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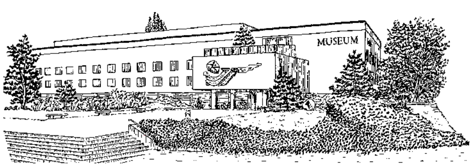

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Pickled fish from the Egyptian Nile: osteological evidence from a Byzantine (Coptic) context at Shanhûr

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Abstract

During excavations of the early Roman temple of Shanhûr (near Luxor, Egypt) a large concentration of small fish bones was found in a younger occupation layer dated to the late 6th-early 7th century AD. The various taxa encountered in this Byzantine (Coptic) assemblage are described and quantified in terms of both number of fragments and minimum number of individuals. Fish lengths are reconstructed using power equations for those taxa for which sufficient modern reference material was available. After excluding natural taphonomic agents (otters, fish eating birds, natural death) it is argued that the deposit is anthropic and that the material represents the remains of fish sauce or of pickled fish. Other archaeozoological data from the literature, textual and archaeological evidence, as well as modern practices show that Nilotic fish were consumed in salted form from about 2500 years ago up to the present-day.

Key words

Archaeozoology, fish sauce, tarichos, salsamenta.

INTRODUCTION

Fish sauces and salted fish from archaeological contexts have been mainly described from Roman contexts in the Mediterranean (e.g., Desse-Berset & Desse, 2000; Delussu & Wilkens, 2000) and consist of species such as sardines, tuna, Spanish mackerel, small sparids, etc. Only occasionally have such products been reported from other areas. This is the case for the Red Sea region where local clupeiforms were used for the preparation of fish sauce during the first centuries of the first millennium (Studer, 1994; Van Neer & Ervynck, 1998, 1999). Small herring, sprat, flatfish and whiting have been reported as ingredients of locally produced fish sauces in north-western Europe (for a review, see Van Neer & Ervynck, 2003). All the aforementioned fish products are of marine origin, but occasionally archaeological finds have been reported that indicate the use of freshwater fish as well. At Mons Claudianus, a 2nd century AD quarry site in the Eastern Desert of Egypt, small specimens of Nilotic species were found and considered as probably pickled fish (Hamilton-Dyer, 2001) and a much older find of salted fish was reported along the Sudanese Nile from the urban centre of Kerma (Chaix, 1984). In a residential Napatan building, occupied between 700 and 500 BC, jars were found that contained carbonised botanical remains, but some of them also yielded a large number of fish bones. A preliminary analysis by Jean Desse (CNRS, Valbonne) showed that the fish remains were disarticulated and that they belonged mainly to small individuals (defined as being less than one pound). Cyprinids, probably mainly *Barbus*, predominated, but the presence of *Hydrocynus* and possibly small individuals of Nile perch (*Lates niloticus*) were also reported, whereas catfish were absent. The product is not considered as a fish sauce, but rather as pickled, whole, fish (Chaix, 1984). In this small contribution, dedicated to Louis Chaix, we report on a salted fish product from a Byzantine (Coptic) site in Upper Egypt that confirms the use of Nilotic freshwater fish during this period.

THE SITE OF SHANHÛR AND THE STUDIED FIND CONTEXT

The site of Shanhûr is located on the east bank of the Nile at about 20 km north of Luxor and about 40 km south of Dendara. It lies in the flood plain at about 2.5 km from the river (Fig. 1). The main landmark of the site is the temple built and decorated over a relatively long period under the rule of the early Roman emperors; Augustus (30 BC-14 AD), Tiberius (14-37 AD), Caligula (37-41 AD), Claudius (41-54 AD) and Trajan (98-117 AD) (Quaegebeur *et al.*, 1994). Between 1992 and 2001 eight archaeological missions were carried out under the auspices of the Katholieke Universiteit Leuven,

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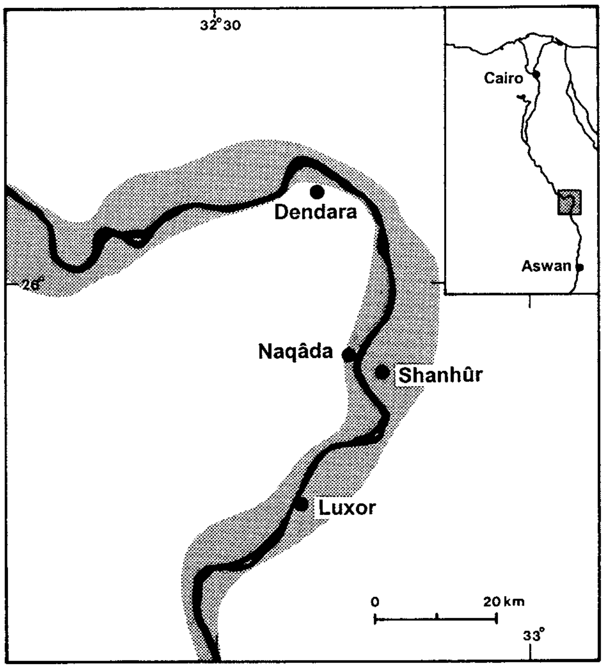

Fig. 1 : Location of the site.

the first six of which were in collaboration with the Université Charles de Gaulle, Institut de Papyrologie et d'Egyptologie de Lille III. Excavations inside as well as in the immediate surroundings of the temple (Fig. 2a) revealed that when the site lost its religious function, it was covered by a domestic settlement in the Byzantine (Coptic) period (QUAEGEBEUR *et al.*, 1994; WILLEMS *et al.*, 1998). The settlement remains consisted of mud brick structures and revealed subsequent occupation levels characterised by the gradual rising of the floor level. In the earliest phase the stone temple floors were re-used. However, as the level rose, red brick floors were constructed. The objects and features and the bone material found *in situ* on the different floors and also within the sediments clearly identify the domestic nature of the structures. The pottery consists of a mixture of coarse and finer wares, mainly amphorae, cooking pots, drinking cups, plates and oil lamps. Structures such as bread ovens and circular bins made of clay as well as the animal remains are also clear indications of a domestic context. Preliminary study of the pottery material dates the occupation of the settlement from the 5th to the 7th century AD.

