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FISH REMAINS AT ABRI DU PAPE

Wim Van Neer

INTRODUCTION

The fish remains described in this contribution represent the first large ichthyofaunal sample for the Mesolithic in Belgium. This is a combined result of the application of sieving methods, the good conditions for preservation in rockshelters such as Abri du Pape, and the function of the site. Previously excavated sites were either open air settlements where bone preservation was poor or were in caves used primarily for funerary practices. The only other Mesolithic fish bones described from a Belgian site are from the Place Saint-Hilaire at Namur, where thus far fifteen fish remains were found (Van Neer 1995).

Abri du Pape was a habitation site located at about 5 km south of Dinant, on the right bank of the river Meuse. The rockshelter is situated at the base of a 100 m high vertical limestone cliff of the Meuse canyon. The river flows right at the foot of the talus in front of the site. The Mesolithic levels in the rockshelter start at about 4.5 m above the present (artificially high) level of the Meuse. This mesolithic sequence is about 70 cm thick and comprises strata 20, 21, and 22 with subdivision lenses pertaining to each (e.g., 22.1). Accelerator dates place the occupation corresponding to strata 21 and 22 around 8800 BP (uncalibrated). After an hiatus of about a millennium the site was inhabited again (stratum 20). The obtained dates correspond to the late Preboreal and Boreal palynological phases. No dates and only a few artifacts are available for strata 23 to 25 which might correspond to the terminal Magdalenian.

Molluscan, avian and mammal fauna of the site are described elsewhere (López Bayón *et al.*, Deville and Gautier, Gautier in this volume). These analyses as well as the archaeobotanical study (Pernaud, this volume) illustrate the temperate climate and Early Holocene vegetational changes. Bird and rodent remains are abundant, but large mammals occur only in small quantities. This, and the fact that no constructed hearths or other manmade structures were found seem to indicate that we are dealing with an ephemeral Mesolithic campsite.

MATERIAL

The recovery procedures during the excavations directed by L. Straus consisted of standard water-sieving of all sediment through 2.5-3 mm mesh, whereas some selected sediment samples were water-screened through 1 mm mesh. The fish remains were identified

through comparison with the reference collection housed at the Royal Museum of Central Africa. Body size reconstructions of the fish, corresponding to each well preserved bone, were obtained by direct comparison with modern specimens of known size. The reconstructed body sizes are expressed in 10 cm length classes of standard length (SL), that is the distance from snout to base of tail.

Table 1 lists the analysed material by taxon and by excavated stratum. The identified fish are described in the following paragraphs.

Remains of eel (*Anguilla anguilla*) were found in two instances only. They comprise a vertebra of an individual measuring 40-50 cm SL and a basioccipital of a specimen of 80-90 cm SL.

The allis shad (*Alosa alosa*) is represented in stratum 22 by a caudal vertebra of an individual measuring 50-60 cm. Thus far, this is the only archaeozoological record for this species in Belgium. This fish, belonging to the Clupeidae (herring family) is a marine species occurring mainly in coastal waters and estuaries. The adults run up from the estuaries into rivers during late spring without, however, penetrating small affluents (Poll 1947: 139). The allis shad has been known to ascend upstream for several hundred kilometres in large European rivers (Duncker 1960: 72; Maitland and Campbell 1992: 95). The species disappeared from the Meuse at the beginning of this century as a result of damming, water pollution and overfishing (Philippart and Vranken 1983: 54). General fishery books from the 19th century report that allis shad ascended the Meuse during April and, especially, May (Poll, *ibid.*: 139). During its spawning run allis shad becomes gregarious. After spawning, which takes place over sandy or gravelly bottoms, the spent adults drop downstream to the sea again.

The Cyprinidae (carp family) comprises 77 % of all identified fish remains at Abri du Pape. Species identification of members of this family is hampered by the fragmentation of the remains and by the similar osteology of the numerous species. For this reason only highly diagnostic and well preserved bones could be identified. The chub (*Leuciscus cephalus*) was identified on the basis of an articular, a basipterygium, and pharyngeal plate fragments. The reconstructed body sizes vary between 10-20 and 50-60 cm SL. This species has also been reported from the Mesolithic levels of the Place Saint-Hilaire at Namur, where it was represented by an isolated pharyngeal tooth (Van Neer 1995). A cleithrum and an opercular fragment from Abri du Pape clearly belong to the genus *Leuciscus* but could not be attributed to a species. Five remains, finally, a basipterygium and four pharyngeal plate fragments, belong to roach (*Rutilus rutilus*), measuring between 20 and 40 cm SL. The remaining, unidentified cyprinid bones are mainly vertebrae (119 bones or 81%), a few ribs and skull fragments (each 9%), and even less finrays (1%). Despite their low diagnostic value for species identification, the majority of these cyprinid remains could be attributed to a size class. The size distributions of the identified and unidentified cyprinids are indicated in Figure 1. This was done separately for the early (strata 21 and 22) and late (stratum 20) occupation phase.

