MEETINGS

Fifth Meeting of the Fish Remains Working Group

This meeting was held from 5th to 9th September 1989 in a fisherman village at Stora Kornö, a small island near the west coast of Sweden. It was organized by Leif Jonsson of the Central Board of National Antiquities and the National Historical Museums, Kungsbacka. At Stora Kornö nearly 30 archaeozoologists with special interests in fish remains from several European countries, USA and Canada came together. The participants gave lectures and presented posters in addition to site reports, a lot of papers dealt with special problems in the field of archaeo-ichthyology. Topics discussed included seasonal dating of fish material, osteomorphological and osteometrical analyses of fish bones, the value of scales in archaeo-ichthyological research, and taphonomic influences on fish bones (e.g. burning). Further it was shown that fish bone assemblages can give information about prehistoric fishing and fish trade, and that they can point to the value of certain fish species as food. Fish remains also can be an indicator for ecological conditions.

There was an excursion to Kristineberg, the Marine Biological Station at Fiskebäcksil near Lysekil. Participants inspected the laboratories and were informed of the aims and ambitions of this institution.
The final discussion emphasized the importance of a catalogue of fish skeletons available in the different research laboratories. Elizabeth Wing has already prepared such a catalogue and looks for further data concerning fish skeletal material. Alfonso Rojo's forthcoming "Archaeologist's Guide to Fish Osteology" will attempt to standardize the nomenclature of the skeletal elements and also other terms used in archaeo-ichthyology. This book will come out shortly. It is planned to publish the contributions given at the meeting. The proceedings of the conference will be edited by Leif Jonsson. It was decided to held the next meeting of the fish remains working group in 1991 at Kiel/Schleswig.

Finally it is to mention that is was a successful meeting for all participants which was very good organized by Leif Jonsson.

Dirk Heinrich  
Institut für Haustierkunde  
Neue Universität  
Olshausenstraße 40  
2300 Kiel  
Germany, FRG

Sixth International Conference of the International Council of Archaeozoology

May 21-25, 1990, The Sixth International Conference of the International Council for Archaeozoology (ICAZ) will be held at the Smithsonian Institution, Washington D.C. The Conference takes as its central theme the nature and implications of human/animal interactions over time. Contributed papers should be explicitly directed towards assessing the impact of human/animal relationships on the distribution, behavior, morphology, and survival of animal species. Contributions are also sought which examine the role of animals in human subsistence economies, in social and political relations, and in ritual and religion. The Conference will include workshops, oral presentations, poster sessions, and field
trips. Inquiry about this Conference should be directed to:
ICAZ, Department of Anthropology, NMNH, Smithsonian Institution, Washington D.C., 20560, U.S.A.

Melinda Zeder
Chair, ICAZ Planning Committee
Department of Anthropology
NMNH, Smithsonian Institution
Washington, D.C. 20560

Seventh Congress of European Ichthyologists

Dear colleagues

Following the indications from our last meeting, I have got a series of informations in relation to the 7th Congress of the European Union of Ichthyologists after talking with Jørgen Nielsen, from the Zoological Museum of Copenhagen.

This is what I know for the moment:

1) The Congress is going to be held in the middle of August 1991 in Amsterdam, not Lissabon.

2) The organizers will be probably one or both of the following persons:

Barel C.D.N., Dr.
Zoologisch Laboratorium
Postbus 9516
2300 RA Leiden
The Netherlands

Nijssen, H. Dr.
Department of Ichthyology
P.O. Box 4766
1009 AT Amsterdam
The Netherlands

3) The contacts with the ICAZ fish remains working group would be very warmly welcomed and J. Nielsen thinks that our work fits nicely among several of the research lines into which these Congresses are organized normally.
4) If a group of papers from our group is big enough, there would probably be a session set up just for them.

With all this informations I think the most proper things at the moment are:
a) to ask our Dutch friends to continue with the investigations and
b) to see if the dates of both meetings could be organized in such a way so that interested people could go to Kiel right after the end of the meeting in Amsterdam.

Also, I think it could be nice if someone of these people are encouraged to assist the Kiel Conference and study ways of increasing cooperation.

