A systematic revision of the piscivorous haplochromine Cichlidae (Pisces: Teleostei) of Lake Victoria (East Africa). Part I

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Key words: Cichlidae; piscivorous haplochromine cichlids; Lake Victoria; *Haplochromis*; *Harpagochromis*; *Prognathochromis*; new species; geographical variation.

The distinction between *Harpagochromis* and *Prognathochromis*, and the distinction between these and other cichlid genera of Lake Victoria as proposed by Greenwood (1980), is demonstrated to be artificial. The BM(NH) collections of *Haplochromis dichrourus* and *H. pellegrini* were found to be polyspecific and are redescribed. On the basis of specimens formerly included in *H. pellegrini* a new species is described. Five new species are described based on material from the Mwanza Gulf and Maisome Island. Specimens of *H. dichrourus* from different areas of Lake Victoria are described separately to demonstrate geographic variation.

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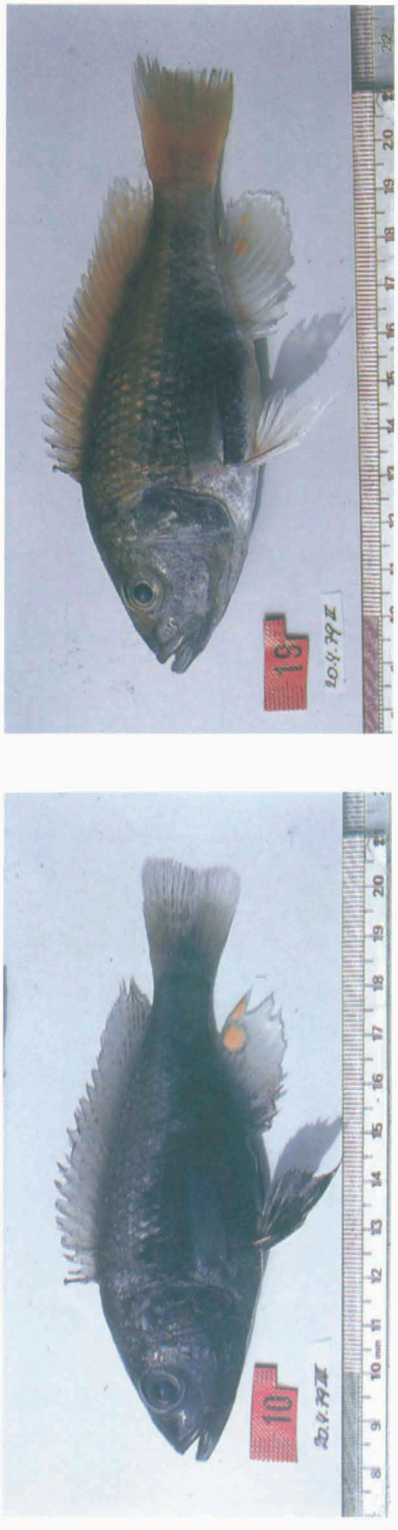
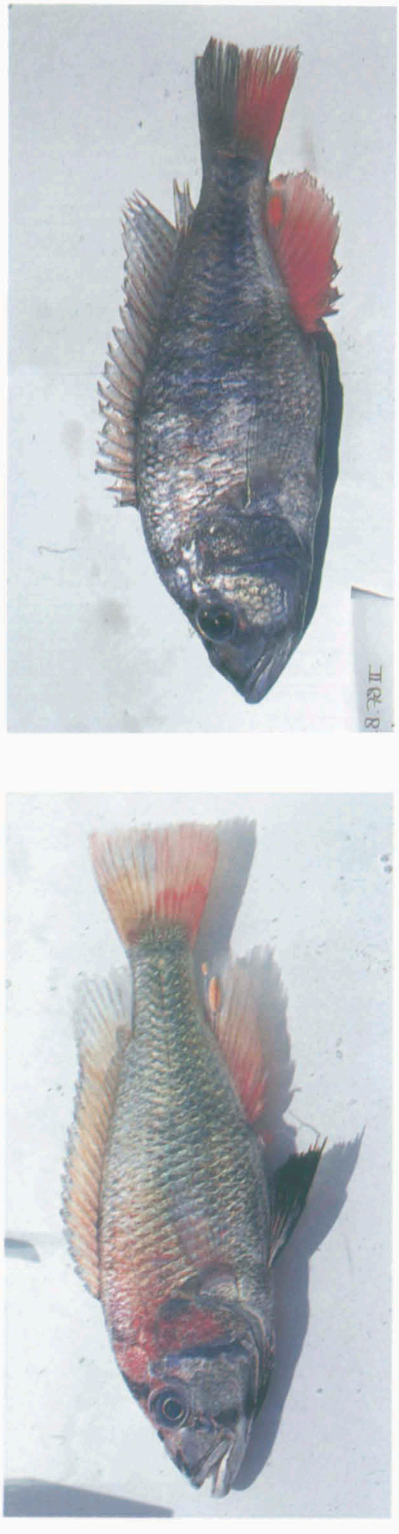
Contents

Introduction

Until recently, Lake Victoria, like Lakes Tanganjika and Malawi was appropriately called a "cichlid lake" (Greenwood, 1984; Witte, 1984a). Cichlids, with an estimated number of more than 300 species (Witte & van Oijen, 1990), dominated the non-



Figs. 1-2, *Haplochromis bareli* spec. nov.; 1 (left), RMNH 30635, SL 97 mm, sexual active ♂; 2 (right), RMNH 30388, SL 100 mm, spent ♀.



Figs. 3-4, *Haplochromis dichrourus* "Mwanza" Regan, 1922; 3 (left), RMNH 30064, SL 89 mm, sexually active ♂; 4 (right), RMNH 30060, SL 132 mm, ripe ♀.

Figs. 5-6, *Haplochromis pyrrhopteryx* spec. nov.; 5 (left), RMNH 30038, SL 137.1 mm, quiescent ♂; 6 (right), RMNH 30038, SL 178 mm, spent ♀.

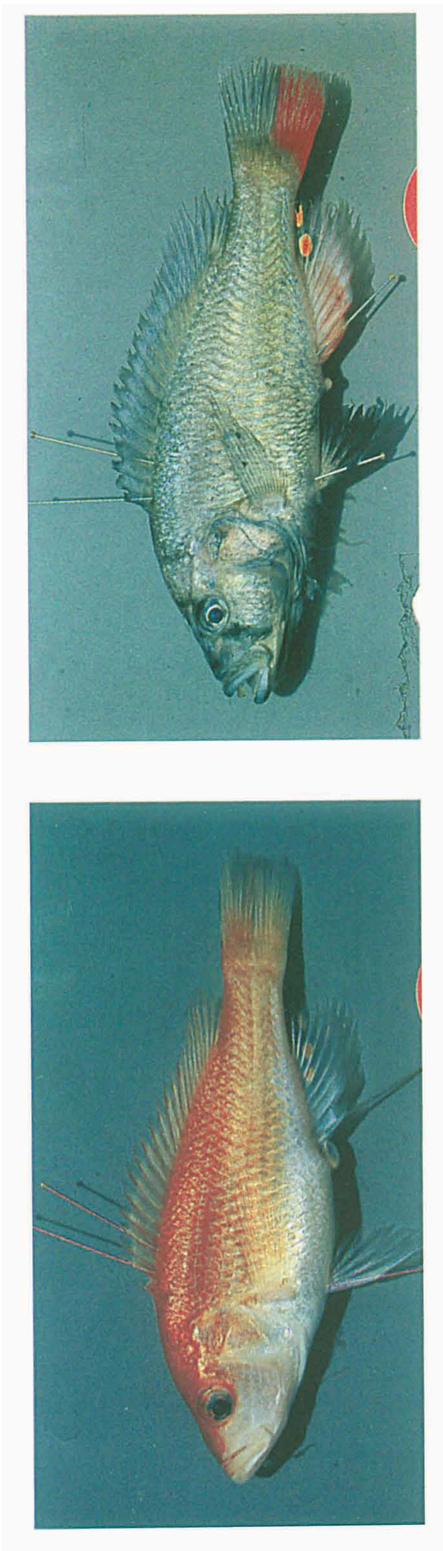


Fig. 7 (left), *Haplochromis chrysogynaion* spec. nov.; RMNH 30466, SL 89 mm, maturing ♀. Fig. 8 (right), *H. maisomei* spec. nov., RMNH 30122, SL 98.1 mm, quiescent ♂.

cichlid fishes (11 families and c. 50 species), not only in number of species but also in biomass. Kudhongania & Cordone (1974) estimated 83% of the ichthyomass of Lake Victoria to consist of haplochromine cichlids. Since the explosive increase of the Nile perch population, the term "cichlid lake" no longer seems applicable to Lake Victoria. Formerly, haplochromine cichlids were found in all habitats of the lake, whereas they are now restricted to very shallow areas (Witte et al., in press). Especially in the deeper water (> 4m) the Nile perch has had a devastating effect on the original fauna. With the exception of a few pelagic zooplanktivorous species all haplochromines have disappeared. Large non-cichlids like *Protopterus aethiopicus* Heckel, 1851, *Bagrus docmak* (Forskål, 1775) and *Clarias gariepinus* (Burchell, 1822) occur only in very small numbers (Goudswaard, Ligtvoet, Witte, pers. comm.). Only the small pelagic zooplanktivorous cyprinid *Rastrineobola argentea* (Pellegrin, 1904) has thrived, apparently profiting from the absence of competition for food with haplochromines (Wanink, 1991; Ligtvoet, Goudswaard, pers. comm.).

As changes in the species composition in the Mwanza Gulf had already been noted before the population explosion of the Nile perch in 1984 (Goudswaard, 1988; Witte & Goudswaard, 1985) the disappearance of the cichlid fishes in this area no doubt was quickened by the high fishing pressure of the commercial trawlers. However, the situation in the Mwanza Gulf is at present not different from areas outside the Gulf where haplochromine fisheries never existed (Witte et al., in press). The deeper waters are now completely dominated by Nile perch forming 95-100% of the demersal ichthyomass (Goudswaard, 1988; Ligtvoet & Mkumbo, 1990). Near rocks and in shallow bays with reed and papyrus margins, areas not frequented by large piscivorous Nile perch, the original fauna seems more or less intact. However, as these areas formerly were used as nurseries by many haplochromine species from deeper waters, the species composition there has also changed. It has been suggested that the shallow areas would serve as refugia for species from deeper waters. This seems unlikely for two reasons. Firstly, the specific requirements of deep water species cannot be found in shallow water habitats, and secondly, it is improbable that there would be space for 'alien' species in the shallow water community which always has been the most speciose of the Lake (Greenwood, 1974; Witte, 1981). Therefore we must assume that the species which have disappeared from the deeper waters, are extinct.

Since 1977 the Haplochromis Ecology Survey Team (HEST), using a variety of fishing techniques (van Oijen et al., 1981), has made an extensive collection of haplochromine cichlids from the Mwanza Gulf area. The original purpose of this collection, i.e. making an inventory of the species inhabiting the Mwanza Gulf as a basis for ecological research to provide data for lasting fisheries on haplochromine cichlids, unfortunately has been made superfluous by the Nile perch. However, the HEST collection now forms a unique record of the fish fauna before, during, and after the Nile perch invasion. The collection probably is both the last and the most comprehensive of the original fauna at any particular area of Lake Victoria. The majority of the species in this collection is still undescribed. This paper deals with the description of six new species of piscivorous haplochromine cichlids and the redescription of two piscivorous species. Six of these species have moderately to strongly curved teeth. All species, except one, are exceptional amongst the Lake Victoria haplochromine piscivores in having polychromatic females. Usually, the females of haplochromine cichlids have an inconspicuous coloration and only the males are brightly coloured.

To find out which genus could accomodate the new species, it was necessary to analyse the descriptions of *Harpagochromis* and *Prognathochromis* both introduced by Greenwood (1980).

Material, methods and techniques

The major part of the material described below was collected from trawl catches made over mud bottoms in the Mwanza Gulf of Lake Victoria. For procedures of preservation, labelling and colour photography see van Oijen et al. (1981). Besides colour slides of live fishes, photographs were also made of specimens which were preserved on melting ice for some time. The coloration of these specimens intensified rather than decreased during preservation. In addition to colour photography, notes on the coloration of specimens were made right after their capture.

Terminology and measurements follow the definitions of Barel et al., (1976), Greenwood (1980), Hoogerhoud (1984), Hoogerhoud & Witte (1981), Witte (1984b)

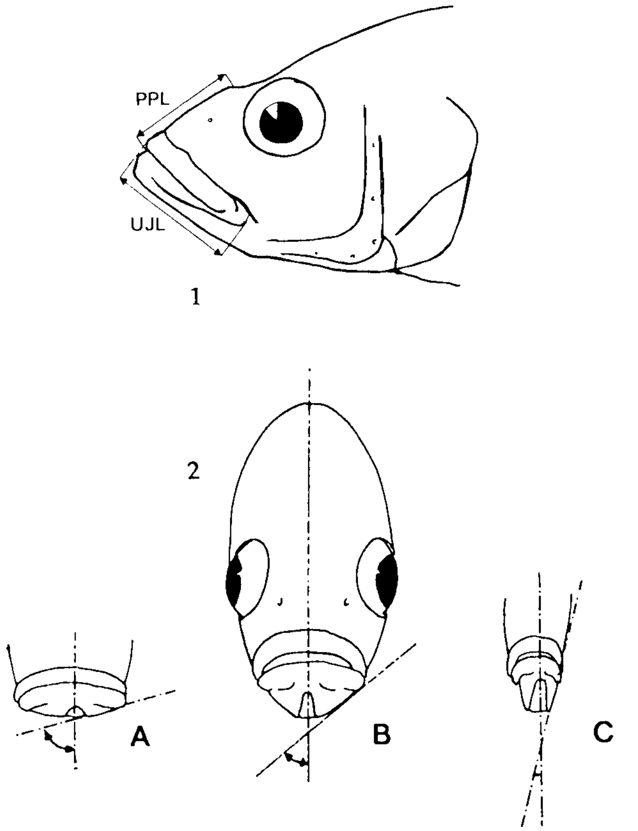


Fig. 1. Measuring points for Premaxillary Pedicel Length (PPL) and Upper Jaw Length (UJL). Fig. 2. Examples of different lower jaw side obliqueness. A, almost flat, B, moderately oblique, C, strongly oblique.

and Witte & Witte-Maas (1981). Two new measurements and a qualitative character proved to be useful in distinguishing piscivorous species and are described below. The measurements should be taken from intact specimens with the mouth closed or slightly opened.

