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The slipped disc: a guide to the identification of shell disc-beads

by

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ABSTRACT

Excavations of the past two decades in Natal have produced disc-beads made of a variety of materials. Because these materials have not been adequately examined and described, some disc-beads have been incorrectly identified which may lead to incorrect archaeological interpretation. An aid towards correct identification is presented.

INTRODUCTION

Shell disc-beads are found on most Late Stone Age and Early Iron Age sites in southern Africa, ostrich eggshell (OES) and Achatinidae, the giant land snails, being the most common raw materials used. In Natal the former is the preferred material on Late Stone Age sites while the latter dominates Early Iron Age assemblages. Research programmes on both these periods have demonstrated the importance of shell disc-beads. They are giving us insights into trading patterns, ecology and social change over the past 7 000 years (Maggs 1980, Mazel 1987). As much of the interpretation depends on accurate identification of the raw materials used, and as we have found several cases of misidentification in the recent literature we believe the need exists for improved methods of identification. Although our work is limited to excavated collections in the Natal Museum we believe that the suggestions presented here may be of far wider relevance.

METHODS

Most cases of misidentification result from insufficient magnification, or encrustations on the bead or inadequate comparative material. This paper provides a solution to the last of these problems; the other two can be rectified by using a low-power binocular miscroscope and an ultrasonic cleaner respectively. In the absence of this equipment, gentle washing in soap and water and examination under a hand lens should suffice.

We examined each type of raw material in three aspects: outer surface, section (both broken and polished) and inner surface. Broken sections presented little problem but, since most beads show rounding and polish from being worn, we attempted to replicate this on the raw material using the following steps:

1. Sections are cut with a Dremel tool.
2. Polishing is done with fine water paper followed by Brasso.
3. If polishing striations still show up under magnification, specimens can have a final polish with jeweller's rouge.
4. Wash in detergent in ultrasonic cleaner.
5. Rinse in water, then alcohol and allow to dry.

To examine the raw material we used optical microscopy first and resorted to scanning electron microscopy only where the optical results were inadequate. The aim has been to make correct identification as simple as possible.

CHOICE OF MATERIAL

OES is well established in the literature as the main raw material for disc-beads. Less well known is the large land snail *Metachatina kraussi* (Pfeiffer, 1846) reported for the Early Iron Age in Natal (Maggs & Ward 1984). We felt it necessary to examine other Achatinidae and, with the help of Dr R. N. Kilburn, malacologist at the Natal Museum, quickly came to the conclusion that the only other one occurring in Natal that has a sufficiently thick shell for beads is *Achatina immaculata* Lamarck, 1822. No other terrestrial molluscs were considered. Following suggestions that freshwater mussels of the family Unionidae may have been used (Maggs 1984) we examined the two large local species *Unio caffer* Krauss, 1848 and *Aspartheria wahlbergii* (Krauss, 1848).

Marine shells are generally found at inland sites of the past 2 000 years in Natal as elsewhere in southern Africa. While these have often been modified we know of only one example from Natal where a disc-bead has been made from a marine mollusc. This is a colourful mother-of-pearl shell, possibly the Natal pearl oyster *Pinctada capensis* (Sowerby, 1889) or a Venus Ear *Haliotis* sp. However, since only one specimen has been found we did not include the nacrous species in this study. Similarly we looked at the brown mussel, *Perna perna* (Linne, 1758), but rejected it as it has a friable structure and therefore was probably not used for beads. If future fieldwork produces more disc-beads made from marine molluscs, further work may be required on a wider range of species.

The only other material included in this study was ivory since a bead from Ndondondwane resembled pieces of elephant ivory found at this site (Maggs 1984).

