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Middle Pleistocene Beads and Symbolism

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Abstract. – The discovery of Palaeolithic stone tools cooccurred with that of Lower Palaeolithic beads more than one and a half centuries ago. But whereas the stone implements of the Acheulian found grudging acceptance after 1859, the accompanying beads were all but forgotten. This article reports the results of the first detailed examination of hundreds of these ignored beads. Many bear extensive wear facets indicating that they must have been worn on strings, or traces showing that their perforations were modified by human hand. The wider evolutionary implications of the use of beads in the Lower Palaeolithic are also discussed. *[Middle Pleistocene, Lower Palaeolithic, beads, symbolism, palaeoart]*

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Introduction

A keenly debated archaeological issue is the question of the origins of symbolism, or the cultural use of referrers or signifiers. There is no consensus in contemporary archaeology of how, why and, especially, when symbolling began. Broadly speaking, two schools of thought have emerged, which are best described as a short-range and a long-range model. According to the still dominant short-range model, the earliest evidence we possess of human symbolling is in the forms of "art" and indications of language ability. No artlike productions are recognized by it of an age exceeding 32,000 or 35,000 years, and the earliest available language evidence is seen to be the first successful colonization of Australia, thought to have occurred perhaps 50,000 to 60,000 years ago. This school of thought is probably most coherently articulated in the work of Davidson and Noble[1] and by British authors too numerous to list, but is in some form embedded in the work of many other writers of the last two decades.

The long-range model, while favoured by most linguists who have considered this topic,[2] has enjoyed little support from archaeologists until recently, when certain concessions were made to it. It postulates a very significantly longer use of symbolling by hominids, probably for one million years or more. There is thus a great difference between these two incompatible paradigms. The short-range model attributes symbolism, and all it entails, solely to late representatives of what have often been described as "anatomically modern humans," or *Homo sapiens sapiens*, or simply "Moderns" (e.g., Gamble 1994). It postulates that earlier hominids possessed no language, artlike products, symbolically codified social systems, self-awareness, or even "proper culture." The faculties derived from symbolling abilities are thought to have been a principal factor in the evolutionary success of Moderns. According to this school of thought, all other hominids lacked these abilities, and consequently also the effective communication and social structures that were so useful in the

1 Davidson and Noble 1989, 1990, 1992; Noble and Davidson 1996; Davidson 1997.

2 E.g., Bickerton 1990, 1996; Aitchison 1996; Dunbar 1996.

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purported colonization of the world through the Moderns.

There are numerous forms of evidence that contradict this model (e.g., Bednarik 1992b, 1994a, 1995a, 1997b, 1999b, 2003c), but here I wish to focus on just one of them. Beads and pendants are primarily nonutilitarian artefacts, they are always symbolic and they demand complex social contexts. Among the types of cultural evidence we have from the Pleistocene they are one of the most unambiguous measures of cultural complexity. Therefore they deserve special attention in any discussion of the beginnings of symbolling. The emphasis in this article on my own work is a fair reflection of the almost total neglect of Middle Pleistocene beads and palaeoart until now, which accounts for frequent self-references here.

Beads of the Middle Pleistocene

One of the principal arguments levelled against specific material evidence suggestive of very early symbolism is that there are valid alternative explanations. This is indeed often the case. Natural surface markings of portable objects of various types have been misinterpreted as meaningful engravings in literally thousands of cases worldwide. I have examined and rejected hundreds of instances (600 at one site in China alone). Objects of bone, limestone, ivory, and ostrich eggshell often feature mycorrhizal grooves that resemble engravings (Bednarik 1992a). Bone fragments may bear markings made by animal canines, by gastric acids (e.g., of hyenas), or by other taphonomic agents of various types (trampling, sediment movement, solifluction, cryoturbation, etc.). Perforated bone fragments and shells are another very common example: animal teeth and corrosive agents can perforate bones, and parasitic organisms commonly bore through gastropod shells. Similarly, natural surface markings on rock have often been archaeologically misinterpreted, and again I have corrected numerous such instances, in which either natural markings were identified as rock art, or rock art as natural markings (Bednarik 1994b).

Some commentators on the issue of possible Pleistocene beads imply that to be a bead, a perforated object must have been *made* by humans (d'Errico and Villa 1997). Any consideration of the kinds of objects used as ethnographic beads will readily show this to be false. The correct logic is that one may be able to demonstrate the use of a bead in some cases from microscopic evidence or wear (Bednarik 1997c, and see below), but one cannot demonstrate that any perforated small object found in an occupation layer was *not* used as a bead. In view of the widespread use of beads today, and the frequency with which they are lost, and considering further that beads were in use for some hundreds of millennia, almost certainly in large numbers, it is much more likely than not likely that most perforated small objects found in occupation layers were used as beads. The fact that we cannot prove that a naturally perforated, beadlike object was used as a bead should not prompt us simply to exclude it from consideration.

The outstanding characteristic of made beads and pendants is that their archaeological identification is usually unambiguous, which one cannot always say about other classes of purported symbolism evidence. Small objects, drilled through with stone tools, could either be beads or pendants, or they could be small utilitarian objects such as buckles or pulling handles, or the *quangings* of the Inuit.[3] Such utilitarian objects are generally of distinctive shape, use-wear, and material; they need to be very robust. Small objects that were drilled through either in the centre or close to one end (e.g., teeth perforated near the root), that are too small or too fragile to be utilitarian objects, that lack the typical wear patterns of such articles, or that display typical wear patterns of beads can safely be assumed to be beads or pendants. Evidence that they were drilled with a stone tool is indicated by a distinctive, often bi-conical and chamfered section and sometimes by rotation striae. The wear of pendants can often be observed on archaeological specimens, including those made of stone (Bednarik 1997c), and is also quite typical.

Examples of a complete lack of ambiguity are the disc beads made from ostrich eggshell. These are extremely common in the ethnography of southern African people (Woodhouse 1997), and in the archaeological record they are found from there to China and Siberia (Bednarik 1993a). The ostrich (*Struthio camelus* ssp.), now extinct in Asia, was widespread in much of Africa and Asia to the end of the Pleistocene, locally even into the Holocene (e.g., in the Arabian peninsula). Its eggshell was used widely, as containers and especially as decorative material, particularly in the Late Pleistocene and early Holocene. In southern Africa, such use extends from the present back to the Middle Stone Age.[4] Some of these finds may be up to 80 ka old, and the recently found forty-one perforated snail

3 Boas 1888: Figs. 15, 17, 121d; Nelson 1899: Pl. 17; Kroeber 1900: Fig. 8.

4 Wendt 1974–75; Beaumont 1992; Woodhouse 1997.

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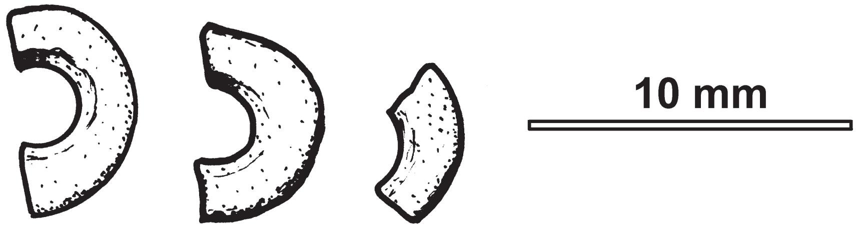

Fig. 1: Some of the ostrich eggshell beads from the Acheulian of El Greifa site E, Libya.

shells of Blombos Cave, South Africa, are also of the Middle Stone Age and about 75,000 years old.

Of still greater antiquity are the ostrich eggshell beads from El Greifa site E, in Wadi el Adjal, Libya (Bednarik 1997c). They come from a substantial sequence of Acheulian occupation deposits representing many millennia of continuous occupation of a littoral site, on the shore of the huge Fezzan Lake of the Pleistocene. This site has exceptionally good preservation conditions, with insect remains and seeds found together with bone. The typical Late Acheulian stone tool forms, including "hand axes," confirm the dating of the occupation strata by Th/U analysis to about 200 ka. These are among the earliest known disc beads in the world, and there can be no reasonable doubt that they are indeed man-made beads and not some chance product of nature (Fig. 1). In addition to the three found initially, more specimens have more recently been recovered from the same site and period (M. Kuckenburg, pers. comm.).

However, these finds may well be exceeded in age by others, such as the two pendants from one of the occupation layers in the Repolusthöhle, in the Austrian Alps. A wolf incisor (Fig. 2) and a flaked bone point, both perforated, occurred together with a large but non-diagnostic stone tool assemblage (Mottl 1951). The industry is variously described as Levalloisian, Tayacian, and Clactonian, three rather vaguely defined Lower Palaeolithic traditions. It is separated from an overlying Aurignacian by substantial cold-period sediment layers. There is no radiometric dating available, but the accompanying faunal remains imply an age of about 300 ka, especially through the phylogeny of the bear remains.