During the excavations of Sector 1, located at the northern side of the temple, a pocket of sediment was found in an homogeneous soil matrix a few centimetres above a red brick floor level (Fig. 2a and 2b, Findspot 1), unfortunately without a container. This sediment had a slightly lighter colour than the surrounding sediment viz. orange-brownish. This very organic deposit, measuring about 25 x 50 cm and between 1 and 5 cm thick, appeared to be a concentration of very small fish bones (Fig. 2c and 2d). It was found in an undisturbed archaeological context consisting of a space surrounded by mud brick walls, with a floor paved with quasi-quadrangular red bricks and occupied by seven circular bins of varying dimensions. These, and the large amount of *in situ* pottery, suggest a function as a storage room. The concentration of fish bones was found between the two southernmost bins. This occupation level contained a lot of *in situ* pottery on the floor as well as in the homogeneous layer just above. The study of the latter material dates the context to the late 6th-early 7th century AD.

IDENTIFICATION OF THE FISH TAXA AND SIZE RECONSTRUCTIONS

Because this concentration contained a large amount of material, subsamples have been taken for analysis. Table 1 indicates the total weight of the subsamples and shows for each of them what the proportions are of sediment, unidentified and identified bone. The data illustrate the variation that exists within the concentration: certain parts (subsample 3) contain almost exclusively bone, but also the preservation of the bone tissue is very variable. Subsample 2 was chosen because of its well-preserved bone, but in all other subsamples the proportion of

Table 1 : Overview of the subsamples analysed from the fish bone concentration north of the temple.

	total weight in g	weight of sediment		weight of unidentified bone		weight of identified bone	
		g	%	g	%	g	%
subsample 1	4.94	0.57	11.5	3.96	80.2	0.41	8.3
subsample 2	3.57	0.61	17.1	1.53	42.9	1.43	40.1
subsample 3	1.35	0.06	4.4	1.02	75.6	0.27	20.0
subsample 4	0.40	0.1	25.0	0.26	65.0	0.04	10.0
subsample 5	13.67	3.27	23.9	9.14	66.9	1.26	9.2
subsample 6	3.93	0.41	10.4	2.91	74.0	0.61	15.5
total	27.86	5.02	18.0	18.82	67.6	4.02	14.4

