

A GROUP OF ZOOPLANKTON FEEDERS OF THE GENUS  
HAPLOCHROMIS (CICHLIDAE) IN LAKE NYASA.

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INTRODUCTION.

IN her synopsis of the Cichlid fishes of Lake Nyasa Trewavas (1935) separated six species of *Haplochromis* which were distinguished by the possession of a strongly protractile upper jaw. Bertram, Borley and Trewavas (1942) grouped these species under the name "Utaka", the native name used at all places on the lake-shore, either for individual species, or for the group as a whole. They were further described as small fishes with a small and narrow mouth, small teeth and a protractile upper jaw so that when the lower jaw is depressed, the upper jaw shoots out to form a short tube; but this protractility was recognised as differing only in degree from that of other species of *Haplochromis*, and in the Utaka group itself it varied considerably. All the species were described as plankton feeders and this was thought to confirm the impression that they occurred in the surface waters over the whole area of the lake. Lowe (1952) also stated that they were zooplankton feeders, that they were probably open water species, but that they may move into shallower and more productive waters when spawning or when brooding young. It has been recognised that the six species listed by Trewavas in 1935 do not indicate the full complexity of the group. Bertram, Borley and Trewavas for instance (op. cit.) said that *H. quadrimaculatus* Regan (Regan, 1922) is probably a species complex, and Lowe (op. cit.) stated that many forms could not be assigned by her to any one species. Little was known of the general biology of the group and because of their potential economic importance, especially in the northern areas of the lake, a study of the Utaka group was undertaken as part of the programme of the Joint Fisheries Research Organisation which between 1953 and 1956 carried out a biological survey of this part of the lake.

Many forms were recognised, some of which are here described for the first time.

METHODS.

Measurements of the various characters used in the descriptions and in the Artificial Key were made as described by Trewavas (1935). In addition the caudal peduncle is measured as follows: the length; from a vertical line from the origin of the last soft ray of the dorsal where it crosses the lower lateral line, to the end of the lateral line where it meets the groove formed by bending the tail slightly. The depth; the least depth between these points. The lower jaw was measured by depressing

it, placing the point of a pair of dividers behind and against the angle so formed, and from there to the symphysis at the base of the outer series of teeth. All measurements were made with dividers and estimated to a tenth of a millimetre. Ratios are expressed as number of times in the standard length or in the length of the head unless otherwise indicated. Usually twenty specimens were used as a basis for a description. Allometric growth is often indicated by the fact that extreme values for a ratio found are associated with extremes of the standard length. The figure in brackets after the range for a ratio is the mean value for that ratio.

All holotypes and allotypes of new species are deposited in the British Museum (N.H.), and of the paratypes, some are retained at the Nkata Bay sub-station of the Joint Fisheries Research Organisation, some deposited in Samfya, Northern Rhodesia and the remainder in the British Museum.

### *Haplochromis eucinostomus* Regan.

*Haplochromis eucinostomus* Regan, 1922. Proc. Zool. Soc. Lond., 1921, p. 716, pl. iv fig. 1.

*Haplochromis eucinostomus* Trewavas, 1935. Ann. Mag. Nat. Hist. 10, xvi, p. 106.

"Cotypes": Two specimens 85 to 100 mm. in total length (Wood collection).  
British Museum.

Other material: Twenty specimens 85 to 125 mm. total length (Christy collection),  
from both ends of Lake Nyasa. British Museum.

Twenty specimens 92 to 110 mm. total length.

Locality: Nkata Bay (Mayoka).

Date: 11/6/57.

Local reference: N.N.B. 3449.

Five Nkata Bay, five samfya, ten British Museum (N.H.).

This species resembles *H. mloto* (see below) superficially but is easily distinguished by the number of gill rakers on the lower arch alone. Both are called "Mloto" by African fishermen at Nkata Bay, but *H. eucinostomus* is described as "Mloto mchenga" (=sand loving "Mloto") and is separated by eye from the other species by its possessing yellow pelvic fins. It has been caught in the open water seine only when this has fished near a sandy substrate, and is more usually found in small numbers in seine hauls over a clean sandy bottom.

The breeding male is highly coloured, the general body colour being iridescent light blue, more marked dorsally. The centres of the visible scales are golden or yellow. The dorsal fin is dusky blue with a white outer margin with yellow or gold lappets and golden ocelli between the spiny rays which become rectangular and regular between the soft rays. The chest and pelvic fins are dark dusky blue against an almost white background. The anal fin has golden ocelli, more prominent at the margins.

Males have been seen building or guarding circular nests of sand in January, February and May 1956 at Chikale beach near Nkata Bay;

and at Sanga, a few miles south, in July 1957 a breeding male was found washed up on a sandy beach after heavy swell.

*Haplochromis inornatus* (Boulenger), 1908.

*Tilapia inornata* Boulenger, Cat. Afr. Fish. iii, p. 263, fig. 178 (1915).

*Haplochromis inornatus* Regan, t.c., p. 715.

*Haplochromis inornatus* Trewavas, t.c., p. 106.

This species is known only from the two cotypes 85 and 95 mm. in total length. These have been examined at the British Museum (Register Numbers 1908.10.27. 101-102) and they are distinguished by their slender forms from *H. flavimanus* (see key).

*Haplochromis flavimanus*, sp. nov. (Fig. 1.)

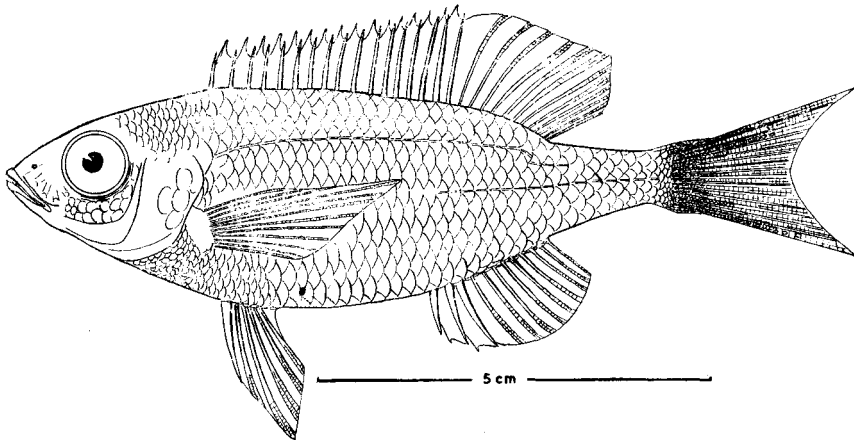
**Holotype :** A female, total length 100 mm.  
Locality : Nkata Bay (near Chikale Beach).  
Date : 28/3/57.

**Paratypes :** Nineteen specimens from 81 to 120 mm. total length. Collected at same time and place as holotypes. Five at Nkata Bay, five at Samfya and nine at British Museum (N.H.).

**Description.** In standard length : head 3.31 to 3.55 (mean 3.41), depth of body 2.59 to 3.00 (in a specimen of 84 mm. standard length, mean 2.78 ; pectoral 2.72 to 3.14 (2.92), pelvic 3.51 to 4.16 (3.82) ; length of caudal peduncle 5.46 to 6.44 (5.85), from 1.28 to 1.54 as long as deep (1.41).

In length of head : eye 2.78 (in a specimen 68 mm. standard length) to 3.19 (in a specimen 102 mm. standard length), mean 2.99, interorbital

Fig. 1.



*Haplochromis flavimanus* sp. nov. Holotype, ♀, 100 mm.

width 3.63 to 4.44 (3.89) ; praemaxillary pedicel 2.84 to 3.25 (3.11), lower jaw 2.50 to 2.75 (2.64) ; praeorbital 4.94 to 6.13 (5.37) ; snout 3.22 to 3.71 (3.45), shorter than eye, postorbital 2.48 to 2.74 (2.58), longer than eye ; width of head 1.88 to 2.14 (2.00), last spine of dorsal fin 1.82 to 2.15 (2.04), usually relatively longer in smaller specimens.

Thirty-four or 35 scales in a longitudinal series (one specimen with 36 on one side). Two or three series of scales on cheek. Dorsal XVI or XVII 12 or 13, commonest number of soft rays 12, commonest total of soft and spiny rays 29, total of soft and spiny rays 28 to 30 ; anal III 9 to 11, gill-rakers 15 to 18, commonest number 17.

Colour : no spots or bars, silver but with distinct yellow or orange pigment visible under scale centres when fresh ; dorsal fin with yellow or orange circular or rectangular areas between rays, also found between rays of anal and caudal fins ; pelvic fins orange or yellow, pectorals faint yellow ; lappets of dorsal white, with yellow posterior margins.

Upper profile of head regularly and rather markedly convex from dorsal fin, lower profile angular or rounded at suspension of jaw, almost symmetrical with upper profile. Maxillary almost covered by praeorbital, vertical line from end of maxillary reaching a point nearer eye than nostril.