In any case, this is the moment I want to take to congratulate you for being such a wonderful group of people. I’m proud and happy of belonging to the ICAZ FWG!

signed
Arturo Morales

Departamento de Biología
Facultad de Ciencias
Universidad Autónoma de Madrid
28049 Madrid
Spain

VIth Ichthyo-archaeology Meeting - First announcement and call for papers

The sixth meeting of archaeologists, historians, osteologists and biologists interested in subfossil fish remains especially from archaeological sites and the problems involved in working on such material will take place from the 3rd - 7th of September, 1991, at the "Archäologisches Landesmuseum der Christian-Albrechts-Universität zu Kiel" in Schleswig, FRG.
To keep the costs of the meeting as low as possible I am seeking financial support. That requires the establishment of a detailed programme already now as well as the list of the participants willing to give lectures and the titles of their papers.

Contributions on all aspects of archaeological and other subfossil fish remains are welcome, that means not only site reports from all parts of the world, but also ethnoarchaeozoological investigations, modern experiments, methodological and osteological analyses.

Participants are asked to keep their contributions as short as possible (5 to 15 minutes) in order to allow a large number of papers to be presented. Poster presentations are also welcome. There will be ample opportunity to display unusual or unidentified specimens.

The meeting will take place at Schloß Gottorf in the rooms of the "Archäologisches Landesmuseum". Accommodation will be available in guestrooms belonging to the museum and - to reduced charge as I hope - in nearby hotels.

There will be opportunities to visit the laboratories of the "Archäologisch-Zoologische Arbeitsgruppe", the site of early medieval Haithabu as well as the "Wikinger Museum Haithabu" situated nearby and the exhibitions at Schloß Gottorf (archaeology, folklore, cultural history, art). On Saturday 7th September there will be an optional excursion to sites of interest in Schleswig-Holstein.

Please, use the enclosed form for your provisional registration and send it back as soon as possible to

Dirk Heinrich
Institut für Haustierkunde
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2300 Kiel
Germany, FRG
A Catalogue of European Subfossil Carp (Cyprinus carpio L.): Your Help is Requested

As part of a larger research interest in freshwater fish and fisheries in medieval (i.e. ca. 4th-16th century A.D.) Europe I have begun interdisciplinary study of carp culture and the westwards diffusion of this species by human agency, probably from a native range on the middle and lower Danube. Conversations at the Stora Kornö meeting of the Fish Remains Working Group confirmed my belief that the subfossil record of Cyprinus carpio was nowhere assembled and encouraged my intention to gather, analyse, and publish that information. A comprehensive collection of the archeological data will set important bench marks to describe and understand this historic human intervention in European aquatic ecosystems. Fish bone workers and other archeozoologists can help improve the speed and accuracy of this collection.

Please send to me what informations you have about remains of Cyprinus carpio found in Europe west of the Dnieper and its tributaries and dating before approximately AD 1600. If the find has been published I welcome either a photocopy of the excavation report or a good citation of where and how that report has appeared. News of unpublished carp remains is especially critical. If possible, please send me a description of the finds with their site and context (including other fish species present), their probable date and how it was determined, the excavator and the individual responsible for the fish bone materials, and the present location of the finds. The format Knud Rosenlund used in his Catalogue of Subfossil Danish Vertebrates: Fishes (København, 1976) may serve as a model. If the drainage basin of the site is potentially ambiguous to a non-native, please identify it. Archeologists and zooarcheologists who have recovered from Iron Age or later European sites only the remains of other cyrinids (i.e. no carp) have potentially relevant information, too. Of course I shall acknowledge any information received and in any future publication be scrupulous to identify all published excavators and other informants.
References or reports written in any European language should be sent to Professor Richard C. Hoffmann, Department of History, 226 Vanier College, York University, 4700 Keele Street, North York, Ontario, Canada M3J 1P3. With luck we may anticipate at least an interim report at the next meeting of the Working Group in 1991.

Richard C. Hoffmann

OBITUARY

In memoriam: On October 22, 1989, Dr. Hanan LERNAU passed away at the age of 88. His first career was in the field of veterinary surgery, but after his retirement he switched to his hobby, archaeology. His new field of activity was archaeozoology, and here he soon concentrated in fish bones. He has built up reference collections, and several publications attest his successful work. I have always admired his scientific inquisitiveness which I think was a pre-condition for his second career. He was an active member of our fish remains working group, whose death is deeply regretted.

Dirk Heinrich

MISCELLANEOUS

Andrea BULLOCK, formerly working at the Environmental Archaeology Unit in York, is now employed at the Faunal Remains Unit, Department of Archaeology, University of Southampton, Southampton SO9 5NH.
I can order and either ship or have shipped white cotton t-shirts imprinted with a roughly 30 x 30 cm fish bone design. Shirt sizes are small, medium, large, and extra large. Cost will probably be $30,-- Canadian ($25,-- US), shipping included. Those interested should write to me with their size and the number of shirts they want. I will try to make one order from all the requests I get by 1st May. It may take some months between the requests and a complete order, so I think people should not pay until I bill them with the shirts.