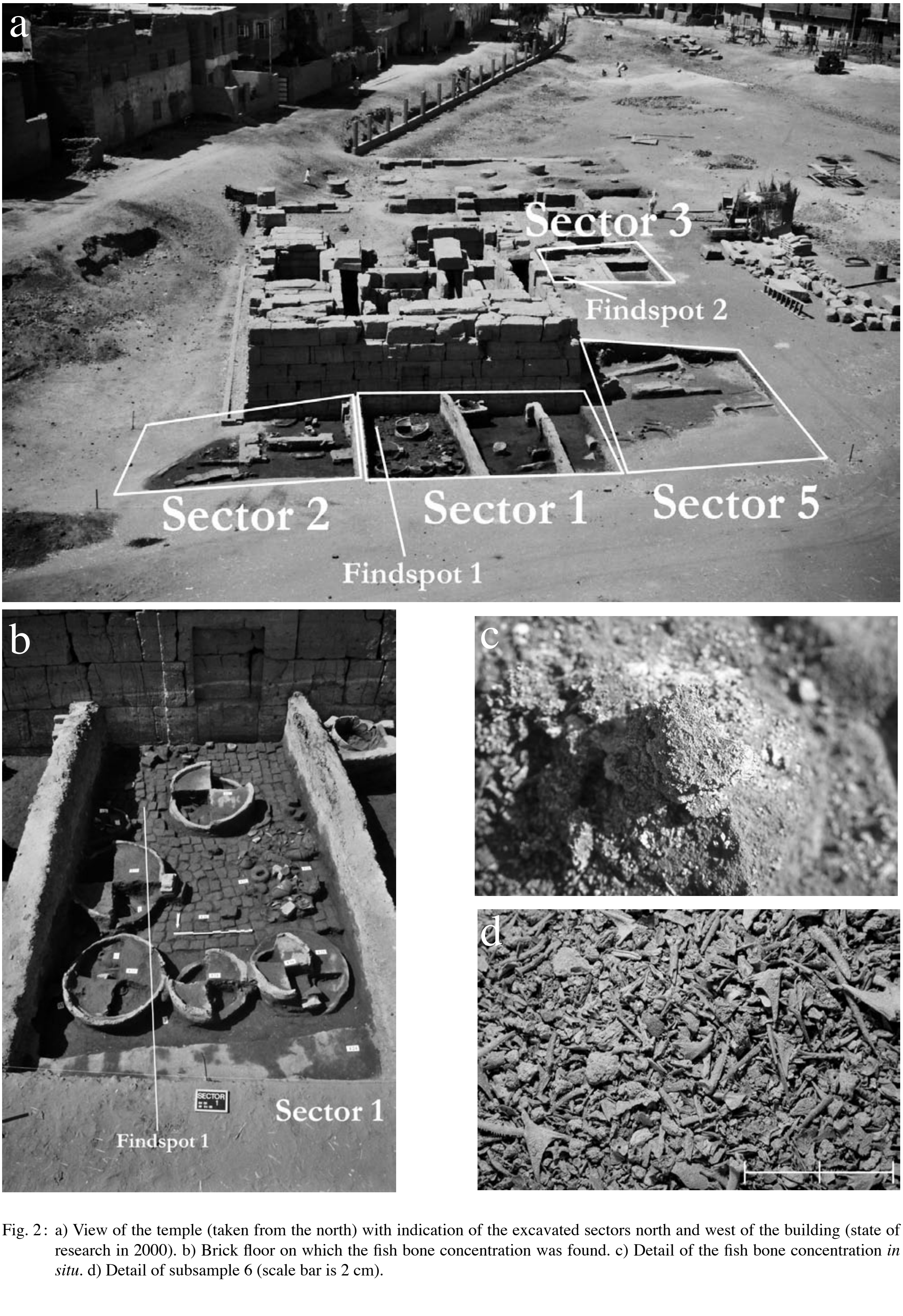

Fig. 2 : a) View of the temple (taken from the north) with indication of the excavated sectors north and west of the building (state of research in 2000). b) Brick floor on which the fish bone concentration was found. c) Detail of the fish bone concentration *in situ*. d) Detail of subsample 6 (scale bar is 2 cm).

unidentifiable small bone splinters was very high. In several of those subsamples bone was so poorly preserved that manipulation of the remains provoked further fragmentation. The total amount of analysed bones is about 7850 fragments, belonging to at least six different taxa (Table 2). For each taxon the minimum number of individuals was established (Table 3). During analysis, a distinction was made between left and right specimens of paired elements, although in some cases the MNI was obtained from an unpaired element (Table 4). In cases where vertebrae were the most common element (Mormyridae and Alestiidae), the number of vertebral centra found was divided by the number of these elements observed in the modern comparative specimens. An MNI of 127 is obtained when the individuals of the various subsamples are separately summed, but when the material is considered as a single entity, the MNI drops to 109.

Identifications were carried out by comparison with the reference material housed at the Royal Museum of Central Africa. Reconstructions of fish size were obtained by direct comparison with modern specimens of known length for those taxa of which insufficient modern material was available to calculate regression equations. In the other cases, the least squares method was applied to calculate correlations between a given measurement and fish length. This method produces a smaller standard error than linear, exponential or logarithmic curves (*e.g.*, Leach *et al.*, 1996 ; Grouard, 2001). Power curves were calculated for measurements that can be taken frequently on the archaeological material and involved the use of more than one species to increase sample size for each considered taxon (cf. Desse & Desse-Berset, 1996). Since all the Shanhûr material is from small specimens, only such individuals were chosen among the modern material to calculate the curves.

The Mormyridae are represented by nine elements only, namely one precaudal and eight caudal vertebrae. The morphology of the vertebral centra did not allow identification beyond the family level. Direct comparison of these bones with the few modern mormyrids of small size in the reference collections shows that they belonged to individuals measuring less than 50 mm SL.

The cyprinids are the second best represented taxon in terms of number of fragments. Pharyngeal plates, which

Table 2 : Absolute number of fragments and relative importance of the fish taxa in the different subsamples.

NF	Mormyridae		Cyprinidae		Alestiidae		*Bagrus*		*Synodontis*		Tilapiini		total
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.
subsample 1	0	0.0	161	14.0	8	0.7	0	0.0	50	4.4	928	80.9	1147
subsample 2	0	0.0	97	17.4	0	0.0	0	0.0	46	8.3	413	74.3	556
subsample 3	0	0.0	71	17.8	4	1.0	0	0.0	16	4.0	308	77.2	399
subsample 4	0	0.0	19	17.4	6	5.5	0	0.0	19	17.4	65	59.6	109
subsample 5	6	0.1	862	16.8	123	2.4	1	0.0	453	8.8	3683	71.8	5128
subsample 6	3	0.6	119	23.4	21	4.1	0	0.0	306	60.2	59	11.6	508
total	9	0.1	1329	16.9	162	2.1	1	0.0	890	11.3	5456	69.5	7847

Table 3 : Minimum number of individuals of the various fish taxa and their relative importance in the different subsamples. Two totals are given : in the first the individuals of the various subsamples have been separately added up, in the second the MNI is given that is obtained when all subsamples are considered together as one entity (cf. Table 4).

MNI	Mormyridae		Cyprinidae		Alestiidae		*Bagrus*		*Synodontis*		Tilapiini		total
	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.
subsample 1	0	0.0	11	28.9	1	2.6	0	0.0	6	15.8	20	52.6	38
subsample 2	0	0.0	6	35.3	0	0.0	0	0.0	5	29.4	6	35.3	17
subsample 3	0	0.0	3	27.3	1	9.1	0	0.0	2	18.2	5	45.5	11
subsample 4	0	0.0	3	37.5	1	12.5	0	0.0	2	25.0	2	25.0	8
subsample 5	1	0.6	38	21.2	6	3.4	1	0.6	43	24.0	90	50.3	179
subsample 6	1	2.5	8	20.0	1	2.5	0	0.0	26	65.0	4	10.0	40
total 1	2	0.7	69	23.5	10	3.4	1	0.3	84	28.7	127	43.3	293
total 2	1	0.4	67	25.5	8	3.0	1	0.4	77	29.3	109	41.4	263

Table 4: Skeletal representation of the various taxa. The elements that were used for the establishment of the Minimum Number of Individuals are underlined.

