MISCELLANEOUS PUBLICATIONS
MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN NO. 168

Bagrid Catfishes from Lake Tanganyika, with a Key and Descriptions of New Taxa

by

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MUSEUM OF ZOOLOGY, UNIVERSITY OF MICHIGAN
Sept. 6, 1984

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ROBERT RUSH MILLER, EDITOR

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ABSTRACT

Bailey, Reeve M. and Donald J. Stewart 1984. Bagrid catfishes from Lake Tanganyika, with a key and descriptions of new taxa. Misc. Publ. Mus. Zool. Univ. Mich., 168:1–41, figs. 1–10.—Lake Tanganyika, with its tributaries, has a distinctive bagrid catfish fauna that consists of six genera and 15 species. Of these, *Bagrus docmak* and *Auchenoglanis occidentalis* are present also outside the basin and 13 species are endemic. All of the latter are assigned to the subfamily Claroteinae Bleeker, which replaces Chrysichthyinae Regan. *Leptoglanis rotundiceps,* together with its congeners and *Zaireichthys,* commonly placed in the Bagridae, are provisionally assigned to the Amphiliidae. A key to the Tanganyikan bagrid genera and species is presented.

The widespread African genus *Chrysichthys* has six Tanganyikan species. Several of these appear to be closely interrelated, but the extra-Tanganyikan species have not been investigated by us. A new genus and species, *Bathybagrus tetranema,* is described. It is a deepwater species, thought to be derived from a *Chrysichthys*-like ancestor, and is unique among bagrids in having only four barbels. Two endemic Tanganyikan genera, *Phyllonemus* and *Lophiobagrus,* although sharply differentiated, share the derived characters of an incompletely ossified mesocoracoid, small size, and few ribs, and are probably sister groups. Their origin from a *Chrysichthys*-like ancestor is postulated. *Lophiobagrus,* formerly thought to be monotypic, and regarded by some as a synonym of *Chrysichthys,* is shown to consist of four species, of which three are described as new. *Lophiobagrus aquilus* and *L. brevispinis* are shallow-water species that are known from Burundi and Zambia. *L. asperispinis* is based on three juveniles taken in rather deep water in Burundi.

Key words: *Bagridae, Amphiliidae, catfishes, Lake Tanganyika, Zambia, Burundi, endemism.*

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INTRODUCTION

Among its many distinctive features, Lake Tanganyika is unique among the East African Great Lakes in having a notable diversity of catfishes of the family Bagridae. Twelve species have been reported from the basin, of which nine are endemic (Poll, 1953). The endemic bagrids are lacustrine, whereas the three other taxa are largely fluviatile. Of the endemic species, six belong to the widely-distributed genus *Chrysichthys,* two to the endemic genus *Phyllonemus,* and one to the endemic genus *Lophiobagrus;* all were classified in the subfamily Chrysichthyinae by Jayaram (1966). Two non-endemic species belong to the bagrid subfamilies Bagrinae and Auchenoglanidinae of Jayaram (1966). The third non-endemic species, called *Leptoglanis brevis* Boulenger by Poll (1953:151) but listed as a synonym of *L. rotundiceps* by Jayaram, 1966:1107, although usually included in the Bagridae, has also been classified as an amphiliid (e.g., David and Poll, 1937), a placement with which we concur (see discussion below, p. 9). We therefore exclude this species from the key and from discussion of the Bagridae.

Four new species of bagrids have been discovered. One lives in deep water and represents the third endemic bagrid genus in the lake. Two others inhabit shore waters and are assigned to *Lophiobagrus;* both of these occur at the north end of Lake Tanganyika in Burundi and also at the south end in Zambia. Still another species of *Lophiobagrus* is represented by three small specimens from deeper water. The chief purpose of this paper is to describe these new taxa and to discuss their relationships. In addition we present a key to the six genera and 15 species (13 endemic) of bagrids known from the basin of Lake Tanganyika.

A review of family-group names in the Bagridae (Bailey and Stewart, 1983) indicates that two of the five subfamily names adopted by Jayaram (1966) need to be corrected for reasons of priority: Claroteinae Bleeker (1862, as stirps Claroteini) replaces Chrysichthyinae Regan (1911), and Bagrichthyinae Bleeker (1858, as subfamily Bagrichthyoidei) replaces Bagroidinae Jayaram (1966:1066,1069). Jayaram (1956) recommended the adoption of *Porcus* to replace *Bagrus* but Bailey and Stewart (1983) have requested that the International Commission on Zoological Nomenclature place *Bagrus* Bosc, 1816, on the Official List of Generic Names in Zoology. We employ the more familiar name *Bagrus* pending a decision.

MATERIALS AND METHODS

Fish lengths are given as standard length (sl). Caudal peduncle length is measured from base of last anal fin ray to middle of caudal fin base. Adipose fin origin was taken as the point where the fin diverges from the dorsal body profile; this point shifts progressively posterior with increasing size for small juveniles (under about 25 mm sl in

Lophiobagrus). Adipose fin length is measured along its base, excluding any free, posterior extension. Dorsal spine length is measured from its base to its osseous tip, excluding any flexible extension. Caudal fin length is measured to tip of longest ray; in *Lophiobagrus,* this is generally to tip of lower caudal lobe or, less often, to tip of middle caudal ray. Pectoral spine length is measured from origin of erect spine to its osseous tip, excluding flexible extension. Posterior cleithral (humeral) process length is measured from origin of erect pectoral spine to tip of the process. Head length is from tip of snout to tip of opercular flap. Interorbital width is measured between fleshy margins of eyes. Width between nostrils is taken between centers of anterior nostrils.

Dorsal soft ray counts include all elements, but the last two anal fin elements are counted as one when joined at base (the typical condition for fishes described herein). Vertebral counts, taken from radiographs and alizarin preparations, include five for the Weberian complex and one for the hypural complex; the first caudal vertebra is taken as the most anterior centrum with a hemal spine.

To avoid repetition, the following locality data are presented in detail here and referred to by field number only in the listing of material (Fig. 1).

B70-25A (type locality for *Lophiobagrus aquilus* and *L. brevispinis*): Zambia: Lake Tanganyika, E side of Nyika Bay on N side of Nkumbula Island, 2 km N of Mpulungu; 8°38′S, 31°9′E; 0–25 m from rock-rubble shoreline, to depth of 3 m, strong wave ac-

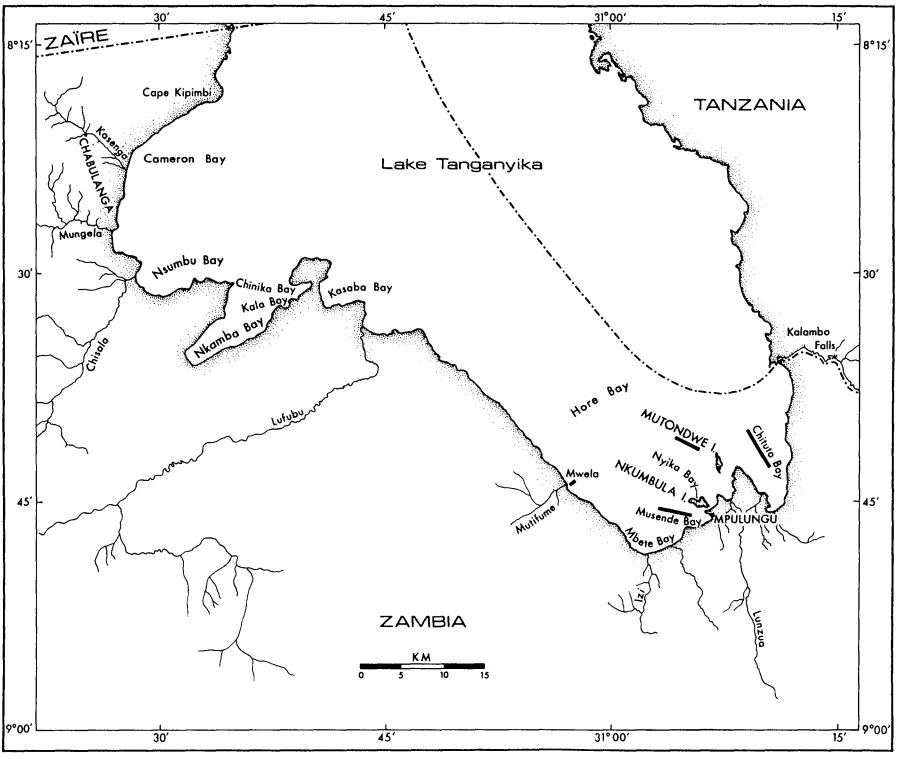


FIG. 1. Zambian part of Lake Tanganyika, showing sampling localities. Bars indicate approximate positions of transect lines for Dr. Kendall's gill-net survey. Each set extended from 40 m depth at the near-shore end to 100 m depth. The bottom was rocky and steeply sloping along the Mwela and Mutondwe transects. Mud and mollusk shells covered the bottom along the more gently sloping Musende Bay and Chituta Bay transects.

tion, clear water with visibility to ca. 5 m, water 27°C (81°F), rotenone; R. M. Bailey, D. J. Stewart and party, 31 Oct. 1970.

B70-25B: Zambia: Lake Tanganyika, SE part of Nyika Bay on N side of Nkumbula Id., 2 km N of Mpulungu; 8°38′S, 31°9′E; about 100 m offshore, depth 7–8 m, visibility and temperature same as B70-25A, SCUBA and rotenone; D. J. Stewart and I. Cech, 31 Oct. 1970.

B70-27: Zambia: Lake Tanganyika, N end of Nkumbula Id. near station B70-25A; habitat data similar to 25A except substrate which was bedrock, large boulders and shingle along a steep, rocky escarpment wall, strong current along shore, depth to 4 m, rotenone; R. M. Bailey, D. J. Stewart and party, 1 Nov. 1970.

B70-28: Zambia: Lake Tanganyika, at neck of Nyika Bay, N end of Nkumbula Id., 2 km N of Mpulungu; 8°38′S, 31°9′E; about 100 m offshore, depth 14 m, slight current, water 28°C (82°F), SCUBA and rotenone; R. M. Bailey, D. J. Stewart and party, 2 Nov. 1970.

B70-31: Zambia: Musende Bay, Lake Tanganyika, 3–4 km W of Mpulungu, 8°46′S, 31°5′E, gill net, 60 m; R. L. Kendall and R. M. Bailey, 2–3 Nov. 1970.

B70-32: Zambia: Lake Tanganyika, 4 km WNW of Mpulungu, 8°45.5′S, 31°5′E, gill net, 72–80 m; R. L. Kendall and R. M. Bailey, 2–3 Nov. 1970.

B70-33: Zambia: Lake Tanganyika, N side of Nkumbula Id., 2 km N of Mpulungu, 8°38′S, 31°9′E, gill net, 3–10 m; R. L. Kendall and R. M. Bailey, 2–3 Nov. 1970.

DJS73-2: Burundi: Lake Tanganyika, between Mutumba and Magara; 3°40′S, 29°20′E; among rocks along shore, SCUBA and rotenone, 0–10 m; D. J. Stewart and C. Ellis, Oct. 1973.

DJS73-3: Burundi: Lake Tanganyika, about 15 km S of Bujumbura; 3°30′S, 29°21.5′E; among rocks along shore, rotenone; D. J. Stewart and C. Ellis, 16 Oct. 1973.

Abbreviations for museum collections are as follows:

AMNH	American Museum of Natural History, New York
BMNH	British Museum of (Natural History), London
CAS-SU	California Academy of Sciences (Stanford University), San Francisco
FMNH	Field Museum of Natural History, Chicago
RGMC	Musee Royal de L'Afrique Centrale, Tervuren, Belgium
ROM	Royal Ontario Museum, Toronto
UMMZ	University of Michigan Museum of Zoology, Ann Arbor
USNM	National Museum of Natural History, Washington, D.C.

