

However, isolated examples should be treated with caution, particularly where perforations occur in the absence of knife or other blade marks.

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Archaeological evidence for cephalopods: taphonomic loss or unfortunate ignorance?

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It appears to be accepted by ichthyo-archaeologists (Wheeler and Jones 1989, 12) that, at least in the NE Atlantic, the geographic location and types of marine fish species have remained virtually unaltered for many millennia. Using modern comparisons, plenty of cephalopods are being caught today mixed in with general catches of mixed fish. On this basis, it seems logical to infer that there was a similar population of these animals in virtually the same areas in the past. Certainly in Roman and Greek classical antiquity, squid and octopus were well known in the Mediterranean. They are depicted on mosaics (Christies 1991) and plates and vases (Wilkins *et al.* 1995). Although no palaeolithic parietal art depicting these species has been found to date there is no reason to doubt their existence during that period either, if my argument above is accepted. If we are to enhance our understanding of the diets of coastal dwelling peoples in prehistory, we certainly need to be aware of the possible existence of any surviving body parts of cephalopods at excavations.

Several criteria need to be addressed. One concerns a knowledge of the anatomical details of the cephalopods likely to inhabit the waters of the NE Atlantic. Standard biology textbooks do not contain this detail, so the archaeologist needs to consult more specialized literature (e.g. Clarke 1977; 1980; Donovan 1977). The second criterion concerns taphonomic loss, something which is problematical to all archaeologists in the field. Archaeological reports on fish remains at coastal

sites contain no mention of cephalopods. What has happened to their hard parts? Have they completely disintegrated in the substrate? Could they have been completely missed during excavations? This leads to the third criterion: the inability of the excavator to recognize those hard parts of cephalopods that might have been present with other animal remains. The mouthparts could even have been erroneously labelled as 'parts of bird beaks', perhaps.

These problems are not difficult to remedy. I illustrate here (Fig. 80) the three basic hard parts of two common cephalopods which can be found today in the NE Atlantic: the translucent 'pen' of a 14 cm (mantle or body length) specimen of the squid (*Loligo vulgaris* Lamarck), the off-white 'bone' of an 8 cm (mantle length) cuttlefish (*Sepia officinalis* Linnaeus) and the dark brown and black 'beak' of the same specimen of cuttlefish. Both species have 'beaks' as hard mouthparts. However, the octopus (*Eledone cirrhosa* (Lamarck)) has no 'bone' or 'pen' within its body. The only part that may already be recognized by archaeologists is the 'bone' of the cuttlefish. It is often washed ashore on beaches in Britain and widely used by cage birds to sharpen their beaks.

To most people, the cephalopod 'beaks' will be unfamiliar. All these parts are hard, and the beaks, in particular, have been used in the past to determine the diet of whales (Clarke 1980).

I would firstly therefore like to emphasize the importance of recognition. Familiarity with diagrams of the hard parts of these animals will help initially. Secondly, examination of these parts in a biological collection will help further with this appreciation. Thirdly one should then perhaps be aware that even if these parts are not actually found at a coastal site, there should at least be some discussion of the fact that these animals might have existed in the past, either in the sea locally or as part of the debris at an occupation site.

I hope this brief introduction to this fascinating group of animals prompts further investigations and discussion.

