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A Report on the Fish Remains From Okehampton Castle.

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7 pages + 2 figs.

The fish remains from Okehampton Castle come from the 1972-8 excavations and date to the thirteenth-sixteenth centuries. They were recovered in 112 units of which 92 contained identifiable remains. Most parts of the site are represented with a concentration in Area XVI, from a range of contexts. The sample amounts to over 2700 bones identified to species or family level; at least 22 species are present, all of which are wholly or partially marine.

The analysis of samples such as this can provide considerable information on how the fish were caught and eaten. Various aspects of the material help our understanding of these two activities. The list of species and their importance can indicate the grounds fished and the methods of capture, together with the selection for consumption. Methods of aging fish give more information on the fishing methods and allow the estimation of the time of year that they were caught. Fish size can be reconstructed to provide an estimate of the amount of meat consumed. The ways in which they were consumed is shown by butchery marks and frequencies of the different bones. It is not always easy to interpret some of these results, and here the wider historical and archaeological record is of importance. Of course, not all of these approaches are possible or relevant for every sample; as Okehampton is a large and well-collected sample most of the techniques were tried.

ANALYSIS

The bones were identified using comparative skeletal collections in London (British Museum-Natural History) and Sheffield, and I must thank Mr. A. Wheeler for assistance in this. An attempt has been made to recognise a range of bones in the skeleton including some identifiable only to the family level, in addition to the most diagnostic elements (jaws etc.). The reconstruction of fish size has been attempted in two ways. For all species the general size range has been noted, and measurements were made on bones of the hake and the Gadidae (cod family). The measurements used follow Wheeler & Jones (1976, 209-10): the width at the base of the prenaxillary processes and the depth of the dentary across the proximal edge of the foramen.

Wheeler A & Jones A (1976) Fish remains, 208-24 in Rogerson A Excavations on Fullers Hill, Great Yarmouth East Anglian Archaeology 2, 131-245

The age of a fish is roughly indicated by its size but it can be more accurately determined by studying the growth rings laid down on bones and other hard parts of the body. In temperate waters fish growth is markedly seasonal and this is reflected in their bones. The cessation of growth over winter leads to the formation of annual growth rings which are clearly visible on a number of structures, particularly the scales and otoliths (small bony elements within the ears). The scales from Okehamton are fragmented and were not identified but there are a number of otoliths and these have the advantage of being quite diagnostic as to species. They come from the hake and several gadoids, and were sectioned for microscopic examination in the normal manner (Blacker 1974). The main purpose of this work was not to determine their age but to establish the season of death from the amount of growth since the last annual ring.

All of the available material was examined to provide a large body of data but this leads to the problem of how it should be quantified. There are drawbacks to each of the methods commonly used in faunal studies. The use of the quantity of bone, by weight or number, suffers from serious biases between species resulting from differences in preservation, recovery and identification rates. The sources of variation are too numerus to list, but include the degree of calcification of the skeleton, the size of the fish and the taxonomic position of the species.

A calculation of the minimum number of individuals (MNI), where only the commonest element is counted, minimises many of these biases but introduces the problem of sample grouping. Each unit could be counted separately but this will lead to an exaggeration of the larger species. A significant proportion of units contain only a few bones and these are principally from the larger species; where there is a low concentration of bones the larger ones have a higher chance of recovery. This bias can be seen in the ranking of species by the number of units in which they occur (figure 1). This contrasts with an order of importance based on the MNI within the whole sample.

Blacker RW(1974) Recent advances in otolith studies in Jones FRH(ed) Sea Fisheries Research, 67-90

This latter technique obviously telescopes the material considerably which could affect species differently and must underestimate the amount of fish consumed(something that should be considered in attempting a reconstruction of meat values). A subdivision of the material would reduce these problems but would sacrifice sample size; as no obvious temporal or spatial variation was visible in the fish remains it was decided to treat it as one group.

SPECIES REPRESENTED

The most important group of fishes belong to the family Gadidae of which several species are present;

Whiting;Merlangius merlangus A common inshore fish,especially on the south coast;found mainly in depths of 30-100m over sand-mud bottoms swimming in shoals in mid-water or near the bottom. It comes nearest the coast in winter but can be caught at all seasons;it is an important species in inshore fisheries and is taken in trawls,seines and on lines. One of the smaller gadoids with an average size of 1kg;its flesh is highly regarded.