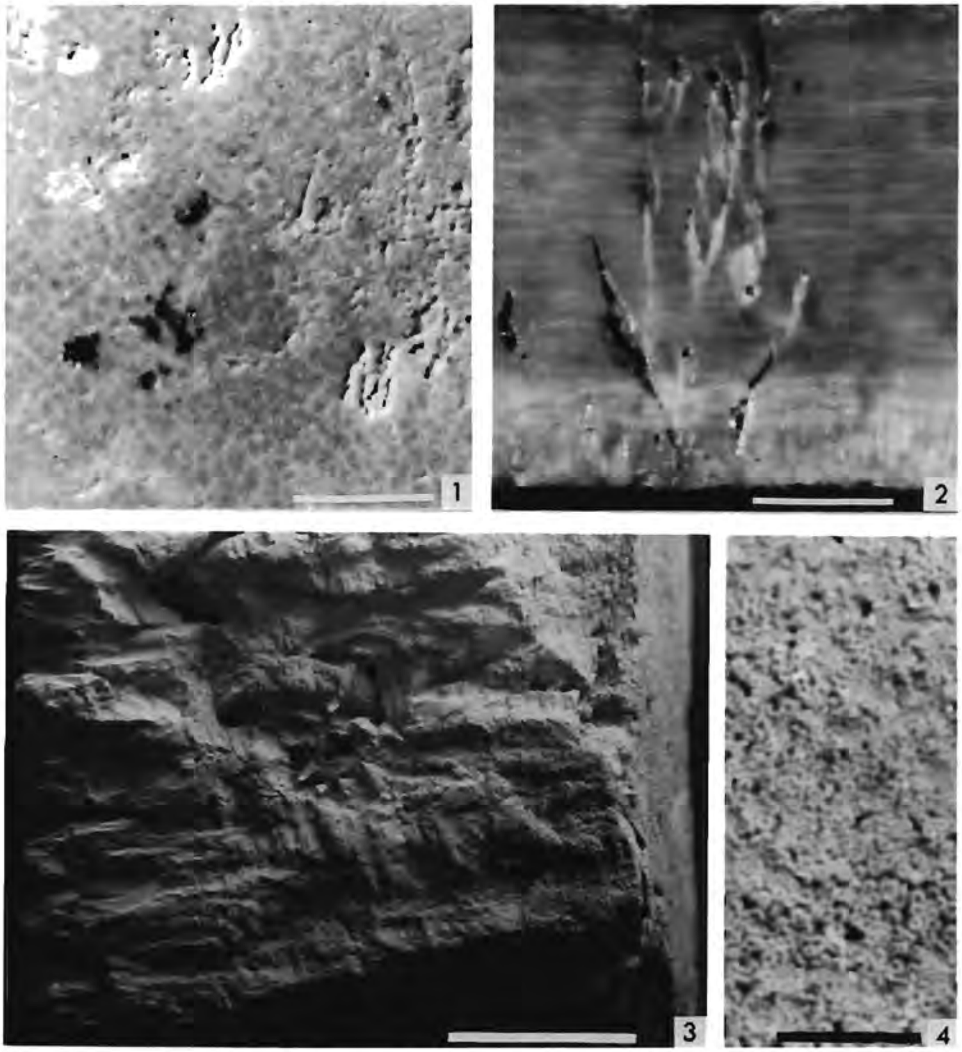
EXAMINATION AND DESCRIPTION OF MATERIAL

Ostrich eggshell (OES)

Fresh, clean pieces of OES are readily identified even by the naked eye, but weathered, burnt and worn pieces may need cleaning and magnification. The outer surface shows the highly characteristic pore clusters each of which forms a dimple (Fig. 1). Abrasion, commonly seen on beads, may have obliterated the dimples but the pores are always visible.

In section, one or more pore clusters may be cut through to reveal characteristic channels (Fig. 2). On broken sections the crystalline structure is revealed running right through the bead thickness (Fig. 3), which therefore has no laminar structure, unlike that of molluscs. The crystalline structure is less apparent in polished sections as on well-worn beads.

The inner surface of OES, if unabraded, shows a distinct spongy and tubular texture (Fig. 4). This is apparent even on ancient pieces of broken shell but is absent from beads because of the abrasion they undergo when strung and worn. Here instead the surface is granular, reflecting the crystalline structure.



Figs 1–4. Ostrich eggshell (OES) raw material. 1. Outer surface showing dimples formed by pore cluster. 2. Polished section showing channels of pore cluster—outer surface at top. 3. SEM showing crystalline structure and pores in broken section—outer surface at left. 4. Spongy and tubular texture of inner surface (this is normally worn away on beads). Scale bar = $50\mu m$.

