Special Issue: Personal Ornaments in Early Prehistory

Bead Making in Aboriginal Australia From the Deep Past to European Arrival: Materials, Methods, and Meanings

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ABSTRACT

This paper reviews the raw materials used by Indigenous Australians to make beads. It includes beads recovered from archaeological sites, as well as beads collected before 1940 held in museum collections, and those that are described in pre-1940 literature and other archival material. All three sources of information indicate that people were highly selective in their choice of materials for bead production and that availability and abundance only partly determined selection. Grass and reeds, the most widespread material represented in the museum and historic sources, if used in pre-European times, have not been preserved in archaeological sites. Beads made of highly iridescent or luminous shells, that historic sources suggest were regarded as imbued with powerful properties, were selected over other, more abundant colorful or patterned shells. Teeth of large macropod species were more commonly used than any other mammals despite other species being more readily available. On the other hand, dingo teeth, which were just as large and more robust than macropod teeth, were very rarely used, and this seems surprising given dingoes' ubiquitous presence in Aboriginal society. As dog teeth were commonly used as beads in personal adornments by Melanesian people in Papua New Guinea, and the teeth of now locally extinct dog-sized carnivores are found as beads in archaeological contexts, we suggest that the lack of dog teeth beads may reflect the high status of dogs in Aboriginal societies. Although the Australian archaeological bead assemblage is small, comparison with the historically documented beads indicates that the choice of raw material has remained relatively constant for thousands of years. The historical sources also describe human teeth and other bone relics as being worn as pendants for protection for the wearer. However these are often unmodified, being suspended by resin or other non-destructive techniques. This has implications for isolated human skeletal parts found in archaeological contexts.

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INTRODUCTION – BEADS IN AUSTRALIAN ARCHAEOLOGICAL ASSEMBLAGES

Beads are some of the earliest forms of recorded symbolic behaviour. Shell beads have been recovered from at least nine Middle Paleolithic African and Near Eastern sites (d'Errico et al. 2009) and from perhaps as early as 100,000–135,000 years ago (Barton et al. 2009; Vanhaeren at al. 2006). In these early assemblages only five shell species have been identified as having been used as beads, of which *Nassarius* is by far the most common (d'Errico et al. 2009). Preferences for particular shell species and other materials have been also recorded for Upper Paleolithic Europe (e.g., Taborin 1993), Island Southeast Asia (e.g., Langley and O'Connor 2016; Langley et al. 2016), and Late Stone Age Africa (Miller and Willoughby 2014).

While bead distribution and the raw materials from which beads were made are now relatively well documented from Paleolithic contexts in Africa, the Near East, and Europe, comparatively little has been published on these subjects in Australia. This is despite the facts that symbolic

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behavior was a prerequisite for the first Australians' arrival by watercraft into Sahul (the Pleistocene continent which comprised Australia, New Guinea, and the Aru Islands) (Balme et al. 2009) and that beads have been found in Pleistocene contexts from at least 30,000 years ago in Australia (Balme and Morse 2006; Balme and O'Connor 2017).

Beads were, and continue to be, used by Australian Aboriginal people in both ceremonial and secular contexts by all members of society—men, women and children (Balme and O'Connor 2017). They were an important trade commodity (e.g., Akerman and Stanton 1994; Mulvaney 1976) and they provide one of the clearest indicators of long distance transport of raw materials and exchange networks in the Australian archaeological record.

However, beads are not common in Australian archaeological sites, having been recovered from only 27 sites. This may be largely a result of poor recovery during excavation as, until recently, Australian archaeologists have routinely used 6mm and 3mm nested sieves or larger mesh sizes that would not have retained small beads and bead fragments. It is probably no coincidence that many of the beads have been found in recent excavations using 1.5mm meshed sieves. In early Australian excavations, shell in shell-rich sites was routinely sampled (e.g., bulk or column samples), so any beads present were most likely discarded at the site along with the majority of the subsistence shell. It is also possible that tiny fragments of exotic shell found in some sites may be the remains of ornaments but have not been recognized as such. Given the important role of bead making in understanding regional symbolic systems and interaction, the highest standards of recovery should be mandatory for all modern Australian excavations.

The uneven distribution of archaeological sites containing beads (Figure 1) may be partly a reflection of the distribution of archaeological research in Australia. South east Australia, in particular, has a longer history of archaeological research than elsewhere on the continent. Of the sites with sufficiently precise dates for beads, only four are Pleistocene compared to 21 that are Holocene (Table 1). Preservation also may have affected the record, particularly in the north where the constant wetting and drying of a tropical monsoon climate does not favor preservation of organics, but considering the by far greater number of excavated Holocene sites in Australia (Williams et al. 2013), it may also be a reflection of sample size.

Although small, what is striking about the Australian sample is the very restricted range of raw materials used to make the beads (see Table 1, Figure 1), despite the abundant possibilities. For example, only three types of shell (scaphopod, baler, and cone) are represented as beads in north west sites, despite over 5,000 recorded species for near coastal shallow waters (Balme and O'Connor 2017, Balme et al. 2018). Of the beads made of mammal materials, most are kangaroo teeth and only two other mammals are represented—the extinct Tasmanian devil and native cat.

We have previously discussed some of the reasons for the selection and uneven distribution of scaphopod beads in archaeological sites in the Kimberley region of north west Australia (Balme and O'Connor 2017, Balme et al. 2018) and in this paper we extend our previous work to the entire Australian archaeological bead assemblage. We first assess the extent to which the archaeological sample might reflect previous bead distributions and then interpret and discuss the perceived selectivity of the species used to make beads before the arrival of Europeans in the late 18th century. In consideration of both of these, we have compared the archaeological record to the ethnographic record just after the arrival of Europeans on the continent as reflected in written accounts and museum collections. While we expect that the use of personal ornaments changed over time, comparison of the ethnographic and archaeological evidence provides some insight into materials that might have been used to make beads, but which are unlikely to preserve in archaeological sites, and to provide hypotheses about the reasons for selectivity in species for bead making.

For this paper we define beads as suspended objects used for personal adornment. They may be strung as a single object (pendant or worn relic) or as a series of objects.

It is worth noting that, as well as the beads made by Indigenous Australians using natural materials, there is another category of beads found in archaeological sites and museum collections—beads made of glass and other exotic materials. These beads were acquired by Aboriginal people from Macassan trepangers and Europeans after contact, and were probably brought by the foreigners specifically as objects for barter. A variety of such beads have been recovered from occupation sites, Mission sites, and burials, in both northern and southern Australia. A recent review by Wesley and Litster (2015) details the sites and contexts of the exotic bead finds, and discusses their entry into and function in Indigenous economies. Here we focus exclusively on beads made of natural materials by Aboriginal people themselves.

THE ETHNOGRAPHIC ASSEMBLAGES

Evidence for Aboriginal use of ornaments in the early years of European occupation is abundant. Some of this evidence is in museum collections in the form of objects and photographs and some in written records of European explorers, settlers, and interested naturalists, and some in archives of photographs and sketches.

For the museum records, we used McAdam's systematic study undertaken for her 2008 Ph.D. thesis of 1,007 beaded ornaments that were collected before 1940 and now held in Australian museums. The date of 1940 is somewhat arbitrary but was selected by McAdam to reduce the effect of the influence of Europeans on the manufacture and movement of goods, which increased markedly after World War II (McAdam 2008: 199).