Pelvic just reaching anus in most males, may almost reach origin of anal fin in larger males ; caudal peduncle rather long, caudal fin rather deeply crescentically emarginate and symmetrical.

Teeth of upper jaw : outer series at symphysis rather small, almost equally bicuspid, cusps almost truncate, curved and borne on expanded crown ; teeth becoming progressively more simple towards side of mouth ; number in outer series 50 to 70 (50 in a specimen of 88 mm. standard length) ; two inner series of teeth, minute curved with expanded crown and three equal cusps at symphysis, but tending to become simple at side of mouth.

This species was thought to be uncommon, but recently has been caught on several occasions near but not at, a sandy beach. It represents what might be considered a borderline case for inclusion in the group. The praemaxillary pedicel is shorter and the gill-rakers fewer than in most of the other species, but neither character falls outside the range shown by, say, *H. chrysonotus* and *H. inornatus*. It seems to be associated with a sandy rather than a rocky habitat, and besides zooplankton, phytoplankton and filamentous algae, sand grains have been found in the stomach of many of the specimens examined. In fresh specimens, the rather conspicuously coloured pelvic fin is a good character to distinguish it immediately from say *H. virginialis* (see below), to which it bears some superficial resemblance. It is often referred to by African fishermen as "Kajose mchenga" ("mchenga" = sand loving), who recognise its habitat preference.

*Haplochromis mloto*, sp. nov. (Fig. 2.)

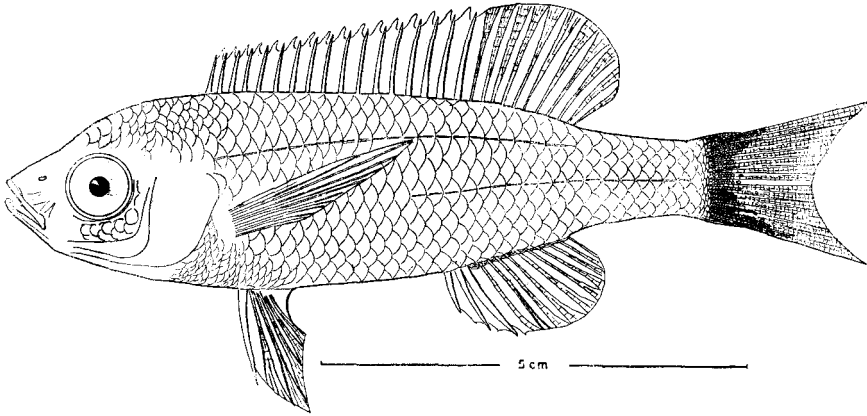
- Holotype : A female, total length 93 mm.  
 Locality : Nkata Bay (Mayoka Point).  
 Date : 20/2/57.  
 Local reference : N.N.B. 3267.
- Paratypes : Nineteen specimens from 85 to 135 mm., all from Nkata Bay. Five at Nkata Bay, five at Samfya, nine at British Museum (N.H.).

*Description.* In standard length : head 3.15 to 3.39 (3.27), depth of body 3.10 to 3.56 (3.39) ; pectoral 2.77 to 3.38 (3.08), pelvic 3.79 to 4.64 (4.21), rather longer in males than in females (respective means 4.08 and

4.38) ; length of caudal peduncle 4.82 to 5.57 (5.17), caudal peduncle from 1.53 to 1.90 as long as deep (1.74).

In length of head : eye 3.15 to 3.61 (in a specimen of 135 mm.) mean 3.39, interorbital width 3.75 to 4.19 (3.97) ; praemaxillary pedicel 2.37 to 2.66 (2.54) ; lower jaw 2.51 to 2.81 (2.68) ; praeorbital 5.10 to 5.88

Fig. 2.



*Haplochromis mloto*, sp. nov. Holotype, ♀, 93 mm.

(5.50), snout 3.25 to 3.71 (3.43) a little longer than eye in larger specimens, equal to or a little shorter than eye in smaller specimens, postorbital 2.20 to 2.59 (2.44), relatively longer in larger specimens and always longer than eye or snout ; width of head 2.08 to 2.28 (2.16), last spine of dorsal 2.11 to 2.76 (in a specimen of 135 mm. total length), mean 2.30, relatively longer in smaller specimens.

Thirty-five or 36 scales in a longitudinal series, two series of scales on cheek. Dorsal XVI to XVIII, 10 to 12, commonest number of spiny and soft rays 28 ; anal III 9 to 11, commonest number of soft rays 10, gill-rakers 21 to 24, commonest number 22.

Colour : silver, darker dorsally, no spots and little trace of yellow body pigment except possibly in larger specimens, no vertical bars below dorsal ; pelvics colourless.

Upper profile of head convex to between eyes, straight along snout, "snouty" appearance not as marked in large specimens. Maxillary almost completely covered by praeorbital, vertical line from end of maxillary reaches about half way between nostril and eye. Profile of lower jaw angular. Body streamlined, oval in cross section.

Pelvic : in female almost reaching anus in small specimens, not reaching anus in large ; in males reaching anus in small specimens and reaching genital papilla in large ones but not reaching base of anal fin. Caudal fin crescentically, rather deeply and symmetrically emarginate.

Teeth of upper jaw : outer series minute at symphysis with slender shaft and flattened, slightly curved crown which is uni-cuspid and pointed,

teeth becoming even more minute towards side of jaw and more simple. Number in outer series 55 (in a specimen of 85 mm.) to about 70, toothed margin of praemaxillary about half, in small specimens, to about two-thirds in larger specimens. Inner series single (possibly a second at the symphysis) about half size of outer teeth and simple.

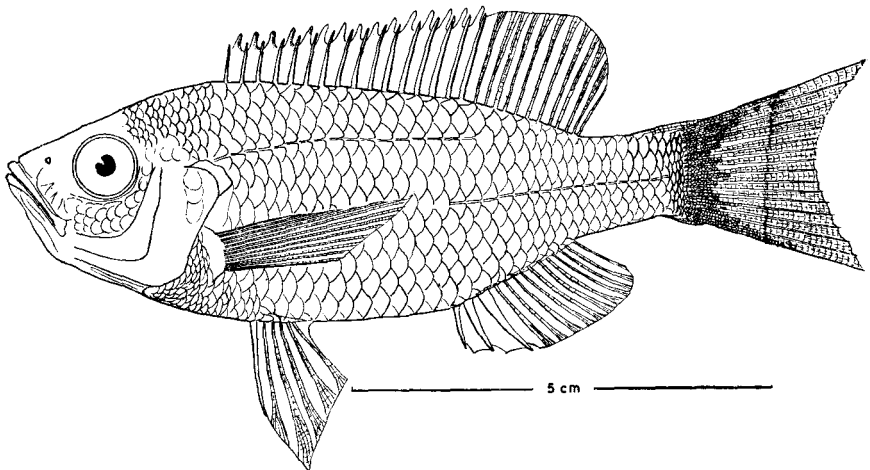
This species, with its shallow body, narrow and long caudal peduncle, rather deeply emarginate caudal and countershading of the body shows perhaps the nearest approach to the pelagic form in the group. It has been found often with *H. virginalis* (see below) with which it might possibly be confused, but it is not as common. African fishermen distinguish it as "Mloto", and easily separate it from the two forms of *H. virginalis* which they name "Kaduna" and "Kajose." It has the smallest teeth in the group.

*Haplochromis virginalis*, sp. nov. (Fig. 3.)

- Holotype : A female, total length 109 mm., caught with young in the mouth.  
 Locality : Nkata Bay.  
 Date : March 1957.
- Allotype : A male, total length 110 mm. and in breeding dress.  
 Locality and date : same as for holotype.
- Paratypes : Thirty-eight specimens from 62 to 132 mm., all from Nkata Bay. Ten at Nkata Bay, ten at Samfya, 18 to British Museum (N.H.).

*Description.* In standard length : head 2.98 to 3.48 (3.20), depth 2.58 to 3.18 (2.87) ; pectoral 2.57 to 3.14 (2.87), pelvic 2.64 to 4.13,

Fig. 3.



*Haplochromis virginalis* sp. nov. Holotype, ♀, 109 mm.

longer in males than in females (mean ; males 3.04 females 3.84) ; caudal peduncle 5.40 to 7.00, from 1.08 to 1.57 as long as deep.