— Upper Jaw Length (UJL, fig. 1) is defined as the distance between the rostralmost point of the premaxillary symphysis and the caudo-ventral tip of the maxilla (the shank process of Barel et al., 1976).

— Premaxillary Pedicel Length (PPL, fig. 1) is defined as the distance between the rostralmost point of the premaxillary symphysis and the dorsal tip of the premaxillary pedicel. (This is in fact the external measurement of the Premaxillary Ascending Arm Length of Hoogerhoud (1984) and Witte (1984b)).

— The obliqueness of the lower jaw sides is defined in a specimen in a rostral view, as the angle between a plane through the lateral side of the lower jaw and the medial plane (fig. 2).

Specimens were measured using a pair of calipers. Measurements in the head region were often made under a WILD M5 binocular microscope, which was also used for the examination of the dentition, the squamation, and the skeletal elements.

Drawings of skeletal elements were made using the same microscope mounted with a camera lucida.

All type specimens of piscivorous haplochromine cichlids from Lake Victoria from the collections of the Academy of Natural Sciences of Philadelphia (ANSP); the Natural History Museum (BMNH), London; the Museum of Comparative Zoology (MCZ), Cambridge; the Museum National d'Histoire Naturelle (MNHN), Paris; the Museo Civico di Storia Naturale (MSNG), Genova; the Naturhistorisches Museum (NHW),Vienna, and the Museum für Naturkunde der Humboldt Universität (ZMB), Berlin were examined. Only the holotype of *Haplochromis serranus* (Pfeffer, 1896) could not be located.

Definition of terms. Whenever a character is called generalized it is similar to that of *H. elegans* Trewavas, 1933, a morphologically modal haplochromine cichlid (Anker, 1978; Barel et al., 1976). When an element is called relatively small or relatively large it is with reference to a modal piscivorous species. "Piscivores" here is used as a collective name for all haplochromine cichlids for which fishes generally are the dominant food, excluding the peadophages. Piscivores have adult sizes between 70 and 280 mm SL. For the sake of convenience a number of size groups are distinguished; small (70-110 mm), medium (110-150 mm) moderately large (150-190 mm), and large (> 190 mm).

The relatively large size of piscivores makes it difficult to compare between species characters which are allometric. Proportional measurements which show allometry can only effectively be compared if the allometric ratio of the characters are known, or between specimens differing little in standard length. To facilitate the comparison, the specimens used for the descriptions were divided into classes of 10 mm. If two successive classes had only few representatives they were united to form one class of 20 mm. In one case, three classes were united to form one group of 66.2-80.5 mm.

In the drawings premaxillary teeth are numbered from medio-rostral to caudal, lower pharhyngeal teeth are numbered from medial to lateral.

Taxonomy

Suprageneric classification of the Lake Victoria haplochromine Cichlidae

Following Greenwood (1974: 17) the HEST members have used the term 'haplochromine cichlids' and 'haplochromines', to refer to all species of *Haplochromis* Hilgendorf, 1888 and the closely resembling monotypic genera (i.e. *Macropleurodus* Boulenger, 1906, *Hoplotilapia* Hilgendorf, 1888, *Platytaeniodus* Boulenger, 1906, *Paralabidochromis* Greenwood, 1956 and *Astatoreochromis* Pellegrin, 1904).

Recently, Eccles & Trewaves (1989: 21) defined the tribe Haplochromini as 'maternal mouth-brooding cichlids of Africa and the Jordan Valley in which the basioccipital bone participates with the parasphenoid to form the apophysis for the upper pharyngeal bones'. Following this definition all haplochromine cichlids fishes of Lake Victoria are Haplochromini.

The generic classification of the Lake Victoria haplochromine Cichlidae

Greenwood's revision of the genus *Haplochromis*: introduction

Greenwood (1979), using a cladistic approach, attempted to break up the genus *Haplochromis* into a number of monophyletic lineages. According to Greenwood (1979), the high number of species (c. 390), the wide geographical distribution and the wide range of anatomical and morphological variation of *Haplochromis* indicated that the genus was 'very ill-defined'. Strictly adhering to Hilgendorf's 'definition' of the tooth shape, Greenwood restricted the genus *Haplochromis* to five (lacustrine) species. For reasons outlined below, this definition of the genus *Haplochromis* will not be used in this paper. In the second part of his revision Greenwood (1980) placed the haplochromine species from lakes Victoria, Nabugabo, Edward, George and Kivu in 20 genera. In the introduction to this paper Greenwood (1980: 3) stated 'At present, the former genus *Haplochromis* can be resolved into a number of apparently monophyletic lineages; the search for characters uniting these lineages through various levels of common ancestry must continue'. Further he admitted that he did not succeed in constructing dichotomously branching phylogenies at either inter- or intra-lineage levels, and suggested that more discriminating anatomical studies and biochemical techniques might reveal linkages so far undiscovered. In the conclusion Greenwood (1980: 95), quoting Regan (1920: 160), stated that he did not regard his new classification as entirely satisfactoriy. Greenwood's revision has been challenged by many researchers working at different levels of biological organisation. A summery of this critique is presented below.

Analyses on the molecular level

Sage et al. (1984), measuring the extent of structural gene divergence by means of starch gel electrophoresis of muscle and eye proteins, found extremely small genetic differences among ten haplochromine species from lake Victoria (belonging to six genera according to Greenwood, 1980). They found it barely possible to distinguish *Hoplotilapia* from *Haplochromis*. However, there was a clear difference between these two genera and *Astatoreochromis*. According to Sage et al. (1984) the small genetic differences are consistent with the possibility that the haplochromine species flock arose from a single ancestral species after Lake Victoria was formed and indicate recent speciation. Verheijen et al. (1985, 1986, 1988), studying allozyme variation by an electrophoretic analysis of muscle enzymes, electrophoretic mobility of haemoglobin bands and iso-electric focused eye-lens protein patterns, did not find any differences among eight *Haplochromis* species (belonging to at least four genera after Greenwood, 1980), and the monotypic genera *Hoplotilapia* and *Macropleurodus*. They suggested that speciation does not have to involve electrophoretically detectable differentiation, and added that the genetic similarity of these species points to a very recent speciation. Verheijen & Van Rompaey (1986) and Van Rompaey et al. (1988) demonstrated for some cichlids from Lake Victoria a correlation between the general electrophoretic pattern of muscle proteins and ecological characteristics. They concluded that in haplochromine cichlids from Lake Victoria trophic differentiation may have occurred after habitat (or substrate) selection. Verheijen (1989) stated that the taxonomic, ecological and morphological diversity in Lake Victoria haplochromines is not matched by a significant level of electrophoretically detectable change. He stressed that his results are in accordance with literature data suggesting that Greenwood's generic subdivision of the 'genus' *Haplochromis* may be invalid.

Dorit (1986), in a study of mitochondrial DNA of ten haplochromine species from Greenwood's *Psammochromis-Macropleurodus* super lineage (belonging to 6 genera after Greenwood, 1980) found that the trees generated by using the presence or absence of particular restriction sites as indicators of homology, bear 'both striking similarities and interesting differences with the cladogram suggested by Greenwood on morphological grounds '(Dorit, 1986: 69). The results of Dorit's research imply some interesting problems; it was possible for example to distinguish *Haplochromis* "velvet black" specimens from six localities in the Mwanza Gulf but it proved impossible to separate specimens of *Haplochromis sauvagei* (Pfeffer, 1894) from those of *H. prodomus* Trewavas, 1935.

Recently, Meyer et al. (1990) suggested a monophyletic origin for the Lake Victoria haplochromine cichlids on the basis of research on mitochondrial DNA sequences. Fourteen endemic haplochromine species showed almost no differentiation at about 800 nucleotide positions in the cytochrome b gene and in mitochondrial DNA that bears part of two transfer RNA genes and the normally highly variable portion of the control region. In the examined sequence, haplochromine cichlid species from Lake Malawi differed from those in Lake Victoria by 54-55 base substitutions, whereas the Lake Victoria haplochromines differed amongst each other by an average of only three mitochondrial mutations. Meyer et al. (1990) date the origin of the extant Lake Victoria haplochromines at less than 200.000 years ago and find it likely that the Victoria flock arose within the lake. However, the last statement is premature as the authors did not yet examine haplochromine cichlids from Lakes Kivu and George.

Implications of the revisions for taxonomy

At the alpha-taxonomic level, researchers were most directly confronted with the consequences of Greenwood's generic revision. Various new haplochromine species from Lakes Kivu and Victoria cannot be placed unequivocally in one of Greenwood's genera. Among species from Lake Kivu: (1) *Haplochromis murakaze* Coenen et al., 1984 combines characters of three genera; it is intermediate between *Astatotilopia, Labrochromis* and *Gaurochromis*; (2) *Haplochromis scheffersi* Snoeks et al., 1987, is partly referable to *Astatotilapia* but the ranges of certain of its characters amply exceeded the ranges of this genus as defined by Greenwood (1979); (3) *Haplochromis occultidens* Snoeks, 1988, agrees in some characters with *Lipochromis* (*Cleptochromis*) but this (sub)genus cannot really accommodate the species unless the generic limits are extended; (4) *Haplochromis olivaceus* and *H. crebidens* Snoeks et al., 1990, both epilithic algae scrapers, cannot be placed in any of the genera of Greenwood (1980). Similarly *Haplochromis erythromaculatus* de Vos, Snoeks & Thys van den Audenaerde, 1990, a species occurring in Lakes Bulero and Ruhondo cannot be placed in any of these genera (de Vos et al., 1990).

Hoogerhoud (1984), working on molluscivorous cichlids, encountered similar problems with species from Lake Victoria: *Haplochromis iris* Hoogerhoud & Witte, 1981 and *H. hiatus* Hoogerhoud & Witte, 1981, bridge the gap between *Gaurochromis* (*Mylacochromis*) Greenwood, 1980, and *Gaurochromis* (*Gaurochromis*) Greenwood, 1980. Reexamination of Greenwood's original material showed that accepting the definition of *Gaurochromis* would mean that specimens of *Haplochromis ptistes* Greenwood & Barel, 1978 and *H. iris* have to be divided over *Labrochromis* Regan, 1920 and *Gaurochromis*, and that *Haplochromis humilior* (Boulenger, 1911) is in fact intermediate between the genera *Gaurochromis* and *Enterochromis* Greenwood, 1980. Witte & Witte-Maas (1987), describing new species of zooplanktivorous haplochromines from Lake Victoria, proved that some of these species bridge the gap between *Yssichromis* Greenwood, 1980 and *Astatotilapia* Pellegrin, 1903. They showed that several characters used by Greenwood (1980) to separate the genera are invalidated by Greenwood & Gee (1969). Witte & Witte-Maas (op. cit.) also suggested that the gap between *Yssichromis* and *Psammochromis* is bridged by certain undescribed species.

Because they realised that generic boundaries might have to be adapted after the description of almost every new species the above mentioned authors decided not to accept Greenwood's genera and to use the genus *Haplochromis* in the sense it was used before the generic revision of Greenwood.

Greenwood's generic classification of the piscivorous species: introduction

Greenwood (1980) placed the majority of the piscivorous haplochromine cichlids in two genera, viz. *Harpagochromis* Greenwood,1980 and *Prognathochromis* Greenwood, 1980, which, according to Greenwood, can be distinguished from the other cichlid genera in Lake Victoria by their relatively long lower jaw. Greenwood (1980) considers the relatively long lower jaw an apomorhpic character. Greenwood gave as ranges for the Lower Jaw Length/Head Length ratio of *Harpagochromis* and *Prognathochromis* 43-61% and 41-62%, respectively. However, some species placed by Greenwood (1980) in *Psammochromis* Greenwood, 1980, viz. *Haplochromis cassius* Greenwood & Barel, 1978, and *H. acidens* Greenwood, 1967 have LJL/HL ratio's of 43-48% and 44-50 %, respectively. The LJL/HL ratio therefore cannot be used to distinguish *Harpagochromis* and *Prognathochromis* from *Psammochromis*. For similar reasons this measurement cannot be used to distinguish the piscivorous genera from *Pixichromis* Greenwood, 1980 and *Lipochromis* Regan, 1920. Other characters which according to Greenwood (1980) sepatate these genera from the piscivorous genera have not yet been critically examined.

The principal diagnostic features Greenwood used to differentiate *Harpagochromis* from *Prognathochromis* are found in the neurocranium. The neurocranium of *Harpagochromis* is of a generalized type, but would have a shallower otic region and a higher supraoccipital crest, generally near pyramidical in outline. In contrast, *Prognathochromis* would possess an elongate, slender and shallow neurocranium with a low supraoccipital crest, wedge shaped in lateral outline. To quantify the differences in neurocranial shape Greenwood (1980; 14, fig. 1) defined four neurocranial characters: viz. Neurocranial Width (NW), Otic Depth (OtD), Orbital Depth (OD) and Preorbital Depth (PrOD).

Analysis

Judging from data in species descriptions and in earlier attempts to unravel phyletic lines amongst the piscivorous species (e.g. from Greenwood, 1962, 1967, 1974; Greenwood & Gee, 1969), the allocation of various species to the genera of Greenwood (1980) is at places inconsistent:

I.— *Haplochromis decticostoma* Greenwood & Gee, 1969, is placed by Greenwood (1980) in *Prognathochromis* without any comment except 'see Greenwood & Gee (1969: 55-7)'. On the indicated page one reads: 'The syncranium of *H. decticostoma* is very similar to that of *H. spekii* (Boulenger, 1906) in most details' and: 'Phyletically, *H. decticostoma* is a derivative of the *H. serranus* stem, and probably from a species anatomically indistinguishable from *H. spekii*'. However, Greenwood (1980) places *Haplochromis serranus* and *H. spekii* in *Harpagochromis*.

