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The Rôle of Australites in
Aboriginal Customs

by

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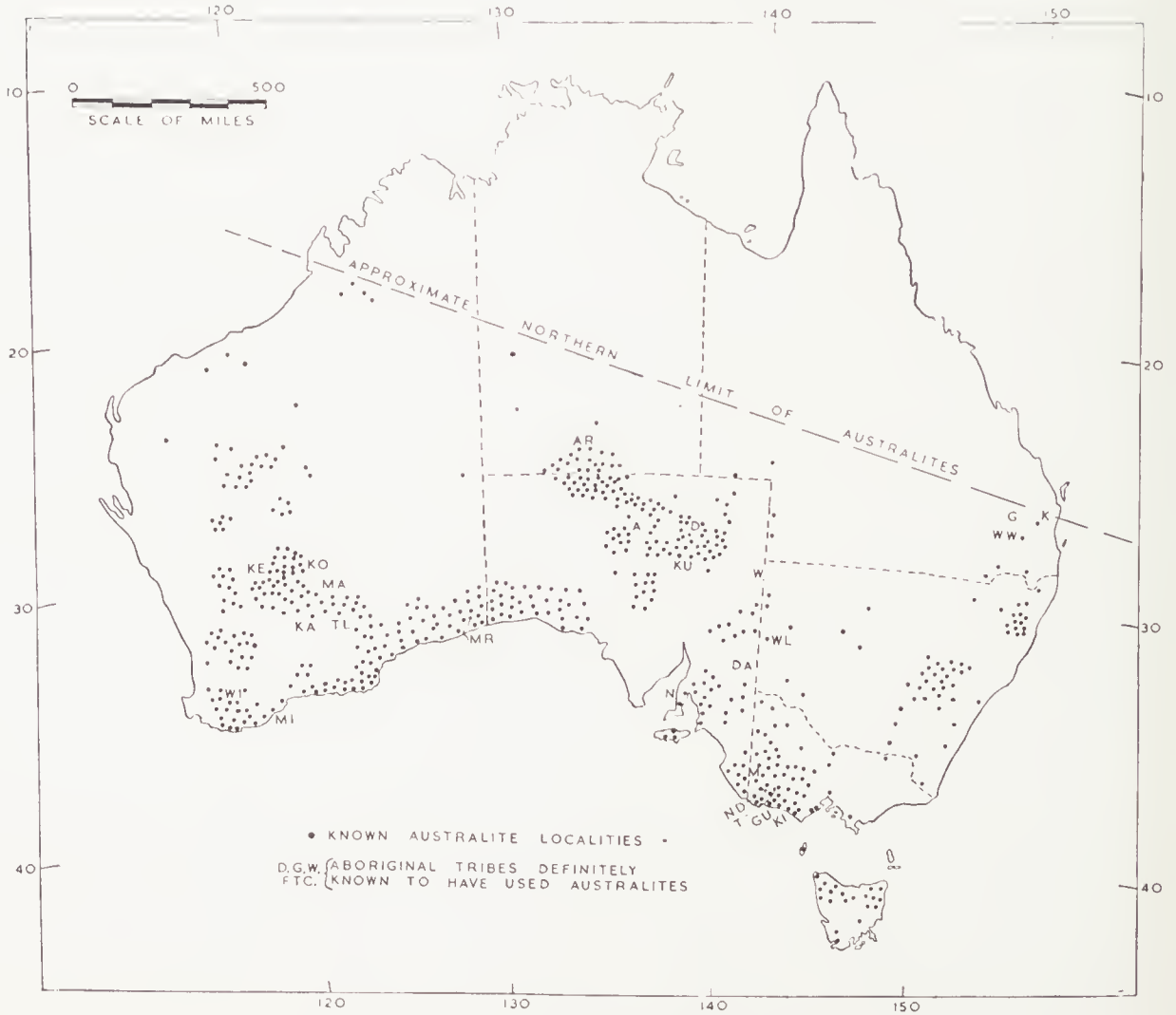
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FIG. I.



For Explanation of Figure 1, see pages 20-21.

The Rôle of Australites in Aboriginal Customs

By GEORGE BAKER, D.Sc.

INTRODUCTION.

The Australian textites (Plates I., II. and III.), formerly called *obsidianites*, *obsidian bombs*, *obsidian buttons*, &c., but now known as australites, have been found in considerable numbers strewn over vast areas of the southern portion of Australia (figure 1). Apart from their geological and astronomical importance, considerable ethnographic interest attaches to australites. They are sometimes encountered, among other types of stones, on the sites of ancient aboriginal camps, and are distinctive in being remarkable, black glassy objects, mostly possessing relatively regular shapes. Many of them were treasured by certain aboriginal tribes (see text figure 1) as medicine-stones, death-pointers, punishment-stones, hunting-stones, sacred-stones, magic-stones, amulets or charm-stones, throwing-stones, rainmaking-stones, message-stones, and a few were used as small implements. It has also been suggested they were earlier used as barter-stones.

Figure 1. Sites of australite discoveries in relation to the location of aboriginal tribes known to have used australites for various purposes. (Based on Fenner's (1935) map of australite distribution, with additions, and Tindale's (1940) map of distribution of aboriginal tribes of Australia.)

Since the occupation of Australia by the white man, and the retreat of the aborigines into the more remote regions of Australia—regions that are principally beyond the northern fringe of the australite strewnfield, many of the native customs concerned with australites have evidently fallen into disuse, or are by no means as commonly applied in native sorcery or native medical practises. Hence it is difficult to verify some of the details relating to certain uses of australites by the aborigines, and recourse has perforce to be made to scattered and passing references in the early literature on such matters.

The writings of various authors on both geological and archaeological aspects of australites date from around the middle of the 19th Century. Several of these refer to the use of australites by the aborigines, and taken in conjunction with subsequent inquiries and findings from discussions and correspondence with anthropologists, ethnologists and geologists, it has been possible to assemble a collection of data deemed worthy of being placed on record. One important conclusion that arises from the archaeological aspect is that australites were more commonly revered and carefully preserved as ceremonial- and magic-stones* by the natives; they were looked upon as objects of magic and mystery, probably more so than any other type of rock or mineral. Complete or nearly complete specimens in particular were largely collected and retained for these purposes, most frequently by such influential members of the tribes as the witch doctors or medicine men.

The term "blackfellows' buttons", sometimes applied to the australites, is attributed to popular fancy, and was evidently used in a whimsical manner by the earlier white settlers, for in his native state the blackfellow of the interior and outback regions of Australia had no use for buttons as such (cf. Fenner, 1939, p. 16).

As a group of natural black glass objects, the australites do not provide particularly satisfactory material for Stone Age artefacts. A few, however, have been shaped or splintered for use as small implements and for parts of certain larger weapons.

* Referred to as "novelty-stones" by Dr. T. D. Campbell of Adelaide (personal communication).

The reasons for such usages as magic-stones, charm-stones, &c., are evidently to be ascribed partly to the curious and symmetrical shapes possessed by the majority of well-preserved australites, and partly to their small size and glassy nature. Being small objects of brittle glass, seldom more than 1 or 2 inches across at the most, more frequently much smaller, the australites are not well-suited to the production of the types of weapons and implements, on a scale and of a size normally required by the Australian aborigine. But, in strong contrast to most superficial materials associated with them, they are of dark colour and extraordinary shapes. They are black in reflected light, yellowish bottle green in transmitted light in thin fragments and plates. Their shapes vary, being most commonly round in plan and lenticular in side aspect, with or without a circumferential flange; less commonly they are oval-, boat-, canoe-, teardrop- or dumbbell-shaped, occasionally aberrant in form. In possession of this colour and these shapes, and showing pronounced sculpture patterns where not excessively abraded, they attracted the notice of the aborigines, with their keen sense of vision, as being a most unusual occurrence, and so were gathered and respected more especially for ceremonial and magical purposes, such as native psychotherapy, &c.

The association of australites and aborigines is considered herein from the aspects of chronological factors and cultural factors, the latter being regarded from (a) the social anthropological, and (b) other ethnological angles. Reference is also made to latter day uses of australites by the aborigines, as brought about by more frequent contact with the white race in Australia.

CHRONOLOGICAL FACTORS.

Considered from the chronological angle, it seems reasonably certain that australites had fallen across the southern part of Australia, including Tasmania and the islands in Bass Strait, some considerable time prior to the arrival of aborigines in these parts (cf. Fenner, 1939, p. 16). In the archaeological importance of australites, the chronological factor is largely subordinated to the social anthropological and other ethnological factors, according to our present state of knowledge of these matters. The chronological factor seems to be more important geologically than archaeologically, for little is known of australite artefacts (which are by no means common) in relation to such of the aboriginal culture levels as may be recognized.