In length of head : Eye 2.91 to 3.48 (3.19), relatively larger in smaller fish, interorbital 3.44 to 4.42 (in a specimen 57 mm. standard length),

mean 3.77 ; praemaxillary pedicel 2.25 to 2.65 (2.46), lower jaw 2.40 to 2.89 (in one specimen) mean 2.56 ; praeorbital 4.50 to 6.80 (5.65), snout 3.00 (in a specimen 110 mm. standard length) to 3.60 (in a specimen 54 mm. standard length) mean 3.31, postorbital 2.36 to 2.69 (2.53) ; width of head 1.98 to 2.25 (2.13), last spine of dorsal 1.94 (in a specimen 84 mm. standard length) to 2.59 (in a specimen 112 mm. standard length) mean 2.18.

Thirty-three to 36 scales in a longitudinal series, two sometimes three series of scales on cheek. Dorsal XV to XVIII 11 to 13 ; anal III 9 to 12, gill-rakers 21 to 25.

Colour : silvery ; fresh specimens often showing faint grey blue or rose hue, or with yellowish body pigment ; often about eight faint vertical dark bars below dorsal. Breeding male ; dark blue, almost black in colour with vertical bars more prominent, dorsal dark at base, light blue or even white at margin with diffuse yellow pigment, and head colour between eyes iridescent light blue or yellow. This head colour is often continued below the base of the dorsal and on the top of the caudal peduncle. Body rather deep and flattened laterally. Pelvic longer in males than females, reaching beyond anus in most specimens ; caudal fin crescentically, symmetrically, but not deeply emarginate.

Teeth of upper jaw : outer series close set, teeth small, broad based, narrowing to give curved slender shaft and ending in a slightly curved, expanded and rounded cusp. Teeth becoming smaller and straighter towards side of mouth. Number in series ; about 60 to 70 in adults 45 to 60 in specimens below about 60 mm. standard length. Toothed margin of praemaxillary of large adults reaching almost side of jaw, and teeth of males especially at symphysis, rather stout. Inner series ; of curved conical minute teeth, two series at symphysis but often only one at side of jaw.

*H. virginalis* belongs to a group of *Utaka* often referred to as "pure *Utaka*", i.e. without spots. Two forms are recognised at Nkata Bay and are given the names "Kaduna" and "Kajose" by local fishermen. Both forms are represented in the paratypes but the holotype and allotype are of the form "Kaduna". "Kaduna" usually has 16 spiny rays in the dorsal fin, where as "Kajose" usually has 17, it is rather deeper in the body with a deeper caudal peduncle, it has little or no yellow pigment on the body while "Kajose" often has a distinct yellow tinge ; it has a rather smaller maximum size, and the eye in specimens of the same length is slightly larger on average in "Kaduna" than in "Kajose".

The two forms at the type locality could be taken to represent two sympatric and closely related species, easily separated on a combination of the above characters, but at other localities they are not as easily distinguishable, and populations appear to be more homogeneous and intermediate in form. It has not been possible to analyse populations from other parts of the lake to test this homogeneity, and it is therefore best at this stage to consider the Nkata Bay forms as being conspecific. If for instance it was decided to distinguish these forms specifically at

Nkata Bay, the status of populations at other localities would be in doubt, and the only conclusion that could be drawn is that at these localities, the homogenous population, completely sympatric has not given rise to the two distinct and sympatric species found at the Nkata Bay locality. This in effect would be equivalent to saying that Nkata Bay species have almost certainly evolved sympatrically, and in the fullest sense of the term. It is not considered that the evidence available would warrant this important conclusion.

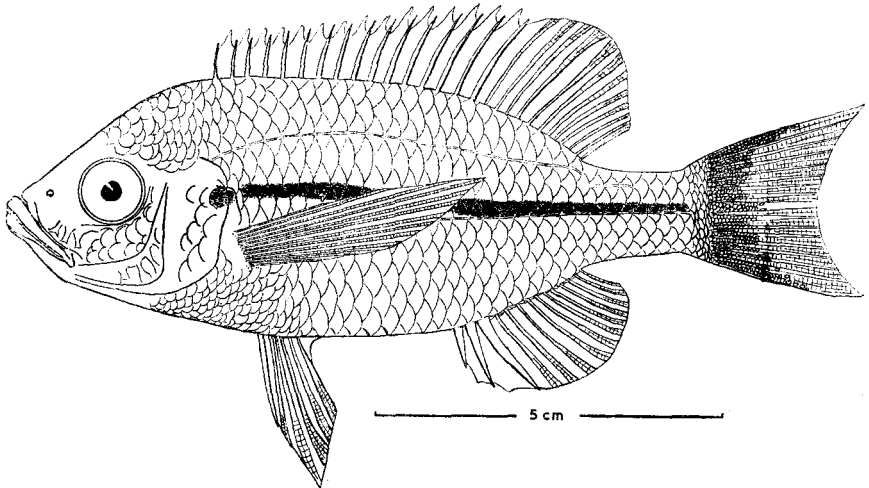
On the other hand, it is not possible to distinguish the Nkata Bay forms at the subspecific level. They are completely sympatric, no minor habitat differences are definable, the breeding seasons, which are short and well defined, show almost complete overlap and on many occasions breeding adults of the two forms have been found together. Full analysis of this complex species must await further and more detailed studies from other parts of the lake.

*H. virginalis* feeds almost entirely on zooplankton, is found inshore throughout the year, and has a short breeding season from March to June.

*Haplochromis boadzulu*, sp. nov. (Fig. 4.)

- Holotype : A female, total length 116 mm.  
 Locality : South-east arm of lake, south of Boadzulu Island and near eastern shore.
- Paratypes : Eleven specimens from 88 mm. to 109 mm.  
 Locality : same as for holotype.  
 Two at Nkata Bay, two at Samfya, seven at British Museum (N.H.).

Fig. 4.



*Haplochromis boadzulu*. Holotype, ♀, 116 mm.

*Description.* In standard length : head 3.00 to 3.20 (3.10), depth 2.57 to 2.73 (2.63) ; pectoral 2.48 to 2.89 (2.68), pelvic 3.52 to 3.98 (3.75),



tends to be slightly longer in male ; caudal peduncle 5.53 to 6.35 (5.88), from 1.22 to 1.45 as long as deep (1.31).

In length of head : eye 3.09 to 3.43 (3.29), interorbital 3.53 to 4.10 (3.71) ; praemaxillary pedicel 2.58 to 2.92 (2.79), lower jaw 2.38 to 2.62 (2.54) ; praeorbital 5.00 to 6.20 (5.65), snout 3.18 to 3.60 (3.41), about equal to eye, postorbital 2.43 to 2.75 (2.60), longer than eye or snout ; width of head 2.11 to 2.34 (2.23), last spine 2.02 to 2.42 (2.19), relatively longer in smaller specimens.

Thirty-three or 34 scales in a longitudinal series, two or three series of scales on cheek. Dorsal XV to XVII 10 to 12, usually XVI or XVII spines, 10 or 11 soft rays, commonest total 27 ; anal III 10 or 11 ; gill-rakers 19 to 21 (18 on one side in one specimen).

Colour : body rather dark, distinct longitudinal band along lower lateral line curving upwards towards head but not reaching operculum ; an opercular spot. Body darker dorsally and there may be more or less distinct blotches along base of dorsal fin and traces of another longitudinal line along upper lateral line. Dorsal fin well pigmented, lappets rather long and dark.

Body rather deep and narrow, pelvics in female barely reaching anal, usually reaching genital papilla in male.

Profile of head convex to between eyes, straight to mouth, praemaxillary pedicel reaching from one third to a half between borders of eye, maxillary well covered, vertical line from end of maxillary reaches almost to edge of orbit. Caudal crescentically but not deeply emarginate upper lobe rather larger than lower.

Teeth of upper jaw : at symphysis teeth small, flattened curved unequally bicuspid, becoming simple at side of jaw ; 60 to 70 in series. Two inner series of minute teeth.

The longitudinal band is very distinct, much more so than that of *H. cyaneus* for instance, a species with which *H. boadzulu* might be confused. It has more gill-rakers than *H. prostoma* and fewer than *H. cyaneus*, the other species of *Utaka* which have longitudinal bands along the body. It has been recorded only from the type locality, but is so distinctive a species that it is accorded specific rank even though relatively little is known of its general biology. All the specimens examined had been feeding exclusively on zooplankton.

### *Haplochromis cyaneus* Trewavas.

*Haplochromis cyaneus* Trewavas, t.c., p. 107.

This species was not found during the survey but recently, dried individuals were brought to Nkata Bay from Monkey Bay, a type locality, to be sold. They were referred to as "Mfufuma", and all showed the rather indistinct longitudinal stripe. Although superficially similar to *H. virginalis* if this character is ignored, and particularly to the form "Kaduna", the shape of the head, the spination of the dorsal fin, the number of scales in a longitudinal series and the size of the eye in

specimens of the same length, all differ. In addition *H. virginialis* never grows to the length 190 mm. recorded by Trewavas, and two males among the co-types of *H. cyaneus*, numbers 445 and 507, examined at the British Museum, had very long pelvic filaments, far longer than those of breeding males of *H. virginialis*.