The European catfish (*Silurus glanis*) occurs in strata 20 and 21 where it is represented by 10 vertebrae and one fragment of the Weberian apparatus. Due to the fragmentary nature of

the remains, the size of only four specimens could be reconstructed. Three fragments correspond to individuals measuring 60-70 cm SL, whereas one bone is from a fish of 100 to 120 cm SL. A vertebra of this species has been described previously from a Magdalenian level in a cave at Néviau, about 5 km south of Namur (Giltay 1931). Two additional, poorly dated finds of a silurid, probably related to *Silurus glanis*, have been reported from Ramioul rock shelter (province of Liège) and from Roger Cave, Namur province (Casier 1957). The specimens are both described as pectoral spines of catfish, but the figured specimen from Ramioul, in reality, clearly is a dorsal spine of a cyprinid. The feathered appearance of the posterior margin is typical of, amongst others, *Barbus barbus*. A re-identification of the Roger Cave specimen is impossible since it was not depicted. It is described as being of the same general outline but with a heavier appearance and less curved processes (Casier, *ibid.* 1957).The only archaeozoological evidence available thus far for *Silurus glanis* in the Meuse basin comes from Namur where the species was found in a Roman context of the Hospice Saint-Gilles (De Cupere and Van Neer 1993) and in the 15th century AD filling of a cesspit at the Grognon (Van Neer and Lentacker 1996). The species lived in the Scheldt basin from at least Neolithic times but evidence postdating the 12 century AD is missing (Van Neer and Ervynck 1994). Archaeozoological finds in the Netherlands also situate the disappearance of *Silurus glanis* at that time (Brinkhuizen 1979). Today, the species is now and then captured in the Meuse and Scheldt basins, but these specimens are derived from experimental fishery ponds and they are not considered indigenous.

Remains of pike (*Esox lucius*) represent about 15% of all identified fish bones. The material comprises 14 vertebrae, 8 isolated teeth, and 12 head elements. The isolated teeth did not allow a precise body size reconstruction and the same is true for two of the skull remains. Figure 2 indicates that the body size of the pike ranged mainly between 50 and 90 cm SL. The pike from the late phase (stratum 20) seem larger on average than those from the early phase (strata 21 and 22) but due to the small sample size this tendency needs to be interpreted with caution. *Esox lucius* was also found in the Mesolithic levels of the Place Saint-Hilaire at Namur (Van Neer 1995).

Only two remains of salmonid were found. A precaudal vertebra belonging to an individual of 60-70 cm SL was present in stratum 20, whereas stratum 22 yielded an articular of a fish of the same length. The latter specimen does not allow a distinction on an osteomorphological basis between the brown trout (*Salmo trutta*) and the Atlantic salmon (*Salmo salar*). The reconstructed size is of no help either, since it falls within the variation of both species (Poll 1947: 149, 152). Small morphological differences on the outer surface of the vertebrae were mentioned by Le Gall (1984), but strong intraspecific variation and overlap among species has been demonstrated by Desse and Desse (1976) on frontal radiographs of vertebral centra. The salmonid vertebral centrum from Abri du Pape is not completely preserved, but is probably derived from an individual in its third year of growth (3+). This, and the fact that the corresponding individual measured between 60 and 70 cm SL might indicate that we are dealing with Atlantic salmon. Brown trout of this age would measure about 35 cm maximally (Seifert and Kölbing 1989: 32). Atlantic salmon was already rare at the end of the 19th century and disappeared totally from the Meuse basin around AD 1940. This was a result of the construction of dams which prevented this marine species to ascend the river (Philippart and Vranken 1983: 84).

The perch (*Perca fluviatilis*) is represented only in stratum 20 by a precaudal vertebra of an individual measuring 15-20 cm SL.