Both the arrival of australites from an extra-terrestrial source on to the surface of southern Australia, and the migration of aboriginal man to the southern seaboard and into Tasmania, are events of geologically Recent history, but neither event has yet been precisely dated relative to one another.

Searches of the literature bearing upon the association of australites with aboriginal customs reveal that there is nothing to be gleaned from their folk-lore that would in any way suggest witnessing of the fall of australites from the sky by the early ancestors in Australia of the blackfellow. Inasmuch as australites were discovered and used by several tribes, the inference is that they were already available on the surface of the ground when the aborigines appeared on the scene. However, the australites did not pre-date the aborigine by any very great length of geological time. 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 novae-hollandiae*) 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 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* (Fenner, 1949, pp. 18-19). Being pre-aboriginal man, the time of arrival of the australites upon the earth's surface, from the above reasonings, could thus be approximately assigned to the early or middle Recent period. The possibility must not be overlooked, however, that if these particular gizzard stones became exposed at the surface, when wind erosion removed the thin, superficial covering sands and soils to reveal the skeletons, then any australites which might have been present could well have been picked up by later native birds, or even by the aborigine. In this event, australites could thus possibly be pre-*Genyornis*. However, the greater antiquity of australites, compared with the time of arrival of the aborigines in southern Australia, seems to be proved by the fact that many australites have been unearthed from geologically Recent auriferous and stanniferous gravels by mining activities (cf. Stephens, 1897, Dunn, 1912, and others), whereas aboriginal works of art have not been found in the Recent drifts containing australites, and these drifts have been largely and widely explored by goldminers in Victoria (cf. Brough Smyth, 1878, pp. lvi and 365).

SOCIAL ANTHROPOLOGICAL FACTORS.

It has been remarked that the Australian natives were the first to theorize upon the origin of australites (Fenner, 1935), and the ideas of certain tribes concerning them were connected with matters relating to superstitions about australites. Legends regarding australites exist among the Dieri and adjacent tribes inhabiting the area east of Lake Eyre, South Australia. In these legends, the australites are referred to as *ooga* and *muramura*, terms which were earlier translated to mean "staring-eyes" and "emu-eyes". Recently, however, Mr. N. B. Tindale has indicated that *muramura* does not directly mean "emu-eye", and that its primary meaning is Ancestral Being. The native word for emu in these parts is *warukati* and australites are loosely called *warukati-undru*, i.e., pertaining to emus; they are things of the *muramura*.

The Wadikali tribe of the Yandama district, Lake Frome basin, South Australia, had similar legends, for they referred to australites as *mindjimindjilpara*, which Mr. N. B. Tindale has translated as meaning "eyes that look at you like a man staring hard" (see Fenner, 1935, p. 137). Fenner considered this might be taken as constituting stone age man's theory of australite origin. Some native tribes, however, evidently regarded the australites as products of lightning, those in Central Australia calling them "lightning-stones" (Horne and Aiston, 1924, p. 136). Other tribes, such as those inhabiting the Ooldea district of south-western South Australia, and the Warburton Ranges, South Australia, had yet other ideas concerning them. Mr. A. G. Mathews, of Kalgoorlie, formerly a missionary among these natives, was convinced that the aborigines believed that the black stones (australites) fall from the sky, and that only an occasional one enters a man, who then becomes ill or "possessed" (communicated by Mr. W. H. Cleverly, Kalgoorlie).

In their relationship to australites, social anthropological factors bear largely upon native superstitious beliefs involving the value of australites in the practise of sorcery and healing by magic. As magic-stones, charm-stones,

sacred-stones and or ceremonial-stones, australites were regarded by different Australian aboriginal tribes to possess superior and mystical powers, and as such they can be divided into the following categories:

- (i) "Medicine-stones" having curative powers.
- (ii) "Lethal-stones" or "death-pointers" having the powers of causing death; and "punishment-stones" having the powers of causing pain or illness.
- (iii) "Rainmaking-stones."
- (iv) "Message-stones."
- (v) "Lucky-stones."

(i) "*Medicine-stones.*"

As a magical power behind healing wounds and bodily pains, and curing sickness and disease, the part played by australites in native customs was prominent. They usually comprised part of the tools of trade of most tribal witch doctors in their practise of native medicine, more especially, if not exclusively, among tribes frequenting areas of Australia lying within the tektite-sprinkled strewnfield. Their use as medicine-stones or as ceremonial-stones is not reported among tribes remote from the australite strewnfield, i.e., in northern portions of Australia. For example, the anthropologist Dr. Donald F. Thomson, who dwelt among the blacks of the Northern Territory for several years, states that he has neither seen nor heard of australites being used for any purpose whatsoever by the aborigines of Arnhem Land (verbal communication).

In central, western and southern parts of Australia, however, australites were typically used in the native art of psychic healing. An example is provided by Professor R. Tate (1879, p. lxxi), who recorded a report from Mr. Canham, of Stuart's Creek, south-west end of Lake Eyre South. Mr. Canham related the strange story of an australite he acquired from an aborigine, who informed him that it had been removed from the breast of a sick member of the tribe by one of their *koonkies* (tribal witch doctor). This "operation" failed to save the life of the patient, the reason for this being given as due to some other *koonkie* of another tribe having had greater powers than the one who "removed the stone". Mr. Canham added that the sick native died of diseased lungs, and all the *koonkies* in the country could not have saved him.

Additional information was received by Tate from a correspondent at Salt River, King George's Sound (Albany district, south-west Western Australia), concerning the magical healing powers attributed to australites (Tate, 1879, p. lxxi). The correspondent stated that the black stones (australites) were rare and much prized by the natives, who believed the possessor bore a charmed life and was able to cure sick people of any complaint with which they may have been afflicted.

Furthermore, the aborigines of the Coolgardie district of Western Australia used the button-shaped australites (see Plate I., figure A) as charms to drive away illness, by pressing them on the part of the body which was suffering pain (Twelvetrees and Petterd, 1897, p. 42). The natives of Condah, in the Western District of Victoria, also applied australites to the human body to remove pain (Dunn, 1912, p. 14).

Two australites from Kanowna, north-west of Boulder, Western Australia, now lodged in the Australian Museum, Sydney (Reg. Nos. 9002-3), were used by the natives as charms in healing the sick (fide Mr. F. D. McCarthy, Curator of Anthropology, Australian Museum, Sydney).

The aborigines of the Warburton Ranges and Ooldea, South Australia, regarded the australites as the seat of their sickness, pain, devil possession, &c.; the witch doctor assured his patients that these black stones were the cause of the illness, and then proceeded either to rub or to suck at the affected part, meanwhile going through a ritual. Finally he "palmed" an australite from the patient's body, or if he had applied the sucking technique, he spat out a previously concealed australite from his mouth. Auto-suggestion being so strong among the natives, the patient then considered himself cured. Only australites were used, never any other stones, in this faith-healing procedure. (Information from Mr. A. G. Mathews, Kalgoorlie.)

In the Ethnological Collection of the Perth Museum, three australites displayed among other objects labelled as "Medicines and Charms" are designated as "Magic Stones (*Mabbin* emu-stones) used for curing diseases, wounds, &c."

Australites found on the banks of Mt. Emu Creek, in the vicinity of Darlington, Western District of Victoria, were regarded by the aborigines as an infallible cure for toothache. Dawson (1881, p. 59) referred to a specimen used for this purpose, and outlined one of the practises in use as follows—a heated spear thrower (*woomera*) was applied to the cheek and then thrown away; the toothache supposedly went with it in the form of an australite about the size of a walnut (cf. Plate II, figure 13A) called *karritch*. It was imagined by the natives that when such stones were thrown into a stream some distance from their camp, they would return to the place where originally found. Similar stones found among sand hills along the sea coast (some 40 miles to the south) used to be placed in a long bag made of rushes, which was fastened around the cheek to cure toothache. The witch doctor always carried these stones in his wallet, and lent them to sick members of the tribe without fee or reward.

The native tribes of some parts of South Australia called australites *pandella* and *kaleya korru* (= emu-eye). The medicine men of these tribes collected specimens and applied them in the art of curing sickness (Basedow, 1905, p. 89).

Among a collection of aboriginal relics in the British Museum of Natural History, London, a box of australites (locality of discovery not stated) is labelled as "obsidian bombs, called by the natives 'mappain' and worn applied to the stomach as medicine" (see Fenner, 1939, p. 16).

The widely separated localities in the above illustrations of the use of australites as medicine-stones, serve to indicate the extensive application of these tektites by the Australian aborigines, and 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.

(ii) "Lethal-stones", "punishment-stones."

In contrast to certain tribes placing faith in the curative values of australites, other groups of natives believed in their destructive powers. A few examples have been recorded of the practise of using australites as lethal-stones or death-pointers. As such, they were not forcefully applied as missiles or weapons intended to cause actual physical damage, but because of their supposed supernatural powers, they were used in such a manner as to cause an afflicted native to die of fear.

