Posters

FISHBONES FROM A BRONZE AGE KITCHENMIDDEN IN SOUTHERN SWEDEN

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Summary

This paper presents the results of the analysis of the fishbone material from a kitchenmidden in southern Sweden, dated to the younger Bronze Age. 11,196 elements from marine fishes have been identified and size diagrams have been made for Gadus morhua *and Pleuronectidae.*

Quantification of the material has been made according to two methods and the different results are presented in diagrams. Local fishing and seasonality are discussed.

Résumé

Ossements de poissons d'un dépotoir domestique de l'Âge du Bronze en Suède méridionale.

Cet article présente les résultats de l'analyse des restes de poissons d'un dépôt de rejets de cuisine de l'Âge du Bronze récent dans le sud de la Suède. 11196 restes de poissons marins ont été identifiés et les diagrammes de taille ont été reconstitués pour Gadus morhua *et les Pleuronectidae.*

Le matériel a été quantifié selon deux méthodes dont les différents résultats sont présentés sur des diagrammes. La pêche locale et la saisonalité sont discutées.

Zusammenfassung

Fischknochen aus einem bronzeitlichen Küchenabfallhaufen in Südschweden.

In diesem Beitrag werden die Untersuchungsergebnisse der Fischknochen von einem bronzezeitlichen Abfallhaufen (Kjökkenmöddinger) in Südschweden vorgestellt. Insgesamt konnten 11.196 Knochenfragmente von Meeresfischen identifiziert werden. Größendiagramme wurden für Gadus mohua *und die Pleuronectidae angefertigt. Die Quantifizierung des Materials wurde mit Hilfe von zwei Methoden durchgeführt. Die unterschiedlichen Ergebnisse werden in Diagrammen dargestellt. Auch die lokale Fischerei und die Saisonalität derselben werden angesprochen.*

Key Words

Fishbones, Kitchenmidden, Size estimation, Quantification, Local fishing, Seasonality.

Mots clés

Os de poissons, Dépotoir domestique, Estimation de taille, Quantification, Pêche locale, Saisonnalité.

Schlüsselworte

Fischknochen, Kjökkenmöddinger, Größe, Quantifizierung, Lokale Fischerei, Saisonalität.

Presentation of the material. Methods

This paper presents the results of an osteological analysis of a fishbone material retrieved during the excavation in 1983-84 of a kitchenmidden at Sandeplan in southwest Scania, Sweden. The midden covered an area of 22 x 12 m (approximately 250 m^2) and the average thickness of the layers was 0.3 m. It was situated near the coast and is dated to the younger Bronze Age, period III-V, based on ceramics and other artifacts. The archaeological dating is confirmed by a ^{14}C- analysis giving the age of 2970 ± 50 bp.

The material is very well preserved owing to the special circumstances of the midden.

Due to the large amount of material, initially one third of the excavated squares - spaciously distributed in the midden - was selected for a thorough analysis. Later the analysis expanded with the inclusion of the entire material.

The fishbones have been identified to element and species by using the comparative collection at the Zoological Museum in Copenhagen, Denmark.

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Due to the various conditions of the material it was impossible to weigh it or measure the volume; the only method was to count the separate elements. Part of the material was meticulously clean, while other parts were very dirty or even embedded in massive crusts of clay. Regarding fishbones, methods of excavation and curation of the material need some improvement (Wheeler and Jones, 1989).

As many as 11,196 elements have been identified. Eight species are represented: *Gadus morhua* (cod), *Acipenser sturio* (sturgeon), *Belone belone* (garfish), *Clupea harengus* (herring), *Scomber scombrus* (mackerel), *Pleuronectes platessa* (plaice), *Platichthys flesus* (flounder) and *Psetta maxima* (turbot; Whitehead *et al.*, 1986). Some elements were only determined to families, e. g. Pleuronectidae, Bothidae and Gadidae.

All species are well spread over the total area of the midden, both vertically and horizontally. Elements from all regions of the cod are present in the material.

The species that are represented by a minor number of elements are also represented by both skullbones and bones of the body (vertebrae). Regarding the mackerel only two vertebrae were found and one cranial bone from the sturgeon. No butcheringmarks were found on the fish bones, but 19 cases of pathological changes were registered.

Estimating the size of the fishes

Size diagrams have been established for *Gadus morhua* and Pleuronectidae. The bones have been measured at specific points, and, by calculating regression lines based on the same measurements of recent fishes with a confirmed total length, the size of the Bronze Age fishes has been estimated (Casteel, 1976; Wheeler and Jones, 1989).

Measured codbones are praemaxillare, dentale, vertebra I and vertebra II (Bödker-Enghoff, 1983, 1989). The diagrams based separately on these elements give the same result. For cod, the size span lies from 36 to 117 cm, the majority between 50 and 90 cm (Cardell, 1995; fig. 1).

When a comparison is made with the size of cod in the Baltic Sea today, it seems possible that the specie was bigger during the Bronze Age or that a greater number of individuals reached a higher age.