The first reports of Lower Palaeolithic beads, however, coincide with the first reports of Palaeolithic stone tools (e.g., Boucher de Perthes 1847–64), which already made mention of the occurrence of centrally perforated fossils together with Lower Palaeolithic "hand axes" at the type site of St. Acheul and elsewhere near Abbeville in France:

> Dr. Rigollot also mentions the occurrence in the gravel of round pieces of hard chalk, pierced through with a hole, which he considers were used as beads. The author found several, and recognized in them a small fossil

Fig. 2: Perforated wolf canine from Lower Palaeolithic layer of the Repolusthöhle, Styria, Austria.

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sponge, the *Coscinopora globularis*, D'Orb., from the chalk, but does not feel quite satisfied about their artificial dressing. Some specimens do certainly appear as though the hole had been enlarged and completed (Prestwich 1859: 52).

Although the lithics Boucher de Perthes had reported were eventually accepted by a hostile discipline, his Acheulian beads were promptly forgotten and remained ignored for the following one and a half centuries. Late in the 19th century, Smith (1894: 272–276) excavated about 200 identical items from an Acheulian site at Bedford, England. He described these as being of the same species and showing identical artificial enlargement of the natural orifice. Smith was certain that his specimens were used as beads, but he made no mention of the French finds, which by that time had apparently been forgotten. Keeley (1980: 164) examined some of the English sample and confirmed that there is no doubt that their perforations were modified, and Marshack (1991) thought to detect organic residues in the holes of a few of these apparent beads.

Globular Porifera Specimens

Intrigued by these vague and unconnected reports I examined 325 specimens, labelled as *Coscinopora globularis*, and ten further perforated objects, all collected before the early 20th century, and subjected them to detailed microscopic study. This material is listed in Appendix 1. Although much of it, if not most, is probably of the Acheulian, I shall focus here on the specimens collected in the Biddenham quarry at Bedford, England, acquired by the Pitt Rivers Museum in 1910 (Fig. 3). This is the only part of the collection accompanied by clear Acheulian stone tools. Appendix 2 lists fifteen of these Bedford specimens for detailed description.

It is of significance that these and other similar objects have been incorrectly identified since the 1850s. All of them appear to be of the species *Porosphaera globularis* Phillips 1829, a Cretaceous sponge. The importance of this lies not in knowing the true attribution but in the consequences of this fact concerning the cognition of the hominids that collected these objects. The genus *Coscinopora* is a lychnisc hexactinellid sponge, for instance *Coscinopora infundibuliformis* Goldfuss 1833 is funnel or cup shaped, with a distinctive stem. It belongs to the order Lychniskida of the class Hyalospongiae, whereas *Porosphaera* is of the Pharetronida, one of the two orders of the Calcispongiae. Therefore, the species are not even closely related. However, even *Porosphaera globularis* is only rarely of truly globular shape, its specimens are of considerable morphological diversity. The species occurs primarily in northern France, United Kingdom, Germany, Denmark, and Poland.

Porosphaera globularis has been misidentified on other occasions, including as *Achilleum globosum* by Hagenow in 1839–40, and as both *Ceriopora nuciformis* and *Achilleum globosum* by Quenstedt in 1881. Its shape is not diagnostic, it is recognised primarily by its surface and internal structure, consisting of radially arranged channels separated by sclerous four-rayed carbonate walls of spicula. These channels connect to surface pores

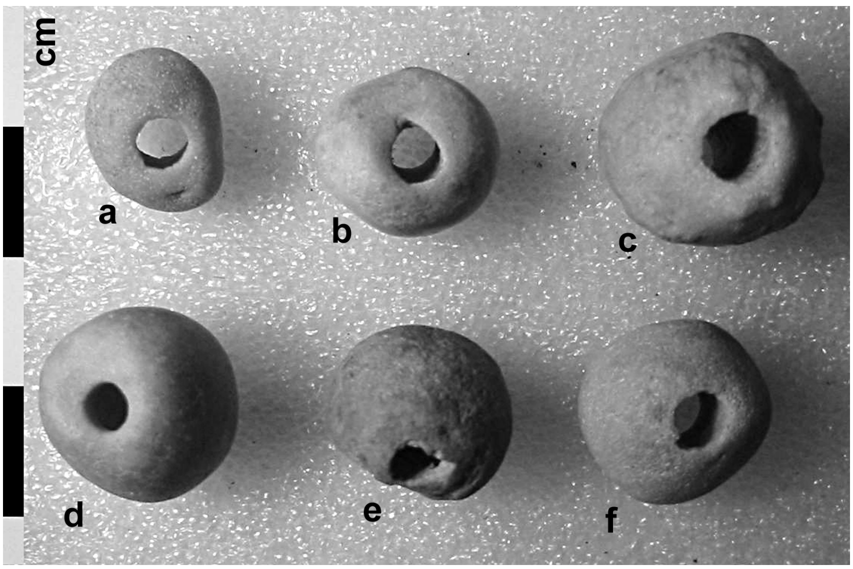

Fig. 3: Six of the Acheulian specimens of *Porosphaera globularis* examined in this study. Note the very heavy wear that resulted in a distinct wedge shape on (b), the thin centric wear facets on (a) and (c), and the light-coloured, distinctly asymmetric major wear facet on (d). Specimen (e) is fractured, and (f) shows very little use-wear.

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of about 200 microns width, which are evenly spaced but never closer than their own diameter. The channels converge at a central point, towards which their size decreases; they are straight and never join other channels. In their overall form, *Porosphaera globularis* range from a more or less spherical shape to that of a flat, polygonal pad. Notably globular specimens are uncommon, accounting for only about a quarter of all specimens, but they are overrepresented in collections. The fossil casts of the species offer no indication of former attachment. Their sizes vary from 1 mm to about 50 mm, the average of collected specimens (among which smallest sizes would be underrepresented) being roughly 10 mm.

An outstanding feature of *Porosphaera globularis* is that some specimens possess cylindrical tunnels that enter to various depths, ranging from mere indentations to complete penetration. These tunnels are usually fairly central, and there are occasional specimens with more than one such tunnel. Nestler (1961) has examined 2,734 randomly collected specimens, reporting that only 390 of them (14%) show any degree of tunnel development, confirming similar findings of previous palaeontologists. The reason for the presence of these tunnels, however, remains unknown. Three possibilities have been suggested: human action (not applicable, because the tunnels date from the times of the live organisms); that the sponges were attached to an object now represented by the tunnel (such as, for instance, kelp); and that the tunnels were bored by parasites, Serpulidae, or gastropods capable of boring into the sponges' hard structure. Of the two latter explanations, the first gained some currency in the late 19th century, but the last-mentioned is clearly the preferred, based on the following:

- The distinctive correlation between the diameters of globular specimens and that of their tunnels, i.e., the larger the sponge, the greater the diameter of any tunnel present (Nestler 1961: Fig. 4).
- Thin sections indicate that the radial channels were developed quite independently of the tunnel, which dissects them, suggesting that they existed before the tunnels were formed (Fig. 4).
- Occasionally the tunnels contain secondary deposits from encrusting organisms such as Bryozoa.
- Most of the tunnels are not very deep.
- More than one tunnel may occur on a specimen.
- The widened portion often apparent just inside the entrance of many tunnels.

These factors support the view that the tunnels were bored into the sponges by other organisms. None of the tunnels I have examined provides any indication of having been made by humans, except for the modification evidence detailed below. The archaeological significance of the above notes is that the Acheulian finds described below consist entirely of relatively spherical specimens and that they are all fully perforated, i.e., the tunnel has two entries. Since it is estimated that only 14% of the natural specimens have any degree of tunnelling, and only a small proportion of these, say, less than one fifth, have tunnels penetrating fully, or penetrating to within 1 to 3 mm of the surface; and bearing further in mind that only about a quarter of the naturally occurring specimens are of reasonably spherical shape, it becomes evident that less than 0.7% of a natural random sample of *Porosphaera globularis* can be expected to have both the shape and the full or nearly full tunnel development which is present on all the Acheulian specimens I have examined from Eng-

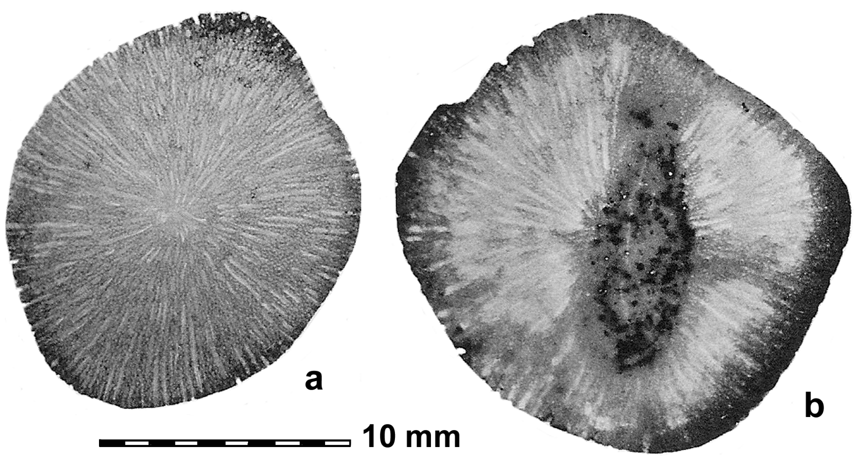

Fig. 4: Two thin sections of *Porosphaera globularis*: (a) shows the radial channels of an undamaged specimen; in (b) a tunnel penetrates most of the way, and the channels, still centred on a focal point, are not structurally related to the tunnel (adapted from Nestler 1961).