We have to recognize that there may be some biases in the representativeness of these collections. For example, the collectors may have selected objects that were more aesthetically pleasing to them or that they considered rare. The geographic range is also biased as often objects were collected by early government workers and anthropologists who were mainly working in the north and encountering

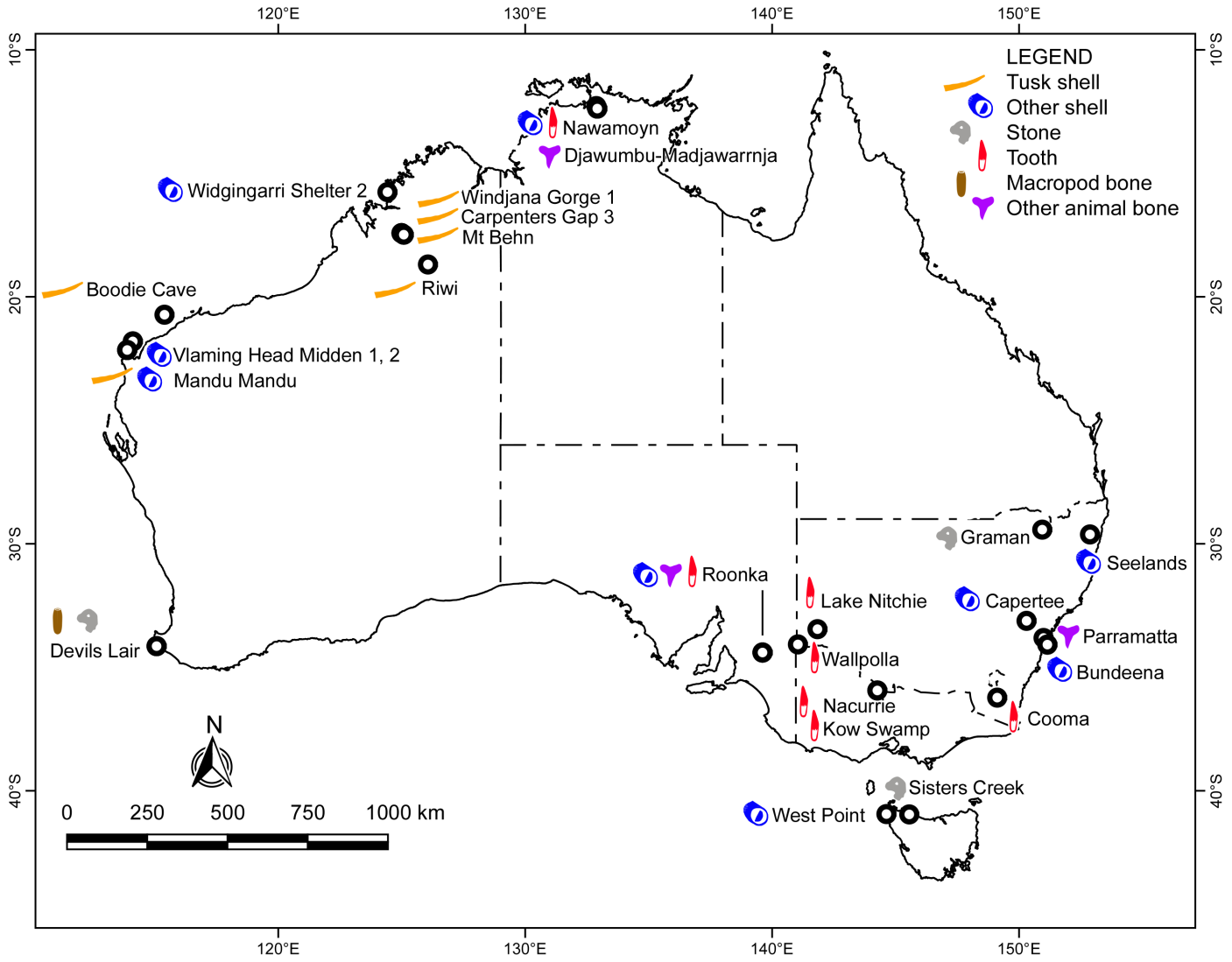

Figure 1. Distribution of beads recovered from Australian Aboriginal archaeological sites in Australia.

Aboriginal groups who had fewer interactions with Europeans. McAdam (2008) and McAdam and Davidson (2018) also refer to minor biases in the sample associated with museum procedures, such as lack of access resulting from cultural sensitivities, or because objects were on display or mislabelled.

To counter balance some of these biases, we used records in well-known collections of observations, and journals and photographs, many of which are also referred to in McAdam 2008. To be consistent with the museum collection evidence, we only referred to sources published, or originally recorded before 1940. The earliest recorded observations were by Arthur Philip, the first Governor of Australia, in 1789 a year after the British colony was founded. Some of the sources gather together observations that had been recorded by others. For example, Curr (1886, 1887) are two of four volumes that compile observations by different people from around the colonies in response to a set of questions that he sent to them.

For the same reasons as the museum collections, there is a geographical bias in the historic sources. However, the major problem with using these sources is that, unlike the museum collections, we cannot quantify the observations because the recorders do not quantify their observations. They often just make general remarks such as 'the local people frequently wore kangaroo teeth necklaces' or that a particular kind of ornament was widespread in a large geographical area. For this paper we have counted each observation as one, regardless of whether the observer specified the actual number or made a general observation, unless they specified that the objects were observed in different geographic areas.

REPRESENTATION AND SELECTION IN THE MUSEUM AND LITERARY RECORDS

The museum records are summarized in Table 2 and the records obtained from literary and archival sources are in Table 3. The distribution of ornaments made from different raw materials from both sources is represented visually in Figure 2. Figure 3 shows the distribution of different shell

TABLE 1. BEADS RECOVERED FROM AUSTRALIAN ABORIGINAL ARCHAEOLOGICAL SITES.*

Type	Taxon/Material	Site Name	Description	Age (years bp)	References
Mammal Bone	Macropod	Devil's Lair	3 beads made from long bone sections	12,000–19,000	Dortch 1979
Mammal Tooth	Macropod	Roonka	Head band and additional strand of upper incisors. Teeth are notched	4,000	Pretty 1977: 305
	Macropod	Kow Swamp	Incisors and resin forming headband on burial	14–9,000	P. Brown, pers. comm. No primary publication but referred to in Flood 1995.
	Macropod	Nacurrie	Incisors and resin forming headband on burial	Terminal Pleistocene (Brown 2009)	P. Brown, pers. comm. No primary publication.
	Macropod	Cooma	327 pierced upper incisors	7,000	Feary 1996
	Macropus antilopinus	Nawamoyn	Pierced upper incisor	Holocene from midden dating from 7,000 years ago	Schrire 1982: 128
	Mammal	Devil's Lair	Perforated bone fragment	12,000	Dortch and Merrilees 1973:110; Dortch 1984: 64-65
	Sarcophilus harrisii	Lake Nitchie	Necklace of 178 pierced canine teeth on a burial	7,000	Macintosh 1971
	Sarcophilus harrisii	Wallpolla	Necklace of pierced teeth associated with burial	7,000	Pardoe 1995: 705
Other Animal/ Element	bird	Roonka Grave 108 child	Skull	4,000	Pretty 1977: 305
	Native cat (*Dasyurus* sp.)	Roonka Grave 63	Two pierced lower jaws	7,000–4,000	Pretty 1977: 315
	Shark	Parramatta	Pierced tooth	Recent past	McDonald, Oct. 2017 pers. comm.
	Unknown	Roonka Grave 109 adult	Lengths of broken bones arranged in a line	4,000	Pretty 1977: 312
	Whaler shark	Djawumbu-Madjawarrnja	6 painted vertebrae beads	Recent past	Wright et al. 2016