KEY TO THE BAGRID CATFISHES OF LAKE TANGANYIKA

1. No teeth on roof of mouth behind premaxilla. Premaxillary tooth patch small. Anterior nostril on lower edge of upper lip. Lips thick and fleshy. Anterior serrae of pectoral spine as strong as those behind. No nasal barbel. Adipose fin large. Length to 100 cm. (Auchenoglanidinae) ..... *Auchenoglanis occidentalis* (Valenciennes)

   Teeth on roof of mouth behind premaxilla. Premaxillary tooth band well developed. Anterior nostril near front of snout, on upper edge of lip. Lips moderate or thin. Anterior serrae of pectoral spine, if present, less strong than those on posterior edge. Nasal barbel present or absent 2

2. Dorsal soft rays 8 to 10 (all elements); dorsal spine entire. Pelvic insertion below posterior dorsal rays. Maxillary barbel long, reaches to or almost to pelvic fin. Branchiostegal rays 13 (Boulenger, 1911:304). Adipose large, its base about one third sl. Vertebrae 44 (including 5 in Weberian complex). A continuous broad band of palatovomerine teeth. Length to 110 cm (Bagrinae) ..... *Bagrus docmak* (Forsskål)

Dorsal soft rays 6; dorsal spine serrate or entire. Pelvic insertion posterior to dorsal base. Maxillary barbel variable, usually short. Branchiostegal rays 8–12. Adipose short or moderate, its base shorter than or about equal to anal base and 1–4.5 in distance to dorsal. Vertebrae 44 or fewer. (Claroteinae) 3

3. Nasal barbel present. Caudal fin forked, truncate or rounded..... 4
No nasal barbel. Caudal fin forked 13

4. Caudal fin forked. Eye free from orbital rim. Vertebrae 37–44. Mesocoracoid arch completely ossified. Length to 150 cm (19 to 77 cm or more in Tanganyika species). *Chrysichthys* Bleeker 5
Caudal fin rounded or shallowly notched. Eye subcutaneous, without free rim. Vertebrae 33–36. Mesocoracoid arch incompletely ossified. Length to 9 cm. *Lophiobagrus* Poll 10

5. Palatovomerine tooth band broad, continuous across midline in adult, narrowly interrupted in young. Barbels short, the maxillary barbel ½ to ⅔ head length. Gill rakers on lower limb of first arch 13–15 (16). Posterior cleithral process well developed, with acute tip. Length to 77 cm or more ..... *Chrysichthys brachynema* Boulenger
Palatovomerine tooth band usually narrow, interrupted at midline. Barbel lengths variable, maxillary barbel 0.6 to more than head length (less than ⅔ head only in *grandis*). Gill rakers on lower limb of first arch 5–12 or 17–20. Posterior cleithral process undeveloped, rudimentary or short, without acute tip. Length of largest to 63 cm..... 6

6. Gill rakers on lower limb of first arch 17–20, long. Body depth 5.5–7.5 in sl. Caudal peduncle depth 2.0–2.6 in its length. Snout to dorsal fin 1.3 to 1.9 in distance from dorsal origin to caudal base. Maxillary barbel extends beyond head. Vertebrae usually 43, occasionally 42. ..... *Chrysichthys sianenna* Boulenger
Gill rakers on lower limb of first arch 5–12, short or moderate. Body depth 4.0–5.6 in sl. Caudal peduncle depth 1.25–2.0 in its length. Snout to dorsal fin 1.4 or less in distance from dorsal origin to caudal base. Maxillary barbel does not extend beyond head except in *stappersi*. Vertebrae 37–42, occasionally 43..... 7

7. Barbels long: maxillary much greater than head length, extends beyond pectoral fin; outer mental 0.7 to 1.0 head length. Anterior one or two gill rakers on lower arm well separated from those behind. Skull roof and occipital process rugose, predorsal bony bridge complete, exposed. Vertebrae 41–43, most often 42..... *Chrysichthys stappersi* Boulenger
Barbels short: maxillary shorter than to slightly longer than head; outer mental 0.3 to 0.6 head length. Anterior gill rakers uniformly spaced. Skull roof and occipital process more or less imbedded in skin, flattened and broad, predorsal bridge, if present, hidden. Vertebrae 37–42 8

8. Jaws about equal or lower longer; premaxillary teeth not visible from below when mouth is closed. Outer mental barbels originate in advance of level of angle of mouth, approximately at anterior free median margin of mental depression. Gill rakers on lower limb 5–8, short. Vertebrae 37–39, usually 38 ..... *Chrysichthys platycephalus* Worthington and Ricardo
Upper jaw longer; premaxillary teeth in part visible from below when mouth is closed. Outer mental barbels originate approximately at level of angle of mouth, well behind free median margin of mental depression. Gill rakers on lower limb (8) 9–12, of moderate length. Vertebrae 41–42 9

9. Orbital diameter 1.0–1.9 in interorbital width. Head width 1.2–1.5 in head length. Gill rakers 8–10 (11). Upper and lower lips when viewed from below and mental barbels unpigmented. Vertebrae 41 (n = 1). ..... *Chrysichthys graueri* Steindachner

Orbital diameter 2.1–2.8 in interorbital width. Head width 1.1–1.3 in head length. Gill rakers 10–12. Upper and lower lips when viewed from below and mental barbels pigmented (at least a fine speckling of melanophores). Vertebrae 42 (n = 3). ..... *Chrysichthys grandis* Boulenger

10. Gill rakers on lower limb of first arch 15 to 21. Anal rays (11) 12 or 13. Body and at least basal parts of fins largely dark-brown to black 11

Gill rakers on lower limb of first arch 7 to 10. Anal rays 10 or 11 (12). Body largely light brown, fins (except caudal) and underparts mostly light..... 12

11. Rayed fins broadly margined with light. Mental barbels notably flattened, straplike; nasal barbel well developed, reaches to behind middle of eye; maxillary barbel reaches to or almost to pectoral spine. Caudal fin rounded. Mandibular muscles extend onto skull. ..... *Lophiobagrus cyclurus* (Worthington and Ricardo)

Rayed fins dark to their margins. Mental barbels almost cylindrical to moderately flattened; nasal barbel very short, scarcely reaches anterior border of eye; maxillary barbel reaches to well short of pectoral spine. Caudal fin shallowly notched. Mandibular muscles do not extend onto skull roof..... *Lophiobagrus aquilus*, n. sp.

12. Front edge of pectoral spine finely serrate; spine length 14.5 to 18.0 percent of sl. Nasal barbel reaches front of eye, its length scarcely greater than diameter of nostril. Maxillary barbel reaches to behind pectoral spine. Adipose origin anterior to anal origin; basal length greater than distance to dorsal fin. Dorsal spine long, greater than interorbital width, 9.4 to 14.4 percent of sl..... *Lophiobagrus asperispinis*, n. sp.

Front edge of pectoral spine entire; spine short, 7.4–13.8 percent of sl. Nasal barbel extends to between back of pupil and back of eye. Maxillary barbel does not reach pectoral spine. Adipose origin posterior to anal origin; basal length less than distance to dorsal fin. Dorsal spine short, less than one-half interorbital width; 1 to 8 percent of sl. ..... *Lophiobagrus brevispinis*, n. sp.

13. One pair of mental barbels. Eye subcutaneous, without free rim. No posterior cleithral process. Maxillary barbel short, does not reach pectoral spine. Length to 14 cm. ..... *Bathybagrus tetranema*, n. g. and n. sp.

Two pairs of mental barbels. Eye with a free rim. Posterior cleithral process developed but short, its tip acute. Maxillary barbel long, reaches beyond level of dorsal fin. Length usually less than 10 cm. *Phyllonemus* Boulenger..... 14

14. Maxillary barbel with two strongly expanded distal flanges. Mental barbels well behind lower jaw, the inner pair originating between or slightly ahead of angles of mouth. Pectoral and pelvic fins pale. Gill rakers on lower limb of first arch (13) 14 (16)..... *Phyllonemus typus* Boulenger

Maxillary barbel slightly flattened but without notable flanges. Mental barbels remote from lower jaw, all originating behind level of angles of mouth. Pectoral and pelvic fins dusky. Gill rakers on lower limb (15) 16–17 ..... *Phyllonemus filinemus* Worthington and Ricardo

BAGRIDAE FROM LAKE TANGANYIKA

Subfamily Claroteinae Bleeker

Chrysichthys Bleeker, 1858

Type species, *Pimelodus auratus* Geoffroy Saint-Hilaire, by subsequent designation by Bleeker, 1863:95.

Among catfishes the posterior cleithral or humeral process varies widely in length, shape, and ornamentation (Lundberg, 1982:58–62), but it is almost always present. In the many genera of Bagridae examined we find the posterior cleithral process lacking only in a few species of *Chrysichthys* and in *Bathybagrus*. Among the non-Tanganyikan species of *Chrysichthys* available to us, *C. auratus* from Egypt, *C. mabusi* from Zambia, and *C. walkeri* from Sierra Leone, all have the process well developed, acutely pointed, and with rugosities on the exposed surfaces. Survey of the illustrations in Boulenger (1911:318–340) shows a well developed posterior cleithral process in these same three species and in nine others that do not occur in Lake Tanganyika. Only in *C. furcatus* from West Africa and *C. delhezi* from the Upper Congo do the figures fail to show a developed process.

Among the *Chrysichthys* species from Lake Tanganyika, Boulenger's figures of *C. brachynema* and its synonym, *C. myriodon,* exhibit the process as well developed and acute at the tip. In *C. sianenna* it is not shown. Our collection contains five species from the lake, lacking only *brachynema.* In the five species the posterior cleithral process is absent or much reduced and more or less rudimentary; in none is it well developed with an acute tip. In *C. sianenna* the process varies; being absent, reduced to a rounded flange, or a blunt, rounded prominence. In *C. stappersi* the process is very short but distinct, sometimes forming a right angle, but in some it is reduced to a low rounded bump. In *C. platycephalus* it is present as a short blunt lobe, more or less right angled distally and somewhat rugose. In the few available specimens of *C. grandis* and *C. graueri* there is no discernible process.

It seems clear that reduction in development of the process is a derived condition. More study of extra-Tanganyikan species is called for but the evidence provided by the reduced process suggests that the Tanganyikan species of *Chrysichthys,* with the probable exception of *brachynema,* constitute a monophyletic group that perhaps includes one or a few non-Tanganyikan species.

Chrysichthys brachynema Boulenger, 1900:480

We failed to obtain specimens of this species. It was reported to be common by Poll, 1953:135.

A specimen (USNM 84131, 35 mm sl) from Ujiji, Tanzania, was reported by Myers (1936) as *Chrysichthys myriodon* Boulenger, which was considered a synonym of *C. brachynema* by Jayaram (1966:1086). The same fish was identified by Jayaram (1966:1079) as *C. mabusi* Boulenger, a species not otherwise known from Lake Tanganyika. Through the courtesy of Mrs. Janet Gomon of the National Museum of Natural History we have reexamined this individual. It is very poorly preserved but agrees closely with *C. mabusi,* as suggested by Jayaram. It fits some of the characters given for *C. brachynema* in couplet 5 of the key, but the maxillary barbel extends almost to the pectoral spine, and the con-

figuration of the palatovomerine tooth band is not evident. The gill rakers are 6 + 1 + 13 = 20, and the posterior cleithral process is well developed and has an acute tip. The occipital process is broad near its base, rugose, and tapers somewhat posteriorly to form a broad bony bridge with supraneural and nuchal plate at dorsal fin base. Vertebrae 44 (possibly 45; there is an abnormality that involves 2 or 3 elements). We hesitantly regard the Ujiji fish as *brachynema,* but if *mabusi* is a different species and is shown from new material to occur in Lake Tanganyika, this identification needs to be reconsidered.

Chrysichthys sianenna Boulenger, 1906:551

UMMZ 199754, 156 mm sl (B70-33).
UMMZ 199798 (13), 84–181 mm preserved and one 233-mm skeleton (B70-31).

Vertebral counts in 14 specimens: precaudal 12(8), 13(6); caudal 24(1), 25(7), 26(6); total 42(2), 43(12).

Although the distribution of the six species of *Chrysichthys* in Lake Tanganyika was indicated by Poll (1953:7–8) to be strictly lacustrine, none being reported from tributary streams, there is evidence that at least one species undertakes periodic upstream spawning migrations. Dr. Allen F. Roberts was engaged in an anthropological project from 1974 to 1977 in Mpala, Moba Zone, Zaïre, a village on the west shore of the lake. While there he witnessed extensive seasonal migrations of sexually mature catfishes from September through November into a tributary stream, the Lufuko River. The catfishes are known locally as "ndjagali." They are captured in weirs in large numbers and formerly provided a substantial food resource for the local population. The fishery was so efficient, however, that according to local testimony the fish population was seriously depleted in the late nineteenth century (Roberts, 1984). Even more serious population reduction is prevented since the onset of the rainy season destroys the weirs, permitting passage of the latter part of the run to breeding areas located in relatively quiet waters above the riffles where weirs are installed. Local fishermen informed Dr. Roberts that the Lufuko River is the only stream known to them in which this spawning migration occurs, perhaps because of its relatively large size.

On the basis of photographs we identify this catfish as *Chrysichthys sianenna,* but verification from specimens is needed. There seems no doubt that it is a species of *Chrysichthys.*

Chrysichthys stappersi Boulenger, 1917:366

UMMZ 199785, 212 mm (B70-32).
UMMZ 199799 (6), 131–165 mm preserved and one cleared and stained (B70-31).

Vertebral counts in 6 specimens: precaudal 12(3), 13(1); caudal 24(1), 25(3); total 41(1), 42(4), 43(1).

Chrysichthys platycephalus Worthington and Ricardo, 1937:1067, 1092

UMMZ 196090 (2) 155,164 mm. Zambia: W of Mutondwe Id., Lake Tanganyika, near Mpulungu, gill net, 80 m, 16 May 1972, R. L. Kendall.
UMMZ 199753 (10), 101–161 mm (B70-33).
UMMZ 199825 (2), 123,161 mm and one cleared and stained (B70-28).
UMMZ 199926 (2), 122,129 mm (B70-25A).

Specimens were taken as shallow as 3 meters, the minimum depth at which we found any species of *Chrysichthys,* but were also taken as deep as 80 meters.

Vertebral counts in 16 specimens: precaudal 10(3), 11(5); caudal 22(4), 23(3), 24(1); total 37(3), 38(10), 39(3).

Chrysichthys graueri Steindachner, 1911:529

UMMZ 199797, 183 mm (B70-31).

Total vertebral count: 41.

Chrysichthys grandis Boulenger, 1917:367

UMMZ 196091 (3), 163–194 mm. Zambia: W of Mutondwe Id., Lake Tanganyika, near Mpulungu, gill net, 80 m, 16 May 1972, R. L. Kendall.

Vertebral counts: precaudal 12(1), 13(1); caudal 24(1), 25(1); total 43(3).

Bathybagrus, new genus

Type species, *Bathybagrus tetranema,* new species.

DIAGNOSIS.—Catfishes of the subfamily Claroteinae that differ from known bagrids in having only four barbels (two maxillary and two mental). All other bagrids except the Asiatic *Rita* have two pairs of mental barbels and a pair of maxillary barbels; most, including *Rita,* also have nasal barbels. Distinguished from genera of Claroteinae known to us with the exception of some species of *Chrysichthys* (see p. 6) by absence of a posterior cleithral (humeral) process.