DISCUSSION

Taphonomy

The analysis of the mammalian remains from Abri du Pape (Gautier, this volume) revealed the presence of several carnivorous species, *viz.*, wolf (*Canis lupus*), fox (*Vulpes vulpes*), marten (*Martes* sp.), weasel (*Mustela nivalis*), stoat (*M.erminea*), polecat (*M.putorius*) and otter (*Lutra lutra*). Although foxes are opportunistic feeders, fish is not usually mentioned as a food item (Lloyd and Hewson 1986; Broekhuizen *et al.* 1992). Similarly, fish has been quoted by Ewer (1973) only as a subsidiary food item of pine marten (*Martes martes*) and wolf. Ewer (*ibid.*) does not list fish among the prey taken by the mustelids. The otter, however, is a true ichthyophagous species which deposits spraints containing fish bones along rivers and lakes. There are two reasons, however, to discard otter as a possible taphonomic agent that accumulated the Abri du Pape fish remains. The reconstructed body lengths of the fishes found in the rockshelter are, with a few exceptions, far superior to the maximum size of the prey animals captured by otter. Harris (1968: 76) lists the mean and maximum length of the prey fishes of *Lutra canadensis* obtained through stomach content analysis. For trout the mean total length was 11.5 cm with a maximum of 23 cm, in pike the average was 25 cm (no maximum given), whereas the maximum length of perch and cyprinids was 13 cm. A comparison of these data with the reconstructed sizes of the archaeological specimens clearly shows that only a minority of the recovered remains are from fish small enough for otter. In addition, field work has demonstrated that otters deposit their spraints close to the shore, often at landing places (Ewer, *ibid.*: 266). The Mesolithic layers were probably too high above the level of Meuse to be used as a sprainting point. For all the aforementioned reasons, it can be safely assumed that the majority, if not all, fish remains found at Abri du Pape were deposited by humans.

The species association

The ichthyofauna from Abri du Pape comprises at least 8 different taxa and can be considered as typical of the 'barbel zone' originally defined by Huet (1954). His zonation of rivers, and associated ichthyofaunal assemblages, was based on the depth and width of the riverbed, its substrate, the speed of the watercurrent, the temperature and oxygen content of the water, and the vegetation. From the source areas towards the rivermouth the following zones are distinguished nowadays: trout zone, grayling zone, barbel zone, bream zone, and flounder zone. All fish species encountered at Abri du Pape spawn in the barbel zone (i.e., the Meuse river), except for the Atlantic salmon which needs the smaller watercourses of the trout zone for reproduction.

Cyprinids (77%) and pike (15%) are the best represented fish at Abri du Pape and, among the identified cyprinids, the chub predominates. The composition of the fish fauna from the early (strata 21 and 22) and late phase (stratum 20) differs only to a very slight extent (Table 2). Apart from a small increase of catfish and a concomitant decrease of pike in the late phase, no particular trends could be observed. The significance of this small shift is probably limited because of possible effects of chance variation in samples of small size. It is worth mentioning, with respect to the general species composition at Abri du Pape, that the small Mesolithic assemblage from the site Place Saint-Hilaire located at the Meuse-Sambre confluence comprises exclusively pike and cyprinids (with chub as the only species-level identification). The only other prehistoric site along the Meuse basin with a reasonable number of quantified fish remains is the Upper Magdalenian site of Bois Laiterie Cave. It is located close to a small tributary of the Meuse in which the prehistoric inhabitants captured brown trout (*Salmo trutta*), grayling (*Thymallus thymallus*) and burbot (*Lota lota*) on a seasonal basis (Van Neer 1997). The difference in species composition compared to Abri du Pape might be related to the possibility that the Meuse river itself may not have been exploited by the occupants of Bois Laiterie.

Season of capture and fishing methods

The fish identified at Abri du Pape comprise one or possibly two anadromous species. The allis shad which is represented by a single element in stratum 22 is a good seasonality indicator. Prior to its local extinction in the Meuse, the species used to ascend the river in April and, especially, May. Reproduction took place during May or June in inshore waters. The spawning grounds of allis shad were probably easy to locate since the fish occur massively near the surface and make a lot of noise slapping the water. This behaviour made the fish an easy prey for prehistoric man as is illustrated by several post-Magdalenian sites in southern France whose ichthyofauna is dominated by allis shad (Le Gall, 1994).

