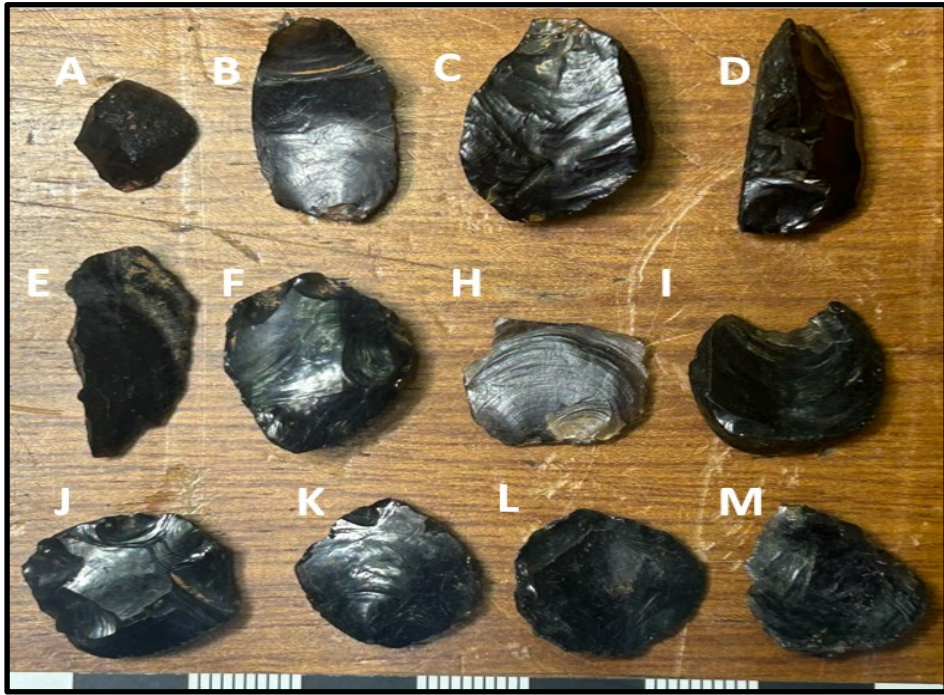


Figure 4. Examples of australite artefacts from Florieton collected by Mervyn Penn. (Tate number 18319). Described by Mawson (1958) as 'broken glass' tectites.



Figure 5. Australite artefact (sample K, Fig.2, Appendix). Front and back views with arrows showing signs of reworking. Sample from Florieton 'strewnfield' area near Burra Creek-Sampsons Well road intersection, 12k NW of Morgan, South Australia. Collected by DH McColl & R Lippert, 1969. (Tate Number, 20478)