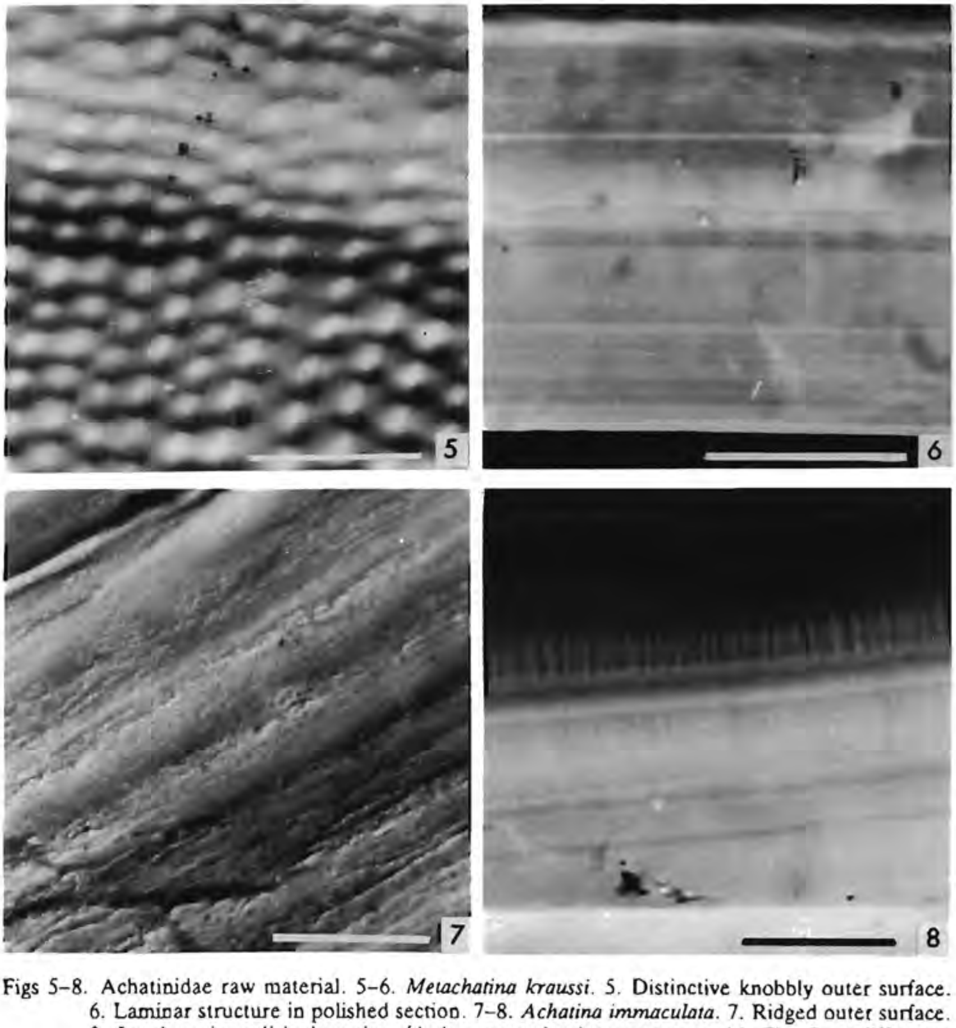
OES seems to have been the original material for disc-beads: other materials being substituted in imitation where supplies of OES were scarce or absent (Maggs 1980 1984, Maggs & Ward 1984).

The Achatinidae

A significant finding is that only those beads with an unworn or slightly abraded outer surface can be identified specifically. Furthermore many of the beads previously attributed to *M. kraussi* are actually *A. immaculata*. Three categories are therefore required within this family, one for each species and a third for Achatinidae of uncertain species.

Metachatina kraussi: The diagnostic feature of this species is the distinctive texture of the outer surface which is made up of parallel rows of small knobs (Fig. 5). Colour is almost invariably white. In section the structure may be more clearly and precisely laminated than *A. immaculata* but this characteristic cannot be used with any confidence (Fig. 6).

Achatina immaculata: The outer surface is irregularly ridged in parallel rows (Fig. 7) but lacks the knobs of the previous species. It is frequently yellowish to



Figs 5–8. Achatinidae raw material. 5–6. *Metachatina kraussi*. 5. Distinctive knobbly outer surface. 6. Laminar structure in polished section. 7–8. *Achatina immaculata*. 7. Ridged outer surface. 8. Laminae in polished section (darker outer laminae contrast with Fig. 7, a difference usually not apparent), outer surface at top. Scale bar = 50μm (6 & 8), 100μm (5 & 7).

pinky-brown which penetrates the outer laminae. In section the outer laminae tend to have a low diagonal angle reflecting the growth pattern of the shell (Fig. 8) but this feature alone is not sufficient for identification.