Characters shared with other genera, but nonetheless useful for identification include: eyes small, without a free margin (among Claroteinae, only *Lophiobagrus* and *Amarginops* Nichols and Griscom, 1917:713, lack a free orbital margin); bands of teeth present on vomer and dermopalatine (versus absent in *Gephyroglanis*); and mesocoracoid arch (Fig. 3) complete (versus incompletely ossified in *Lophiobagrus* and *Phyllonemus*). Caudal fin forked. Branchiostegal rays 10 to 12. Vertebrae

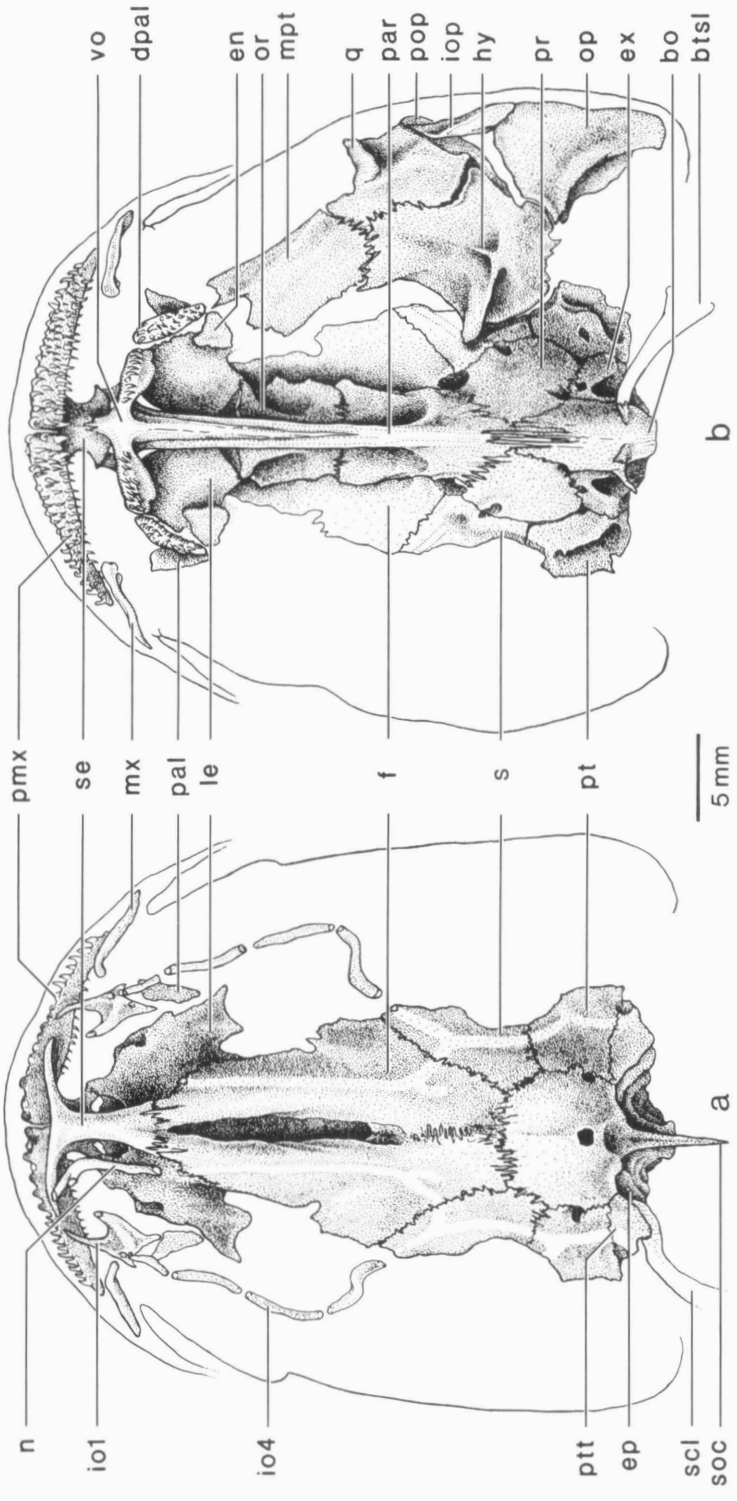
38 to 40. Eight pairs of ribs. Supraoccipital spine (Fig. 2a) narrow, of moderate length, but its tip failing by a wide gap to contact the supraneural at the dorsal fin base.

COMMENTS.—All African Claroteinae with either rudimentary or no nasal barbels were lumped by Jayaram (1966) into the tribe Gephyroglanidini. We choose not to recognize this tribe since it seems to be a polyphyletic assemblage based on a single, variable reduction character. The genus *Gephyroglanis* is questionably distinct from *Chrysichthys*. *Phyllonemus* is perhaps allied to *Lophiobagrus*. They share an advanced character unique in the Bagridae, an incomplete mesocoracoid arch. The remaining two genera of Gephyroglanidini, *Leptoglanis* and *Zaireichthys* (Roberts, 1968:124), are closely allied to each other but are removed from the Bagridae primarily because they have the swimbladder encapsulated in the Weberian apparatus.

Boulenger (1911:350) reported incorrectly that *Leptoglanis* had the "air bladder large, free". Examination of *L. rotundiceps* (UMMZ 200020, from Zambia) by dissection and from cleared and stained material, reveals that the swimbladder consists of paired vesicles largely encapsulated in expanded parapophyses of the fourth and fifth vertebrae of the Weberian complex, with the lateral surface non-bony and in close contact with the body wall just above the posterior cleithral process. The ossified capsules are connected by a bony bridge that passes ventral to the vertebral column. The communicating duct that joins the swimbladder vesicles to the pneumatic duct lies just dorsal to the bridge. The structure is essentially the same as determined by us in dissection of *Amphilius platychir* (UMMZ 199815, from Zambia) and as illustrated by Harry (1953:208) for *A. longirostris* except that ossification of the capsules is less complete and the ventral, bony bridge is absent in *Amphilius*. The paired ossified capsules with bony bridge connecting them ventrally are shared by *Leptoglanis xenognathus* (UMMZ 196084, alizarin preparation), *Zaireichthys zonatus* (CAS-SU 64127, paratype), "*Amphilius*" *notatus* (AMNH 6711, holotype), and, we predict, all of the other species now classified as *Leptoglanis*. We interpret these taxa as a monophyletic assemblage. It is excluded from the Bagridae and provisionally referred to the Amphiliidae, an association that requires confirmation by study of additional characters.

David and Poll (1937:226) included *Leptoglanis* in the Amphiliidae but this was disputed by Harry (1953:180) who assigned that genus to the Bagridae because of the "normal, large free air bladder", a characterization perhaps taken from Boulenger. Jayaram (1955:123–124; 1966:1105–1106) followed Harry, citing in addition the possession by *Leptoglanis* of a strong pectoral spine and the anterior placement of the dorsal fin, both regarded by us as primitive characteristics among catfishes. Poll (1953:151) and Jubb (1967:131) also ranked *Leptoglanis* among the Bagridae.

RELATIONSHIP.—*Bathybagrus* bears superficial resemblance to *Chrysich-*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thys, the most generalized, largest, and wide ranging African bagrid genus. The principal differences (see Diagnosis) are derived, especially the reduction in barbel number and loss of the free orbital rim, and suggest that *Bathybagrus* is a specialized derivative of *Chrysichthys* or a *Chrysichthys*-like ancestral stock. This is supported by the loss of the postcleithral process, likely a shared specialization that in varying degree characterizes some but not all species of *Chrysichthys,* especially some of those in Lake Tanganyika. Also, the reduction of the supraoccipital and interruption of the predorsal bony bridge is regarded as a specialization which is either shared with some species of *Chrysichthys* (e.g., *sianenna*) or parallels that condition. It may be noted that parallel loss has occurred in other catfish lineages (e.g., Ictaluridae, Lundberg, 1982:80).

Chrysichthys contains a diverse assemblage of species and has not been subjected to recent rigorous phylogenetic analysis. It may not be monophyletic. When better known it will probably be possible to elaborate phyletic understanding.

ETYMOLOGY.—The name is derived from the Greek, *bathys,* deep and *Bagrus,* a genus of catfishes, in allusion to the profundal habitat of the only known species. Gender masculine.

Bathybagrus tetranema, new species
Figs. 1–4

MATERIAL.—All specimens were collected in Zambian waters of Lake Tanganyika and, unless noted otherwise, were collected using gill nets by Robert L. Kendall (see Fig. 1). Holotype (Fig. 4): UMMZ 196110, a male 120 mm sl (total length 149 mm), near Mpulungu, 1971 or early in 1972. Four paratypes were taken with the holotype: UMMZ 196109 (3), 101–123 mm sl and UMMZ 196111 (1 alizarin preparation), 120 mm. Other paratypes: six lots are from *west of Mutondwe Island,* UMMZ 196089 (2), 94,138 mm, 80 m, 16 May 1972; UMMZ 196086 (5), 63–94 mm, 40 m, 10 May 1972; UMMZ 196087 (5), 87–120 mm, 60 m, 10 May 1972; UMMZ 196020 (6), 68–103 mm, 40 m, 3 Aug. 1972; UMMZ 196018 (4), 113–127 mm, 60 m, 3 Aug. 1972; and UMMZ 196019 (4), 82–127 mm, 60 m, 13 June 1972; RGMC 83-04-P-1-2 (2),

FIG. 2. Dorsal (a) and ventral (b) views of the skull, upper jaws, and suspensorium of *Bathybagrus tetranema* (UMMZ 196111, 120 mm sl, paratype). Abbreviations (nomenclature follows Lundberg, 1975, 1982): *bo,* basioccipital; *btsl,* ossified transscapular ligament; *dpal,* dermopalatine; *en,* endopterygoid; *ep,* epioccipital; *ex,* exoccipital; *f,* frontal; *hy,* hyomandibula; *io1,* infraorbital 1 (lacrimal); *io4,* infraorbital 4; *iop,* interopercle; *le,* lateral ethmoid; *mpt,* metapterygoid; *mx,* maxilla; *n,* nasal; *op,* opercle; *or,* orbitosphenoid; *pal,* palatine; *par,* parasphenoid; *pmx,* premaxilla; *pop,* preopercle; *pr,* prootic; *pt,* pterotic; *ptt,* posttemporal; *q,* quadrate; *s,* sphenotic; *scl,* supracleithrum; *se,* supraethmoid; *soc,* supraoccipital; *vo,* vomer.

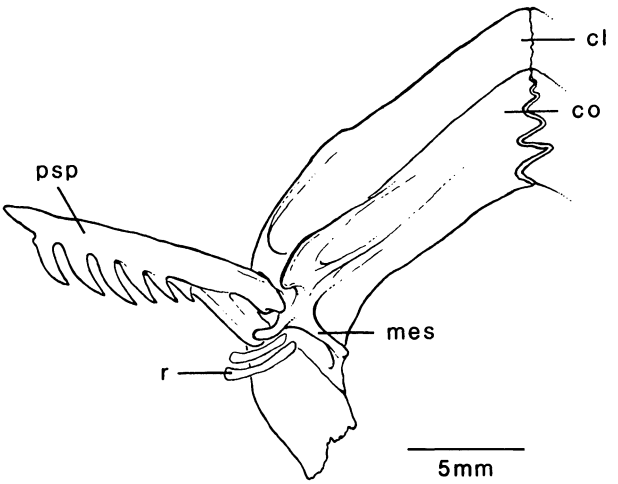

FIG. 3. Ventral view of the right pectoral girdle and spine of *Bathybagrus tetranema* (UMMZ 196111, 120 mm sl, paratype). Abbreviations: *cl*, cleithrum; *co*, coracoid; *mes*, mesocoracoid; *psp*, pectoral spine; *r*, radial.

85,117 mm, 60 m, 13 June 1972. *Chituta Bay*, UMMZ 196092, 126 mm, 60 m, 19 Apr. 1972. *Mwela*, UMMZ 196088 (2), 137,138 mm, 40 m, 11 May 1972. *Musende Bay*, UMMZ 196017, 116 mm, 80 m, 2 Aug. 1972; and UMMZ 199796 (9), 97–131 mm, west of Mpulungu (3–4 km), 60 m, gill net, R. L. Kendall and R. M. Bailey, 2–3 Nov. 1970 (field number B70-31). *Near Mpulungu*, UMMZ 196085 (2), 65,75 mm, BMNH 1983.2.8:1 (1), 60 mm, FMNH 94586 (2), 68,123 mm, USNM 256707 (2), 73,74 mm, 40–100 m, Mar.–Apr. 1972. *Crocodile Island* (near Mpulungu), BMNH 1977.7.25.2–3 (2), 43,51 mm, 10 m, R.S.A. Beauchamp, 7 Aug. 1938. *Mbete Bay* (near Mpulungu) BMNH 1977.7.25.1, 30 mm, Beauchamp.

DIAGNOSIS.—The distinctive characters of the single known species of *Bathybagrus* are given in the generic diagnosis.

DESCRIPTION.—Proportional measurements are presented in Table 1; for the following meristic data, counts for the holotype are marked by asterisks and frequencies are given in parentheses.