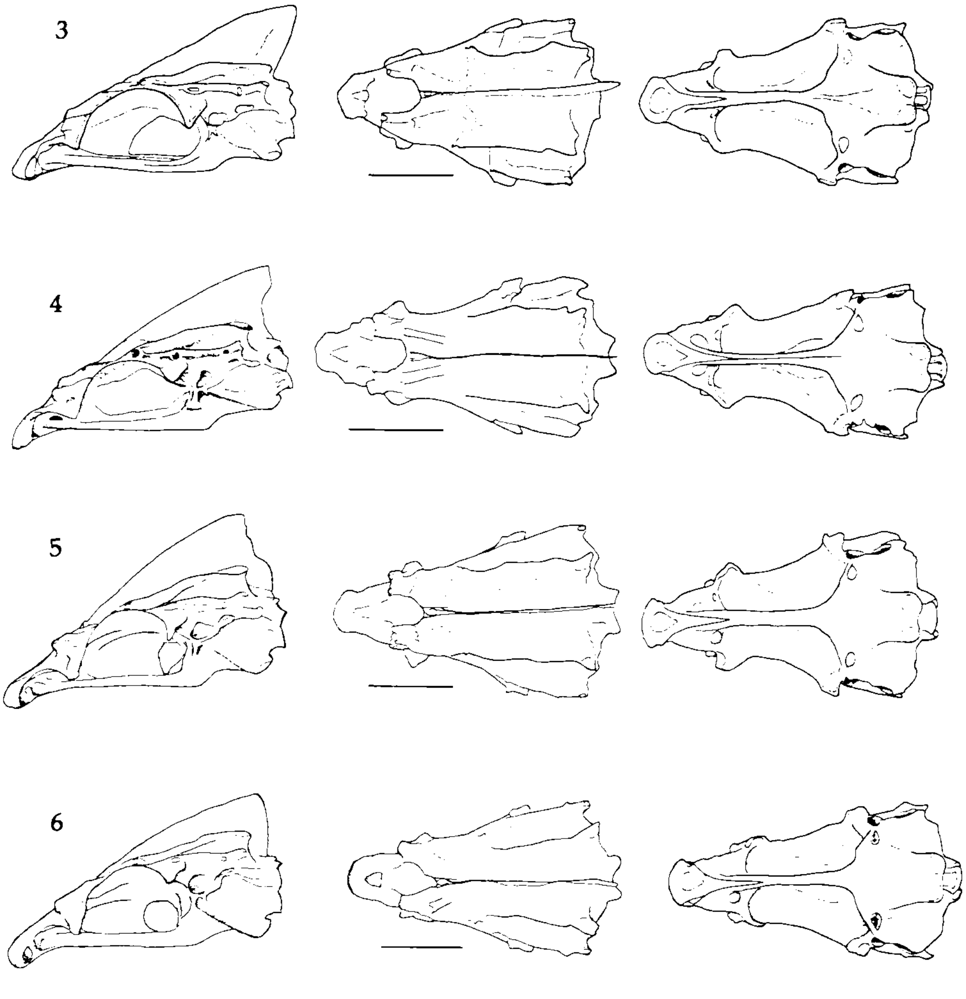
II.— *Haplochromis altigenis* Regan, 1922, is placed by Greenwood (1980) in *Harpagochromis* with a reference to the redescription of the species in Greenwood (1967: 60-65). However, on the indicated page the author states that: 'The neurocranium of *Haplochromis altigenis* resembles that of *H. bayoni* but is relatively broader in the otic region. Thus although it shows some of the characters associated with the *"mento"*-type it still retains the curved preorbital profile, greater preorbital depth and broad otic region of the more generalised neurocranium. In these characters it also resembles *H. pseudopellegrini*'. Both *H. bayoni* (Boulenger, 1909)and *H. pseudopellegrini* Greenwood, 1967 are allocated to *Prognathochromis* by Greenwood (1980).

III.— *Haplochromis xenostoma* Regan, 1922, is placed by Greenwood (1980) in *Prognathochromis*. In the redescription of this species Greenwood (1967: 53) states: 'The neurocranium of *H. xenostoma* is similar to that of *H. victorianus* but has a longer preorbital face..; the neurocranioum of the two species also differ in that the supraoccipital crest is relatively higher and more pointed than in *H. victorianus*'. And on p. 55: 'the skull of *H. xenostoma* is clearly of the *"serranus"*-type'. Both *Haplochromis serranus* and *H. victorianus* (Pellegrin, 1904) were reallocated to *Harpagochromis* by Greenwood (1980).

IV.— *Haplochromis melichrous* Greenwood & Gee, 1969, is placed by Greenwood (1980) in the subgenus *Prognathochromis (Tridentochromis)*. In the description of *H. melichrous*, Greenwood & Gee (1969, 26) state: 'The neurocranium of *H. melichrous* resembles that of *H. victorianus*: in other words it is referable to the *"serranus"* group'. In Greenwood (1974), in the section of species feeding on benthic crustacea, the author still writes '*Haplochromis melichrous* differs from members of the *'tridens'* group in its neurocranial morphology, and in these characters resembles members of the *"serranus"* group piscivores'. However, in Greenwood (1980) *Haplochromis serranus* and *H. victorianus* are placed in *Harpagochromis*.

V.— In the description of *Haplochromis paraquiarti* Greenwood (1967; 70) states: 'The neurocranium of *H. paraquiarti* is identical with that of *H. acidens*. It differs somewhat from the presumed generalised piscivorous skull of *H. quiarti* and shows some of the characters found in the more specialised type of *H. prognathus*. It is, in fact almost intermediate between the two types.' In 1980 *Haplochromis paraquiarti* and *H. prognathus* are placed in *Prognathochromis*, *H. acidens* Greenwood, 1967 is placed in *Psammochromis* and *H. quiarti* (Pellegrin, 1904)is placed in *Harpagochromis*. The intermediate position of the neurocrania of *Haplochromis paraquiarti* and *H. acidens* is not mentioned again after 1967.

The examples I-V given above may indicate that the delimitation between the alleged taxa is not as sharp as one might expect for genera. The foregoing inconsis-



Figs 3-6. Lateral, dorsal and ventral view of neurocrania of picivorous haplochromine species. Fig. 3. *Haplochromis bareli* spec. nov. Fig. 4. *H. dichrourus* "Uganda". Fig. 5. *H. dichrourus* "Mwanza". Fig. 6. *H. pyrrhopteryx* spec. nov. Scale equals 10 mm.

tensies might be explained by the fact that Greenwood's statements about similarity of neurocrania and the notes concerning similarities in publications before 1980 were based on visual impressions only. Except for the preorbital face (in Greenwood, 1967: 50) Greenwood never defined the characters he based his conclusions on in terms of morphometric measurements. Even in Greenwood (1980), the shape of the supraoccipital crest, a major character for separating *Harpagochromis* and *Prognathochromis*, is not defined in this way.

Classifying new species

Attempting to classify piscivorous species from the Mwanza Gulf in the genera of Greenwood (1980) I measured the neurocrania (see figs. 3-6) using the definitions of Greenwood (1980). It turned out to be impossible to place some new species on the basis of these measurements in either *Harpagochromis* or *Prognathochromis*. For instance in *Haplochromis bareli* spec. nov. half of the range of Skull Width lies in the range of *Prognathocromis*, the other half in the range of *Harpagochromis*; the Otic depth range entirely covers the range of *Harpagochromis*, but extends to part of the range of *Prognathochromis*; Orbital Depth lies in the overlapping area of *Harpagochromis* and *Prognatochromis*, and Preorbital Depth parly falls in the range of *Prognathochromis* (fig. 7).

To exclude the possibility that the results of my measuring technique differed from those of Greenwood, I had to compare my measurements with those of Greenwood. However, as Greenwood's (1980) paper does not contain a table with measurements of individual specimens, the only way to reveal differences was to compare the total ranges. Greenwood (1980) stated that all the BM(NH) haplochromine material from the five lakes were involved in his revision. Using the definitions of Greenwood (1980) I measured the 66 neurocrania from the BMNH collections belonging to 44 piscivorous species (table 1). All measurements were taken with TESA DIGIT-CAL II digital calipers under a binocular microscope.

Table 1. Neurocranial mesurements of species placed in *Harpagochromis*, *Prognathochromis* and *Psammochromis* by Greenwood (1980). All specimens from the BMNH collections. Measurements in mm.. Gen.: genus according to Greenwood (1980); *Ps.* = *Psammochromis*; *P.* = *Prognathochromis*; *Ha.* = *Harpagochromis*; NL = Neurocranial Length; NW = Neurocranial Width; PrOD = Preorbital depth; OD = Orbital Depth; OtD = Otic Depth; - = Damage on neurocranium makes accurate measurement impossible.

No.	Gen.	Species	NL	NW	NW/NL	PrOD	PrOD/NL	OD	OD/NL	OtD	OtD/NL
1.	*Ps.*	*acidens*	31.9	16.8	50.7	7.7	24.1	10.6	33.2	14.0	43.8
2.	*Ha.*	*altigenis*	44.6	23.8	53.3	9.2	20.6	12.7	28.4	17.9	40.1
3.	*P.*	*arcanus*	31.6	14.3	45.2	5.8	28.1	8.9	28.1	13.2	41.7
4.	*P.*	*argenteus*	49.5	22.7	45.8	7.0	14.1	12.3	24.8	17.7	35.7
5.	*Ha.*	*artaxerxes*	19.3	10.0	51.8	4.3	22.2	6.0	31.0	8.3	43.0
6.	*P.*	*bartoni*	36.9	-		7.0	18.9	10.0	27.9	15.1	40.9
7.	*P.*	*bayoni*	37.1	19.4	52.2	5.9	15.9	9.1	24.5	14.3	38.5
8.	*Ha.*	*cavifrons*	32.6	17.9	54.9	5.8	17.7	8.3	25.4	12.9	39.5
		"	40.2	-		7.3	18.1	9.5	23.6	17.0	42.2
9.	*P.*	*crocopeplus*	24.9	13.0	52.2	4.1	16.4	7.0	28.1	10.2	40.9
		"	25.8	-		4.1	15.8	7.1	27.5	11.1	43.0

10.	*P. cryptogramma*	26.4	12.0	45.4	5.0	18.9	7.1	26.8	11.1	42.0
11.	*P. decticostoma*	52.3	28.6	54.6	10.1	19.1	14.1	26.9	21.5	41.1
12.	*P. dentex*	37.1	18.1	48.7	5.0	13.4	9.0	24.2	13.5	36.3
13.	*P dichrourus*	31.3	15.6	49.8	6.0	19.1	9.1	29.0	12.1	38.6
14	*P. dolychorhynchus*	30.2	14.3	48.0	4.6	15.2	8.3	27.4	12.2	40.3
15.	*P. estor*	43.0	20.7	48.1	7.1	16.5	11.1	25.8	16.1	37.4
16.	*P. flavipinnis*	30.6	16.9	55.2	5.9	19.2	8.9	29.0	13.2	43.1
17.	*P. gilberti*	29.7	14.7	49.4	5.1	17.1	7.9	26.5	11.8	39.7
18.	*P. gowersi*	40.4	17.8	44.0	6.7	16.5	11.9	29.4	14.8	36.6
19.	*Ha. guiarti*	34.4	18.3	53.2	5.8	16.8	9.4	27.3	13.9	40.4
	"	35.0	20.7	59.1	8.6	24.5	10.9	31.1	14.6	41.7
	"	37.9	23.6	62.6	8.1	21.3	11.1	29.2	16.3	43.0
20.	*P. longirostris*	30.9	14.0	45.3	4.1	13.2	7.4	23.9	12.0	38.8
	"	34.9	18.0	51.5	5.7	16.3	8.3	23.7	12.3	35.2
	"	35.7	16.6	46.6	5.9	16.5	8.9	24.9	13.0	36.4
21.	*P. macrognathus*	44.2	20.6	46.6	5.5	12.4	9.3	21.0	17.2	38.9
	"	43.1	19.0	44.0	6.3	14.6	10.1	23.4	15.0	34.8
22.	*Ha. maculipinna*	38.8	22.1	56.9	8.4	21.6	11.9	30.6	17.0	43.8
23.	*P. mandibularis*	34.9	15.6	44.6	4.8	13.7	8.4	24.0	13.1	37.5
24.	*P. mento*	37.5	17.4	46.4	6.2	16.5	9.9	26.4	14.0	37.3
	"	38.4	17.2	44.7	6.5	16.9	9.9	25.7	13.7	35.6
	"	41.0	18.4	44.8	7.8	19.0	10.8	26.3	15.0	36.5
25.	*P. melichrous*	25.5	14.8	58.0	4.9	19.2	7.2	28.2	11.2	43.9
26.	*Ha. michaeli*	28.0	15.9	56.7	-	-	10.1	36.0	12.2	43.5
	"	35.9	19.6	54.5	6.5	18.1	9.1	25.3	14.9	41.5
27.	*P. nanoserranus*	22.8	11.6	50.8	3.7	16.2	6.5	28.5	8.9	39.0
28.	*P. paraguiarti*	30.2	15.7	51.9	5.8	19.2	8.8	29.1	13.1	43.3
29.	*P. pellegrini*	21.0	10.7	50.9	3.1	14.7	5.4	25.7	8.0	38.3
30.	*Ha. plagiostoma*	30.4	17.7	56.5	7.0	23.0	9.0	29.6	13.0	42.7
	"	29.3	17.3	59.0	6.3	21.5	8.3	28.3	12.8	43.6
	"	28.8	17.5	60.7	6.0	20.8	7.9	27.4	12.1	42.0
	"	32.3	19.4	60.0	7.6	23.5	10.9	33.7	13.9	43.0
	"	31.7	18.9	59.6	5.8	18.2	8.3	26.1	12.6	39.7
31.	*P. prognathus*	23.2	11.1	47.8	4.5	19.3	6.8	29.3	9.3	40.0
	"	33.8	16.1	47.6	5.2	15.3	9.5	28.1	13.6	40.2
	"	34.5	16.6	48.1	6.2	17.9	10.0	28.9	13.8	40.0
	"	36.2	-	-	5.5	15.1	9.5	26.2	14.8	40.8
32.	*P. pseudopellegrini*	31.9	-	-	5.5	17.2	8.2	25.1	12.8	40.1
33.	*Ha. serranus*	26.6	14.8	55.6	6.1	22.9	8.3	31.2	11.2	42.1
	"	27.5	14.7	53.4	6.5	23.6	9.0	32.7	11.8	42.8
	"	27.4	15.1	55.1	6.0	21.8	8.9	32.4	12.0	43.7
	"	43.8	-	-	8.8	20.0	11.7	26.7	18.0	41.0
34.	*Ha. spekii*	36.9	20.1	54.4	7.8	21.1	11.4	30.8	16.0	43.3
	"	38.2	20.3	53.1	6.7	17.5	10.9	28.5	16.8	43.9
35.	*Ha. squamipinnis*	44.0	23.4	53.1	8.5	19.3	10.9	24.7	18.1	41.1
36.	*Ha. squamulatus*	34.8	19.3	55.4	7.8	22.4	10.8	31.0	14.7	42.2
	"	39.5	22.2	56.2	8.9	22.5	11.8	29.8	18.1	45.8
37.	*P. sulphurius*	25.3	12.6	49.8	4.2	16.6	6.9	27.2	10.5	41.5
	"	27.0	13.5	50.0	4.8	17.7	7.5	27.7	10.5	38.8
38.	*P. tridens*	24.6	12.8	52.0	4.2	17.0	6.7	30.8	10.2	41.4
39.	*P. tyrianthinus*	27.5	14.2	51.6	4.7	17.0	7.3	26.5	10.3	37.4
41.	*P. venator*	35.1	17.1	48.7	5.8	16.5	8.9	25.3	13.3	37.8
42.	*Ha. victorianus*	38.6	20.6	53.3	8.8	22.7	11.6	30.0	15.9	41.1
43.	*P. vittatus*	23.4	11.8	50.4	4.2	17.9	6.7	28.6	8.9	38.0
44.	*P. xenostoma*	45.5	22.4	49.2	7.6	16.7	11.3	24.8	18.8	41.3