The flatfishes vary from 20 to 39 cm. Measured bones are os anale (Bödker-Enghoff, 1986).

Quantification of the material from Sandeplan

The material from Sandeplan was quantified according to two different methods, which gave totally different results: in the first case, by counting the elements and in the second, by calculating minimal number of individuals. Using

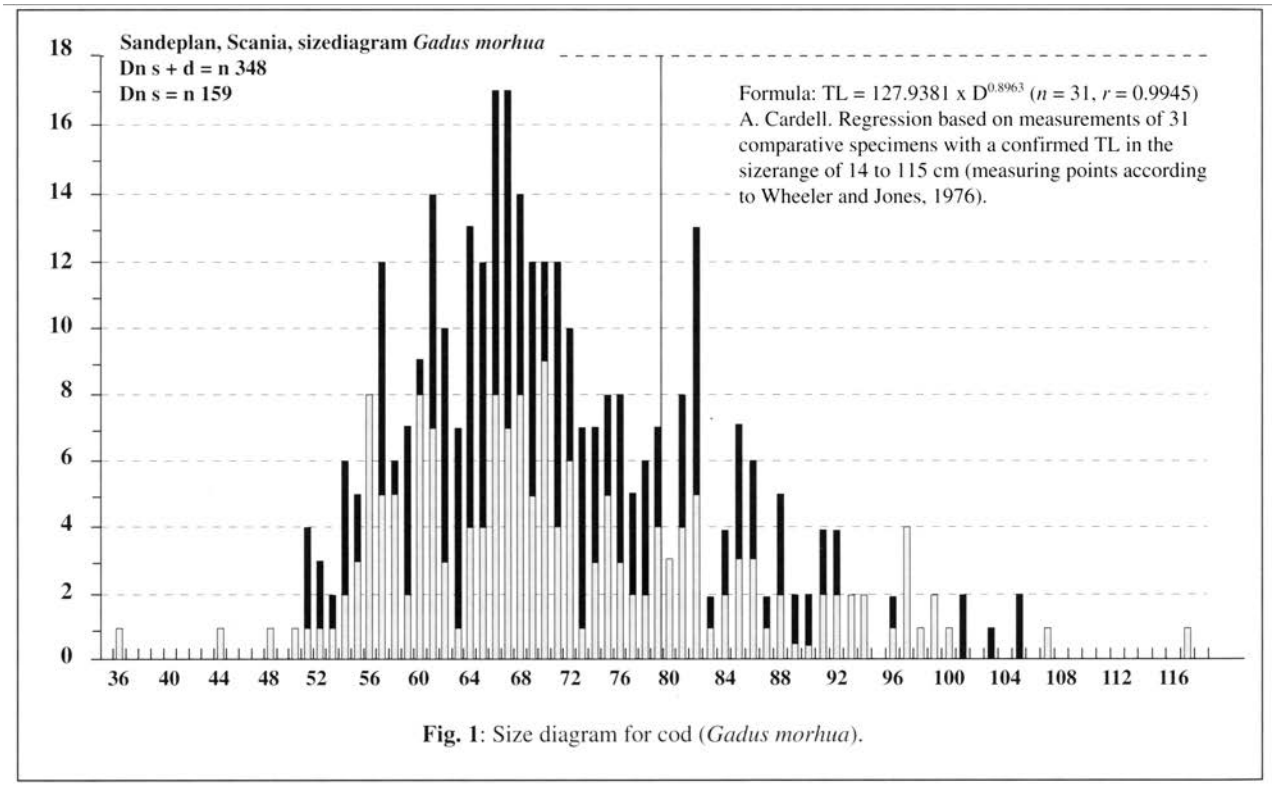

Fig. 1: Size diagram for cod (*Gadus morhua*).

the registered elements within each species I got a diagram showing that the cod totally dominates the material with 92.6%, and that, within the other species, the garfish is as frequent as the flatfishes.

I do not believe that this is the true picture of the fishing at Sandeplan, as the garfish is a seasonal species which occurs in these waters during summer and normally is being caught within a few weeks. It would be extremely peculiar if the garfish was as important as the flatfishes for the fishers of the Bronze Age.

Therefore I tried the other way, although knowing that it is considered unorthodox to use the MNI-method on fish-material. There are several biases when counting fishbones: different size and number of bones of different species, different constitution/robusticities which gives them different possibilities to be preserved and of course to be retrieved during excavation. The herring is surely underrepresented because of its tiny size and bone structure. The methods of excavation indeed plays a great part especially concerning fishbones. The question is whether or not the material has been sieved and how meticulously the bones have been collected. Also the handling of the material after excavation has had the result that it is more fragmented. Bearing in mind these details, I believe that the diagram based on the minimal number of individuals is closer to the reality. In this diagram the cod represents 58.9%, Pleuronectidae 31.1%, Bothidae 3.7%, the garfish 3.3% and the rest of the species 3% (fig. 2).

