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The Types of African Cichlid Fishes described by Borodin in 1931 and 1936, and of two Species described by Boulenger in 1901. By
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1. BORODIN'S TYPES.

Introductory.

In 1931, the late N. A. Borodin described seven "new species" of Cichlid fishes from material in the Museum of Comparative Zoology, Harvard University. The author was so evidently at sea that Dr. Tate Regan obtained from the late Dr. Barbour, Director of the Museum of Comparative Zoology, photographs of Borodin's types, and, on the basis of these, published some tentative identifications (Regan, 1932). The same photographs were later used by Borodin as illustrations for a somewhat fuller paper on the same collection (Borodin, 1936). To this paper Borodin added a postscript in which he attempted to meet Regan's criticisms, and replied with a counter-criticism of the impracticability of Regan's classification (1920) of the Tanganyika genera for identifying single specimens. This is so far just that Dr. Regan himself was unable to check the critical character of the apophysis on the base of the skull in unique types, and misplaced some of the genera accordingly, as will be shown in the third part of this paper. It does not, however, excuse Borodin's many and gross errors—he failed to count even the spines of the dorsal and anal fins correctly.

In 1936, through the kindness of Dr. Barbour, I was able to examine the types described by Borodin, and found them to be small specimens of well-known species. I had intended to publish these results in a larger work on the Cichlidae, but the war and other events have so far postponed the completion of such a work that I think it best to make my identifications available now to other workers. I do not record Regan's tentative identifications here, for they were based only on photographs of rather poorly preserved specimens, and were only offered "for what they are worth." It is not surprising that only one of them was confirmed when the specimens were examined.

I wish to record my gratitude to Dr. Barbour, whose recent death we are lamenting, for his kindness in making it possible for me to see these types.

Methods of Counting.

In counting the scales in longitudinal series I follow here the method used for Cichlidae by Boulenger and Tate Regan. The scales of the upper lateral line are counted, followed by those of the horizontal series containing the lower lateral line, beginning with the first scale in the oblique series (sloping downwards and forwards) next behind that containing the last scale of the upper lateral line. This usually gives two more scales than a count of the whole horizontal series containing the lower lateral line. In neither method are scales on the caudal fin counted.

Gill-rakers on the lower part of the anterior arch are all counted, however short the lower ones may be. I do not count, however, a gill-raker which occurs exactly at the angle between epi- and ceratobranchials.

Fin-rays.—The last fin-ray is counted, even if it is unbranched, and if its base touches that of the penultimate ray, so long as it is a distinct ray. In this I believe I differ from Boulenger.

"Standard length" is the length from tip of snout to base of caudal fin.

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HAPLOCHROMIS FASCIATUS Borodin.

Borodin, 1931, p. 49; 1936, p. 18, pl. i, fig. 6.

Mus. Comp. Zool. 32622. Two specimens, 43 and 47 mm., in standard length.

These are two young specimens of *Tilapia tanganyicae* (Günther). The numbers of gill-rakers are respectively 23 and 24 on the lower part of the anterior arch, not 20 as given by Borodin. This and the slightly projecting lower jaw distinguish them from *Tilapia nilotica*.

Examination of a large series of specimens of *T. tanganyicae* in the British Museum shows that the outer teeth are bicuspid in the young, becoming replaced by tricuspid teeth when the standard length of the fish reaches 70 to 120 mm. The presence of tricuspid outer teeth in large specimens characterizes also certain populations of *T. nilotica*, namely, those of L. Baringo and of a crater-lake in L. Rudolf (*T. vulcani* Trewavas, 1933). These facts make the maintenance of the genus *Neotilapia* Regan untenable. *T. tanganyicae* shows very close resemblance to *T. galilaea* which it evidently represents in the lake.

The type of *Petrochromis andersonii* Boulenger, which is the second species placed by Regan in *Neotilapia*, was said to have come from L. Albert. Boulenger (1915) remarks that this record needs confirmation, but subsequent explorations of L. Albert have failed to confirm it. Comparison with a larger series of *T. tanganyicae* confirms Boulenger's doubt of the specific distinctness of *P. andersonii*.

I have not seen the specimens assigned by Borodin to *P. andersonii*, but, if they are rightly identified, the long soft dorsal and anal fins to which Borodin drew attention suggest that they may be males, as is the type of *P. andersonii*.