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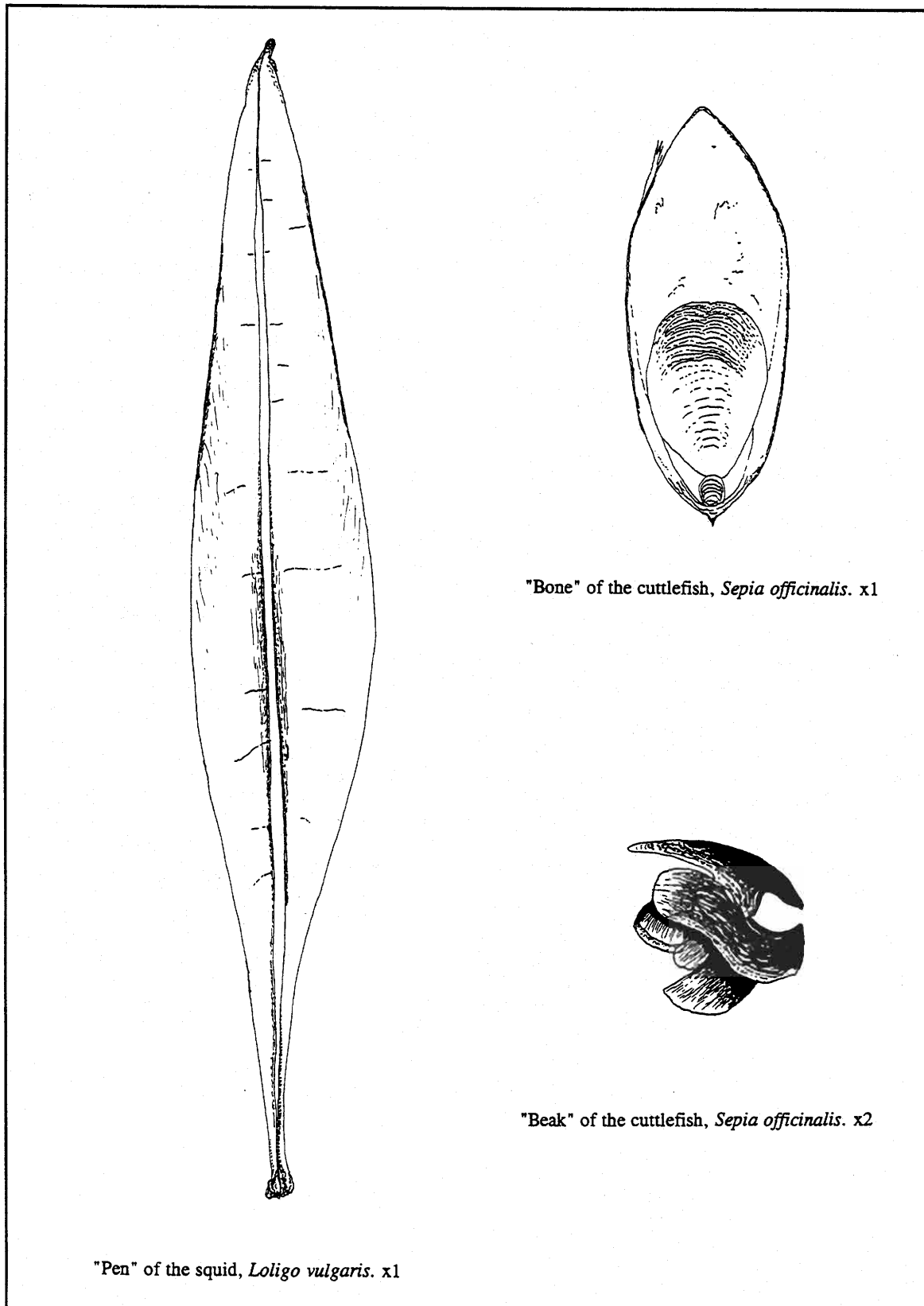


Figure 80. Hard parts of two species of cephalopod: (a) 'pen' of the squid, *Loligo vulgaris* (x1); (b) 'bone' (x1) and (c) 'beak' (x2) of the cuttlefish, *Sepia officinalis*.

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vertebrae, compared with $r=0.64$ and $r=0.74$ for DEXA, and $r=0.78$ and 0.85 for photodensitometry.

LAXS could prove a valuable tool for those wishing to carry out a range of studies on archaeological bone.

Acknowledgement

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CONFERENCE PAPER SUMMARIES

The following summaries have been provided by some of the speakers at the AEA's Spring Meeting held at the University of Birmingham, 17th April 1996

The LAXS approach to studying osteoporosis in archaeological bone

Osteoporosis is a metabolic disease of bone in which the equilibrium which normally exists between bone turnover processes is disrupted, resulting in a net loss of bone.

Bone consists of a hard outer shell, the cortex, and a rigid framework of bony struts, trabecular bone. Trabecular bone is far more metabolically active, so it is in this region where bone loss will first be seen.

Several scanning techniques were compared on 30 femora and 25 vertebrae. Low Angle X-ray Scattering (LAXS) is a technique being developed at the Department of Medical Physics, University College London, for early detection of osteoporosis. This is the first time the technique has been applied to archaeological bone. The technique can be configured to measure trabecular bone density only. Data obtained contain information that can be used to determine the type and amount of minerals present, so diagenetic changes could be detected.

Measurements were also made using Dual Energy X-ray Absorptiometry (DEXA) and photodensitometry techniques. The results were compared with bone mineral density values which were obtained through the physical removal of the trabecular bone. LAXS gave the most accurate results—correlation coefficients of $r=0.8$ and 0.9 respectively for femora and

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Sub-fossil Mollusca: improving environmental interpretation

As in other subfossil or fossil analyses, the interpretation of subfossil Mollusca relies, to a greater or lesser degree, on a 'uniformitarianist' approach, at the species level (autecology), the community level (synecology), or both. The notion, however, that present-day ecological preferences or associations can simply be applied to the past inevitably leaves a nagging doubt. Recently, Evans (1991) and Evans *et al.* (1992) have sought to identify recurrent molluscan taxocenes, particularly in Holocene overbank alluvium, and to rely on internal taxocene characteristics for interpretation rather than direct species or habitat analogy. To date, eight taxocenes have been recognised from such contexts. The approach is still analogous but at a more general level, relying on concepts such as species diversity, habitat diversity and succession, and the interrelationship of all three. To a large degree, interpretation proceeds without reference to named species.

In order to determine whether taxocenes had a numerical basis the data from three molluscan profiles through Holocene overbank alluvium at Kingsmead Bridge on the River Wylye, Wiltshire, were analysed using Detrended Correspondence Analysis (DCA). Data were entered into a spreadsheet on a species-by-sample basis and DCA used to group similar