The whiting is the most numerous gadoid and all parts of the skeleton are present. The size range of the jaw bones is similar to that from Exeter (Wilkinson forthcoming) and Gt Yarmouth(Wheeler & Jones 1976, 224) and gives a fish size range of 30-50cm(Fig 2). This is supported by estimates made from otolith sizes and these were also used to look for evidence of the season of death. All of the sectioned otoliths show corrosion of their exposed surfaces and this obscures the final growth layers. However,this can be reconstructed and suggests that these whiting were caught near the close of the 'summer' growth ring,ie. during the summer months.

Haddock;Melanogrammus aeglefinus This species grows somewhat larger but the Okehampton bones come mainly from small-average sized fish(40-50cm). It lives close to the bottom over soft grounds in depths of 50-300m; the stocks and hence the fishery(with trawls and also lines) fluctuate from year to year. A good food fish and it keeps well ~~suited for preservation~~, but it is not so common on the south coast and is not as important as whiting. The otoliths face the same problem as the latter species but again suggest fishing during

Wilkinson MR(forthcoming) The fish remains from Exeter.

the summer.

Ling Molva molva A deepwater species inhabiting depths of several hundred metres, fished mainly in spring when spawning closer inshore(200m). Taken on lines, it grows to 200cm and its flesh is good particularly when salted and dried. All of the Okehampton material is large and butchery marks on several of the vertebrae show that it was filleted for consumption.

Cod, Gadus morhua The cod occurs in all British waters in depths down to 600m, but is less abundant in the south. It comes closest to the coast in winter but is taken through the year with trawls, lines etc. The bones are from fairly large fish-the species can reach 150cm and 40kg. Its flesh is good, fresh or preserved, and it provides other useful products.

Pollack, Pollachius pollachius A common inshore fish in southern waters that grows to a considerable size(over 100cm), not commercially important as it is fairly solitary and inhabits rough ground. It is caught in small numbers by lines and trawls. All sizes of fish except the smallest are represented at Okehampton.

Trisopterus sp. This genus contains two species that occur in the Channel, the bib T.luscus and the poor-cod T.minutus. Both are small inshore fishes not commercially sought but taken in trawls. Only two otoliths were identified from one unit and these could not be differentiated as to species.

Closely related to the Gadidae is the hake Merluccius merluccius . This is by far the most important species at the site and occurs in over half the units. All the bones come from fairly large fish(Fig 2), within a size range of c60-100cm. It was not possible to determine the season of death from the otoliths because in hake they are more difficult to read and they were also corroded. It is a fairly deepwater fish(165-500m) but comes nearer the shore in summer. An important species to the south and west of Britain it has been the object of a major fishery since at least the thirteenth century; though its flesh is coarse it is well-suited for drying and a large trade existed in this product.

The conger eel Conger conger occurs in a large proportion of units but only in small quantities. This may be related to the way this large, elongated fish was processed; it can reach over 180cm and 65kg. It frequents rocky ground

in all depths of water and is common off the south-west coast. Caught mostly on lines ;opinions of its flesh vary considerably though it is a good food fish fresh or preserved. Its skeleton is solid and quite distinctive so it may be over-represented relative to other species.

At least two species of flatfish are present at Okehampton. In one unit there are bones of the turbot Scophthalmus maximus,a large species(up to 100cm) found in inshore waters;it is a fine-flavoured fish taken mainly in trawls or on lines. The remaining bones are smaller and from them only one species was identified,the plaice Pleuronectes platessa. This species is very common in inshore waters over sandy' bottoms. It is the object of a major trawl fisher, but is also taken with seines and lines;the flesh is good and the fish grows to a reasonable size(average 60cm)

The gurnards(Triglidae) are very distinctive fishes with large armoured heads,the bones of which are easily recognisable. At least two species are present,both living on'Sandy' grounds in inshore waters;the grey gurnard Eutrigla gurnardus and the larger tub gurnard Trigla lucerna,reaching 40 and 60cm respectively.Rather less common in British waters are the sea breams (Sparidae) although two species are present at Okehampton,the red sea bream Pagellus bogaraveo and the pandora Pagellus erythrinus. The former reaches 50cm and is regularly taken in the deeper waters of the south coast while the latter is smaller frequents shallower depths and is now a visitor to these shores.