	Mormyridae	Cyprinidae	Alestiidae	*Bagrus*	*Synodontis*	Tilapiini
mesethmoid	0	0	0	0	0	27
basioccipitale	0	3	0	0	0	25
exoccipitale	0	0	0	0	0	3
posttemporale	0	0	0	0	0	47
lacrimale	0	0	0	0	0	18
cranial roof fragments	0	0	0	<u>1</u>	39	1
nuchal plate	0	0	0	0	35	0
palatinum	0	0	0	0	0	4
quadratum	0	0	0	0	0	22
maxillare	0	0	0	0	0	45
premaxillare	0	0	0	0	0	43
articulare	0	0	0	0	0	58
dentale	0	0	0	0	0	54
operculare	0	4	0	0	1	64
preoperculare	0	3	0	0	0	29
suboperculare	0	0	0	0	0	36
hyomandibulare	0	6	0	0	0	17
keratohyale	0	5	0	0	0	37
urohyale	0	3	0	0	0	39
pharyngeal plate	0	<u>125</u>	0	0	0	0
pharyngeal tooth	0	59	0	0	0	0
branchial elements	0	0	0	0	0	427
cleithrum	0	3	0	0	38	54
supracleithrum	0	0	0	0	0	8
postcleithrum	0	0	0	0	0	5
scapula	0	0	0	0	0	4
coracoideum	0	0	0	0	18	3
basipterygium	0	5	0	0	0	70
ventral spine	0	0	0	0	0	134
dorsal pterygiophore	0	6	0	0	0	434
dorsal spine	0	1	0	0	20	1295
lock of dorsal spine	0	0	0	0	12	0
anal pterygiophore	0	0	0	0	0	98
anal spine	0	0	0	0	0	16
pectoral spine	0	0	0	0	<u>151</u>	18
Weberian apparatus	0	0	0	0	10	0
first precaudal vertebra	0	5	0	0	0	72
second precaudal vertebra	0	17	0	0	0	<u>109</u>
third precaudal vertebra	0	0	0	0	0	59
other precaudal vertebrae	1	444	21	0	133	943
last caudal vertebra	0	0	0	0	0	47
other caudal vertebrae	<u>8</u>	640	<u>141</u>	0	433	1091
total number of fragments	9	1329	162	1	890	5456
MNI	1	67	8	1	77	109

are the most diagnostic bone elements in this family, are well represented in the samples, albeit that they are only rarely preserved complete. During identification it was necessary to take into account all 13 species that have been reported from the Nile (Boulenger, 1907; Bishai & Khalil, 1997). *Raiamas senegalensis* (Steindachner, 1870) could be excluded because it has only two tooth rows whereas the archaeological specimens all have three such rows. *Garra dembeensis* (Rüppell, 1836), *Leptocypris niloticus* (Joannis, 1835) and *Chelaethiops bibie* (Joannis, 1835) could also be excluded on the basis of the different shape of the pharyngeal bone itself. The remaining taxa are five species of the genus *Barbus* and four of the genus *Labeo*. Modern reference specimens were available for the *Labeo* species, namely *Labeo coubie* Rüppell, 1832, *Labeo forskalii* Rüppell, 1836, *Labeo horie* Heckel, 1846-49 and *Labeo niloticus* (Forsskål, 1775). Subsample 5 yielded six pharyngeal tooth plates from this genus, and they all matched most closely to *Labeo forskalii*. For *Barbus* the reference collection at our disposal comprises *Barbus bynni* (Forsskål, 1775) and *Barbus perince* Rüppell, 1836, but the three other species reported from the Egyptian Nile (*Barbus anema* Boulenger, 1903, *Barbus neglectus* Boulenger, 1903 and *Barbus stigmatopygus* Boulenger, 1903) are lacking. A final identification can therefore not be given, although it can be stated that the archaeological specimens differ from *Barbus bynni* and that they match *B. perince* very closely. The size reconstruction is again hampered by the lack of modern specimens of small size. Aside from five specimens of *Barbus perince*, measuring between 61 and 97 mm SL, we had two specimens at our disposal of an Asiatic barb *Puntius gelius* (Hamilton, 1822) (formerly *Barbus gelius*) of 24 and 25 mm SL. Direct comparison of a sample of 98 pharyngeal plates from Shanhûr with these modern specimens shows that most archaeological specimens must have measured between 20 and 30 mm SL, but both slightly smaller and slightly larger fish occurred as well. Although we realise that a larger number of cases is needed, a least squares regression was calculated from the seven modern specimens giving the relationship between the gape length of the pharyngeal plate and the standard length (Fig. 3a). If this formula is used to reconstruct the sizes of the Shanhûr sample, then it appears that the fish vary between 15 and 45 mm SL, with about half of the specimens measuring between 20 and 25 mm (see Fig. 4a).

The Alestiidae are represented in the archaeological assemblage only by vertebrae. Their morphology allows exclusion of identification as *Micralestes elongatus* Daget, 1957 or as one of the *Hydrocynus* species living in the Lower Nile today. The remaining Alestiidae species from the area are *Alestes baremoze* (Joannis, 1835), *Alestes dentex* (Linnaeus, 1758), *Brycinus macrolepidotus* Valenciennes, 1850 and *Brycinus nurse* (Rüppell, 1832). Because no consistent morphological differences could be found on the modern vertebrae of these taxa, the archaeological specimens can be labelled only as "*Alestes*/*Brycinus*". Direct comparison of the archaeological material with modern specimens of known size shows that most Alestiidae from Shanhûr measured between 30 and 50 mm SL.