*Haplochromis prostoma* Trewavas.

*Haplochromis prostoma* Trewavas, t.c., p. 106.

"Cotypes" : Six specimens from 76 to 115 mm. total length, from Vua and Deep Bay.

Other material : Twenty-three specimens from 85 to 106 mm. total length.

Locality : Nkata Bay (Mayoka).

Date : 23/5/56.

Five at Nkata Bay, five at Samfya, 13 at British Museum (N.H.).

The 23 Nkata Bay specimens, all collected on the same occasion, were the only ones found during the survey. Like *H. flavimanus* it has rather a short praemaxillary pedicel and relatively few gill-rakers, but the stomachs of the specimens of *H. prostoma* caught at Nkata Bay contained zooplankton and they were caught at a typical "Utaka" habitat. The longitudinal band, unlike that of *H. boadzulu*, is continued to the operculum where there is a small but prominent spot. The upper band is represented by a series of small spots whose positions are marked by faint vertical bars, 10 or 11 below the dorsal, one in front of the dorsal and two or three on the caudal peduncle. The pectorals are short and the caudal is rather deeply emarginate. The mouth opens somewhat downwards.

*Haplochromis chrysonotus* (Boulenger) 1908.

*Paratilapia chrysonota* Boulenger. Cat. Afr. Fish. iii, p. 362, fig. 246 (1915).

*Haplochromis chrysonotus* Regan, t.c., p. 102.

*Haplochromis chrysonotus* Trewavas t.c., p. 107.

This species has often been recorded at Nkata Bay, and small shoals are usually to be seen at a launch mooring, at a little distance from the shore, and in the surface waters. At Monkey Bay in the south of the lake similar small shoals have been observed near the floating dock moored there, and at Kambwe Lagoon, in the north of the lake, a single specimen was seined from a sand spit which gave place abruptly to deeper water. Although in some ways it might be described as being more of an open water species than many of the other Utaka species, it does not seem to leave the surface waters of sheltered bays and similar types of habitat, and in these has a rather limited range of movement. Like *H. nkatae*, which sometimes is caught with it at Nkata Bay at the launch mooring, and *H. jacksoni* (see below), which it resembles, it is greenish in hue in fresh specimens. Although phytoplankton as well as zooplankton is found in the stomachs, only the zooplankton appears to be digested. The specimens caught at Monkey Bay and those recorded frequently

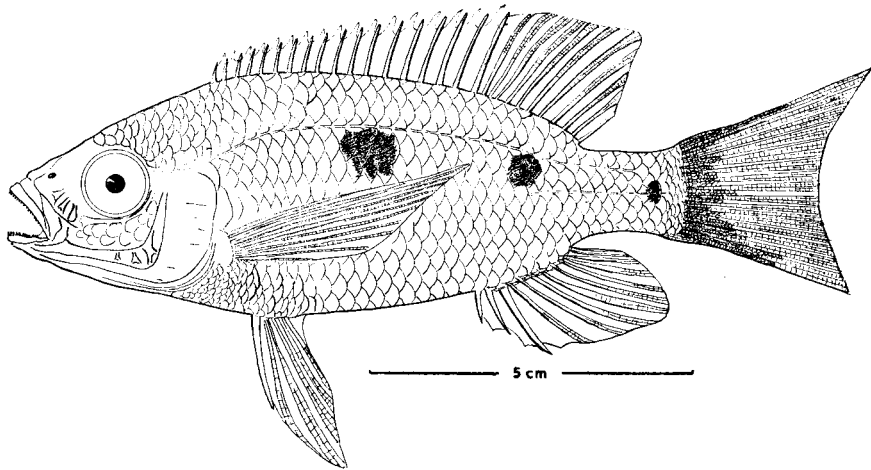
from Nkata Bay were similar in all respects, and this widespread species apparently does not show any marked variation throughout its range.

*Haplochromis trimaculatus*, sp. nov. (Fig. 5.)

- Holotype : A male, total length 128 mm.  
 Locality : Nkata Bay.  
 Date : 18/1/57.  
 Local reference : N.N.B. 3247 B.
- Paratypes : Fifteen specimens from 75 to 196 mm. total length.  
 Localities : Nkata Bay and Likoma Island.  
 Three Nkata Bay, three Samfya, eight British Museum (N.H.).

*Description.* In standard length : head 3.02 to 3.29 (3.19), depth 2.47 (in a specimen 144 mm. standard length), to 2.87 (in a specimen 61 mm. standard length), mean 2.69 ; pectoral 2.32 to 2.67 (2.48), pelvic 2.80 (in a male 144 mm. standard length), to 3.48, mean 3.30 ; length of

Fig. 5.



*Haplochromis trimaculatus*, sp. nov. Holotype, ♂, 128 mm.

caudal peduncle 6.10 to 7.56 (6.82) from 1.07 to 1.41 as long as deep (1.21).

In length of head : eye 2.85 to 3.75 (in a specimen 164 mm. standard length), mean 3.10, interorbital 2.98 to 4.04 (in a specimen 61 mm. standard length), mean 2.62 ; praemaxillary pedicel 2.84 to 3.34 (2.95), lower jaw 2.40 to 2.59 (2.49) ; praeorbital 4.70 (in a specimen 144 mm. standard length) to 6.52 (in a specimen 61 mm. standard length), mean 5.54, postorbital 2.50 to 2.85 (2.68) ; width of head 1.92 to 2.11 (2.03), last spine of dorsal 1.77 to 2.13 (in a specimen 164 mm. standard length), mean 1.95.

Thirty-four or 35 scales in a longitudinal series, two or three series of scales on cheek. Dorsal XVIII or XIX 10 or 11, commonest total of soft and spiny rays 29 ; anal III 9 to 11, usually 10, gill-rakers 15 to 18.

Colour : not silver, body brownish with distinct yellow or golden pigment at scale centres. About 11 faint vertical bars below dorsal in

many specimens. Pelvic, anal, caudal and dorsal yellow or golden in fresh specimens, pelvic particularly so. A large spot between the laterals which may cover six scales in a series and beginning at about the ninth scale from the head, another smaller spot on and above the lower lateral line at about the 25th scale, a caudal spot. Opercular spot not prominent.

Profile almost straight from dorsal, curving slightly at mouth. Lower profile more strongly and evenly curved.

Pectoral long, pelvic in larger specimens reaching past origin of anal fin, in smaller specimens reaching genital papilla; longer in males than in females.

Teeth of upper jaw: outer series unequally bicuspid at symphysis, slightly curved, becoming progressively simple towards side of jaw. Over 70 in outer series of large specimens, which may have a few conical curved teeth at symphysis. Two irregular inner series of very small teeth.

This species was originally identified with *H. pleurostigma* Trewavas (Trewavas, 1935), one described on a single specimen, and not included by her in the group distinguished by the protractile upper jaw. Like *H. pleurostigma* and unlike other Utaka species, *H. trimaculatus* has a rather heavy pharyngeal with a convex free edge posteriorly. It is included in the group because of its undoubted close affinity with *H. pleurostigmoides* which has a very protractile jaw and with which it is often found, and because of the fact that it is a plankton feeder and is found together with species of Utaka in typical Utaka habitats. It differs from *H. pleurostigma* in its possession of a longer pectoral, a shorter praeorbital, a different head profile, a slightly larger eye, and a longer and slightly shallower caudal peduncle, apart from the obvious difference of the markings. It can be easily separated from *H. pleurostigmoides* by the number of spots, of gill-rakers, and the length of the praemaxillary pedicel. It is perhaps most easily distinguished by its possessing a very long intestine, about five times the total length, much longer than in any other species. The stomach is very large and is always found full and containing well fragmented zooplankton and often also *Botryococcus* sp.

*Haplochromis nkatae*, sp. nov. (Fig. 6.)

- Holotype : A female, total length 137 mm.  
 Locality : Nkata Bay (Mayoka point).  
 Date : 11/6/57.  
 Local reference : N.N.B. 3448.
- Paratypes : Nineteen specimens 84 to 145 mm. total length.  
 Locality : Nkata Bay.  
 Five at Nkata Bay, five at Samfya, nine at British Museum (N.H.).

*Description.* In standard length: head 3.15 to 3.51 (3.34), depth 2.91 to 3.30 (3.09); pectoral 2.85 to 3.56 (3.32), pelvic 3.67 to 4.60 (4.13); length of caudal peduncle 5.30 to 6.07 (5.58), from 1.34 to 1.66 as long as deep (1.53).