TABLE 1. BEADS RECOVERED FROM AUSTRALIAN ABORIGINAL ARCHAEOLOGICAL SITES (continued).*

Type	Taxon/Material	Site Name	Description	Age (years bp)	References
Shell	*Anadara* sp.	Nawamoyn	Pierced shell with ochre	From 7,000	Schrire 1982: 129
	Conus sp.	Mandu Mandu	22 perforated shells	32,000	Morse 1993b: 179,184
	Conus sp.	Mandu Mandu	3 perforated shells	21,000	Morse 1993b: 179, 184
	Fossil oyster	Roonka Grave 89	Two perforations on a single shell	7,000–4,000	Pretty 1977: 315
	Geloina sp.	Nawamoyn	Pierced shell	<7,000	Schrire 1982: 129
	Geloina sp.	Widgingarri Shelter 2	Pierced shell	Surface find	O'Connor 1999: 80, 81
	Lunella torquata or *Turbo militaris*	Seelands	Pierced (cut, not drilled) fragment of nacreous shell	<400	McBryde 1974: 194–195
	Melo amphora	Vlaming Head Midden 1	pierced shell fragment deriving from midden	<5,000	Przywolnik 2003: 20
	Melo amphora	Vlaming Head Midden 2	pierced shell fragment deriving from midden	<5,000	Przywolnik 2003: 20
	Mussel shell (?freshwater)	Capertee	Pierced shell	<5,000	McCarthy 1964: 222
	Nerita atramentosa	Bundeena Beach Shelter	6 perforated shells	Undated	Harper 1899
	Nerita atramentosa	Bundeena UC midden	4 perforated shells	2,000–1,000	Irish 2007
	Phasianothrochus sp.	West Point	32 pierced shells	1,500–1,000	Jones 1967
	Scaphopod	Windjana Gorge 1	2 shell segments	8,500	Balme and O'Connor 2017: 11,12
	Scaphopod	Carpenters Gap 1	15 shell segments	4,000–0	Balme and O'Connor 2017: 11
	Scaphopod	Carpenters Gap 3	5 shell segments	11,000–5,500	Balme and O'Connor 2017: 11
	Scaphopod	Mt Behn	14 shell segments	5,000–2,000	Balme and O'Connor 2017: 11
	Scaphopod	Mt Behn	1 shell segment	260	Balme and O'Connor 2017: 11

TABLE 1. BEADS RECOVERED FROM AUSTRALIAN ABORIGINAL ARCHAEOLOGICAL SITES (continued).*

Type	Taxon/Material	Site Name	Description	Age (years bp)	References
Shell	Scaphopod	Riwi	14 shell segments	30,000–8,000	Balme and O'Connor 2017: 11
	Scaphopod	Boodie Cave	22 shell segments	12,000	Veth et al. 2017: 25
	Scaphopod	Mandu Mandu	shell segments	26,000–22,000	Morse1993b: 145–146
	Scaphopod	Mandu Mandu	shell segments	5,000–400	Morse 1989: 86
Stone	Chalcedonized opal	Graman	2 pierced stone fragments interpreted as pendants	4,500	McBryde 1974: 320–322
	Marl	Devil's Lair	pierced stone fragments interpreted as a possible pendant	12,000–19,000	Dortch 1976
	Micaceous shale	Sisters Creek	About 4cm x 2cm	6,000	Jones 1965: 195

*As noted in the text we have excluded glass and ceramic beads from our review.

TABLE 2. AUSTRALIAN ABORIGINAL ARTIFACTS MADE FROM BEADS AND HELD IN AUSTRALIAN MUSEUM COLLECTIONS.*

Species	Museum assemblage
Pearl shell (*Pinctada* sp.)	273
Tusk shell (Scaphopod)	81
Baler Shell (*Melos* sp.)	74
Nautilus (*Nautilus* sp.)	61
Other marine/ fresh water shell	68 (16 species)
Grass/reed bugle	211
Macropod teeth	123
Fish or shark vertebrae	31
Crocodile teeth	10
Other animals	18
Seeds	45
Human	3
Other (carapace, crayfish, landsnail, gum, clay, stone etc.)	9
Total	**1007**

*Data recovered from McAdam (2008, Chapter 9 and Appendices 14–16).

TABLE 3. SUMMARY OF ABORIGINAL BEADS RECORDED IN SELECTED DOCUMENTS AND ARCHIVES PUBLISHED BEFORE 1940.

State	Type	Reference
New South Wales	Grass/reed bugles	Bonnemanis et al. 1989: 89 (drawing by Lesueur 1802); Curr 1886: 36, 158; Mathews 1905: 65
	Macropod teeth	Bonnemanis et al. 1989:89 (drawing by Lesueur 1802; Edge-Partington 1898: 140)
	Dingo teeth	Phillip 1789: 137
	Crayfish parts	Philip 1789: 137
	Bird leg bones	Curr 1886: 346
	Unspecified animal teeth/bones	Curr 1886: 178
	Nautilus	Curr 1887: 352
	Unspecified shell	Curr 1887: 304
Northern Territory	Grass/reed bugles	Edge-Partington 1898: 131
	Macropod teeth	McCarthy 1953: 97; Spencer 1914: 397; Spencer and Gillen 1904: 694; Thomson photo in McAdam2008: 162
	Crocodile	Thomson 1948:405
	Dolphin or porpoise teeth	Edge-Partington 1898 (3): 140
	Eagles claws	Spencer and Gillen 1904: 692
	Echidna spine	Edge-Partington 1898: 140
	Unspecified animal bones	Spencer and Gillen 1904: 435, 691
	Scaphopod	Meggitt 1966: 129
	Cypraea sp. (cowrie)	Edge-Partington 1898: 131
	Unspecified shell	McCarthy 1953: 97
	Seeds/ berries/ other plant	Edge-Partington 1898 (3): 140
Queensland	Grass/reed bugles	Curr 1886: 36, 340, 374, 464; Curr 1887: 4, 19, 156, 252; Hale and Tindale 1934: 141; Richards 1926: 250; Roth 1897: 111; Roth 1910: 33; Smyth 1978 (1): 279; Lumholtz 1908: 222; Campbell-Petrie 1975: 19–20
	Seeds/ berries/ other plant	Curr 1886: 418; Edge-Partington 1898: 131; Hale and Tindale 1934: 141; Roth 1910: 28
	Macropod teeth	Curr 1886: 471; Roth 1897: 109, 360
	Macropod bones	Roth 1897: 108
	Eel bone	Hamlyn-Harris 1918: 9; Roth 1910: 2
	Dingo teeth	Curr 1886: 471
	Dingo bones	Roth 1897: 108
	Crayfish parts	Roth 1910: 34
	Shark vertebrae	Roth 1910: 34
	Eagle claw	Curr 1887: 90; Roth 1897: 112
	Baler shell	Roth 1897: 112; Roth 1910: 35, 36
	Mussel shell	Curr 1886: 464; Curr 1887: 19, 36, 64, 252; Richards 1926: 250
	Pearl shell	Curr 1887: 122; Hale and Tindale 1934: 141; Roth 1910: 26, 32, 35; Thomson 1936: 383

TABLE 3. SUMMARY OF ABORIGINAL BEADS RECORDED IN SELECTED DOCUMENTS AND ARCHIVES PUBLISHED BEFORE 1940 (continued).

State	Type	Reference
Queensland	*Nautilus*	Curr 1887: 45, 223; Mathew 1910: 95; Roth 1910: 27, 32, 35; Smyth 1878 (1): 279
	Pteria (winged oysters)	Roth 1910: 32
	Solen sloanii	Roth 1910: 32
	Scaphopod	Roth 1910: 32
	Olivia sp.	Roth 1910: 32,38
	Conus leopardus	Thomson 1934: 228
	Unspecified shell	Curr 1886: 331, 471; Curr 1887: 4, 90, 156
	Beeswax	Roth 1910: 34
South Australia	Grass/reed bugles	Curr 1886: 78, 119, 158; Smyth 1878: 281; Worsnop 1897:158
	Macropod teeth	Spencer and Gillen 1904: 687–688
	Eagle claw	Smyth 1878: 281
	Swan and duck beaks	Worsnop 1897: 158
	Human skull fragment	Edge-Partington 1898: 131
	Unspecified animal teeth/bones	Spencer and Gillen 1899: 611
	Baler shell	Spencer and Gillen 1899: 573
	Mussel shell, unspecified	Smyth 1878: 281
	Mussel shell, freshwater	Horne and Aiston 1924: 47
	Pearl shell	Mountford and Harvey 1938: 126; Spencer and Gillen 1899: 573
	Seeds/ berries/ other plant	Chewings 1936: 65; Spencer and Gillen 1899: 27
	Moth cocoons	Waite 1923
Tasmania	Macropod teeth	Leigh (1822, cited in Roth 1899: 131–132)
	Human bones	Bonwick 1870: 27; Thomas Bock portrait of Maulboyheener (Timmy) published in Fenton (1884: 122); Leigh (1822, cited in Roth 1899: 131)
	? Wombat claws	Plomley 1966: 167
	Maireener shell	Baudin 1974; Bonwick 1870: 285; Labillardiere 1800: 27; Leigh (1822, cited in Roth 1899: 131); Tasmanian Museum and Art Gallery photograph of Truganini taken in 1866 by C.A. Wooley; Tasmanian Museum and Art Gallery 1837 portrait by Thomas Bock of Wortabowigee (Fanny)
	Columbella shell	Leigh (1822, cited in Roth 1899: 132)
	Unspecified shell	Bonwick 1870: 27
Victoria	Grass/reed bugles	Curr 1887: 344; Dawson 1881: 81; Glover 1988: 15; Smyth 1878 (1): 273, 274, 278
	Macropod teeth	Dawson 1881: 81; Glover 1988: 15; Morgan 1852: 72; Smyth 1878 (1): 274, 276, 278
	Bird bones	Morgan 1952: 73
	Human bones	Howitt 1904: 459, 460, 561, 562, 560

TABLE 3. SUMMARY OF ABORIGINAL BEADS RECORDED IN SELECTED DOCUMENTS AND ARCHIVES PUBLISHED BEFORE 1940 (continued).