Mouth subterminal, upper jaw longer. Teeth conical and relatively large, those on the mandible in a single row laterally and in 2–4 rows mesially. Teeth in the outer rows directed more or less vertically, those of the inner rows directed posteriorly. The mandibular teeth may be discontinuous at the symphysis and are opposed by a comparable band of teeth on the upper jaw. Width of the premaxillary band of teeth usually about 8 or 9, but varies from 6.6 to 13.1 times its breadth near the midline. Narrow bands of teeth are present on the vomer and dermopalatine in all specimens, including the smallest (30 mm). The paired vomerine tooth bands are inclined slightly backward (Fig. 2b)

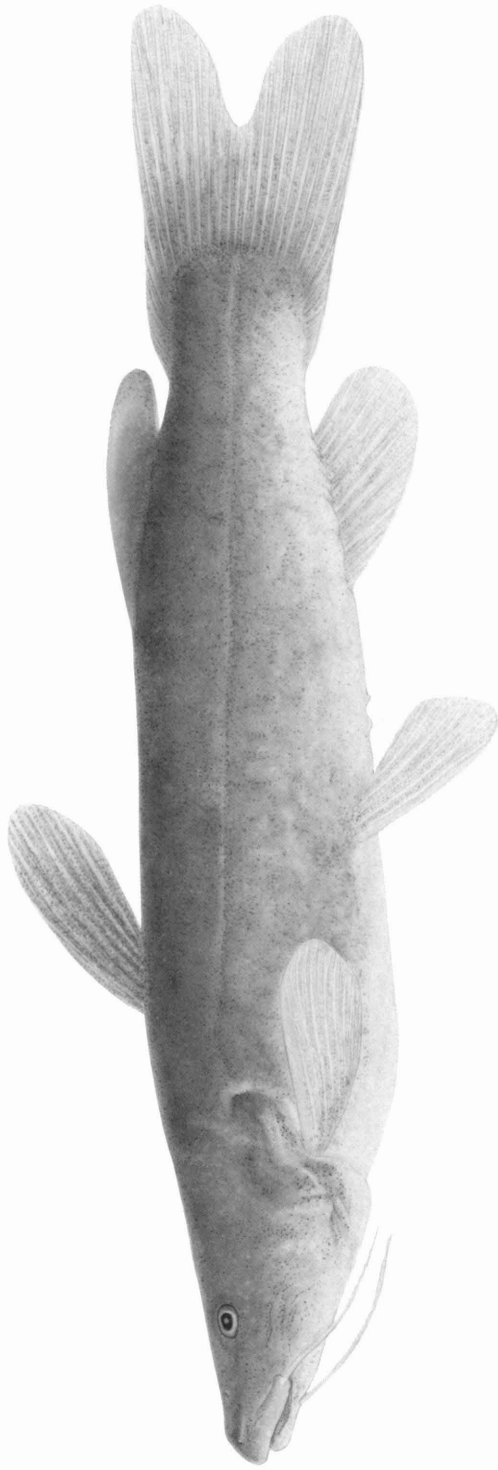

FIG. 4. *Bathybagrus tetranema*, holotype, UMMZ 196110, 120 mm sl, male.

TABLE 1

MORPHOMETRIC CHARACTERISTICS OF *Bathybagrus tetranema*[1]

	Specimen number												
Measurement	1 (Holotype) ♂	2 ♀	3 ♂	4 ♂	5 ♂	6 ♂	7 ♂	8 ♀	9 ♂	10 ♀	11 —	12 —	13 —
Standard length, mm	120	130	129	129	127	127	125	117	116	116	74.5	64.5	30
Total length, mm	149	158	157	157	155	157	151	142	142	143	90	79	38
Body depth	217	211	163	190	173	194	176	182	193	197	170	186	213
Caudal peduncle depth	113	118	103	122	114	117	112	121	112	115	103	110	127
Predorsal length	404	417	405	406	414	430	408	410	419	409	389	384	377
Caudal peduncle length	147	155	157	152	130	154	147	158	159	157	160	167	173
Dorsal spine length	53	61	53	44	50	53	45	73	61	74	71	99	93
Highest dorsal ray	171	170	159	170	165	157	164	150	162	166	148	169	183
Preanal length	744	735	744	740	737	776	758	738	728	752	706	710	—
Anal fin, basal length	133	125	129	126	130	134	143	120	139	118	128	129	—
Pectoral fin length	157	181	169	167	167	174	178	175	162	168	160	186	223
Pectoral spine length	96	108	105	88	98	94	102	121	91	105	105	140	173
Pelvic fin length	145	158	141	134	159	155	149	141	157	147	144	136	167
Head length	328	342	339	340	338	354	349	336	345	334	322	315	317
Head width	207	218	219	208	198	215	217	214	201	216	180	197	200
Head depth at occiput	149	158	146	147	143	156	144	162	147	145	140	144	—
Snout length	127	135	123	134	130	127	124	128	134	124	121	112	110
Orbit length	35	38	38	38	37	35	40	38	37	40	46	50	67
Interorbital width	109	118	109	109	108	102	106	113	108	103	101	95	130
Mouth width	157	163	174	158	165	174	169	168	168	164	141	152	150
Maxillary barbel length	142	164	146	170	150	182	184	174	164	162	173	164	160
Mental barbel length	155	135	119	171	134	157	169	150	134	155	138	121	130

[1]Values expressed in thousandths of standard length. Specimen numbers are from UMMZ catalogue numbers as follows: holotype, 1, No. 196110; paratypes, 2, 4, 8, No. 199796; 3, 6, 7, 10, No. 196018; 5, No. 196092; 9, No. 196017; 11, 12, No. 196085; 13, BMNH 1977.7.25.1.

and are well separated mesially; these in turn are narrowly separated from the dermopalatine tooth plates which are somewhat longer and directed backward and diverge slightly.

The first gill arch has 5*(6) or 6(8) gill rakers on the upper limb, one at the angle, and 12(1), 13*(5) or 14(8) on the lower limb, total 18 to 21. The fifth ceratobranchial has a dense band of short teeth along its entire length. Gill membranes free from the isthmus and deeply divided; branchiostegal rays, 12–11 and 11–10 in two specimens.

Anterior nostrils placed close behind upper lip, opening forward on the snout, with very low rim, widely separated (about 4/5 interorbital width); posterior nostrils without barbel or elevated rim, about equidistant or slightly closer to anterior nostril than orbital rim, interspace somewhat less than between anterior nostrils. The four barbels are thread-like and relatively short; the maxillary pair never extend to the level of the pectoral fin origin, the mental barbels not quite so far. Occipital crest slender, spinelike, falling well short of contact with nuchal plate.

Dorsal spine relatively short and weak, without serrations on anterior or posterior edge, its distal part flexible and incompletely ossified. Dorsal soft rays, 6. Pectoral spine (Fig. 3) entire anteriorly, typically with 6 or 7 strong retrorse serrations on posterior edge (5 in the 30 mm specimen), the distal serrae longest, their length equal to diameter of shaft; the spine tip is often flexible or partly ossified. Pectoral soft rays, 7; the pectoral fin extends back to below the center of dorsal fin and just over half way to pelvic fin origin. Pelvic fin with a simple first ray and 5 branched rays, the second branched ray longest. The pelvic fin extends beyond anus and may just reach anal fin origin. Anal fin with 5* or 6 simple and 7 to 9* branched rays, the last split to the base and supported by an expanded basal element; total anal rays 13(1) or 14*(7).

The upper posterior corner of the adipose fin is pointed, and the fin is remote from the procurrent caudal rays (including the 30 mm specimen). Height of adipose fin, 22 to 33 per mille of sl in adults and 37 in the 30-mm specimen; length of base, 66 to 167 in adults, 250 for the 30-mm fish. Distance from dorsal fin base to adipose fin divided by length of adipose fin base typically varies from 1.37 to 3.00 (4.47 in one specimen) but is 0.32 in the small juvenile.

Caudal fin forked, its longest rays about twice the length of median rays. Principal caudal rays (Lundberg and Baskin, 1969:34), 17; 7 branched rays in the upper lobe and 8 in the lower lobe plus a simple procurrent ray on the outer edge of each lobe. Caudal peduncle depth 1.13 to 1.55 in its length.

Free precaudal vertebrae, 13(2), 14(5); caudal vertebrae, 19(1), 20(4), 21(2); total counts for 13 specimens are: 38(5), 39(5), 40(3).

Color: Specimens preserved in alcohol are uniformly dusky gray to gray-brown on the upper part of the head and body. The top and side

of the head are covered with small pores or pits which appear as light specklings. The lower lip and underside of the head anterior to the gill membranes are dusted with melanophores. The branchiostegal membranes and belly back to the level of the anal fin origin are relatively unpigmented. The dorsal, anal, pectoral, and pelvic fins have gray specklings; they are darker basally than distally. The adipose is rather dark, usually with a speckling of white and dusted with melanophores, and a narrow light margin. The caudal fin is dusky, with the posterior margin, the distal part and lower margin of the lower lobe lighter.

REPRODUCTION.— The largest specimen is 138 mm sl and those more than 116 mm examined seem to be mature. A 130-mm female has 86 ova in two size classes; 34 eggs are 3.0 to 3.5 mm in longest dimension and 52 are 1.0 to 1.5 mm. The smaller eggs are whitish. A second female, 117 mm, also has two size classes of eggs with the larger ova about 3.0 mm. The two gravid females were collected in early November. The number and size of eggs in *tetranema* is comparable to mouthbrooding cichlid fishes. It is possible that *tetranema* may also exhibit relatively intensive parental care.

DISTRIBUTION.—Known only from Zambian waters of Lake Tanganyika where it is most abundant at depths between 40 and 80 m. Dr. Kendall routinely fished gill nets at 40, 60, 80 and 100 m, but no *tetranema* are known to have been taken at 100 m. Of 50 fish with recorded depth data, 2 (small) specimens were at 10 m, 7 were between 40 and 100 m, 13 at 40 m, 25 at 60 m, and 3 at 80 m.

ETYMOLOGY.—From the Greek *tetra*, four and *nema*, a thread, in reference to the barbels which are reduced to four slender filaments. The name is a substantive.

Phyllonemus Boulenger

Type species, *Phyllonemus typus* Boulenger, 1906, by original designation.

Phyllonemus typus Boulenger, 1906:552

UMMZ 199828 (13), 22–86 mm (B70-28).
UMMZ 199909 (28), 26–89 mm, one cleared and stained (B70-25B).
UMMZ 199933 (3), 31–53 mm (B70-25A).

Differences between the two species of *Phyllonemus* are given in the accompanying key. Vertebral counts on six specimens (from UMMZ 199909) are 37(1), 38(4), 39(1).

Phyllonemus filinemus Worthington and Ricardo, 1937:1096, Kibwezi (=Kibwesa, Tanzania)

UMMZ 196153 (5), 41–74 mm (DJS73-2).

In the original proposal the specific name was spelled *filinemus*. The etymology was not discussed, but was presumably from *filum*, a thread,

nema, a thread, with the suffix *us* added because *Phyllonemus* is in masculine form. Emendation to *filinema,* a substantive, would seem called for; the word *nemus* signifies a wood with open meadows, a grove, and obviously has no relevance to this fish. Under the rules of nomenclature, however, such correction is probably not admissible.

Vertebral counts on five specimens (UMMZ 196153) are 36(1), 37(2), 38(2).

Lophiobagrus Poll, 1942

Type species, *Lophiobagrus lestradei* Poll, 1942 (=*Chrysichthys cyclurus* Worthington and Ricardo, 1937), by monotypy.

DIAGNOSIS.—Small fishes of the subfamily Claroteinae. Mesocoracoid reduced to a short ventrolateral segment that projects mesially, terminating in a ligamentous connection to the anterior wall of the abdominal cavity (Fig. 5), not forming a closed, bony loop on the lower, posterior side of the pectoral girdle as in other bagrids except *Phyllonemus* (Fig. 3). Caudal fin truncate or at most shallowly notched with rounded corners, a distinctive characteristic among Tanganyikan bagrids (among other claroteines, *Amarginops* and *Chrysichthys delhezi* also have shallowly emarginate caudal fins). Eyes reduced and subcutaneous, without a free margin (a probably convergent feature shared by *Bathybagrus* and *Amarginops* among claroteines). Teeth on vomer and dermopalatine in four oval or elongate patches (Fig. 5). Eight barbels (two maxillary, two nasal, and four mental). Posterior cleithral process (Fig. 5) moderate to well developed, its tip acute. Branchiostegal rays 8 or 9. Vertebrae 33–36 (versus 36 to 44 in other Tanganyika bagrids). Seven pairs of ribs. Supraoccipital spine variable in length, in contact with, narrowly separated, or widely separated from nuchal plate at dorsal fin base.

