

Fish exploitation in the Neolithic: some new data from Northern Central Europe

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ABSTRACT: Fish remains from three Middle and Late Neolithic sites in the north-eastern part of Germany are discussed. At Niedergörne on the Elbe river and at Klessin on the Oder river species of the Cyprinidae, like bream (*Abramis brama*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), chub (*Leuciscus cephalus*), orfe (*Leuciscus idus*) and tench (*Tinca tinca*) dominate the fish bone material. From a zoogeographic point of view the presence of *Aspius aspius* at Niedergörne is remarkable. The ichthyological material from the site Löddigsee - a seasonal camp situated on a lake - comprises a high portion of pike bones (*Esox lucius*). The frequency distribution of the skeletal elements for this species suggests that only a part of the catch was directly consumed at this site while another part was slaughtered here and transported - as dried fish? - elsewhere for consumption.

KEYWORDS: GERMANY, FISH, NEOLITHIC, CYPRINIDAE, *Esox lucius*, FISHING, CONSUMPTION, TRANSPORT

RESUMEN: El trabajo valora los restos de peces procedentes de tres yacimientos del Neolítico medio y final en la zona nororiental de Alemania. En Niedergörne, en el río Elba, y en Klessin, en el Oder, la muestra está dominada por diversas especies de ciprínidos como la brema (*Abramis brama*), el rutilo (*Rutilus rutilus*), el escardino (*Scardinius erythrophthalmus*), el cacho (*Leuciscus cephalus*), el ido (*Leuciscus idus*) o la tenca (*Tinca tinca*). Desde el punto de vista zoogeográfico resulta llamativa en Niedergörne la presencia del aspío (*Aspius aspius*). Los restos ícticos de Löddigsee, un campamento estacional establecido junto a un lago, incluyen una gran cantidad de restos de lucio (*Esox lucius*). El patrón de representatividad esquelética de esta última especie sugiere que aquí se produjo un consumo directo de sólo parte de lo pescado y que el resto fué posiblemente transportado a otro lugar, quizás como salazón, al objeto de ser consumido allí.

PALABRAS CLAVE: ALEMANIA, PESCADO, NEOLÍTICO, CIPRÍNIDOS, *Esox lucius*, PESCA, CONSUMO, TRANSPORT.

INTRODUCTION

Little is known about the food economy of the lowlands of Northern Central Europe during the Middle and Late Neolithic. Only a few sites have yielded well excavated and documented faunal assemblages that allow a closer examination of the subsistence strategies of these periods (Benecke, 1994; fig. 39 ff.). Although the sites are located in a landscape which is rich in stretches of water, fish remains were rarely found in great quantities. This

is partly due to the bad conditions for bone preservation and the excavation techniques in particular the lack of sieving.

Neolithic fish remains from the lowlands of Northern Central Europe have been reported from Hüde I (Hüster, 1983), Bistoft (Heinrich & Lepiksaar, 1979), Siggeneben-Süd (Heinrich, 1983), Szczecin-Ustowo (Chełkowski, 1960), Dąbki (Iwaszkiewicz, 1985) and from Rzucewo (Niezabitowski 1928).

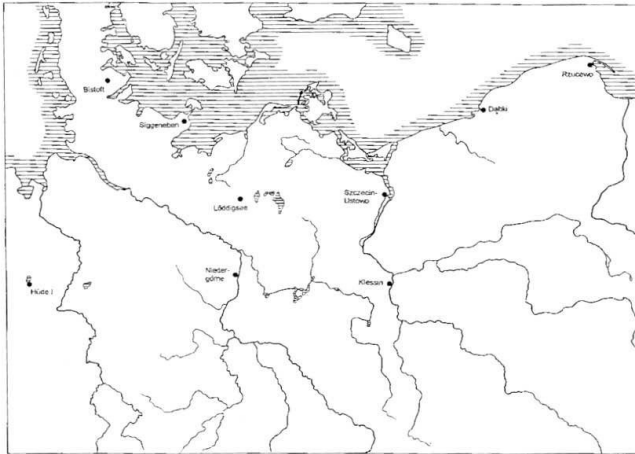


FIGURE 1

Location of Middle and Late Neolithic sites in the lowlands of Northern Central Europe from which large quantities of fish remains have been studied (references see text).