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land and France. When it is further considered that the Acheulian finds are mostly between 10 mm and 18 mm diameter, whereas a natural sample would include sizes from 50 mm down to under 1 mm, with the smaller sizes probably greatly dominating, it becomes evident that the Acheulian sample is representative for perhaps 0.1% or 0.2% of a random sample (or one or two specimens among 1,000). Specimens that are fully perforated by natural agency alone are extremely rare, accounting for certainly far less than one per thousand. I cannot think of any factor of natural selection that could account for such accumulations as those from Acheulian deposits. I propose that these samples were selected by size, sphericalness, and completeness of perforation, and that humans were responsible for this selection.

This aspect of the sample considered here should suffice by itself to demonstrate that these objects were culturally selected for three properties. The alternative would be to claim that they were selected by some natural agency (e.g., a bead-collecting bird, or a mysterious sedimentation process that selects only beadlike specimens) from a random sample of at least 100,000 specimens. That would be absurd. I note here that the 1884 sample from Les Boves, of thirty perforated specimens, was found "in small heaps in the drift," which cannot reasonably be accounted for except by hominid collection. I now turn to the material evidence I have examined microscopically.

General Observations on the 1910 Bedford Material

Among the twenty-nine loose *P. glob.* specimens, collected in 1910 from the Bedford Acheulian deposit, is one in which the tunnel is partially blocked and which contains presumably original sediment still filling part of the tunnel volume. The sediment is a compact, light-brown, carbonate-consolidated silt-grade deposit.

Within the tunnels of many specimens, longitudinal grooves are visible but these were not caused by wear occasioned by strings, as might easily be presumed. These are inherent structural features. Similarly, it is not to be expected that the dark-brown to blackish material occurring in some of the tunnels, which is quite abundant in one case, will become relevant to the interpretation of these specimens. It is probably of some taphonomic nature and perhaps derived from the sediment, and appears to be relatively recent.

In terms of the interpretation of this corpus, the features that are of the greatest relevance are the *evidence of flaking* and percussion or pressure damage that occurs at the partially or fully closed end of the fossil's tunnel; the indication of reaming out of this opening in some cases; and most particularly the *wear facets*. Clearly the opening up of the closed end of the tunnel, evidenced by impact and reaming, is a form of damage entirely limited to the small tunnel ends, the ends where the tunnel has not quite broken through (Fig. 5). The fossils are presumably fully silicified, they are as hard and brittle as chert or chalcedony. The form in which this damage occurs is not random, it cannot reasonably be attributed to any natural process, it is distinctly anthropic and intentional. In some cases as many as six or seven impact flake scars can be clearly discerned, indicating the difficulties in removing the remaining wall at tunnels that stopped 1–3 mm from the surface opposite the tunnel entry.

But even more importantly, many of the specimens examined closely bear distinctive wear facets around the openings of the tunnels, i.e., the surfaces where they would have been in contact with other beads had they been threaded on a string and subjected to long-term abrasive wear from neighbouring beads (Fig. 6). These facets range from minor to very extensive, in some cases covering much of the entire side surface of a specimen. They are nonuniform, their morphology dependent upon not only the specimen's own shape but also that of the neighbouring bead rubbing against it, and the area of contact as well as preferential pressure as occurs in beads arranged as a necklace. The wear facets range from flat-angled to quite steep recesses of conical shape, and their extent is always distinctly delineated. Some of these cone-shaped wear facets are almost perfectly circular and central (Fig. 3c), so that the resulting concave ring of worn surface is evenly wide around the tunnel entry, while others are distinctly asymmetrical (Fig. 3d). Of particular interest are those specimens, usually rather small, that are distinctly wedge shaped when viewed perpendicular to the direction of the central tunnel (see Fig. 3b). They show the most nonsymmetrical wear facets, evidently because if beads were worn as a necklace, i.e., forming a circle, there was inevitably more wear on the inside. Smaller beads were more affected by this and may have taken on a "keystone function": the two wear facets are then distinctly nonparallel, so that the two tunnel openings can both be seen from one perspective (the centre of the circular arrangement of the beads, presum-

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Fig. 5: Microphotograph of the artificially enlarged orifice of one of the Bedford beads.

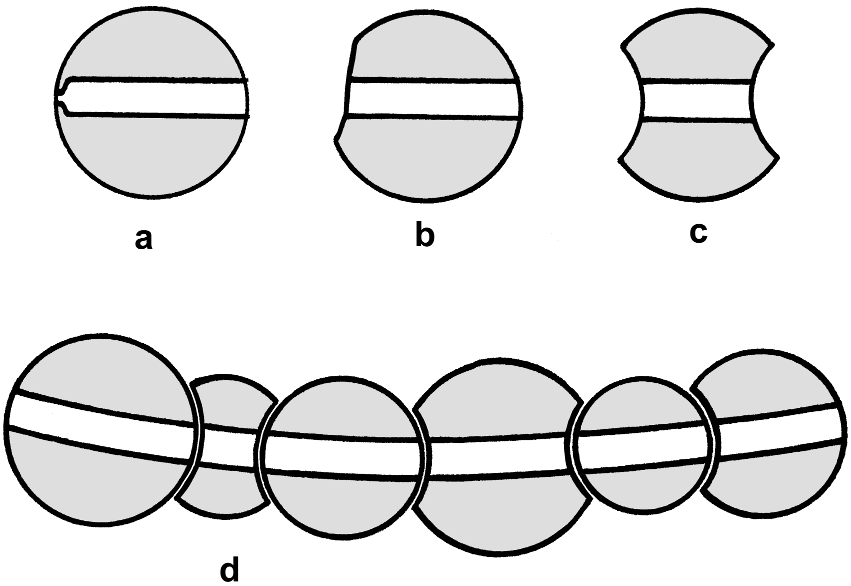

Fig. 6: Schematic depiction of the wear found on *Porosphaera globularis* specimens, all shown in section: (a) is the natural, unmodified object with the tunnel closed or almost closed at one end; (b) shows the flaking on the left to remove the obstruction; (c) is the effect of very long-term use-wear as a bead, probably over many years and after rubbing against various other, fresher beads; and (d) illustrates the effects of wear on beads used for varying durations assembled on the string of a necklace. Note how older beads are deeply worn, their semiconical wear facets accommodating the adjacent bead in each case.

ably). This was necessary simply to accommodate the bulk of the fully spherical and larger beads, such as those perhaps added to a necklace at a later time (Fig. 6c).

Unless discoloured by the sediment, the *P. glob.* specimens are of the same buff colour as the weathering rind or cortex on sedimentary silica (which is indeed what they consist of). The wear

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facets, however, are always of a notably lighter colour, and significantly they never bear any taphonomic markings as found on the rest of the surfaces of these fossil casts. It is evident that all worn specimens were worn only in two areas: next to, and surrounding the two tunnel openings. Only one type of abrasive wear can account for such consistently typical wear patterning: *the stones must have been arranged with their tunnels permanently aligned to be worn in this way*. Such consistent wear patterns cannot be explained as natural phenomena, the beads can only have been subjected to this wear through hominid intervention. These specimens were worn like stone beads because that is how they were used.