Results and conclusions

There are several discrepancies between the ranges given by Greenwood (1980) and the ranges calculated from my measurements. In fact only one range (the NW/NL ratio for *Prognathochromis*) is more or less equal (fig. 7). The differences could be partly due to the fact that Greenwood's neurocranial characters are difficult to measure accurately: Only the measuring points of Neurocranial Length and Skull Width are (more or less) fixed. However, Otic Depth, which is measured between points on convex surfaces, and especially Preorbital Depth and Orbital depth, which are measured in the vertical plane from ill-defined points on the neurocranium to 'a horizontal line extended from the ventral face of the parasphenoid ', are bound to give results with a relatively large variation.

In order to show that there is not just overlap of the extremes of the ranges of the neurocranial measurements of the two genera, the measurements of the individual species are presented in fig. 8. This figure clearly show that there is indeed a considerable overlap in the neurocranial measurements which are supposed to separate *Harpagochromis* and *Prognathochromis*. These characters seem to form continuous morphoclines in which any division is arbitrary. Therefore, it is impossible to maintain the genera *Harpagochromis* and *Prognathochromis* as defined by Greenwood (1980). Greenwood (1984: 149), writing about morphoclines in the piscivorous haplochromines, states: 'one can trace changes in relative skull proportions, leading by differential growth of particular skull regions, from the generalized shape to one which is elongate and shallow '. As Greenwood (1980; 10) defined the *Harpagochromis* neurocranium as 'essentially of the generalised type' and the neurocranium of *Prognathochromis* was said to be 'elongate, slender and shallow' (Greenwood, 1980; 14) this statement is not applicable to only one of the two genera. This seems to imply that Greenwood (1984) realised that there is no clear morphological gap between the neurocrania of the two genera.

The majority of piscivorous haplochromine cichlids are immediately recognizable by a relatively large and slender body, a relatively small eye, a deep cheek, and a relatively long lower jaw (Greenwood, 1974; Witte & van Oijen, 1990). However, morphological variation among this most speciose trophic group of Lake Victoria haplochromines is large (Greenwood, 1974; van Oijen, 1982): There are deep bodied species like *H. victorianus* and *H. bareli*, small sized species like *H. perrieri* (Pellegrin, 1909) and *H. martini* (Boulenger, 1906), species with relatively large eyes like *H. maculipinna* (Pellegrin, 1912) and *H. boops* Greenwood, 1967, and species with a somewhat shorter lower jaw, like *H. guiarti*. It is possible to devide the piscivores in groups e.g. on the basis of body form or dentition. However, 'among the piscivorous predators it is possible to detect series showing a gradual, species by species changeover from a bicuspid biting dentition to unicuspid grasping dentition, (Greenwood, 1984: 149). Therefore problems arise when we want to delimit these groups. For almost any character a series of species can be made exhibiting the range from absent to fully develloped (Greenwood, 1974, 1984). It is this consistent lack of clear morphological gaps that makes the Lake Victoria haplochromine cichlid fauna so unique. Maybe, rather than making artifical taxonomic separations in morphoclines we should accept the fact that the evolution of the haplochromine cichlids in Lake Victoria has not (yet?) produced groups of species that deserve generic status.

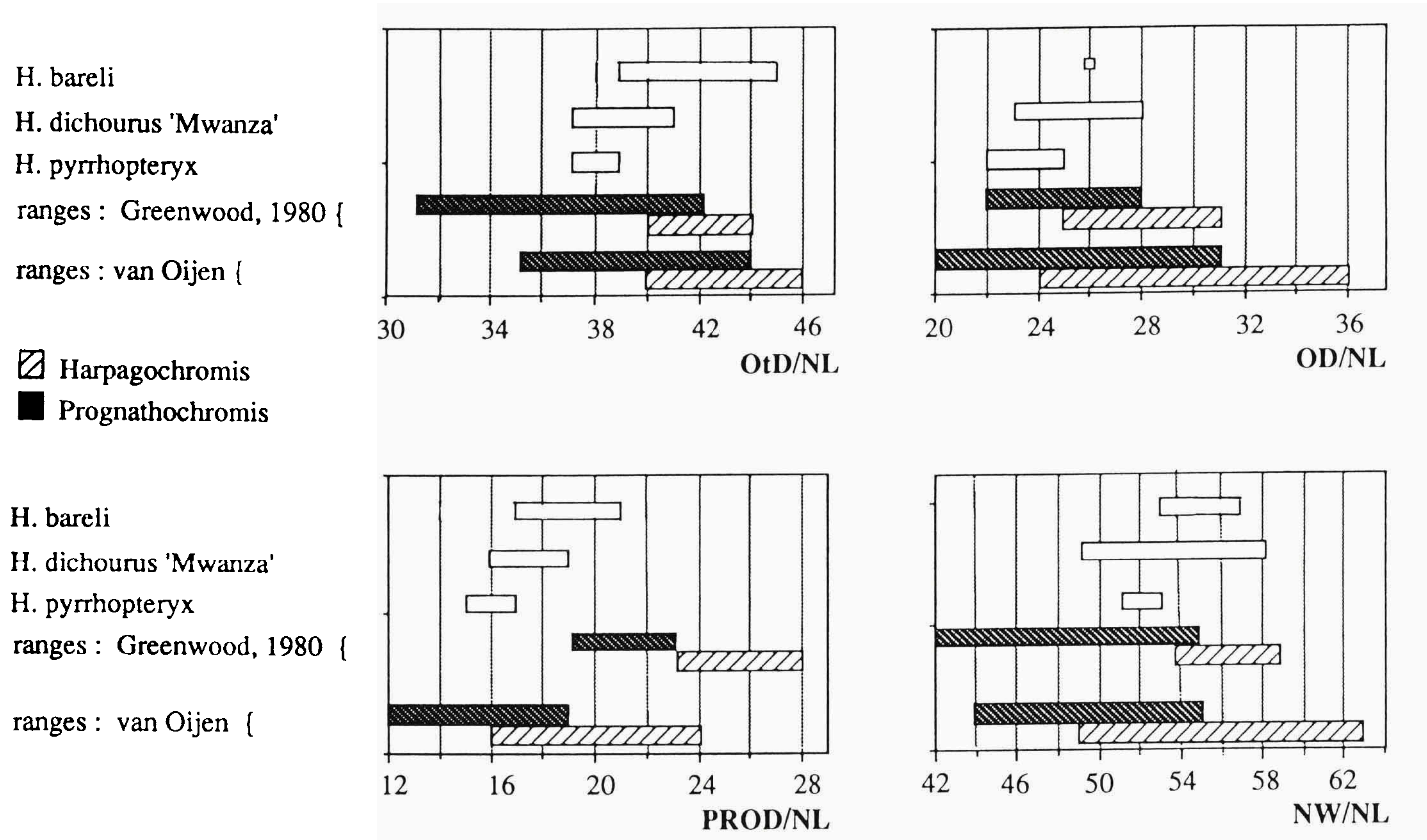


Fig. 7. Comparison of ranges of neurocranial measurements of species of *Harpagochromis* and *Prognathochromis*, as measured by Greenwood (1980) and by van Oijen on skeletal material from the BMNH collection (see table 1). Measurements of specimens of *H. bareli* spec. nov., *H. dichrourus* "Mwanza" and *H. pyrrhopteryx* spec.nov. from the Mwanza Gulf are by van Oijen, and have not been included in the ranges. OtD = Otic Depth, OD = Orbital Depth, PrOD = Preorbital Depth, NW = Neurocranial Width.

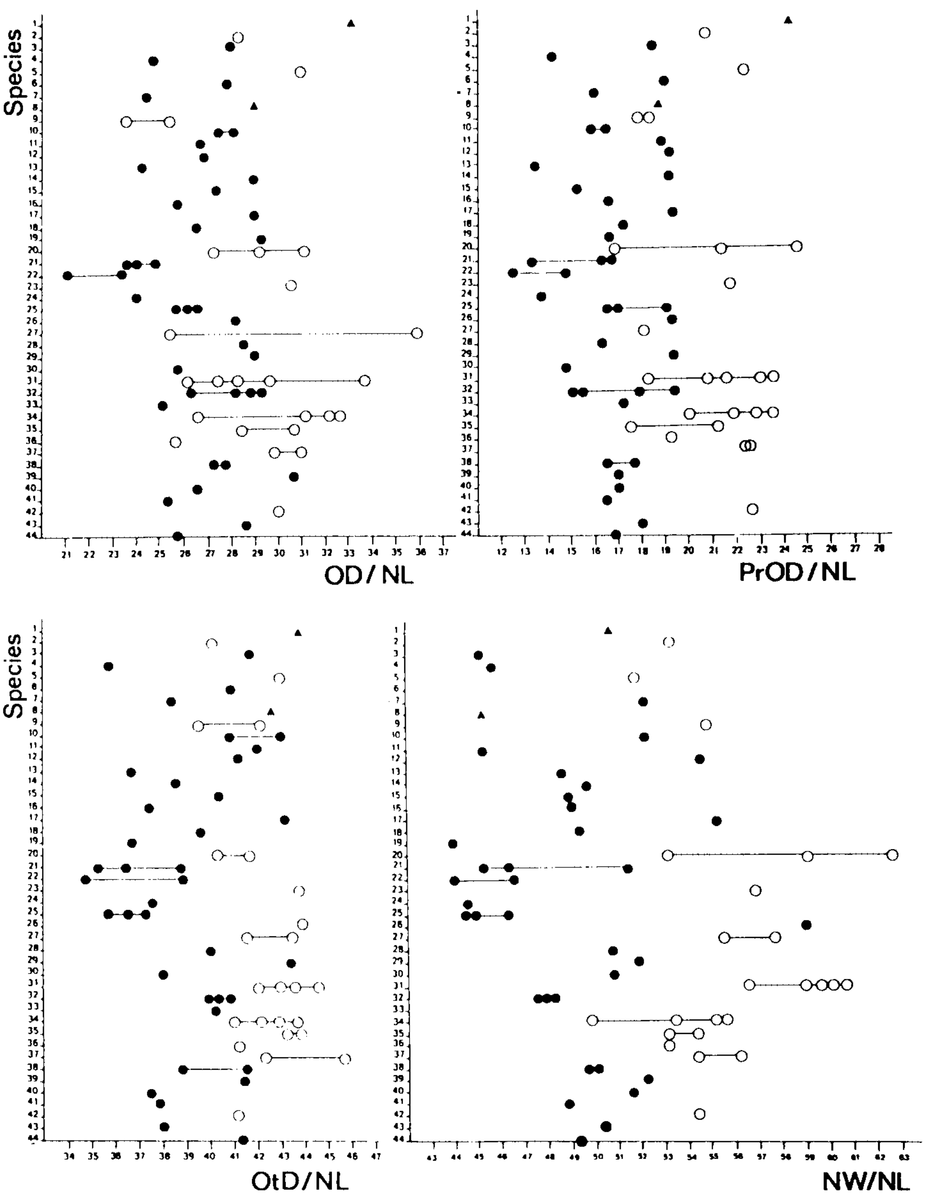


Fig. 8. Neurocranial measurements of species placed by Greenwood (1980) in *Harpagochromis*, *Prognathochromis* and *Psammochromis*, taken from neurocrania in the BM(NH) collection. Numbers on vertical axis refer to species in table 1. OtD = Otic Depth, OD = Orbital Depth, PrOD = Preorbital Depth, NW = Neurocranial Width. ● = *Prognathochromis* (Greenwood, 1980), ○ = *Harpagochromis* (Greenwood, 1980), ▲ = *Psammochromis* (Greenwood, 1980).

Perhaps the definition of the genus *Haplochromis* should be broadened rather than narrowed, to encompass all endemic Lake Victoria haplochromine cichlids. The gap between *Haplochromis* and the monotypic genera was already disputed by Regan (1922: 160) who,in his revision of the cichlid fishes of Lake Victoria stated: 'a few extreme types are regarded as generically distinct although the close relationship of each to a species of *Haplochromis* is obvious.' Greenwood (1974: 103), not long before his generic revision wrote: 'The generic status of *Macropleurodus* and *Paralabidochromis* is, I now think questionable.' The morphological differences between several *Haplochromis* species are of the same magnitude as those between certain *Haplochromis* species and *Platytaeniodus degeni* and *Hoplotilapia retrodens* (Witte, pers. comm.)

In my view Greenwood (1967: 32), discussing the problem of the generic division of the Lake Victoria haplochromine cichlids, was right when he stated: 'I do not think that the question can be dealt with untill the whole Lake Victoria species flock has been described.' Till then, I would propose to describe all new species of Lake Victoria haplochromine species in the genus *Haplochromis*.

