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A large, dumbbell-shaped australite from north of Hyden, Western Australia

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A large, asymmetrical, dumbbell-shaped australite core (Figure 1) was found in road metal during road construction c. 21 km NNW of Hyden at 32°14'S, 118°48'E. The original locality of the specimen may have been one of the numerous borrow pits not far distant from the find site, because the lateritic "gravel" used on the roads is an almost ubiquitous sub-soil of the region.

Salient properties of the australite are presented in Table 1 for comparison with other dumbbell cores known to weigh more than 100 g each. The Hyden specimen, weighing 130.98 g, ranks third in weight. The dimensions are 113.3 x 32.2(28.2) x 30.2(27.2) mm, stated in the conventional form with those of the wider gibbosity followed by those of the narrower gibbosity in brackets. The first three specimens listed in Table 1 are from the western sector and the fourth is from the eastern sector of occurrence of unusually heavy australites (Cleverly and Scrymgour 1977).

The gibbosities and waist of the Hyden specimen are slender compared with other large australite dumbbells (Table 1), but the length of 113.3 mm is the greatest reported for any australite.

Table 1 Dumbbell-shaped australite cores weighing more than 100 g each

Weight g	S.G.	Dimensions mm	Waist mm	Find Site	Reference
176.00	2.435	100 x 42(35.8) x 33.7(25)	c. 34 x 24*	Near Cuballing, W.A.	Baker (1966)
151.29	2.433	98.4 x 35.6(35.1) x 29.6(27.2)	33.2 x 26.8	16 km NW of Ongerup, W.A.	Baker (1967); Cleverly (1974)
130.98	2.423	113.3 x 32.2(28.2) x 30.2(27.2)	21.6 x 19.6	21 km NNW of Hyden, W.A.	This paper
115.75	2.467	74.9 x 36(33.4) x 29.7(24.8)	c. 35 x 24*	Laing, Vic.	Baker (1969)

*Estimated from Baker's illustrations.

No rim is evident and the equatorial zone is represented only by two — possibly three — small circular depressions, the largest 6 mm diameter with circumferential U-grooves. These circular features were "flake scars" formed during loss of the stress shell and since severely corroded (Figure 1B).

The flight orientation adopted for Figure 1 is based upon the greater abundance of U-grooves (worm grooves, gutters) on one set of surfaces (Figure 1C) relative to the

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opposing surfaces (Figure 1A). The development of such grooves by solution etching in soils occurs preferentially on anterior surfaces created by loss of the aerothermal stress shell (Chapman 1964). There are probably small, secondary, residual strains within those surfaces. However, grooves may occasionally be equally, or even more abundantly developed on posterior surfaces where there are residual strains dating from shape development and consolidation of the primary tektite body. An australite found only 17 km N of the Hyden specimen and having grooves equally developed on the anterior and posterior surfaces has been described by Baker (1961). Thus, the orientation adopted for Figure 1 is uncertain.

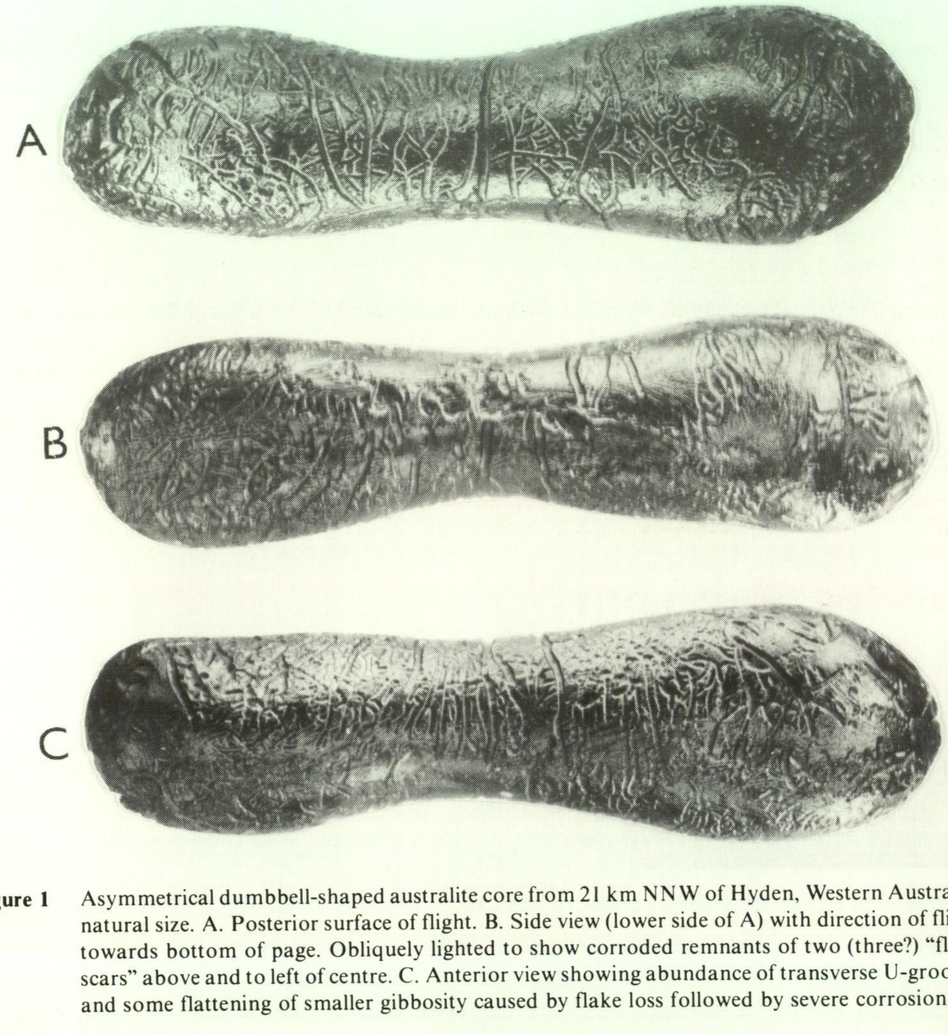

Figure 1 Asymmetrical dumbbell-shaped australite core from 21 km NNW of Hyden, Western Australia, natural size. A. Posterior surface of flight. B. Side view (lower side of A) with direction of flight towards bottom of page. Obliquely lighted to show corroded remnants of two (three?) "flake scars" above and to left of centre. C. Anterior view showing abundance of transverse U-grooves and some flattening of smaller gibbosity caused by flake loss followed by severe corrosion.

Most of the U-grooves are oriented normal to, or obliquely across, the length of the dumbbell. This orientation is quite unlike the usual meandrine pattern ("worm grooves") on surfaces created by loss of the stress shell. It is suggested that the pattern on the dumbbell may be related to a considerable increase in the length/width ratio — usually known as the "elongation" of an australite — during rotation of the primary tektite mass. The original elongation may have been little different from unity (spherical form). The elongation of the primary dumbbell body, allowing for a stress shell up to 4 mm thick, was more than three.

The low specific gravity of 2.423 matches those of other large australites found in south-western Australia. The mean specific gravity and SD for 30 large australites from that region weighing more than 100 g each are 2.425 ± 0.012 (Cleverly 1974, 1981; Scrymgour 1977).

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