State	Type	Reference
Victoria	Echidna spine	Dawson 1881: 25
	Unspecified shells	Morgan 1852: 72
Western Australia	Grass/reed bugles	Kaberry 1939: 131
	Macropod teeth	Bates 1985: 285; Edge-Partington 1898: 140
	Pearl shell	Bassett-Smith 1894: 329; Carnegie 1898a: 281–281; Clement 1904: 7, 8; Love 1917: 27; Peggs 1903 (Fig XV opposite p. 365); Schmeltz in Clement 1903: 17, 19, 20
	Scaphopod	Kaberry 1939: 131; Peggs 1903 (Fig XV opposite p. 365); Schmeltz in Clement 1903: 19; Worsnop 1897: 158
	Strombus sp.	Carnegie 1898: 281–281; Schmeltz in Clement 1903: 19
	Cypraea sp. (cowrie)	Schmeltz in Clement 1903: 19
	Unspecified shell	Kaberry 1939: 248
	Seeds/ berries/ other plant	Carnegie 1898: 281–281; Schmeltz in Clement 1903: 19
	Clay	Edge-Partington 1898 (3): 131

species.

Tables 2 and 3 highlight both the importance of highly perishable materials in Australian bead production and the collector bias in museum collections. In the literary sources, by far the most the most common observed bead material used across the continent (but not Tasmania) are lengths of grass or reeds. However, in the museum collections, pearl shell ornaments are the most frequently represented, probably reflecting both the attractiveness of this highly iridescent raw material to Europeans and their widespread occurrence in the north of the continent. Beads of lengths of grass and reeds are the second most abundant raw material in the museum collections. Apart from these two material types, the frequencies of different types of raw materials are similar in both the museum collections and ethnographic observations. The next most common recorded raw material is shell, followed by mammal teeth, with small numbers of items made on animal bone, turtle carapace and beeswax. There are also a few items made from human bone.

Within each of the broad categories of 'shell' and 'mammal' there is much selectivity. Of the thousands of shell species available only a few species (19) are recorded as being used. Most commonly these are pearl shell (*Pinctada* sp.), members of the scaphopod family, baler shell (*Melo* sp.), and nautilus (*Nautilus* sp.). Of the beads made from animals, only 12 kinds are recorded as being used, and objects made of macropod (kangaroo family) by far dominate.

EXPLAINING SELECTION IN THE ETHNOGRAPHIC RECORD

In previous work we (Balme and O'Connor 2017; Balme et al. 2018) and others (Akerman with Stanton 1994) have argued that one of the reasons for the selection of scaphopod, baler, and pearl shell for personal ornaments in the Kimberley region of north west Australia relates to their white, luminous and/or iridescent qualities. Nautilus shell, the fourth most common shell type represented in the museum and literary records is also highly iridescent as are maireener shells (*Phasianothrochus* sp.), the main bead raw material in Tasmania. Maireener shells have a brown exterior when collected but were treated to bring out their iridescent silver, blue-green color. This was done by smoking the shells over green leaves, which allowed the outer brown skin, to be rubbed off, and then rubbing the shells with fat (Bonwick 1870: 26).

The attributes of luminosity, brilliance, and shininess are highly valued in Indigenous Australia and are often associated with special or magical powers. The power of pearl shell, in the various places across Australia where it was, and continues to be used, by Aboriginal people has been attributed to the qualities of its shimmering, iridescence, or brilliance (Akerman and Stanton 1994: 19–32). Such qualities also provide power to other kinds of material culture such as the pigments used in art (Morphy 1989), large shiny white stone blades (Allen 1997), and crystals, especially quartz crystals (e.g., Akerman 1979; Berndt 1946–7; Elkin 1977: 32–33).

So highly prized were these qualities that shells and shell fragments made of these materials, including beads, were widely traded (Figure 4). The further the articles moved from their source, the more highly valued and often more powerful they became (see Balme and O'Connor 2017; Balme et al. 2018). In arid central Australia, some 1000km from the nearest source of scaphopod shells, Meg-

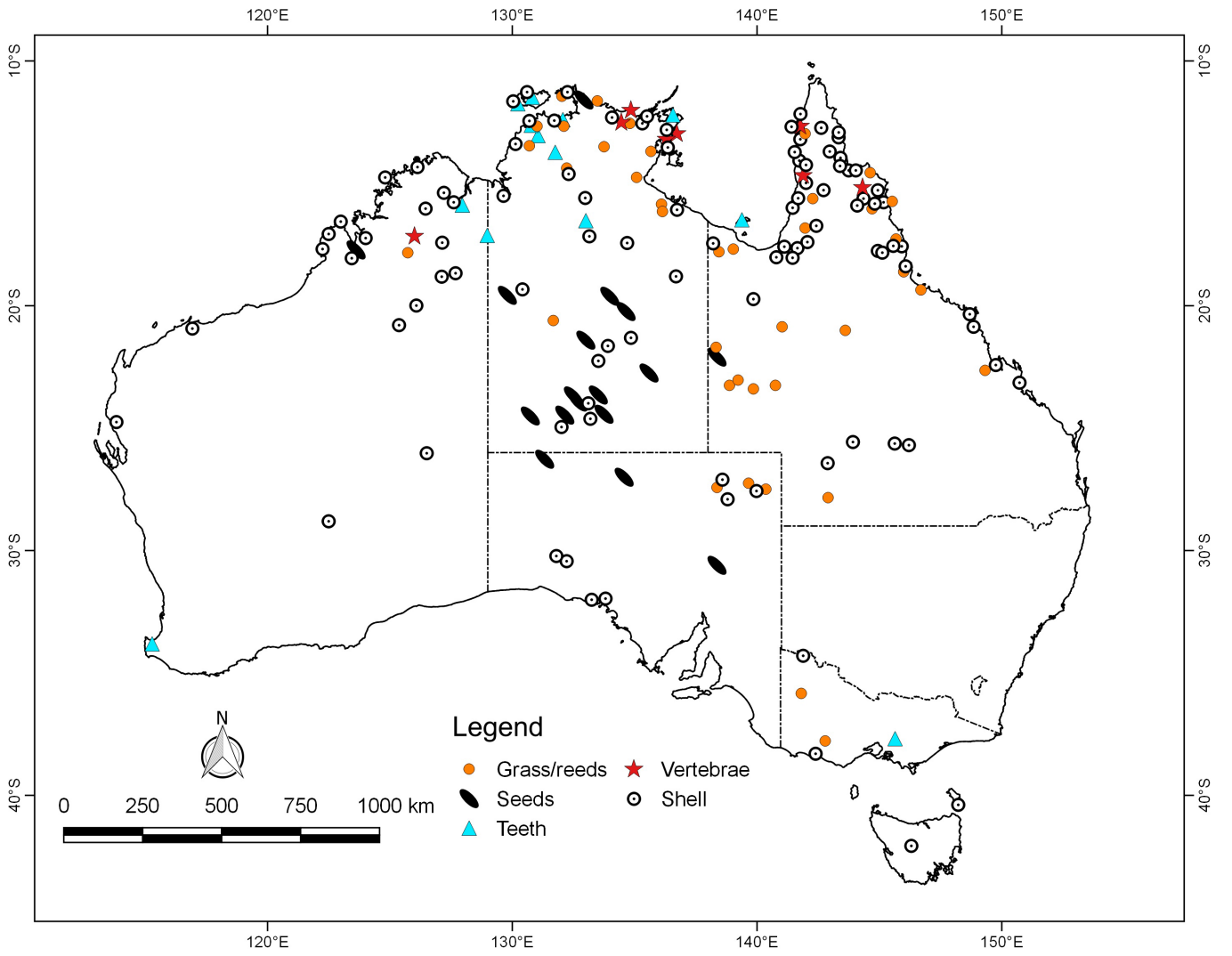

Figure 2. Distribution of Australian Aboriginal artifacts made from beads and held in Australian museum collections. Data obtained from McAdam (2008: 236: Figure 9.2; Appendices 14–16).

gitt (1966: 129–132) recorded that Warlpiri people regarded scaphopods as so dangerous and powerful that only initiated men, or young men during the initiation process, could view them.