There are three pelagic,or surface-dwelling,species in the material; these swim in large shoals and are taken in vast quantities by surface nets though the mackerel Scomber scombrus in particular will also take a hook. Both this species and the scad Trachurus trachurus appear close inshore in summer,while the herring Clupea harengus is a ~~is a~~ winter visitor in the south-west. All are small fish but are caught in large numbers and are preserved by salting or smoking.

Only one species of shark/ray was identified although others may be present. The bucklers of the thornback ray Raja clavata are large and distinctive (only the teeth and denticles are likely to survive as these fish have cartilaginous skeletons),but this species is also the most common ray in coastal waters. It Lives on the bottom and is taken with trawls and on lines;it provides good flesh that can be preserved. The dory Zeus faber is a prime food fish,

and is quite common in inshore waters. However,it leads a passive,solitary existanceaand so is only caught in small quantities,mostly by trawls. The wrasses(Labridae) are shore fishes of rocky coasts,coming right to the shore during the summer months and moving on to deeper water in winter. Three species are common in the south-west including the largest, which reaches 50cm;though common and easily taken,their flesh is soft and not esteemed and so they are rarely exploited.

Two species that are exploited during the summer when they appear inshore-even to the extent of entering estuaries-are the bass Dicentrarchus labrax and the thick-lipped mullet Crenimugil labrosus. Bass can be caught by various gears but grey mullet are very difficult to hook and so imply the use of nets. The two remaining fish are migratory, spending part of their lives at sea but entering freshwater to spawn(salmon Salmo salar) or to live and feed(eel Anguilla anguilla). Both these fish are highly regarded for their distinctive flavours, in both fresh and preserved forms. They can be caught at various stages of their lives,but the main fisheries concentrate on their migrations when large numbers of fish pass through a constricted stretch of river over a short time;the most productive fishing gear in such situations are various forms of 'traps'. The main salmon fishery is based on their migration upstream to spawn in autumn, and while eels are caught all year there is a major fishery for the autumn movement of silver eels.

INTERPRETATION

Although the sample of fish remains was not collected with specific research aims in mind it has proved possible to investigate several methodological aspects in addition to producing a report on the remains themselves. While these may not have been conclusive they do point to the directions for further studies. For instance,there is as yet no satisfactory means for quantifying the material but we are now aware of variations in the recovery of different bones and from varying contexts. Also the evidence provided by the sectioning of otoliths was far from definitive but suggests that there is more scope for investigation.

Turning to the interpretation of the material from Okehampton Castle our understanding can be enhanced by looking at the wider historical record and the evidence from other archaeological sites. The most appropriate comparison is with Exeter,for which a large sample of fish remains has recently been analysed(Wilkinson forthcoming). This material includes a small Roman sample,and a continuous sequence from the twelfth to the nineteenth centuries,and was recovered by careful hand-sorting as at Okehampton. Their comparability

is borne out by the virtually identical species lists for the two sites. The few differences can be explained as the result of recovery procedures, for a number of the Okehampton units were sieved. The most important result of this is the position of the herring, which is absent from the Medieval levels at Exeter despite its known historical importance. In the most meticulously recovered unit from Okehampton at least seven individuals are represented which suggests that this species is seriously underrepresented at both sites. This may also apply to some other small species, like the eel, although this could also reflect more use of freshwater fish at the inland site.

The list of species at Okehampton, and their relative importance, together with the evidence for their size, age and season of death, gives a clear indication of the fishery supplying the site. It was predominantly marine and could all have come from the waters around the coasts of Devon; the productivity of these seas is clearly attested in historical times just as at the present day, with the addition of many southern fishes to the basically northern fauna. Many of the species would have been taken on handlines with a few hooks in depths of water from the shore to several hundred metres; this list includes the hake and the various gadoids. The other main fishing gear would have been the various surface nets, with the drift net for the herring etc. and probably the shore seine for others; several species could have been caught in any of these ways. Finally, freshwater/estuarine fish traps could have caught at least two of the species. There is no clear seasonal pattern to the fishing, with evidence for species taken during the summer together with those more likely to be caught in winter.

The similarity between the fish at Exeter and Okehampton Castle is interesting because it suggests that the transport of fish inland for at least 25 miles was no problem. There is also no evidence of different processing (butchery etc.) for the Okehampton fish which supports this claim of ease of movement. One point that could affect this, however, is the high status of this site which may have given it a greater pull than neighbouring settlements. The historical record makes clear that most of the fish were consumed in a preserved form and that fish was a very important food resource. Both of these points are not made apparent by the archaeological data, but this is largely due to the failings of our techniques. This is a new field of study that has much to learn but in return can offer a great deal to our historical understanding, given that our knowledge of Medieval fishing is fairly limited.