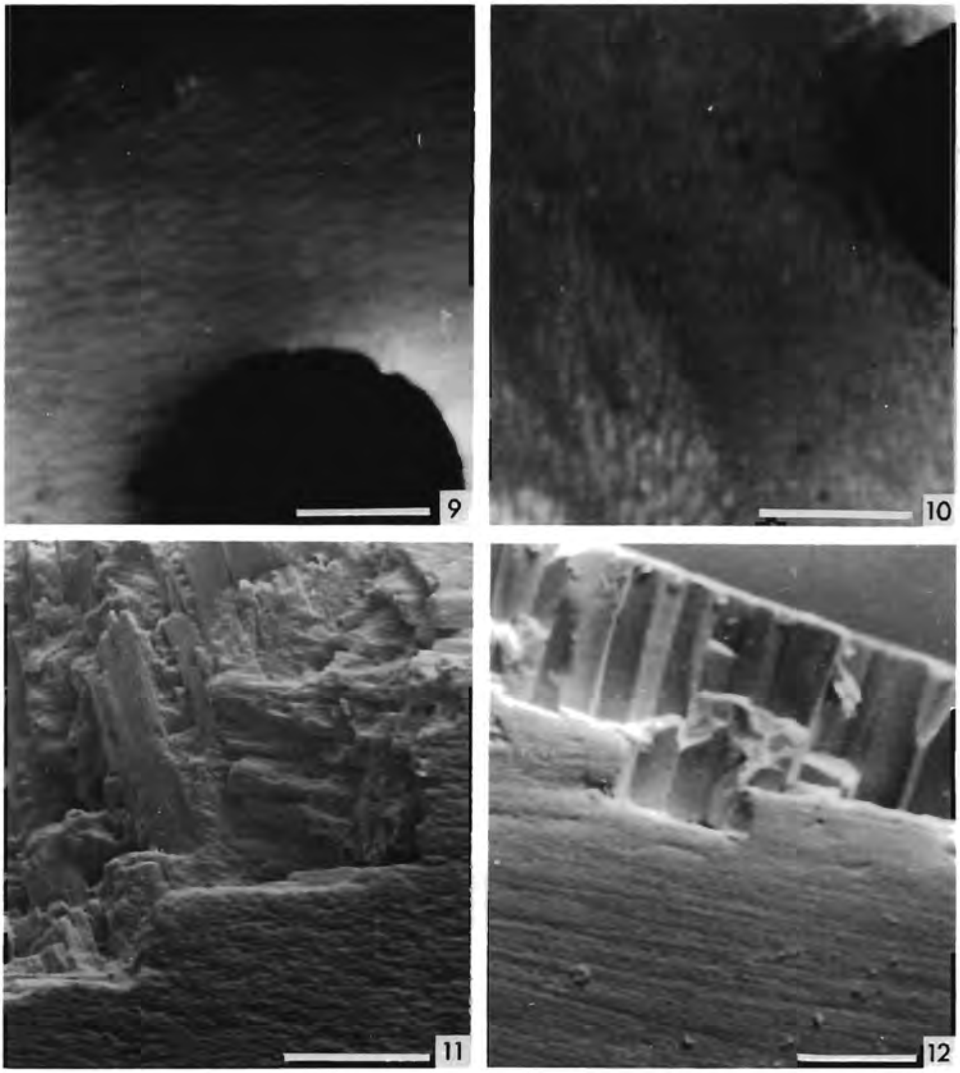
Achatinidae of uncertain species: The fresh inner surface and worn inner or outer surfaces normally show a characteristic ripple pattern (Figs 9 & 10). This is a colourless lustre resulting from the crystalline structure and therefore difficult to photograph. It is, however, readily apparent to the eye through a microscope using oblique lighting and rotation of the specimen. In section the laminated structure is clear—more so on ancient beads than on fresh material (Fig. 7). The laminae are more numerous and distinct than those of the two other achatinids examined. Each successive layer consists of elongated crystals set approximately at right angles to its neighbours. In obliquely worn or broken examples this shows a texture like torn plywood (Fig. 11).