Richard C. Hoffmann
Department of History
York University
4700 Keele Street
North York, Ontario
Canada, M3J 1P3

SHORT COMMUNICATION

Inventory of fish bone measurements for estimating fish size

by

Wietseke Prummel and Dick C. Brinkhuizen

This document presents an inventory of the fish bone measurements for which equations, graphs or factors to estimate the length of the fish and its weight, are available in literature. The aim of the inventory is to make these methods better known among ichthyo-archaeologists.

The three most frequently used methods for the estimation of fish size on the basis of bone size are: the proportional method (f), the graphical method (g) and the regression method (e). The proportional method (factor) gives the least
reliable results, whereas the regression method is preferable to the graphical method.

The weight of an individual fish can show considerable variation over the year because of changes in the development of the gonads and in food supply for instance. The length of an individual fish does not fluctuate, it only increases. Therefore, fish length estimates are more precise than weight estimates. Estimates of fish weight on the basis of bone measurements show a much larger proportion of error. Therefore, we prefer the regression method in two steps (the double regression method according to Casteel 1976), to estimate fish weight:

1. a linear regression between the fish bone measurement and a length parameter of the fish
2. a linear regression between the logarithmic transformations of the fish length parameter and fish weight.

The regression method in two steps to estimate fish length and weight is already followed by most ichthyo-archaeologists cited in this inventory.

In using the factors, graphs or equations mentioned in this inventory one should be aware that their validity is limited. This is best explained by Rojo (1986), from which we took over the next citation (p. 330):

"The regressions ... are only valid for the population and for the size range from which the sample is taken. ..., they can be applied to past material with a certain degree of confidence. Extrapolation outside the range studied is very inaccurate, especially when estimating weight and age. ..., the larger the difference in place and time, the larger the error in estimating the size of the animal when using one single formula or index. For instance, for the same otolith length (15 mm), the length of Atlantic cod from two different areas of the Northwest Atlantic varied from 507 to 602 mm, a total of 95 mm."

Because of this we are of the opinion that before applying factors, graphs or equations to past material from a different area, their validity should be tested for recent specimens
from that area. As a rough rule a deviation of about 10% between actual and estimated length still can be regarded as acceptable, as this deviation may also occur within a population (Brinkhuizen 1989: Table 4.4).

In the inventory some publications are listed that use otolith measurements to estimate fish size. A handbook on the otoliths of the Northeast Atlantic bony fishes gives regression equations between otolith length and fish length and weight (Härkönen 1986). The book has not been consulted by us.

In future, more publications for estimating fish length and weight will come available. We may have overlooked studies that have already been published. It is our intention to summarize these as supplements to this inventory in next issues of Ichthyo-osteo-archaeology News. Ichthyo-archaeologists are invited to send comments, corrections and additions to the above address.

Explanation of the way of presentation of the inventory

The measurements have been presented in the sequence of family, species. The head for each species refers which publications contain methods to estimate length and/or weight of the fish (see Abbreviations), and between brackets the type of these methods:

e regression equation(s) available

g graph(s) available

f factor(s) available

The details of the measurements are presented in this shape: Skeletal element, abbreviation of the reference, notation of the measurement by the author(s), and between brackets the number of (the page where is given) the figure that illustrates the way the measurement has to be taken; eg:

dentale Hall Lo (Fig. 1.B)
Synonyms of the equations or graphs by different authors are given between [ ]. The sequence of listing is arbitrary; eg:

dentale Bkh1 5.17:1 [= NoeN b]

(N.B. In Bkh1 the notation of the measurement refers to the number of the figure)

If a specific illustration is absent, we have referred to the more global figures of Morales & Rosenlund (1979); eg:

parietale Bene PARIET 1 (M&Ro 18.A:1)

Details on the equations, graphs or factors themselves have to be derived from the references (Bibliography).