In the past few years I had the opportunity to study some faunal assemblages from newly excavated Middle and Late Neolithic sites in the north-eastern part of Germany. Three of those assemblages also comprise fish remains. These excavations are Niedergörne, Löddigsee and Klessin (Figure 1). The present paper gives some details about the results of the archaeoichthyological analyses.

FISH REMAINS FROM NIEDERGÖRNE

The site is situated north of the former village of Niedergörne at the very edge of the so-called Arneburg plateau on the left bank of the Elbe river (Stolle *et al.*, 1988; fig. 1). In 1985 rescue excavations at this site revealed two large pits belonging

to a settlement of the Middle Neolithic «Tiefstichkeramik» culture (Table 1). The strata of pit 1 were partly sieved (c. 0,1 m³ with a sieve of 1 mm mesh size), while pit 2 was not. The fill of the two pits consisted mainly of silty sand. During the excavation of pit 1 numerous nest-like concentrations of fish scales were encountered of which only a small sample has been collected (c. 250 specimens). These concentrations are probably the remains of skinning fishes. Another remarkable find is the large number of mussels in both pits. In pit 1 some of the shells were deposited as a continuous layer (Stolle *et al.*, 1988; fig. 2).

The faunal assemblage from both pits comprises 2590 remains (omitting fish scales), 531 belonging to mammals, 699 to mussels and 1360 to various species of fish. Table 2 shows that 12 fish species could be identified in the material from Niedergörne: seven species of cyprinid [bream (*Abramis brama*), roach (*Rutilus rutilus*), rudd (*Scardinius erythrophthalmus*), chub (*Leuciscus cephalus*), orfe (*Leuciscus idus*), tench (*Tinca tinca*) and asp (*Aspius aspius*)], pike (*Esox lucius*), eel (*Anguilla anguilla*), perch (*Perca fluviatilis*), catfish (*Silurus glanis*) and sturgeon (*Acipenser sturio*). Fish scales are mainly of cyprinids and only some are of pike. With the exception of sturgeon, all identified species belong to the recent fish fauna in that part of the Elbe river (Bauch, 1958). From the zoogeographic point of view the presence of *Aspius aspius* is remarkable. Today this species is widely distributed in Eastern Europe and Western Asia with the Elbe river being regarded as its western limit (Ladiges & Vogt, 1979; fig. 73). As far as we know from the literature there is no subfossil evidence for *Aspius aspius* west of the Elbe river.

SITE	CULTURE	¹⁴ C-DATES (UNCAL. BP)
Niedergörne	Tiefstichkeramik	4550 ± 60 (Bln 3552)
Klessin	Britz	4459 ± 41 (Bln 4649)
Löddigsee	Single Grave	4130 ± 60 (Bln 3050)
		4290 ± 60 (Bln 3090)
		4200 ± 50 (Bln 3130)
		4080 ± 50 (Bln 3825)
		4290 ± 100 (Bln 3828)

TABLE 1

Radiocarbon-dates for Niedergörne, Klessin and Löddigsee (according to J. Görzdorf, Berlin, personal communication).

As can be seen from Table 2, cyprinids are the most numerous group in the ichthyological material from Niedergörne, followed by pike, eel and catfish. Within the cyprinids, bream, roach, rudd and chub are the most frequent species.

For some species, the size of the fishes was estimated by comparing the bones with skeletons of known length from our comparative collection. The size of the breams varies between 20 and 55 cm. Two pikes are larger than 100 cm, two c. 80 cm, six between 60 and 80 cm, two c. 50 cm and two c. 30 cm long. The catfish bones belong to small individuals with a total length between 50 and 70 cm. The bony plate of the sturgeon comes from a fish with an estimated length of about 100 cm.

Fishing gear is represented by a single fish hook made from bone. An interesting bone item is a knife-like object, which could have been used for removing the scales from the body (Stolle *et al.*, 1988; fig. 7.5).