TILAPIA NADINAE Borodin.

Borodin, 1931, p. 54; 1936, p. 29, pl. i, fig. 7.

M.C.Z. 32625. Two specimens, 48+12 mm. and 52+13 mm. long respectively, from Albertville, L. Tanganyika.

These are *Haplochromis burtoni* (Günther). I find the diameter of the eye and the interorbital width both contained $3\frac{3}{4}$ to 4 times in the length of the head, and I count one more soft ray in each dorsal and anal fin than does Borodin.

NEOCHROMIS SIMOTES NYASSAE Borodin.

Borodin, 1936, p. 23.

M.C.Z. 32629. A single specimen 50+12 mm. long, from Mwaya, L. Nyasa. = *Haplochromis callipterus* (Günther). The specimen is ill-preserved and distorted and does not agree at all well with Borodin's description. There are nine gill-rakers on the lower part of the anterior arch. According to my method of counting there are 29 scales in a longitudinal series, five between the origin of the dorsal fin and the lateral line. Dorsal XIV 10. Anal III 9.

HAPLOCHROMIS TENUIS Borodin.

Borodin, 1931, p. 50; 1936, p. 20, pl. i, fig. 4.

M.C.Z. 32568. A single specimen, 95+18 mm. long, from L. Victoria.

I identify this as *Haplochromis longirostris* (Hilgendorf). It compares well with a slightly smaller specimen (B.M. 1906.5.30.274) and a slightly larger one (B.M. 1906.5.30.263) so named in the British Museum.

As Borodin's photograph shows, the specimen had the mouth wide open, and head measurements are difficult to standardize in such conditions. My measurements give the interorbital width and the diameter of the eye indeed approximately equal, but respectively 4.7 and 4.5 times in the length of head. I find nine gill-rakers on the lower part of the anterior arch, 32 scales in longitudinal series, six between the origin of the dorsal fin and the lateral line. D. XVI 10. A. III 9.

HAPLOCHROMIS CENTROPRISTOIDES VICTORIANUS Borodin.

Borodin, 1936, p. 18.

M.C.Z. 32578. A single specimen 91+23 mm. long, from L. Victoria.

This is a specimen of *Haplochromis nubilus* (Boulenger). I differ from Borodin in finding the diameter of the eye contained only $4\frac{1}{3}$ times in the length of the head, and in counting five scales between the origin of the dorsal fin and the lateral line, and 31 in longitudinal series, the last partly owing to our different methods of counting.

TILAPIA FASCIATA TANGANAICAE Borodin.

Borodin, 1936, p. 29.

M.C.Z. 32566. A specimen of 94+18 mm. from Ujiji, L. Tanganyika.

This is *Haplochromis horei* (Günther). I have seen only this specimen, which is evidently, having regard to the name, to be considered as the type. Borodin also included a specimen from Lake Victoria, the identity of which I do not know.

I find D. XV 10. A. III 7. The colour pattern is variously preserved in museum specimens of this species, and in this specimen is rather faded. On the body the only markings are the longitudinal stripes formed by the dark spots at the upper and lower ends of each scale. On the head, the spots on the snout, the bars on the occiput and the opercular spot are preserved, and there are faint traces of the markings on cheek and operculum.

PELMATOCHROMIS TANGANYICAE Borodin.

Borodin, 1931, p. 52.

P. tanganyicae Borodin, 1936, p. 25, pl. i, fig. 9.

M.C.Z. 32575. One specimen 180 mm. in standard length, from L. Tanganyika.

=*Serranochromis thumbergii* (Castelnau). Examination of Borodin's type confirms Regan's identification. I doubt the correctness of the locality-label, as this is the only record of this species in Lake Tanganyika.

Borodin (1936, p. 32) states that "it differs from Castelnau's type in having a smaller head ($2\frac{3}{4}$ and not $2-2\frac{1}{4}$ in length), smaller eye (7 times and not $4\frac{1}{2}-6$ in head)," etc. Boulenger stated that Castelnau's type is lost, and Borodin made no claim to have found it. Castelnau did not include the size of the head in his brief description. The length of head in Boulenger's specimens was $2\frac{3}{4}$ to three times in the length, and in his figured specimen it is of the same proportion as in the type of *P. tanganyicae*. The apparent difference in scale-counts is a difference in the method of counting. By Boulenger's method the scales of Borodin's type number 37 in longitudinal series. The dark bands on the body, which become obscured in large males, were not mentioned by Castelnau for his 300 mm. specimen, and are only faintly indicated in Borodin's type. The produced pelvics are also a character of the male.

