

e. Pisces

Fish remains from the Mumba Cave, Lake Eyasi

by

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Through the courtesy of Dr. U. LEHMANN of the Geologisches Staatsinstitut, Hamburg, I have been able to examine the fish remains collected from the Mumba Cave by Professor KOHL-LARSEN'S 1938 expedition.

Fish remains were obtained from the third (*Homo sapiens*; late Stone Age) and fifth (*Africanthropus*; Stillbay) strata, and comprise vertebrae, neurocranial fragments and fin spines. The majority are slightly mineralized (as measured by their hardness and weight) and are lightly coloured, but a small proportion are dark brown in colour and are more heavily mineralized. Fossils from any one depth usually show some intergradation in hardness and coloration, but specimens in the "pale-soft" category predominate. In general, the bones are well preserved and consequently a high proportion (over 98%) can be identified generically. But, since specific characters are not clearly reflected in any of the elements preserved, it is impossible to name the species present.

The material had been pre-sorted into collections from successive 20 cm depths within each horizon and will be described according to this grouping.

Horizon III: (*Homo sapiens*; late Stone-age cultures) 0,0—0,2 m deep.

CLARIIDAE

Clarias sp.

Neurocranium: represented by thirty-seven fragments of roofing-bones. Two bones are identified as dermethmoids, two as fragments of frontals, one as part of a lateral ethmoid (prefrontal), one as part of a post-temporal and two are tentatively identified as sphenotics. Judging from the thickness of the bone and from the size of those elements which are almost entire, the bones were derived from small fishes of about 40—50 cm standard length.

The ornamentation of the bones, both in the shape and the pattern of their pointed tubercles, resembles that occurring in *C. laxera* C. and V. more closely than it does the ornamentation of the skull in *C. mossambicus* PETERS. However, it would be unwise to use only these characters as a basis for identifying species, particularly since their intra-specific variability has not been studied adequately in living fishes (see p. 129.)

In addition to the roofing bones, there is part of the compound vertebra which, in the entire skull, is suturedly united with the basioccipital.

The only other skull element is a large part of the left articular. This specimen is more heavily mineralized than the other skull-bones from this depth.

Vertebrae: Anterior abdominal elements: one hundred and eleven specimens, most of which are lightly mineralized and pale.

Posterior abdominal and caudal elements: one hundred and nineteen specimens. Variation in hardness and colour shown by these bones is similar to that of the specimens described above.

The position in the vertebral column of eleven other vertebrae cannot be determined.

One centrum (from a fish about 75 cm long) is referred to *Clarias* since it resembles closely an aberrant form of vertebra sometimes encountered in the vertebral column of *Clarias mossambicus* (personal observations). In these atypical vertebrae the centra of two or occasionally three vertebrae are apparently fused together and somewhat compressed antero-posteriorly. Traces of the individual elements are seen in the ridge encircling the centrum at approximately its mid-point and in the discrete neural arches.

Pectoral spines: forty-five specimens (21 right and 24 left spines) of the articular head and the proximal $\frac{1}{3}$ — $\frac{1}{2}$ of the spine. The degree of mineralization of these spines exhibits the same range of variation and intergradation as shown by the vertebrae.

Twelve other fragments are from the distal ends of pectoral spines.

CICHLIDAE

Tilapia sp.

Sixteen centra, derived from fishes in the size range 25—30 cm standard length, are referred to this genus.

Unidentifiable material

Thirty-seven fragmentary vertebrae cannot be identified; most were probably derived from *Clarias* and *Tilapia*.

0,2—0,4 m deep.

The appearance and texture of material from this layer does not differ markedly from specimens in the 0,0—0,2 m layer and shows the same variation in hardness and coloration.

CLARIIDAE

Clarias sp.

Neurocranium: There are nineteen fragments of neurocranial roofing bones, of which two are left frontals, two are post-temporals and one a dermethmoid; all the specimens are from small fishes. In addition to these bones, five large fragments have been matched together to form part of the neurocranium of a fish estimated to be about 80 cm standard length. The ethmoidal region, part of the frontals, and the anterior part of the supra-occipital are preserved.

All the fragments have ornamentation of the *C. lazera* type.

Two other elements from the skull of *Clarias* are preserved in this layer. One is a fragment of the compound cranial vertebrae and the other, a small piece of dentigerous bone, probably from the vomerine tooth-band.

Pectoral girdle: An almost complete coracoid, from a large fish, may possibly be associated with the neurocranium mentioned above.

Pectoral spines: There are thirty-nine specimens (18 left, 21 right) of the articular head and proximal $\frac{1}{2}$ of the spine, together with six fragments from the distal ends of pectoral spines.