COMMENTS.—*Lophiobagrus lestradei* was described from a single, poorly-preserved specimen (Poll, 1942). Poll's definition of the genus was based entirely on external morphology. Poll later (1953) determined that *L. lestradei* was a synonym of *Chrysichthys cyclurus* Worthington and Ricardo, 1937, and proposed the new combination *Lophiobagrus cyclurus.* Jayaram (1966) suggested that *L. cyclurus* was closely similar to *Chrysichthys delhezi* and placed *Lophiobagrus* in the synonymy of *Chrysichthys.* Jayaram did not examine the types of *cyclurus* or *lestradei.*

We have examined the types of *cyclurus* and *lestradei* as well as alizarin preparations and dissections of newly collected material of *cyclurus* and two of the new species described below. We agree with Poll's synonymy of *lestradei* under *cyclurus* but disagree with Jayaram's synonymy of *Lophiobagrus* with *Chrysichthys.* Characters which we feel warrant the retention of two genera are given in the foregoing diagnosis. The distinctive mesocoracoid of *Lophiobagrus* is apparently shared only by the two species of *Phyllonemus* and is interpreted as a synapomorphy. These

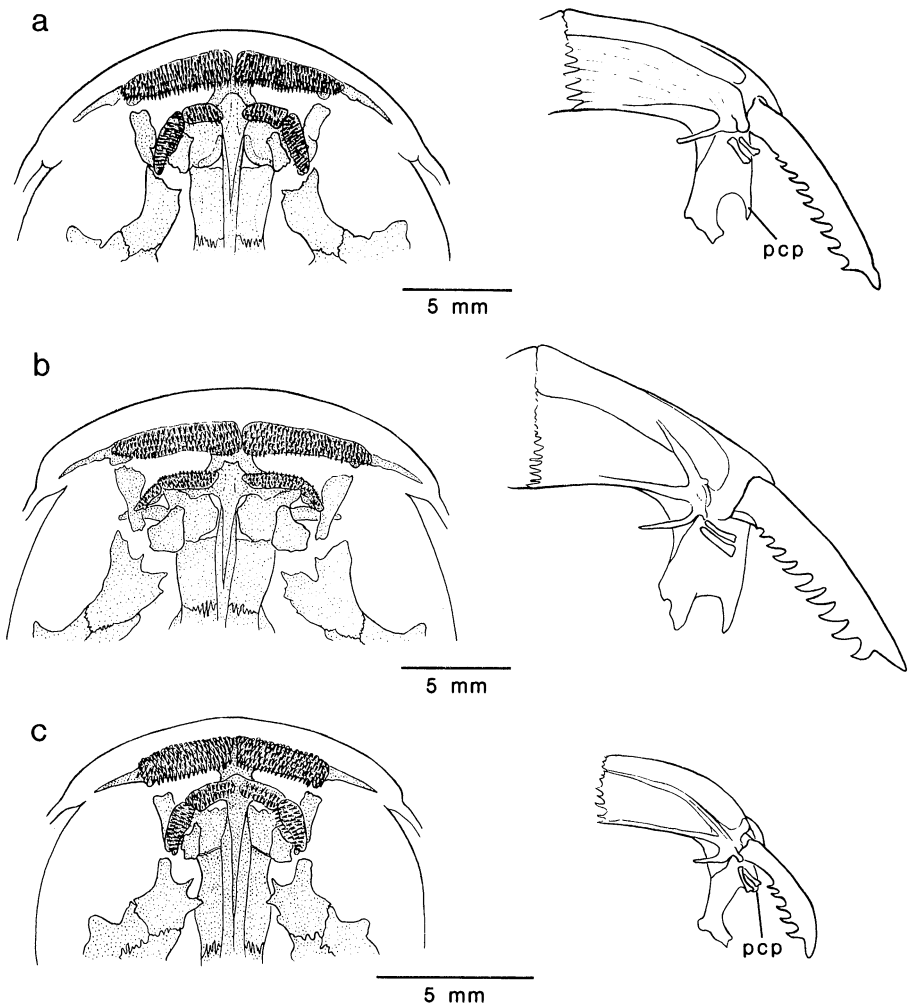

FIG. 5. Premaxillary, vomerine, and dermopalatine tooth patches (left), and ventral view of pectoral girdle and spine (right) of (a) *Lophiobagrus cyclurus*, UMMZ 199932, 67 mm sl; (b) *L. aquilus*, paratopotype, UMMZ 199929, 70 mm sl; and (c) *L. brevispinis*, paratopotype, UMMZ 199931, 54 mm sl. Abbreviation: *pcp*, posterior cleithral (humeral) process.

two taxa also agree in their small size and share in the reduction of ribs to 7 pairs (versus 8 pairs in *Bathybagrus* and 9–13 pairs in the three species of *Chrysichthys* for which we have alizarin preparations). We hypothesize that *Lophiobagrus* and *Phyllonemus* are sister groups derived from a *Chrysichthys*-like ancestor. It is perhaps significant that in at least some species of *Chrysichthys* the mesocoracoid, though complete, is very slender. We have examined skeletons for numerous representative species of Asian bagrid genera; they all have the primitive condition of the mesocoracoid forming a closed loop.

Lophiobagrus differs from *Phyllonemus* in the presumably more primitive presence of nasal barbels, shorter maxillary barbels, and more robust body configuration. It differs further in the probably more advanced character states of the scarcely notched to rounded caudal fin, absence of a free orbital margin, fewer vertebrae (33 to 36 instead of 36 to 39), and fewer branchiostegal rays (8 or 9 instead of 10).

DISTRIBUTION AND HABITAT.—The genus *Lophiobagrus* is apparently endemic to the Lake Tanganyika basin (but, see Comment under *L. cyclurus* below). Three of the four species (all except *L. asperispinis*) occur both at extreme southern and northern ends of the lake, suggesting that they may be generally distributed around the lake's perimeter. *Lophiobagrus asperispinis* is known from a single, offshore locality (9–20 m depth) in southern Burundi.

Our rotenone samples in Zambia were taken both near shore (0–4 m) and slightly offshore (at 7 and 14 m). Only 10 of 314 specimens of *Lophiobagrus* spp. were at the deeper stations, indicating a possible preference for the littoral, rock-rubble habitat in the surge zone, at least for the three species collected (Table 2). Substrate at the offshore stations, however, was relatively level with mixed sand and rock; thus, we cannot rule out the possibility that species of *Lophiobagrus* occur in rock-rubble habitats in deeper water. In Burundi, one of us (DJS) took a fish collection using SCUBA and rotenone on an offshore, submerged, rocky reef at a depth of about 4 m. That sample yielded no *Lophiobagrus* in marked contrast to 210 specimens of three species taken in littoral, rock-rubble habitats in the same part of the lake (Table 2). Further exploration may reveal that *asperispinis* is, in fact, a deep-water representative of the genus. To date, there is no evidence that *Lophiobagrus* enters tributaries to the lake, but perhaps the rocky streams have not yet been adequately sampled.

Distribution of *Lophiobagrus* species in Lake Tanganyika appears from our collections to be largely complementary to that of *Chrysichthys*, the

TABLE 2

RELATIVE ABUNDANCE OF *Lophiobagrus* SPP. COLLECTED IN ROTENONE SAMPLES AT VARIOUS DEPTHS IN LAKE TANGANYIKA

Locality	Depth meters	NUMBER OF *Lophiobagrus*		
		cyclurus	*aquilus*	*brevispinis*
Zambia, B70-25A	0–3	43	96	113
Zambia, B70-27	0–4	27	0	25
Burundi, DJS73-2	0–2	15	6	76
Burundi, DJS73-3	0–1	90	0	23
Burundi, DJS73-2	3–4	0	0	0
Zambia, B70-25B	7–8	5	0	4
Zambia, B70-28	14	1	0	0

six species of which occur farther offshore in deeper water. The rotenone samples listed in Table 2 yielded only *Chrysichthys platycephalus,* while the various other species in that genus (like *Bathybagrus*) were routinely collected in gill nets set farther offshore. Nevertheless, Poll (1953:7–8, 119–141) reported that all of the species of *Chrysichthys* occur within the ten-meter isobath, although most collections were in deeper water. Brichard (1978) has observed *Chrysichthys* resting among rocks, but did not say at what depth they were seen. Several ecological variables including depth and substrate apparently contribute to the suggested complementary distributions of *Chrysichthys* and *Lophiobagrus.*

Lophiobagrus appears to have specialized through maturation at a small size to occupy small interstices of the littoral rock-rubble. The largest *Lophiobagrus* seen by us was an 87 mm sl individual of *cyclurus*; the six species of *Chrysichthys* in Lake Tanganyika have maximum reported sizes of 190 to 770 mm sl (Poll, 1953). *Chrysichthys platycephalus,* however, is one of the smallest species of its genus in the lake. The only other bagrids collected with *Lophiobagrus* in the littoral, rock-rubble habitat (both in Zambia and Burundi) were the two species of *Phyllonemus,* also small, with maximum sl of about 100 mm (Poll, 1953:148–150; but Jayaram, 1966:1109, reported a specimen of *P. typus* 194 mm long).

Brichard (1978:416) noted that when confined to a tank, *Lophiobagrus* exudes a sticky, transparent mucus which mixes with the water and kills other fish in a matter of minutes. This possibly comes from a gland just behind the pectoral girdle; these 'poison glands' are greatly enlarged in *Lophiobagrus* relative to more generalized *Chrysichthys* species. Perhaps the toxic secretion protects *Lophiobagrus* from various predators among the littoral, rock-dwelling fishes.

Lophiobagrus cyclurus (Worthington and Ricardo, 1937)
Figs. 5a, 6a, and 7

Chrysichthys cyclurus (in part). Worthington and Ricardo, 1937:1093–1094, figure 7, syntype series complex.
Lophiobagrus lestradei. Poll, 1942:318–322.

MATERIAL.—(All are from Lake Tanganyika; also see Materials and Methods.) Lectotype of *cyclurus,* here designated, BMNH 1936.6.15.879, 49 mm sl, and paralectotypes of *cyclurus,* BMNH 1936.6.16.880–883 (4), 41–50 mm, 3 of these 5 former syntypes were collected near Mpulungu, Niamkolo, Zambia; all were collected by C. Christy, 1926–7. The sixth paralectotype of *cyclurus* is listed herein as a paratype of *L. asperispinis* n. sp. Holotype of *lestradei:* RGMC 54924, 61 mm sl, Burundi, Nyanza, A. Lestrade, 1937. Ten lots of nontypes as follows: UMMZ 199932 (43), 24–70 mm (incl. 2 alizarin preparations 33,67 mm), Zambia, B70-25A; UMMZ 199908 (5), 24–72 mm, Zambia, B70-25B; UMMZ 199857 (27), 15–76 mm, Zambia, B70-27; UMMZ 199826, 61 mm, Zambia, B70-28; UMMZ 196152 (15), 18–48 mm, Burundi,

DJS73-2; UMMZ 196151 (90), 10–50 mm, Burundi, DJS73-3; ROM 28164 (4), 19–62 mm, Zambia, 16 km west of Mpulungu, near Chilinguba, E.K. Balon, 11 June 1969; RGMC 130765, 43 mm, Zaïre, Ubemba, G. Leleup, 10 July 1961; RGMC 131084-092 (8), 37–87 mm (incl. 1 alizarin preparation), Zaïre, Kalungwe, G. Leleup, 11 July 1961; RGMC 130856-858 (3), 19–70 mm, Zaïre, Kigongo, G. Leleup, 6 July 1961.

COMMENTS.—Among numerous other specimens of *cyclurus* in the RGMC collections, our colleague D. Thys van den Audenaerde discovered a 40 mm sl specimen with the following data: RGMC 130128, Zaïre, Manguredjipa, Terr. de Lubero, alt. 1000 m, Kivu, R. Laurent, 5–7 Mar. 1951. This would be somewhere in the Ituri forest, Ituri River drainage. According to Thys van den Audenaerde (letter dated 25 Feb. 1980), R. Laurent lived at Uvira on Lake Tanganyika, but traveled and collected widely. We have examined this fish and cannot distinguish it from *cyclurus*. It seems at least possible that it was mislabeled. This record outside the Lake Tanganyika basin should be considered dubious, pending discovery of additional material. If *Lophiobagrus* occurred in streams of the Tanganyika basin, a record from outside the basin would seem more believable.

DIAGNOSIS.—Distinguished from all other Tanganyikan bagrids by mandibular muscles which extend up and back to insert on the skull roof, and from other species of *Lophiobagrus* by notably flattened, strap-like mental barbels (Fig. 6a). Relatively high total number of gill rakers (22–25 on first arch, 15–17, mode 16, on lower limb) and anal rays (12–13, mode 13) separate *cyclurus* from *brevispinis* and *asperispinis*. Light-margined fins, longer nasal barbels, lower dorsal fin, and slightly lower gill raker counts readily separate *cyclurus* from *aquilus* (also see Key and Table 4).

DESCRIPTION.—Measurements are presented in Tables 3, 5, and 6. Configuration of premaxillary, vomerine, and dermopalatine tooth patches, and a ventral view of pectoral girdle and spine are shown in Fig. 5a. A ventral view of head and pectoral fins to illustrate the subterminal mouth, forms and lengths of barbels, and relative lengths of pectoral spine and branched pectoral rays is presented in Fig. 6a. Color pattern and relative lengths and shapes of the fins are depicted in Fig. 7. Finally, diverse quantitative and qualitative characteristics useful for distinguishing *cyclurus* from other *Lophiobagrus* species are summarized in Table 4.

For the following meristic data, counts for the lectotype are marked by asterisks and frequencies are given in parentheses. The first gill arch has 6*(4), 7(7) or 8(3) gill rakers on upper limb, 1*(11) or 0(3) at the angle, and 15(3), 16*(8) or 17(3) on lower limb; totals 22(2), 23*(4), 24(5), 25(2) or 26(1); two juveniles of about 24 mm sl had approx. 20–21 total. Dorsal fin I, 6*(13) or I, 7(1); rounded with second soft ray typically longest. Pectoral spine with anterior margin smooth and 8*, 7–11 retrorse serrations on posterior margin (3–5 serrations at 15–25 mm

TABLE 3

MEASUREMENTS OF TYPE SPECIMENS FOR FOUR SPECIES OF *Lophiobagrus* FROM LAKE TANGANYIKA[1]

Character	*cyclurus* Lectotype BMNH 1936-6-15:879	*cyclurus* 2 Paralectotypes BMNH 1936-6-15:880–883	*lestradei* Holotype RGMC 54924	*aquilus* Holotype UMMZ 199928	*brevispinis* Holotype UMMZ 199930	*asperispinis* Holotype RGMC 14359A
Standard length, mm	49.1	44.4, 50.0	61.0	65.8	42.3	27.6
Body depth	236	209, 174	187	233	182	261
Caudal peduncle depth	141	133, 134	130	146	156	170
Predorsal length	383	374, 382	384	406	385	399
Dorsal to adipose	—	187, 160	—	155	246	156
Adipose fin length	257	180, 198	259	220	191	203
Caudal peduncle length	145	185, 146	146	146	158	174
Dorsal spine length	(112+)	— —	130	167	52	94
Highest dorsal ray	191	194, 186	172	205	154	178
Caudal fin length	212	216, 202	193	196	206	239
Preanal length	717	705, 718	689	739	754	670
Anal fin base	—	133, 134	—	131	130	149
Pectoral fin length	214	234, 224	215	217	189	207

Pectoral spine length	171	189,	182	180	185	99	145
Pelvic fin length	—	160,	164	—	164	161	185
Pelvic fin interspace	—	45,	—	—	55	61	65
Postcleithral process length	—	92,	97	—	103	57	69
Head length	306	302,	310	315	337	322	348
Head width	285	268,	284	282	304	246	326
Head depth at occiput	—	160,	168	—	196	132	185
Snout length	100	110,	104	128	109	106	116
Orbit length	49	52,	56	48	55	38	76
Interorbital width	126	115,	116	111	135	104	138
Width between nostrils	—	90,	92	—	106	92	101
Mouth width	208	176,	208	193	234	198	254
Tooth patch width:							
premaxillary	153	133,	152	149	182	132	185
palatovomerine	—	—	—	—	103	83	—
Barbel length:							
nasal	73	68,	66	79	55	52	40
maxillary	165	182,	186	143	135	142	236
outer mental	132	149,	136	120	114	142	170
inner mental	84	—,	98	69	78	99	116

[1]Values expressed in thousandths of standard length.