PELMATOCHROMIS LOVERIDGEI Borodin.

Borodin, 1931, p. 51; 1936, p. 24, pl. i, fig. 3.

M.C.Z. 32563. A single specimen of 173+30 mm., from Ujiji, L. Tanganyika.

=*Limnotilapia dardennii* (Boulenger).—I count 13 gill-rakers on the lower part of the anterior arch, 36 scales in longitudinal series, five between origin of dorsal fin and lateral line. D. XX 9. A III 8. The teeth, which in Cichlidae usually have brown tips, have in this specimen mostly been broken or worn short, so that only colourless stumps are left. Some conical teeth remain at the posterior end of each jaw, those of the upper becoming larger towards the corners of the mouth, as is often the case in this species. There are three (?) series of tricuspid inner teeth, difficult to distinguish from the swollen papillae in which they are embedded in this formalin-fixed specimen.

PELMATOCHROMIS XENOTILAPIAFORMIS Borodin.

Borodin, 1931, p. 53 ; 1936, p. 26, pl. i, fig. 8.

M.C.Z. 32637. Two specimens, ♂ and ♀, each 88+18 mm. long, from L. Tanganyika.

=*Callochromis macrops* (Boulenger). Gill-rakers 12 on lower part of anterior arch. D. XV-XVI 12. A. III 7. Scales 35 in longitudinal series, 4 or 5 from origin of dorsal to lateral line. Middle posterior teeth of lower pharyngeal enlarged and blunt.

ECTODUS DESCAMPSEI ORNATIPINNIS Borodin.

Borodin, 1936, p. 17.

M. C. Z. 32591. One specimen, a male of 56+13 mm., from Ujiji, L. Tanganyika.

=*Callochromis* sp. I refrain from assigning this at present to a definite species of *Callochromis*. Myers (1936, p. 8) has drawn attention to the need for a revision of this genus, and this I hope to undertake with the rich material of the Christy collection in the British Museum.

In this specimen the middle posterior teeth of the lower pharyngeal bone are enlarged and blunt. I count 34 scales in longitudinal series, 4 from origin of dorsal to lateral line. D. XIII 13. A. III 7.

JULIDOCHEOMIS MACROLEPIS Borodin.

Borodin, 1931, p. 51 ; 1936, p. 21, pl. i, fig. 5.

M.C.Z. 32619. One specimen, 46 mm. in standard length, from Ujiji, L. Tanganyika.

=*Telmatochromis temporalis* Boulenger. There are six canines in the lower jaw and six or more in the upper, the canines grading into the posterior teeth. The inner teeth are tricuspid, in three series. About nine mucus-canal pores open under the eye, but there appear to be no suborbital bones. D. XIX 8. A. VI 7. An oblique stripe extends from the eye along the top of the operculum and another from the posterior edge of the cleithrum across the base of the pectoral fin. Dorsal, anal and caudal fins are spotted.

LAMPROLOGUS CUNNINGTONI NYASSAE Borodin.

Borodin, 1936, p. 22.

M.C.Z. 32586. Six specimens seen.

=*Lamprologus elongatus* Boulenger. The locality given, Mwaya, L. Nyasa, is probably an error, as the genus has never been found in Nyasa. In three specimens I count respectively 75, 75 and 71 scales in longitudinal series. (By the same method I count 73 and 71 in the types of *L. elongatus*, and I cannot account for the higher numbers given by Boulenger.) The dorsal rays number XVII 10 (two specimens), XVII 11 (two), XVIII 10 (one) or XIX 10 (one), the anal rays V 8 (five) or V 9 (one).

Only one specimen (55+10 mm.) is preserved so that proportions can be measured. My measurements agree fairly well with those of Borodin, except that the diameter of the eye is $3\frac{2}{3}$ times in the length of head, the interorbital width five times.

LAMPROLOGUS MODESTUS NYASSAE Borodin.

Borodin, 1936, p. 23.