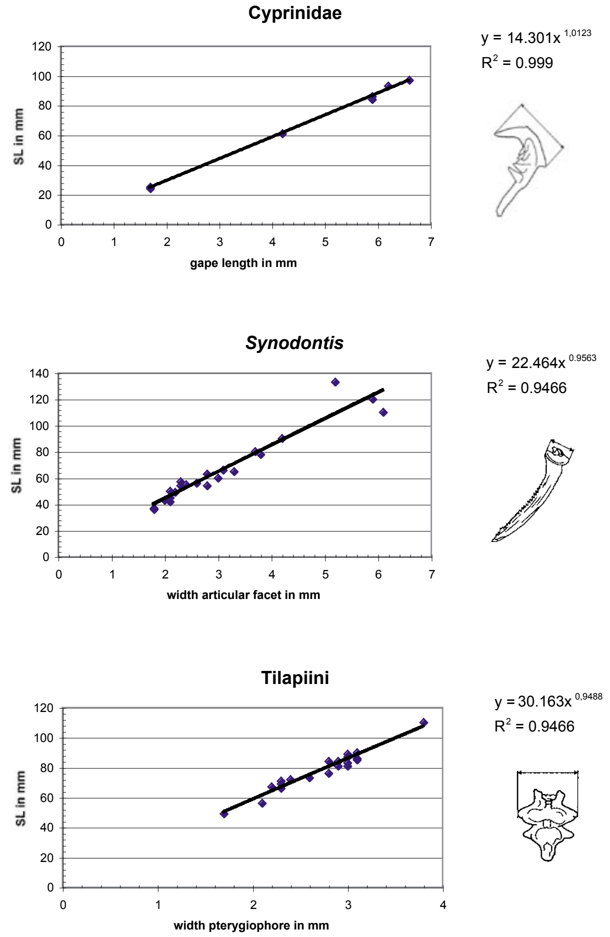

Fig. 3: Power curves showing the relation between standard length and a given measurement: a) the gape length of the pharyngeal bone in cyprinids; b) width of the articular facet of the pectoral spine in *Synodontis*; c) width of the anal pterygiophore in Tilapiini.

A catfish of the Bagridae family is represented by a mesethmoid that can be identified as *Bagrus docmak* (Forsskål, 1775). The morphology of this cranial element differs clearly from that seen in the second Nilotic species *Bagrus bajad* (Forsskål, 1775) (see also Plate 8 in Boessneck & von den Driesch, 1982). The other catfish taxon found in the assemblage is much more numerous and belongs to the Mochokidae, a family that is represented by 10 species in the Egyptian Nile. Aside from *Mochokus niloticus* Joannis, 1835, *Chiloglanis niloticus* Boulenger, 1900, and *Hemisynodontis membranaceus* (Geoffroy Saint-Hilaire, 1808-9), seven species of the genus *Synodontis* have been reported (Boulenger, 1907). These species, *Synodontis batensoda*

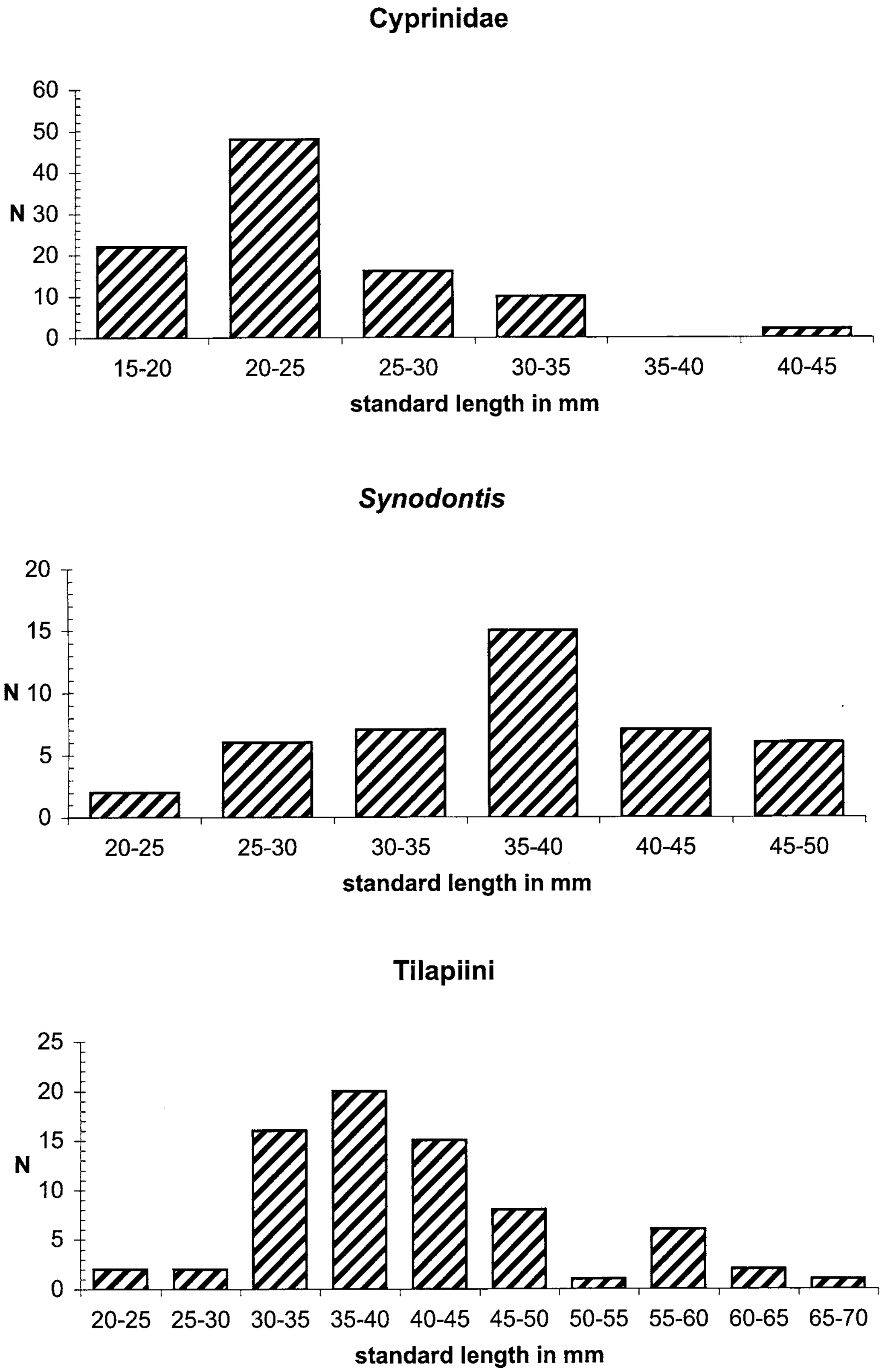

Fig. 4 : Size reconstructions obtained for a) cyprinids (n=98) ; b) *Synodontis* (n=43) ; c) Tilapiini (n=73) from Shanhûr.