Native possessors of australites in some areas of the south-western portion of Western Australia were supposed to have the powers of bewitching their enemies, or anyone against whom they had a grievance, tormenting them with all kinds of diseases, and finally destroying life itself (Tate, 1879, p. lxxi).

In a section devoted to "Australites used by Aborigines" Dunn (1912, p. 11) referred to Curr's (1887, vol. III, p. 547) statement that the blacks occupying the Gippsland district of Eastern Victoria used an egg-shaped specimen known to them as *bulk*, the owner of which was supposed to have the power of causing death by merely touching with it; the priests worked enchantment with this stone. It should be noted, however, that Curr did not record the petrological character of this particular stone, while Brough Smyth (1878, vol. I, p. 386) had earlier stated that it was thickly covered with oxide of iron, part of which was cleared away to reveal "an appearance like that of a trap rock". This stone was given to Brough Smyth by A. W. Howitt, who obtained it from an old (aboriginal) man in Gippsland. Brough Smyth recorded the weight of the stone as 27½ ounces (approximately 780 grams), and its dimensions as 4 inches (just over 10 cms.) by 2½ inches (nearly 6½ cms.). This particular stone would thus be three and one-half times as heavy as the heaviest australite specimen known to Science to-day, and its length and breadth measurements far in excess of the largest known elongated australite. An approximate calculation of its density from Brough Smyth's measurements yields a value of 2.6 to 2.7, whereas the average specific gravity of australites is 2.41 and the range in value up to 2.51 (Baker and Forster, 1943, p. 380). Moreover, this specimen would represent the only australite, if authentic, to have come from the far eastern regions of Victoria. It is evident that the specimen known as *bulk* is not an australite, and Brough Smyth's reference to it as being a trap-like rock indicates a fine-grained, non-vesicular volcanic rock. The whereabouts of this stone is at present unknown. Howitt himself described another example of *bulk* (see Appendix, p. 307, of Brough Smyth, 1878) as being "rock crystal like a small pigeon's egg".

Some of the black varieties of the magic-stones (*dhakke*) employed by sorcerers of the Kabi Kabi, Waka Waka and Gurang Gurang tribes in the Wide Bay and Burnett districts of south-east Queensland were known as *mullu* (= black) to the Kabi Kabi* tribe, and as *minkom* (= *mingom**) to all three tribes. The Rev. John Mathew, an authority on aboriginal customs (Mathew, 1910, pp. 174-175), was satisfied that some of the black coloured magic stones were australites. He was told by the aborigines that they were found in creeks and waterholes. A native sorcerer was credited with having a number of these stones in his inside, and this was the secret of his power; the more he had, so much the greater his vitality and magic power. He certainly carried a stock in his dilly-bag, wrapped in hair, as something tangible and visible for use with his hands. When a native felt a sudden pain, he ascribed it to a *mullu* being thrown at him by an enemy, not because the stone actually struck him, but because of its supposed irresistible influence.

Further to these observations, Dr. L. P. Winterbotham, of Brisbane (personal communication), adds that the black stones (*mingom*) were obtained from waterholes in which the Rainbow Snake was supposed to dwell. The native medicine men used to dive into these waterholes in order to procure such stones per medium of the Rainbow Snake. The *mingom* were used in the practise of evil magic, while white stones (*jinding*) were used to heal and to promote good.

* Also spelt Gabi Gabi and *mingom*, as k and g seem to be interchangeable in these native words, according to Dr. L. P. Winterbotham, of Brisbane.

The Condah natives, Western Victoria, also employed australites as punishment-stones, inasmuch as they sometimes threw them in the direction of an offending tribe, with a request to punish it with toothache or some other form of illness. If, next day, these stones were found where originally picked up, it was believed that their mission had been fulfilled (Dawson, 1881, p. 89).

(iii) "*Rainmaking-stones.*"

The medicine men of the Wheelman tribe of south-western Australia were known as *mulgars*, and the natives possessed a deep regard for magic (*mulga*) and magical processes, most practises of which were confined to the use of stones. Any stone differing markedly from others in the neighbourhood was immediately accepted as a magic-stone. Although not specifically chosen for any one kind of magical practise, there seemed to be some rule governing the particular purpose to which were put certain of the rarer types of stones. Every *mulgar* had his collection of magic-stones (*booliah*), which were carried about in his bag (*coot*) made from kangaroo skin (Hassell, 1936, pp. 705-707). From Hassell's description, it is plainly evident that some half a dozen of the stones seen in possession of this tribe were well-shaped australites. They were greatly prized by the aborigines for use during their rainmaking ceremonies.

Some of the other stones in use for magical practises were specifically assigned to the curing of illnesses. Some were used to place curses upon members of the tribe, or upon individuals or groups of other tribes. Others were utilized to make game more plentiful, to stop the wind, to make the sun shine, or for many other purposes. It is not clear from Hassell's account, however, whether forms of australites other than those of a particular shape (dumbbell—Plate III., figures 25-27), reserved for the rainmaking ceremonies, were used in any of the other magical processes cited.

(iv) "*Message-stones.*"

Two australites from Mt. Margaret, Western Australia, now lodged in the Australian Museum, Sydney (Reg. Nos. 23531-2), were regarded by the natives of that district as being of great value in the transmission of messages. They were carried about in the beards of medicine men; this gave them a power, supposedly exuded through the navel, to receive and transmit messages long distances (fide Mr. F. D. McCarthy, Australian Museum, Sydney).

(v) "*Lucky-stones*" or "*Charm-stones.*"

Australites found on the gibber plains of Central Australia are occasionally regarded by the aborigines as lucky-stones. Horne and Aiston (1924, pp. 135-136) state that they are in very great demand as luck-bringers, and as soon as possible after a tree has been struck with lightning, some of the blackfellows dig around the roots to get what they call lightning-stone. Any of an unusual shape are carefully preserved.

Other Examples of Australites used as Magic-stones.

Inquiries among ethnologists in possession of collections of aboriginal stone implements have revealed a few known to have been used for purposes of magic. Thus, in a comprehensive collection of such implements in the possession of Mr. S. R. Mitchell, of Frankston, Victoria, are several australites obtained from Mr. George Aiston, of Mulka, via Maree, South Australia, said by him to have been used by the natives as magic-stones (see also Mitchell, 1949, p. 93).

One australite, among others, in the collection of Mr. C. S. Rogers, of Kilsyth, Victoria, is pronounced as being a magic-stone from the dilly-bag of a native medicine man.

In connexion with the use of australites as magic-stones by aboriginal tribes, it is of interest to note the fate of the australites on the death of their possessors. It has been recorded for the Wheelman tribe of south-western Australia (Hassell, 1936) that, when a *mulgar* (medicine-man) dies, his successor takes over the contents of his *cool* (dilly-bag), and hence acquires such australites as were used as magic-stones for rainmaking, &c. On the other hand, among certain of the Victorian tribes, it has been observed that the custom was to bury with the corpse all the personal effects of a deceased native of some influence, such as an old man or a witch doctor (Brough Smyth, 1878, vol. I., pp. 104 and 111). This means that any australites among the personal effects would become buried some 5 feet underground, and normally such specimens were originally picked up on the surface of the ground. Among the personal effects, Brough Smyth recorded the presence of pieces of hard stone suitable for paring skins, small relics and other articles. It is an established fact that the medicine men and some of the older men of some aboriginal tribes used australites as magic-stones. Hence it is highly likely that both well-preserved australites and small implements made from them could have been emptied into graves, which are usually up to 5 feet deep, 3 ft. 6 in. long and 2 feet wide. It was customary to empty the personal effects into the grave before interment of the corpse, so that it should be possible to find australites buried at depths of some 5 feet or so in native burial grounds. No one, however, has yet been able to ascertain whether any particular australite (or group of australites) was so treated, and none can be specifically said to have been unearthed from a probable grave site, while none are recorded as having been found beneath skeletons in known graves. The possibility remains, however, that australites might have been re-buried by this means.

Other Ethnological Factors.

The more practical uses for australites by the Australian aborigines include their employment (a) as small implements and in certain weapons, (b) as hunting-stones, and (c) as barter-stones.

(a) Use as Implements and in Certain Weapons.

The use of australites as aboriginal implements and in the manufacture of certain larger weapons was evidently not particularly extensive, partly because of their relative rarity, and partly because of their comparatively small size. Their shapes and their colour were obviously far more decisive factors in imparting to them a much greater importance in the practise of witchcraft and healing, hence it is highly likely that only already naturally fractured, badly preserved or accidentally fractured specimens were flaked for producing small scraper-stones, cutting-stones and splinters for barbing spears.

In connexion with their relative rarity, Tate (1879, pp. lxx-lxxi) remarked that these stones (australites) "were held in high esteem by the aborigines, a fact which proves inferentially that they are not common".