M.C.Z. 32585. One specimen of 36 mm. standard length, stated to come from Mwaya, L. Nyasa.

=*L. reticulatus* Boulenger. The same scepticism is felt as to the alleged locality as for the previous species. I agree with Borodin in finding 36 scales in longitudinal series, but I count four or five between the origin of the dorsal and the lateral line, D. XIX 9. A. VIII 6.

2. OTHER IDENTIFICATIONS BY BORODIN.

From the above it is clear that Borodin's other identifications may be ignored, and, further, that the locality labels in this collection are not reliable. It is dangerous to deny a record because it is surprising, but among the supposed new species are included one Nyasa species for which this would constitute the first record from Lake Tanganyika, and two Tanganyika species alleged to occur in L. Nyasa. Among the other Cichlidae listed, *Boulengerochromis microlepis*, *Limnotilapia dardennii*, *Tylochromis polylepis* and *Stappersia singularis* are recorded from Nyasa for the first time, while the Nyasa species *Tilapia shirana* and *T. squamipinnis* are recorded from L. Tanganyika. None of these records is confirmed by the large collections from both these lakes in the British Museum, nor from the Tanganyika material reported upon in the Musée du Congo Belge.

Borodin's paper includes a rather full account of several specimens which he assigns to *Ectodus descampsii* Boulenger. Although he points out the discrepancies in Boulenger's accounts of this species, he has followed Boulenger in confusing with it several specimens of the species later described by Poll (1942, p. 347) as *Cardiopharynx schoutedeni* Poll. Although I have not seen the material which Borodin named *E. descampsii*, I suggest that most of it belongs to *C. schoutedeni*.

3. TYPES OF TWO SPECIES DESCRIBED BY BOULENGER.

In sorting the Christy collection of Tanganyika Cichlidae, I found that nearly all previously described species were represented, most of them very richly. I was surprised, however, to find no specimens of *Gephyrochromis moorii* Boulenger, or of *Tilapia pleurotaenia* Boulenger (= *Limnotilapia pleurotaenia* Regan). On examining the types I found that these were identical with subsequently described Nyasa species. The types of both were collected by J. E. S. Moore, who was also responsible for the "Lake Albert" label of the type of *Pelmatochromis andersonii* Boulenger. As subsequent explorations of the three lakes have found the first two only in Nyasa and the last only in Tanganyika, it may now be assumed that the collector's locality labels were unreliable.

GEPHYROCHROMIS MOORII Boulenger.

Boulenger, 1901*a*, p. 4; 1901*b*, p. 448; 1901*c*, p. 156, pl. xx, fig. 1; 1915, p. 458, fig. 313.

Regan, 1920, pp. 35 and 40.

Christyella nyasana Trewavas, 1935, pp. 67 and 77.

Regan placed *Gephyrochromis* with the genera in which the apophysis for the upper pharyngeal bones is formed by the parasphenoid alone, but he did not dissect the unique type of the single species. I have ventured to dissect it, and I find the apophysis to be of the *Haplochromis* type, as also is that of the type of *Christyella nyasana*. The basioccipital takes an important share in the facets for the upper pharyngeal bones. I have no hesitation in synonymising the two names. Several further specimens were collected by me during the Nyasa Fishery Survey in 1939 at Karonga, L. Nyasa. In life the males have a blue and orange coloration characteristic of the Nyasa genera of the *Pseudotropheus* group. In both sexes there is a bright orange spot at the posterior edge of the anal fin.

TILAPIA PLEUROTOENIA Boulenger.

Boulenger, 1901*a*, p. 4; 1901*b*, p. 474; 1901*c*, p. 157, pl. xviii, fig. 4.

Limnotilapia pleurotaenia Regan, 1920, p. 39.

Haplochromis microstoma Regan, 1921, p. 695, text-fig. 10; Trewavas, 1935, p. 93.

Boulenger designated as types six specimens collected by J. E. S. Moore and stated to come from the northern end of L. Tanganyika, and five labelled

Rusisi River by the same collector. The above synonymy applies to five of the "Tanganyika" specimens and two of the "Rusisi" specimens, and I hereby restrict the name *T. pleurotaenia* to the species represented by these seven syntypes, 72 to 90 mm. in standard length. The species should now be known as *Haplochromis pleurotaenia* (Boulenger).