The predominance of teeth in the beads made from mammals might also be related to the luster of these body parts relative to other body parts, although the comparative robustness of teeth may also play a part. However, the selection of macropod teeth, particularly lower incisors, over other animal teeth is not easily explainable and we could find no explanations in the literature of why macropod teeth were particularly desirable. One likely reason is size, as some members of the kangaroo family are the largest living land mammals in Australia with male red kangaroos (*Macropus rufus*) weighing up to 90kg (Dawson 1995). Lower incisors of red kangaroos are leaf shaped and about 30mm in length, and their rectangular, two lophed molars are about 10–11mm long and about 7–9mm wide (Sharman et al. 1964: 34). After the large kangaroos, the heaviest mammals in Australia are the three members of the wombat (Vombatidae) family that average about 30kg (Horsup and Johnson 2008; Taggart and Temple-Smith 2008). They have one pair of upper and one pair of lower incisors, and molars all of which grow throughout the animals' lifetime. Confined to the south and east of the continent, wombats were human prey but wombat teeth beads are not reported in the museum or literature sources.

Possibly one of the reasons for the overwhelming predominance of macropod skeletal elements over those of other animals may be related to the prestige associated with hunting, particularly large, kangaroos. Australia is such an environmentally diverse continent that the quantities and animal species exploited by different groups of people varied markedly. However, it is fair to say that most of the diet consisted of plants and small animals. Large macropods are difficult to catch and hunting expeditions are often unsuccessful. They are usually hunted by men and, when successful, the hunters are afforded prestige and power (Bliege

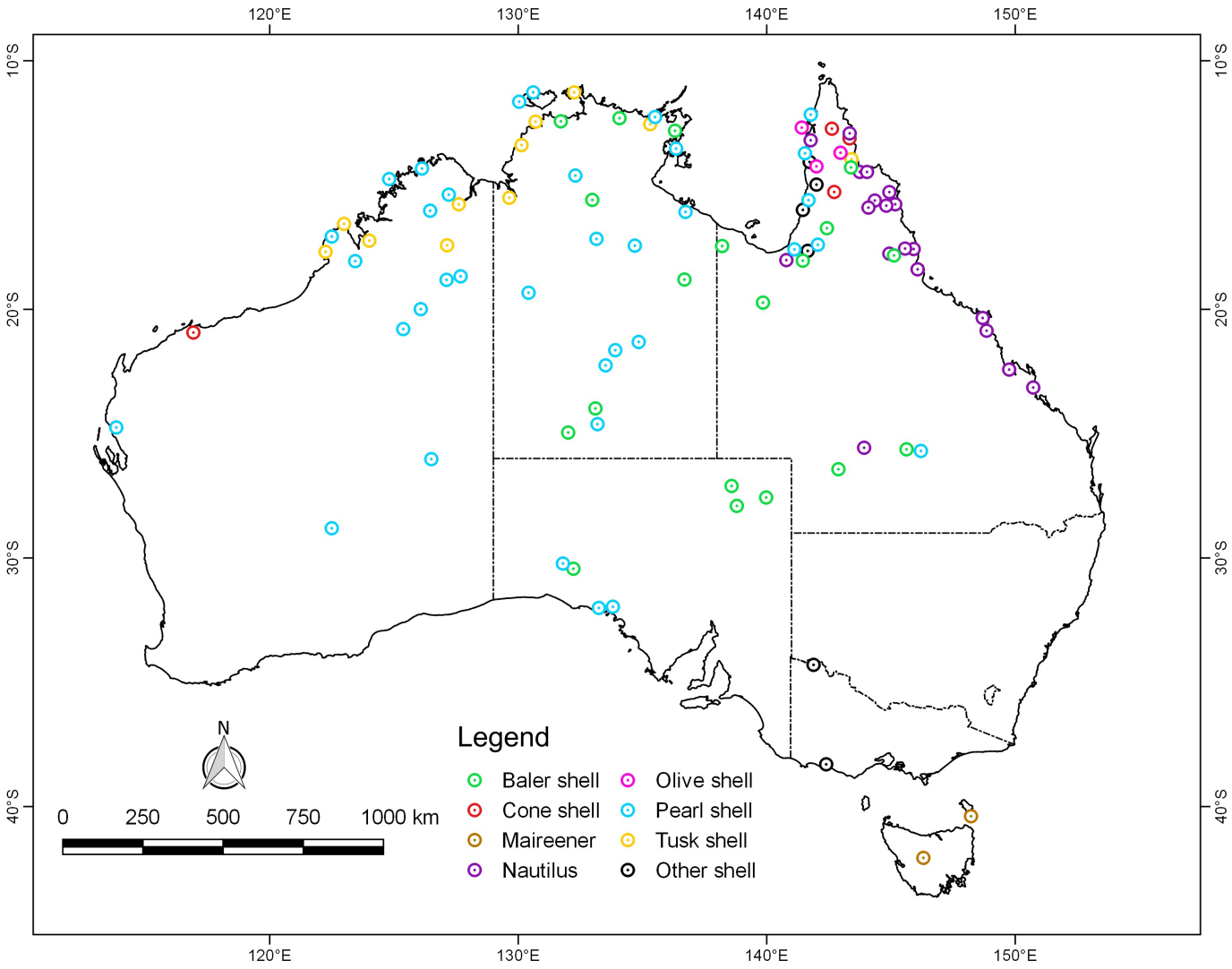

Figure 3. Distribution of different shell species used to make Australian Aboriginal bead artifacts and held in Australian museum collections. Data obtained from McAdam (2008: 236: Figure 9.2).

Bird and Smith 2005; Bliege Bird et al. 2001; Jones et al. 2013). The importance of large kangaroos is therefore not so much as dietary foods, but as symbols of social success, and the predominance of kangaroo teeth beads over those made on other animals may reflect this social importance; effectively communicating the social status of the wearer.

While it might be tempting to infer that the numbers of teeth in bead strands represent the number of hunts, as noted above, successful kangaroo hunts were not necessarily common. It is also possible that teeth were collected from animals that died naturally in rock shelters or near water sources in times of stress or were added to over long time periods. Thus the selection of kangaroo teeth may be more about the symbolic nature of the relationship between kangaroos and people, rather than evidence of 'prized catches.' In this respect, it is surprising that the placental dogs (dingoes) are so poorly represented in the bead ethnographic sources as they were living side by side with people in large numbers and, with deaths, would have been a convenient source of decorative raw material.

Dingoes weigh up to about 20kg and have large canine teeth—about 9–11mm for upper canines and about 10–11mm for lower (Gollan 1982: 307, 309) and are more robust than kangaroo incisors. Their lower M1 molar, averaging about 21mm long (Gollan 1982: 308), is longer than that of the red kangaroo. Dingo teeth are not represented in the museum collections and there are only two references of them being used as ornaments in the literature. One of these is by Governor Philip for the Sydney area who reported that Aboriginal people 'sometimes hang in their hair the teeth of dogs and other animals…" (Philip 1789: 137). The second, by Curr (1886 II: 471), refers to "chaplets of the teeth of wild dog' being worn at 'corroborrees' in north eastern Queensland. It is not clear whether these observers were skilled at distinguishing dingo teeth from the teeth of other animals, and no illustrations are provided but, if they are right, these observations are a rare indication of dingo teeth being used as personal ornaments.

