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New species of Cichlid fishes from Lake Nyasa

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The fishes described in the following account have all been collected during the course of recent studies on the ecology of the littoral zone of Lake Nyasa. All the species described here are inhabitants of rocky shores. More detailed information on their ecology and their interrelationships with other members of the fish fauna of the rocky shores concerned will be presented in a subsequent publication.

All counts and measurements employed in the following descriptions conform with those defined by TREWAVAS (1935) with the exception of the snout length. This is measured as the shortest distance between the anterior margin of the eye and the tip of the snout. Such a measurement is more accurate and more repeatable than that obtained by the method formerly used by Dr. TREWAVAS and is indeed the method employed by her at present.

Recent work on the group of Nyasan Cichlid fishes to which all the species here described belong has shown that, in several species at least, as a result of allometric growth the body becomes proportionately deeper as the fish grows larger. When a long series of specimens covering a wide range of size variations is dealt with therefore the only satisfactory method of expressing these ratios is by means of a graph. However, when material is limited, as in the present cases, the best that can be done is to give the range of variation of this ratio with a note on the size of the specimens measured, while bearing in mind the somewhat unsatisfactory nature of such a description.

The following species are described as new. Pseudotropheus minutus sp. nov. Pseudotropheus elongatus sp. nov. Pseudotropheus fuscoides sp. nov. Labidochromis caeruleus sp. nov.

The holotype and at least one paratype of each species have been deposited in the collection of the British Museum (Natural History) London.

Pseudotropheus minutus sp. nov. (Figs. 1-2)

Body length 2.82 to 3.21 times as long as maximum depth (in specimens of total length 50 to 63 mm.). Caudal peduncle about as long as deep.

Head comprising between 30.8 and 34.8 % of body length. Snout with convex, fairly evenly curved profile; comprising 32 to 36.4 % of head length, and shorter than post-orbital part of head. Premaxillary pedicel moderately long; 26 to 34 % of head length. Diameter of eye 25.2 to 29.8 % of head length. Interorbital width 24 to 28.2 % of head length. 5 or, very rarely, 6 series of scales on cheek.

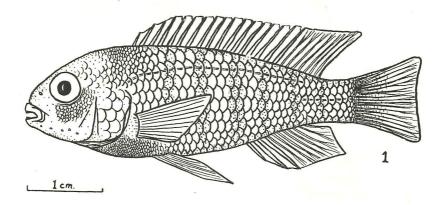
Mouth narrow; terminal in position. Lips feebly thickened. Both upper and lower jaws rather sharply rounded, and each having 4 series of teeth. Inner 3 series of teeth in both jaws considerably smaller than outermost and all tricuspid. Outermost series in each jaw close set; all somewhat unequally bicuspid save outermost 3 or 4 of upper jaw which are conical and somewhat enlarged. 24 to 28 bicuspid teeth in outer series of upper jaw, of which median 8 or 10 are conspicuously enlarged as are their counterparts in lower jaw. Maxillary not extending backwards to the vertical from anterior margin of eye.

Gill rakers short, 7 or, less commonly, 8 on lower part of anterior arch.

Lower pharyngeal bone slender, somewhat indented on posterior margin. Pharyngeal teeth fairly numerous, mostly small, but with several of posterior teeth noticeably enlarged, especially medially. Nape densely covered with minute scales. 31, rarely 32, scales in longitudinal series.

Dorsal fin with 16 to 18 (usually 17) spines and 8 or 9 soft rays. Anal fin with 3 spines and 7 or, more usually, 8 soft rays. Last anal spine half or a little more than half length of head. Pelvic fin not quite extending backwards to anal in female, but just reaching anterior margin in ripe male. Caudal fin very feebly emarginate; covered with minute scales, particularly near root.

Female with left ovary atrophied. Both testes of male functional. Colour: Female dull olive green to brownish, sometimes with bronze or blue sheen. Faint traces of several dark vertical bars sometimes present, 5 occurring below dorsal fin. Two dark cross bars usually distinguishable on snout, upper between eyes, with lighter bar between them. A dark spot on posterior dorsal part of operculum. Outer margins of



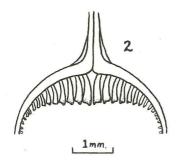


Fig. 1-2. — Pseudotropheus minutus sp. nov.

1. Adult (lateral view). — 2. Anterior row of teeth of upper jaw (drawn from a skeleton).

pelvic fins almost black, often with a very narrow white line on extreme margin. Margins of dorsal, anal, and caudal fins sometimes distinctly orange-brown. Dorsal fin sometimes, but not always, with indistinct dark sub-marginal band.

Male in breeding dress with ground colour bright ultramarine blue with 5 black vertical bars and an incomplete bar below dorsal fin. A dark spot on operculum as in female. Dorsal fin blue with (usually) a

dark submarginal band. Anal with two bright orange spots near posterior margin.