One of the salmonid remains from Abri du Pape has been tentatively identified as Atlantic salmon, a marine species which is also known to migrate upstream for spawning. As opposed to allis shad, Atlantic salmon is not a good seasonality indicator for the site studied here. Reproduction usually takes place in November or December, or sometimes in October and January when the water temperature reaches about 5° C. Spawning grounds are situated in smaller rivers of the trout zone *sensu* Huet (1954), usually in shallow waters, over gravelly bottom. Since our ichthyofaunal assemblage corresponds to the barbel zone (i.e., the Meuse itself) it is unlikely that the salmon was captured while reproducing. Most probably it was caught during the upstream migration towards its spawning grounds. However, since salmon ascend rivers in different waves, according to their size, a good estimation about the probable season of capture is delicate. The larger specimens run up during the winter preceding the spawning season, the smaller individuals during spring or summer of the spawning year (Philippart and Vranken 1983: 82).

The other fish identified at Abri du Pape live in the Meuse all year round, but their capture is easiest during spring when they occur in more inshore waters for spawning. The eel does not reproduce in rivers but, as a reputed predator on fish eggs and larvae, it follows the spawning fish. A growth increment study has not been carried out on the vertebrae from Abri

du Pape. Such an analysis is hampered by the incomplete preservation of the outer margins of many of the vertebral centra, by the difficulties to identify the vertebrae to species in the case of the cyprinids, and by the lack of basic data on the growth rate of the individual species. In any case, the fish fauna from Abri du Pape does not yield hard evidence for a recurrent, seasonal exploitation of spawning grounds comparable to the pattern that could be established for the Upper Magdalenian cave site of Bois Laiterie (Van Neer 1997). Allis shad, the only species that is reputed for its predictable and massive seasonal occurrence, is poorly represented.

The archaeological material discovered at Abri du Pape does not comprise any objects that can be unequivocally related to fishing. Generally speaking, relatively few data exist on the type of fishing gear used during Mesolithic times in northwestern Europe (Cleyet-Merle 1990: 101-108). It has been suggested that composite tools may have been manufactured using microliths and that triangular microliths were used as fish gorges, although the sharp cutting edges may have rapidly cut the line to which the triangle was attached. Harpoons seem to be rare during this period. Some barbed points were found in France, Denmark, and the Netherlands (Brinkhuizen 1986: 33). Hooks, made of antler or bone, appear for the first time during the Mesolithic. They were found on sites in Denmark and Germany (Clark 1948: 54). As to fishing gear, made of botanical matter, it has low chances of preservation. Thus far, the oldest evidence for the use of fishing baskets comes from the Mesolithic site Hauts de Nachères at Noyen-sur-Seine (France), where such remains were found in a level dated between 8000 and 7400 BP (Cleyet-Merle 1990: 104). All other finds of fish traps mentioned in the literature date from the Atlantic period or later (Brinkhuizen 1986). Remains of fishing nets have been reported from early Boreal contexts in Finland (Clark 1948: 56) and Sweden (Welinder 1969).

The low frequency of fish remains and fishing gear from Mesolithic contexts has been interpreted in the past (Cleyet-Merle 1990: 107; Le Gall 1992, 1996) as a result of a decreased interest in fishing during that period. It remains to be verified, however, to what extent the scarcity of fish remains is due to effects of differential preservation, especially since the majority of the Mesolithic settlements are open air sites. Similarly, the possibility cannot be ruled out that the low find numbers of fishing gear are related to a more frequent use of botanical matter for the manufacture of such devices. Since Mesolithic times navigation was possible, which together with the use of nets, traps, and hooks, must have increased the exploitable waters as well as the fish species spectrum. It would be premature to try to explain the broader fish species spectrum at Abri du Pape, compared to the Upper Magdalenian Bois Laiterie site, as a result of improved fishing techniques. More ichthyofaunas from the Meuse basin will be necessary to further document the fish procurement strategies through time.

CONCLUSIONS

The fish remains discovered in the Mesolithic levels at Abri du Pape are most probably anthropic and comprise, in decreasing order of importance, cyprinids, pike, catfish,

eel, salmon, perch and allis shad. These fish may all have been captured in the Meuse itself, close to the site. The species occur all year round in the river, except for the allis shad and the salmon. Of the latter two anadromous species, only the allis shad is a good seasonality indicator. It spawns in late spring or early summer, but since it is represented by one specimen only there is no evidence for a recurrent, seasonal exploitation of a predictable food resource.