SPECIES	NISP
Sturgeon (<i>Ancipenser sturio</i>)	1
Eel (<i>Anguilla anguilla</i>)	13
Pike (<i>Esox lucius</i>)	104
Bream (<i>Abramis brama</i>)	85
Roach (<i>Rutilus rutilus</i>)	38
Rudd (<i>Scardinius erythrophthalmus</i>)	32
Chub (<i>Leuciscus cephalus</i>)	21
Orfe (<i>Leuciscus idus</i>)	9
Tench (<i>Tinca tinca</i>)	6
Asp (<i>Aspius aspius</i>)	2
Carps (Cyprinidae indet.)	262
Catfish (<i>Silurus glanis</i>)	4
Perch (<i>Perca fluviatilis</i>)	4
Total identified	581
Total unidentified	779

TABLE 2

Niedergörne. List of fish species (Stolle *et al.*, 1988; Table 1). Frequencies are given in number of identified specimens (NISP).

SPECIES	NISP
Tench (<i>Tinca tinca</i>)	5
Roach (<i>Rutilus rutilus</i>)	2
Rudd (<i>Scardinius erythrophthalmus</i>)	1
Carps (Cyprinidae indet.)	28
Catfish (<i>Silurus glanis</i>)	1
Total identified	37

TABLE 3

Klessin. List of fish species (Benecke, in press; Table 1). Frequencies are given in number of identified specimens (NISP).

A second aquatic resource, mussels, was exploited by the inhabitants of the Niedergörne settlement. All shell remains encountered in the two pits belong to the species *Unio pictorum*. Most shells were complete, some still interlocking at the hinge. The state of preservation indicates that shells were not used as animal fodder.

FISH REMAINS FROM KLESSIN

A site similar to Niedergörne in terms of time period and location is Klessin, on the left bank of the Oder river, several kilometers north of Frankfurt (Figure 1). In 1994 test excavations revealed four pits of a settlement of the Middle Neolithic Britz culture (Table 1). The fill of the pits consisted of sand. The contents of these pits were collected by hand. Only pit S 189,3/O 335,9 was sampled for wet sieving and a small soil sample taken. It provided most of the fish remains from this site.

The faunal assemblage from the four pits from Klessin is quite small, comprising only 117 identifiable specimens. Mammal bones are most frequent in the sample, with 40 bones coming from domestic and 29 bones coming from wild animals. Fish are represented by 37 bones (33 specimens are from the soil sample of pit S 189,3/O 335,9). With the exception of one bone from catfish (*Silurus glanis*) all fish remains belong to cyprinids. Three species could be identified: tench (*Tinca tinca*), roach (*Rutilus rutilus*) and rudd (*Scardinius erythrophthalmus*). In relation to mammal bones,

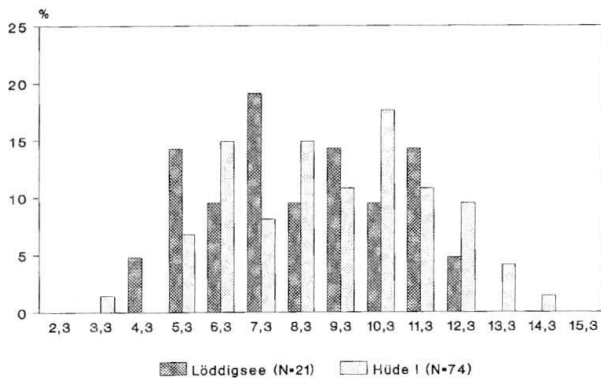


FIGURE 2

Pike. Osteometric comparison between Löddigsee and Hüde I for the anterior height of the dentale (in mm). References: Löddigsee (Benecke, forthcoming), Hüde I (Hüster, 1983; Table 3).

fish remains are not as frequent as at Niedergörne. Nevertheless fish seem to have been an important food resource at this site as well. Ten *Unio* shell fragments, which complete the faunal list of Klessin, demonstrate that a second aquatic food resource, was exploited by the inhabitants of this settlement.