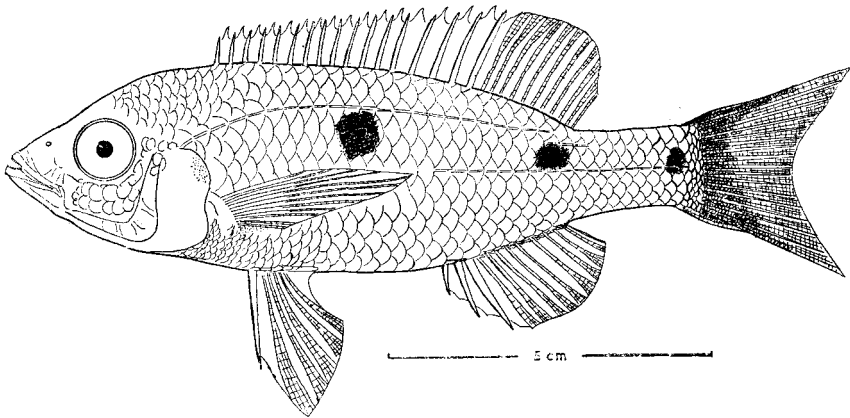
In length of head: eye 2.95 (in a specimen 77 mm. standard length) to 3.51 (in a specimen of 115 mm. standard length), mean 3.20, interorbital 3.45 to 3.95 (3.65); praemaxillary pedicel 2.40 to 2.88 (2.70), lower jaw

2.45 to 2.68 (2.58) ; praeorbital 4.08 to 5.60 (4.86), snout 3.22 to 3.55 (3.40), longer than eye ; width of head 1.89 to 2.27 (2.08), last spine of dorsal 2.06 (in a specimen of 79 mm. standard length) 2.77 (in a specimen of 117 mm. standard length).

Thirty-four to 36 scales in a series (most with 35), two or three series of scales on cheek. Dorsal XVI to XVIII 10 to 12, majority with 17 spiny rays and with total of 28 soft and spiny rays ; anal III 10 or 11, number of gill-rakers 19 (in one specimen) to 23.

Colour : distinct green hue, especially dorsally and in fresh specimens, but larger specimens may have yellow areas at scale centres. Three spots, one at base of caudal, one immediately above lower lateral line,

Fig. 6.



*Haplochromis nkatce*. Holotype, ♀, 137 mm.

about 22 scales from head, a large spot at level of lower lateral line and extending in some specimens to upper lateral line at about nine scales from head. There may also be small and indistinct spots between these three ; and in one specimen there is also a small spot above and in front of the anterior spot giving the impression of a line from the nape to the base of the caudal which has become broken up. Often there are faint traces of about eight vertical bars below the dorsal.

Upper profile of head convex to between eyes, almost straight to mouth, which opens downwards rather ; in larger specimens lower jaw projects a little. Maxillary well covered by praeorbital, vertical line from end of maxillary reaches one third between nostril and eye.

Pelvic fin in large males does not reach beyond genital aperture and in females may not reach anus.

Teeth of upper jaw : outer series of very small teeth, curved and flattened, simple or may show traces of bicuspid nature ; becoming even

smaller towards side of jaw. Inner series of minute tricuspid teeth with crowns turned backwards ; two inner series at symphysis but only one found at side of jaw.

This species, often referred to as "Utaka Sargeant" at Nkata Bay, because of the three well marked spots, has on many occasions been recorded with *H. chrysonotus* near a launch mooring there and is sometimes given the same name "Kabananga". It is also caught near rocks, as were the types, and then often with *H. jacksoni* (see below), but it is also seined from sandy beaches. At such a beach near Sanga, some nine miles from Nkata Bay to the south it is reported to be commonly seined from July to September, and in August 1957, at this place, a female in a ripe condition, of total length 135 mm. was seen by me. It feeds mainly on zooplankton but phytoplankton, apparently undigested, has been recovered from the stomachs of some individuals.

*Haplochromis jacksoni*, sp. nov.

- Holotype : A female, total length 133 mm.  
 Locality : Nkata Bay (Mayoka).  
 Date : 11/6/57.  
 Local reference : N.N.B. 3323.
- Allotype : A breeding male, total length 183 mm. Same time and place as holotype.
- Paratypes : Eighteen specimens from 77 to 178 mm. total length.  
 Locality : Nkata Bay.  
 Five at Nkata Bay, five at Samfya, eight British Museum (N.H.).

*Description.* In standard length : head 3.13 to 3.47 (in a specimen 112 mm. standard length), mean 3.28, depth 2.46 to 2.86 (in a specimen 93 mm. standard length), mean 2.69 ; length of pectoral 3.06 to 3.79 (3.42), pelvic 3.60 to 4.00 (3.76) in females and young males, 2.29 to 2.82 in breeding males (of length between 147 and 152 mm. standard length), length of caudal peduncle 6.06 to 7.16 (6.56), from 1.06 to 1.29 as long as deep (1.16).

In length of head : eye 2.93 (in a specimen of 99 mm. standard length) to 4.08 (in a specimen of 152 mm. standard length), interorbital width 3.26 to 3.80 (in a small specimen), mean 3.47 ; praemaxillary pedical 2.84 to 3.32 (3.06), lower jaw 2.43 to 2.62 (2.51) ; praeorbital 4.60 to 6.28 (in a small specimen), mean 5.47 ; usually shorter than eye even in large specimens, postorbital 2.38 to 2.62 (2.51), longer than eye ; width of head 1.98 to 2.21 (2.09), last spine of dorsal 1.66 to 2.15 (in a large specimen), mean 1.95.

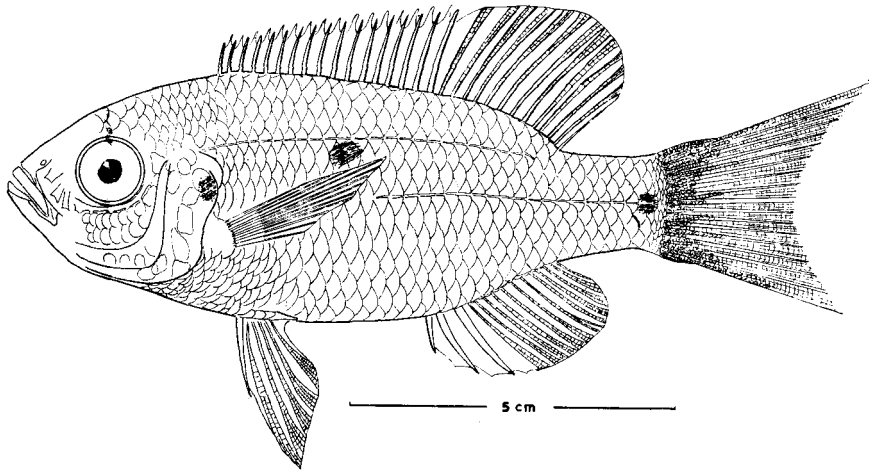
Thirty-four or 35 scales in a longitudinal series, two or three series of scales on cheek. Dorsal XVI to XVII 12 to 14, usually 17 spiny rays and 12 or 13 soft rays, commonest total 29 or 30 ; anal III 11 to 13, usually 12 or 13, gill-rakers 19 to 24.

Colour : silver, darker dorsally and in fresh specimens greenish, line of demarcation of darker colour rather distinct and at about level of lower lateral line ; dorsal fin dark, lappets long and dark ; two spots on body, anterior spot small, indistinct and at about 12th scale from head

below upper lateral line ; a caudal spot. An opercular spot, and seven or eight faint vertical bars below dorsal.

Upper profile of head uniformly but slightly convex from dorsal to mouth, lower profile angular or sometimes rounded at jaw suspension, not symmetrical with upper. Lower jaw slightly projecting except in smaller

Fig. 7.



*Haplochromis jacksoni* sp. nov. Holotype, ♀, 133 mm.

specimens, chin rounded. Depth of scaled area of cheek about two-thirds length of eye. Maxillary well covered by praeorbital, vertical line from end of maxillary reaching half way between nostril and eye, or nearer nostril.

Caudal crescentically, moderately emarginate and may be slightly asymmetrical in larger specimens.

Teeth of upper jaw : outer series of unequally bicuspid teeth, small curved flattened, or in larger specimens conical, curved and rather stout. Becoming more simple towards side of jaw ; 60 to 72 in series. Two or three series of inner teeth, minute, tricuspid.

This species is morphologically similar to *H. chrysonotus* and *H. nkatae*, the three forming a rather closely related group distinguished by their greenish colour. The young of *H. jacksoni* is called "Kabananga" at Nkata Bay but the large adult is usually called "Nguwa". It is often found with *H. nkatae*, but only on one occasion have individuals of *H. chrysonotus* and *H. jacksoni* been caught together. Even so it is more likely to be confused with *H. chrysonotus* from which it can be distinguished by the total of soft and spiny rays in the dorsal, there being no overlap in this character. It occurs throughout the year inshore but the larger

adults are more usually recorded from gill net catches off rocky shores. Breeding fish have been recorded in March.