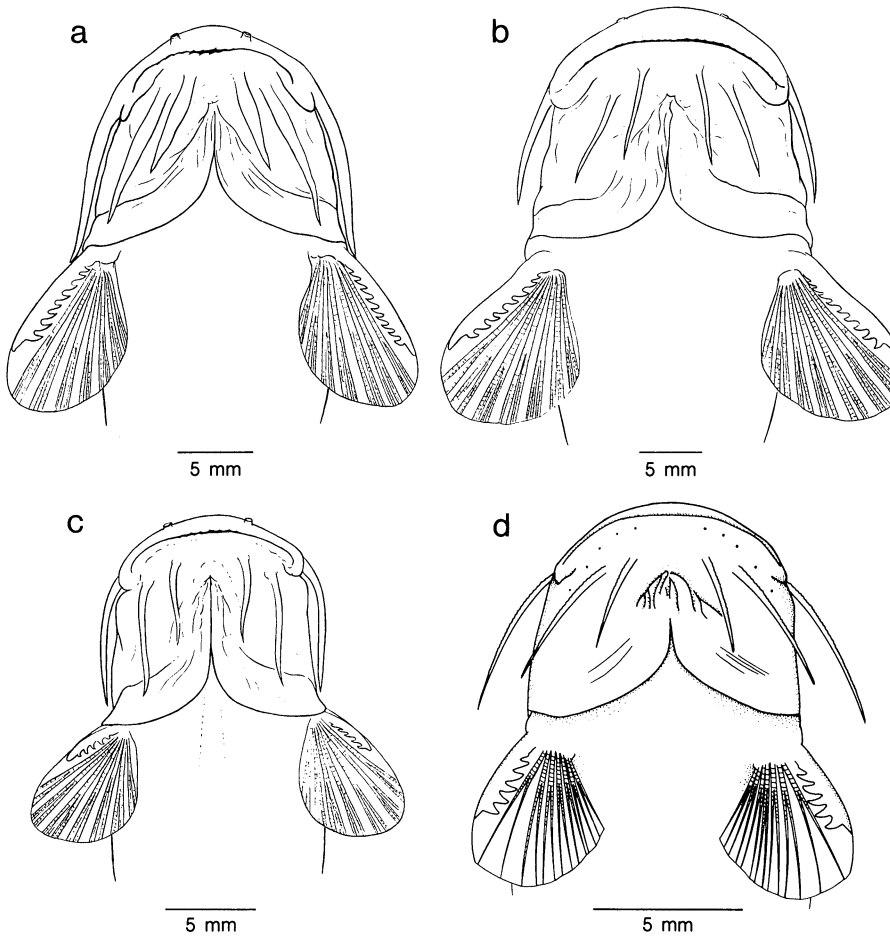

FIG. 6. Ventral view of head and pectoral fins of (a) *Lophiobagrus cyclurus*, UMMZ 199932, 55 mm sl; (b) *L. aquilus*, holotype, UMMZ 199928, 65 mm sl; (c) *L. brevispinis*, holotype, UMMZ 199930, 43 mm sl; and (d) *L. asperispinis*, holotype, RGMC 14359A, 27.6 mm sl.

sl); pectoral soft rays 7(18) or 8(6), counting both sides of 12 specimens. Pelvic fin i, 5, rounded with second or third branched ray longest. Anal fin with 12(4) or 13(8) total rays. Branched caudal rays 15–16; procurrent caudal rays 17–19 above and 15–17 below (based on 2 alizarin specimens). Total vertebrae 34(1), 35(9) or 36(1). Branchiostegal rays 8 on each side; pleural ribs 7 (2 alizarin specimens). Supraoccipital spine narrow, well developed, but its tip well separated from supraneural at dorsal fin base.

Lophiobagrus **aquilus,** new species
Figs. 5b, 6b, and 8

MATERIAL.—(All from Lake Tanganyika; also see Materials and Methods.) Holotype: UMMZ 199928, 65.8 mm sl (80 mm tl), Zambia,

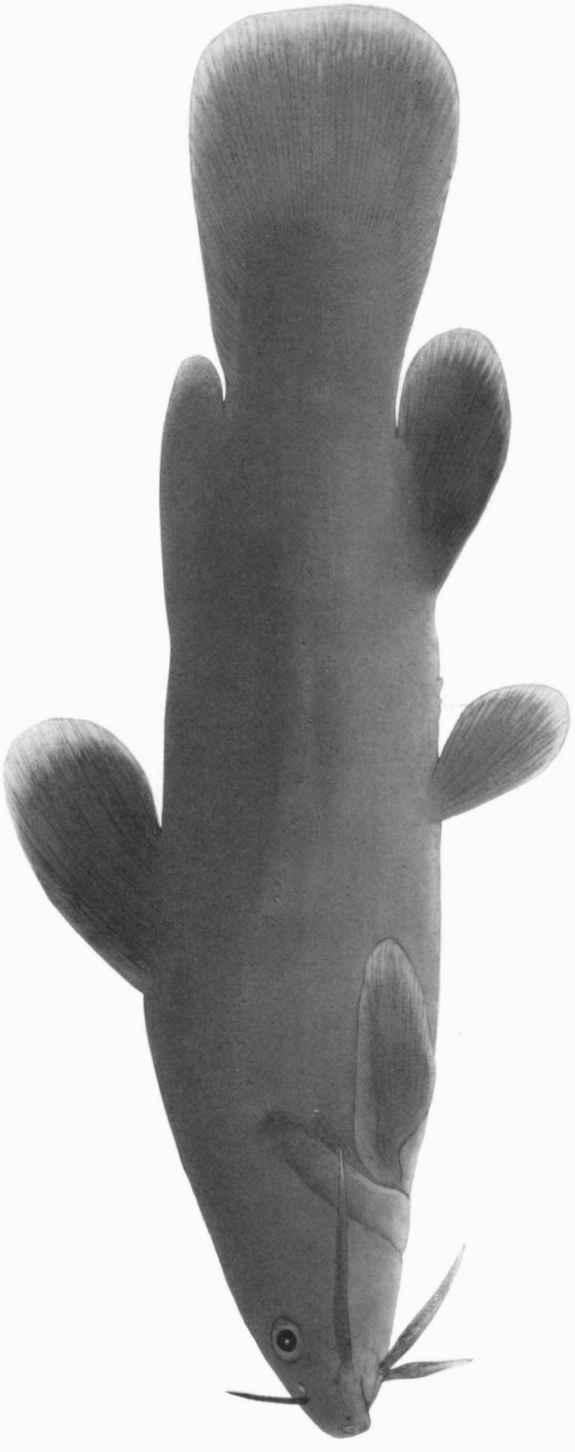

FIG. 7. *Lophiobagrus cyclurus*, UMMZ 199932, 55 mm sl, female.

TABLE 4
COMPARISON OF FOUR SPECIES OF *Lophiobagrus* FROM LAKE TANGANYIKA[1]

CHARACTER	*cyclurus*	*aquilus*	*asperispinis*	*brevispinis*
Body form	Deep, heavy forward, little depressed	Deep, heavy forward, little depressed	Deep, heavy forward, little depressed	Slender, much depressed
Body depth	21–28	21–25	23–26	16–22
Head depth (at occiput)	17–20	19–23	18–21	13–16
Head length	26–33	31–37	32–35	29–33
Head width	25–29	27–31	29–33	22–26
Postcleithral process length	5–10	8–12	7–9	4–6
Dorsal fin, highest ray	15–19	19–25	18–23	14–19
Dorsal spine length	9–14	13–21	9–14	1–8
Pectoral spine length	13–18	17–24	14–18	7–14
Adipose origin	In advance of anal origin	In advance of anal origin	In advance of anal origin	Above or posterior to anal origin
Adipose fin length	20–36	17–25	20–24	13–21
Caudal fin margin	Slightly rounded	Shallowly notched	Slightly rounded	Truncate to scarcely rounded
Mental barbels:				
Shape	Much flattened	Little flattened	Little flattened	Little flattened
Pigmentation	Dusky at base, lighter distally	Dusky, the tips somewhat lighter	Light	Light
Outer barbel length	10–18	9–11	14–17	11–16

Inner barbel length	6–13	6–10	10–12	6–10
Nasal barbel, extent, length (adults)	To middle or back of pupil; 7–11	Not quite to front of eye; 4–6	To front of eye; 3–4 (yg.)	To back of pupil or back of eye; 5–7
Maxillary barbel, extent, length	To or almost to pectoral spine; 12–22	To well short of pectoral spine; 11–16	To behind pectoral spine; 21–29	To well short of pectoral spine; 11–17
Gill rakers, total	22–25	23–29	10–12	12–15
Anal rays	12 or, usually, 13	11 or, usually, 12	10–11	Usually 11, occasionally 12
Vertebrae	(34) 35 (36)	34 or 35	33–35	34–36
Premaxillary tooth band	Scarcely curved; width ca. 7.5 times length	Gently curved; width ca. 10 times length	Slightly curved	Gently curved; width ca. 5.5 times length
Palatovomerine tooth band	Narrow or moderate median separation; long posterior projections	Well separated medially; short posterior projections	Separated medially; separated between vomer and palatine	Narrow band, almost continuous at midline; long posterior projections
Mandibular muscles insert on skull roof	Yes	No	No	No
Color of body	Violaceous to black, lighter on breast; lower side of head dirty white	Blackish, somewhat lighter on breast; lower side of head dirty white	Light brown or faded	Brownish above, breast and underside of head light
Color of fins	Rayed fins black with sharply contrasting broad light margins; adipose black, sometimes with narrow light edge behind	All blackish to margins, margin often darkest	Unpigmented	Paired fins light; median fins dark basally, with broad light margins

[1]Data for *L. cyclurus, L. aquilus,* and *L. brevispinis* are from juveniles and adults from near Mpulungu, Zambia, including cleared and stained specimens; those for *L. asperispinis* are from the type series of three juveniles, none dissected or stained. Measurements are percentages of standard length; condensed from Tables 5 and 6.

TABLE 5

MEASUREMENTS OF ADULTS OF THREE SPECIES OF *Lophiobagrus* FROM ZAMBIA[1]

		cyclurus		*aquilus*		*brevispinis*	
	Sex	♂ ♂	♀ ♀	♂ ♂	♀ ♀	♂ ♂	♀ ♀
Character	Number	5	5	6	5	5	5
Standard length, mm		65.6 (58.6–76.5)	56.7 (45.5–65.3)	67.4 (65.4–69.5)	62.9 (61.5–65.1)	44.4 (42.3–47.1)	34.0 (31.9–38.0)
Body depth		234 (219–248)	251 (208–284)	233 (221–244)	238 (212–252)	187 (180–196)	197 (179–224)
Caudal peduncle depth		144 (135–148)	148 (134–163)	141 (129–151)	133 (131–138)	156 (149–162)	145 (138–158)
Predorsal length		395 (382–412)	384 (364–400)	419 (410–434)	399 (394–408)	386 (384–389)	389 (376–397)
Dorsal to adipose		190 (167–227)	194 (180–230)	172 (153–220)	171 (147–185)	242 (204–263)	241 (213–258)
Adipose fin length		225 (203–269)	235 (217–251)	206 (175–220)	216 (197–234)	182 (157–193)	163 (129–184)
Caudal peduncle length		170 (161–179)	174 (171–180)	152 (146–161)	157 (145–176)	173 (158–191)	159 (140–171)
Dorsal spine length		113 (90–126)	132 (120–141)	153 (134–167)	158 (148–171)	32 (13–52)	50 (38–66)
Highest dorsal ray		169 (154–184)	181 (170–193)	209 (194–226)	210 (197–221)	156 (153–162)	161 (138–172)
Caudal fin length		206 (189–221)	205 (199–213)	215 (196–234)	221 (211–239)	199 (172–211)	212 (205–221)
Preanal length		704 (673–721)	696 (683–708)	736 (717–746)	736 (726–748)	711 (684–754)	721 (703–750)
Anal fin base		133 (115–150)	140 (132–150)	126 (121–131)	123 (118–133)	124 (112–130)	136 (129–145)
Pectoral fin length		208 (196–223)	218 (212–226)	225 (207–237)	226 (219–234)	166 (142–189)	185 (176–196)