RÜPPELL, 1832, *Synodontis clarias* (LINNAEUS, 1758), *S. filamentosus* BOULENGER, 1901, *S. frontosus* VAILLANT, 1895, *S. schall* (BLOCH & SCHNEIDER, 1801), *S. serratus* RÜPPELL, 1829 and *S. sorex* GÜNTHER, 1864, as well as the ones listed previously, can be distinguished from each other by the morphology of the humeral process of the cleithrum (cf. Plates VIII-XII in POLL, 1971, and Plates 5-7 in BOESSNECK & VON DEN DRIESCH, 1982). All well-preserved cleithra from Shanhûr have the typical pointed shape of *S. schall,* which is today still the most common mochokid in Egypt. Using the least squares method, a regression equation was calculated for the width of the articular facet of the pectoral spine, on the basis of 23 modern *Synodontis* specimens measuring between 36 and 133 mm SL (Fig. 3b). Figure 4b shows the distribution of the reconstructed standard lengths for a sample of 43 pectoral spines from Shanhûr. The sizes vary between 20 and 50 mm SL with most specimens measuring 35-40 mm.

Six species of Cichlidae have been reported from the Egyptian Nile (BOULENGER, 1907) of which two are not taken into consideration here because they live exclusively in brackish waters of the Nile delta. This is the case for *Hemichromis fasciatus* PETERS, 1857 and for *Oreochromis aureus* (STEINDACHNER, 1864). The four remaining species are the small-sized *Haplochromis bloyeti* (SAUVAGE, 1883) and the three important food species *Oreochromis niloticus* (LINNAEUS, 1758), *Sarotherodon galilaeus* (LINNAEUS, 1758) and *Tilapia zillii* (GERVAIS, 1848). A full osteomorphological study of the modern specimens at our disposal was not carried out, but when the dentaries from the archaeological assemblage were compared to modern specimens of the four taxa, it appeared that none of them had the broad processus dorsalis superior observed in *Haplochromis bloyeti*. The shape of the dentary did not allow, however, the making of a distinction between the three tilapia species, for this reason the cichlid material is identified only as Tilapiini. The power equation defining the relation between the width of the anal pterygiophore and the total length given in VAN NEER & LESUR (in press) was not used for the size reconstruction here. That power curve was obtained from 34 modern specimens measuring between 50 and 470 mm SL (mean 180 mm). Instead we calculated a new regression curve (Fig. 3c) using 20 individuals measuring between 49 and 110 mm SL (mean 78 mm). The distribution of standard lengths obtained from a sample of 73 anal pterygiophores from Shanhûr is shown on Figure 4c. It appears that the lengths vary between 20 and 70 mm SL, with most individuals measuring between 30 and 50 mm SL.

GENERAL COMPOSITION OF THE SAMPLE AND TAPHONOMY

The proportions of the various taxa are indicated in Figure 5, for the number of fragments and for the MNI respectively. It appears that tilapia is the best represented taxon in all subsamples, except subsample 6 where *Synodontis* predominates. This latter assemblage is also characterised by a relatively high proportion of cyprinids. In all the other subsamples the Cyprinidae are also the second best represented taxon. *Synodontis* is rather well represented everywhere, especially in subsample 4 and, as already mentioned, in subsample 6. It is also in subsamples 4 and 6 that Alestiidae are reasonably well represented. When the entire sample is considered, tilapia are the most common fish, followed by cyprinids, *Synodontis* and Alestiidae. The contribution of mormyrids and *Bagrus* is negligible. When the MNI are considered, these four taxa remain the major groups with – for the whole sample - again tilapia as the most frequent one. *Synodontis* is, however, slightly more frequent than cyprinids, contrary to the proportions seen for the

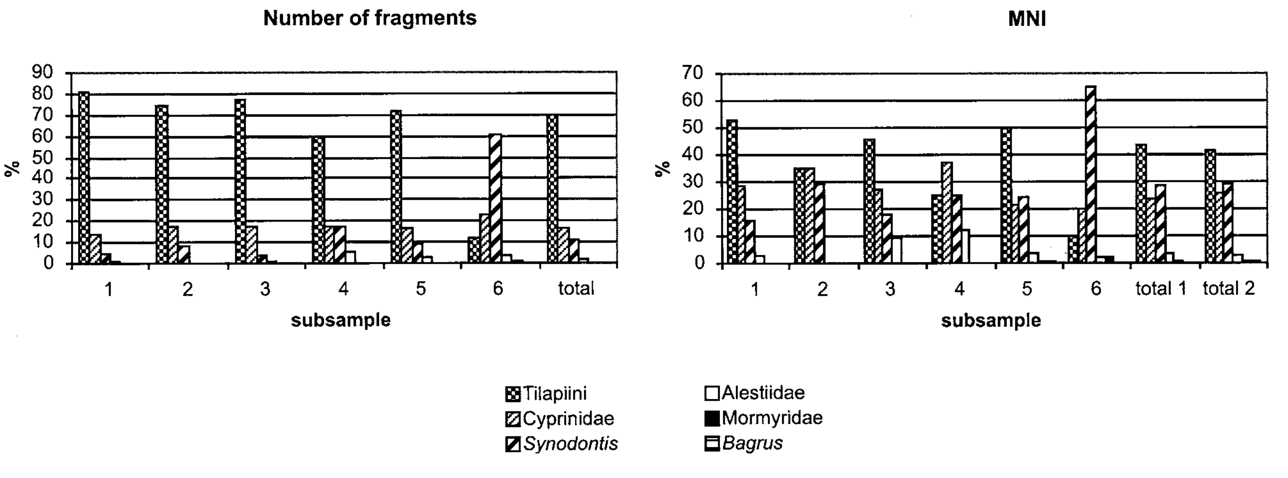

Fig. 5 : Proportion of the various fish taxa in function of the number of fragments (left pane) and of the Minimum Number of Individuals (right pane).