The enlargement of the orifice on one side of each bead was rendered necessary by the fact that the *P. glob.* fossils' central tunnel, roughly cylindrical for most of its length, tends to be closed or almost sealed off at one end (Figs. 4b, 6a). To open or enlarge it would be easy with a metal pin, but would have been very difficult with Lower Palaeolithic stone tools. Therefore many specimens bear distinctive flaking and impact damage around the enlarged opening (Figs. 6b, 7). It must be remembered that in all those instances where the bead was subsequently subjected to heavy wear, the resulting wear facet would have erased all traces of this flaking around the orifice (Fig. 6c). Therefore this feature is only present in unworn or slightly worn specimens. If we assume that this enlargement damage was limited to what was required to be able to thread the string through

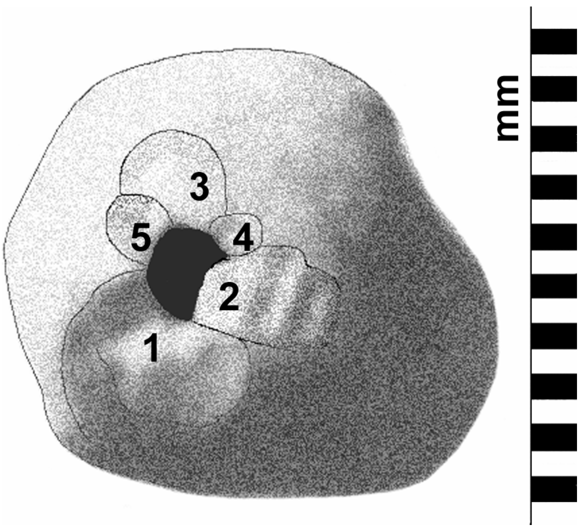

Fig. 7: Distinctive flaking on one of the Bedford Acheulian beads, to open up the closed end of the tunnel; five separate flake scars can be clearly discerned, No. 2 even showing "rippling" typical of impact fractures on silica stone.

the bead, the smallest openings would provide an indication of the diameter of the string. Most are 3.2 mm or greater, only one has been found of 2.9 mm diameter (Fig. 5). Therefore the strings, possibly of sinew, were probably close to 3 mm thickness. However, I failed to detect any evidence of organic material within the bead orifices that I would consider to be attributable to their use.

I have argued above that there is only one rational explanation for the presence of *P. glob.* specimens of only one shape, one size range and one stage of tunnel development in Acheulian deposits in France and England: collection by humans. There is only one rational explanation for the form of flaking many specimens show, and there is only one rational explanation for the extensive wear many possess. Each of these three factors *suffices by itself* to justify the identification of these specimens as beads. These factors have been presented here as testable, falsifiable propositions, i.e., in a scientific format. I ask archaeologists who wish to challenge my findings to use the same approach, not dogmatic denouncements as they have characterized this discipline since the times of Boucher de Perthes.

The Symbolism of Beads

In exploring the symbolic significance of beads, archaeologists are likely to mention their occurrence in burials, or write about "decoration." But what does it mean that a particular condition is perceived as "decorative"? Does a nonhuman animal perceive beads, or cicatrices, body painting, or tattoos on a human body as "decorative"? Probably not, so this is very likely an anthropocentric perception. It is perhaps not shared by other animals or hypothetical intelligent beings elsewhere in the universe, should they exist.

Beads, whether sewn on apparel (as presumably on the Sungir' burials in Russia; White 1989, 1992) or worn on strings, have symbolic meanings that are never fully accessible to the anthropologist. They, or pendants, may for instance be protective, warding off evil spirits or spells, or they can be good luck charms. They can signify status and convey complex social, economic, emblemic, ethnic, or ideological meanings, or any subtle combinations of them. Their emic meanings can be public or private, but they may be difficult to convey to an alien researcher, and they could never be analyzed archaeologically.

Nevertheless, of the Palaeolithic forms of possible symbolic products, beads seem to tell us the

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most. First, there are the purely technological aspects. To make a bead one has to, at the very least, be able to drill through an object (or use or enlarge a natural perforation), thread a string through the hole, and fasten the ends of the string, presumably by knots. To persist with such a complex process of manufacture, one must have a mental construct of the end product, and a desire to acquire what is clearly a nonutilitarian artefact. The bead is such an artefact, but the string is not, being utilitarian. The latter is merely a means of permitting the bead to fulfil its nonutilitarian role. So this is a combination not only of diverse (composite) artefacts but also a hierarchy of diverse concepts of relating to them. The primary imperative, presumably, is to display the bead to its best advantage; the secondary intent is to find a means of doing so. Now, a piece of ostrich eggshell can be worn on a string without first drilling a hole through it, so why bother with this additional work? This kind of exploration raises a whole swathe of questions, and it is through it that the beads begin to become alive with meaning and significance.

Any logic-based interpretation attempt needs to be underpinned by an intimate knowledge of the technology involved, and for this purpose I have conducted extensive replicative experimentation with ostrich eggshell between 1990 and 1996 (Bednarik 1992a, 1993a, 1995b, 1997c). The results pertaining to disc beads manufactured with Lower Palaeolithic stone tool replicas have been described in some detail, they are only briefly summarized here. I found that the most effective way of producing precise replicas of Acheulian and later Pleistocene ostrich eggshell beads, using such technology, is first to break the shell into polygonal fragments of $1-2\,cm^2$ area. These are then drilled individually, from one side only. Once the stone drill breaks through, the hole is reamed out from the other side. The specimen is then firmly gripped between two fingers, and the excess area trimmed off, either by pressing the protruding part on its convex side against a stone surface, or by using one's teeth as a vice. Once the excess material is snapped off, the bead blank is abraded on a coarse siliceous rock such as quartzite or silcrete. The beads from the Libyan Acheulian are all of about 6 mm diameter, and I found that the average time of producing replicas of them is about 17 minutes.

In making many replicas of the Acheulian ostrich eggshell beads, I discovered that the smallest size such a bead can realistically be ground down to is about 6 mm diameter. There are two reasons for this. First, as the size approaches this order of magnitude, the disc becomes increasingly difficult to hold between fingers, and as the finger tips are beginning to rub against the grindstone as the bead becomes smaller, their skin is also abraded and the process becomes quite painful when making many beads (there is no evidence that the alternative "stick method," used widely in the late Holocene, was employed in the Pleistocene). Second, since the diameter of the central hole can be no smaller than 1.4 to 2.0 mm, it follows that the bead's fragility increases exponentially as the outside diameter of 6 mm is approached. This diameter represents the smallest size at which the bead remains structurally strong enough to withstand some rough handling. I have established this quantitatively, through controlled destruction experiments.

The Acheulian eggshell beads are very well made, with a near-perfect circular outer margin and an equally perfect rim thickness all around. In my replication work I found that these precise forms could be achieved only intentionally, by constant checking of the shape during the final abrading phase. It is practically impossible to obtain such a perfect round shape and centrality of the perforation by accident. This means that the makers had not just a well-developed sense of symmetry but also a clearly defined concept of the perfect geometric form they aspired to.

This leads to several observations. Even if it is preferred to have a perforated bead, this does not necessarily call for a *central* perforation. The rational explanation why the maker would go to such lengths to abrade the bead equidistantly is because of a sense of perfection. This proposition is confirmed by the size of the beads. It seems self-defeating to make beads so small. Surely a purpose of a bead is to be seen. Yet the labour investment of making a very small bead is significantly greater than that required for a large bead. Perhaps the most telling aspect of the production process is that the Acheulian beads are, as noted, of the smallest possible size in which these objects can realistically be made. There is a palpable impression that the primary objective was to push the available technology to its very limits. It is from this perspective that we need to examine these symbolic objects, and the nature of their semiotic function.

Lower Palaeolithic hominids have few models of the form concept that would underpin the mental template of a disc bead. To our thinking, used to the idea of the wheel, this is a great deal more familiar than it would have been to early humans. Of course they may have collected circular fossils such as crinoids and used them as beads (Goren-Inbar et al. 1991; also from Soissons and

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an unnamed site on the Loire, France). Perhaps this is how the very concept came into being, and the humanly made disc beads were merely substitutes for the fossils that were in short supply. Whatever the process was, these hominids did possess a clear concept of a perfect geometric form that had no practical value at all (consider also the engraved nummulite from Tata, Hungary; Bednarik 1992b: Fig. 4). It may sound provocative to say this, but they had in fact developed the wheel without discovering its practical application. As one reams out the perforation it is easiest to hold the reamer still and rotate the disc around it. Similarly, the finished bead can be turned around the string, or one can run it along a surface like a wheel by holding the string tautly.

Naturally the hominids had no use for wheels (or means of making large-scale versions), but they may well have been fascinated by such properties. Even as nonutilitarian objects, the beads did not need to be so well made. The significance in this perfection, this self-conscious display of ability, is itself part of the semiotic qualities of the product. The bead no doubt has one or more cultural meanings of a kind that will remain inaccessible to us, but one meaning is not: the bead expresses perfection, technological confidence, and competence. Its perfection is part of its message. It is a symbol of achievement, and it was displayed to the beholder at least partly for this very reason. As an experienced maker of such beads I can see no other reason for wanting to create perfectly proportioned specimens of a demonstrably smallest possible size. Occam's Razor demands that there must have been a justification for this considerable labour investment in artefacts that are of no practical use or survival value.