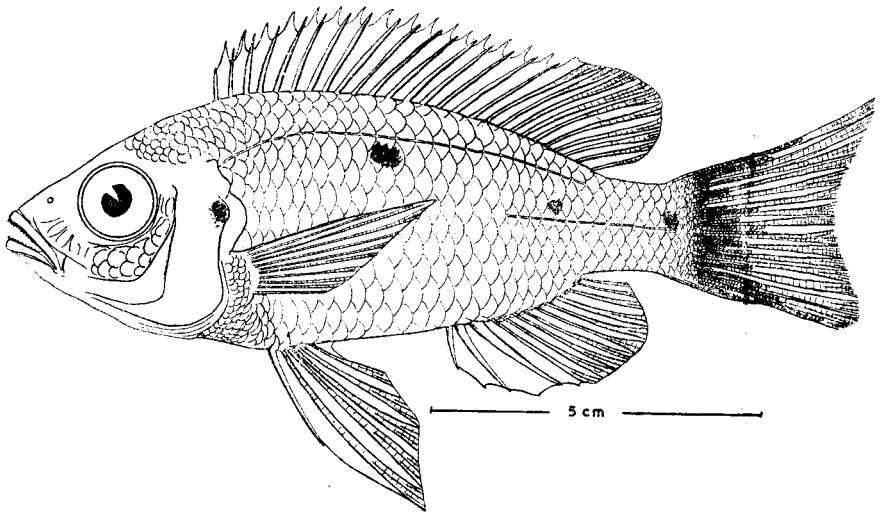
*Haplochromis borleyi*, sp. nov. (Fig. 8.)

- Holotype : A female, total length 108 mm.  
 Locality : Nkata Bay.  
 Date : 21/6/57.  
 Local reference : N.N.B. 3451.
- Allotype : A breeding male, total length 124 mm.  
 Same locality and reference as the holotype.
- Paratypes : Eighteen specimens, from 81 to 129 mm.  
 Locality : Nkata Bay.  
 Five at Nkata Bay, five at Samfya, eight at British Museum (N.H.).

*Description.* In standard length : head 3.02 to 3.27 (3.17), depth of body 2.42 to 2.68 (2.56) ; length of pectoral 2.45 to 2.93 (in a small specimen), mean 2.69, length of pelvic 1.55 to 3.38 ; mean for breeding males 1.78, for non-breeding males 3.17, for females 3.30 ; length of caudal peduncle 6.46 to 7.10 (6.74), caudal peduncle from 1.05 to 1.24 as long as broad (1.15).

In length of head : eye 2.78 (in a specimen 67.5 mm. standard length), to 3.51 (in a specimen 122 mm. standard length), interorbital width 3.50 to 3.93 (3.67) ; praemaxillary pedicel 2.57 to 2.97 (2.84), lower jaw 2.39 to 2.62 (2.50) ; praeorbital width 4.80 (in a specimen of 122 mm. standard length) to 6.06 (in a specimen of 68 mm. standard length), mean 5.40, snout

Fig. 8.



*Haplochromis borleyi* sp. nov. Holotype, ♀, 108 mm.

2.95 to 3.88 (3.39), shorter than eye in small specimens, longer than eye in larger specimens, postorbital 2.54 to 2.98 (in a specimen of 68 mm. standard length), mean 2.75 longer than eye in specimen above 80 mm., width



of head 1.97 to 2.16 (2.05), last spine 1.77 to 2.09 (1.91) usually relatively longer in small specimens than the larger specimens.

Thirty-three to 35 scales in a longitudinal series, two series on the cheek. Dorsal XVI to XVIII 11 to 12, commonest number of spiny rays 17, of soft rays 11, commonest total 28 ; anal III 9 to 11 usually 9 to 10, gill-rakers 19 to 22.

Colour : body not silvery, yellow diamond shaped areas under centres of scales, rest of skin dark bronze or russet coloured. Dark bronze between rays of dorsal and caudal; pelvic and anal fins dark. Three indistinct spots on body ; an anterior spot beginning beneath 11th or 12th scale from head, another between lateral lines, a third at base of caudal. Eleven or 12 faint vertical bars below dorsal in some specimens. Distinctive colour may be lost in preservative.

Profile of head convex from dorsal to behind eye, almost straight along snout, lower profile convex, more so than upper. Angle of lower jaw rounded, and lower jaw may be included. Praemaxillary pedicel reaches up to one third distance between anterior and posterior borders of orbit, maxillary nearly covered by praeorbital, vertical line from end of maxillary reaches up to half way between nostril and eye.

Teeth of upper jaw ; outer series ; at symphysis small, in large specimens curved, conical pointed, in small specimens unequally or sub-equally bicuspid, in all, becoming simple towards side of jaw. Seventy in outer series of larger specimens. Two inner series of minute curved conical teeth at symphysis.

Pelvic fin long ; even in female reaching past genital papilla, in young males reaching almost to origin of anal fin and in breeding males a very long filament may reach well past anal fin to caudal peduncle.

This species is very distinctive, and can be identified among other species caught with it by the colour alone. It is known as "Chafinya", the name including both the breeding male and the smaller female. A common species, it is not found away from a rocky substrate, but in this type of habitat is widespread. Although common it is not caught in large numbers. Its habitat preference seems to overlap that of *H. pleurostigmoides* widely, and it must be considered a typical rock-preferring form. It appears to have no short well-defined breeding season, and ripe females have been recorded in almost every month of the year. A mouth brooding female only 82 mm. in length has been recorded but the males appear to breed at a larger size. The breeding colour of the male is very distinctive.

The name is in honour of H. J. H. Borley, Esq., Director of the Game Fish & Tsetse Control Department Nyasaland, and one of the members of the 1939 Fishery Survey Team.

*Haplochromis pleurostigmoides*, sp. nov. (Fig. 9.)

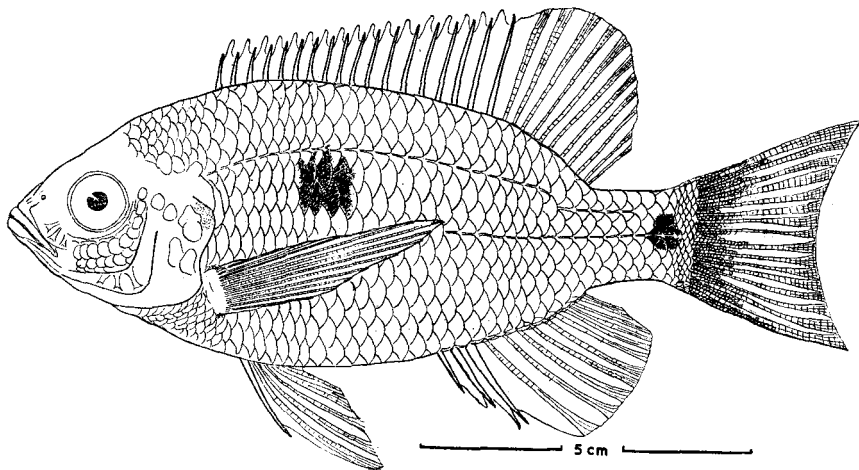
- Holotype : A female, total length 137 mm.  
Locality : Nkata Bay, near Katenda Rock in the North Bay.  
Date : 28/5/56.  
Local reference : N.N.B. 3131.

- Allotype : A male in breeding dress, length 142 mm.  
 Locality : Nkata Bay.  
 Local reference : N.N.B. 3450.
- Paratypes : Eighteen specimens from 69 to 148 mm. total length.  
 Locality : Nkata Bay.  
 Five at Nkata Bay, five at Samfya, eight at British Museum (N.H.).

*Description.* In standard length : head 3.10 to 3.35 (3.02 in one specimen), mean 3.22, depth 2.44 to 2.80 (in a specimen of 61 mm. standard length), mean 2.56 ; pectoral 2.38 to 2.88 (in one specimen), mean 2.54, pelvic 2.15 (in a breeding male 116 mm. standard length) to 3.67 ; length of caudal peduncle 6.10 to 7.38 (7.79 in one specimen), mean 6.42, caudal peduncle from 1.02 to 1.28 as long as deep (1.10).

In length of head : eye 2.60 (in a specimen of 61 mm. standard length) to 3.49 (in a specimen of 113 mm. standard length), interorbital width 3.30 to 3.79 (3.55) ; praemaxillary pedicel 2.50 to 2.84 (2.67), lower jaw 2.41 to 2.62 (2.53) ; praeorbital 5.00 to 6.04 (5.44), snout 3.14 to 3.66 (3.44),

Fig. 9.



*Haplochromis pleurostigmoides* sp. nov. Holotype, ♀, 137 mm.

shorter than eye in small specimens, longer than eye in larger specimens, postorbital 2.45 to 2.67 (2.56) longer than eye ; width of head 1.96 to 2.17 (2.07), last spine of dorsal fin 1.66 to 2.11 (in a specimen 117 mm. standard length), mean 1.85.