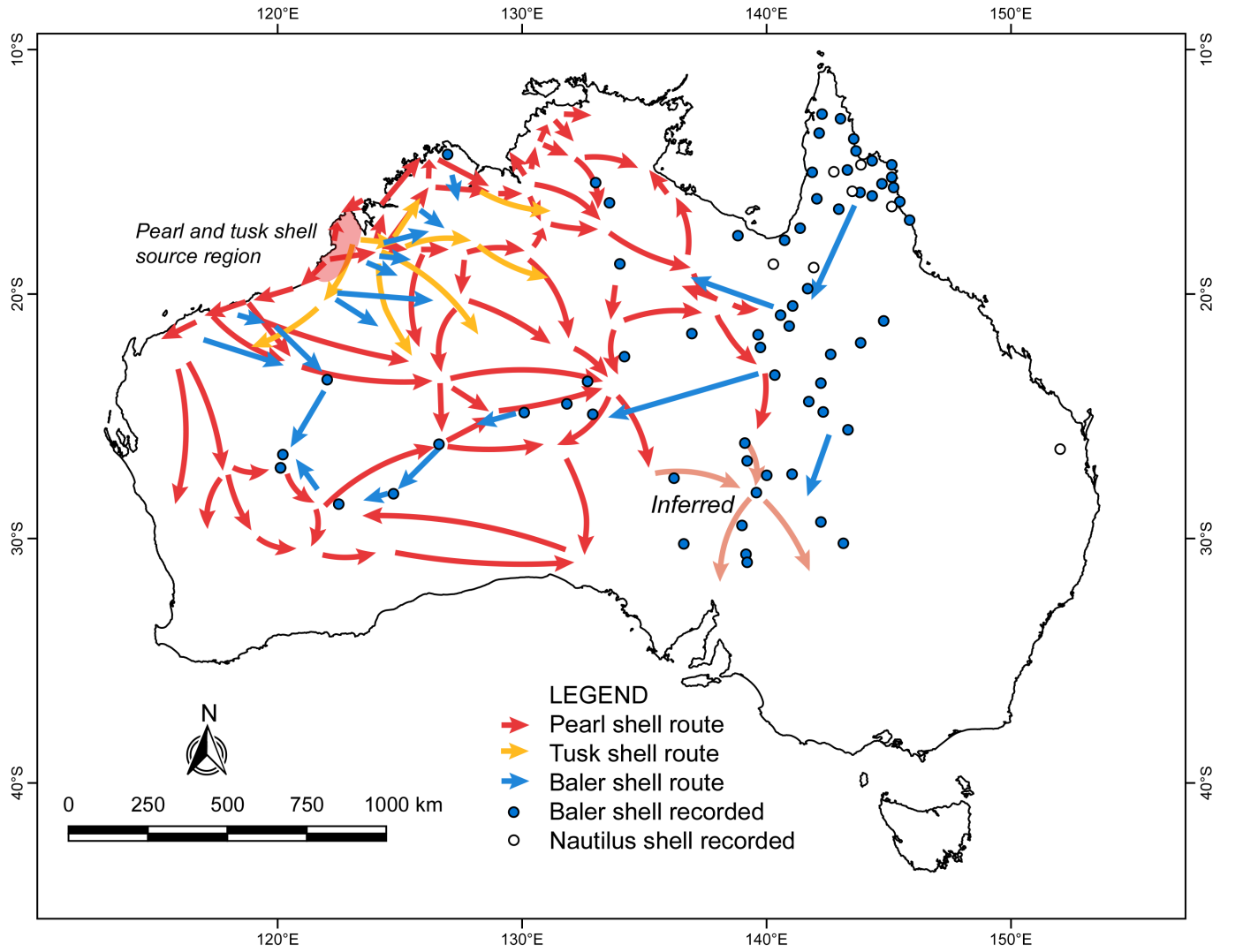

Figure 4. Aboriginal trade routes for scaphopod (Akerman, pers. comm. 2017), baler (after Akerman, pers. comm., 2017, and Mulvaney 1976), pearl shell (after Akerman and Stanton 1994). Trade routes are not available for Nautilus *but their ethnographically recorded locations were obtained from McCarthy (1939: 93: Figure 14).*

Although dingo teeth appear to have been rarely used as beads, they are recorded as parts of objects used as charms. Two such objects consisting of a single dog tooth, resin and string have been recorded from the Kimberley. One of these, now held in the Western Australian Museum, was bought by Kim Akerman from an antique shop in the 1960s (Akerman, personal communication 2018) and the second is illustrated in Edge-Partington (1890–1898, part 3: 132, item 16). In these contexts the dingo teeth might be considered as relics.

The relationship that people have with dingoes was/is very different from that with kangaroos and other animals. While the date of the arrival of dingoes in Australia is controversial, most researchers would agree that they arrived in the last 5000 years—perhaps about 4,000 years ago (Balme and O'Connor 2016: 775–778). We have argued that once they did arrive, they may well have been rapidly incorporated into Aboriginal society (Balme and O'Connor 2016) where they were highly valued and used for a variety of purposes including as pets, blankets, guards against ghosts, and as hunting aids, particularly by women (Balme and O'Connor 2016: 777–778).

Evidence for close relationships with dingoes is indicated by the fact that women suckled the pups, especially in the desert regions (Berndt and Berndt 1942: 162), and in some places protected puppies from spirits by rubbing them with ochre (Hamilton 1972: 289; Krefft 1862–5: 370). Dingoes have important positions in songlines and ceremonies (e.g., Berndt and Berndt 1942; Hamilton 1972; Rose 1992, 2011) and, unlike other animals, are frequently given kinship names (Berndt and Berndt 1964: 288; Maddock 1972: 24). Kolig (1978: 100) reports that, when he questioned some Aboriginal people about the presence of dogs at a ceremony, he was told that dogs were permitted as they were fully-fledged 'lawmen'—a term usually reserved for people who are experts in religious lore.

The fact that dingoes were the only animals given formal burials is further testimony to their human-like qualities. Archaeological dingo burials suggest that, like human burials, internment practices vary within the continent. In the Murray River Valley and south eastern Australia, archaeological dingo burials are mainly primary (Gollan 1984; Littleton et al. 2013; Pardoe 1996) and in northern Australia, secondary burial practices have been recorded (Gunn et al. 2010; Love 1917).

The relationship between Aboriginal people and dingoes is also very different from that between Melanesian people and dogs. In Papua New Guinea, for example, people also highly value dogs, and men, in particular, use them for hunting. Dogs are given as gifts and received in marriage transactions (e.g., Seligman 1910: 69, 778, 301, 450) but they do not seem to have been regarded as imbued with the same spiritual power as dogs in Aboriginal Australian society. There is one record of a dog burial dating from the earliest occupation levels (about 2500 BP) at the site of Taurama on the Papuan coast (Bulmer 2001: 189). However, it seems from a record in Seligman (1910) that such burials are rare. After the government ruling that people could no longer be buried in the villages, one man's response was "Is my father a dog that he should be buried in the bush?' (Seligman 1910: 716). Dogs' teeth were/are used to make necklaces and other beaded ornaments. Such ornaments were highly prized (Haddon 1904: 293), could be used as payment for goods (Haddon 1904: 293), are also traded (Harding 1994), and inherited at death (Seligman 1910:91).

It seems then that the difference between the selection of raw materials for bead-making is very much dependant on the nature of the relationship between the animal species and the people who make the beads.

HUMAN BONE AS RELICS

Both the museum collections and literature sources have ornaments made from human teeth or bone. One of the museum ornaments is a series of both macropod and human teeth.