number of fragments. Another result of the calculation of MNI is that the poorly represented taxa, i.e. mormyrids, *Bagrus* and Alestiidae become relatively speaking more prominent, an effect that is well known (cf. Poplin, 1976). As mentioned above, only subsamples were analysed in detail. After that, the bone in the unstudied material was separated from the sediment and weighed. It appeared that the analysed bone represented about 20% of the total amount that was available, meaning that the total minimum number of individuals can be estimated at about 550.

When this first concentration of fish bones was found at Shanhûr, the question was raised whether the deposit was anthropic or if, alternatively, natural causes could explain their presence. Although otters are presently absent from the Egyptian Nile, the former presence of *Lutra maculicollis* has been attested by bone finds (Van Neer, 2002). Pictorial evidence and historical records of otters also exists. Otter sprains are an unlikely explanation for the accumulation from Shanhûr, because of the high number of fish individuals found on a small surface, and because otters are known to defecate rather close to the river banks (Nowak, 1991 : 1136). Fish eating birds (*e.g.*, cormorants or birds of prey) that regurgitated fish are also unlikely to be the agent responsible for the deposit found, again because of the large number of fish present on a small surface. The same argument allows exclusion of another scenario: it is highly unlikely that the stomach contents of a large number of piscivorous fish, such as the Nile perch *Lates niloticus* (Linnaeus, 1758), would have been deposited by man on the same small spot. Natural death in residual pools could be an alternative explanation: mass mortality of juveniles can occur when they are trapped in small ponds that desiccate completely after the floods. However, the skeletal remains from Shanhûr were not found in articulating position, as would be expected in the case of natural death. Moreover, it is unlikely that the flood waters would have reached the temple. For the reasons just mentioned, but also because of some other fish bone concentrations at Shanhûr, apparently showing an association between fish and pottery (see below), it is believed that we are dealing with the remains of a fish product. It has been suggested that the distinction between fish sauce (garum, allec, etc.) and pickled fish (tarichos, salsamenta) can be made on osteological grounds (Desse-Berset & Desse, 2000). Typical of pickled fish would be that their remains are still in anatomical position, which was not the case at Shanhûr. It is unclear, however, if this can be used as an argument to define the Shanhûr material as a fish sauce: when the fermentation of pickled fish continues, the product may disintegrate and individual fish may be no longer recognisable. Maybe the described remains correspond to a product that was intended as pickled fish, but that spoiled and therefore was disposed of? An alternative explanation could be that fish sauce was stored in the area north of the temple, but that the vessel that contained the product broke.

The settlement yielded still other samples with a predominance of very small fish bones, but not all of them have been analysed completely at the moment. They consist, however, of the same taxa as mentioned above. Worth mentioning is a small open cooking pot (Fig. 6) found close to the western exterior wall of the temple in the lowest occupation layer of Sector 3, located on the western side of the temple (Fig. 2a, Findspot 2). This vessel, made from Nile silt, also dated to the late 6th-early 7th century AD and contained small fish remains at the bottom. There are other instances where there was an association of pottery and small fish bones. They were excavated in the oldest occupation layer of Sector 1, well-below the well-preserved floor level described above. The samples were found just above the original floor level of the temple in a layer that is characterised by various discolorations and deposits of ashes. The presence of large limestone blocks, broken column and architrave fragments leaves no doubt that they were deposited in a period shortly after the destruction of an exterior portico, which once served a kind of contra-temple in which the common people could pray to the Gods. These shards can be connected to the first traces of domestic occupation excavated among the rubble (fragments of brick walls and a fireplace installation). One of the samples consisted of organic material sticking to a fragment of a cooking pot. It is comparable in texture and content to the material described above. However, the sediment with the fish bone was found both inside and outside the container. Still another cooking pot made from Nile silt was found in the same context. It contained the remains of an MNI of six *Synodontis* and six cyprinids. All the *Synodontis* were smaller than 50 mm, whereas five of the cyprinids were less than 100 mm SL. The occupational layer in which these samples were found is tentatively dated, on the basis of the pottery fragments, to between the second half of the 5th and the 6th century AD. In the same find spot several amphora sherds were found, belonging to more than one broken container. One sherd of an amphora, typical of the 5th-

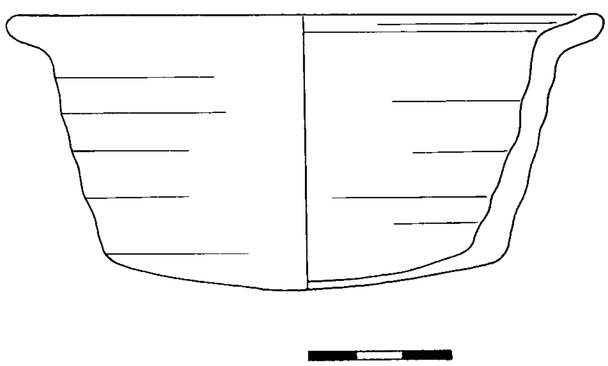

Fig. 6: Small open cooking pot that contained small fish remains at its bottom (scale bar is 3 cm).