Abbreviations

Bene Benecke 1987; code for measurement (eg OPERCUL 1)
BoDr Boessneck & von den Driesch 1979.
Bkh1 Brinkhuizen 1989; figure number (eg 5.4) and measurement number (together eg 5.4:1).
Bkh2 Brinkhuizen in press.
Des1 Desse 1984.
Des3 Desse, Desse-Berset & Rocheteau 1987b.
Eng1 Bødker Enghoff 1983.
Hall Hallet 1982.
Hein Heinrich 1987; Figure number (eg Abb. 27).
Lib2 Libois & Hallet-Libois 1988; Tableau 2 (page 22).
MeWi Mellars & Wilkinson 1980.
NoeN Noe-Nygaard 1983.
Rojo Rojo 1986.
Acipenseridae

Acipenser sturio: Bkh1 (e, g)

lateral scute Bkh1 lat.pl.gr.h. [no exact estimate of total length, only a range within which fell the real total length; Fig. 9.18 (p. 255)]

Anguillidae

Anguilla anguilla: Lib1 (e, g), Eng2 (e)

frontale Lib1 L(Fr) (Fig. 2)
basioccipitale Lib1 L(Bo) (Fig. 2)
maxillare Lib1 L(Mx) (Fig. 2)
Lib1 D(Mx) (Fig. 2)
dentale Lib1 L(De) (Fig. 2)
Eng2 width (Fig. 4)
articulare Lib1 L(Aa) (Fig. 2)
Lib1 D(Aa) (Fig. 2)
operculare Lib1 L(Op) (Fig. 2)
Lib1 D(Op) (Fig. 2)
keratothyale Lib1 L(Ch1) (Fig. 2)
Lib1 L(Ch2) (Fig. 2)
Eng2 width (Fig. 4)
cleithrum Lib1 L(Ab) (Fig. 2)
Lib1 D(Ab) (Fig. 2) [= Eng2 (Fig. 4, a)]
1st vertebra Eng2 Wfv

Clupeidae

Sardina pilchardus: WhLo (g)
dentale WhLo length (Fig. 1)
operculare WhLo width (Fig. 1)
Cyprinidae

Rutilus rutilus: Bkh1 (e, g), Hein (g), Lib2 (e), Eng2 (e)

praeperculare  Bkh1 5.3:1
               Bkh1 5.3:2
operculare     Bkh1 5.4:1
               Bkh1 5.4:2
               Bkh1 5.4:3

pharyngeum inferius
                 Bkh1 5.5:1
                 Bkh1 5.5:2 [= Hein Abb. 20]
                 Bkh1 5.5:3
                 Lib2 L (Fig. 2.C)
                 Lib2 Da (Fig. 2.C)
                 Lib2 Ds (Fig. 2.C)

cleithrum       Bkh1 5.7:1
                 Bkh1 5.7:2

1st vertebra    Eng2 Wfv

2nd vertebra    Eng2 Wsv

Rutilus frisii meidingeri: Tork (g) [NB estimates of total and gutted weights instead of total length].

dentale         Tork 1 (p. 8)
                 Tork 2 (p. 8)

quadratum       Tork 1 (p. 9)
                 Tork 2 (p. 9)

hyomandibulare  Tork 1 (p. 9)
                 Tork 2 (p. 9)

keratohyale     Tork 1 (p. 9)
                 Tork 2 (p. 9)

pharyngeum inferius
                 Tork 1 (p. 8)
                 Tork 2 (p. 8)

Rutilus erythrophthalmus: Bkh1 (e, g), Lib2 (e)

maxillare       Lib2 L (Fig. 24)
                 Lib2 H (Fig. 24)
                 Lib2 E (Fig. 24)

dentale         Lib2 L (Fig. 5)
                 Lib2 H (Fig. 5)
                 Lib2 C (Fig. 5)

praeperculare   Bkh1 5.3:1
                 Bkh1 5.3:2
operculare
  Bkh1 5.4:1
  Bkh1 5.4:2
  Bkh1 5.4:3

pharyngeum inferius
  Bkh1 5.5:1
  Bkh1 5.5:2
  Bkh1 5.5:3

cleithrum
  Bkh1 5.7:1
  Bkh1 5.7:2

**Alburnus alburnus**: Lib2 (e)

dentale
  Lib2 L (Fig. 5)
  Lib2 H (Fig. 5)
  Lib2 C' (Fig. 5)

maxillare
  Lib2 L (Fig. 24)
  Lib2 H (Fig. 24)
  Lib2 E (Fig. 24)