Thirty-four or 35 scales in longitudinal series, usually two sometimes three series of scales on cheek. Dorsal XVII to XIX 10 to 12, usual number of spiny rays 18, of soft rays 11, usual total 29 ; anal III 10 or 11, gill-rakers 22 to 25.

Colour : not silvery ; the body may be brownish with very distinct yellow areas at centre of scales. Pelvic, anal and caudal fins markedly yellow. Dorsal fin yellow between rays. This yellow colour may be lost in preservative and the fins and body are then dark. Two spots on body, anterior spot being below 9th or 10th scale counting from head and

may cover five or six scales in a longitudinal series ; does not reach the upper lateral line, but may reach a continuation of the lower lateral line. Nine or ten (sometimes more) vertical dark bands may be visible below the dorsal fin.

Upper profile of head slightly convex to between eye, almost straight in front of eye, lower profile angular or rounded at jaw suspension, not symmetrical with upper profile. Depth of scaled area of cheek from half, in smaller specimens to nearly height of eye. Maxillary well covered by praeorbital, vertical line from edge of maxillary ending half way between eye and nostril, or nearer eye in smaller specimens ; lower jaw included or slightly projecting, chin usually rounded.

Pelvic rather long, reaching genital opening even in females ; in larger males reaching to the origin of the anal fin as it does in some larger females, and in breeding males reaching first or second soft ray of anal. Pectoral long, reaches anal. Caudal crescentically emarginate, upper lobe tends to be larger than lower, particularly in large males.

Teeth of upper jaw : outer series of conical flattened, curved teeth, pointed in large specimens, or some bicuspid in smaller specimens ; number in outer series about 60. Two inner series of minute curved conical teeth.

This species is superficially similar to *H. trimaculatus*, often occurs with it and both are given the name "Chakhuta" by African fishermen which means replete, but the stomach is never as distended as in *H. trimaculatus*, and the intestine is shorter. The maximum size recorded is about 150 mm. and the minimum breeding size 135 mm. The breeding male is dark blue, but with a light blue or even almost white "blaze" from eye to base of the dorsal fin. The dorsal fin is white at the margin. Although quite distinct from *H. quadrimaculatus* when fresh and showing its distinctive colouration, it could be confused if the colour is lost in preservative. Occasionally smaller specimens of *H. quadrimaculatus* also have yellowish pelvic fins and could be confused, even when fresh, with *H. pleurostigmoides*. The body colour of *H. pleurostigmoides* is however distinctive, and strikingly similar to that of *H. trimaculatus*. The profile is more rounded, and the pectoral fin longer than in *H. quadrimaculatus*. It is a very definite rock associated form, never being caught at any distance from this type of habitat when adult. A deep bodied form and highly coloured, it nevertheless has a long praemaxillary pedicel, and numerous gill-rakers. *H. pleurostigmoides* breeds seasonally, apparently during the months from April to about August. It is caught all the year around inshore and at all stages of growth.

#### *Haplochromis quadrimaculatus* Regan.

*Haplochromis quadrimaculatus* Regan, t.c., p. 703.

*Haplochromis quadrimaculatus* (part) Trewavas t.c., p. 107.

Lectotype : A specimen collected by Rhoades (1908.10.27.43) removed by Regan with seven other "cotypes" from *Paratilapia intermedia* (Günther) to *H. quadrimaculatus*. No exact locality.

Other material : The remaining six "cotypes" (coll. Rhoades) and twenty specimens 72 to 180 mm. total length.  
 Locality : Nkata Bay.

*Description.* In standard length : head 3.03 to 3.39 (3.26), depth of body 2.51 to 2.85 (3.03 in one specimen of 82 mm.), mean 2.72 ; pectoral 2.74 to 3.13 (2.96), pelvic 2.86 (in a breeding male 136 mm. standard length) to 3.89, mean for females 3.68, for young males 3.54, longer in males than females ; length of caudal peduncle 5.93 to 6.78 (6.24), caudal peduncle from 1.14 to 1.35 as long as broad (1.23).

In length of head : eye 2.80 (in a juvenile 55.5 mm. standard length), to 4.12 (in a breeding female 138 mm. standard length), mean 3.34, inter-orbital width 3.43 to 4.12 (3.72) ; praemaxillary pedicel 2.43 to 2.80 (2.63), lower jaw 2.42 to 2.66 (2.54) ; praeorbital 4.79 to 6.64 (in juvenile 55.5 mm. standard length), mean 5.35, snout 2.80 (in a larger specimen) to 3.72 (3.34), shorter than eye in smaller specimens, longer than eye in larger specimens, postorbital 2.44 to 2.71 (2.58) ; width of head 2.14 to 2.36 (2.23), last spine of dorsal 1.76 to 2.16 (2.01).

Thirty-five or 36 scales in a longitudinal series, two or three series of scales on cheek. Dorsal XVI to XVIII 11 to 13, commonest number of spiny rays 17 or 18, commonest number of total of spiny and soft rays 29 ; anal III, 11 or 12 commonest number 11, gill-rakers 23 to 27 mean 24.9.

Colour : silver, but with distinct steel blue tinge particularly dorsally. Two spots which may be rather indistinct ; one on caudal peduncle, one between lateral lines about 10th scale from head, often a third between these two on lower lateral line, nine or ten faint, vertical, narrow dark bars below dorsal in many specimens, one or two on nape, one or two on caudal peduncle. Dorsal fin dark with very dark lappets which project beyond spines.

Profile of head, straight from dorsal to mouth, particularly so in young specimens, profile of chin angular or rounded, maxillary well covered, vertical from praemaxillary reaches about half way between nostril and eye in smaller specimens, nearer nostril in larger specimens ; end of praemaxillary pedicel reaching up to half way between eyes. Caudal crescentically and moderately emarginate, slightly asymmetrical in larger specimens.

Pelvic dark even in females, in juveniles reaches to anus, in specimens of about 90 mm. standard length and above reaches to genital aperture or beyond, further in male than in females and in larger males and in those in breeding dress may reach beyond origin of anal fin ; breeding filament of male not well developed.

Teeth of upper jaw : outer series ; small but stout, curved, conical, evenly placed with dark pointed cusp in larger juveniles and adults. May be unequally bicuspid in smaller specimens and some juveniles show curved expanded pointed crown with traces also of two minute lateral cusps. In adults, teeth in outer series become smaller at side of mouth and toothed margin extends about seven-eighths distance to side of jaw. In juveniles of about 55 mm. standard length there may be as few as 40 teeth in outer

series and toothed margin may be only half width of praemaxillary. Two inner series, which in adults are curved and conical, but tend to be irregularly spaced. In juveniles only one series of inner teeth may be seen at symphysis.

*H. quadrimaculatus* is the commonest, most widespread and most abundant species of Utaka in the north of the lake. The breeding adults, known as "Mbarule", are the basis of a seasonal fishery from April to July at Likoma, Chizumulu, Nkata Bay and many other places. The juveniles are known at these places as "Mbaba". It is a rock loving species, and breeding adults are caught inshore and close to the rocks by small meshed gill nets. The largest of the Utaka species, it is also the only one which for a part of its life history may be an open water species. Individuals above 130 mm. total length, a size reached in two years, are not found inshore outside the breeding season, and it is likely that this species spends its third year in open water, returning to breed. It is never seined, however, and frequents rocks while juvenile. It is entirely a zooplankton feeder.

I have examined the cotypes in the British Museum, and those collected by Rhoades seem to be conspecific with the fish known as "Mbarule", are of the correct breeding size, and to me are distinct from Christy's specimens. The name *H. quadrimaculatus* is therefore best restricted to fish conspecific with "Mbarule" and "Mbaba", and I have chosen one of Rhoades' cotypes to be the lectotype for *H. quadrimaculatus* s. str. The description given here extends that given by Regan (1922) to specimens down to 72 mm. in total length.

*Haplochromis likomae*, sp. nov. (Fig. 10.)

- Holotype : A female, total length 131 mm.  
 Locality : Likoma near Mbamba Bay.  
 Local reference : N.L.I. 200.
- Paratypes : Twelve specimens, 96 to 140 mm. in total length, from same locality as holotype.  
 Two at Nkata Bay, three at Samfya, six at British Museum (N.H.).

*Description.* In standard length : head 2.82 to 3.22 (3.06), depth of body 2.49 to 2.61 (2.54) ; length of pectoral 2.41 to 2.76 (in one specimen), mean 2.54; pelvic 2.58 (in a breeding male) to 4.12, longer in males than females ; length of caudal peduncle 5.55 to 6.78 (6.33), caudal peduncle from 1.07 to 1.41 as long as deep (1.24).

