

Australites from Pinjin Pastoral Station, Western Australia

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Abstract

Australites from Pinjin Pastoral Station are typical of the Eastern Goldfields region if some allowance is made for the quality of the available sample. The specific gravity range of 2.422-2.469 with 55% of the values in the 2.45-2.46 interval indicates that the australites are of the "normal" chemical type of Chapman (1971). The aberrant forms include a rare "tailed" core.

Introduction

The homestead of Pinjin Pastoral Station is 141 km east-north-east of Kalgoorlie, Western Australia, near the south end of the Pinjin line of gold workings and close to the site of the former town of Pinjin at 30°05'S, 122°44'E. A complex system of salt lakes within the station includes elongated parts of Lake Rebecca, the partly choked and much modified remnants of a river system which flowed to the south-east in more humid times. The region is now semi-arid with internal drainage. Mean rainfall at the nearest recording station (Edjudina, adjoining to north) is 209 mm/a. The small mining centres of Mulgabbie and Pinnacles are within the station (Figure 1). Australites occur on the surface of the ground, in rain-wash gutters leading to the lakes, on alluvial fans, and around the margins of claypans and lakes.

Australite sample and laboratory procedure

The following six small parcels of australites collected from various parts of Pinjin Station were available for examination: — Tillotson private collections — 19 specimens from small dry lakes south-west of Old Pinjin (a former homestead), and 98 specimens from 8 km west-north-west of Old Pinjin; Western Australian Museum — two collections totalling 50 specimens from Mulgabbie; South Australian Museum — 27 from dry lake in the vicinity of Pinnacles and 33 from "Tinjin" ex S.F.C. Cook collection. The last item was accepted as being from the Pinjin Mining Centre. The Cook collection was very poorly documented. There has never been a "Tinjin" in Western Australia (pers. comm. from Department of Land Administration), but Pinjin was an active mining centre when Cook was assembling his collection by purchases from prospectors and mining men. Cook's collection contained australites from mining centres neighbouring Pinjin to north-west (Edjudina) and to south-west (Kurnalpi).

The marked imbalance in distribution of the above parcels (Figure 1) was partially corrected by collecting from several points in the central and south-eastern parts of the station. Australites were sparsely present and small. Most were found on the margins of claypans or salt lakes. Only five of 78 australites collected weighed more than two grams

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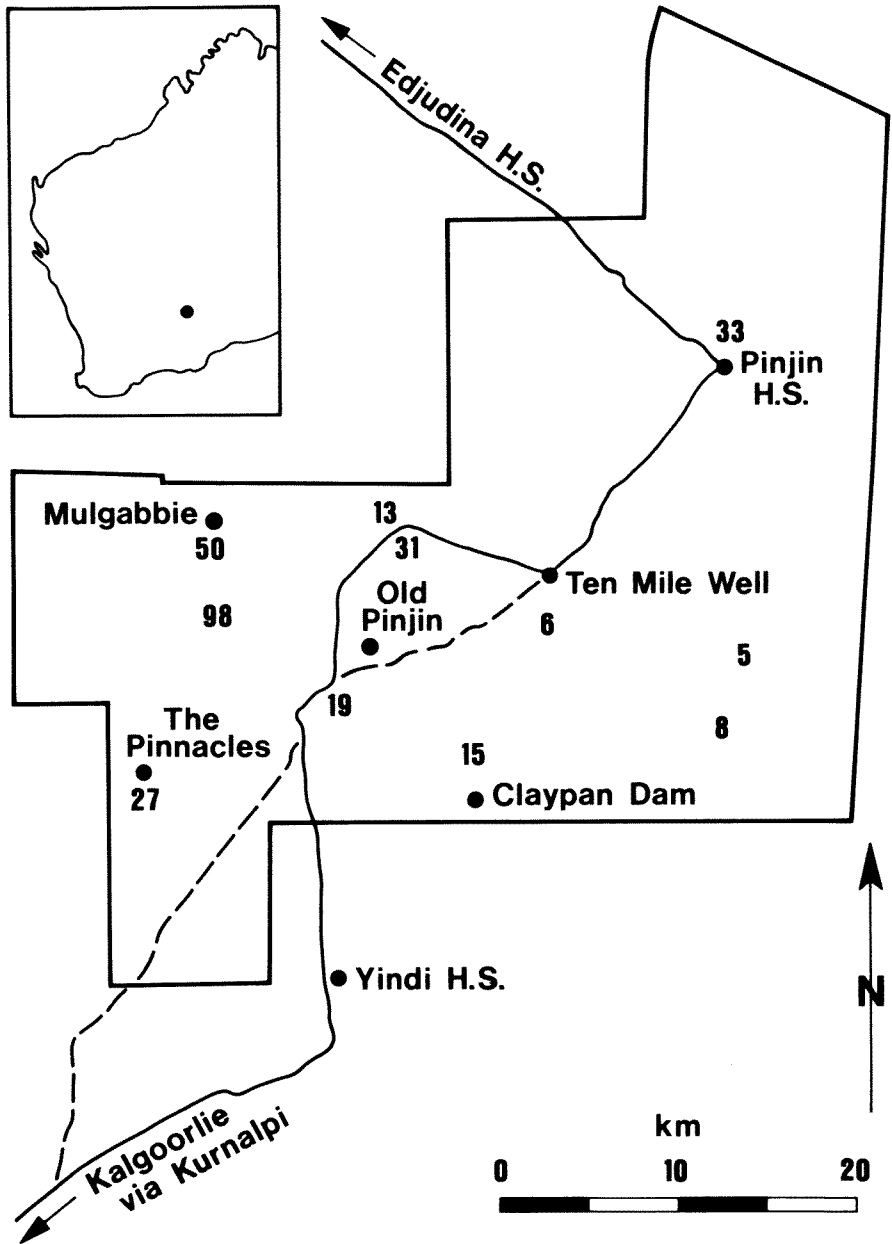