**Abramis brama**: Bene (e), Lib2 (e), Bkh1 (e, g), Hein (g)

parietale
  Bene PARIET 1 (M&Ro 18.A:1)
  Bene PARIET 2 (M&Ro 18.A:2)

frontale
  Bene FRONTAL 1 (M&Ro 18.B:1)
  Bene FRONTAL 2 (M&Ro 18.B:2)

parasphenoideum
  Bene PARASPH 1 (M&Ro 17:1)
  Bene PARASPH 2 (M&Ro 17:2)
  Bene PARASPH 3 (M&Ro 17:3)

supraoccipitale
  Bene SUPOCC 1 (M&Ro 19.A:1)
  Bene SUPOCC 2 (M&Ro 19.A:2)

vomer
  Bene VOMER 1 (M&Ro 16:1)
  Bene VOMER 2 (M&Ro 16:2)

maxillare
  Bene MAXILL 1 (Abb. 1.5:1) [= Lib2 L (Fig. 24)]
  Bene MAXILL 2 (Abb. 1.5:2)
  Bene MAXILL 3 (Abb. 1.5:3)
  Bene MAXILL 4 (Abb. 1.5:4)
  Bene MAXILL 5 (Abb. 1.5:5)
  Lib2 E (Fig. 24)

quadratum
  Bene QUADRAT 1 (M&Ro 25:1)
  Bene QUADRAT 2 (M&Ro 25:2)
  Bene QUADRAT 3 (M&Ro 25:3)

hyomandibulare
  Bene HYOMAND 1 (Abb. 1.3:1)
  Bene HYOMAND 2 (Abb. 1.3:2)
  Bene HYOMAND 3 (no figure)
  Bene HYOMAND 4 (Abb. 1.3:4)
articulare
Bene ARTICUL 1 (M&Ro 23:1)
Bene ARTICUL 2 (no figure)
Bene ARTICUL 3 (no figure)

dentale
Bene DENTALE 1 (M&Ro 22:1) [= Lib2 L (Fig. 5)]
Bene DENTALE 2 (M&Ro 22:2) [= Lib2 H (Fig. 5)]
Bene DENTALE 3 (M&Ro 22:3)
Bene DENTALE 4 (M&Ro 22:4)

praeoperculare
Bkh1 5.3:1
Bene PRAEOP 1 (Abb. 1.2:1)
Bkh1 5.3:2 [= Bene PRAEOP 2 (Abb. 1.2:2);
Hein Abb. 27]
Bene PRAEOP 3 (Abb. 1.2:3)

operculare
Bkh1 5.4:1 [= Bene OPERCUL 2; Hein Abb. 26]
Bkh1 5.4:2 [= Bene OPERCUL 1]
Bkh1 5.4:3 [= Bene OPERCUL 6 (Abb. 1.1:6)]
Bene OPERCUL 3 (M&Ro 35:3)
Bene OPERCUL 4 (M&Ro 35:4)
Bene OPERCUL 5 (Abb. 1.1:5)

suboperculare
Bene SUBOP 1 (M&Ro 37.A:1)
Bene SUBOP 2 (M&Ro 37.A:2)
Bene SUBOP 3 (M&Ro 37.A:3)

interoperculare
Bene INTEROP 1 (M&Ro 37.B:1)
Bene INTEROP 2 (M&Ro 37.B:2)

epihyale
Bene EPIHYAL 1 (M&Ro 33.B:1)
Bene EPIHYAL 2 (M&Ro 33.B:2)

keratohyale
Bene CERATOH 1 (M&Ro 33.A:1)
Bene CERATOH 2 (M&Ro 33.A:2)

urohyale
Bene UROHYAL 1 (M&Ro 33.C:1)
Bene UROHYAL 2 (M&Ro 33.C:2)
Bene UROHYAL 3 (no figure)

pharyngeum inferius
Bkh1 5.5:1 [= Bene OSPHAR 1]
Bkh1 5.5:2 [= Bene OSPHAR 2; Lib2 L (Fig. 2.B)]
Lib2 Ds (Fig. 2.B)
Bene OSPHAR 3 (no figure)
Bene OSPHAR 4 (no figure)

posttemporale
Bene POSTTEM 1 (M&Ro 41.A:1)
Bene POSTTEM 2 (M&Ro 41.A:2)

supracleithrale
Bkh1 5.6 [= Bene SUPCLEI 2]
Bene SUPCLEI 1 (M&Ro 41.B:1)

cleithrum
Bkh1 5.7:1 [= Bene CLEITHR 1]
Bkh1 5.7:2 [= Bene CLEITHR 2]
Bene CLEITHR 3 (no figure)
Bene CLEITHR 4 (Abb. 1.4:4)
Bene CLEITHR 5 (Abb. 1.4:5)
cleithrum
  Bene CLEITHR 6 (Abb. 1.4:6)
  Bene CLEITHR 7 (Abb. 1.4:7)

basipterygium (pelvis)
  Bkh1 5.8:1 [= Bene PELVIS 1 (Abb. 1.6:1)]
  Bkh1 5.8:2 [= Bene PELVIS 2 (Abb. 1.6:2)]
  Bene PELVIS 3 (Abb. 1.6:3)
  Bene PELVIS 4 (Abb. 1.6:4)