Collections of specimens of australites in museums and in the hands of private collectors total approximately 30,000 to 35,000 complete, nearly complete or fragmented specimens. Of these, something of the order of 0.005 per cent. are aboriginal chipped flakes and implements. Although such flakes and implements are thus of considerable rarity among australites, it must not be overlooked that naturally fractured specimens may well have been utilized by the aborigines. Some of the naturally fragmented australites have broken up into pieces that would be ideal for use, without further treatment,

as points, scrapers, cutting-edges and so forth; this applies especially to many flange fragments from australites, which frequently break up to produce sharp-pointed and sharp-edged fragments.

The rarity of the formation of implements from australites by aborigines is also made evident from inspection of the lists of various rock types set out as being typical of the implements found at numerous aboriginal camp sites (cf. Mitchell, 1949).

From references scattered throughout the literature on aboriginal man in Australia, and from the known specimens preserved in natural history museums and private collections in Australia, one finds proof that a few australites were employed as implements. Generally, however, greater quantities of more suitable larger stones possessing denseness of texture or a homogeneous character were available for these purposes merely by picking them up from gibber plains, creek beds, dry lake beds, marine beaches, &c. Stones such as quartz (morion, rock crystal, reef quartz, &c.), quartzite, jasper, flint, chalcedony, agate, opal, chert, lydianstone, dacite, diabase, basalt, tachylyte, silicified volcanic ash, silicified rhyolite, silicified wood, ferruginous silicified fine-grained sandstone, and others, therefore predominate among aboriginal implements and weapons, and australites only constitute a very minor proportion. Since the arrival of the white man in Australia, it is even probable that such artificial materials as porcelain insulators, bottle glass, motor car windscreen glass and the like have been fashioned into aboriginal implements far more extensively than ever were australites.

It has been pointed out by Mr. N. B. Tindale, South Australian Museum, Adelaide, that the aborigines sometimes made small implements (microlith adze stones) from australites, but so far as is known none was made from the larger specimens (see Fenner, 1949, p. 18). It is significant, according to Tindale, that all such implements as are known from the region extending from the Broken Hill district of New South Wales to Yorke Peninsula in South Australia first appear in the Mudukian culture, which is now dated roughly to about 2,000 years ago. This is the latest but one of the aboriginal culture sequences, and lends support to the fact, indicated by all other available evidence, that the fall of the australite swarm of tektites was a comparatively recent occurrence. Mr. Tindale (personal communication) points out that aborigines of earlier times, such as the Pirrian period, might have been acquainted with australites, and did not find them suitable for implement purposes, but it is equally possible that the reason why australites first appear as implements among the Mudukian people was because this shower of tektites fell during their time.

On Kangaroo Island, off the coast of South Australia, australites were often found in the possession of the aborigines, who not only used them as charms, but sometimes chipped them into the form of scrapers (Howchin, 1909, p. 349).

In reference to 72 pieces of australites discovered among sand dunes in the Moonta area, South Australia, Fenner (1938, p. 196) recorded that such dunes were the sites of aboriginal camps, and that, in addition to the use of the australites for purposes of magical practises by these people, some were also used as material for cutting-tools.

Information supplied by Mr. Archibald, a former curator of the museum at Warrnambool on the south coast of Western Victoria (see Walcott, 1898, p. 42), was to the effect that the aborigines of the Western District of Victoria carried australites as amulets, and sometimes broke them up to obtain splinters for barbing spears.

Earlier, Dawson (1881, p. 87) described the *wurokiigil* spear as being jagged for 6 inches on each side of the point, with sharp splinters of flint or volcanic glass fixed in grooves with wattle gum. This volcanic glass is recorded in Dawson's (1881, p. xvi) vocabulary of aboriginal words as *wurokiin*. Since no obsidian has been found in Australia, and australites were originally referred to as obsidians, and furthermore, since Dawson (1881, p. 78) regarded one of the glassy substances used by the aborigines as being obsidian, it is apparent that the "volcanic glass" set into the *wurokiigil* spear was either australite glass, or else has been confused with a special type of fragmented tachylyte (see Baker, 1956b).

Australites from other parts of the tektite-sprinkled strewnfield have also been artificially chipped by aboriginal man for use as flaked implements. Thus, Dunn (1912, p. 14) referred to some that he inspected as showing distinct signs of handwear (now referred to as "carry polish"), and others as having been artificially chipped or rubbed. A few in the collection of Dr. T. D. Campbell, of Adelaide, have been likewise secondarily chipped.

One collected from the large aboriginal encampment at Willaura in the Western District of Victoria by Dr. R. M. Wishart, of Kew, Victoria, measures 14 x 14 x 8 mm., and is a semi-discoidal scraper which was made from the interior portion of a broken australite.

Seven implements prepared from australites, lodged in the collection of Mr. F. C. Smith, of Mt. Dandenong, Victoria, were found at three different localities in Western Victoria, namely, Glenthompson, Murtoa and Willaura. The one from Glenthompson was prepared from a boat-shaped australite, and measures 45 mm. in length, 21 mm. in width, and 17 mm. in depth (= thickness). Reconstruction of the specimen reveals an original length of approximately 55 mm. One end of this specimen was chipped away by a Stone Age craftsman in such a manner as to produce a secondary face lying at an oblique angle to the long axis of the boat-shaped australite, thus producing an implement ideally suited for use as a scraper, or micro-adze stone. The fracture surface reveals a vitreous lustre and conchoidal fracture pattern. Dr. R. M. Wishart and Mr. F. C. Smith classify this implement as an end-scraper. It shows signs of having been used, for the fractured surface is scratched and possesses a scraper edge with minor chipping effects brought about by wear. Since the hardness of australites is between six and seven, the scratched character of the fracture surface on this end-scraper indicates that it was occasionally used to attempt to shape something relatively hard.

The implement from Murtoa is a semi-discoidal scraper measuring 15 x 14 x 3 mm., and was prepared from one side of the waist region of a dumbbell-shaped australite. It reveals three remnants of flow ridges which provide the clue to the original shape of the australite, and also indicate that the portion of the outer surface of the australite still remaining on the implement is the anterior surface. The fracture surface reveals many subsequently developed scratches.

The other five implements in Mr. F. C. Smith's collection were obtained from the ancient aboriginal camp site at Willaura. One is classified as a geometric and measures 15 x 9 x 5 mm., one is a semidiscoidal scraper measuring 19 x 19 x 6 mm., and one a discoidal scraper measuring 19 x 19 x 5 mm. The original shape of the australite from which the semidiscoidal scraper was prepared is not indicated, but the slightly thinner discoidal scraper represents the greater part of the bubble-pitted top of the posterior surface of a button-shaped australite from which the flange had previously been broken, either purposefully or accidentally (by natural fracture). In plan aspect, this

implement is thus virtually circular in outline, and its shape entirely due to the original form of the australite. It bears adequate testimony to the adroitness of the aboriginal craftsman, who fashioned it by cleanly fracturing a small lenticular, glassy object (originally just over 19 mm. in diameter) along an equatorial plane; the depth of such a lenticular object with a diameter of approximately 19 mm. would not have exceeded some 9 to 14 mm. (cf. Baker, 1955b, figure 11, p. 181). Of the two other scrapers in the Smith collection, one was derived from the edge of an oval- or boat-shaped australite; this implement measures 17 x 9 x 3 mm., the thickness of 3 mm. on one side tapering down to a fraction of a millimetre on the other side. It shows typical conchoidal fracture, with a well preserved vitreous lustre on the fracture surface, this being in marked contrast to the opposite surface, which is constituted of a duller, remnant portion of the flow-ridge-bearing anterior surface of the original australite. This implement, which is blade-like in character, reveals five minor points of conchoidal fracture at one end, six at the other, all of which represent points of minute secondary pressure flaking. These minute conchoidal fracture surfaces vary from 1 mm. to 2.5 mm. across. The other microscraper, measuring 13.5 x 12 x 6 mm., was prepared from the edge of an australite core carrying a few bubble pits, and considerably weathered. The implement is trigonal in end-on aspect (i.e., normal to its long axis), and the vitreous, conchoidal fracture surface is slightly dulled by natural etching which has accentuated a few internal flow lines; this surface is also scratched in two or three places. The edges show no marginal flaking, but are occasionally minutely chipped from use as a scraping implement.