The Unionidae

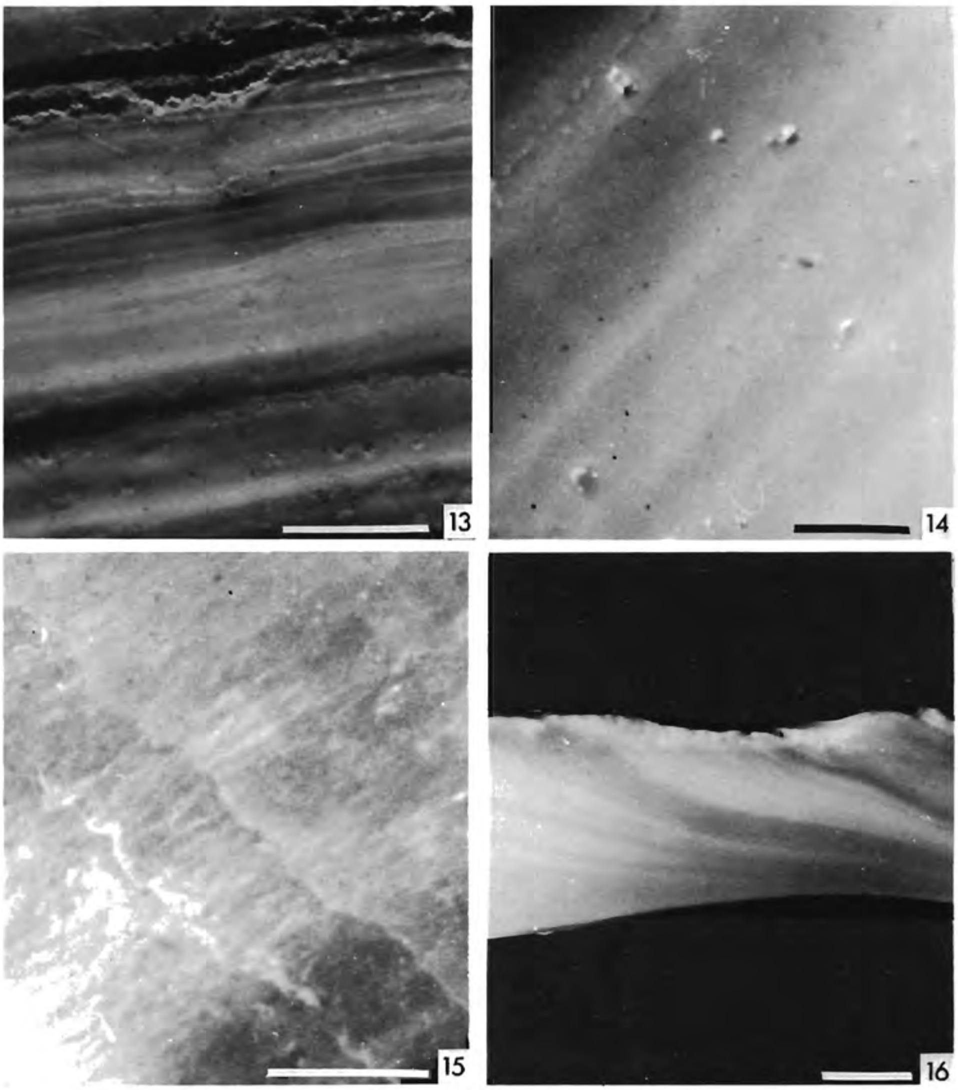
This family of freshwater bivalves is characterised by an outer layer consisting of elongated crystals set nearly vertical to the surface (Fig.12) while the remainder has a pearly lustre (Hyman 1967). The two species considered here, *U. caffer* and *A. wahlbergii*, can perhaps be separated on the characteristics of their outer surfaces—the former having more prominent and irregular ridges (Fig. 13) than the latter (Fig. 14). However this outer layer is relatively friable and is unlikely to survive on a bead, as is the case with the only archaeological example we have found (Maggs 1984). Inner and worn surfaces show a rich though colourless lustre (Fig. 15) which we consider to be the most characteristic feature of this material. In section the outer crystalline layer is superimposed on the lustrous layer which shows a diagonally banded pattern whose lines curve to become parallel with the inner surface (Fig. 16).