The Origins of Symbolism

One form of symbolism, "reflective" language, probably began its development some time between the appearance of *Homo erectus* (about 1.8 million years ago, at which time the species, in its broadest definition, is found in eastern Africa, in the Caucasus, and on Java) and his first known crossing of the sea (perhaps 0.9 million years ago, from Bali to Lombok and later Flores; Bednarik 1999b, 2003c). Verbal language is a form of communication that involves the use of conventionalized vocal sounds in meaningful patterns. In order to develop beyond simple action and response patterns (which apply, in various complexities, throughout the animal world), culturally determined meanings need to be attached to the "signs." Such meanings are not genetically passed on but are acquired during the life trajectory of each individual; they are learnt. Culture is of course not limited to humans; it is available to many other animals, albeit in considerably less complex forms. In humans culture has reached extraordinary levels of complexity, which are only possible through the use of an exceptionally large brain.

The key question is therefore: when did complex culture (individually acquired system of "understanding") begin to become such a dominating determinant of selection that it began to rival environmental factors in defining the course of human evolution? When did our ancestors begin to exercise sufficient control over environmental variables that a neural feedback system emerged which led to what we simplistically call "consciousness," and thus to what we regard as conscious modulation of response patterns? Such a development rendered the proliferation of cultural systems almost inevitable, and the increasing skill in the use of symbolisms became an evolutionary determinant. The practice of wearing beads or pendants obviously requires a comprehension of the self, of the existence of the individual. Individuality is a central factor in all "decoration," necessarily, and that applies also to the pretence of perfection: there seems to be no reason to wish to project the concept of perfection in the absence of a concept of the self. Self-awareness with all its implications is an important factor in cognitive evolution, and can be assumed to have been available to select for in the Acheulian. This issue is far more important than any other in human evolution, because for hominids to form constructs of reality they had to detach the self from the other; they had to develop autonomous consciousness. Beads constitute clear evidence that this, the most crucial step in our evolution, had been mastered.

The long-range model perceives a slow and gradual process that was already under way at the time of the first humans, say 2.5 million years ago. The marked encephalization in the earliest humans, such as the habilines, is seen as being related to cognitive development. The oldest archaeological find known in the world that has been suggested to indicate a hominoid ability to recognize iconic resemblance (the visual similarity of two otherwise unrelated objects) is the Makapansgat cobble from South Africa. It appears to have been deposited in a cave almost 3 million years ago (Bednarik 1998). But when could we expect such an ability to have developed sufficiently to have a major impact on the behaviour of hominids?

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By 1.5 million years ago, *Homo erectus* began to produce formalised tools suggestive of mental templates (Wynn 2002; Wynn and Coolidge 2003). That species had by that time successfully occupied vast areas of the Old World, apparently within a geological instant, adapting no doubt to many environments and climates in the process. If there were a hominid predisposition to achieve this, it would have been attempted earlier, so the evidence suggests the availability to this species of a faculty or conceptual tool not available previously. Rather than speculating what this might have been, I consider the next major developments. By the advent of the Middle Pleistocene, *H. erectus* had acquired seafaring ability and he also used manuports that seem to have no utilitarian significance. He or a subsequent hominid collected clear quartz crystals in South Africa, India, and elsewhere (Bednarik 1994a); fossil casts (Oakley 1981), and used red pigments.[5] It, therefore, appears that the most likely time frame for the crucial developments in establishing the role of symbolism in human culture is that these developments commenced with the relatively rapid expansion of *Homo erectus*, perhaps 1,8 million years ago, and resulted in structured societies with relatively complex technology, modes of symbol use, and effective language about a million years later. From there on, the cognitive and intellectual evolution of hominids merely followed an established trajectory, demanding accelerating refinement. Evidence includes home bases with established activity zones, increasing use of fire, specialized hunting of very large animals (especially elephants and rhinos), refinement of weapons and artefacts, and increased use of pigments.

By the late Lower Palaeolithic, "palaeoart" was produced in several world regions, and in various forms. Engravings on portable objects of bone and stone commence about 300,000 years ago, with the sites Bilzingsleben (Mania and Mania 1988; Bednarik 1995a) and Sainte Anne I (Crémades 1996) being early representatives. The earliest "protosculptures" are the Acheulian finds from Tan-Tan, Morocco (Bednarik 2003b) and Berekhat Ram, Israel (Goren-Inbar 1986), which, like the Makapansgat cobble, are natural forms but have been altered by human hand. Petroglyphs appear first in the Acheulian of India, in the form of numerous cupules and one engraved meandering line.[6] The cupule is particularly noteworthy, because it represents the earliest form of rock art in all continents except Antarctica. For instance, the oldest known rock art of Europe are the eighteen cupules on the underside of a stone slab placed over the grave of a Neanderthal child in La Ferrassie, France (Peyrony 1934), but these are much more recent than those of the Acheulian in India.

During the Middle Palaeolithic, symbolic evidence such as palaeoart (Bednarik 1992b, 1994a, 2003a) occurs widely in the Micoquian and Mousterian of Europe, in the Middle Stone Age of sub-Saharan Africa, and in the Middle Palaeolithic industries of Asia and Australia (which in the latter continent continue to the end of the Pleistocene, and in Tasmania to European occupation). Seafarers of this period accomplished incredible ocean crossings in the region to the north and northeast of Australia (Bednarik 1997b, 1999b, 2003c). Underground mining occurs in Europe, two regions of Africa, and in Australia (Bednarik 1995c). None of these developments seem attributable to the supposed African carriers of the Upper Palaeolithic mode of technology (*sensu* Foley and Lahr 1997), in fact there is not a single technological, cognitive, or symbolic innovation that can be linked to the appearance of Moderns in Europe. If that group ever did exist as a genetically discrete entity, for which there is no evidence other than the claims of *some* geneticists, opposed by others,[7] then that "race" contributed little to the human ascent. All fundamental innovations and achievements predate it, and the most important are perhaps attributable to *Homo erectus*.

The very significant underrepresentation of artefacts from relatively perishable materials has prompted distorted technological characterisations of Lower Palaeolithic traditions. For instance, bone, ivory, fibre, skin, or wood are poorly represented, if at all – although there are in fact far more wooden finds from the Lower Palaeolithic than from the Upper Palaeolithic (Bednarik 1999a). The technology of Lower Palaeolithic woodworking has never been examined in a consistent and comprehensive fashion, even though the period's stone tools were primarily used to work wood (Keeley 1977). The same applies to the Middle Palaeolithic (Beyries 1988), and microwear studies (e.g., Anderson 1980; Anderson-Gerfaud 1990) of lithics show that only about 10% were used for working hides, while the majority served to fashion wooden objects. Of the astronomical numbers of wooden tools and weapons made before the Upper Palaeolithic, almost none survived from the Middle

5 Bednarik 1990; McBrearty 2001; McBrearty and Brooks 2000; Barham 2002.

6 Bednarik 1993b; Kumar 1996; Kumar et al. 2003.

7 Barinaga 1992; Templeton 1993, 1996; Brookfield 1997; Pennisi 1999; Strauss 1999.

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Palaeolithic. From the Lower Palaeolithic, we have a minute sample, but even this has not been considered in a collective technological perspective.[8] That nearly all of the few thousand known wooden finds from that period are from Germany and Israel suggests inadequate recovery methods in other schools of archaeology (Bednarik 1999a). Other neglected aspects of early technology are the use of resinous materials in hafting,[9] bone and ivory points,[10] composite or hafted tools (Thieme 1995), underground mining (Bednarik 1995c), and particularly early seafaring (Bednarik 1997b, 1997a, 1999b, 2003c).

While the seafaring prowess of *Homo erectus*, the greatest colonizer in ca. 2.5 million years of human history, is by itself sufficient evidence to show that the capacity of reflective communication, presumably by verbal means (i.e., language), was available at least 850 ka ago (Bednarik 2003c), there are still a few other technological points to consider. The construction of rafts is contingent upon the use of cordage of some type, in the form of vines, sinews, fibres, or similar materials. This demands further complexities in the available technology. Most importantly, cordage of any type can only be employed usefully by means of knotting. Strings, ropes, and thongs were no doubt used for much of the Palaeolithic (Warner and Bednarik 1996), including for beads and pendants, but we have no physical evidence of knots and almost none of cordage, except from the Upper Palaeolithic.[11]

The use of symbolic systems demonstrated by seafaring and palaeoart extends several hundred millennia into the past. Taphonomic logic (Bednarik 1994c) alone demands this, which I regard as particularly strong evidence that the still dominant model of nonphysical human evolution is false. The products of symbolism that have survived from the earliest phase of human culture, the Lower Palaeolithic, have so far not been considered in any depth. This evidence has been neglected since its first tenuous mention over 150 years ago. It is especially through this neglect of available information, here and in seafaring, that the precarious models of recent decades have been able to flourish as they did.