While the contexts of the museum items are not recorded, those discussed in the literature indicate that the ornaments made from human bone can be considered as 'relics,' which are considered to have powerful properties. In many parts of Australia, secondary burial was the norm and women would carry their child's bones or people would carry bones ready for secondary burial (e.g., Gill 1907–8: 229; Howitt 1904: 449–450; Smyth 1878: Vol I: 121). Keeping of human relics was also widespread practice in Aboriginal Australia and a thorough review of the early references to these is provided in Meehan (1972: 217–222). Many of the relics in this review are various selected skeletal elements or body parts carried in bags or cached in protected places, such as rockshelters, in the landscape. The use of crania as ceremonial drinking vessels and other bones for various magical purposes, were widespread practices.

In addition to the relics described above, some early documents and images describe human relics that were suspended from the body. These are often referred to as having been derived from friends or relatives (e.g., Bonwick 1870: 27; Howitt 1904: 460; Morgan 1852: 92). For example, in the west coast of Tasmania, Robinson (1831 May 18: 722) recorded a woman wearing a thick cord around her neck made from human skin. Pullleine (1924: 85) lists relics collected by Robinson in Tasmania as including the calvarium of a child, lower jaws, tibias, and a radius—all attached to string for suspension around the neck. A well-known image, originally published in Fenton (1884), of Maulboyheenner, a Tasmanian Aboriginal man who accompanied Robinson, shows one such relic, a lower jawbone suspended around his neck.

Many of the recorders refer to the powerful properties associated with such objects. For example Howitt (1904: 460) reported that 'sometimes the Kurnai (Gurnai or Gunailkurnai) cut off one hand of the corpse or both hands. As string of twisted possum fur was attached to hang around the neck by the parent, child, brother or sister. ….at the approach of an enemy, the hand would push or pinch the wearer'.

THE ARCHAEOLOGICAL AND ETHNOGRAPHIC COMPARISON

Our review is by no means exhaustive, as there are objects in many other small Australian museums as well as museums in other countries, private collections, and extensive historical archives that we have not yet examined. However, the discussion above reveals that there was clearly deliberate selection of a relatively restricted range of raw materials for bead production in Aboriginal Australia.

Figure 5 compares the raw material distribution of the museum and archaeological records. Some of the selection clearly relates to abundance and ease of manufacture of the beads from the raw material. The overwhelming abundance of beads made of reeds and grasses recorded in the literature and other archival sources, no doubt reflects these aspects. The plant stems were simply cut into lengths. The lack of such beads in the archaeological samples very likely reflects poor preservation of soft organic remains in Australian archaeological sites. In other respects, the three sources of information on bead raw material are similar. Apart from plant stems, all three sources indicate that shell is the most common material from which beads were made, followed closely by animal teeth.

Of the shell species, items made from pearl shell are most common in the museum and literature sources but no pearl shell ornaments have been found in archaeological sites, despite the abundance of excavations in north west Australia close to pearl shell sources. It is possible that tiny fragments identified in some archaeological sites may derive from such ornaments but have not been identified as such. For example, in Widgingarri Shelter 1, in north western Australia, a fragment of pearl shell weighing 0.77g was recovered from an excavation unit dated to 18,900±1,800 bp (23,494±4,445 cal BP) at which time the shelter was over 200km inland (O'Connor 1999: 80). From the same site, a fragment of baler shell weighing 2.9g was recovered and directly dated to 28,060±600 bp (32,286±208 cal BP) (O'Connor

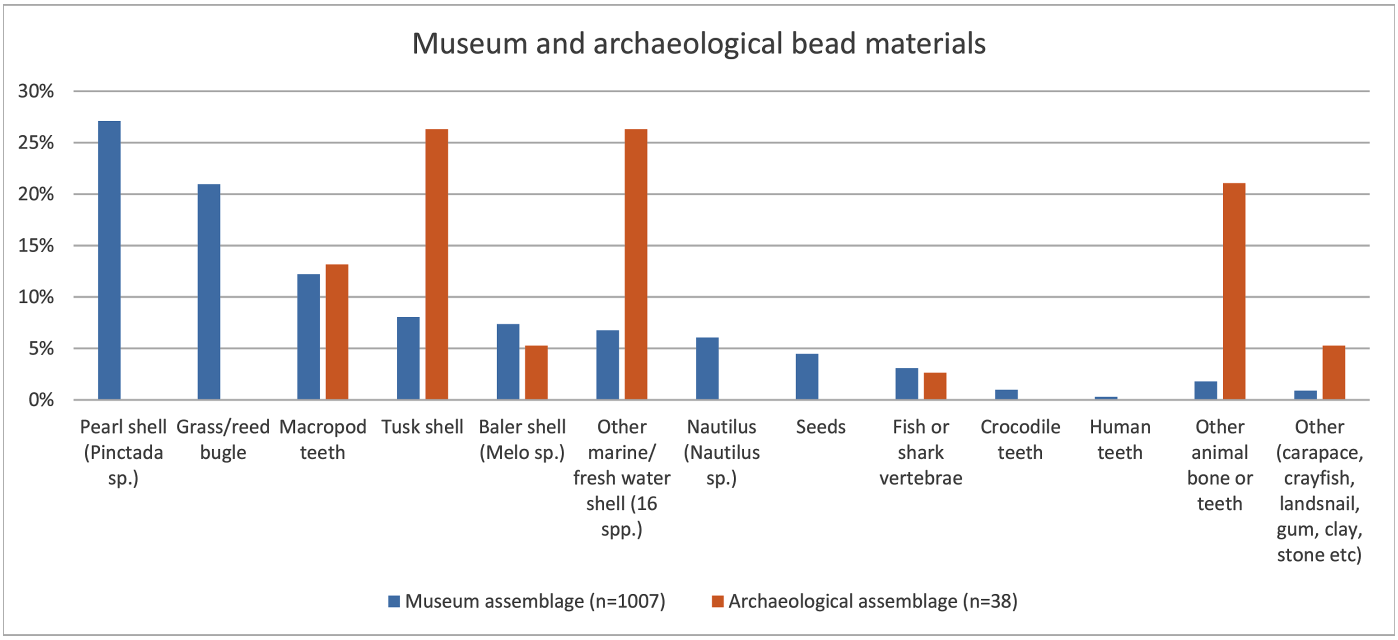

Figure 5. Comparison of percentages of beads made from different raw materials in the archaeological and museum assemblages.

1999: 196). Fragments of pearl shell also have been recovered from deposits with an associated radiocarbon date of 25,200±250 bp (29,304±628 cal BP) at Mandu Mandu (Morse 1993: 145–146) on the Pilbara coast. A baler shell fragment was recovered from pre-European deposits at Devil's Lair in south western Australia (Dortch and Merrilees 1971:1 09) and a fragment of nacreous abalone from Pleistocene-aged (14,000–13,000 BP) deposits in Allen's Cave in the Nullarbor (Cane 2001: 143).

If, as suggested by the literature, pearl shell items were considered to be imbued with importance and power, they may not have been discarded in general occupation sites and cave sites where archaeological excavations have been carried out. A similar pattern is indicated for *Nautilus pompillus* whose sources are in north east Australia. *Nautilus* are pelagic and thus were probably collected as beach washed empty shells specifically for their ornamental iridescent quality. No *Nautilus* ornaments have been recovered from archaeological sites in Australia. Most of the archaeological beads are made from scaphopods that occur in waters around most of Australia (Lamprell and Healy 1998). In northern Australia, especially after storms, these can be collected from the beach in great abundance and can be threaded without the need to pierce the shell. This may indicate why scaphopod ornaments from coastal areas are so commonly represented in museum collections and referred to in the literature. However, beads made from scaphopods have only been recovered from north west archaeological sites and, of these, only two sites were near the coast at the time of the deposition of the beads. Mandu Mandu cave (Morse 1993: 145–146) and Boodie Cave (Veth et al. 2017). We have suggested for the Kimberley region (Balme and O'Connor 2017; Balme et al. 2018) that the absence of scaphopod beads in coastal sites and their common occurrence in cave and shelter sites up to 500km inland at the time of their deposition may be explained by the increasing value of the shell beads with distance from the coast, as in inland regions the shells were highly prized. The very high values associated with scaphopods in the arid center, are indicated by Meggitt's (1969: 129) observations of their powerful properties, and their even greater rarity, resulted in such beads not being incorporated into occupational sites. For the same reasons the particularly highly valued lustrous qualities of pearl shell may explain the lack of such finds in any archaeological site.