Ivory

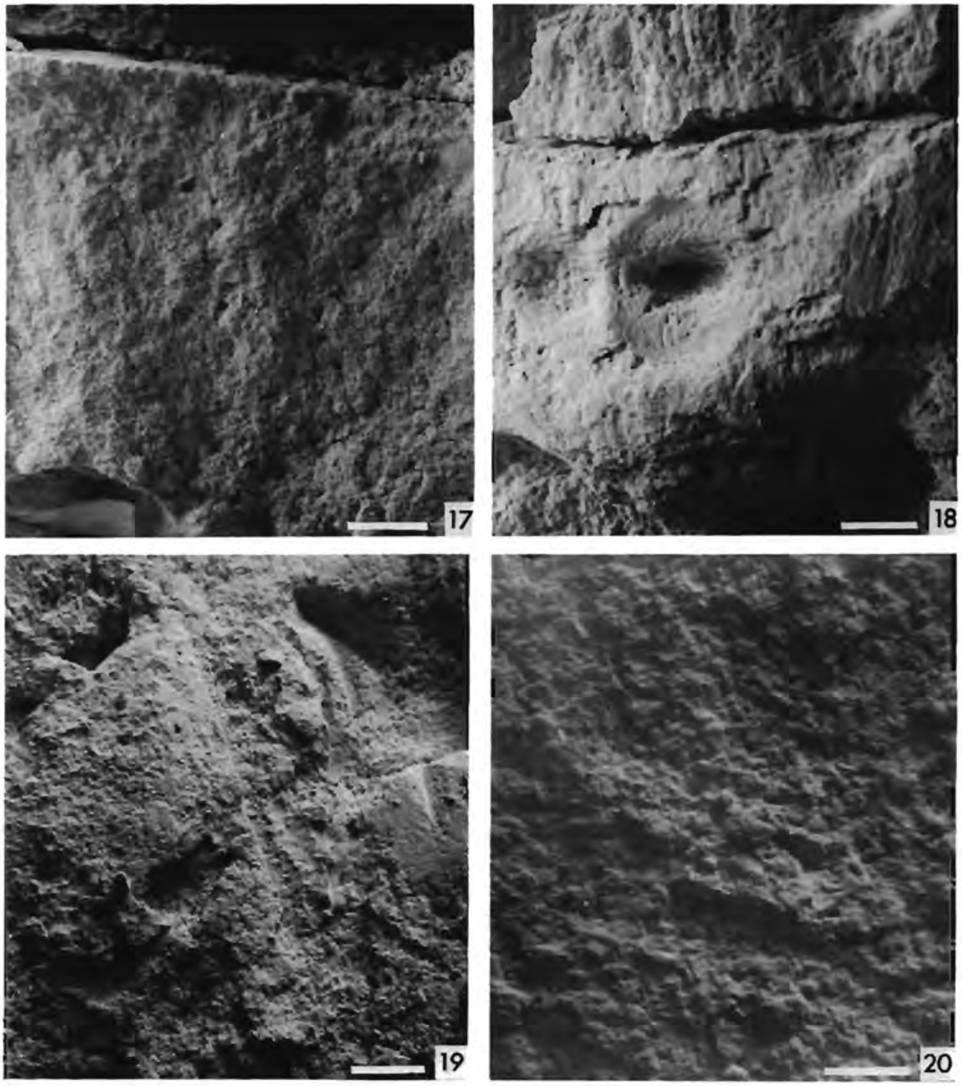
On re-examining beads from Early Iron Age sites we found several with a laminar structure and chalky appearance, the structure within each lamina appearing fine-grained and homogenous. Since one of these beads was from Ndondondwane (Maggs 1984) which yielded quantities of worked ivory we examined this possibility using SEM photography because of the fine-grained texture. A broken section of bead (Fig. 17) was compared with two samples from Ndondondwane ivory chips, one viewed parallel (Fig. 18) and the other perpendicular (Fig. 19) to the laminae. A sample of recent elephant ivory was also studied (Fig. 20). The fine texture of all four is similar while the cleavage of Figs 17 and 18 are closely comparable. The archaeological specimens all show similar cavities which are probably the result of weathering underground for 1 200 years. We consider this similarity sufficient to identify the beads as ivory. The flatness of the laminae suggest that it is elephant ivory but more work is needed to eliminate other species such as the hippopotamus.