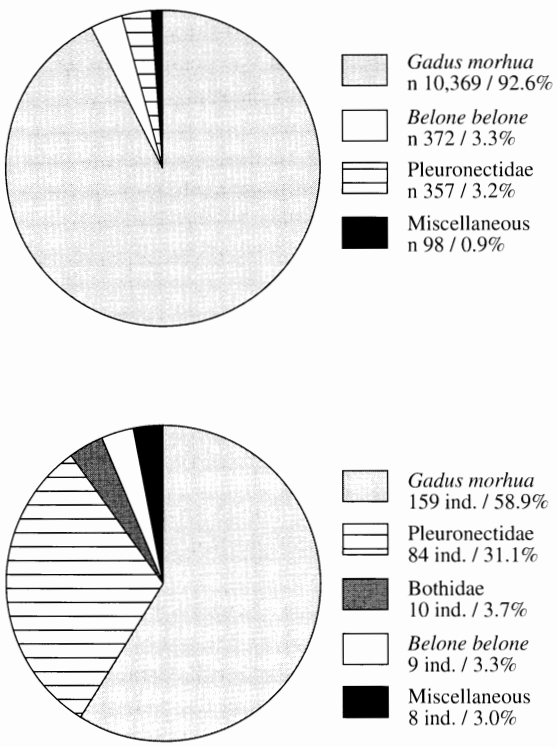

Fig. 2: Relative frequences of species based on number of identified elements (above) and minimal number of individuals (below).

Today cod, herring and flatfishes together with Eel, which is absent at Sandeplan, represent the bulk of fishing round the coast of Scania (Curry-Lindahl, 1985).

Pathological changes

Pathological changes occur on some of the fishbones; nineteen cases of seven different types of changes are registered in the total material. Most of the different changes concerns vertebrae. There are six cases of vertebrae that are joined together, three cases of vertebra with a thickened body, one case of compressed vertebra and four cases where the vertebra looks abnormal. A tubercle occurs in four cases, three on the dentale and one on the praemaxillare. And finally one post temporale is thicker than normal.

The pathological changes can be explained as traces of infectious diseases, tumours, congenital malformations or traumas of different kinds, such as bites from other fishes, or when the fish has been caught in a net or on a hook and was able to get loose.

Most of these things would have allowed the fish to live without problems. Another explanation is that the fish has lived under hard circumstances on the border of its demands for nutrition, salinity, temperature, and therefore developed these anomalies.

Biting marks

During the analysis a remarkable find was made. A left praemaxillare originating from a cod with the total length of 88 cm, bears distinctive marks of gnawing - or rather biting. The marks fit extremely well with the upper carnassial tooth (P^4) of the jaw of a medium sized dog (fig. 3).

Local fishing

The material points to local fishing, according to the list of species. The fact that elements from all regions of the fish body are present in the material indicates local fishing and consuming at the site. The material exclusively consists of marine species. Today the very same species, excluding the sturgeon which now is an extinct species, have their natural habitat in the waters close to the site.

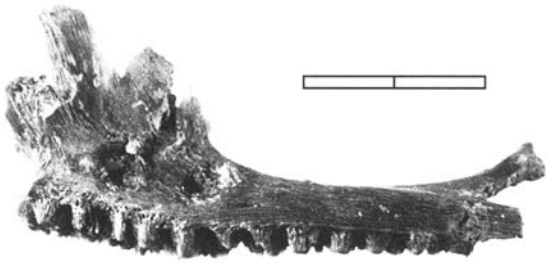

Fig. 3: Praemaxillare of cod with biting marks made by a dog (the scale is 2 cm long).

Gadus morhua is the only Gadidae present. This probably results from the fact that the other species of this group prefer water of a higher salinity and therefore seldom occur this far south in the Öresund and the Baltic Sea (Curry-Lindahl, 1985). The size of the cod can be explained by the hypothesis that the inhabitants at Sandeplan preferred to conduct their fishing on the south coast of the small peninsula, where the water depth increases rapidly to nearly 20 m.

Methods of fishing

Available methods of fishing during the Bronze Age in Scandinavia and applicable to the species at Sandeplan were nets, hooks and traps of wickerwork. The fishing was probably conducted near the coast or from small boats. It is also possible that harpoons and prongs have been used in shallow water.

A stone presumed to have been used as a sinker for nets was found on the site of Sandeplan, but no other fishing equipment has been retrieved.

Seasonality

There are two migratory species present in the material that can be used as indicators of season of inhabitation. Those are the mackerel and the garfish. Both species swim down the Öresund and enter the Baltic Sea in the beginnning of May to spawn (Curry-Lindahl, 1985). Usually the garfish is caught near the coast during a few weeks of this migration although the species spends the summer in the Baltic Sea. The flounder also prefers shallow coastal waters during the summer season. Growth ring analysis on vertebrae was made by Leif Jonsson and he reached the same conclusion. Early summer is the most likely period of inhabitation at Sandeplan, but it is possible that the site has been used for a longer part of the year.

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