Abramis (Blicca) bjoerkna: Bkh2 (e)

pharyngeum inferius
  Bkh2 (M&Ro 43.B:1; Bkh1 5.5:1)

Tinca tinca: Hein (g), Lib2 (e)

maxillare
  Lib2 L (Fig. 24)
  Lib2 E (Fig. 24)

dentale
  Lib2 A (Fig. 6)
  Lib2 C' (Fig. 5)

operculare
  Hein Abb. 24 (M&Ro 35:2)

pharyngeum inferius
  Lib2 L (Fig. 2.A)
  Lib2 Da (Fig. 2.A)
  Lib2 Ds (Fig. 2.A)

Gobio gobio: Lib2 (e)

dentale
  Lib2 L (Fig. 5)
  Lib2 H (Fig. 5)

pharyngeum inferius
  Lib2 L (Fig. 3.A)
  Lib2 Ds (Fig. 3.A)

Cyprinus carpio: Lib2 (e), Bkh2 (e)

dentale
  Lib2 L (Fig. 5)
  Lib2 H (Fig. 5)
  Lib2 C (Fig. 5)

maxillare
  Lib2 L (Fig. 24)
  Lib2 E (Fig. 24)

pharyngeum inferius
  Lib2 L (Fig. 4.B)
  Lib2 Da (Fig. 4.B, as 'd')

2nd+3rd vertebra
  Bkh2 maximum height (no figure)

5th vertebra
  Bkh2 maximum height (no figure)
Siluridae

Silurus glanis: Bkh1 (e, g)
mesethmoideum  Bkh1 5.12
frontale  Bkh1 5.13
1st vertebra  Bkh1 maximum width (M&Ro 44-45)
cleithrum  Bkh1 5.14:1
          Bkh1 5.14:2
          Bkh1 5.14:3

Esocidae

Esox lucius: Bkh1 (e, g), Hein (g), Tork (g), NoeN (e, g)
[NB Tork estimates total and gutted weights instead of total length].
parashenoidem  Bkh1 5.16
basioccipitale  Bkh1 maximum height (M&Ro 19.B:1)
               Bkh1 maximum width (M&Ro 19.B:2)
dentale  Bkh1 5.17:1 [= NoeN b]
         Bkh1 5.17:2 [= Hein Abb. 15 (p.206)] (medial)
         Bkh1 5.17:3 (lateral)
         Bkh1 5.17:4
         NoeN a (no figure)
         Tork 1 (p. 9)
         Tork 2 (p. 9)
articulare  Bkh1 5.18:1
            Bkh1 5.18:2
praepercular  Bkh1 5.19:1
               Bkh1 5.19:2
quadratum  Bkh1 5.20:1
            Bkh1 5.20:2 [= Tork 2 (p. 9)]
            Bkh1 5.20:3
            Tork 1 (p. 9)
palatinum  Bkh1 5.21:1
            Bkh1 5.21:2
hyomandibulare  Tork 1 (p. 9)
                Tork 2 (p. 9)
keratohyale  Bkh1 5.22:1 [= Tork 1 (p. 9)]
             Bkh1 5.22:2 [= Tork 2 (p. 9)]
             Bkh1 5.22:3
cleithrum  Bkh1 5.23:1 [= Hein Abb. 16]
            Bkh1 5.23:2
            Bkh1 5.23:3
Salmonidae

Salmo trutta: Hall (e, g)
dentale Hall Lo (Fig. 1.B)

Hucho hucho: Tork (g) [NB estimates of total and gutted weights instead of total length].
dentale Tork 1 (p. 9) Tork 2 (p. 9)
quadratum Tork 1 (p. 9) Tork 2 (p. 9)
hyomandibulare Tork 1 (p. 9) Tork 2 (p. 9)
keratoxyale Tork 1 (p. 9) Tork 2 (p. 9)