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Table 1: The fish remains by taxon and by excavated stratum. Figures indicate number of specimens (NISP).

provenance / fish species	20	21	22	22.1	23	24	24.1	total
eel (*Anguilla anguilla*)	1	-	1	-	-	-	-	2
allis shad (*Alosa alosa*)	-	-	1	-	-	-	-	1
chub (*Leuciscus cephalus*)	9	4	2	-	-	1	-	16
Leuciscus sp.	1	-	1	-	-	-	-	2
roach (*Rutilus rutilus*)	3	1	1	-	-	-	-	5
Cyprinidae indet.	79	28	33	1	5	-	1	147
catfish (*Silurus glanis*)	9	2	-	-	-	-	-	11
pike (*Esox lucius*)	16	10	6	-	2	-	-	34
salmonid (*Salmo* sp.)	1	-	1	-	-	-	-	2
perch (*Perca fluviatilis*)	1	-	-	-	-	-	-	1
total identified fish	120	45	46	1	7	1	1	221
unidentified fish	44	16	13	1	-	-	-	74
grand total	164	61	59	2	7	1	1	295

Table 2: Relative abundance (%) of the fish species of the late (stratum 20) and early (strata 21 and 22) occupation phase.

provenance / species	20	21and22
eel (*Anguilla anguilla*)	0.8	1.1
allis shad (*Alosa alosa*)	0.0	1.1
chub (*Leuciscus cephalus*)	7.5	6.5
Leuciscus sp.	0.8	1.1
roach (*Rutilus rutilus*)	2.5	2.2
Cyprinidae indet.	65.8	67.4
catfish (*Silurus glanis*)	7.5	2.2
pike (*Esox lucius*)	13.3	17.4
salmonid (*Salmo* sp.)	0.8	1.1
perch (*Perca fluviatilis*)	0.8	0.0
sample size	120	92

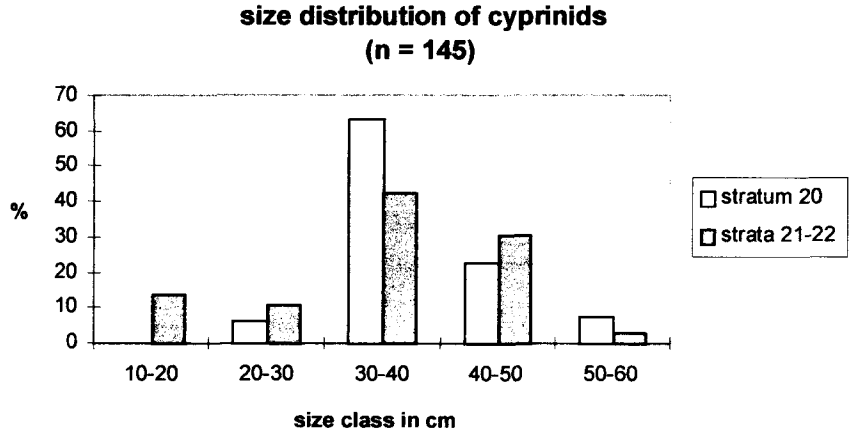

Figure 1: The size distribution of cyprinids for the early (strata 21 and 22) and late (stratum 20) occupation phase. Percentages were calculated separately for the early and late phase.

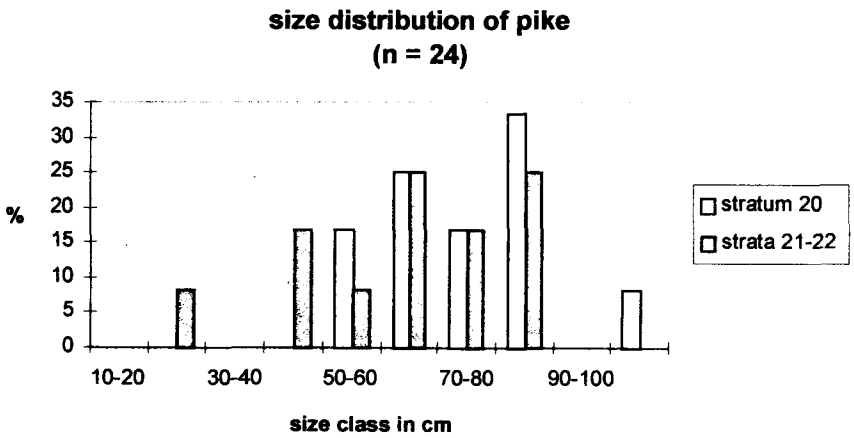

Figure 2: The size distribution of pike for the early (strata 21 and 22) and late (stratum 20) occupation phase. Percentages were calculated separately for the early and late phase.