Figure 1. Map of Pinjin Pastoral Station showing numbers and find sites of australites examined. Inset: Western Australia showing location of Pinjin H.S.

each and the recovery rate was less than two australites per person per hour. The absence of large australites from the eastern section may explain why the area was not represented in earlier collections. The additional specimens bring the total number available to 305, a sample of minimally acceptable size for this work.

Australites were classified morphologically, the results tabulated, and extracts made (Table 1, column 1) according to the system and methods of Cleverly (1986). This procedure was used to enable the comparison of the Pinjin australites with those from other areas previously quantified by the same system and methods. The specific gravities of 80 australites drawn from all parcels were determined.

Discussion and conclusion

The Pinjin australite sample was gathered by various people at various times, and it is likely that the greater part of the station has never been searched. Moreover, the parcels in the sample vary greatly in quality. There is a natural variation in australite size from place to place as shown, for example, by the distinct sectors in which very large australites occur (Cleverly and Scrymgour 1978). However, mean size may also be influenced by the degree of care in collecting. Thus, in the Pinjin sample, there are parcels resulting from the experienced and thorough collecting of the Tillotsons with average specimen weight 1.0 g, and on the other hand, the casual and perhaps accidental finds of prospectors contributing to the Cook collection, average weight 3.4 g. In conformity with weight difference, the ratio of the larger core-type specimens to the smaller lens-forms in the Tillotson contribution is 0.18 (i.e. fewer cores than lens-forms), while the ratio for the Cook collection is 2.40 (the reversed situation). That these differences are related to thoroughness of sampling rather than to differences in the material available is suggested by comparable figures for australites from other areas in the same collections. For example, figures for the Leonora district are:

Collection	Mean weight	Cores/lens-forms
Tillotson	0.8 g	0.06
Cook	8.2 g	2.53

Features of the Pinjin sample and average Eastern Goldfields australites are compared in Table 1. Small percentage differences in major constituents are in the directions expected from the nature of the sample. The higher than average percentage of classifiable specimens (Table 1, item 3, 56.8%) is understandable as the result of casual or fortuitous discovery of the larger specimens present in some parcels. This is true also for the higher than average percentage of round plus broad oval forms (item 8, 81.0%), which are especially abundant amongst larger specimens (Cleverly 1991b). It follows also for the higher percentage of the larger cores (item 17, 41.7%), lower percentage of the smaller lens-forms (item 15, 52.4%) and consequent larger cores/lens-forms ratio (item 18, 0.80).

Table 1. Comparison between morphological features and mean weights of australites from 1. Pinjin Pastoral Station (this paper) and 2. average of seven australite samples from the Eastern Goldfields (Cleverly 1986, 1988, 1990, 1991a).