The types, thus restricted, have 24 to 26 bicuspid teeth in the outer series of the upper jaw, and 10 or 11 gill-rakers on the lower part of the anterior arch. D. XV 11 (one specimen), XVI 12 (two), XVII 11 (three) or XVIII 11 (one). The lower pharyngeal bone, examined in two specimens, has four middle posterior teeth slightly enlarged. The apophysis for the upper pharyngeals is formed by parasphenoid and basioccipital, in one specimen examined. There are two dark longitudinal stripes on each side of the body, as in Boulenger's and Regan's figures.

The skeleton listed by Boulenger (1915) probably belongs to the same species. In the skull, the basioccipital is produced to form part of the pharyngeal apophysis, but it does not share in the facet, which is formed entirely by the parasphenoid. In a skeleton of *H. microstoma* with which I have compared it, the basioccipital forms the postero-lateral corner of the facet. Such variation is observable in other Nyasa species. In both these skeletons the vertebrae number 14+18, and they agree well in other details.

The sixth of Boulenger's "Tanganyika" specimens is 78+14 mm. long. It differs from the types as restricted in the absence of longitudinal stripes on the body, and in the dentition. There are 44 teeth in the outer series of the upper jaw and the anterior are not markedly enlarged as they are in *H. pleurotaenia*. The teeth of the inner series are simple or with very small lateral cusps, whereas the three cusps of the inner teeth of *H. pleurotaenia* are nearly equal. It is a specimen of *H. selenurus* (Regan).

The three remaining "Rusisi" fishes are specimens of a third Nyasa species, *Haplochromis plagiotaenia* Regan. They have a dark oblique band on each side from nape to caudal fin. The lower pharyngeals have a group of enlarged, blunt teeth posteriorly. There are 42 to 46 teeth in the outer series of the upper jaw, a few anterior of which have broad simple crowns, the others being bicuspid or, posteriorly, conical. The gill-rakers number 9 or 10 on the lower part of the anterior arch.

The fact that Boulenger's types included three Nyasa species confirms the falsity of the locality labels.

SUMMARY.

Haplochromis fasciatus Borodin = *Tilapia tanganyicae* (Günther).

Tilapia nadinae Borodin = *Haplochromis burtoni* (Günther).

Neochromis simotes nyassae Borodin = *Haplochromis callipterus* (Günther).

Haplochromis tenuis Borodin = *Haplochromis longirostris* (Hilgendorf).

Haplochromis centropristoides victorianus Borodin = *Haplochromis nubilis* (Boulenger).

Tilapia fasciata tanganyicae Borodin = *Haplochromis horei* (Günther).

Pelmatochromis tanganyicae Borodin = *Serranochromis thumbergii* (Castelnau).

Pelmatochromis loveridgei Borodin = *Limnotilapia dardennii* (Boulenger).

Pelmatochromis xenotilapiaformis Borodin = *Callochromis macrops* (Boulenger).

Ectodus decampsi ornatipinnis Borodin = *Callochromis* sp.

Julidochromis macrolepis Borodin = *Telmatochromis temporalis* Boulenger.

Lamprologus cunningtoni nyassae Borodin = *Lamprologus elongatus* Boulenger.

Lamprologus modestus nyassae Borodin = *L. reticulatus* Boulenger.

Reasons are given for doubting the correctness of the locality assigned to Borodin's "*Pelmatochromis tanganyicae*" and to the so-called Nyasa subspecies of *Lamprologus*, as well as to other specimens of the Loveridge collection determined by Borodin.

Christyella nyasana Trewavas, 1935 = *Gephyrochromis moorii* Boulenger, 1901.

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Gephyrochromis is related to the Nyasa Cichlidae of the *Pseudotropheus* group, and has since been found only in Nyasa. The locality "Tanganyika" was probably erroneously attributed to the type of *G. moorii*.

Haplochromis microstoma Regan, 1921 = *Tilapia pleurotaenia* Boulenger 1901 = *Haplochromis pleurotaenia*.

The types of *T. pleurotaenia* include specimens of three Nyasa species of *Haplochromis*. The fact that none of these has been found in the large British Museum collections from L. Tanganyika is sufficient evidence that the attribution of these specimens to that lake and its affluent was an error of labelling.

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