FISH REMAINS FROM LÖDDIGSEE

The site Löddigsee several kilometers southeast of the town Parchim lies on a sandbank within the valley of the Elde river, which in the past formed a lake, the so-called Löddigsee, at that part of its course. Excavations between 1983 and 1989 led to a more or less complete exposure of a neolithic settlement which belongs to the Late Neolithic Single Grave culture (Table 1). In contrast to Niedergörne and Klessin, the Löddigsee site exhibits no permanent habitation. There are indications from the archaeological as well as from the zoological data that this site was only seasonally occupied, mainly during the spring and summer months. In the course of the excavations a large number of animal remains was found. As the cultural layer mainly consisted of peat, the process of sieving was very difficult yielding only few small animal remains. Most of the bones and fish remains were collected by hand.

The faunal assemblage, which comprises c. 15000 specimens, is dominated by bones from

mammals, mainly from wild species like red deer, aurochs, wild horse, roe deer, beaver and wild boar. Bones from domestic animals are represented by only 8% of the total NISP. A small number of animal remains belong to different bird species and to a terrapene (*Emys orbicularis*). Among the 207 identifiable fish bones, six species were identified (Table 4): pike (*Esox lucius*), perch (*Perca fluviatilis*), catfish (*Silurus glanis*), pike-perch (*Stizostedion lucioperca*), eel (*Anguilla anguilla*) and roach (*Rutilus rutilus*). Pike is the most numerous species followed by perch and catfish.

Table 5 provides some information about the size distribution of pike in the material from Löddigsee. For every bone, the size of the fish was estimated by comparing it with three skeletons in our reference collection. As can be seen from the table, most pike caught at this site varied between 60 to 90 cm in length. An osteometric comparison with pike bones from Hüde I shows that the size distribution of pike is similar at both sites. In the Löddigsee sample the percentage of smaller individuals seems to be slightly higher.

The frequency distribution of pike skeletal elements exhibits an interesting pattern. In Table 6 the absolute numbers for the different elements and, for each of them, their frequency calculated on the basis of the MNI, are presented. It is remarkable that bones from the pelvic girdle (basipterygium)

SPECIES	NISP
Eel (<i>Anguilla anguilla</i>)	2
Pike (<i>Esox lucius</i>)	170
Roach (<i>Rutilus rutilus</i>)	2
Carps (Cyprinidae indet.)	4
Catfish (<i>Silurus glanis</i>)	11
Perch (<i>Perca fluviatilis</i>)	15
Pike-perch (<i>Stizostedion lucioperca</i>)	3
Total identified	207
Total unidentified	30

TABLE 4

Löddigsee. List of fish species. Frequencies are given in number of identified specimens (NISP).

SIZE GROUP	NUMBER	in %
< 30 cm	2	1,5
c. 30	1	0,7
> 30 cm	14	10,1
c. 60 cm	22	15,9
> 60 cm	37	26,8
c. 90 cm	38	27,5
> 90 cm	24	17,4

TABLE 5

Löddigsee. Size distribution of pike.

are missing, while those from the vertebral column only occur in very small numbers. A comparison of the relative frequency of elements of pike between Löddigsee and Hüde I and Bistoft shows a similar pattern. Heinrich & Lepiksaar (1979) argued that the extremely low frequency of vertebrae at Bistoft was the result of some of the pike being butchered at the site by cutting off the head and the trunk/tail being consumed elsewhere. A similar scenario one can imagine for the Löddigsee site. Indirect evidence for this assumption one can obtain from the observation, that in at least five quadrants of the excavated area there are pike bones from originally complete heads, while vertebrae are missing altogether.

DISCUSSION AND CONCLUSIONS

The bone assemblages indicate that fish was an important food resource in the lowlands of Northern Central Europe during the Middle and Late Neolithic periods. At Niedergörne, where fish remains dominate the fauna (being two to three times as frequent as mammal bones), fishing seems to have been a common strategy in the food economy of this settlement. This also applies to collecting mussels as the abundant shells suggest. We can assume a similar situation existed at Klessin on the Oder river. The relative small number of fish remains in relation to mammal bones –in comparison to Niedergörne– is probably due to the lack of sieving at this site. A characteristic feature of both assemblages is the high percentage of bones from cyprinids. At Szczecin-Ustowo, a settle-

ment of the Funnel Beaker culture, species of Cyprinidae dominate the fish bone material as well (Figure 4). All three sites, Niedergörne, Klessin and Szczecin-Ustowo, have a similar topographic location. They lie on a high terrace of a large river (Elbe, Oder) overlooking its wide flood plain. The high percentage of cyprinids seems to indicate a fishery which exploited the seasonally flooded areas, probably at the time of spawning.