8 Belitzky et al. 1991; Jacob-Friesen 1956; Thieme 1995; Wagner 1990; Howell 1966: 139; among others.

9 Again, nearly all cases are from Germany; Mania and Toepfer 1973; Bosinski 1985; Boëda et al. 1996; Hayden 1993.

10 Tode 1953; Bednarik 1995a; Mania 1999; Howell and Freeman 1982.

11 Leroi-Gourhan 1982; Nadel et al. 1994; Pringle 1997.

Appendix I: The Objects in the Pitt Rivers Museum, Oxford

The following beads and beadlike objects were examined by the author at the Pitt Rivers Museum, Oxford. This corpus comprises 325 *Porosphaera globularis* specimens, 2 perforated snail shells, 2 crinoid specimens, and 6 perforated stones. Of the total, 252 items are from British sites, mostly of the Acheulian, but some are unprovenanced; and 83 items are from northern France.

1884.76.76: Pitt Rivers sent this collection to Bethnal Green Museum, probably in 1874, and it arrived from South Kensington Museum in 1884 as part of the Augustus Henry Lane Fox Pitt Rivers founding collection. This string of 30 *Porosphaera globularis* originates from Les Boves, near Amiens, France. The 30 pieces were found "in small heaps in the drift, some are naturally bored, others are supposed to be artificially bored, supposed to have been used as beads." The term "drift" refers to glacial deposits of the Pleistocene.

1894.21.24 [1–41]: Collected by Henry Balfour in France before 1894. In all there are 41 perforated pieces, mostly *P. glob.*, in three boxes. One contains six items from the Loire river, one of which is a crinoid, the others are *P. glob.* that fall within the range of the Bedford material. One box is marked "Le Pacy, nr. Paris," containing 10 *P. glob.* pieces plus one naturally perforated stone, probably chert. No working or wear traces are evident. The remaining 24 items are marked "nr. Paris" and they are suggested to have been used as beads by "drift man." This includes perforated stones and two definite artificially perforated snails as well as *P. glob.* specimens. No secure provenience is given.

1904. 49.41.1–17: Collected at Bedford before 1904, almost certainly by F. H. S. Knowles and supplied by him in 1904, 17 specimens of *P. glob.* They range in size from 13.1 mm to 24.8 mm diameter. Some feature wear facets but most are of coarser surfaces and more weathered than the main collection from Bedford (1910).

1904.49.41.2 [1–49]: Collected by "F. W. Knowles" at Bedford, 49 specimens of *P. glob.* These are better size graded than the 1910 collection, ranging in size from 7.4 mm to 16.1 mm maximal diameter. The tunnels are more uniform, ranging in diameter from 2.9 mm to 6.5 mm, with 4–5 mm being the most common dimensions. There is less evidence of wear than in the 1910 Bedford sample. However, all of the tunnels are fully opened and the removal of material is often evident at the narrow end, in the form of impact scars. Some specimens show distinctive conical wear facets and some of the smaller specimens fit perfectly into these worn recesses. It is clear from these examples that the steepness of the angle in the conical wear facets is determined by the size of the adjacent bead.

1906.6.7: Provided by F. H. S. Knowles in 1906, who almost certainly also collected these three *P. glob.* at

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Bedford, probably in the gravels of the Biddenham quarry. One of them is very large, 24.3 mm diameter, with a tunnel of 8.5 mm on one, 4.9 mm the other end. The collection includes also one naturally perforated piece of jasperite, 22.3 mm long with a hole of 7.1 mm diameter.

1910.72.91.2: Probably collected by Raymond Wilson in gravels at Soissons, near Aisne, Picardie, France, and provided by him from his private collection in 1910. Of the 12 items, 11 are *P. glob.*, the remaining is a thick disc consisting of four columnar crinoid segments.

1910.75.157.1–30: Collected in 1910 by F. H. S. Knowles in the gravels of the Biddenham quarry at Bedford, together with 156 Lower Palaeolithic implements and flakes and a bovid tooth. Of the total of 59 *P. glob.*, 29 are loose, 30 more are on a string. This is the only properly provenanced collection of *P. glob.* in the Pitt Rivers Museum. The specimens threaded onto a string range in size from 7.5 mm to 21.8 mm diameter. Of the loose specimens, 15 are described in Appendix 2.

1916.34.3.1–?: Double loop of 104 beads, nearly all *P. glob.* The material was provided by Edward Burnett Tyler in 1916, and probably also collected by him. No find site is recorded, other than that the items come from river gravels in England. They provide no good evidence of use-wear because the specimens have porous, weathered surfaces. Nevertheless, some conical wear facets do occur in this large collection, even though they are lacking on most specimens.

1921.91.481.1: Alexander Montgomerie Bell provided these 19 *P. glob.* and probably collected them. They are now assembled into a string. The only location given is "British isles," find site(s) unknown. The fossils are probably from different sites, according to the records of the Pitt Rivers Museum, and are thus of very limited value. The specimens have very well preserved surfaces and are generally of medium sizes, but distinctive work or wear traces are found on only a few of them.

Appendix II: Selected Specimens from the 1910 Biddenham Acheulian Site

No. 1: 15.7 mm maximum size, maximum diameter (perpendicular to tunnel axis) 14.7 mm, with a distinctive concave, off-centre wear facet on one side. The facet is fairly circular, at about 7 mm diameter. The extent of the wear implies very long use as a bead. The tunnel diameter is 4.7 mm on the nearly unworn side but only 3.5 mm on the facetted side, and on the latter side slightly oval. There is also faint evidence of flaking at the tunnel entrance on the latter side, but the scars have been almost entirely obliterated by the concave wear.

No. 2: 11.8 mm maximal size, 11.3 mm maximal diameter, 4.9 mm diameter tunnel opening which has not been chamfered round. Strongly worn concave facet, particularly on one side. In side view, this bead is distinctly wedge-shaped, so that the length of the tunnel is only 6.7 mm on what is presumed to be the "inner" side, but 11.1 mm on the "lower" side. It is apparent that this bead had a "keystone" function within a set.

No. 3: 13.5 mm maximum size and maximal diameter, the bead width in the direction of the tunnel is 9.7 mm. The tunnel is 5.0 mm diameter at one end, 4.6 mm at the other. Around the smaller tunnel entrance, heavily worn evidence of damage can be discerned.

No. 4: 12.7 mm maximal dimension, 11.5 mm maximal diameter, pronounced globular shape, no faceting is visible, the tunnel is small with entrances of 3.9 mm and 3.2 mm diameter respectively. At the smaller end of the tunnel, there is clear flaking evidence around most of the circumference of the opening, which appears to have been obstructed before it was cleared. Here, the tunnel was closed or partially closed over a length of only about 1 mm, and this wall was reamed out by percussion and perhaps also rotation. There is no evidence of working at the opposite end of the tunnel.

No. 5: 14.0 mm maximum size, 13.7 mm maximum diameter. One end of the tunnel is of 4.6 mm diameter, the other is almost closed. It features an irregularly shaped hole of maximal 3.2 mm size in one direction, which features evidence of working but no use-wear.

No. 6: 13.4 mm maximal dimension as well as maximal diameter, large tunnel opening at 4.9 mm, very circular and uniform on both sides, which on this wedge-shaped specimen are only 5.0 mm apart on the shorter side. The rim of both tunnel openings is evenly worn about 1.5 to 2.0 mm wide, and distinctly concave towards the tunnel ends. Despite the heavy wear on the sides, there is almost no wear evident inside the tunnel, which suggests that this item was worn as a bead rather than a pendant.

No. 7: 15.1 mm maximum dimension, 14.7 mm maximum diameter, 13.6 mm width, with circular tunnel that measures 8.8 mm at one end, 6.4 mm diameter at the other. There is a polished wear facet on the smaller opening, while at the larger end of the tunnel there is a fully conical wear facet reaching into the tunnel, apparently because the neighbouring bead was of significantly smaller size. There are also previous traces of flaking in this concavity surrounding the tunnel opening, and the projecting aspects inside the rim exhibit distinctive polishing facets that are generally aligned with the orientation of the conical concavity. This is, therefore, an excellent specimen to demonstrate the wear patterns on these beads.

No. 8: 14.6 mm maximum size, 14.3 mm maximum diameter, tunnel diameters 5.5 mm and 4.4 mm respectively. The larger rim is worn extensively, up to 2.0 mm wide, while the wear is less pronounced around the smaller opening, but still clearly evident. There are two very worn flaking scars present at the smaller opening, indicating that is was probably enlarged.