Figure 1: The species of fish represented at Okehampton Castle

	(1)	(2)	(3)
HAKE	55	77	22
CONGER EEL	32	35	5
FLATFISH(PLAICE)	24	33	15
WHITING	20	42	28
GURNARD	18	23	9
HADDOCK	17	23	13
LING	17	18	22
SEA BREAMS	16	28	1
COD	8	8	1
SHARK/RAY(THORNBACK)	7	7	1
EEL	6	6	1
POLLACK	5	5	1
SALMON	5	5	1
HERRING	4	10	1
MACKEREL	4	4	1
BASS	4	4	1
DORY	3	3	1
SCAD	2	2	1
THICK-LIPPED MULLET	2	2	1
BIB/POOR-COD	1	1	1
TURBOT	1	1	1

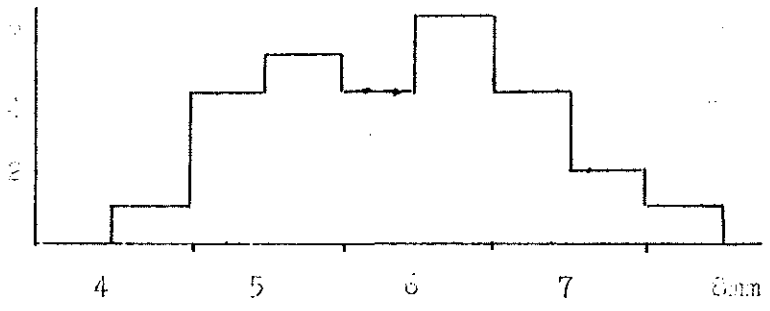
(1) No. of units in which a species occurs

(2) MNI based on individual units

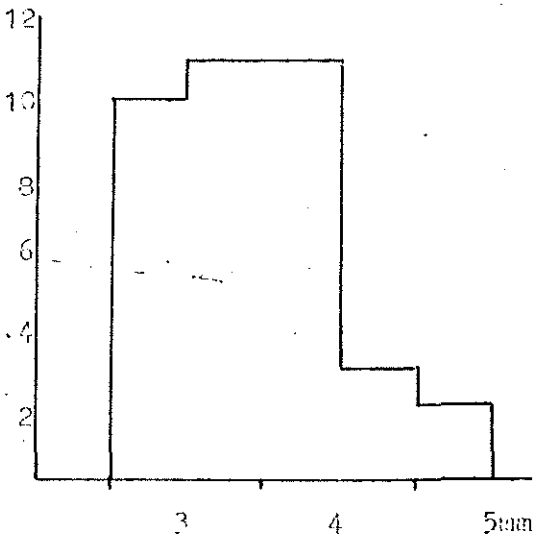
(3) MNI based on the whole sample

Figure 2: Size frequencies of whiting & hake premaxillary & dentary bones

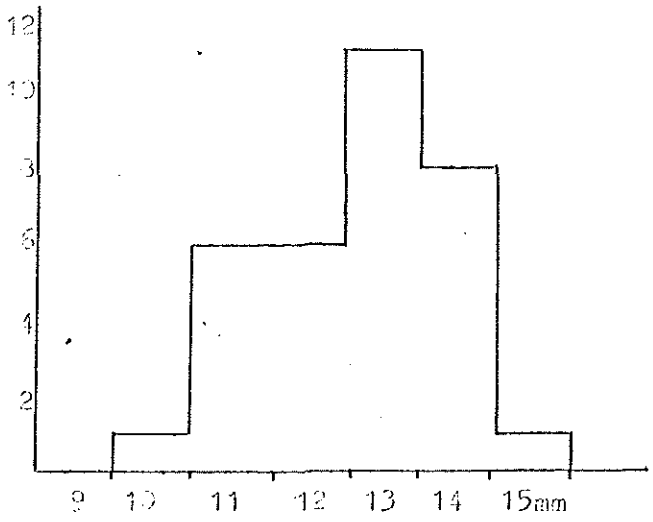
Whiting:premaxillaries



Whiting:dentaries



Hake:premaxillaries



Hake:dentaries