One or two specimens among a collection of some two dozen or so australites obtained by the late Mr. F. A. Cudmore from Oakvale Station, in South Australia, have also been fashioned into micro-scrapers; these are now lodged in the Geological Collection of the University of Melbourne, along with ten other worked flakes of australites also presented by Mr. Cudmore. The range in size of these microliths is from 13 x 8 x 2 mm. to 25 x 17 x 10 mm. The third figure in these measurements provides the maximum thickness of the flakes; the minimum thickness is a fraction of a millimetre for specimens where sharp, relatively straight edges have been produced along one side, or along one side and one end. All of these flakes show signs of marginal pressure flaking, and most provide evidence of having been prepared for use as scraper-stones. One in particular has been used more extensively than the remainder, evidently on something harder than australite glass, for it is much scratched on the fracture surfaces, and possesses a number of minute conchoidal fracture points along the scraping or cutting edge. It is not known where these specimens were collected, and the indications are that they were obtained from several localities, because some of the flakes with remnants of original australite surface have well-preserved structural features typical of the fresher australites found in more temperate regions of Australia; others are much worn like the abraded specimens that come from the sub-arid and desert regions of the central and western parts of the continent.

Two secondarily chipped australites from Mulka, South Australia, now in the collection of Mr. H. R. Balfour, of Toorak, Victoria, appear to be of aboriginal manufacture. One, which was probably employed as a small knife, is slightly crescent-shaped, shows secondary chipping on the sharp, thinner edge, and measures approximately $\frac{1}{2}$ inch across; the other specimen measures $1\frac{1}{4}$ inch across. A slightly chipped specimen in the same collection, found by Mr. Balfour himself, comes from the Glen Aire district on the south coast of Western Victoria; it also was possibly chipped by an aborigine, but was probably not used as an artefact.

Two secondarily chipped flakes of australites in the collection of Mr. S. R. Mitchell, Frankston, Victoria, show definite "scraper re-touch", and were undoubtedly used by the aborigines as scraper-stones. They measure 13 x 10 x 2.5 mm. and 15 x 9 x 3 mm. respectively, and were collected 6 miles west of Willaura in the Western District of Victoria. Another australite flake in the same collection, obtained from the same locality, is a micro-flake exhibiting no signs of use as an artefact; it measures 14 x 10 x 2 mm. As a stone used for cutting- and scraping-tools, Mitchell (1949, pp. 93 and 159) records that microscrapers were made from australites by the aborigines.

Several hundred fragmented australites have been examined by the author among collections totalling over 2,500 specimens of australites from the Moonlight Head, Port Campbell, Peterborough, Nirranda and Childers Cove districts of southern South-west Victoria (Baker, 1937, 1938, 1940*a*, 1940*b*, 1943, 1944, 1946, 1950, 1955*b*, 1956*a*) and from Harrow in the far west of Western Victoria (Baker, 1955*a*). Of these, and specimens from a few other Victorian localities, only five showed convincing evidence of aboriginal flaking. They have been determined as worked aboriginal flakes by Mr. A. Massola, of the National Museum of Victoria, Melbourne. One is a flaked implement of the semi-discoidal scraper type, and another, of the same type, measures 18 x 15 x 9 mm. The third is a blade which may have been a point; it has a broader flat face, is triangular in cross section, and measures 24 x 9 x 5 mm. The remaining two consist of chips measuring 16 x 7 x 2 mm. and 11 x 6 x 3 mm. respectively. One of the chips was derived from the interior portion of an australite, whereas the remainder reveal small portions of the original outer surfaces. There is insufficient left of these outer surfaces, however, to determine the particular australite shape group from which the flakes were derived. The shapes of two of the flakes suggest development from elongated forms of australites. The flakes reveal the typical conchoidal fracture with associated ripple fracture, which is so characteristic of australite glass. The flakes are of no very great antiquity, inasmuch as the fracture surfaces are fresh and still possess a marked vitreous lustre in contrast with remnant portions of the original surfaces. Natural etching has not brought out the internal schlieren on two of the implements, while on the remaining three, only very light etching has occurred. This would suggest some little difference in the date of manufacture of the several implements, provided that natural conditions of etching were not markedly different in different locations.

The first of these five aboriginal flakes was found in 1955 by Colin Drake, of Warrnambool, and Brian Mansbridge, of Allansford, in the Childers Cove district, 14 miles east of Warrnambool, and was presented to the National Museum of Victoria (Reg. No. 49250) along with approximately 300 other specimens of australites. The other four flakes (Reg. No. 49301) were discovered in 1956 by the same collectors, on the property known as "The Brae", between Childers Cove and Wilson's Crack on the south coast of Western Victoria. They are also now in the collection of the National Museum of Victoria.

Among a dozen or so chips of black stones from Caramut, Western Victoria, in the private collection of Mr. A. Massola, one is a chip from an australite. It has been determined by Mr. Massola as an end scraper, and measures 17 x 9 x 5 mm. Eight of the fragments in this collection are identical with the natural black glass fragments (tachylite) described from the Sherbrook River, Port Campbell, and from the Childers Cove district of Western Victoria (Baker, 1956*b*). The remaining three or four chips consist of black, silicified material.

The sizes of the flakes given in the above illustrations provide a fair indication of the average size of chipped fragments that could be obtained by the aborigines from australites generally.

For the many other fragments of australites examined from the Moonlight Head-Port Campbell-Peterborough-Nirranda-Childers Cove districts of Western Victoria, there is much doubt concerning the assignment of any to the work of aboriginal man, because so many are likely to have been fractured by other means. Such fragments may nevertheless have been put to use during earlier culture periods, even if not manufactured by aboriginal man. Most show signs of ancient fracturing, followed by relatively prolonged natural etching of the fracture surfaces, and no signs of secondary re-touching. There is ample evidence at many places in the region referred to above of previous occupancy by aborigines. According to Brough Smyth (1878, vol. I., p. 40), the Barrath tribe occupied the area around the Sherbrook River and Brown's Hill, east of Port Campbell, and the Narrapoort tribe inhabited the region east of Curdie's River—i.e., between Peterborough and Port Campbell. Kitchen middens, chief of which is at the mouth of the Sherbrook River, are common in the coastal regions of the district. These have yielded numerous flakes chipped from various types of hard, dense rocks transported into this region by the aborigines from several parts of Victoria, and occasional stone weapons have also been discovered. At the same time, these camp sites frequently carry the occupational debris (firestones, shell debris, small bones) usual to ancient aboriginal encampments. By and large, however, it again becomes apparent that the aborigines prized the australites more for other purposes than for breaking them into fragments for the production of small implements, as evidenced by the extreme rarity (less than 0.5 per cent.) of worked australite fragments among the large number of specimens so far recovered.

It has been shown (Baker, 1940, p. 489; 1946, plate XII.; 1956a, pp. 66-67, 73-76 and 91-94) that the fracturing of these australites has first to be considered and examined from the aspect of fragmentation by natural and accidental means, rather than by purposeful shaping. One or two specimens are known to have been chipped by modern ploughing operations, or as a result of having been struck by steel-shod horse-hooves or steel-banded cart-wheels, inasmuch as they show fresh, glassy internal fracture surfaces, and, occasionally, streaks of iron across outer weathered surfaces, small fragments of the iron being lodged in bubble-pits on such surfaces. Some of the fragmented australites have been fractured by the effects of diurnal temperature changes, others probably by impact, either on landing, or subsequently during transportation by eroding agents, or rolling down slopes. Some may have been fractured during the end stages of atmospheric flight. Yet others might have been broken in the gizzards of the large, flightless native birds such as emus and plain turkeys, especially if already cracked and etched before being taken into the gizzards to act as "grinder-stones".*

Thus, one can only be reasonably sure that certain fragmented australites were worked by aboriginal man, if indisputable evidence is present of the effects of the application of marginal pressure flaking or the like.

There is another aspect of the way in which the fracturing and chipping of australites can be accomplished. Chipping may be deliberately carried out by an aborigine, but not for purposes of making implements. Whether or not

* Of 49 australites among 51 black stones from the gizzard of one specimen of a Plain Turkey (*Eupodotis australis*), three consisted of fragments of australites (see Fenner, 1949, p. 11).

this was done by earlier tribes of aborigines, in order to ascertain the nature of the insides of such stones, is not known, but it has been recorded (see Fenner, 1940, p. 317) that Dr. Keith Ward, of Adelaide, who many years ago used to collect australites from the aborigines frequenting the tektite-sprinkled area around Kalgoorlie, Western Australia, himself witnessed the fact 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.

A common error in classifying certain black, vitreous aboriginal flakes or implements as having been prepared from australites is one of mistaken identity of the material of which they are composed. It has been the author's experience that among several collections of implements thought to be made from australites, usually only 2 per cent., sometimes 9 per cent. to 15 per cent., and very rarely up to 50 per cent. of implements so designated, are actually made from australite glass. Microscrapers, microliths, &c., composed of dense, black, vitreous to sub-vitreous materials in these ethnological collections, principally turn out to be fragments of morion (black quartz) or a peculiar form of tachylyte (cf. Baker, 1956*b*).

Flaked Australites used in Operations.

