AMERICAN MUSEUM NOVITATES

Number 319 — Published by THE AMERICAN MUSEUM OF NATURAL HISTORY New York City — June 23, 1928

59.7(66.2)

FISHES FROM THE WHITE NILE COLLECTED BY THE TAYLOR EXPEDITION OF 1927

A DISCUSSION OF THE FRESH-WATER FISH FAUNÆ OF AFRICA

BY J. T. NICHOLS

The first collection of Nile fishes which The American Museum of Natural History has obtained directly from the field are those of the Taylor Sudan Expedition of 1927 (H. E. Anthony, collector). They comprise about 285 specimens, taken at some 16 localities as follows: Akona, Bahr-el Arab, South of El Dueim, Gemeiza, Bahr-el-Ghazal, Jebelein, 125 miles south of Khartoum, Kosti, South of Malakal, Mongalla, Musran Island, Lake No, Renk, Shambe, Tonga Island, Bahr-el-Zeraf.

Although several of the species were previously unrepresented in the Museum, and some of the forms are of peculiar interest, all are well known. They are listed below with approximate numbers, size, and number of localities where taken, for such index as they may furnish to the character of the Nile fauna. As has been pointed out in discussing the fishes of Angola,[1] representative collections may prove better criteria for drawing faunal lines than more complete local lists. A representative collection is a substitute for actual study of this problem in the field, frequently not practicable.

Osteoglossids

1. **Heterotis niloticus** (CUVIER); 3 specimens; 480–580 mm. standard length; 1 locality.

Mormyrids

2. **Petrocephalus bane** (LACÉPÈDE); 7 specimens; 88–153 mm. standard length; 3 localities.
3. **Gnathonemus cyprinoides** (LINNÆUS); 1 specimen; 155 mm. standard length; 1 locality.
4. **Hyperopisus bebe** (LACÉPÈDE); 2 specimens; 210–256 mm. standard length; 1 locality.
5. **Marcusenius petherici** BOULENGER; 1 specimen; 120 mm. standard length; 1 locality.

[1] Nichols and Boulton, 1927, Amer. Mus. Novitates, No. 264, pp. 1–2.

Characins

6. **Hydrocyon forskalii** CUVIER; 2 specimens; 190–206 mm. standard length; 1 locality.

7. **Hydrocyon lineatus** BLEEKER; 5 specimens; 165–242 mm. standard length; 3 localities.

8. **Hydrocyon brevis** GÜNTHER; 1 specimen; 350 mm. standard length; 1 locality.

9. **Alestes dentex** (LINNÆUS); 14 specimens; 98–235 mm. standard length; 7 localities.

10. **Alestes baremose** (JOANNIS); 3 specimens; 110–190 mm. standard length; 3 localities.

11. **Alestes nurse** (RÜPPELL); 50 specimens; 70–140 mm. standard length; 8 localities.

12. **Alestes macrolepidotus** (CUVIER AND VALENCIENNES); 15 specimens; 90–430 mm. standard length; 3 localities.

13. **Ichthyoborus besse** (JOANNIS); 1 specimen; 160 mm. standard length; 1 locality.

14. **Distichodus niloticus** (LINNÆUS); 24 specimens; 90–380 mm. standard length; 2 localities.

15. **Citharinus citharus** (GEOFFROY); 33 specimens; 95–310 mm. standard length; 4 localities.

Catfishes

16. **Clarias anguillaris** (LINNÆUS); 1 specimen; 440 mm. standard length; 1 locality.

17. **Schilbe mystus** (LINNÆUS); 5 specimens; 85–160 mm. standard length; 2 localities.

18. **Eutropius niloticus** (RÜPPELL); 7 specimens; 195–290 mm. standard length; 4 localities.

19. **Bagrus bajad** (FORSKAL); 1 specimen; 165 mm. standard length; 1 locality.

20. **Clarotes laticeps** (RÜPPELL); 8 specimens; 112–310 mm. standard length; 5 localities.

21. **Auchenoglanis occidentalis** (CUVIER AND VALENCIENNES); 1 specimen; 275 mm. standard length; 1 locality.

22. **Synodontis schall** (BLOCH AND SCHNEIDER); 5 specimens; 77–195 mm. standard length; 2 localities.

23. **Synodontis clarias** (LINNÆUS); 1 specimen; 230 mm. standard length; 1 locality.

24. **Malopterurus electricus** (GMELIN); 1 specimen; 240 mm. standard length; 1 locality.

Carps

25. **Labeo niloticus** (FORSKAL), and

26. **Labeo horie** HECKEL; 20 specimens; 105–410 mm. standard length; 6 localities. Both of these forms represented, but there is doubt to which some of the material is referable.

27. **Labeo coubie** RÜPPELL; 2 specimens; 90–110 mm. standard length; 1 locality.