Gadidae

Gadus morhua: WhJo (g), Engl (e, g), Rojo (e), Hein (g)

praemaxillare Rojo Lm (Fig. 3.A) Rojo Hm (Fig. 3.A) Rojo Sth (Fig. 3.A) WhJo P (Fig. 62)
maxillare Rojo Lm (Fig. 3.B)
dentale Rojo Lm (Fig. 3.C) Rojo Hm (Fig. 3.C) Hein dn.i.l., Abb. 34 WhJo D (Fig. 62)
articulare Rojo Lm (Fig. 3.D) Rojo Hm (Fig. 3.D)
quadratum Rojo Lm (Fig. 4.B) Rojo Hm (Fig. 4.B)
hyomandibulare Rojo Hm (Fig. 4.C) Rojo Da (Fig. 4.C)
praeoperculare Rojo Hm (Fig. 4.D) Rojo Wm (Fig. 4.D)
operculare Rojo Lm (Fig. 4.A) Rojo Hm (Fig. 4.A) [= Hein Abb. 33 (p. 207:2)]
                   Rojo Wf (Fig. 4.A)
cleithrum Rojo Lm (Fig. 4.E) [= Hein cl.c.l., Abb. 35]
                   Rojo Lh (Fig. 4.E)
                   Rojo Wm (Fig. 4.E)
postcleithrum  Rojo Lm (Fig. 3.E)
1st vertebra  Engl width
vertebra praecaudalis
  Hein Abb. 37 (M&Ro 45.B:2)

Pollachius virens: MeWi (g)
otolith  MeWi length

Merlangius merlangus: Engl (e, g)
1st vertebra  Engl width

Gasterosteidae

Gasterosteus aculeatus: Lib1 (e)
basipterygium (pelvis)
  Lib1 L(os) (Fig. 4)

Cottidae

Cottus gobio: Lib1 (e), Hall (e, g)
praeparaculare  Lib1 L(os) (Fig. 11.D) [= Hall Lo (Fig. 1.A)]

Centropomidae

Lates niloticus: Neer (g)
vomer  Neer 1 (Planche I)
basioccipitale  Neer 1 (Planche I)
  Neer 2 (Planche I)
  Neer 3 (Planche I)
preamaxillare  Neer 1 (Planche I)
  Neer 2 (Planche I)
  Neer 3 (Planche I)
maxillare  Neer 1 (Planche I)
  Neer 2 (Planche I)
dentale  Neer 1 (Planche I)
  Neer 2 (Planche I)
angulare  Neer 1 (Planche I)
  Neer 2 (Planche I)
  Neer 3 (Planche I)
quadratum Neer 1 (Planche I)
Neer 2 (Planche I)
Neer 3 (Planche I)
Neer 4 (Planche I)

hyomandibulare Neer 1 (Planche II)
Neer 2 (Planche II)

praeoperculare Neer 1 (Planche II)

operculare Neer 1 (Planche II)
Neer 2 (Planche II)

otolith Neer 1 (Planche II)
Neer 2 (Planche II)

1st spina pinnae dorsalis
Neer 1 (Planche II)

pterygiophore analis
Neer 1 (Planche II)

1st vertebra Neer 1 (Planche II)
Neer 2 (Planche II)
Neer 3 (Planche II)

2nd vertebra Neer 1 (Planche II)
Neer 2 (Planche II)
Neer 3 (Planche II)

vertebrae 3, 4, 6, 10, 15, 20 and 24
Neer 1 (Planche III)
Neer 2 (Planche III)
Neer 3 (Planche III)

Percidae

Perca fluviatilis: Cren (e, g), Bkh1 (e, g), Hein (g), Des2 (g), Lib1 (e)

parasphenoides Bkh1 5.25
Des2 1 (p. 5)
Des2 2 (p. 5)
Des2 4 (p. 5)
Des2 5 (p. 5)
Des2 6 (p. 5)

basioccipitale Bkh1 maximum height (M&Ro 19.B:1)
Bkh1 maximum width (M&Ro 19.B:2)

vomer Bkh1 5.26

praemaxillare Des2 1 (p. 5)
Des2 2 (p. 5)
Des2 4 (p. 5)
Des2 5 (p. 5)

maxillare Des2 1 (p. 5)
Des2 2 (p. 5)
maxillare
Des2 3 (p. 5)
Des2 4 (p. 5)

quadratum
Des2 1 (p. 5)
Des2 2 (p. 5)
Des2 3 (p. 5)
Des2 4 (p. 5)

dentale
Des2 1 (p. 5)
Des2 3 (p. 5)
Des2 4 (p. 5)
Des2 5 (p. 5)

articulare
Des2 1 (p. 5)
Des2 2 (p. 5)
Des2 4 (p. 5)