Figs 9–12. 9–10. Worn inner surface of achatinid disc-beads showing achatinid 'ripple' pattern. 9. *Metachatina kraussi*. 10. *Achatina immaculata* (indistinguishable from *M. kraussi*). 11–12. SEMs of raw mollusc material. 11. *M. kraussi*, showing layers of elongate crystals set at right angles to each other, typical of Achatinidae. 12. *Aspartheria wahlbergii* (Unionidae), showing friable outer layer of upright crystals (striations are due to polishing). Scale bar = 50μm (9), 100μm (10), 25μm (11), 10μm (12).



Figs 13–16. Unionidae. 13. *Unio caffer* showing irregular ridges of outer surface. 14–15. *Aspartheria wahlbergii.* 14. Less prominent ridges of outer surface. 15. Lustrous inner surface, typical of Unionidae. 16. *U. caffer* showing banded section, typical of Unionidae. Scale bar = 100μm.



Figs 17–20. SEMs of ivory. 17. Broken section of disc-bead from Ndondondwane. 18–19. Section of ivory chip from Ndondondwane. 18. Viewed parallel to laminae. 19. Viewed perpendicular to laminae. 20. Section of recent elephant ivory. Scale bar = 10μm.

REVISION OF SOME PREVIOUS IDENTIFICATIONS

We re-examined the shell disc-beads from several Late Stone Age sites in Natal published in recent years. The Good Hope report (Cable *et al* 1980) mentions four OES beads and two of bone; however, the collection contains 17 of OES and none of bone. The original Driel Shelter report describes one *M. kraussi* bead among 20 OES (Maggs & Ward 1980); this bead, however, lacks the clear outer surface features and must therefore be referred to as an 'Achatinidae of uncertain species'.

Disc-beads from Ntshekane (Maggs & Michael 1976) were originally assigned mainly to *M. kraussi* with two possibly of OES. The re-examination, subdivided according to the three ceramic phases, is shown in Table 1. Although numbers are small, the absence of OES in the later phase may be significant.

TABLE 1
Ntshekane disc-beads

	OES	*M. kraussi*	*A. immaculata*	Other Achatinidae
Maggs & Michael 1976	2 possibly	numerous	—	—
Revision according to ceramic phases:				
Ntshekane phase	—	5	1	3
Ndondondwane phase	2	4	2	3
Msuluzi phase	1	3	1	8

Revision of part of the Ndondondwane collection (Maggs 1984) similarly shows up the number now relegated to the unspecific Achatinidae category (Table 2). The ivory bead is a new identification.

TABLE 2
Ndondondwane disc-beads

	OES	*M. kraussi*	*A. immaculata*	Achatinidae	Unionidae	Ivory
Maggs 1984	56	439	—	—	1	—
Revised position	44	48	16	180	1	1

Likewise the revision of the Magogo material (Maggs & Ward 1984) alters the Achatinidae picture (Table 3); it also highlights the ivory and 'mother-of-pearl' examples which were not identified previously.

TABLE 3
Magogo disc-beads

	OES	*M. kraussi*	*A. immaculata*	Achatinidae	Ivory	Mother-of-pearl
Maggs & Ward 1984	27	367	—	—	—	—
Revision according to ceramic phases:						
Ndondondwane	1	—	—	2	—	—
? Intermediate	—	13	5	32	1	—
Msuluzi	34	47	33	172	3	1
Uncertain	31	12	6	52	4	—

Unlike the Early Iron Age position, disc-beads are rarely found on Late Iron Age sites in Natal. Here too there have been some misidentifications. From Moor Park (Davies 1974) a 'bead' stuck to a potsherd was ascribed to *M. kraussi*. During this revision a gentle washing lifted it off the sherd and it has now been identified by Mr P. Croeser, arachnologist at the Natal Museum, as an egg sac of the spider family Scleropidae. Two beads from Mpambanyoni (Robey 1980) were suggested to be *Achatina granulata* Pfeiffer 1852 which is probably too thin and fragile for beads. On re-examination we found that one is a worn bead attributable only to 'Achatinidae of uncertain species' while the other is of OES.

These revisions are sufficient to demonstrate the need for much more careful identification of disc-beads. This is important not so much for purely systematic reasons but more so because information derived from beads is increasingly being used to give us deeper insights into life in the past.

ACKNOWLEDGEMENTS

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