Criteria to distinguish species

Criteria to distinguish haplochromine species in Lake Victoria were proposed by van Oijen et al. (1981) and refined by Hoogerhoud & Witte (1981) and Witte & Witte-Maas (1987). Adult specimens are considered conspecific when they share a unique combination of morphological (incl. coloration), ethological and ecological characters. Species description of cichlids from Lake Malawi (Marsh et al, 1981; Lewis, 1982; Marsh, 1983; Ribbink et al., 1983) and Lake Tanganyika (Yamaoka, 1982, 1983) give the impression that information on depth distribution, territory size, feeding behaviour, feeding site utilization, agression and courtship collected by underwater observations are almost indispensible for getting a clear insight into the taxonomy of lacustrine cichlids.

Indeed it is only by underwater observations that direct evidence for reproductive isolation under natural conditions, Mayr's (1942) criterion for species definition, can be obtained. However, because of the opacity of the water, underwater observations in the Mwanza Gulf are impossible. Thus, in contrast to researchers working on cichlids in the clear rift lakes, taxonomists dealing with Lake Victoria material have to rely more on the classical taxonomical approach concentrating on morphological differences. However, field data on live coloration were often essential to trigger the search for morphological differences (see Hoogerhoud & Witte, 1981). I follow Witte & Witte-Maas (1987) in taking as a rule that because of its role in the Specific Mate Recognition System, distinct differences in male coloration indicate different species.

In addition to data on colour patterns, data concerning breeding places and breeding seasons, deduced from catch data, and ecological data inferred from stomach contents investigations and samples from food organisms from the preferred habitat, are used as much as possible (e.g. Hoogerhoud et al., 1983; Goldschmidt et al., 1990; Goldschmidt & Witte, 1990)).

Intraspecific variation

When comparing specimens of described species from the Mwanza Gulf with material from the northern part of the lake, my morphological criteria for species distinction appeared narrower than that of previous authors. Material used for redescriptions proved polyspecific and contained specimens which could not be placed in any of the described species. In a number of cases these specimens could be placed in what I considered undescribed species from the Mwanza Gulf. After the misidentified specimens were removed, morphometric ranges of the material from the northern part of the lake still were found to be larger than those of conspecifics from the Mwanza Gulf. This in spite of the fact that collections from the Mwanza Gulf for a certain size range are larger. The wider morphometric ranges of the species in the BM(NH) collections may be caused by the fact that the BM(NH) collections of one particular species are composed of samples from different localities which are often hundreds of kilometers apart. Geographical variation in morphometric ranges apparently is a common feature of Lake Victoria haplochromine cichlids (see Witte & Witte-Maas, 1987).

Recently the first examples of intraspecific variation in Lake Victoria haplochromine cichlids were described by Witte & Witte-Maas (1987). Working on zooplanktivorous species collected from different areas of Lake Victoria, they noticed differences in certain morphometric ranges and details of coloration between allopatric specimens belonging to one species. Citing many recently described examples of phenotypic plasticity in cichlids, Witte & Witte-Maas (1987) made it plausible that the differences between the allopatric forms could be, for the greater part, a result of influences of environmental conditions on the phenotype, and consequently described the forms as populations. Regrettably, insufficient material from different areas is available to engage in a similar analysis for the species described below. Specimens of *H. dichrourus* Regan, 1922, were collected from four different areas around the lake, but from three areas only two to four specimens were collected. However, comparison of the four groups of specimens showed small but consistent differences in morphometric measurements and differences in the shape of headmarkings. As it is very unlikely that additional material of this species will become available we probably will never be able to find out whether the variation is clinal or discontinuous. Therefore the taxonomic status of these forms will always be uncertain. To emphasize the existence of geographic variation in this species I have, like Witte & Witte-Maas (1987), adapted the suggestion of Wilson & Brown (1953), who advocated the usefulness of adding to the specific name, the name of the locality where the population is found. Considering the distance between various areas where the specimens of *H. dichrourus* were collected and the ecological barriers which separate the areas, the taxonomic status of population for the geographic forms seems amply justifiable. Four specimens of another species, *H. pyrrhopteryx* spec. nov., collected in three different areas outside the Mwanza Gulf, did not differ markedly from their Mwanza Gulf conspecifics. This species inhabits deeper waters, which in various parts of the lake have more ecologically important factors in common than have the shallow areas. Possibly the species has a more continuous distribution.

Sexual dimorphism in morphological characters was only found in the maximum size: in all species, here described, for which adult males and females are known, females reach a larger size than males.

Species descriptions

Haplochromis bareli spec. nov.
(figs 3, 9-25, 104, tables 2-4)

Haplochromis "black"; van Oijen, 1982: 340, 349.

Material. — Holotype, ♂, 100.5 mm, RMNH 29600, Mwanza Gulf, Tanzania, Lake Victoria, 7.x.1977, HEST; Paratypes: 1 ♀, 69.1 mm + 3 ♂♂, 89.0-93.0 mm, RMNH 29612-15, Mwanza Gulf, Tanzania, Lake Victoria, G.Ch. Anker & C.D.N. Barel. Other paratypes from the Mwanza Gulf, Tanzania, Lake Victoria collected by HEST; 2 ♀♀, 77.2, 89.5 mm, RMNH 29651, 29616, 1977; 1 ♂, 81.8 mm + 1 ♀, 105.8 mm, MNHN 1987-1668, 4.xi.1977; 2 ♀♀, 98.4, 109.8 mm, RMNH 29654-55, 18.xi.1977; 1 ♀, 106.2 mm, RMNH 29617, 28.xi.1977; 1 ♂, 103.0 mm BMNH 1987.2.4:18., 16.xii.1977; 1 ♀, 108.3 mm, RMNH 29619, 23.xii.1977; 1 ♀, 118.2 mm, RMNH 29610, 6.1.1978; 1 ♂, 97.4 mm, RMNH 29611, 7.iv.1978; 1 ♀, 63.8 mm, RMNH 29620, 28.iv.1978; 1 ♂, 64.0 mm, RMNH 29621, 5.v.1978; 1 ♂, 73 mm, RMNH 29622, 19.v.1978; 1 ♀, 103.5 mm, RMNH 29623, 26.v.1978; 1 ♀, 114.1 mm, RMNH 29624, vi.1978; 1 ♀, 115.2 mm, RMNH 29625, 9.vi.1978; 1 ♂, 109.1 mm + 1 f 116.0 mm, RMNH 29628-29, 29.xii.1978; 1 f, 78.1 mm, ANSP 168240, 29.xii.1978; 1 ♂, 103.0 mm, RMNH 29627, 29.xii.1978; 1 ♀, 119.8 mm, RMNH 29607, 1978; 1 ♂, 102.0 mm, RMNH 29609, 19.i.1979; 1 ♂, 109.9 mm, RMNH 29632, 9.xi.1979; 1 ♀, 82.6 mm, ANSP 168239; 1 ♀, 44,5 mm, RMNH 29633, 12.iii.1979; 1 ♂, 92.4 mm, RMNH 29634, 14.iv.1979; 2 ♀♀, 82.0, 96.2 mm + 3 ♂♂, 81.3-97.0 mm RMNH 29635-39, 20.iv.1979; 1 ♀, 100.0 mm S.L., RMNH 30388, 20.iv.19978; 1 ♀, 52.8 mm, RMNH 29640, 25.iv 1979; 2 ♂♂, 57.5, 92.00 mm, RMNH 29641-42, 4.v.1979; 3 ♂♂, 78.1-94.6 mm, RMNH 29601-03, 4.v.1979; 1 ♂, 42.5 mm, RMNH 29643, 13.iii.1980; 1 f, 108.0 mm, RMNH 29644, 21.iv.1980; 1 ♀, 125.0 mm, BMNH 1987.2.4:19, 22.iv.1980; 2 ♀♀, 124.5, 124.8, RMNH 29646-47, 23.iv.1980; 1 ♀, 41.1 mm, RMNH 29648, 16.v.1980; 1 ♂, 97.0 mm, RMNH 29608, 22.i.1980; 1 ♂, 71.1 mm + 1 ♀, 72.0 mm, RMNH 29649-50, 1.vi.1984. Paratype from Speke Gulf: 1 ♀, 100 mm, RMNH 29626, 2.viii.1978. Other material: 2 ♀♀, 99.0, 106.0 mm, RMNH 30382-83, 6.ix.1979.

Etymology.— This species is named in honour of Dr C.D.N. Barel, the initiator of the Haplochromis Ecology Project, who first collected specimens of this species. His stimulating enthusiasm and interest in all aspects of biology engaged many biology students in cichlid research. His research has contributed much to our knowledge of the Lake Victoria haplochromine cichlids.

Diagnosis.— A small to medium sized, relatively deep-bodied, piscivorous species with relatively large eyes and strongly recurved unicuspids teeth in the oral jaws. Live males are entirely black on the ventral two-third of head and body. Snout brownish. Dorsal part of head and body, dark blueish-grey. Live females have at least the lower half of the flank black, but the ventral side is bright white. Snout and head ventral to the eye greyish. Dorsal part of head and body golden-yellow.

Description.— (based on 55 specimens (including the holotype) 41-125 mm standard length).

Habitus.— A relatively deep-bodied species with a rather generalized habitus. Dorsal head outline hardly to slightly interrupted by the premaxillary pedicel. Snout somewhat blunt. Cephalic lateral line openings not enlarged; lateral line canals on the lachrymal not visible. Eye circular and relatively large, pupil subcircular with a distinct aphakic aperture rostro-ventrally to the lens. Mouth slightly to moderately oblique. Premaxilla not expanded medially. Exposed part of maxilla small, the posterior tip reaching a vertical just rostral to the anterior border of the eye lens. Lips normal. Lower jaw isognathous or prognathous (mainly in larger specimens), slightly protruding. Rostral outline of lower jaw slightly convex with a smoothly rounded mental area, rarely with a small mental protuberance. Lateral sides of lower jaw slightly to moderately oblique.

Scales.— Cheek, gill-cover, nape and neck with cycloid scales; weakly ctenoid scales sometimes present on gill-cover and nape. Scales on the dorsum either all cycloid or an admixture of cycloid and a few weakly ctenoid scales. Some cycloid scales may be present on the ventral part of the chest, otherwise all body scales ctenoid. A gradual size transition between scales of chest and the adjoining parts of the body. Small elongate scales on the proximal half of the caudal fin.

Fins.— Dorsal and anal fin relatively high for a piscivorous species. Pectoral and pelvic fins just or not quite reaching the anal fin. Dorsal and anal fin not reaching base of caudal fin. Pelvics with first soft ray slightly produced. Caudal fin outline truncate and slightly emarginate.

Gill-apparatus.— Eight or nine gill rakers on the lower part of the first gill arch; the lowermost 1 or 2 reduced, the following 3 slender and somewhat conical, and the upper 4 flattened with slightly expanded crowns. Approximately 128 gill filaments on the first hemibranch.

Viscera.— Intestine length varies from 1.1-1.3 times the standard length (n = 30). Following the definitions of Zihler (1982) the arrangement of the digestive tracks of adult *H. bareli* is of type D (with backflap).

Oral teeth.— Shape. In adult specimens over 77 mm SL, teeth of the outer row are rather stout, conical and acutely pointed unicuspids, moderately to strongly curved. Specimens smaller than 77 mm SL have an admixture of equally bicuspids and unicuspids, with the unicuspids dominating. In these specimens the teeth, especially the crowns, are somewhat compressed. The unicuspids may be shouldered, the bicuspids with the major cusp sharply pointed. Inner rows: In larger specimens the inner rows in both jaws consist mainly of rounded, acutely pointed unicuspids, some weakly bicuspids and tricuspids may also be found. Bicuspid and tricuspid teeth more numerous in smaller specimens. All inner teeth moderately curved. Tooth size gradually decreasing from rostral to caudal.

— Dental arcade and toothband. Dental arcade rounded in upper jaw, slightly acute in lower jaw. Two inner rows in both jaws. Distance between outer row and first inner row slightly larger than the distance between the inner rows.