The sharp, keen edges of fracture fragments from australites renders this natural tektite glass eminently suitable for use by the medicine men and elders of the tribes as surgical implements.

In the Ethnological Collection of the Perth Museum, Western Australia, a shaped australite fragment from Red Hill, Western Australia, is labelled as "Chip of australite worked and used as a knife by an aboriginal". This implement is approximately 30 to 35 mm. long, 15 mm. broad, and 1 to 2 mm. thick. It was evidently dressed, in common with occasional larger, thin oval, plate-like pieces of australites approximately 40 mm. across (derived from elongated australites such as those depicted on Plate II., figures 14 and 16), for use in the aboriginal religious rite of *lartna* (circumcision), and also in the operation of *ariltha* (sub-incision).

A flaked australite recently discovered by Mr. W. H. Cleverly, of Kalgoorlie, Western Australia, at a locality adjacent to a cutting on the former Kalgoorlie-Kurramia woodline, 7.4 miles east-north-east from Kalgoorlie railway station, has been determined by Mr. A. Massola as an aboriginal circumcision knife. This specimen is now lodged in the collection of the National Museum of Victoria (Reg. No. 49299).

Suggestion that Australites were made by Aborigines.

About the middle of the 19th Century, Clarke (1855, p. 403) remarked that the australites "appeared as if they had been cast in a mould". As a probable outcome of this remark, one European writer, early in the 20th Century, credited the Australian natives with having been able to produce the actual shapes of australites from plastic materials. Regarding the australites as artificially moulded forms, Berwerth (1917) proclaimed them to be artefacts representing the traces of ancient workshops or firepits of a very early but lost culture. Subsequent European writers, and all Australian workers on the subject of australites, however, summarily dismiss this hypothesis as being entirely incorrect. In fact, it had been shown earlier by Summers (1909, p. 433) that an artificial origin for australites was chemically impossible, and that it was difficult indeed to entertain the belief held by some people at that time that the aborigines were sufficiently advanced metallurgically to control temperatures exceeding 1,300° C.—the fusion temperature of australite glass being 1,320° C.

(b) "*Hunting-stones.*"

One of the more practical applications for australites by aboriginal man in Australia concerns his food-hunting methods, for emus in particular. One method has been recounted by Mr. H. R. Balfour, of Toorak, Victoria, who, in 1954, made inquiries among the blacks of the Woomera region of Central Australia concerning the reason for their calling them "emu-stones" (see Baker, 1956a, pp. 66-67). One native told Mr. Balfour that the natives of his district loosely bind up a number of australites in balls of emu feathers, and throw them on to the feeding grounds of these struthious birds. The aborigines, who had meanwhile camouflaged themselves, await the approach of the emus. Being endowed with an especial natural inquisitiveness, the emus are attracted to these balls of feathers containing australites, and while engaged in investigating them for the extraction of the australites (for use as gizzard-stones), they are speared by the aborigines. It has been found that the gizzards of emus often contain several ounces of stones up to an inch or so in diameter. These gizzard-stones are frequently black in colour, and often the greater proportion of them are australites.

A somewhat different method in use among the natives of Central Australia was described by Horne and Aiston (1924, p. 60), who state that the "obsidian bombs" (= australites) picked up on the gibber plains of the Centre are known to the natives as "emu-eyes". The natives believed that these stones had a magical effect upon the emus, causing them to go blind. According to information obtained by the authors from a native known as *Old Pittibunna*, the technique of emu capture was as follows:—When the emus came down to drink, a cordon of aborigines formed along one side of a lagoon and lit a number of small fires on to which they placed salt bush for creating dense smoke. The cordon gradually contracted towards the water where the emus had gathered. Suddenly, two men, one from each end of the line, rushed out and threw a small feather packet containing "emu-eyes" at the birds. The emus became confused, as they were supposedly blinded by the australites, and no doubt worried by the smoke from the salt bush on the fires, so that they rushed out into the waters of the lagoon, where they were easily captured. As a great favour, *Old Pittibunna* gave one of the authors "a nest containing three emu-eyes", informing him that he could now catch emus whenever he wished. Horne and Aiston's illustration of this "nest" reveals that the "emu-eyes" are button-shaped australites (cf. Plate I, figure 1).

In further comments on these "obsidian bombs" from the Centre, Horne and Aiston (1924, p. 135) stated that the stones were called *warroo getti milki** (emu-eyes) by the natives, *warroo getti* being their name for the emu. The stones were supposed to be eyes that the emu had lost when wandering around in search of food. When found by the natives, they were smeared with fat and red ochre, and stored in a net bag full of emu feathers bound together with hair rope. Such treatment given to australites by the aborigines—the smearing on them of fat and ochre, which would become well embedded in the bubble pits on posterior surfaces, and in the gap regions between the flange and the central core portions of flanged australites—may well account for the fact that the first australite known to Science, discovered by Sir Thomas Mitchell on the Darling Downs and given to Charles Darwin for determination and description, appeared as if it had been embedded in "reddish tuffaceous material".

* The proper spelling of the Dieri name is *Warukati milki* (= "emu-eyes"), *Warukati* meaning "emu" according to Mr. N. B. Tindale (personal communication).

There may appear to be some little confusion between the use by certain aboriginal tribes of the terms "emu-eyes" and "emu-stones" as applied to australites, or else this confusion has arisen from different usages by different authors. As far as can be ascertained at present, it seems desirable to assume that the two terms were fundamentally used to connote a different sense, "emu-eyes" more frequently having its application in a manner relating to their supposedly representing lost emu-eyes, or to their being "staring-eyes" and hence involving the supposed magical powers of the button-shaped australites. "Emu-stones", on the other hand, seems to be applied more particularly as a term in connexion with "gizzard-stones". It is also possible that the term "emu-stones" is now used by living aboriginals in place of the term "emu-eyes", as a result of their more recent association with white man in Australia. The present day white inhabitants of the Outback have adopted the name "emu-stones" as a popular name for "gizzard-stones". The term was used by the early white settlers for all gizzard-stones, and because of their preponderance among the contents of the gizzards of emus, the term ultimately applied more particularly to australites. There is also a preponderance of australites among the gizzard-stones of the Australian buzzard or plain turkey (*Eupodotis australis*). One specimen which was shot carried 4½ ounces of stones in its gizzard. The total number of stones was 51, of which 49 were australites the remaining two were also black in colour and rounded, but were definitely not australites (cf. Fenner, 1949, p. 11). No doubt the blacks frequenting the Nullarbor Plain region were aware of the use of these black stones by the plain turkey, and took advantage of this fact in hunting for food.

(c) "*Barter-stones.*"

There are no authenticated examples recorded in the literature on australites or on the customs of aboriginal man in Australia, which point directly and indubitably to the specific use of australites as articles of barter among different native tribes. In view of the fact, however, that australites were regarded in some quarters as obsidian in the early days of the white man's settlement of Australia, and that stones were sometimes bartered between tribes, it can be assumed that a few australites might well have been brought into the native exchange system. One of Dawson's (1881, p. 78) accounts lends some credence to this suggestion, for he remarked that "obsidian or volcanic rock for scraping and polishing weapons is found near Dunkeld", Victoria. It is now known that obsidian does not occur at Dunkeld, but australites have been collected in the district. Dawson stated further that these were used (along with several other items) as articles of exchange, a favourite meeting place for this purpose being at Mt. Noorat, near Terang, in the Western District of Victoria. Some tribes of the Australian aborigines were masters in the art of bartering, e.g., the Dieri tribe east of Lake Eyre in South Australia, but it seems that other tribes would not part with certain much revered objects.

As a means of accounting for the widespread distribution of australites over some 2,000,000 square miles embraced by the southern portions of Australia, some of the early workers on the subject expressed the opinion that the aborigines used them as articles of barter among themselves, and were thus responsible for distributing "these attractive-looking stones" far and wide over Australia. This suggestion was accepted by Krause (1896, p. 214), but others considered that such a practise was not in accord with the known habits of Australian native tribes, and that australites were not bartered to any appreciable extent. Such conflicting statements evidently arise from different authors having considerable knowledge of the habits and customs of certain tribes only, and some customs apparently varied somewhat from tribe to tribe.

Since australites were principally treasured as charm and ceremonial stones, the view that they would not be extensively exchanged between tribes receives some support from Dr. Donald F. Thomson, of Melbourne University, who expresses the opinion, based on first-hand knowledge of the customs and habits of aboriginal man in northern Australia, that ceremonial stones are so highly prized the natives would certainly not barter them (verbal communication).