1st vertebra
Bkh1 maximum height (M&Ro 45.A:1)
Bkh1 maximum width (M&Ro 45.A:2)
Bkh1 maximum length (M&Ro 45.B:2)

praepercular
Bkh1 5.27:1
Bkh1 5.27:2 [= Des2 2 (p. 5); Libl L(pop) (Fig. 8.A)]
Hein Abb. 48 (p.207)
Des2 3 (p. 5)

opercular
Bkh1 5.28:1 [= Hein Abb. 47; Des2 1 (p. 5); Cren]
Bkh1 5.28:2 [= Des2 2 (p. 5)]
Des2 3 (p. 5)
Des2 4 (p. 5)

posttemporal
Bkh1 5.29

supracleithral
Bkh1 5.30

cleithrum
Bkh1 5.31:1
Bkh1 5.31:2
Bkh1 5.31:3
Hein Abb. 49 (p. 207:2)

basipterygium
Bkh1 5.32

vertebra praecaudalis
Des2 1 (p. 6)
Des2 2 (p. 6)
Des2 3 (p. 6)

1st vertebra caudalis
Des2 1 (p. 6)
Des2 2 (p. 6)
Des2 3 (p. 6)

3rd vertebra caudalis
Des2 1 (p. 6)
Des2 2 (p. 6)
Des2 3 (p. 6)
Sparidae

Sparus aurata: BoDr (f)
praemaxillare BoDr b (Fig. 2:1)
dentale BoDr c (no figure)

Sarpa salpa: Des1 (g)
neurocranium Des1 M.2 (p. 80)
praemaxillare Des1 M.3 (p. 80)
maxillare Des1 M.1 (p. 80)
palatinum Des1 M.2 (p. 80)
dentale Des1 M.1 (p. 80)
articulare Des1 M.2 (p. 80)
operculare Des1 M.2 (p. 80)
vertebra praecaudalis Des1 M.1 (p. 80)
vertebra caudalis Des1 M.1 (p. 80)
ultimate vertebra Des1 M.1 (p. 80)

Mugilidae

Liza ramada (= Mugil capito): Des3 (g)
neurocranium Des3 1 - 11 (p. 5)
parasphenoidesum Des3 4 (p. 5)
Des3 5 (p. 5)
praemaxillare Des3 1 (p. 5)
Des3 2 (p. 5)
Des3 3 (p. 5)
maxillare Des3 1 (p. 5)
Des3 2 (p. 5)
Des3 3 (p. 5)
Des3 4 (p. 5)
quadratum Des3 1 (p. 5)
Des3 2 (p. 5)
dentale Des3 1 (p. 5)
Des3 2 (p. 5)
dentale
Des3 3 (p. 5)
Des3 4 (p. 5)

articulare
Des3 1 (p. 5)
Des3 2 (p. 5)
Des3 3 (p. 5)

praeperculare
Des3 1 (p. 5)

operculare
Des3 1 (p. 5)
Des3 2 (p. 5)
Des3 3 (p. 5)

cleithrum
Des3 1 (p. 5)
Des3 2 (p. 5)
Des3 3 (p. 5)

vert. praecaudales & caudales
Des3 1 (p. 7)
Des3 2 (p. 7)
Des3 3 (p. 7)

otolith
Des3 1 (p. 7)
Des3 2 (p. 7)

Labridae

Crenilabrus melops: Whee (g)

pharyngeum inferius
Whee tw (Fig. 39)
Whee mw (Fig. 39)

Pleuronectidae: Bkh1 (e, g)

praeperculare dextrum
Bkh1 5.35.a:1
Bkh1 5.35.a:2

praeperculare sinistrum
Bkh1 5.35.b:1
Bkh1 5.35.b:2

os anale
Bkh1 5.34 (separate regressions for Pleuronectes platessa, Platichthys flesus and Limanda limanda, and a regression for the three species combined)

1st vertebra caudalis
Bkh1 (M&Ro 45.A:1)

penultimate vertebra caudalis
Bkh1 (M&Ro 45.A:1)
Bibliography


Enghoff, I. Bødker 1983: Size distribution of cod (Gadus morhua L.) and whiting (Merlangius merlangus (L.)) (Pisces, Gadidae) from a mesolithic settlement at Vedbæk, North Zealand, Denmark. Videnskabelige Meddelelser fra dansk naturhistorisk Forening i København 144, 83-97.


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