No. 9: Maximum size 15.0 mm, maximum diameter 14.5 mm, the larger tunnel opening of 6.2 mm diameter

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has a narrow, ca. 1.0-mm-wide wear cone. The second opening, 5.0 mm diameter, is irregularly shaped, with limited wear evident.

No. 10: Both the maximum size and the maximum diameter of this smaller specimen are 12.3 mm. The larger tunnel opening is 4.7 mm diameter and is saddle-shaped near the rim, while the smaller opening, separated by only 6.6 mm, has a diameter of 3.6 mm and is more angular, with probable working traces surrounding it. Inside the tunnel, where it used to be closed or partly closed before modification, there are traces of a dark-brown substance that extend also onto the fracture surfaces of the flaking event. They, therefore, do postdate the no doubt artificial enlargement or penetration of the opening, but in my view they are not related to any organic matter threaded through the tunnel at the time of the Middle Pleistocene use.

No. 11: Maximum size and maximum diameter are both 13.4 mm, the width between the two rims is 8.2 mm. This specimen is much more worn than all the previous items described here. Particularly noteworthy is that the angle formed by the tunnel wall and the conical wear facet, which is more acute than on other specimens because the wear facets on both sides are particularly deep. The specimen is also more worn on its entire outside surfaces. A circular opening of 4.4 mm diameter is surrounded by a distinctive wear cone that is flattish rather than steep, of fairly even width and quite central. The slightly smaller other tunnel opening, however, is worn very unevenly; the wear cone is not circular and entirely off-centre. This is in part due to the shape of the bead, but the main reason is clearly the shape of the formerly adjacent bead, which wore much deeper into what appears to have been the bead's inside on the necklace. At this side, the wear facet is fully 5.5 mm wide, whereas the same conical rim is only 1.4 mm wide on the other side of the orifice. There is extensive deposition of near-black matter within the tunnel.

No. 12: 13.1 mm maximum size and diameter, 11.7 mm wide in the direction of the tunnel, and of very globular form. One tunnel opening is 4.5 mm diameter and has a minor but clear wear facet and rim. The other is 3.2 mm diameter, showing a similar amount of wear evenly distributed around the rim.

No. 13: 11.9 mm maximal size and diameter, the tunnel openings are 3.7 mm and 2.9 mm diameter respectively. There is minor damage apparent at the larger opening, but at the smaller orifice there is distinctive flaking where the specimen was skilfully worked to remove the tunnel closure. One of the percussion micro-flake scars present there is 1.7 mm long.

No. 14: 17.0 mm maximum size and maximum diameter, 15.3 mm width, on one side perfectly round tunnel opening of 5.0 mm diameter with conical wear facet ranging in width from 1.5 mm to 2.0 mm. On the smaller tunnel end, the opening is only marginally different at 4.8 mm diameter and there is a similar amount of wear evident, but the facet is less symmetrical.

No. 15: Maximum diameter 10.1 mm, width 7.5 mm, one tunnel opening 4.8 mm diameter with flattish conical wear that is less than 1 mm wide. The other opening is 4.6 mm diameter and wear is slightly more flat. This is one of the smallest specimens in the collection.

References Cited

Aitchison, J.
1996 The Seeds of Speech. Language Origin and Evolution. Cambridge: Cambridge University Press.

Anderson, P.
1980 A Microwear Analysis of Selected Flint Artifacts from the Mousterian of Southwest France (Abstract). *Lithic Technology* 9/2: 33.

Anderson-Gerfaud, P.
1990 Aspects of Behaviour in the Middle Palaeolithic. Functional Analysis of Stone Tools from Southwest France. In P. Mellars (ed.), The Emergence of Modern Humans; pp. 389–418. Ithaca: Cornell University Press.

Barham, L. S.
2002 Systematic Pigment Use in the Middle Pleistocene of South-Central Africa. *Current Anthropology* 43: 181–190.

Barinaga, M.
1992 "African Eve" Backers Beat a Retreat. *Science* 255: 686–687.

Beaumont, P.
1992 The Time Depth of Aesthetic and Symbolic Behaviour in Southern Africa. [Paper presented to the Biennial Conference of the Southern African Association of Archaeologists, Johannesburg]

Bednarik, R. G.
1990 An Acheulian Haematite Pebble with Striations. *Rock Art Research* 7: 75.
1992a Natural Line Markings on Palaeolithic Objects. *Anthropologie* 30: 233–240.
1992b Palaeoart and Archaeological Myths. *Cambridge Archaeological Journal* 2: 27–43.
1993a About Palaeolithic Ostrich Eggshell in India. *Indo-Pacific Prehistory Association Bulletin* 13: 34–43.
1993b Palaeolithic Art in India. *Man and Environment* 18/2: 33–40.
1994a Art Origins. *Anthropos* 89: 169–180.
1994b The Discrimination of Rock Markings. *Rock Art Research* 11: 23–44.
1994c A Taphonomy of Palaeoart. *Antiquity* 68/258: 68–74.
1995a Concept-Mediated Marking in the Lower Palaeolithic. *Current Anthropology* 36: 605–634.
1995b Towards a Better Understanding of the Origins of Body Decoration. *Anthropologie* 33: 201–212.
1995c Untertag-Bergbau im Pleistozän. *Quartär* 45/46: 161–175.
1997a The Earliest Evidence of Ocean Navigation. *International Journal of Nautical Archaeology* 26/3: 183–191.
1997b The Origins of Navigation and Language. *The Artefact* 20: 16–56.

https://doi.org/10.5771/0257-9774-2005-2-537
Generiert durch IP '13.58.60.192', am 29.04.2024, 18:56:31.
Das Erstellen und Weitergeben von Kopien dieses PDFs ist nicht zulässig.

1997c The Role of Pleistocene Beads in Documenting Hominid Cognition. *Rock Art Research* 14: 27–41.
1998 The Australopithecine Cobble from Makapansgat, South Africa. *South African Archaeological Bulletin* 53: 4–8.
1999a Determining the Maximum Capability of Palaeolithic Technologies. *Praehistoria Thuringica* 3: 80–97.
1999b Maritime Navigation in the Lower and Middle Palaeolithic. *Comptes Rendus de l'Académie des Sciences* (Earth and Planetary Sciences) (Paris) 328: 559–563.
2003a The Earliest Evidence of Palaeoart. *Rock Art Research* 20: 89–135.
2003b A Figurine from the African Acheulian. *Current Anthropology* 44: 405–413.
2003c Seafaring in the Pleistocene. *Cambridge Archaeological Journal* 13: 41–66.

Belitzky, S., N. Goren-Inbar, and **E. Werker**
1991 A Middle Pleistocene Wooden Plank with Man-Made Polish. *Journal of Human Evolution* 20: 349–353.

Beyries, S.
1988 Functional Variability of Lithic Sets in the Middle Palaeolithic. In: H.L. Dibble and A. Montet-White (eds.), Upper Pleistocene Prehistory of Western Eurasia; pp. 213–223. Philadelphia: University of Pennsylvania. (University Museum, Monograph, 54)

Bickerton, D.
1990 Language and Species. Chicago: The University of Chicago Press.
1996 Language and Human Behaviour. London: UCL Press.

Boas, F.
1888 The Central Eskimo. Lincoln: University of Nebraska Press. [Reprinted 1964]

Boëda, E., J. Connan, D. Dessort, S. Muhesen, N. Mercier, H. Valladas, and **N. Tisnérat**
1996 Bitumen as a Hafting Material on Middle Palaeolithic Artefacts. *Nature* 380: 336–338.

Bosinski, G.
1985 Der Neanderthaler und seine Zeit. Köln: Rheinland-Verlag.

Boucher de Perthes, J.
1847–64 Antiquités celtiques et antédiluviennes. 3 vols. Paris: Treuttel et Wurtz.

Brookfield, J. F. Y.
1997 Importance of Ancestral DNA Ages. *Nature* 388: 134.

Crémades, M.
1996 L'expression graphique au paléolithique inférieur et moyen. L'exemple de l'Abri Suard (La Chaise-de-Vouthon, Charente). *Bulletin de la Société Préhistorique Française* 93/4: 494–501.

Davidson, I.
1997 The Power of Pictures. In: M. W. Conkey, O. Soffer, D. Stratman, and N. G. Jablonski (eds.), Beyond Art. Pleistocene Image and Symbol; pp. 125–159. San Francisco: California Academy of Sciences.