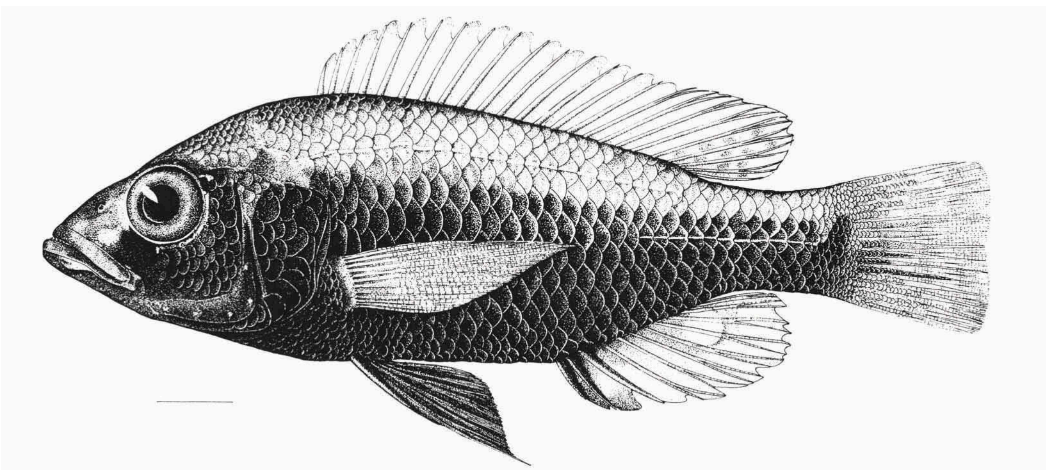
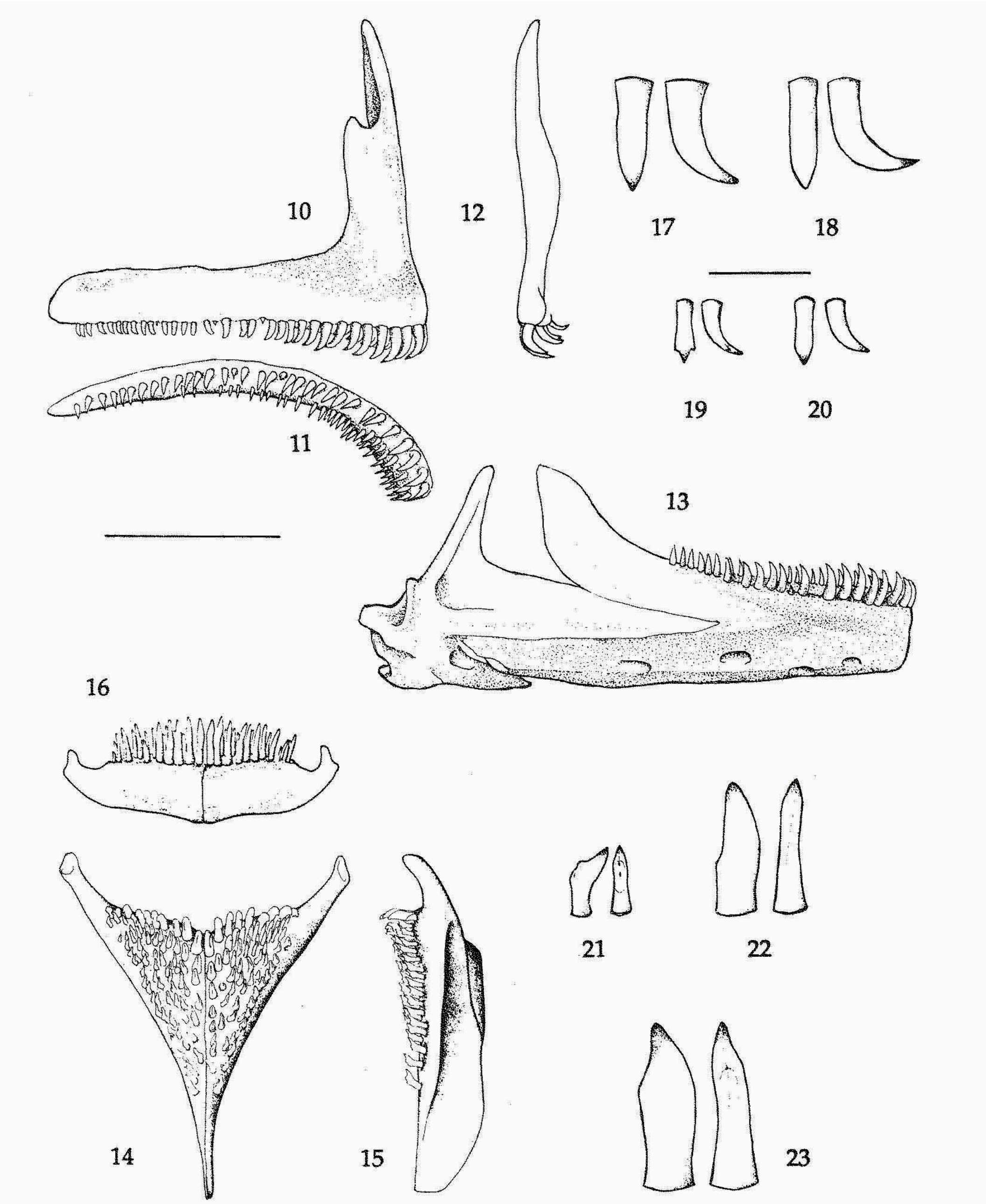


Fig. 9. *Haplochromis bareli* spec. nov. Paratype, RMNH 29601. Scale equals 10 mm.



Figs 10-23. *Haplochromis bareli* spec. nov. Fig. 10. Premaxilla, lateral view. Fig. 11. Premaxilla, view perpendicular to dentigerous area. Fig. 12. Premaxilla, medial view of ascending arm. Fig. 13. Lower jaw, lateral view. Fig. 14. Lower pharyngeal element, dorsal view. Fig. 15. Lower pharhyngeal element, lateral view. Fig. 16. Lower pharhyngeal element, caudal view. Figs. 17-20. Premaxillary teeth, labial and lateral view. Fig. 17. Fourth tooth of outer row. Fig. 18. Second tooth of outer row. Fig. 19. Third tooth of first inner row. Fig. 20. Fourth tooth of first inner row. Figs. 21-23. Lower pharhyngeal teeth, lateral and rostral view. Fig. 21. Seventh lateral tooth. Fig. 22. Fourth tooth of caudalmost row. Fig. 23. Second tooth of caudalmost row. Scale of bony elements = 5 mm, scale of teeth = 1 mm.

— Counts and setting. 52-62 teeth in the outer row of the upper jaw, 36-52 in the lower jaw, the numbers showing a positive correlation with standard length. Outer row teeth are regularly set at a distance equal to or slightly less than the diameter of the toothbase. Outer row occupying 9/10 of the premaxilla and on the dentary reaching the first third of the coronoid wing. Inner rows occupying 3/5 of the outer row length on the premaxilla and 3/4 on the mandible.

—Implantation. In upper jaw outer row teeth erect (medial teeth) to slightly recumbent (caudal teeth). In lower jaw outer row teeth slightly procumbent (medially) to erect (caudally). All teeth slightly suspensoriad inclined. Implantation of inner row teeth strongly recumbent.

Pharyngeal teeth.— Counts. About 20 teeth in the caudalmost row. Nine teeth in the median series.

— Shape. Most pharyngeal teeth of the bevelled type, relatively fine and acutely pointed; some medial teeth of caudalmost row and some caudal teeth of median row relatively stout and hooked, with a blunt rostro-dorsad directed major cusp. Tooth size increasing from rostral to caudal and from lateral to medial.

Osteology.— The osteological descriptions are based on skeletal elements of five dissected specimens, SL 97.4-119.8 mm. Description of oral teeth based on all type specimens.

— Neurocranium. Compared with the neurocranium of a generalized cichlid (*H. elegans* (Barel et al., 1976)) that of *H. bareli* is both broader and more slender, the otic region is less deep but the supraoccipital crest is deeper. The ethmovomerine block is less decurved and slightly longer than that of *H. elegans*. As in most piscivorous cichlids from Lake Victoria the pharyngeal apophysis is situated further caudally as compared with the generalized type, and the postorbital process is broadened.

— Oral jaws. Premaxilla; dentigerous arm longer than ascending arm, angle between the arms 78-82°. Both arms relatively broad. Ventral outline of dentigerous arm almost straight. Ventral part of the ascending arm very slightly expanded. Mandible relatively stout, with a rather steep coronoid process. Length/depth ratio of 2.5. The tooth bearing part is slightly less than half the jaw length.

— Lower pharyngeal element. Lower pharhyngeal element rather shallow, slightly longer than broad (length/width = 1.05-1.17). Dentigerous area slightly broader than long (length/width = 0.85-1.00).

— Vertebrae. There are 29 vertebrae, comprising 13 abdominal and 16 caudal elements (n= 7).

Coloration.— Live quiescent males have a deep black colour below an irregular horizontal line through the dorsal margin of the gillcover. The irregular shape of the dorsal border of the black area indicates that it is built up of six or seven broadened vertical bars. The cheek and snout may be slightly lighter with a dark brown or copper sheen. Dorsal aspects of snout dark golden green. The dorsal, lighter part of the body dark grey with a distinct bluish flush. Fins: pectorals grey, pelvics black, anal black rostrally and near the fin base, the remaining part white with a faint red flush rostrally. Dorso-caudally on the anal two or three relatively large, orange-yellow egg-dummies bordered by a white inner and a dark outer rim, the egg-dummies sometimes partly fused. Dorsal fin dull white, with small, dark lappets and small dark red spots between the rays. Caudal sooty proximally, dull white distally, dark red spots and streaks between the rays.

— Sexually active males. Almost entirely black, the red spots between the fin rays brighter than in quiescent males. Caudal fin usually with a red flush. Exceptionally the entire caudal and anal fins bright red. A brown-coppery flush on the head and dorsal part of the body.

— Sexually active females. Ventral part of the head grey with a lighter ventral side. Gill-cover dark grey to black. The body with a partly similar black area as in males. The dorsal and caudal extension of the black area variable. More often than in males the females have the caudal part of the black area broken up in broad vertical bars. Dorsal margin of black area mostly touching a horizontal through the dorsal edge of the gill-cover but in some specimens extended to the dorsal fin base. Chest and ventral side bright white, caudal part of caudal peduncle lighter grey. Dorsal parts of body and head greyish-yellow. Fins: pectorals hyaline, pelvics white. Anal

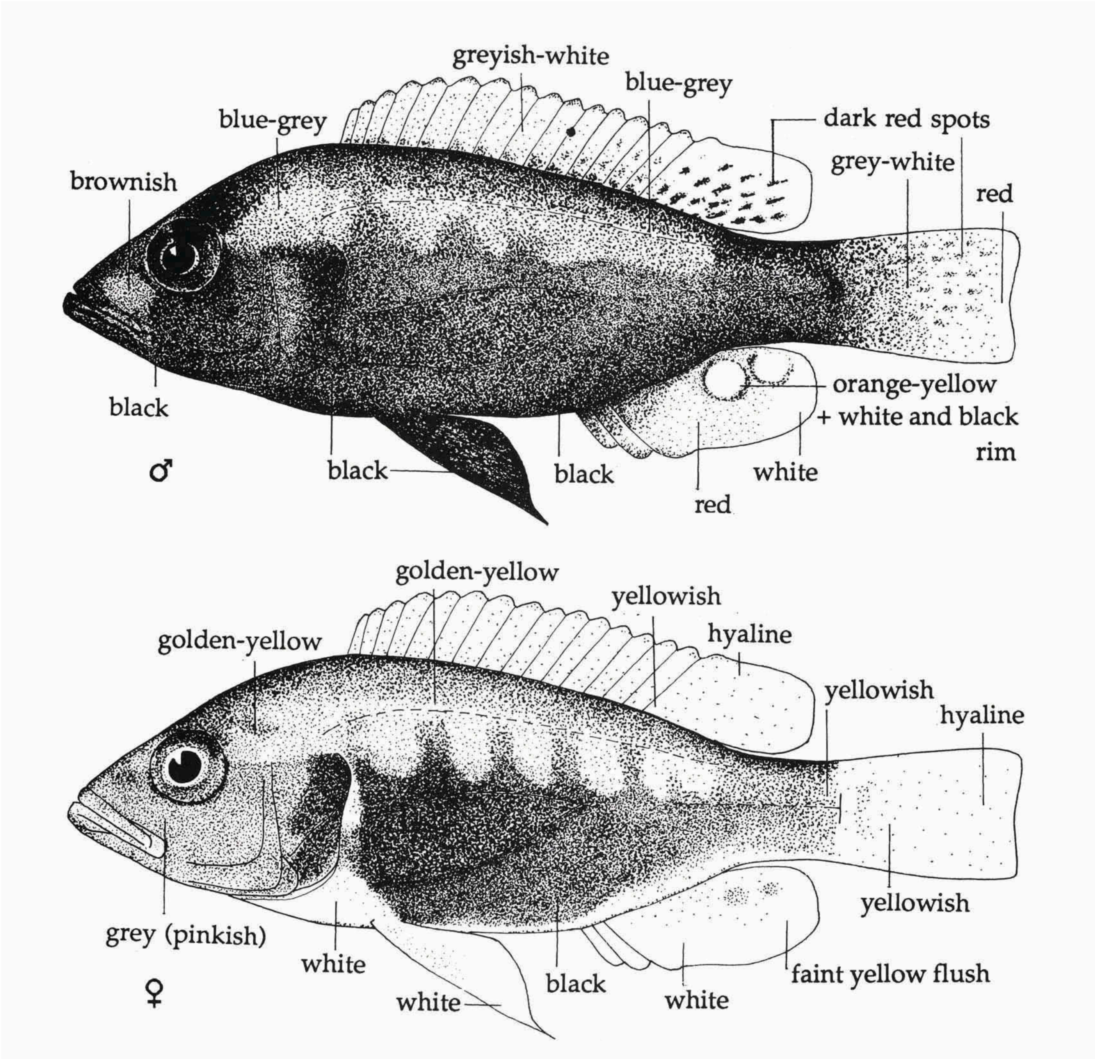


Fig. 24. *Haplochromis bareli* spec. nov. Live colours and markings of a sexually active male and ripe female.

Table 2. Ranges of linear measurements of *Haplochromis bareli* spec. nov.

Standard length range in mm		41.0-57.5	63.3-78.1	81.0-89.5	90.8-98.4	100.0-109.1	114.1-125.0
Number of specimens		5	9	10	10	11	9
Body Depth	% SL	30.7-33 8	33.7-37.3	33.3-37.9	33.4-36.7	34.2-36.1	35.3-37.8
Pectoral Fin Length	% SL	23.5-29 2	27.0-31.1	28.1-30.4	28.2-31.9	27.4-32.7	27.6-32.1
Caudal Peduncle Length	% SL	16.6-19.7	14.3-18.2	15.2-17.1	14.7-18.3	14.8-17.2	14.8-16.9
Caudal Peduncle Depth	% SL	11.8-12.5	10.6-12.9	11.3-12.4	10.8-13.2	10.9-12.5	11.2-12.0
Caudal Fin Length	% SL	24.4-26.5	23.5-27.2	23.1-25.1	23.1-25.9	21.9-24.8	22.5-24.7
Head Length	% SL	34.8-37.7	36.3-37.9	35.6-38.1	35.7-38.2	36.0-38.0	36.9-38.5
Snout Length	% HL	25.3-30.5	26.8-31.2	28.5-31.3	28.9-33.3	30.2-33.0	31.3-34.4
Snout Width	% HL	29.5-32.8	31.5-34.7	30.1-34.8	30.2-34.2	29.7-34.7	29.3-34.6
Head Width	% HL	43.1-45.1	43.9-45.9	44.3-48.8	44.7-46.6	42.7-46.5	42.7-48.1
Interorbital Width	% HL	19.0-22.5	20.6-24.4	22.8-26.9	22.7-24.7	22.8-26.5	24.5-28.1
Preorbital Width	% HL	24.5-27.3	26.0-30.1	24.2-30.9	24.7-30.3	26.7-30.8	27.3-32.4
Lachrymal Width	% HL	24.5-29.8	26.0-28.8	26.7-30.1	25.5-29.1	24.8-30.5	26.3-30.7
Preorbital Depth	% HL	12.6-15.9	14.5-17.0	15.5-17.8	15.0-18.2	15.9-18.0	17.0-19.9
Eye Length	% HL	29.1-37.8	27.4-31 2	25.3-30.4	24.7-30.7	24.8-28.3	23.7-28.1
Cheek Depth	% HL	14 1-20.6	19.0-22 5	19.0-23.6	18.6-22.4	21.1-24.0	22.0-25.1
Lower Jaw Length	% HL	40.5-46.4	42.7-47.4	46.0-49.2	45.1-49.1	47.0-52.0	48.8-53.1
Lower Jaw Width	% HL	18.7-22.4	18.6-22.2	17.6-23.5	19.7-23.2	19.7-23.7	19.7-25.9
Upper Jaw Length	% HL	30.5-35.2	33.7-37.Z	33.1-39.2	36.6-38.8	36.0-40.9	37.8-42.5
Premax. Pedicel Length	% HL	25.1-26.9	24.1-27.7	24.9-28.1	25.6-27.8	26.2-30.0	26.9-29.8

Table 3. Means and standard deviations of linear measurements of *Haplochromis bareli* spec. nov.

