

Middle Stone Age Shell Beads from South Africa

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There are two competing models for the emergence of modern human behavior: first, a late emergence in Africa or Eurasia at ~50 to 40 thousand years ago (ka), and second, a gradual transition in Africa between 250 to 50 ka (1). In both models, personal ornaments and art are unquestioned expressions of symbolism that equate with modern human behavior. The earliest undisputed African personal ornaments are 13 ostrich eggshell beads from Enkapune Ya Muto in Kenya at ~40 ka (2). Evidence from Eurasia includes two perforated teeth, dated ~43 ka, from Bacho Kiro in Bulgaria and 58 marine shell beads from the ~41-ka layers of Üçağızlı, Turkey (3).

Here we report on 41 perforated tick shell (*Nassarius kraussianus*) beads (Fig. 1) recovered from the Middle Stone Age (MSA) levels at Blombos Cave, a site located on the southern Cape shoreline of the Indian Ocean (4). Phase M1, in which 39 beads were found, was dated to 75.6 ± 3.4 ka, by optically stimulated luminescence (OSL) signals from both single aliquots and 4800 individual quartz grains. Thermoluminescence dates for five burnt lithic samples from the same phase provide a mean age of 77 ± 6 ka (5). Two beads that may be intrusive come from the top of the underlying, and still undated, phase M2.

The MSA tick shells cannot derive from the cave walls, are too small to be leftovers from human food, and were not brought to the site accidentally by animals, because their only known predator is a gastropod (*Natica tecta*) that lives, like *N. kraussianus*, only in estuarine environments. If the tick shells had been accidentally brought to the cave site from 20-km-distant estuaries in wracks of dead *Zostera capensis*, a grass used for bedding by Later Stone Age (LSA) hunter-gatherers, all age classes would have been present, whereas Blombos Cave MSA beads include shells of adults only (fig. S1).

Of the MSA tick shells, 88% are dorsally perforated near the lip (Fig. 1 and fig. S1). This type of perforation is absent in living populations and accounts for only 8.6% of naturally pierced shells in modern thanatocenoses. Microscopic analysis of the MSA shells reveals a use-wear pattern, absent on natural shells, consisting of facets that flatten the outer lip or create a concave surface on

the lip close to the anterior canal (fig. S1). A similar concave facet is seen opposite to the first one, on the parietal wall of the aperture of many of the shells. This use-wear pattern is consistent with friction from rubbing against thread, clothes, or other beads and is the principal factor that defines the MSA shells

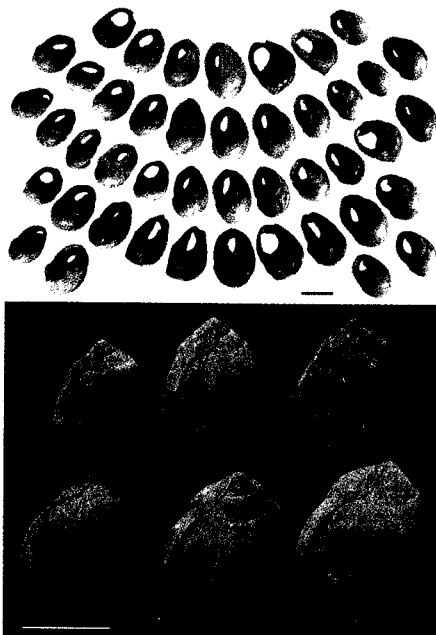


Fig. 1. Perforated *N. kraussianus* beads from the Middle Stone Age of Blombos Cave. Scale bars, 5 mm.

as beads. Microscopic residues of ochre detected inside the shells suggest that either the material in contact with the beads or the beads themselves were colored red.

Small objects may easily be displaced through archaeological layers, and perforated tick shells were also recovered at Blombos Cave from the more recent LSA layers. OSL measurements on 1892 individual quartz grains from the aeolian sand layer that separates the LSA and MSA levels (6) indicates no contamination by grains of different ages, contraindicating downward percolation of younger objects. Also, MSA beads are significantly larger ($P < 0.0001$) than those from LSA levels; the most common MSA perforation type is present on <1% of the LSA

shells; LSA beads do not have the wear facets found on MSA specimens; and only 5% of MSA beads have broken lips, compared to 52% of LSA beads, suggesting that the latter were strung in a different way. MSA beads are dark orange or black, whereas those from the LSA are white or pale beige (fig. S1). MSA shells were found in clusters of 2 to 17 beads, with each group clustering in the same or neighboring 50-by-50-cm quadrates. Within a group, shells display a similar size, shade, use-wear pattern, and perforation size. Each cluster may represent beads coming from the same beadwork item, lost or disposed during a single event.

The discovery of personal ornaments in the ~75-ka levels of Blombos Cave adds an unambiguous marker of symbolically mediated behavior to the list of innovations already identified in the MSA (1), including two decorated pieces of ochre, also from Blombos phase M1 (5). In human societies, beads have many different functions, all eminently symbolic (1–3, 7). Fully syntactical language is arguably an essential requisite to share and transmit the symbolic meaning of beadworks and abstract engravings such as those from Blombos Cave. Future research needs to establish a geography and precise chronology for behavioral innovations, with the aim of understanding the role played by each in the emergence of modern humanity.

References and Notes

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Supporting Online Material

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Fig. S1

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