Vertebrae: Anterior abdominal elements: one hundred and fifty-six specimens, thought to be derived from fishes of about 30—80 cm standard length.

Posterior abdominal and caudal elements: two hundred and forty-five specimens; some are from small fishes of about 20—25 cm standard length, but most are from fishes in the size-range 30—80 cm.

Two other vertebrae are identified tentatively as being aberrant, compound elements. One specimen appears to be a double vertebra from the abdominal region of the column and the other, a triple vertebra from the caudal region.

? CYPRINIDAE

? *Barbus* sp.

One specimen, the centrum of a vertebra, compares closely with the caudal vertebrae of *Barbus altianalis radcliffi* BLGR. Although the resemblance is marked, the generic identification must be considered tentative in view of the imperfections of the specimen.

CICHLIDAE

Tilapia sp.

Thirty-two vertebrae (10 abdominal and 22 caudal) are referred to this genus. The size range of fishes represented by the fossils is estimated to be from 15—25 cm standard length.

Unidentifiable material

Twenty-nine fragmentary vertebrae (of which eleven should probably be referred to *Clarias*, and the remainder to small *Clarias* and *Tilapia*) cannot be identified with certainty.

0,4—0,6 m deep.

The single fish-fossil recovered from this level is the articular head and proximal half of a *Clarias* pectoral spine; it was derived from a small fish.

0,6—0,8 m deep.

Specimens from this depth are similar in appearance and texture to those from the more superficial layers.

CLARIIDAE

Clarias sp.

Neurocranium: There are two neurocranial bones, one, an almost complete right frontal, and the other a fragment from the anterior part of a supraoccipital. The frontal is considered to be from a fish about 50 cm standard length, and the supra-occipital fragment from a larger individual, about 80 cm long. The ornamentation of both bones resembles that found in *C.lazera*.

Pectoral spines: four specimens (1 left and 3 right) of the articular head and proximal part of the spine. There is also a small fragment from the distal end of a spine.

Vertebrae: twelve specimens are identified as anterior abdominal elements and forty-six as posterior abdominal and caudal elements. The estimated size range of the fishes represented by these bones is from 30—75 cm standard length.

CICHLIDAE

Tilapia sp.

This genus is represented by six vertebrae (2 abdominal and 4 caudal elements) from fishes of about 20—25 cm standard length.

Unidentifiable material.

Twelve fragments of vertebrae, or badly damaged vertebrae, are unidentifiable. Three of these bones are probably from *Clarias* and three from *Tilapia* skeletons.

0,8—1,0 m deep.

All the material from this layer is slightly mineralized and pale in colour.

CLARIIDAE

Clarias sp.

Neurocranium: There are two fragments of roofing bones, one of which is identified as a right lateral-ethmoid (prefrontal) from a fish about 70 cm standard length. The ornamentation of both bones closely resembles that found in *C.lazera*.

Pectoral spines: are represented by the articular head and proximal half of a right spine, together with a fragment from the distal part of a spine.

Vertebrae: fourteen abdominal and caudal elements are thought to be derived from fishes of 30—75 cm standard length.

CICHLIDAE

Tilapia sp.

Tilapia is represented by two caudal vertebrae from a fish of about 25 cm standard length.

Unidentifiable material: a fragment of centrum.

1,0—1,2 m deep.

Only *Clarias* occurs in this layer. There are thirteen vertebrae from fishes of 50—75 cm standard length. The bones are lightly mineralized and pale in colour.

1,2—1,4 m deep.

Material from this layer shows a range of variation in colour and hardness comparable with specimens from layers contained in the first metre of the deposit.

CLARIIDAE

Clarias sp.

Neurocranium: six fragments of neurocranial roofing bones are preserved. The fragments are too small for the pattern of their ornamentation to be determined. With one exception, however, the tubercles are similar to those of *C. lazera*. The exceptional bone (part of a supra-occipital) has low, broad-based granulations of a *C. mossambicus* type. All the skull fragments are lightly mineralized.

Pectoral spines: There are six specimens (5 right and 1 left) of the articular head and proximal part of the spine. The estimated size-range of the fishes represented by these spines is from 35—60 cm standard length.

The spines are dark brown in colour and are more heavily mineralized than the vertebral and neurocranial fragments from the same level.

In addition to these specimens, there are three fragments from the distal ends of pectoral spines. The appearance of one specimen is comparable with that of the proximal ends, but the others are white and fragile.