Such arguments apply more to the customs of aboriginal man in his more primitive state, in areas where virtually unaffected by the white civilization. It is an entirely different story, however, in those parts of the tektite-sprinkled region of Australia where remaining members of Australian native tribes are in occasional or frequent contact with the white race. In the past two or three decades, there has been a marked impact upon their customary uses of australites, for such natives evidently no longer value them as objects of magic and mystery. They have recently used them more and more as articles of barter. Large numbers of australites have been readily exchanged by them with the white man for small sums of money, for food, and for tobacco and sweets. In this way, the aborigine has become one of the most prolific collectors and distributors of specimens of australites; this is unfortunate in some respects, for it has resulted in many australites which were acquired in this manner, and which ultimately passed into museum collections, being labelled as coming from such extensive areas as "Nullarbor Plain" or "Central Australia" or "Western Australia", &c. At the same time, detailed information is completely lacking for such large numbers of specimens. Their manner of occurrence and the nature of associated superficial materials at the sites of discovery, for example, will never be known accurately.

The following reports serve to indicate the extent to which the latter-day aborigines have bartered australites with the white man in Australia, including more especially station owners, station hands, tourists and interested collectors.

The aborigines along the Transcontinental Railway, between Port Augusta and Kalgoorlie, have traded australites with passing travellers, and in later years have been exploited as collectors of australites (Fenner, 1934, pp. 64-65). It has been reported by Mr. George Aiston, of Mulka, via Maree, South Australia, that around the Mulka district "the aboriginal children collected australites at the rate of one lolly per australite, but at the present time the older blacks are asking 1s. for each whole specimen" (see Fenner, 1935, p. 127). Furthermore, station owners and others in various parts of the tektite-sprinkled strewnfield where aborigines remained encouraged the natives to collect australites, more especially "in the arid plains of Central, Southern and Western Australia", where "a considerable amount of collecting was carried out by the aborigines, because they thus obtained small rewards from interested white men" (Fenner, 1935, p. 135).

In amassing large collections of australites numbering 3,920 and 7,184 specimens respectively, both W. H. C. Shaw (Nullarbor Plain, South Australia and Western Australia) and J. W. Kennett (Charlotte Waters, Central Australia) utilized the aborigines of the Outback regions (see Fenner, 1934; 1940, p. 308). It has been reported by Sergeant J. W. Kennett, in charge of the Police Station at Charlotte Waters, Central Australia, in 1932, that he had a blacktracker under him of more than average intelligence. This native (called Mick Doolan) informed Kennett that certain black stones brought in by other natives were australites, and that one—a flanged button (cf. Plate I, figure 1)—was called "emu-eye" by the natives, but that these stones were regarded as glass meteorites by the white man. Kennett scoffed at this idea

at first, but was later convinced. He would accompany the blacks out on to the gibber plains, but was completely exasperated at the outset by being unable to find any, while the natives were picking them up all around him. However, he was ultimately successful, after several weeks hard searching, and at the end of five years at Charlotte Waters a collection totalling 7,184 specimens of australites had been made, with the help of the aborigines. Kennett's first find was a relatively large specimen, after which he received the following hint from the aborigines:—"Supposem you find more big fella stone, alright, you look about properly fella, and you findem mob little fella." Kennett later became as keen-eyed as the natives in finding australites; his collection came from an area of just over 2,100 square miles of gibber plain territory. The second largest australite seen by Kennett in the Charlotte Waters area was one he was unable to acquire. This specimen was found by a lubra, and purchased by Mrs. Child, of Crow Point Station, for the handsome reward of one minty (see Fenner, 1940, p. 307).

A large australite specimen weighing approximately 142 grams, and known to the natives as *nooloo*, was found by a native woman in the vicinity of Eucla, on the Nullabor Plain, on the Western Australian side of the Western Australia-South Australia border. This specimen was sent to a jeweller in Melbourne, but it split into several pieces during treatment, and was then thrown away (Fenner, 1934, p. 78).

The above accounts indicate that, since white man's occupation of Australia, the aborigine has been responsible for collecting and distributing several thousands of australites. There is no clear proof, however, that his ancestors spread them all over southern Australia in the first place. Undoubtedly, specimens of australites exposed on the surface of the ground, that were collected and used by earlier aboriginal tribes, have been locally moved about, as a consequence of their use as throwing-stones and hunting-stones, or by their having been dropped and lost while the aborigines were on "walkabout" (cf. Clarke, 1855, p. 403; Tate, 1879, p. lxx; Basedow, 1905, p. 89; &c.). Several, when subsequently found, are thus not necessarily *in situ* discoveries. Generally, however, it is considered that the majority of australites so far collected come from the area in which they originally fell. The use of australites by the aborigines, although widespread, does not account for their occurrence at depths of 15 to 30 feet below the surface in auriferous and stanniferous drifts, and up to 20 feet in clay pan deposits. Such recent sediments were accumulated prior to the arrival of the aborigine (cf. Twelvetrees and Petterd, 1897; Stephens, 1897, p. 57). Discussing such matters as these at the turn of the 20th Century, Simpson (1902, p. 84) remarked that it had been suggested the australites were distributed by the aborigines—"some tribes certainly look upon them as charms, but the majority apparently of the present race of blacks set practically no value upon them, so that it would seem that in most cases their present position is not due to the aborigines".

SUMMARY OF ABORIGINAL NAMES FOR AUSTRALITES USED AS MAGIC-STONES.

| Name. | Meaning. | Tribe. | District. | Phonetic Spelling of Aboriginal Name. | Phonetic version of Tribal Name. |
|------------------|--|---------------------------------------|---|---------------------------------------|-----------------------------------|
| Boohiah | rain-stones | Wheelman | South-western Australia | bulia | Wilman |
| Kaleya Korru | emu-eyes (Kalaia =emu, kuru=eye) | .. | South Australia | kalaiaikuru | Kukatja |
| Karriitch | "toothache" (kar =root meaning sky in South-east of South Australia) | Bunanditj | Darlington district, Western Victoria | karitj | |
| Mabbin | emu-stones | ? | Western Australia | | |
| Mappain | ? | ? | ? | map:ain | |
| Mindjimidjilpara | staring-eyes | Wadikali | Lake Frome, South Australia | mindjimidjilpara | Wadikali |
| Minkom (mingom) | ? | Wakka Wakka, Gurang Gurang, Kabi Kabi | Wide Bay—Burnett area, Queensland | minkom (mingom) | Waka Waka, Korengoreng, Kabi Kabi |
| Mullu | black | Kabi Kabi | Wide Bay—Burnett area, Queensland | mulu | |
| Muramura | Ancestral Being | Dieri | East of Lake Eyre, South Australia | mura mura | Dieri |
| Nyooloo (tjulu) | australite | Tjalkadjara | Western Australia, Eucla, Nullarbor Plain | tjulu | Mirning |
| Ooga | staring-eyes | Dieri | East of Lake Eyre, South Australia | nguga | Dieri |
| Pandella | ? | ? | North-west regions of South Australia | (?) pandala (limestone) | Pitjandjara |
| Warrakati milki | emu-eyes | .. | Northern South Australia | | |
| Wirrokin | ? | ? | Western Victoria | | |

NOTES ON TABLE SHOWING SUMMARY OF ABORIGINAL NAMES.

(a) Some names, e.g., *booliah*, also include magic-stones other than australites.

(b) "Emu-eye" refers more specifically to the flanged, button-shaped australites (see Plate I, figure 1).

(c) In western South Australia, the name *parndella* could mean "pertaining to limestone places", since *parnda* and *parndala* mean lime and limestone (fide Mr. N. B. Tindale).

(d) The known or inferred phonetic spellings of the aboriginal names for australites used in magical practises, and for the tribes using them as such, were supplied by Mr. N. B. Tindale. The system of transcription is that employed by research workers in anthropology at Adelaide, South Australia.

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EXPLANATION OF FIGURE 1.

Sites of australite discoveries in relation to the location of aboriginal tribes known to have used australites for various purposes. (Based on Fenner's (1935) map of australite distribution, with additions, and Tindale's (1940) map of distribution of aboriginal tribes of Australia.)

KEY TO ABBREVIATIONS.

| | | |
|----|---|----------------|
| A | — | Arabana |
| AR | — | Aranda |
| D | — | Dieri |
| DA | — | Danga : li |
| G | — | Gurang Gurang |
| GU | — | Gu : nditjmara |
| K | — | Kabi Kabi |
| KA | — | Kala : ko |
| KE | — | Kela : ko |
| KI | — | Kir : ae |
| KO | — | Ko : ara |
| KU | — | Kujani |
| M | — | Marditjali |
| MA | — | Maduwonga |
| MI | — | Min : en |

KEY TO ABBREVIATIONS—*continued*.

| | | |
|----|---|----------------------|
| MR | — | Mirnid |
| N | — | Nar : anga |
| ND | — | Nditj |
| T | — | Tjapwuron |
| TL | — | Tjeraridja : l |
| W | — | Wadikali |
| WI | — | Wi : lmen (Wheelman) |
| WL | — | Wiljakali |
| WW | — | Waka Waka |

The known australite localities shown on figure 1 include specimens from the surface as well as specimens from placer deposits.