Pectoral spine length	155 (126–181)	174 (160–184)	175 (167–185)	185 (172–194)	87 (74–99)	111 (92–129)
Pelvic fin length	150 (137–162)	150 (144–160)	166 (158–174)	163 (157–169)	157 (151–162)	157 (146–163)
Postcleithral process length	77 (63–92)	77 (59–91)	95 (87–107)	89 (81–98)	53 (45–58)	50 (41–56)
Head length	318 (313–328)	312 (301–319)	356 (337–371)	351 (337–368)	307 (293–322)	316 (297–329)
Head width	286 (275–294)	280 (273–294)	307 (299–312)	304 (301–310)	246 (236–256)	233 (218–250)
Head depth at occiput	184 (179–190)	185 (168–195)	200 (194–208)	217 (201–227)	139 (132–144)	149 (138–163)
Snout length	105 (102–110)	102 (92–110)	121 (109–131)	113 (82–125)	99 (90–106)	97 (87–109)
Orbit length	54 (51–56)	52 (50–55)	53 (51–55)	55 (54–61)	35 (32–38)	43 (40–47)
Interorbital width	116 (107–125)	125 (116–140)	137 (128–145)	128 (126–135)	108 (104–112)	108 (103–113)
Width between nostrils	90 (87–95)	90 (87–94)	108 (102–111)	108 (103–113)	87 (83–92)	88 (85–94)
Mouth width	202 (193–217)	191 (184–198)	231 (221–242)	216 (200–226)	193 (180–201)	180 (165–189)
Tooth patch width:						
premaxillary	154 (148–164)	149 (143–158)	189 (183–199)	181 (172–190)	126 (119–132)	129 (124–135)
palatovomerine	86 (81–91)	87 (82–90)	109 (103–117)	113 (107–118)	86 (81–94)	86 (79–90)
Barbel length:						
nasal	79 (72–86)	88 (70–106)	47 (37–56)	46 (39–55)	55 (47–64)	60 (53–65)
maxillary	156 (120–188)	187 (162–215)	121 (113–135)	136 (118–153)	138 (130–142)	156 (139–174)
outer mental	139 (132–148)	150 (134–177)	100 (93–114)	103 (92–112)	138 (132–146)	134 (113–156)

TABLE 5 Continued

Character	Sex / Number	*cyclurus* ♂ ♂ 5	*cyclurus* ♀ ♀ 5	*aquilus* ♂ ♂ 6	*aquilus* ♀ ♀ 5	*brevispinis* ♂ ♂ 5	*brevispinis* ♀ ♀ 5
inner mental		85 (79–93)	98 (86–114)	74 (66–78)	76 (60–98)	90 (76–99)	88 (78–97)

[1]Proportional measurements are expressed in thousandths of standard length. Data on the holotypes of *aquilus* and *brevispinis* (from Table 2) are included. Mean values are given; ranges of variation in parentheses (*cyclurus* = UMMZ 199857; *aquilus* = UMMZ 199928, UMMZ 199929; *brevispinis* = UMMZ 199930, UMMZ 199931).

TABLE 6

MEASUREMENTS OF JUVENILES OF FOUR SPECIES OF *Lophiobagrus* from Lake Tanganyika[1]

Character	*cyclurus* (N = 5)	*aquilus* (N = 5)	*asperispinis* (N = 3)	*brevispinis* (N = 5)
Standard length, mm	15.3–24.7	23.8–27.2	16.0–27.6	21.6–26.3
Body depth	232	225	247	176
	(209–253)	(206–244)	(231–261)	(159–200)
Caudal peduncle depth	159	138	149	127
	(146–164)	(121–145)	(133–170)	(120–135)
Predorsal length	383	411	396	384
	(344–398)	(387–432)	(388–400)	(382–387)
Dorsal to adipose	113	134	143	205
	(65–146)	(121–147)	(119–156)	(194–213)
Adipose fin length	286	238	221	186
	(231–359)	(228–252)	(203–238)	(176–208)
Dorsal spine length	119	194	123	63
	(111–133)	(180–213)	(94–144)	(51–76)
Highest dorsal ray	175	238	197	169
	(170–182)	(226–252)	(178–226)	(153–187)
Caudal fin length	229	264	263	223
	(215–243)	(243–274)	(239–287)	(209–249)
Preanal length	658	686	691	707
	(628–699)	(669–710)	(670–703)	(702–715)
Pectoral fin length	203	267	228	198
	(196–211)	(256–282)	(207–251)	(176–222)
Pectoral spine length	150	229	160	128
	(137–162)	(210–243)	(145–180)	(116–138)
Pelvic fin length	146	170	192	169
	(137–163)	(165–176)	(181–210)	(152–182)
Postcleithral process length	70	108	75	52
	(52–97)	(100–118)	(69–87)	(37–64)
Head length	300	329	333	318
	(261–332)	(312–346)	(319–348)	(310–329)
Head width	268	283	311	236
	(247–283)	(272–305)	(288–326)	(224–249)
Head depth at occiput	189	212	190	145
	(176–200)	(201–232)	(179–206)	(135–156)
Snout length	106	110	115	101
	(93–121)	(100–116)	(100–128)	(93–111)
Orbit length	49	69	72	46
	(46–53)	(63–71)	(63–77)	(42–49)
Interorbital width	125	125	135	114
	(105–137)	(109–135)	(128–138)	(106–132)
Width between nostrils	95	102	107	94
	(85–100)	(97–108)	(101–113)	(91–98)
Mouth width	171	186	233	166
	(146–183)	(172–195)	(188–254)	(151–178)
Premaxillary tooth patch width	132	160	162	128
	(117–142)	(154–163)	(138–185)	(118–142)
Barbel length:				
nasal	37	47	32	54
	(28–52)	(42–51)	(26–40)	(46–61)

TABLE 6 Continued

Character	*cyclurus* (N = 5)	*aquilus* (N = 5)	*asperispinis* (N = 3)	*brevispinis* (N = 5)
maxillary	170 (150–190)	147 (133–155)	245 (213–287)	151 (142–167)
outer mental	122 (101–137)	100 (97–109)	163 (144–174)	128 (116–149)
inner mental	91 (65–126)	75 (70–84)	113 (100–123)	75 (64–88)

[1]Mean values in thousandths of standard length are given with ranges of variation in parentheses (*cyclurus* = UMMZ 199857; *aquilus* = UMMZ 199929; *brevispinis* = UMMZ 199931; *asperispinis* = RGMC 14359 A, B, and BMNH 1920.5.25:78, the type series).

B70-25A. Paratopotypes: UMMZ 199929 (75), 23–71 mm (incl. 2 alizarin preparations, 32,70 mm), BMNH 1983.2.8:2–6 (5), 34–66 mm, FMNH 94587 (5), 34–63 mm, RGMC 83-04-P-3-7 (5), 30-65 mm, USNM 256708 (5), 29–69 mm, taken with the holotype. Paratypes: UMMZ 196148 (6), 25–62 mm, Burundi, DJS73-2.

DIAGNOSIS.—Distinguished from other species of *Lophiobagrus* by a relatively high dorsal fin (Tables 5 and 6, negative allometry apparent), slightly emarginate caudal fin, and fins dark to the margin, often with fin margins darkest. Relatively high total number of gill rakers (23–29 on first arch, 17–20, mode 18, on lower limb) and anal rays (11–12, mode 12) separate *aquilus* from *asperispinis* and *brevispinis*. Shorter nasal barbels and slightly higher gill-raker counts separate *aquilus* from *cyclurus*. Adults of *aquilus* can also be distinguished from *cyclurus* and *brevispinis* by a relatively long, wide head and correlated characters such as width between anterior nostrils and width of premaxillary tooth patch; also, the palatovomerine tooth patch has relatively short posterior projections (Fig. 5b, also see Key and Table 4).

DESCRIPTION.—Measurements are presented in Tables 3, 5, and 6. Configuration of premaxillary, vomerine, and dermopalatine tooth patches, and a ventral view of pectoral girdle and spine are shown in Fig. 5b. A ventral view of head and pectoral fins to illustrate the subterminal mouth, forms and lengths of barbels, and relative lengths of pectoral spine and branched pectoral rays is presented in Fig. 6b. Color pattern and relative lengths and shapes of the fins are depicted in Fig. 8. Finally, diverse quantitative and qualitative characteristics useful for distinguishing *aquilus* from other *Lophiobagrus* species are summarized in Table 4.

For the following meristic data, counts for the holotype are marked by asterisks and frequencies are given in parentheses. The first gill arch has 7(1), 8*(9) or 9(1) gill rakers on upper limb, 1*(9) or 0(2) at the angle, and 18*(6), 19(4) or 20(1) on lower limb; totals 26(1), 27*(6),

28(3) or 29(1); two juveniles at about 25 mm sl had approx. 24–26 total. Dorsal fin I, 6; differs from the other *Lophiobagrus* species in having first soft ray longest. Pectoral spine with anterior margin smooth (but, 2–3 rudimentary serrations in a 24 mm specimen) and 9–12 retrorse serrations on posterior margin (6–7 serrations at 23–27 mm sl); pectoral soft rays 7* on both sides of 15 specimens. Pelvic fin i, 5, rounded with second or third branched ray longest. Anal fin with 11(2) or 12*(9) total rays; holotype has 5 simple and 7 branched rays. Branched caudal rays 13–14; procurrent caudal rays 20,22 above and 17,17 below (2 alizarin specimens). Total vertebrae 34(1) or 35(6). Branchiostegal rays 9 on each side (2 alizarin specimens). Supraoccipital spine broad, rugose, forming a bony bridge with supraneural and nuchal plate at dorsal fin base.

ETYMOLOGY.—From the Latin *aquilus,* blackish, dark-colored, dun.

Lophiobagrus **asperispinis,** new species
Figs. 6d and 9

Chrysichthys cyclurus (in part). Worthington and Ricardo, 1937:1093–1094 (the small paralectotype collected by Stappers).

MATERIAL.—(All from Lake Tanganyika.) Holotype: RGMC 14359A, 27.6 mm sl (34 mm tl), Burundi, Lake Tanganyika, sample no. 1952, about 5 km east of hydrographic station T 16, approx. 4°2′S, 29°25′E, dredged from 9–20 m by M. Stappers, 14 Jan. 1913. Paratopotypes: RGMC 14359B, 16.0 mm and BMNH 1920.5.25:78, 19.5 mm, both taken with the holotype.

COMMENTS.—The types of *L. asperispinis* are the three juvenile specimens assigned to *Chrysichthys grandis* by Boulenger (1920:41–42). They were labeled as "co-types" of *C. grandis,* but were not cited by Boulenger (1917:367) in the original description. That account of *grandis,* which listed only a 570 mm (tl) specimen, included a range of values for various characters. This suggests that the 400 mm (tl) specimen included in the French translation (Boulenger, 1920:41) was also used. Both versions of the description stated that the caudal fin is forked, quite unlike the truncate or slightly rounded caudal of *asperispinis.* We find no evidence that the three juvenile specimens were part of Boulenger's (1917) type series, but one of these was clearly used by Worthington and Ricardo (1937) as a syntype of *Chrysichthys cyclurus.*

DIAGNOSIS.—Distinguished from other species of *Lophiobagrus* by a long maxillary barbel which extends beyond pectoral fin origin (21–29% sl). Relatively lower numbers of gill rakers (10–12 on first arch, 7–8 on lower limb) and anal rays (10 or 11), longer outer mental barbels, and longer pectoral and pelvic fins all separate *asperispinis* from similar-sized *cyclurus* and *aquilus.* Short nasal barbels which just reach the orbital rim, deeper body, longer fin spines and posterior cleithral process, and stronger serrae on pectoral spine distinguish *asperispinis* from *brevispinis* (also see Key and Table 4).

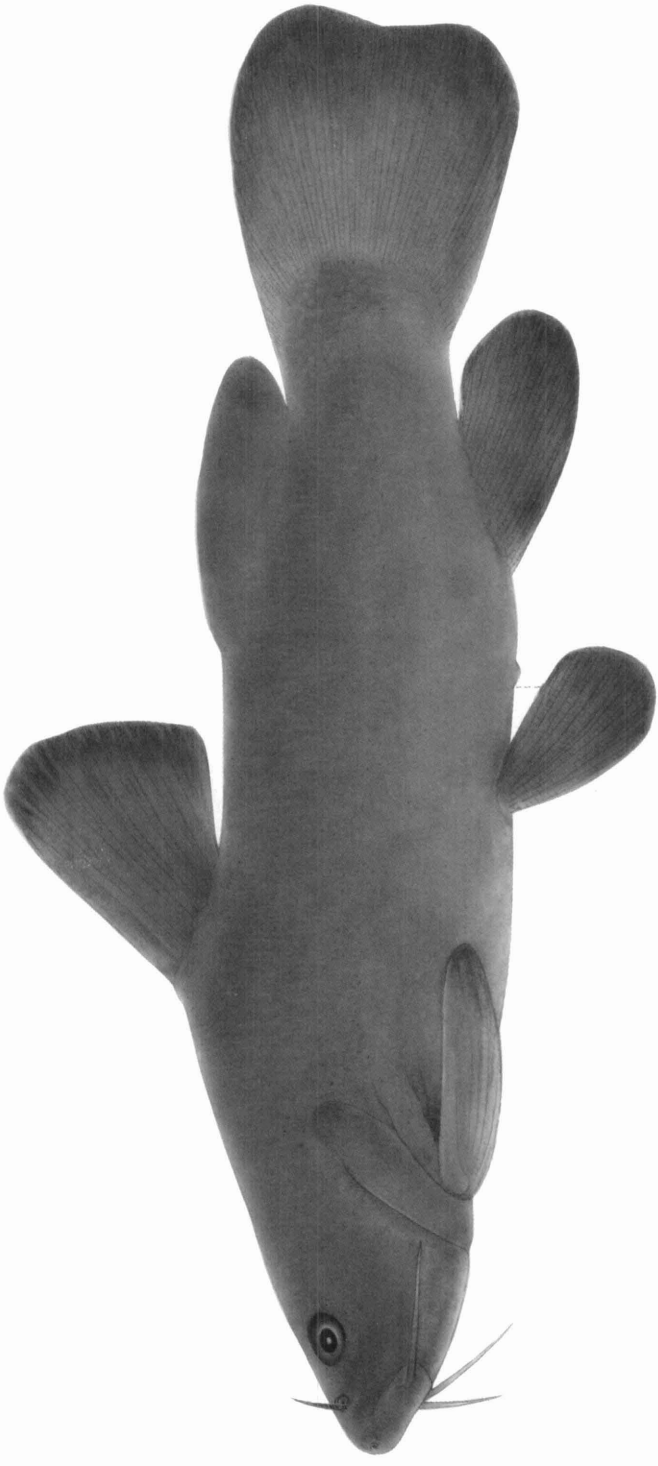

FIG. 8. *Lophiobagrus aquilus*, holotype, UMMZ 199928, 65 mm sl, male.