28. **Barbus bynni** (FORSKAL); 2 specimens; 140 mm. standard length; 1 locality.

Miscellaneous

29. **Ophicephalus obscurus** GÜNTHER; 3 specimens; 210 mm. standard length; 1 locality.

30. **Lates niloticus** (LINNÆUS); 4 specimens; 170–290 mm. standard length; 3 localities.

Cichlids

31. **Tilapia nilotica** (LINNÆUS); 49 specimens; 55–370 mm. standard length; 8 localities.

32. **Tilapia zillii** (GERVAIS); 8 specimens; 90–120 mm. standard length; 2 localities.

33. **Tilapia galilæa** (ARTEDI); 3 specimens; 65–105 mm. standard length; 1 locality.

Various methods are followed for drawing a line between two adjacent faunal areas. That which appears to the writer most satisfactory is based on the affinity of the majority of the commoner species at localities in debatable territory. It was on this basis, and taking an Angolan collection to hand as representative, that Angola was placed with the East and South African faunal area, rather than with the West African dominated by the Congo fauna.[1] On the same grounds there can be no question that the Nile and Congo belong together.

Any fauna is a composite affair, made up of elements derived at different times and from different directions. What gives a fauna its peculiar character is the modification and, more especially, the proportions of these elements. In the Congo we have a very strong fauna comprising a multitude of species, representing groups which have little relationship and diverse history. Among them are various species of the genus *Barbus*, taken as a whole doubtless of recent Asiatic derivation. This Asiatic genus, however, forms so small a proportion of the total that its presence gives no pretext for grouping the fauna of the Congo with that of Asia. As a matter of fact the two belong in different main divisions of the continental fresh-water fish fauna of the world.

There seems to be no theoretical necessity for fishes of one taxonomic group to have entered a given area at approximately one time and from the same direction and for those of another taxonomic group to have had

[1]Nichols and Boulton, 1927, Amer. Mus. Novitates, No. 264, pp. 1–2.

an unlike source or distributional history. However, bearing in mind many minor exceptions, the constitution of faunæ indicates that such has been the general rule. Thus we may consider mormyrids and characins preëminently West African, the genus *Barbus* Asiatic, etc. An analysis of 234 species identified by Nichols and Griscom[1] in very extensive collections of the American Museum Congo Expedition shows 36 per cent mormyrids and characins, 27 per cent catfish; 4 per cent *Barbus;* 9 per cent cichlids; and 24 per cent otherwise distributed. A similar analysis of the 33 species in the Nile collection to hand gives 42 per cent mormyrids and characins; 27 per cent catfish; 3 per cent *Barbus;* 9 per cent cichlids; and 18 per cent otherwise distributed. The correspondence in proportions is rather remarkable and distinctly is evidence of the unity of the Nile-West African fauna. The Nile fauna is a perfectly well-marked subdivision of the above, however. Comparatively few of the common Nile species are actually identical with those found in the Congo, and the presence of such identical species in the Nile is very likely due to recent penetration from the Congo. The Congo fauna is very rich, with abundant species, the Nile fauna correspondingly, almost surprisingly poor, with few species, but these abundant in individuals.

Recent study of the problem indicates certain modifications of the faunal areas postulated by Nichols and Griscom[1] (p. 741, Map 2) for African fresh-water fishes. The primary Nile-West African faunal area (with the Nile area as a subdivision) does not include Angola but appears to be limited on the south by rising land along a line running east and west, north of 10° latitude. Perhaps even the headwaters of north-flowing Congo affluents should be considered to lie outside this area in a more or less well-marked transition belt.[2] It may be noted that, although this line more or less corresponds with the edge of broken forest, it is doubtless more dependent on topography, as there is little difference between fishes of the Congo and those of the Nile.

It is next in order to compare the Nile and West African fauna with that of East and South Africa. To do so intelligently one should consider the fresh-water fishes of the world in general. There is one main modern group of fresh-water fishes, the Ostariophysi. Of Tertiary origin or distribution, it dominates suitable continental fresh waters of the world, with the exception of Australia. Its derivation is not clear, though probably from some more primitive, equally fresh-water, isospondyles. Variously combined with more primitive fresh-water elements, and with

[1]1917, Bull. Amer. Mus. Nat Hist., XXXVII, Art. 25, pp. 653 to 756.
[2]Nichols, 1928, Amer. Mus. Novitates, No. 309, p. 4.

fresh-water elements which show marine affinity, it is the modern distinctive fresh-water fauna. The area dominated by it is the continental fresh-water faunal area.