Although the number of specimens available for mensuration has been rather small it nevertheless permits the calculation of the standard deviations of the most important ratios. These are expressed in tabular form below.

B.D. as % B.L. H.L. as % B.L. D.E. as % H.L. S.L. as % H.L.
$$33.65 \pm 1.441$$
 33.3 ± 0.949 27.71 ± 1.306 34.33 ± 1.409 P.M.P. as % H.L. 28.95 ± 2.781 I.O.W. as % H.L. 26.45 ± 1.213

Table 1. — Some morphometric ratios of *Pseudotropheus minutus* and their standard deviations (13 to 15 specimens measured in each case). B.L. = Body length; B.D. = Body depth; H.L. = Head length; D.E. = Diameter of eye; S.L. = Snout length; P.M.P. = Premaxillary pedicel; I.O.W. = Interorbital width.

Occurrence: Several specimens have been collected at Nkata Bay where it seems to be not uncommon on rocky shores.

Remarks: The outstanding morphological characteristics of this species, by which it can be very readily identified, are its small size and the very large median bicuspid teeth of the outer series of both jaws. It is not only the smallest member of its genus but is possibly the smallest of the numerous Cichlid fishes of L. Nyasa. (The only known specimen of *Melanochromis labrosus* Trewavas is a little smaller than the largest available specimen of *P. minutus*.)

Pseudotropheus elongatus sp. nov. (Fig. 3)

Body length 3.27 to 3.74 times as long as maximum depth (in specimens of total length 70 to 82 mm.). Caudal peduncle about as long as deep.

Head comprising between 29 and 34 % of body length. Snout with a slightly convex profile, comprising about 32 to 35 % of head length, and approximately equal in length to post-orbital part of head. Premaxillary pedicel about 27 to 34 % of head length. Diameter of eye about 27 to 29 % of head length. Interorbital width 25 to 30 % of head length. 4 or 5 series of scales on cheek.

Mouth wide, and slightly subterminal in position. Both upper and lower jaws broadly rounded, each having four series of teeth in fairly regular rows. Outermost series in each jaw bicuspid save last 3 or 4 lateral teeth of upper series which are conical and somewhat enlarged. 34 to 36 bicuspid teeth in outer series of upper jaw. Inner 3 series of

teeth in both jaws considerably smaller than outermost and all tricuspid. Maxillary of upper jaw not extending backwards to the vertical from anterior margin of eye. Gill rakers short, 11 or 12 on lower part of anterior arch. Lower pharyngeal bone in form of an approximately equilateral triangle, with rather deep indentation in posterior margin. Pharyngeal teeth fairly numerous and small, the most posterior row being somewhat enlarged, especially medially.

Nape densely covered with small scales. 33 scales in longitudinal series. Dorsal fin with 17 or 18 spines and 8 or 9 soft rays. Anal fin with 3 spines and 7 soft rays. Caudal fin feebly emarginate, covered with minute scales, particularly near root.

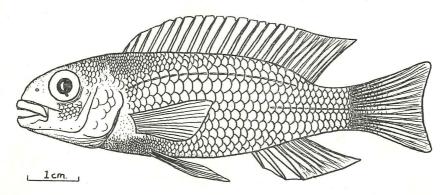


Fig. 3. — Pseudotropheus clonyatus sp. nov.

Female with left ovary atrophied.

Colour in life fawn, with bluish tinges and several dark vertical bars, (observed in field and not studied minutely), rapidly becoming almost uniformly dark, nearly black, on death, though remaining a little lighter ventrally. Fins, particularly dorsal, anal, and caudal, dusky, almost black.

Occurrence: The three specimens of this species from which the above description was prepared were collected at Mbamba Bay on the castern shore of the lake. Three juvenile specimens have also been collected on the western shore, at Nkata Bay.

Remarks: This species is more like *Pseudotropheus fuscus* Trewavas than any other species of its genus. It is, however, distinguishable from this and other congeneric species by its more elongate body with which is apparently associated a slight increase in the number of scales in the longitudinal series, 33 being present in all 3 adults studied as opposed to a maximum of 32 in other species of the genus. Its dentition is similar to that of *P. fuscus* and it takes similar food.