Vertebrae: fourteen anterior abdominal elements and forty-nine posterior abdominal and caudal elements, some of which are very fragmentary. These vertebrae are estimated to be derived from fishes of 35—80 cm standard length.

CICHLIDAE

Tilapia sp.

The genus is represented by ten vertebrae from fishes of 12—30 cm standard length.

In addition to the vertebrae referred to *Tilapia*, there are two other vertebrae which appear to be of a cichlid type nearest that found in *Haplochromis*. The possibility of their being somewhat atypical *Tilapia* vertebrae cannot, however, be overruled.

Unidentifiable material.

Thirteen fragments of vertebrae and badly damaged vertebrae must be placed in this category. Five specimens are probably from *Clarias* skeletons but the remainder are too badly damaged to warrant even tentative identification.

Horizon V ('*Africanthropus*'; Stillbay).

There are only two fish-fossils from this stratum; both are referable to *Clarias* and are relatively well mineralized and dark in colour. One specimen is a small fragment of neurocranial roofing bone, the other, a vertebra from a fish of about 65 cm standard length.

Discussion

Unfortunately, deductions which might be made from these remains are hampered by an almost complete lack of information on the fishes of the present lake. Indeed, despite an intensive search I have been unable to find any published record of the fishes occurring in Lake Eyasi.

That only two genera, *Clarias* and *Tilapia*, are definitely present throughout Horizon III is of interest and leads to speculation on the biological significance that can be attached to this observation.

As Horizon III is not a lacustrine deposit (although it immediately succeeds a lacustrine stratum; ROLLER, 1955), the fish remains contained therein were almost undoubtedly brought together through the agency of some predatory, fish-eating animal. Otters and men are the animals most likely to accumulate fish-bones within a cave. Since the fish-remains were found together with human artifacts and with ashes, the possibility of

their originating as the debris of an otter's lair is considerably weakened. If, as seems more likely, the bones represent the remains of human activity, some selection of particular genera from these potentially available in the lake might be expected. Selection would probably be exercised through the fishery methods employed and the areas in which fishing was carried out.

Thus, the predominant fish-fossils may not necessarily reflect the relative abundance of the various genera which may have inhabited the lake. It is therefore difficult to derive any information on the ecology of the early Holocene Lake Eyasi from the fossils preserved in Horizon III.

An estimate of the minimum number of *Clarias* occurring in the various levels of Horizon III has been made by using the pectoral spines to give an actual minimum number of fishes. Where no spines are present (as in the levels between 1,0 and 1,2 m) a marked size range in the vertebrae preserved is taken to indicate the presence of at least two fishes. On this basis the minimum number of individuals is:

0,0—0,2 m	: 24
0,2—0,4 m	: 21
0,4—0,6 m	: 1
0,6—0,8 m	: 3
0,8—1,0 m	: 2
1,0—1,2 m	: 2
1,2—1,4 m	: 5

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The vertebrae of *Tilapia* do not, in the case of this material, lend themselves to such treatment. However, it is likely that, in each 20 cm level where the species has been positively identified, at least two *Tilapia* are present.

The specific identity of the *Clarias* remains poses an interesting question. On the characters of skull ornamentation, the fossils are nearer *C.lazera* than *C.mossambicus*. On the other hand, the morphology of the articular head in most specimens of the pectoral spine is more like that of *C.mossambicus*, although in a few specimens the articular head is more *C.lazera*-like. In neither type of fossil is the correspondence exact. Unfortunately, the intra-specific variability of these characters in extant representatives of the two species is virtually unknown. In specimens of *C.lazera* from Lake Edward, and *C.mossambicus* from Lake Victoria, the neurocranial ornamentation appears to show no interspecific overlap.

Lake Eyasi lies within the present range of *C.mossambicus*, but is beyond the southern limits of *C.lazera* in East Africa. From a taxonomic view-point, however, the two species are very similar and may form, together with the two southern species *C.gariepinus* and *C.natalensis*, part of a north-south cline (WORTHINGTON, 1933). Thus, until more is known about interspecific variation in characters such as skull-ornamentation, it would be unwise to speculate on the identity of the *Clarias* inhabiting Lake Eyasi during early Holocene times. It is of interest that WORTHINGTON (1936), using other morphological characters, found that the *Clarias* of Lake Baringo were intermediate between *C.lazera* and *C.mossambicus*.

Acknowledgements: I should like to thank Dr. U. LEHMANN for the information he has given me on the site and its stratigraphy. These data were obtained from ROLLER's thesis which was unavailable to me. Also, I am grateful to Dr. E. TREWAVAS of the British Museum (Natural History), London, who assisted me in the search for literature on the fishes of Lake Eyasi.