The distribution of all of the three principal groups of Ostariophysi, namely, characins, catfishes, and carps, seems to have been from the north. Although it is not unlikely that their common ancestor resembled the characins most closely, the order of distribution seems to have been first catfishes, then characins, and lastly carps. At least it is certain that the carps are much more recent than the other two. They have not yet reached South America and are recent invaders in Africa. Characins, on the other hand, are now confined to tropical and South America and to Africa, where they form a very important element of the faunæ; and catfishes show a much greater abundance and diversity of form in the southern, than in the northern, continents. This is the basis for a first division of the primary continental into northern and austral faunæ. The austral fauna of Africa and South America has other characteristic elements aside from the characins and an abundance of catfishes. Such an element common to both continents is the modern acanthopterygian family of cichlids, related to the marine tropical reef pomacentrids. The history and distribution of cichlids is not easily explained. Nichols and Griscom[1] suggest that they were originally of marine origin, decended perhaps from pomacentrids or a common ancestor, and had specialized or differentiated to some extent before leaving the sea, and entering Africa and South America directly and independently from salt water. The austral divides itself naturally into an African and a Neotropical fauna on the basis of fundamental differences in the characins of the two continents, about what one would expect from complete isolation of the two groups since entering the southern hemisphere, and presence of the more primitive mormyrids, which there form an important element, in Africa.

To return to consideration of the components of the African austral fauna, it has been noted that the carps, though comparatively recent invaders from Asia, are present in Africa, in fact they are well established throughout that continent. In the Nile-West African area characterized by an abundance of mormyrids, characins and catfishes, they form only a minor element of the fauna. This is particularly true of the genus *Barbus*, a dominant present-day carp genus in southern Asia. In East and South Africa *Barbus* is a dominant element, correlated with a comparative scarcity of the typically West African groups, and thus the East and South African area, with a poorer fauna, has also a more northern, less austral

[1]1917, Bull. Amer. Mus. Nat. Hist., XXXVII, Art. 25, pp. 653 to 756.

aspect than the Nile and West African area. An important chichlid element helps to classify its fauna as African austral rather than with the Asiatic northern faunæ.

Africa's two primary austral continental faunæ are then the Nile-West African, and East and South African. In delimiting the boundaries between them it will probably be best to recognize certain intermediate or transition areas belonging properly to neither. Such would include Tanganyika and probably other of the great lakes; a locality recently studied in the southeast corner of the Congo basin,[1] and probably other of the north-flowing headwaters of the Congo. Our view that the cichlids are not a truly continental element, and have come in recently from the outside accords with their inflorescence in the lakes if these be considered transition territory; study of transition areas in general having led to the conclusion that such are particularly favorable for the establishment of outside forms.

The above discussion may be understood more readily with reference to the writer's following tentative tabulation of the world's fresh-water fish faunæ. It first divides fresh-water fishes into two main faunæ, continental and peripheral. The continental is dominated by the carp-catfish-characin group. It occupies continental Eurasia, Africa, and the Americas, with the exception of a rather vague northern circumpolar area, and the southern tips of South America and Africa. The peripheral is made up of elements with better-marked affinities to salt-water groups. It occupies a vague northern circumpolar area (trouts and pikes); the southern tips of South America and Africa (*Galaxias*); Australia and the islands of the world in general. No attempt is here made at analysis down to the ultimate recognizable faunal unit, and doubtless certain lesser units which are not mentioned from the writer's comparative unfamiliarity with them may be of greater importance than others which are mentioned because they have recently been subjects of his attention. In general, however, the list aims to be comprehensive.

FRESH-WATER FISHES

I. Peripheral
   1. Boreal
   2. Austral
   3. Insular and Australian
      A. Australian
      B. Insular
         a. West Indian
         b. Oceanic

[1]Nichols, 1928, Amer. Mus. Novitates, No. 309, p. 4.

II. Continental
  1. Northern
    A. Holarctic
      a. Palæarctic
      b. Nearctic
    B. High Asiatic
    C. Indian and Oriental
      a. Indian
      b. Chinese
        x. Temperate
        y. Subtropical
  2. Austral
    A. African
      a. East and South African
      b. Nile and West African
    B. Neotropical
      a. Middle American
      b. South American

It is somewhat remarkable, if the West African and East and South African areas were ecologically comparable to what they are today, and at the same time in contact through the Tertiary, that the West African fauna did not give rise to adaptive forms in East and South Africa, which would have been too strong to be replaced by the more recent Asiatic invasion of that territory. The West African fauna is comparable to the Neotropical, and an equally rich and strong fauna. The Neotropical fauna has adapted itself to the uplands of that continent.

The invasion of Africa from Asia, by the genus *Barbus* at least, seems to have been recent. Study of the distribution of the group in Asia would place this invasion not earlier than the Pliocene, and it must have taken place under physiographic and climatic conditions in northeast Africa unlike those of today. It can not have been via the Nile, but was in a land connection across what is now the southern end of the Red Sea. The present Arabian deserts would also have been an obstacle thereto. It is easier to suppose these to be the result of recent elevations in Asia than that so recent a land highway existed across the deep waters of the Arabian Sea, which would have accomplished the same result.