Standard length range in mm		41.0-57.5	63.3-78.1	81.0-89.5	90.8-98.4	100.0-109.1	114.1-125
Number of specimens		5	9	10	10	11	9
Body Depth	% SL	32.0±1.2	34.2±1.3	34.7±1.7	34.8±0.7	35.3±0.8	36.1±0.8
Pectoral Fin Length	% SL	26.6±2.1	28.5±1.8	29.2±0.6	29.9±1.4	29.5±1.3	29.7±1.4
Caudal Peduncle Length	% SL	18.2±1.1	16.8±1.0	16.2±0.6	16.0±1.7	15.7±0.7	15.9±0.7
Caudal Peduncle Depth	% SL	12.2±0.5	12.0±0.7	12.0±0.7	11.8±0.6	11.6±0.4	11.6±0.2
Caudal Fin Length	% SL	25.5±0.8	24.8±1.4	24.2±0.9	24.4±0.9	23.1±0.9	23.5±0.5
Head Length	% SL	37.1±1.2	37.3±0.4	36.7±0.6	37.1±0.8	37.0±0.6	38.0±0.4
Snout Length	% HL	27.0±1.8	29.2±1.5	29.7±0.8	31.0±1.3	31.2±0.9	33.1±0.9
Snout Width	% HL	30.7±1.2	33.0±1.0	32.7±1.4	32.3±1.2	33.3±2.0	33.1±2.0
Head Width	% HL	44.1±0.8	44.4±1.0	44.9±0.7	45.2±0.6	45.1±1.2	45.9±2.1
Interorbital Width	% HL	20.1±1.2	22.5±1.1	24.4±1.2	23.6±0.7	24.8±1.2	25.4_1.0
Preorbital Width	% HL	26.1±1.1	26.9±1.4	27.8±2.2	28.1±1.3	28.5±1.2	28.7±0.6
Lachrymal Width	% HL	25.9±1.2	27.4±0.7	28.0±1.4	28.0±1.1	28.9±1.5	28.2±1.5
Preorbital Depth	% HL	13.9±1.1	15.6±1.6	16.4±0.7	16.4±0.9	16.8±0.6	18.4±0.6
Eye Length	% HL	33.9±3.0	29.3±2.3	28.1±2.5	26.0±1.5	26.3±1.1	24.8±1.6
Cheek Depth	% HL	16.6±2.3	20.0±1.2	20.7±1.4	20.2±1.2	22.4±1.1	23.3±0.9
Lower Jaw Length	% HL	43.5±2.4	45.1±1.4	47.0±1.0	47.1±1.2	49.7±1.4	51.1±1.6
Lower Jaw Width	% HL	20.3±1.8	20.1±1.0	20.3±2.2	20.7±1.4	21.9±1.8	24.3±2.6
Upper Jaw Length	% HL	33.3±1.6	35.3±0.9	36.6±1.6	37.9±0.6	38.2±1.3	40.2±1.6
Premax. Pedicel Length	% HL	25.6±0.6	26.3±1.1	26.5±1.3	26.8±0.4	27.1±1.4	28.6±1.4

white rostrally, more hyaline caudally. One or two small yellow orange spots on the caudal part. Dorsal hyaline, yellowish basally. Caudal yellowish proximally, hyaline distally and bright yellow ventrally.

— Sexually inactive females and juveniles have the same coloration as the sexually active females although the lighter ventral area is less contrasting and the yellow sheen on the body is duller and darker. The smallest juveniles (SL < 60 mm) have, on the flank and the rostral part of the caudal peduncle, six or seven vertical bars which do not extend onto the dorsum or ventral side.

— Preserved coloration of males and females are equally distinctive, as the contrast between the dorsal and ventral parts of the body is increased by preservation. Thus, preserved males are deep black ventrally, with the dorsal part of head and body light greyish-brown. The dorsal side a shade lighter. The caudal part of the snout and a small area just caudal to the eye light grey. On the head a supraorbital stripe, a nostril stripe and a blotch just rostral to the dorsal fin may be visible. Fins: pectorals whitish, pelvics and rostral part of anal black, caudal part of anal hyaline. Dorsal greyish, lappets darker. Caudal sooty proximally, hyaline distally. Dark spots between rays of dorsal and caudal.

— Preserved females have the head darker grey-brown, nape lighter, gill-cover almost black and the body light yellowish-brown. On flank, belly and rostral part of the caudal peduncle a black area is present, which may be more or less divided in six or seven broad vertical bars. Chest and ventral side light yellowish. All fins whitish-hyaline.

Distribution.— *H. bareli* is only known from Lake Victoria. Specimens were caught in the northern part and the entrance of the Mwanza Gulf, and near Nafuba Island and in Magu Bay of the Speke Gulf (Tanzania).

Ecology.— Occurrence. In the period from 1977-1980 *H. bareli* was a common piscivorous species in the open water of the Mwanza Gulf. Since the explosive increase of Nile perch population in the Mwanza Gulf area, *H. bareli* has disappeared from the catches.

— Habitat. Most specimens were caught in a bottom trawl over mud bottoms with a depth of 8-20 m. A few specimens were captured at a depth of 25 m. The smallest specimens were collected over mud bottoms at a depth of 2-4 m in shallow bays. Gillnet catches indicate that *H. bareli* lives near the bottom.

— Food. Intestines of 36 specimens of *H. bareli* were examined. Thirteen of these were empty, 18 contained remains of haplochromine fishes, two contained remains of *Rastrineobola argentea* (Pellegrin, 1904), five contained *Chaoborus* Lichtenstein, 1800, larvae, pupae and undeterminable insects, and remains of the shrimp *Caridina nilotica* (Roux, 1833) were found in only one specimen each. *H. bareli* specimens of 45 to 98 mm SL, were found to prey on haplochromines of 9 to 16 mm, and specimens of 117 and 118 mm SL had preyed on haplochromines of 20 to 30 mm. H. bareli therefore is a predator of juvenile (mostly postbuccal) haplochromines. The *Rastrineobola* preys were of a much larger size; a specimen of *H. bareli* of 110 mm SL had ingested a specimen of 50 mm (see van Oijen, 1989 for an explanation of the length difference between the prey species).

— Breeding and growth. *H. bareli* matures at approximately 80 mm SL. Ripe males have been caught from January till May, spent females were present in catches during April and August, but no information is available on the type of breeding.

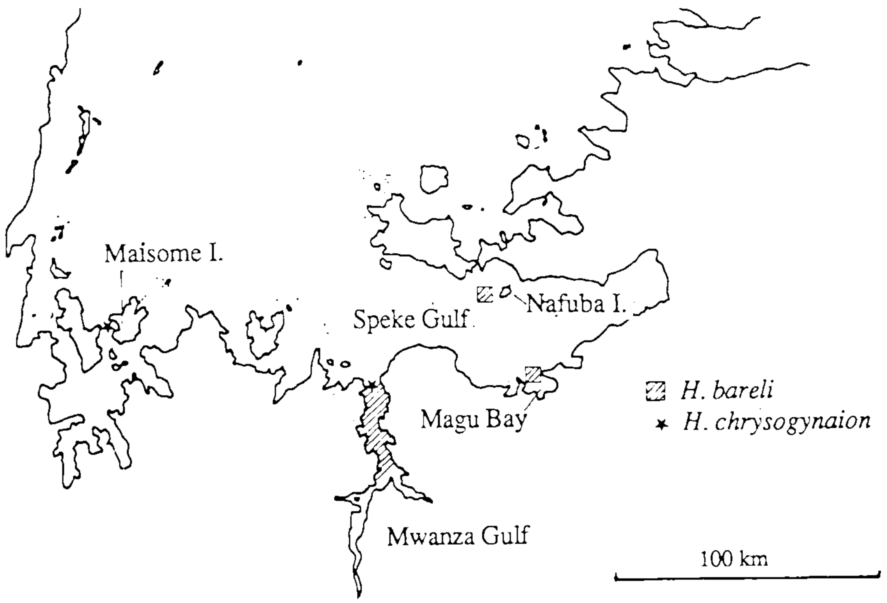


Fig. 25. Catch localities of *Haplochromis bareli* spec. nov. and *H. chrysogynaion* spec. nov. in the southern part of Lake Victoria.

Table 4. Angular and qualitative measurements, and counts of *Haplochromis bareli* spec. nov.

	ranges			mean ± st.dev.
Dorsal Head Profile Inclination	27°-43°			33.0° ± 4°
Premaxillary Pedicel Inclination	32°-50°			41.0° ± 4°
Snout Acuteness	65°-79°			73.2° ± 3°
Gape Inclination	30°-38°			34.6° ± 2°
Dorsal Head Profile (curvature)	+			
Premaxillary Pedicel Prominence	0(+)/+			
Lower Jaw Anterior Extension	0/+			
Lateral Snout Outline	0/+			
Mental Prominence	0/+			
Lip Thickening	0			
Premaxilla Beaked	0			
Premaxilla Expanded	0			
Maxillary Posterior Extension	0			
Cephalic Lateral Line Pores: Width	0			
Lateral Line Scales	30 (f= 2);	31 (f= 7);	32 (f= 17);	33 (f= 12)
Lateral Line - Dorsal Fin (Sc.rows)	5 (f= 10);	6 (f= 20);	7 (f= 8)	
Pectoral - Pelvic Fin Bases (Sc.rows)	5 (f= 10);	6 (f= 18);	7 (f= 8);	8 (f= 2)
Cheek (Vertical Sc.rows)	3 (f= 6);	4 (f= 31);	5 (f= 1)	
Dorsal Fin (Spines/Rays)	XIV 9 (f= 1);	XV 8 (f= 1);	XV 9 (f= 25);	
	XV 10 (f= 6);	XVI 8 (f= 2);	XVI 9 (f= 2)	
Anal Fin (Spines/Rays)	III 8 (f= 19);	III 9 (f= 19)		

The right ovary grows larger than the left one. Eggs measured in ripe ovaries of females of 92 and 93 mm SL were approximately 3.3×2.5 mm and 3.8×3.0 mm, respectively. Females grow to a larger size than males; the largest female was 125 mm SL, the largest male 100 mm SL. Generally, however, the males are in the range 85-95 mm SL, while females regularly reach a size of 100 mm SL.

Haplochromis dichrourus Regan, 1922
(figs 4, 5, 27-62, tables 5-9)

Paratilapia serranus (part): Boulenger, 1915: 334
Haplochromis dichrourus Regan, 1922: 178, fig. 6; Greenwood & Barel, 1978: 480-481, fig. 46
"Haplochromis" dichrourus; van Oijen et al., 1981: 161.
Haplochromis dichrourus (part); Greenwood, 1967: 65-69, fig. 11 & 1974: 52.
Prognathochromis (P.) dichrourus (part); Greenwood: 1980:19.
Haplochromis pellegrini (part); Greenwood, 1962: 236-239.

Diagnosis. A medium to moderately large (depending on the locality; see below) piscivorous species with strongly curved unicuspid teeth in the outer row of the oral jaws. Live coloration of both sexes rather similar; females basically coloured as males, having black pelvic fins, coloured medial fins (viz.; anal fin bright red with an orange egg spot dorso-caudally, and caudal fin bright red at least on the ventral half) and headmarkings including a distinct lachrymal stripe. In preserved specimens the light lower jaw contrasts strongly with the black intermandibular area and branchiostegal membrane.

Notes on the BM(NH) collection of *H. dichrourus*

Apart from the holotype, Greenwood (1967) based his redescription of *H. dichrourus* on six specimens (three from Uganda and three from Tanzania). One of these (BM(NH)1966.3.9.185), a sexually active male caught off Soswa Island (Tanzania), is now thought to belong to a different species which is described below. However, on the basis of this specimen Greenwood (1967) described the live male coloration of *H. dichrourus*. A specimen from Jinja (BM(NH) 1966.3.9.186) diverges from all other specimens in its more slender head and body shape and in its very faint lachrymal stripe. A radiograph of this specimen revealed that it has an exceptionally low supraoccipital crest and a high number of vertebrae. As it was included in *H. dichrourus* on the basis of its live coloration (Greenwood, pers. comm.) I consider it an aberrant specimen. A specimen from Katebo, Uganda (BM(NH) 1966.3.9.187), i.e. from all specimens the one caught most closely to the type locality (Buganga, Uganda), is no longer unimpaired. Its head has been dissected for the preparation of skeletal material. A photograph of the whole specimen shows that the head shape was comparable to that of the holotype. The photo also shows that the specimen had a short lachrymal stripe very similar to that of the holotype in the figure of Regan (1922)(see fig. 26). Regrettably, measurements of this specimen are not available. While examining the BM(NH) collections two more specimens of *H. dichrourus* were found which were not included in Greenwood's redescription; a specimen from Grant Bay, Uganda (BM(NH) 1962.3.2.510) was found in the collection of *H. pellegrini* Regan, 1922, and a specimen from Jinja was discovered amongst uncatalogued material (RMNH 30564).

HEST material of *H. dichrourus* came from the Mwanza Gulf area.

Based on differences in morphological characters and preserved coloration three geographically separate groups of specimens can be recognized. They will be described as populations of *H. dichrourus*. These groupes are: 1) Specimens from Uganda (including the holotype) 2) Specimens from a beach North of Majita, Tanzania, 3) Specimens from the Mwanza Gulf, Tanzania.

1. **Haplochromis dichrourus** "Uganda"
(figs 4, 27-44, 105, tables 5-6).