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Pseudotropheus fuscoides sp. nov. (Figs. 4-7)

Body length 2.73 to 3.16 times as long as maximum depth (in speci-

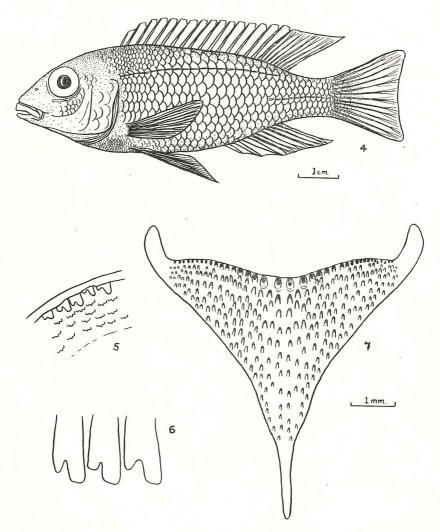


Fig. 4-7. — Pseudotropheus fuscoides sp. nov.
4. Adult (lateral). — 5. Teeth of upper jaw. — 6. Teeth of outer row of upper jaw. — 7. Lower pharyngeal bone

mens of total length 58 to 95 mm.). Caudal peduncle about as long as deep.

Head comprising between 34 and 36 % of body length. Snout with

a slightly convex, fairly evenly curved profile, comprising 32 to 36 % of head length, and a little less than post-orbital part of head. Premaxillary pedicel 26 to 29 % of head length. Diameter of eye 29 to 34 % of head length. Interorbital width 21 to 27 % of head length. 3 or 4 series of scales on cheek.

Mouth wide, terminal in position. Lips moderately thickened. Both upper and lower jaws broadly rounded, each having 3 or 4 series of teeth. Inner 2 or 3 series of teeth in both jaws considerably smaller than outermost and all tricuspid. Outermost series in each jaw close set; all unequally bicuspid and with rather sharply-pointed cusps save outermost 4 to 6 of upper jaw which are conical and somewhat enlarged. 34 to 38 bicuspid teeth in outer series of upper jaw. Maxillary not extending backwards to the vertical from anterior margin of eye.

Gill rakers moderately long, 12 to 14 on lower part of anterior arch. Lower pharyngeal bone in form of an approximately isosceles triangle, slightly indented on posterior margin. Pharyngeal teeth mostly small, rather scattered, particularly anteriorly, and with the posterior row and five or six median teeth of next row distinctly enlarged. Nape densely covered with minute scales. 7 or 8 scales between origin of dorsal fin and upper lateral line. 30 to 32 scales in longitudinal series. Dorsal fin with 16 or 17 spines and 9 soft rays. Anal fin with 3 spines and 7 or 8 soft rays.

Last anal spine a little less than half length of head. Pelvic fin not quite extending backwards to anal in female, but just reaching beyond anterior margin in ripe male.

Caudal fin very feebly emarginate; covered with minute scales, particularly near root.

Female with left ovary atrophied. Both testes of male functional. Body and fins of female very darkly coloured; almost black. Ripe male also very dark, almost black, but with traces of blue vertical bars. 5 bright orange spots on posterior margin of dorsal fin. One specimen was a little lighter in colour and showed the blue vertical bars more clearly and also showed cross bars on snout. All these rapidly disappeared after death.

Occurrence: Holotype and 5 paratypes collected at Nkata Bay.

Remarks: Superficially this species is strikingly similar to *Pseudotropheus fuscus* Trewavas with which it co-exists, but it can readily be distinguished by its sharper teeth and larger eye, both of which are correlated with the diet which is strikingly different from that of *P. fuscus*. *P. fuscoides* appears to feed largely on insects while *P. fuscus* is an algal browser. It is also very similar to *Melanochromis perspicax* Tre-

WAVAS, a fact which emphasises the very tenuous distinction between the genera *Pseudotropheus* and *Melanochromis*.

Labidochromis caeruleus sp. nov. (Fig. 8-10)

Body length 2.78 to 3.04 times as long as maximum depth (in specimens of total length 55 to 75 mm.). Caudal peduncle approximately as long as deep.

Head comprising between 34.25 and 36 % of body length. Snout with an almost straight or slightly convex profile, comprising 34 to 38.4 % of head length, and a trifle shorter than post, orbital part of head.

Premaxillary pedicel from 26.4 to 31.9 % of head length. Diameter of eye 25.8 to 28.5 % of head length. Interorbital width 21.4 to 25.4 % of head length. 4 or 5 series of scales on cheek. Mouth narrow, terminal in position. Lips moderately thickened. Both upper and lower jaws sharply rounded, and each having 3 series of teeth. Inner 2 series in both jaws very small, rather scattered and slightly tricuspid. Teeth of outermost series in each jaw distinctly separated; all conical. 30 teeth in outer series of upper jaw of which median 10 and, more particularly, median 4 are much enlarged, somewhat curved, and directed forwards. Outermost 3 teeth on each side feebly enlarged. Maxillary not extending backwards to vertical from anterior margin of eye.

Gill rakers fairly long, 10 on lower part of anterior arch. Lower one or two very short.