Only 16 objects, either as single items or groups of beads representing a single object, made of animals have been recovered from archaeological sites. The oldest beads made from mammals are three polished segments of macropod fibulae found in different stratigraphic horizons dated to between 12,000 and 19,000 BP from Devil's Lair in south west Australia (Dortch 1979). However, the ethnographic examples of beads made on mammals and most beads from Australian archaeological contexts are made from macropod teeth.

The archaeological sample also includes two examples of Tasmanian devil bead ornaments. Both of these were associated with burials about 7,000 years old. One, found as a headband on a burial from Lake Nitchie, is suggested by Macintosh et al. (1970: 95–96) to be made of 159 teeth representing 46–100 individual animals. The second is from Walpollo Island, Victoria (Pardoe 1995: 705). While extant on Tasmania, Tasmanian devils became extinct in mainland Australia about 3,000 years ago (Brown 2006), accounting for the lack of representation of beads made from this species at least in mainland museum collections and European observations. As, apart from the human body part pendants, beads in Tasmania only seem to have been

made from shell, this accounts for their absence from the Tasmanian record. Tasmanian devils are carnivorous marsupials that are about the size of a small dog—males averaging about 8kg (Guiler 1983). They have large heads with a powerful jaw (Wroe et al. 2005) and like dogs, have 42 teeth (Owen and Pemberton 2005). The selection of dog-like teeth, but not dingo teeth, for ornaments in the past provides further support for the suggestion that the nature of the relationship between people and particular animal species plays an important role in the selection (or lack of selection) of raw materials for bead production.

While the Tasmanian devil teeth are pierced for suspension, and some of the macropod teeth items from archaeological sites are pierced (Feary 1996; Schrire 1982), none of the macropod beads made from teeth held in the museum collections are pierced. Instead they are held in place by an adhesive (such as resin or wax) and sometimes with the aid of notches cut into the teeth to hold fibre in place (McAdam 2008: Appendix 15), as were some of the archaeological beads (e.g., Pretty 1977). Fish hooks made of marine shell also were often secured to the fiber line using extensive knotting and/or adhesive and were sometimes worn around the neck by women in coastal eastern Australia. Only women fished using hooks and, in this case, these carefully crafted tools clearly had a utilitarian as well as decorative function (Figure 6). Some beads, such as those made from teeth, echidna quills, and claws, were made without any alteration to the raw material fabric or form (McAdam 2008: Appendix 5). No pierced teeth are found in the museum collections and none of the literature sources specify that teeth were pierced, but, if objects were used to make beads without modification of the raw material, they would not be recognizable as beads in archaeological sites unless the adhesive was also preserved.

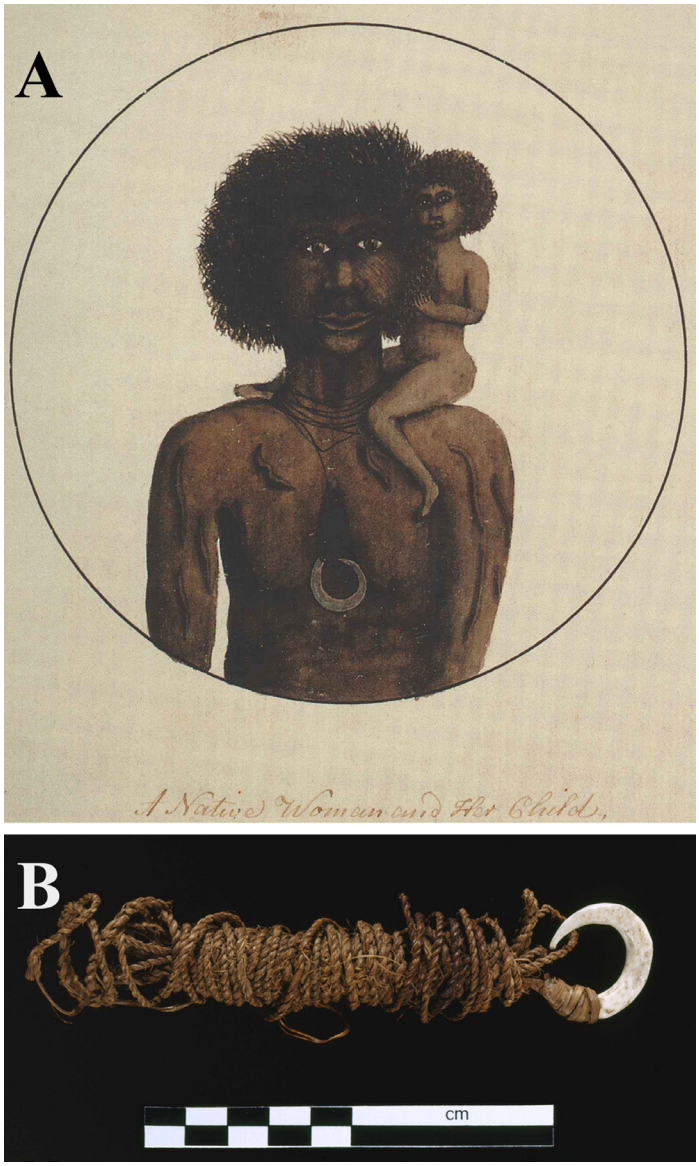

Figure 6. A) 'A Native Woman and Her Child', Artist unknown, attributed to 'Port Jackson Painter'; B) Bone fish-hook and line from Lake Tyers, Victoria, (MoV reg. no. X1599-co). Reproduced courtesy of the Museum of Victoria.

CONCLUSIONS

From this brief review of beads in Aboriginal Australia, past and present, several observations can be made. First, in the recent past at the time of European contact, men, women, and children in secular and ceremonial contexts, commonly wore beads and so their presence in archaeological sites is not remarkable.

The comparison of historical observations suggests that some of the commonest beads are made of plant material and unlikely to be represented in museum collections or archaeological sites. In the former case, this may be because of their perceived 'ordinariness' by collectors and, in the latter, because of the poor preservation of these materials in archaeological sites.

Beads and other suspended ornaments, made of highly luminous irridescent shell are a shared aesthetic by early European colonizers and Aboriginal people. This means that they are often remarked upon by the European recorders and collected for museums. However, Aboriginal people viewed these properties, especially iridescence associated with nacreous pearl and nautilus shells, as being associated with strong magic, and they are highly prized and as a result they were curated and reduced to small-sized fragments. The very properties that made them so valued mitigates against their recovery in mundane contexts from archaeological occupation sites.

Although size may be a factor in the selection of animal species used in bead making, other factors appear to be related to people's relationships to particular species rather than abundance or immediate availability of the species.

Considering the similarities between materials used to make beads in Australia in the recent and deep past there seems to be a long tradition of personal ornament raw material selection stretching back 30,000 years—a pattern seen for ostrich eggshell beads in Africa which have a 50,000 year history (Miller and Willoughby 2014). Closer to Australia, in Timor-Leste, there is similar continuity of shell selection; a 42,000 year old tradition of *Nautilus pompilius* shell use for

making personal decorations such as beads and pendants, and *Oliva* spp. shells consistently over at least 37,000 years (Langley and O'Connor 2016; Langley et al. 2016). Many of these shell beads have evidence for the presence of red pigment, which very likely indicates that they were worn against ochred bodies or items. Interestingly, a similar tradition appears to have been the case in Australia where both ethnographic and archaeological scaphopod shells have evidence for the presence of red pigment (Balme and Morse 2006; Balme and O'Connor 2017; Balme et al. 2018). The white or pearly lustrous shell against an ochred body would have created a startling impact. Among Australian Aboriginal groups, red ochre embodies spiritual powerful qualities being linked to blood, healing, renewal, and ritual cleanliness (Jones 2007).

Finally, isolated human teeth and fragments of human bones, and perhaps other animal species, used for magical or ritual purposes, may not show evidence of suspension when found in archaeological sites where soft organic remains are not preserved. It is perhaps time to have a closer look at isolated teeth and skeletal parts in zooarchaeological assemblages for evidence of string wear or traces of mastic that may have been used to secure fibre attachments.

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