DESCRIPTION.—Measurements are presented in Tables 3 and 6. A ventral view of head and pectoral fins to illustrate the subterminal mouth, forms and lengths of barbels, and relative lengths of pectoral spine and branched pectoral rays is presented in Fig. 6d. Color pattern and relative lengths and shapes of the fins are depicted in Fig. 9. Finally, diverse quantitative and qualitative characteristics useful for distinguishing *asperispinis* from other *Lophiobagrus* species are summarized in Table 4.

For the following meristic data, counts for the holotype are marked by asterisks and frequencies are given in parentheses. The first gill arch has 2(1) or 3*(2) gill rakers on upper limb, 1*(3) at the angle, and 7*(2) or 8(1) on lower limb; totals 10, 11, and 12*. Dorsal fin I, 6, rounded with second or third soft ray longest. Pectoral spine differs from that of other *Lophiobagrus* species in having anterior margin finely serrate (not shown in Fig. 6d); 5–7* retrorse serrations on posterior margin; pectoral soft rays 7*. Pelvic fin i, 5, rounded with second branched ray longest. Anal fin with 10(2) or 11*(1) total rays; holotype has 4 simple and 7 branched rays. Branched caudal rays 14*. Total vertebrae 33*, 34, and 35. Supraoccipital spine separated from supraneural at dorsal fin base.

ETYMOLOGY.—The name *asperispinis* is from the Latin *asper,* rough or pungent, *spina,* thorn, and the adjectival suffix *-is,* having or with, because the pectoral spine is armed with stronger serrae than other species, especially *brevispinis* which it closely approaches in gill-raker count.

Lophiobagrus **brevispinis,** new species
Figs. 5c, 6c, and 10

MATERIAL.—(All from Lake Tanganyika; also see Materials and Methods.) Holotype: UMMZ 199930, 43 mm sl (51 mm tl), Zambia, B70-25A. Paratopotypes: UMMZ 199931 (112), 18–53 mm (incl. 2 alizarin preparations 25,53 mm), taken with the holotype. Paratypes: UMMZ 199907 (4), 29–32 mm, Zambia, B70-25B; UMMZ 199856 (25), 18–39 mm, BMNH 1983.2.8:7–10 (4), 26-37 mm, FMNH 94588 (4), 26–36 mm, USNM 256709 (4), 19–36 mm, Zambia, B70-27; UMMZ 196150 (64), 11–49 mm (incl. 2 alizarin preparations 11 mm) Burundi, DJS73-2; UMMZ 196149 (23), 13–40 mm, Burundi, DJS73-3; RGMC 81-16-P-1-13 (13), 17–41 mm, Burundi, DJS73-2; RGMC 130766, 33 mm, Zaïre, Ubema, G. Leleup, 10 July 1961; RGMC 131093, 31 mm, Zaïre, Kalungwe, G. Leleup, 11 July 1961; RGMC 78-25-P-8-10 (3), 32–41 mm, Zambia, Cape Chipimbi [=Kipimbi], P. Brichard, Feb. 1978; ROM 28970 (6), 14–34 mm, Zambia, cove under Chilingala Hill near Mpulungu, E. K. Balon, 11 June 1969.

DIAGNOSIS.—Distinguished from all other Tanganyikan bagrids by a very short dorsal spine (1–8% sl), and from other species of *Lophiobagrus* by a slender, depressed body and head, short posterior cleithral process and pectoral spine, and adipose fin origin above or behind anal

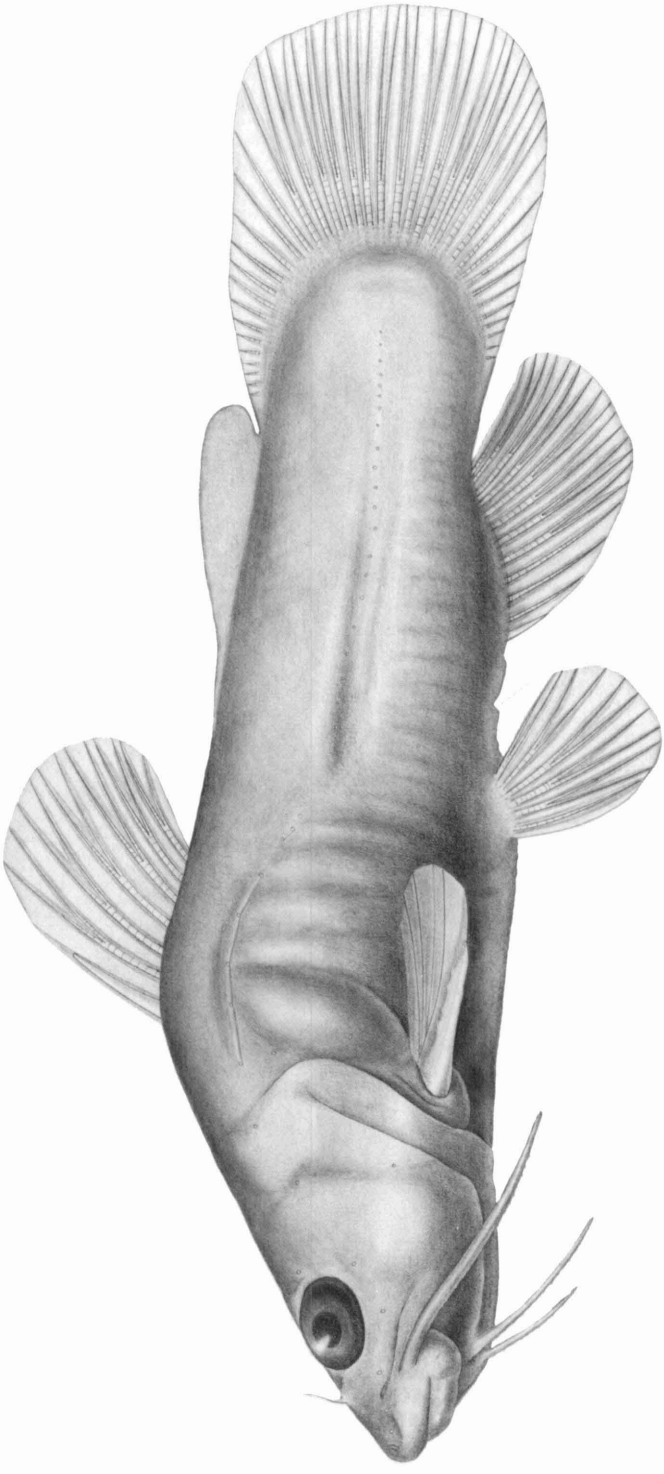

FIG. 9. *Lophiobagrus asperispinis*, holotype, RGMC 14359A, 27.6 mm sl.

fin origin. Relatively lighter, olive-brown color, lower number of gill rakers (12–15 on first arch, 8–10, mode 9 on lower limb) and anal rays (10–12, mode 11) separate *brevispinis* from *cyclurus* and *aquilus*. A relatively long nasal barbel which extends to beyond middle of eye and short maxillary barbel which does not reach pectoral fin insertion further distinguish *brevispinis* from *asperispinis* (also see Key and Table 4).

DESCRIPTION.—Measurements are presented in Tables 3, 5, and 6. Configuration of premaxillary, vomerine, and dermopalatine tooth patches, and a ventral view of pectoral girdle and spine are shown in Fig. 5c. A ventral view of head and pectoral fins to illustrate the subterminal mouth, forms and lengths of the barbels, and relative lengths of pectoral spine and branched pectoral rays is presented in Fig. 6c. Color pattern and relative lengths and shapes of the fins are depicted in Fig. 10. Finally, diverse quantitative and qualitative characteristics useful for distinguishing *brevispinis* from other *Lophiobagrus* species are summarized in Table 4.

For the following meristic data, counts for the holotype are marked by asterisks and frequencies are given in parentheses. The first gill arch has 3*(5) or 4(5) gill rakers on upper limb, 1*(6) or 0(4) at the angle, and 8*(3), 9(5) or 10(2) on lower limb; totals 12*(3), 13(5), 14(1) or 15(1); five juveniles at 21–26 mm sl had 3−4+1+8−9, 12–14 total. Dorsal fin I, 6*; tapered forward with a very short dorsal spine and third or fourth soft ray longest. Pectoral spine with anterior margin smooth (or, weakly crenate at 21–26 mm sl) and 5–7 retrorse serrations on posterior margin (4–5 serrations at 21–26 mm sl); pectoral soft rays 7*(17) or 8(3), counting both sides of 10 specimens. Pelvic fin i, 5, rounded with second or third branched ray longest. Anal fin with 10(2), 11(7) or 12*(1) total rays; holotype has 5 simple and 7 branched rays. Branched caudal rays 14(2), 15(2) or 16*(4); procurrent caudal rays 19,21 above and 16,16 below (2 alizarin specimens). Total vertebrae 34(4), 35(5) or 36(2). Branchiostegal rays 9 on each side; pleural ribs 7 (2 alizarin specimens). Supraoccipital spine short, blunt, its tip remote from supraneural and nuchal plate at dorsal fin base.

ETYMOLOGY.—The name *brevispinis* is from the Latin *brevis,* short, *spina,* thorn, and the adjectival suffix *-is,* having or with, because of the short and weakly armed dorsal and pectoral spines.

SUBFAMILY BAGRINAE BLEEKER

Bagrus Bosc, 1816:147

Type species, *Silurus bajad* Forsskål, 1775, by subsequent designation of Bailey and Stewart (1983:168). The nomenclatural status of *Bagrus* and of *B. docmak* is discussed by Bailey and Stewart (1983).

Bagrus docmak (Forsskål), 1775:65

We did not obtain specimens of this species in Lake Tanganyika. It

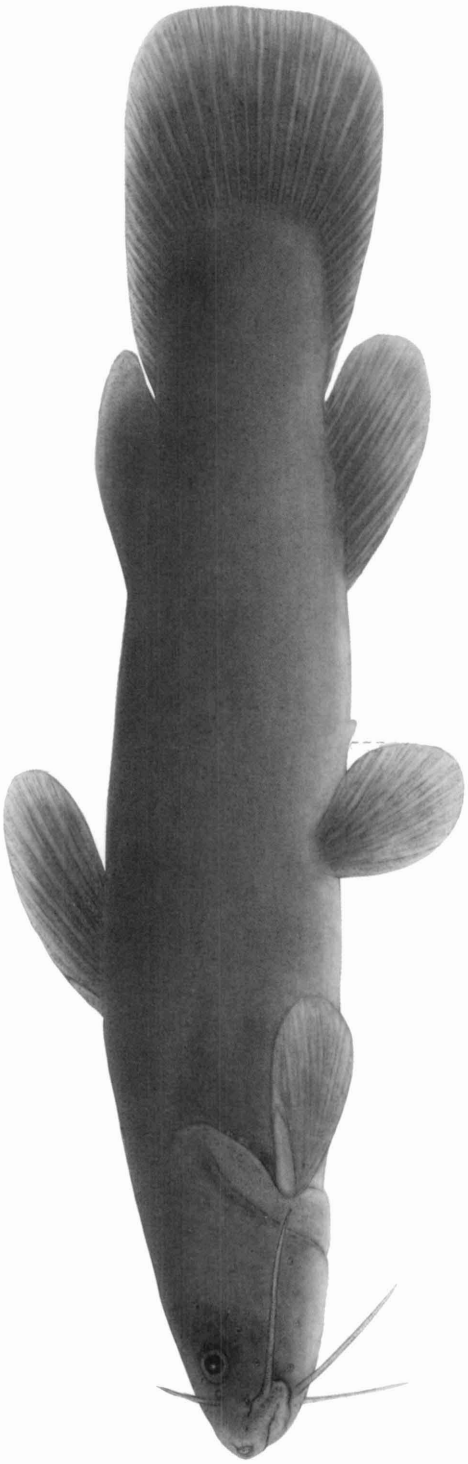

FIG. 10. *Lophiobagrus brevispinis*, holotype, UMMZ 199930, 43 mm sl, male.

was reported from the lake by Worthington and Ricardo (1937:1067, 1097) and by Poll (1953:117–119).

Subfamily Auchenoglanidinae Jayaram

Auchenoglanis Günther, 1865:165

Substitute name for *Auchenaspis* Bleeker, 1863:101 (preoccupied). Type species, *Pimelodus biscutatus* Geoffroy Saint-Hilaire, 1827:301 (=*Auchenoglanis biscutatus*), by original designation by Bleeker.

Auchenoglanis occidentalis Valenciennes, *in* Cuvier and Valenciennes, 1840:203

UMMZ 199925, 96 mm sl (B70-25A).

This species has been reported from Lake Tanganyika also by Boulenger (1906:553 and 1911:369), by Worthington and Ricardo (1937:1089–1090), and by Poll (1953:144–147). Jayaram (1966) treated *occidentalis* as a subspecies of *biscutatus,* but since he said that they were sympatric in the Nile we follow general practice of ranking them as separate species.

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