In length of head : eye 2.95 (in a specimen 80 mm. standard length) to 3.29 (in a specimen 110 mm. standard length) mean 3.23, interorbital width 3.33 to 3.68 (3.54) ; praemaxillary pedicel 2.37 to 2.58 (2.47), lower jaw 2.50 to 2.60 (2.54) ; praeorbital width 4.90 to 5.90 (5.34), snout 3.18 to 3.68 (3.33), postorbital 2.41 to 2.67 (2.51) ; width of head 2.09 to 2.32 (in one specimen) mean 2.15, last spine of dorsal fin 1.93 (in a specimen of 80 mm. standard length) to 2.32 (in a specimen 116 mm. standard length), mean 2.13.

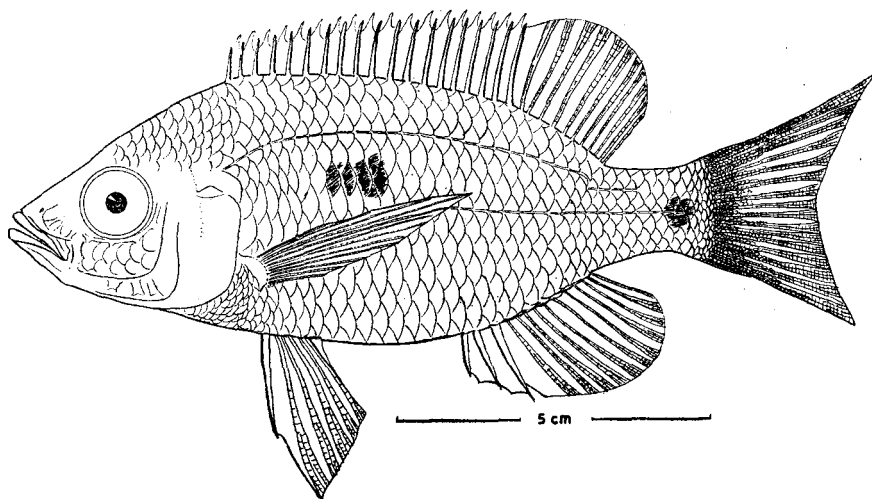
Thirty-four to 36 scales in a longitudinal series, usually two sometimes three series of scales on cheek, depth of scaled area up to two-thirds

height of eye. Dorsal XVII to XVIII 10 to 12, usually 18 spiny rays, total of spiny and soft rays 28 or 29 ; anal III 9 to 11, usually 10 or 11, soft rays, gill-rakers 24 to 28.

Colour : silver, but rather darkly pigmented ; two spots, an anterior spot between lateral lines which may be quite large, a caudal spot, opercular spot not prominent.

Upper profile of head convex to between eye, straight in front of eyes, more pronounced "snouty" appearance in males ; lower profile of head usually angular at suspension of lower jaw. End of maxillary rather exposed and vertical from maxillary ending nearer nostril than eye. Jaws equal but chin may project slightly, as may teeth of lower jaw.

Fig. 10.



*Haplochromis likomae* sp. nov. Holotype, ♀, 131 mm.

Pectoral long, reaching beyond vertical line from origin of anal fin spines, pelvic reaches genital opening in smaller specimens, in larger females reaches beyond and half way to origin of anal, in breeding males reaches past origin of anal. Caudal moderately, crescentically emarginate and symmetrical.

Teeth in upper jaw : in large males at symphysis stout conical, curved, small, about 70 in outer series ; in females not as stout ; teeth at side of jaw rather large although smaller than those at symphysis.

This species, recorded so far only at Likoma Island, is very similar to *H. quadrimaculatus*, and probably represents another species in the complex. It is distinguished from *H. quadrimaculatus* by the longer pectoral, and the larger eye. Even though both species are caught together at Likoma, the local fishermen distinguish *H. likomae* as "Vizinga". Apparently, and unlike *H. quadrimaculatus*, it is found inshore throughout the year at all stages of growth and it is significant

in this respect that whereas the young and the breeding adults of *H. quadrimaculatus* are given different names, *H. likomae* is referred to as "Vizinga" at all stages of growth. It is a form caught most often at rocky habitats, but it is not as abundant at Likoma as is *H. quadrimaculatus*. The two body spots are constant and well marked. A third form is distinguished at Likoma as "Kafwanthupu", which is very similar to *H. likomae* and *H. quadrimaculatus*, but which has a darker body and a single spot at the end of the caudal peduncle. This is included by me in neither species. Information gained from local fishermen indicates that they distinguish it both morphologically and biologically and it is preferred to postpone placing this form until more information is available. *H. likomae* is a zooplankton feeder entirely.

*Artificial key to the Utaka group of Haplochromis.*

Small members of the genus *Haplochromis* usually below 150 mm. total length. A small narrow mouth but with a long praemaxillary pedicel which shoots forward as the lower jaw is depressed so that the mouth forms a sucking tube. Teeth small, usually three or less series in upper jaw at symphysis, not often more than two at side of jaw but teeth fairly numerous and usually more than 60 in outer series of adults. More than 13 gill-rakers on lower part of anterior gill-arch. Colour uniform or with spots on side of body or with longitudinal bands but never with distinct vertical cross bars (except in some breeding males) with interdigitating spots or blotches or with a continuous band from nape to base of caudal. Head small, one-third or less of standard length, lower jaw from 2.45 to 2.7 in head, praemaxillary longer than 3.3 in head and usually longer than three, lower pharyngeal usually small, Y shaped and with small teeth. Zooplankton feeders throughout life history but may also take phytoplankton.

- A. Body silvery, no spots or longitudinal bands, but sometimes with faint vertical cross bars.
1. Less than 20 gill-rakers on lower part of anterior gill-arch.
    - (a) Praemaxillary pedicel from 2.5 to 2.7 in length of head ..... 1. *eucinostomus*.
    - (b) Praemaxillary pedicel from 2.8 to 3.3 in length of head.
      - (i) Depth of body 3.25 to 3.33 in standard length .. 2. *inornatus*.
      - (ii) Depth of body 2.60 to 3.00 in standard length .. 3. *flavimanus*.
  2. More than 20 gill-rakers.
    - (a) Caudal peduncle from 1.5 to 1.9 as long as deep. Depth of body from 3.1 to 3.6 in standard length. 4. *mloto*.
    - (b) Caudal peduncle from 1.1 to 1.6 as long as deep. Depth of body from 2.6 to 3.2 in standard length .. 5. *virginalis*.
- B. Body with spots or longitudinal bands or if spots indistinct dark or highly coloured.
1. At least one longitudinal band which may be indistinct, and extend from a caudal spot.
    - (a) More than 17 gill-rakers on the lower part of anterior gill-arch.
      - (i) No caudal spot, band very distinct Dorsal XV to XVII, 10 to 12 ..... 6. *boadzulu*.
      - (ii) Caudal spot, band indistinct Dorsal XVI to XVIII 10 to 12 ..... 7. *cyaneus*.
    - (b) Less than 17 gill-rakers on lower parts of anterior gill-arch ..... 8. *prostoma*.
  2. No longitudinal bands.
    - (a) Twenty or less gill-rakers and with at least an anterior spot on body prominent.
      - (i) Total number of rays of dorsal 28 or less ..... 9. *chrysonotus*.
      - (ii) Total number of rays of dorsal 29 or more ..... 10. *trimaculatus*.
    - (b) Nineteen or more gill-rakers and if with 20 or less spots on body not prominent.

- (i) Caudal peduncle from 1·34 to 1·66 as long as deep ..... 11. *nkatae*.
- (ii) Caudal peduncle from 1·02 to 1·35 as long as deep.
- (α) Praemaxillary pedicel from 2·84 to 3·32 in length of head. Pectoral from 3·06 to 3·79 in standard length ..... 12. *jacksoni*.
- (β) Praemaxillary pedicel from 2·37 to 2·97 in length of head. Pectoral from 2·41 to 3·13 in standard length.
- \* Number of gill-rakers 19-22 ..... 13. *borleyi*.
- \*\* Number of gill-rakers 22-28.
- † Pelvic anal and dorsal all distinctly yellow when fresh. Number of gill-rakers 22-25. .. 14. *pleurostigmoides*.
- †† Pelvic anal and dorsal not all yellow.
- Number of gill-rakers 23 to 28.
- Pectoral 2·74 to 3·13 in standard length.
- Eye 2·8 to 4·12 in length of head ..... 15. *quadrifasciatus*.
- Pectoral 2·41 to 2·76 in standard length.
- Eye from 2·95 to 3·29 in length of head ..... 16. *likomae*.

## SUMMARY.

The number of species in a group of zooplankton feeding fishes of the Genus *Haplochromis* (Cichlidae) from Lake Nyasa is increased from six to sixteen by the description of ten new species. The group is defined and an artificial Key is given.

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