Davidson, I., and **W. Noble**
1989 The Archaeology of Perception. Traces of Depiction and Language. *Current Anthropology* 30: 125–155.
1990 Tools, Humans, and Evolution. The Relevance of the Upper Palaeolithic. [Paper presented to the symposium "Tools, Language, and Intelligence. Evolutionary Implications," Cascais, Portugal]
1992 Why the First Colonisation of the Australian Region Is the Earliest Evidence of Modern Human Behaviour. *Archaeology in Oceania* 27: 113–119.

d'Errico, F., and **P. Villa**
1997 Holes and Grooves. The Contribution of Microscopy and Taphonomy to the Problem of Art Origins. *Journal of Human Evolution* 33: 1–31.

Dunbar, R.
1996 Grooming, Gossip, and the Evolution of Language. London: Faber and Faber.

Foley, R., and **M. M. Lahr**
1997 Mode 3 Technologies and the Evolution of Modern Humans. *Cambridge Archaeological Journal* 7: 3–36.

Gamble, C.
1994 Timewalkers. The Prehistory of Global Colonization. Cambridge: Harvard University Press.

Goren-Inbar, N.
1986 A Figurine from the Acheulian Site of Berekhat Ram. *Mi'Tekufat Ha'Even* 19: 7–12.

Goren-Inbar, N., Z. Lewy, and **M. E. Kislev**
1991 The Taphonomy of a Bead-Like Fossil from the Acheulian of Gesher Benot Ya'aqov, Israel. *Rock Art Research* 8: 83–87.

Hayden, B.
1993 The Cultural Capacities of Neandertals. A Review and Re-Evaluation. *Journal of Human Evolution* 24: 113–146.

Howell, F. C.
1966 Observations on the Earlier Phases of the European Lower Paleolithic. *American Anthropologist* 68/2, 2: 88–201. [Special Issue]

Howell, F. C., and **L. G. Freeman**
1982 Ambrona, an Early Stone Age Site in the Spanish Meseta. *Anthroquest – L. S. B. Leakey Foundation News* 22: 11–13.

Jacob-Friesen, K. H.
1956 Eiszeitliche Elefantenjäger in der Lüneburger Heide. *Jahrbuch des Römisch-Germanischen Zentralmuseums Mainz* 3: 1–22.

Keeley, L. H.
1977 The Function of Paleolithic Flint Tools. *Scientific American* 237/5: 108–126.
1980 Experimental Determination of Stone Tool Uses. Chicago: University of Chicago Press.

Kroeber, A. L.
1900 The Eskimo of Smith Sound. *Bulletin of the American Museum of Natural History* 12: 265–327.

Kumar, G.
1996 Daraki-Chattan. A Palaeolithic Cupule Site in India. *Rock Art Research* 13: 38–46.

Kumar, G., R. G. Bednarik, A. Watchman, R. G. Roberts, E. Lawson, and **C. Patterson**
2003 2002 Progress Report of the EIP Project. *Rock Art Research* 20: 70–71.

Leroi-Gourhan, A.
1982 The Archaeology of Lascaux Cave. *Scientific American* 246/6: 80–88.

https://doi.org/10.5771/0257-9774-2005-2-537
Generiert durch IP '13.58.60.192', am 29.04.2024, 18:56:31.
Das Erstellen und Weitergeben von Kopien dieses PDFs ist nicht zulässig.

Mania, D.
1999 125 000 Jahre Klima- und Umweltentwicklung im mittleren Elbe-Saale-Gebiet. *Hercynia* 32: 1–97.

Mania, D., and **U. Mania**
1988 Deliberate Engravings on Bone Artefacts of *Homo erectus*. *Rock Art Research* 5: 91–107.

Mania, D., und **V. Toepfer**
1973 Königsaue. Gliederung, Ökologie und mittelpaläolithische Funde der Letzten Eiszeit. Berlin: Deutscher Verlag der Wissenschaften.

Marshack, A.
1991 A Reply to Davidson on Mania and Mania. *Rock Art Research* 8: 47–58.

McBrearty, S.
2001 The Middle Pleistocene of East Africa. In: L. Barham and K. Robson-Brown (eds.), Human Roots. Africa and Asia in the Middle Pleistocene; pp. 81–92. Bristol: Western Academic and Specialist Press.

McBrearty, S., and **A. S. Brooks**
2000 The Revolution That Wasn't. A New Interpretation of the Origin of Modern Human Behavior. *Journal of Human Evolution* 39: 453–563.

Mottl, M.
1951 Die Repolust-Höhle bei Peggau (Steiermark) und ihre eiszeitlichen Bewohner. *Archaeologia Austriaca* 8: 1–78.

Nadel, D., A. Danin, E. Werker, T. Schick, M. E. Kislev, and **K. Stewart**
1994 19,000-Year-Old Twisted Fibers from Ohalo II. *Current Anthropology* 35: 451–458.

Nelson, E. W.
1899 The Eskimo about Bering Strait. In: J. W. Powell (ed.), Eighteenth Annual Report of the Bureau of American Ethnology to the Secretary of the Smithsonian Institution, 1896–97, Part 1; pp. 3–518. Washington: Government Printing Office.

Nestler, H.
1961 Spongien aus der weißen Schreibkreide (Unt. Maastricht) der Insel Rügen (Ostsee). *Paläontologische Abhandlungen* 1/1: 1–70.

Noble, W., and **I. Davidson**
1996 Human Evolution, Language, and Mind. Cambridge: Cambridge University Press.

Oakley, K. P.
1981 Emergence of Higher Thought, 3.0-0.2 Ma B. P. *Philosophical Transactions of the Royal Society of London* B 292: 205–211.

Pennisi, E.
1999 Genetic Study Shakes up Out of Africa Theory. *Science* 283: 1828.

Peyrony, D.
1934 La Ferrassie. *Préhistoire* 3: 1–92.

Prestwich, J.
1859 On the Occurrence of Flint-Implements, Associated with the Remains of Extinct Mammalia, in Undisturbed Beds of a Late Geological Period. *Proceedings of the Royal Society of London* 10: 50–59.

Pringle, H.
1997 Ice Age Communities May Be Earliest Known Net Hunters. *Science* 277: 1203–1204.

Smith, W. G.
1894 Man the Primeval Savage. London.

Strauss, E.
1999 Can Mitochondrial Clocks Keep Time? *Science* 283: 1435–1438.

Templeton, A. R.
1993 The "Eve" Hypotheses. A Genetic Critique and Reanalysis. *American Anthropologist* 95: 51–72.
1996 Gene Lineages and Human Evolution. *Science* 272: 1363.

Thieme, H.
1995 Die altpaläolithischen Fundschichten Schöningen 12 (Reinsdorf-Interglazial). In: H. Thieme und R. Maier (Hrsg.), Archäologische Ausgrabungen im Braunkohlentagebau Schöningen, Landkreis Helmstedt; pp. 62–72. Hannover: Verlag Hahnsche Buchhandlung.

Tode, A.
1953 Einige archäologische Erkenntnisse aus der paläolithischen Freilandstation von Salzgitter-Lebenstedt. *Eiszeitalter und Gegenwart* 3: 192–215.

Wagner, E.
1990 Ökonomie und Ökologie in den altpaläolithischen Travertinfundstellen von Bad Cannstatt. *Fundberichte aus Baden-Württemberg* 15: 1–15.

Warner, C., and **R. G. Bednarik**
1996 Pleistocene Knotting. In: J. C. Turner and P. van de Griend (eds.), History and Science of Knots; pp. 3–18. Singapore: World Scientific.

Wendt, W. E.
1974–75 "Art mobilier" aus der Apollo 11-Grotte in Südwest-Afrika. Die ältesten datierten Kunstwerke Afrikas. *Acta Praehistorica et Archaeologica* 5–6: 1–42.

White, R.
1989 Production Complexity and Standardization in Early Aurignacian Bead and Pendant Manufacture. Evolutionary Implications. In: P. Mellars and C. Stringer (eds.), The Human Revolution. Behavioural and Biological Perspectives on the Origins of Modern Humans; pp. 366–390. Edinburgh: Edinburgh University Press.
1992 Beyond Art. Toward an Understanding of the Origins of Material Representation in Europe. *Annual Review of Anthropology* 21: 537–564.

Woodhouse, H. C.
1997 Ostrich Eggshell Beads in Southern Africa. *Rock Art Research* 14: 41–43.

Wynn, T.
2002 Archaeology and Cognitive Evolution. *Behavioral and Brain Sciences* 25/3: 389–438.

Wynn, T., and **F. Coolidge**
2003 The Role of Working Memory in the Evolution of Managed Foraging. *Before Farming* 2003/2 (1). <http://www.waspress.co.uk/journals/beforefarming/journal_20032/abstracts/index.php>

https://doi.org/10.5771/0257-9774-2005-2-537
Generiert durch IP '13.58.60.192', am 29.04.2024, 18:56:31.
Das Erstellen und Weitergeben von Kopien dieses PDFs ist nicht zulässig.