No doubt many other tribes occupying areas within the australite strewnfield utilized australites for various purposes, but the author has been unable to find evidence that would warrant their inclusion in the above list.

The majority of the tribal names have been chosen from Tindale's map (1940), rather than employing tribal names set out in earlier literature; abbreviations for these tribal names are located according to Tindale's tribal boundaries.

DESCRIPTION OF PLATES.

Plate I.—Australites selected from a large collection from Port Campbell, Victoria, to illustrate typical round forms (all x3).

- 1—complete button-shaped forms; A = posterior surface showing smooth circumferential flange and bubble-pitted core (1212).
B = side view, with posterior surface uppermost (1212).
C = anterior surface showing counterclockwise flow ridge and radial flow lines (C).
- 2—complete detached flange, posterior surface uppermost (91).
- 3—broken, hollow button-shaped form, showing high degree of lustre (“hot-polish”) of walls of internal cavity (890).
- 4—lens-shaped form showing bubble-pitted surface (posterior) and primary flow-swirls (884).
- 5—small lens-shaped form showing posterior surface (661).
- 6—round core; A = posterior surface, B = side view showing equatorial zone, and with posterior surface uppermost (A).
- 7—flange fragment, anterior surface uppermost (1128).
- 8—oval-shaped form with remnants of flange, posterior surface uppermost (1010).
- 9—small, thin, slightly concave round disc, with minute depression at centre of posterior surface (1187).
- 10—small button, with relatively broad flange, posterior surface uppermost (1205).
- 11—small, thin, oval bowl-like form, showing broad flange and small core on posterior surface (419).
- 12—small, thin, teardrop-shaped form, with posterior surface showing small core and broad flange (883).

(Photographs—R. OLDFIELD.)

Plate II. Australites selected from a large collection from Port Campbell, Victoria, to illustrate aberrant forms and typical elongated forms (all x3). (No. 13 from Moonlight Head, 20 miles south-east of Port Campbell.)

- 13 large oval core; A = posterior surface showing bubble pits and flow lines, B = side view showing naturally flaked equatorial zone, and with posterior surface uppermost (918).
- 14 oval-shaped form without flange, posterior surface uppermost (984).
- 15 flat, oval-shaped, plate-like form with broad flange, posterior surface uppermost (1193).
- 16 boat-shaped form, without flange, posterior surface uppermost (609.)
- 17 boat-shaped form, with incomplete flange, posterior surface uppermost (617).
- 18 canoe-shaped form showing longitudinal flow structures and thin, elongated, turned-back ends, posterior surface uppermost (1219).
- 19 aberrant form, showing "twisted" flow ridges (1354).
- 20 Nondescript fragment with thin edges, showing bubble-pitted posterior surface (1333).

(Photographs—R. OLDFIELD.)

Plate III. Australites selected from a large collection from Port Campbell, Victoria, to illustrate typical constricted elongated forms (all x3).

- 21 teardrop-shaped form; A = posterior surface, B = side view, with posterior surface uppermost (B).
- 22 attenuated "tail" broken from a teardrop-shaped form, posterior surface uppermost (1326).
- 23 slender teardrop-shaped form, with attenuated "tail" partly broken away; showing elongated flow grooves trending towards the "tail", posterior surface uppermost (639).
- 24 stumpy teardrop-shaped form, showing longitudinal flow lines and narrow, broken flange, posterior surface uppermost (947).
- 25 large dumbbell-shaped core, showing thick waist and naturally flaked equatorial zone, posterior surface uppermost (628).
- 26 dumbbell-shaped form, with flange, posterior surface uppermost (78.)
- 27 dumbbell-shaped form, without flange, posterior surface uppermost (1025).

(Photographs—R. OLDFIELD.)

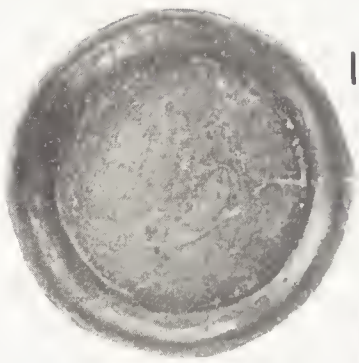
(Numbers and letters in brackets refer to registered numbers and letters in the author's australite collection.)

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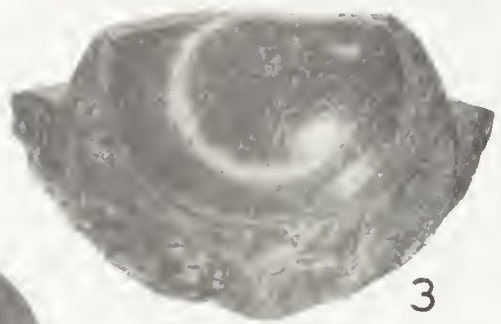
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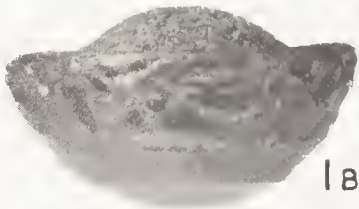
PLATE I



1A



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1B



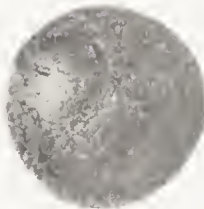
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6A



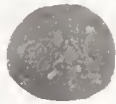
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6B



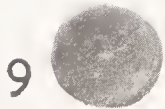
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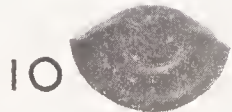
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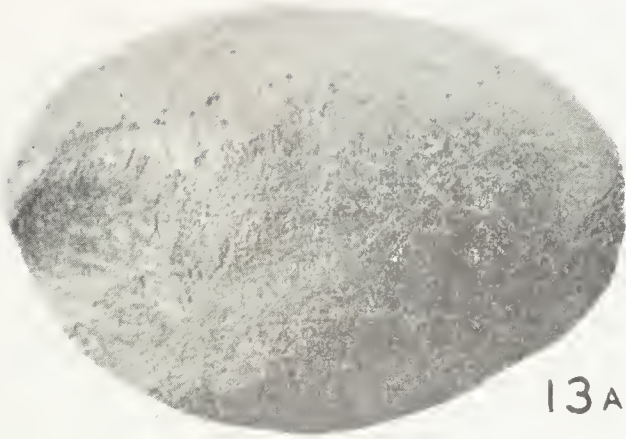


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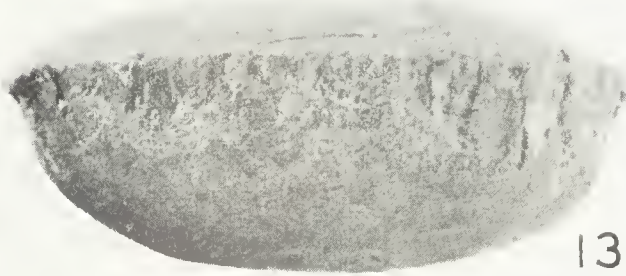
PLATE II



13A



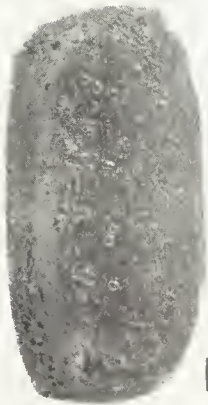
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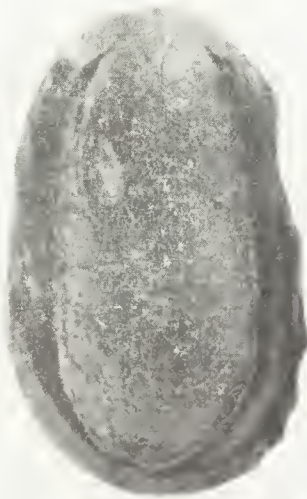
13B



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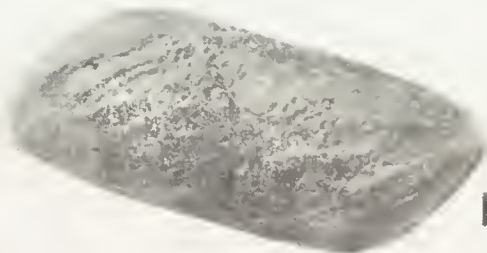
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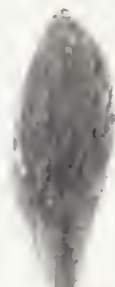


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PLATE III



21A



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22



21B

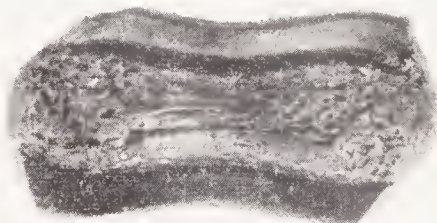


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