PART OF SKELETON/ELEMENT	NUMBER	VR (%)
Head		
Unipaired elements (NEB 22)		
Parasphenoideum	3	13,6
Basioccipitale	1	4,5
Paired elements (NEB 44)		
Dentale	36 (18:17:1)	81,8
Articulare	6 (3:3)	13,6
Keratohyale	6 (4:2)	13,6
Maxillare	4 (3:1)	9,1
Operculare	3 (1:2)	6,8
Quadratum	3 (0:3)	6,8
Frontale	2 (1:1)	4,5
Palatinum	2 (1:0:1)	4,5
Ectopterygoideum	2 (1:1)	4,5
Hyomandibulare	2 (2:0)	4,5
Praeoperculare	1 (0:1)	2,3
Suboperculare	1 (0:1)	2,3
Epihyale	1 (1:0)	2,3
Pteroticum	1 (1:0)	2,3
Nasale	1 (0:1)	2,3
Shoulder girdle		
Paired elements (NEB 44)		
Cleithrum	11 (6:5)	25,0
Trunk-Tail		
Serial elements		
Vertebrae praecaudales (NEB 41 x 22 = 902)	66	7,3
Vertebrae caudales (NEB 18 x 22 = 396)	18	4,5

TABLE 6

Löddigsee. Pike, frequency of elements. VR=value of representation, NEB = number of expected bones (for an MNI = 22).

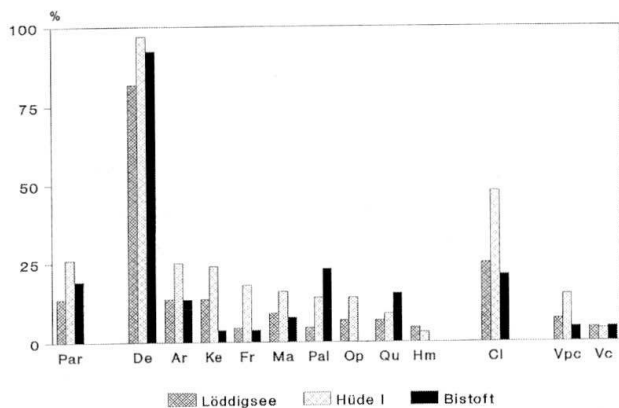


FIGURE 3

Pike. Value of representation for selected elements in the bone finds from Löddigsee, Hüde I and Bistoft. ABBREVIATIONS: Par: Parasphenoideum, De: Dentale, Ar: Articulare, Ke: Keratohyale, Fr: Frontale, Ma: Maxillare, Pal: Palatinum, Op: Operculare, Qu: Quadratum, Hm: Hyomandibulare, Cl: Cleithrum, Vpc: Vertebrae praecaudales, Vc: Vertebrae caudales. REFERENCES: Löddigsee (cf. Table 6), Hüde I (Hüster, 1983; Table 2), Bistoft (Heinrich & Lepiksaar, 1979; Table 2).

A different situation has been detected at sites like Loddigsee, Hude I and Bistoft. The ichthyological materials from those sites comprise a large amount of pike bones, while cyprinids seem to have been only of marginal importance (Figure 4). In contrast to Niedergörne, Klessin and Szczecin-Ustowo, all three of these sites are located on a lake. Another common feature is that these sites were seasonal camps, where hunting and fishing activities took place mainly during the spring and summer months. The *annuli* of vertebrae from Löddigsee indicate that pike were mainly caught in spring. For Hüde I the late summer months appear to be the main season for fishing (Hüster, 1983). Obviously, only a portion of the catch was directly consumed at those sites while another portion was transported elsewhere for consumption. This seems to have been the case especially for pike as the frequency distribution of the skeletal elements for this species suggests (Figure 3). The processing of pikes meant for transportation included be-heading and probably drying of the flesh.