7th century AD, with broad turn-ribs on the surface, had fish bones adhering to the inside. The sample consisted of an MNI of seven *Synodontis* of less than 50 mm SL, and of one *Labeo*. During the 2001 excavation season a special effort was made to take many sediment samples for sieving on a 4 mm and 2 mm mesh. This was not only done for the content of ceramics, but samples were also systematically taken from the various layers and units that were excavated. It was striking that almost every sample produced faunal remains and that their species spectrum was rather limited and consistent. Besides fish remains, the material found in the 2 mm sieves consisted mainly of large numbers of house mouse and black rat. Compared to the fish bone concentration described here, it is striking that *Synodontis* is the most common taxon. This genus is present in almost every sediment sample that yielded bone and is represented mainly by remains of cleithra and dorsal and pectoral spines. These are the most robust elements of this catfish skeleton and it is believed that differential preservation in the occupation layers is responsible for the underrepresentation of vertebrae (which are numerous in the assemblage presented here, see Table 4). The same phenomenon could explain the smaller proportion of tilapia and cyprinids.

PRODUCTION OF PICKLED NILOTIC FISH THROUGH TIME

The assemblage from Shanhûr is the first such fish product that is described in detail from the Nile Valley. As mentioned in the introduction, similar material has been reported from 700 to 500 BC contexts at Kerma (CHAIX, 1984), which seems to be the oldest evidence available thus far. These fish remains were found in jars, indicating that this food item was stored. Similarly it has to be accepted that the small mormyrids and cyprinids, found in the bottom of an amphora at 2nd century AD Mons Claudianus, were salted (HAMILTON-DYER, 2001). This site is located at about 120 km from the Nile from where they were brought in along one of the desert routes connecting the Nile with the Red Sea. The finds from Shanhûr demonstrate that the practice of pickling small fish continued into the Byzantine (Coptic) period. This fish product is still very popular in Egypt today (see below).

Papyrological evidence on fish sauce and its production and commerce in Egypt is relatively scanty for the Ptolemaic, Roman and Byzantine period (DREXHAGE, 1993). If the number of references related to fish sauce is taken as a measure, it appears that the demand was low until the 2nd century AD. It is only from the 3rd century onwards that the papyrological data increase in number. DREXHAGE (1993) excludes large-scale production of fish sauce in Egypt and believes, because of the numerous descriptions of taste and quality, that there was a varied supply and demand that could be mainly covered by local or domestic production. This hypothesis is supported by the low number of references to specialized trade. Fish sauce or pickled fish can indeed be easily prepared when containers with fish and salt are exposed to the sun.

The use of *Synodontis* and of cyprinids in the early Islamic period as an ingredient for the preparation of pickled fish (tarichos) has been demonstrated by the analysis of ostraca, representing Coptic delivery chits (CLACKSON, 1999, 2002). The textual evidence shows that both taxa were stored in jars, presumably preserved, and that pickled fish were consumed by monastic communities. During excavations at the monastery of Bawit, from where the aforementioned ostraca are believed to originate, vessels were found that contained pickled fish (MASPERO & DRIOTON, 1931-1943: xii, xv). Neither the species nor the sizes of the fish are indicated, but one of the brief descriptions (MASPERO & DRIOTON, 1931-1943: 44) mentions that the fish were in chunks showing that they must have been rather large.

Pickled fish are still popular in Egypt, and one particular variety is a typical domestic product. Each year, during the yearly spring festival sham an-naseem (شام النسيم), faseekh (فسيخ) is traditionally eaten, although it is also consumed outside that season. This commodity has also been reported from northern Sudan where it is known under the same name (CHAIX, 1984). In November 2000, the first author bought at Luxor market a bunch of small, fresh fish meant for the preparation of faseekh. The species identifications and the sizes of the specimens present in this modern sample of 396 fish are indicated in Table 5. Compared to the fish bone concentration from Shanhûr, the modern sample is totally different in the sense that *Synodontis* is completely lacking and that cichlids are virtually absent. Cyprinids are better represented, but they are still much less frequent than the Alestiidae. Asking why tilapia were not used in the

Table 5: Composition of a sample of modern fish used for the preparation of faseekh.

species	SL in cm	number	%
Mormyridae			
Pollimyrus isodori	8-8.5	6	1.6
Cyprinidae			
Barbus perince	8-10	47	12.7
Leptocypris niloticus	6.5	1	0.3
Alestidae			
Micralestes elongatus	4.5-6	301	81.6
Cichlidae			
Haplochromis bloyeti	6.5	2	0.5
Tilapia zillii	6-7	2	0.5
Latidae			
Lates niloticus	8-10	10	2.7

Fig. 7 : Preparation of faseekh.

preparation we were told that it is simply not done (Reda Said Hassan, pers. comm.). The same person, inhabitant of Luxor, showed us how faseekh is produced (Fig. 7). This was done along the Red Sea coast in February 2001, using locally available marine fish, in this case *Synodus* of maximally 10 cm. Fish of this size are not gutted, but simply mixed with salt and with a small quantity of oil and red pepper. The container is then closed of from the air and stored in a dark place. Depending on the size of the specimens, the faseekh is ready for consumption within 3-4 days for small fish or one week to 10 days for larger fish. We tasted the end product, which can be described as soft fish meat with a loosened texture and with a taste that slightly recalls salted anchovies.

As a conclusion, it can be stated that not only marine fish but also freshwater species can be used for the production of fish sauce or tarichos, a practice for which the oldest evidence in the Nile Valley thus far comes from the Napatan contexts of Kerma, dated to 700-500 BC (Chaix, 1984). The archaeological, textual and faunal evidence summarized here seems to indicate that there was a continuity in the production of these salted products from at least the middle of the first millennium BC until the present day.

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