Lower pharyngeal bone triangular, approximately equilateral, and markedly indented on posterior margin. Pharyngeal teeth rather robust medially, particularly the 6 median posterior teeth. Teeth gradually diminishing in size towards anterior apex and towards lateral corners. Nape densely covered with minute scales. 31 or 32 scales in longitudinal series.

Dorsal fin with 17 or 18 spines and 8 or 9 soft rays. Anal fin with 3 spines and 7 or 8 soft rays.

Last anal spine a little less than half length of head.

Pelvic fin not quite reaching anterior margin of anal fin in female but just reaching it in ripe male.

Caudal fin feebly emarginate, covered with minute scales, particularly near root.

29 vertebrae in the one skeleton examined.

Female with left ovary atrophied, right fully developed. Both testes of male functional.

Colour in both sexes a startling light cobalt blue, approaching white in one specimen. Dorsal fin with a broad black sub-marginal band. Anal fin and pelvic fins each with a black marginal band. The specimen

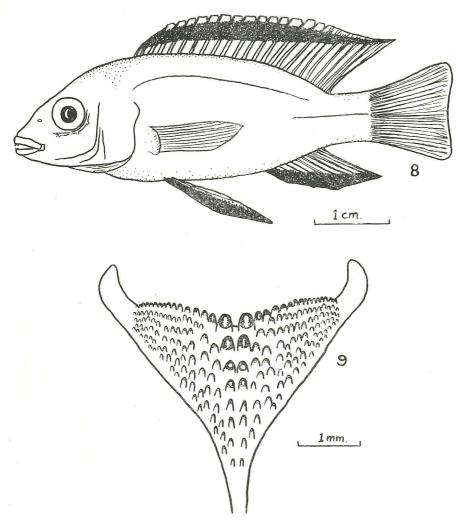


Fig. 8-9. — *Labidochromis caeruleus* sp. nov. 8. adult (lateral). 9. Lower pharyngeal bone.

which was whitish showed faint traces of 6 dark vertical bars below the dorsal fin whose intensity varied with the emotional state of the fish. Males with an intense orange spot on posterior margin of anal fin. Occurrence: Holotype and 6 paratypes (one a skeleton) collected at Nkata Bay.

Remarks: This species is very similar in almost all respects to *L. velli*cans Trewavas which was formerly the only known species of the genus. It differs from it most strikingly in colour and this feature may well

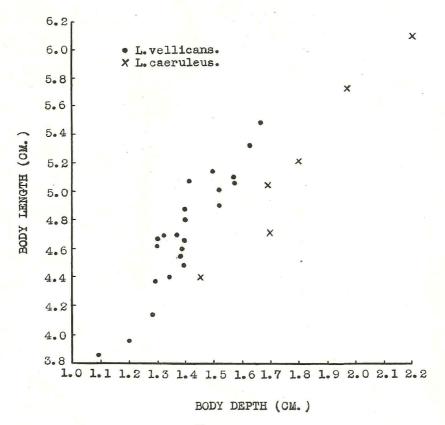


Fig. 10. — Ratio of body length to body depth in two closely related species of *Labidochromis*

be one of the most important biological differences between the two species. It also differs in having a greater body depth in relation to its length (fig. 10), and in the pharyngeal dentition; the pharyngeal teeth as a whole, and more particularly, the median teeth, being considerably more robust than the corresponding teeth in *L. vellicans* in which species they are, with the exception of the most posterior row, quite slender. The head length too appears to be slightly greater in proportion

to body length than in L. vellicans, comprising 34.25 to 36.0 % of body length in the 6 specimens available for mensuration while in a random sample of 6 specimens of L. vellicans the range was from 29.4 to 32.6 %. The diameter of the eye in relation to head length is also slightly smaller than in L. vellicans this comprising 25.8 to 28.5 % of head length in the 6 specimens measured as compared with 28.3 to 31.1 % in the 6 specimens of L. vellicans. L. caeruleus also appears to attain a greater length than does L. vellicans.

The colour differences between this species and L. vellicans, striking though they are, are no more striking than the colour differences exhibited by the different forms of two other cichlid species found in L. Nyasa which have been shown (FRYER unpublished) to be polymorphic in this respect. However, there can be no doubt as to the distinctness of the present species which differs from L. vellicans also in certain well defined, though small, morphological characteristics, of which the difference in pharyngeal dentition seems to be connected with slight dietary differences, though an insufficient number of specimens has been examined to demonstrate this conclusively.

In fig. 8 the scales have been deliberately ominited in order to emphasise the very striking colour pattern of the fish.

I should like to thank Dr. E. Trewavas for confirming my suspicions that two of the species described here were indeed new, and for helpful comments on these and other species.

REFERENCE

TREWAVAS, E., 1935. — A synopsis of the Cichlid fishes of L. Nyasa. — Ann. Mag. Nat. Hist., (10) 16: 65-118.