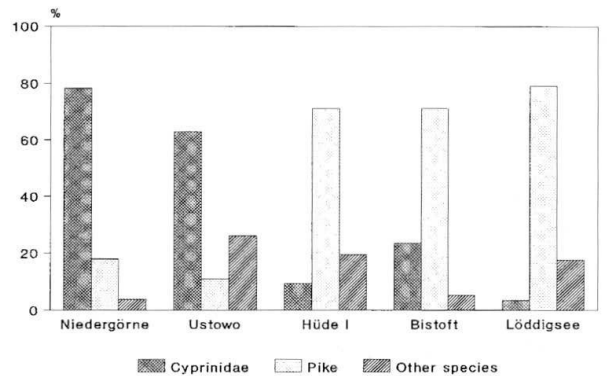


FIGURE 4

Percentages of Cyprinidae and pike in fish bone assemblages from different Middle and Late Neolithic sites. References: Niedergörne (Table 2), Szczecin-Ustowo (Chełkowski, 1960; Table 1), Hüde I (Hüster, 1983; Table 1), Bistoft (Heinrich & Lepiksaar, 1979; Table 1), Löddigsee (Table 4).

REFERENCES

- BAUCH, G. 1958: Untersuchungen über die Gründe für den Ertragsrückgang der Elbfischerei zwischen Elbsandsteingebirge und Boizenburg. *Zeitschrift für Fischerei und deren Hilfswissenschaften* N. F. 7: 161-438.
- BENECKE, N. 1994: *Archäozoologische Studien zur Entwicklung der Haustierhaltung in Mitteleuropa und Südsandinavien von den Anfängen bis zum ausgehenden Mittelalter*. Schriften zur Ur- und Frühgeschichte 46, Berlin.
- BENECKE, N. IN PRESS: Archäozoologische Untersuchungen an Tierresten aus Siedlungsgruben der Britzer Kultur bei Klessin (Kr. Märkisch-Oderland). *Veröffentlichungen des Museums für Ur- und Frühgeschichte Potsdam*.
- CHEŁKOWSKI, Z. 1960: Pozostałości ryb w materiale wykopaliskowym osady kultury pucharów lejkowatych w Ustowie, pow. Szczecin. *Materiały Zachodnio-Pomorskie* 6: 9-35.
- HEINRICH, D. 1983: Fischreste des frühneolithischen Fundplatzes Siggeneben-Süd. In: Meurers-Balke, J.: *Siggeneben-Süd. Ein Fundplatz der frühen Trichterbecherkultur an der holstei-*

- nischen Ostseeküste*. (Offa-Bücher 50): 119-123, Neumünster.
- HEINRICH, D. & LEPIKSAAR, J. 1979: Die Fischreste von Bistoft LA 11. In: Johansson, L.: *Socioökonomiska strukturer i tidigt Neolitikum och deras förutsättningar. Studier över Bistoft LA 11-ett boplatzfynd från Schleswig-Holstein*: 112-117, Göteborg.
- HÜSTER, H. 1983: Die Fischknochen der neolithischen Moorsiedlung Hüde I am Dümmer, Kreis Grafschaft Diepholz. *Neue Ausgrabungen und Forschungen in Niedersachsen* 16: 401-480.
- IWASZKIEWICZ, M. 1985: Szczątki ryb z osady mezolityczno-neolitycznej w Dąbkach koło Darłowo. *Roczniki Akademii Rolniczej w Poznaniu* 164, *Archeozoologia* 10: 3-6.
- LADIGES, W. & VOGT, D. 1979: *Die Süßwasserfische Europas*. 2. ed., Hamburg, Berlin.
- NIEZABITOWSKI, E. L. 1928: Szczątki zwierzęce z osady neolitycznej w Rzucewie na polskim wybrzeżu Bałtyku. *Przegląd Archeologiczny* 4: 64-81.
- STOLLE, TH.; BENECKE, N. & BERAN, J. 1988: Zwei Siedlungsgruben der altmärkischen Gruppe der Tiefstichkeramik mit zahlreichen Tierresten von Niedergörne, Kr. Stendal. *Jahresschrift für mitteldeutsche Vorgeschichte* 71: 37-55.