	1	2
1 Complete forms or essentially so %	44.3	37.3
2 Incomplete but classifiable %	12.5	12.9
3 Total classifiable %	56.8	50.2
4 Unclassifiable, mostly fragments %	42.6	48.6
5 Flakes and flaked cores %	0.6	1.2
6 Round forms %	73.9	68.2
7 Broad oval forms %	7.1	8.4
8 Total round and broad oval forms %	81.0	76.6
9 Narrow oval forms %	6.5	7.7
10 Boat forms %	5.4	5.1
11 Dumbbell forms %	6.5	7.3
12 Teardrop forms %	0.6	3.3
13 Flanged, disc and plate, bowl and canoe forms %	3.0	2.3
14 Indicators I %	1.2	1.8
15 Lens-forms %	52.4	61.6
16 Indicators II %	1.8	1.1
17 Cores, including conical cores %	41.7	33.2
18 Cores/lens-forms	0.80	0.54
19 Number of whole australites	135	
20 Mean weight of whole australites (g)	2.82	2.74
21 Total number of specimens	305	
22 Mean weight of all specimens (g)	1.92	1.86

The mean weights (items 20 and 22) of the Pinjin sample are only fractionally higher than average but this is partly accountable to painstaking collecting in the eastern portion of the station, which would not otherwise have been represented. The 78 specimens collected there have mean weight only 0.82 g.

The percentages of some minor constituents such as teardrop forms (item 12, 0.6%) are distinctly different from average, but such differences must be expected when the sample is of minimally acceptable size. Only 168 specimens are available for distribution in the group of items Nos. 6-12 (Table 1). Previous experience of samples having 103-304 specimens in that group is that the percentage of teardrop forms varied widely from 1.0 to 5.2% (Cleverly 1991a). It would require the recognition of only a single additional teardrop from amongst the 130 un-named, weathered or fragmented, Pinjin specimens to bring their percentage within that range.

The 80 measured specific gravities are in the range 2.422-2.469. The frequency distribution of the specific gravities is unimodal with 55% of them in the 2.45-2.46 interval. These features are typical of the frequency diagram for the "normal" australite chemical type of Chapman (1971).

Table 2. Comparison between australite from Mulgabbie and other "tailed" or "beaked" australite cores.

Collection	WAM 12 170	1. WAM 1645	SAM 1389	2. K. Jenkins coll.
Find site	Mulgabbie, W.A.	Kookynie, W.A.	Finke, N.T.	Eastern Goldfields
Core				
Shape type	Round	Round	Round	Round
Dimensions mm	(23.5-22.9) x 20.3	(30.4-30.1) x 26.6	(24.5-24.0) x 19.7	(31-29.5) x 32
Mass g	12.85	29.26	13.36	33.07
S.G.	2.45	2.46	2.43	2.43
Primary body				
Diameter mm	25.6	33.5	28.0	c.40
Mass g	21.5	48.9	27.9	c.80
Losses from primary body				
Mass %	40	40	52	c.55
Thickness %	21	20	30	c.20

1: Data from Cleverly (1974); others, this work.

2: Figures for primary body from visual estimates of curvature and complicated by flake losses.

The five aberrant forms in the sample constitute 2.9% of classifiable specimens, which is close to the mean of 3.0% for seven Eastern Goldfields samples previously examined. The aberrant specimens include a weathered, "tailed" or "beaked", round core from Mulgabbie (WAM 12 170). It is compared in Table 2 with a better preserved specimen described by Cleverly (1974) and two other examples. The origin of the form is uncertain. One possibility is that after the parting of a slim-waisted dumbbell primary mass, the two resulting apioids tended to adopt spherical shape under the influence of surface tension, being no longer constrained within a rotating system. Such a tendency would be expected especially in medium sized and larger bodies with longer liquid life. A mass failing to attain spherical shape would orient in ablation flight like other apioids with the unabsorbed "tail" as an extension of the posterior surface, and the resulting secondary shape would be round or nearly so. The four examples of the "tailed" form known to the writer had such an orientation and are round forms. "Tailed" forms would thus be apioids which has progressed further than most others towards the adoption of a spherical shape.

The only two australite flakes in the sample were found on adjacent clypanes 12 km east-south-east of Ten Mile Well (Figure 1), where flakes and flaked cores of chalcedony and various siliceous rocks are also sparsely present. The australite flakes are therefore presumed to be artifacts. The area was evidently not particularly favoured by Aborigines. It is improbable that destructive use of australites could have contributed significantly to the scarcity and small size of australites in the general area. No evidence was seen of the removal of australites from the area.

The Pinjin australites do not differ significantly from others in the Eastern Goldfields except insofar as their features are influenced by the quality of the available sample.

Acknowledgements

I thank A.W.R. Bevan, A. Pring and R.G. Tillotson for the loan of australites, E.I. Cleverly for assistance in australite search and for typing the manuscript, and J.M. Wearne for drafting Figure 1. Messrs Bruce Agars and Philip Agars allowed ready access to the station and offered numerous courtesies during the course of three visits.

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