Material.— Holotype, ♀, 113.9 mm, BMNH 1906.5.30.265, Lake Victoria near Buganga, Uganda, E.Degen. Other material; 1 ♂, 82.6 mm + 1 ex., 101.0 mm, BMNH 1966.3.9.188-9, Lake Victoria near Karenia, Napoleon Gulf, Uganda, EAFRO; 1 ♂, 91.1 mm, BMNH 1962.32.510, Lake Victoria, Grant Bay, Uganda, EAFRO; 1♀, 114.0 mm, RMNH 30564, Lake Victoria, near Jinja, Uganda, J. Kendall; 1 ♀, 147.4 mm, BMNH 1966.3.9.186, Lake Victoria, off Golf Course near Jinja, Uganda, EAFRO; Skeletal elements of ex. BMNH 1966.3.9.187, 124 mm (estimated from photograph), Lake Victoria near Katebo, Uganda, EAFRO.

Description.— Based on the holotype and five other specimens, 82.6-147.4 mm SL.

Habitus.— A medium sized, moderately slender species. Dorsal head profile gently curved from dorsal fin origin to just before the eye, where it is interrupted by the prominent premaxillary pedicel tip. Premaxilla slightly expanded medially in two specimens and somewhat beaked in the smallest specimen. Mouth moderately oblique, lips normal. The vertical through the caudal tip of the maxilla reaching or just passing the rostral margin of the eye. Lower jaw and lateral snout outline prognathous. Rostral outline of lower jaw nearly straight, mental prominence small or

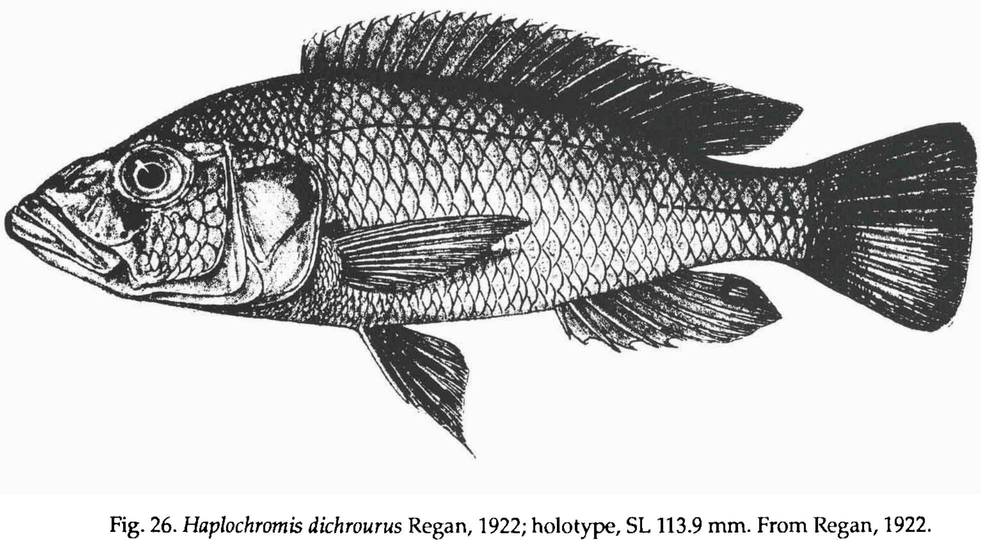


Fig. 26. *Haplochromis dichrourus* Regan, 1922; holotype, SL 113.9 mm. From Regan, 1922.

non-existent. Lower jaw sides slightly oblique. Rostral margin of vertical arm of preoperculum nearly vertical, the dorsal border of the horizontal arm horizontal or slightly declined ventrad. Eye normal, slightly elongated in rostro-caudal direction. Pupil similarly elongated. Cephalic lateral line pores not enlarged, the canals on the lachrymal not visible.

Scales.— Cheek, gill-cover, dorsal head surface and dorsum with cycloid scales. Flanks and caudal peduncle with weakly ctenoid scales. Chest and belly with a mixture of cycloid (especially ventrally) and weakly ctenoid scales. A gradual size transition between the relatively small chest scales and the scales of the flank. Caudal fin with small elongate scales on its proximal half to 3/5.

Fins.— Pectoral and pelvic fins not quite reaching the origin of the anal fin. Dorsal and anal fin not reaching base of caudal fin. Caudal fin outline subtruncate, slightly emarginate.

Gill apparatus.— There are nine gill rakers on the lower half of the first gill arch on the left side. The specimen of 91.1 mm SL has the lowermost two reduced, number 3-5 slenderly pointed, and 6-9 slightly broadened with a more or less broad tip. The holotype has the lowermost four reduced, conical, the fifth elongate conical, number six elongate and broadened and numbers 7-9 broadened with an expanded bifid or trifid head. Specimen RMNH 30564 has 123 gill filaments on the lateral hemibranch of the first gill arch from the right side.

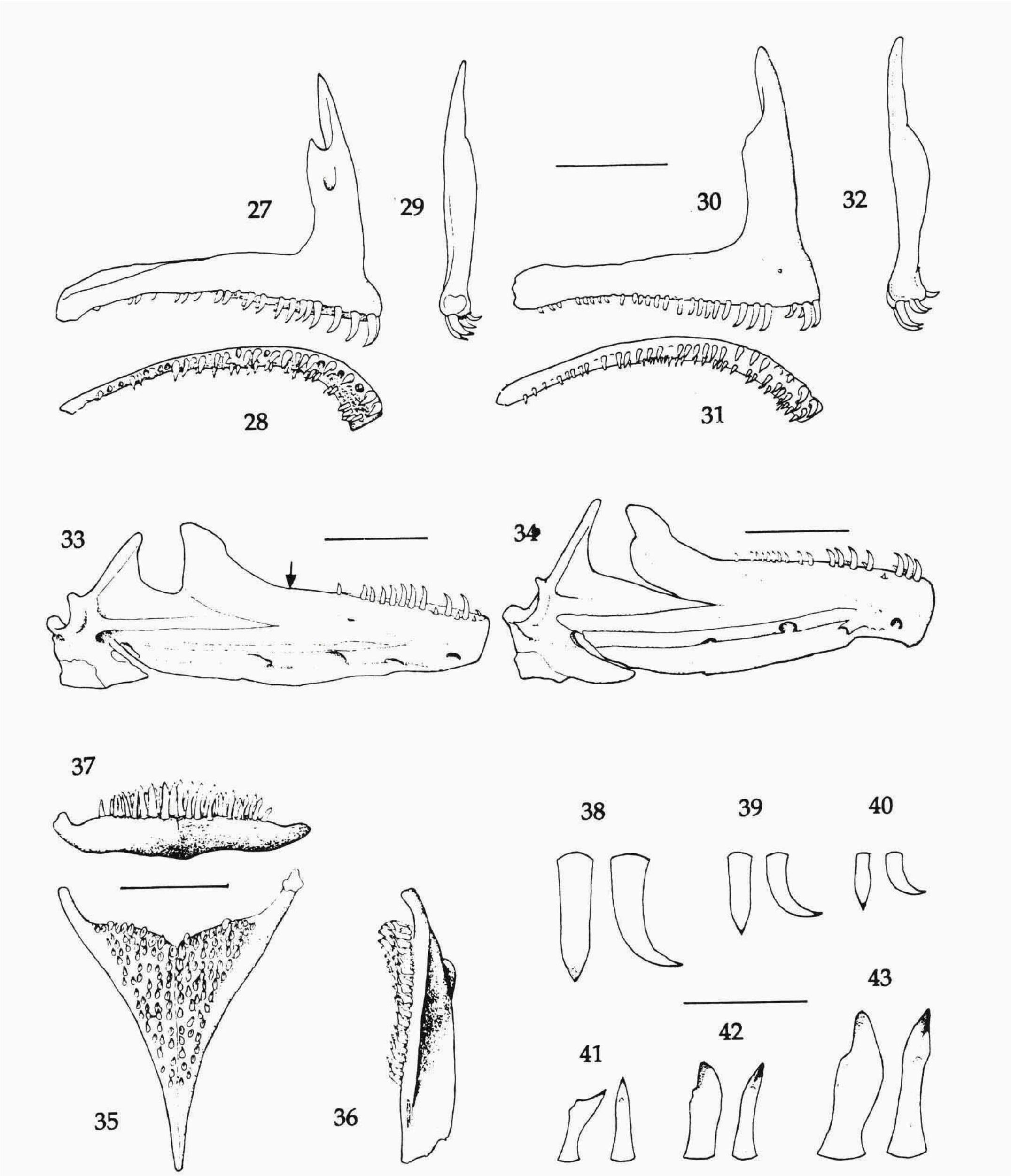
Viscera.— Intestine length of RMNH 30564 is 0.98 times its standard length. Following the definitions of Zihler (1982) the arrangement of the digestive tract of this specimen is of type D (with backflap).

— Oral teeth. As the teeth are strongly curved and deeply embedded in the mucosa, the tips of the teeth are barely visible in a lateral view. However, in the holotype, probably due to shrinkage of the lip tissue, they are visible.

— Shape: Nearly all outer row teeth are acutely pointed, strongly curved unicuspids. Rostral and lateral teeth rounded, postero-lateral teeth somewhat compressed. Upper jaw teeth generally more curved than teeth of the lower jaw. In the holotype some postero-lateral teeth are more nearly shouldered unicuspids; one of the lateral lower jaw teeth on the right side is very weakly bicuspid. Generally, the compressed teeth have the crown narrowing more abruptly, the sides of the crown being somewhat concave in a labial view. Tooth size gradually decreasing from the symphysis to the caudal end of the jaws. Inner rows with a mixture of slightly to moderately, compressed shouldered unicuspids and tricuspids, the former dominating. All inner teeth are strongly curved.

— Dental arcade and toothband. Dental arcade rounded. Outer row covers nearly the whole length of the premaxillary dentigerous arm, the first inner row about 2/3. Two or three inner rows in the rostral quarter of the premaxilla, decreasing to zero in the caudal third. Rostrally a distinct gap between outer row and first inner row. In lower jaw the outer row extending only slightly further caudad than the first inner row, just reaching the coronoid wing. Rostrally a distinct gap between the outer row and the first inner rows.

— Counts and setting: 55-62 teeth in the outer row of the premaxilla, 40-46 in the outer row of the lower jaw. Teeth regularly set, neck-distance varying between 1/2 to nearly equalling the neckwidth. Teeth caudally in both jaws slightly more closely set. A small medial gap in both jaws.



Figs. 27-43. *Haplochromis dichrourus* "Uganda". Figs. 27 & 30. Premaxilla, lateral view. Figs. 28 & 31. Premaxilla, view perpendicular to dentigerous area. Figs. 29 & 32. Medial view of premaxillary ascending arm. Figs. 33 & 34. Right lower jaw, lateral view. Arrow in Fig. 33 indicates position of last (22nd) outer row tooth. Fig. 35. Lower pharyngeal element, dorsal view. Fig. 36. Lower pharhyngeal element, lateral view. Fig. 37. Lower pharhyngeal element, caudal view. Figs. 38-40. Premaxillary teeth, labial and lateral views. Fig. 38. First tooth of outer row. Fig. 39. Seventh tooth of outer row. Fig. 40. Fifth tooth of first inner row. Figs. 41-43. Lower parhyngeal teeth, loateral and rostral views. Fig. 41. Seventh lateral tooth. Fig. 42. Fifth tooth caudalmost row. Fig. 43. First tooth of caudalmost row. Figs. 30-32 & 34 from specimen RMNH 30564, other figs. from BMNH 3.9.66.187. Scale of bony elements = 5 mm, scale of teeth = 1 mm.

Table 5. Linear and angular measurements of *Haplochromis dichrourus* Regan, 1922, and *H. maisomei* spec. nov. For convenience the ratios are multiplied by 100.

	Haplochromis dichrourus								*Haplochromis maisomei*		
Locality	Karenia		Grant Bay	Buganga	Jinja	Majita			Maisome I.		Standieri I.
Museum	BM(NH)		BM(NH)	Holotype BM(NH)	RMNH	BM(NH)	BM(NH)		Holotype RMNH	RMNH	RMNH
Reg.no.	1966.3.9.188-189		1962.3.2.510	1906.5.30.265	30564	1966.3.9.186	1966.3.9.183-184		30122	30121	30386
SL in mm	82.6	101.0	91.1	113.0	114.0	147.4	167.0	185.0	98.1	96.1	81.5
BD/SL	29.7	29.7	29.6	31.1	30.3	28.5	36.5	34.0	33.3	32.3	33.2
PFL/SL	23.8	22.7	24.3	24.8	25.0	22.3	24.9	23.4	25.2	23.7	24.6
CPL/SL	14.2	14.3	13.6	15.1	13.9	15.6	13.8	12.4	15.9	15.9	14.4
CPD/SL	10.8	11.7	12.0	11.0	10.7	10.9	12.3	11.4	11.9	12.1	12.2
CFL/SL	22.7	22.7	23.2	22.3	21.8	21.5	21.5	20.6	22.7	22.6	23.3
HL/SL	35.2	37.1	36.3	37.2	35.8	36.0	37.5	35.6	35.4	35.5	36.3
SnL/HL	31.9	35.4	32.3	35.1	34.4	35.3	39.7	40.0	33.9	32.1	33.1
SnW/HL	30.5	32.5	29.9	30.6	31.2	29.6	35.8	36.5	32.7	32-1	30.4
HW/HL	41.2	37.8	39.2	37.7	39.3	39.4	43.2	43.9	39.6	42.1	41.2
LOW/HL	17.5	18.1	18.4	19.2	19.5	17.6	21.5	22.5	19.6	19.8	19.2
POD/HL	23.3	24.0	24.1	22.5	24.6	21.6	25.5	25.7	25.3	25.7	27.7
IAW/HL	27.4	26.6	26.5	26.1	26.8	27.2	30.3	31.8	25.9	26.6	26.6
POW/HL	17.5	20.0	18.7	19.2	19.0	19.7	22.6	22.5	19.3	18.7	17.9
EyL/HL	24.3	22.4	24.7	20.6	22.1	23.1	18.6	18.1	25.6	26.3	23.6
ChD/HL	23.3	21.3	22.6	24.9	24.4	25.0	28.3	30.3	22.2	23-3	23.6
LJL/HL	51.5	48.5	51.0	49.4	51.1	53.9	50.2	52.2	47.8	49.1	45.9
LJW/HL	23.3	21.0	19.9	19.2	21.0	20.6	25.5	28.7	21.6	19-5	20.6
UJL/HL	40.8	40.2	41.6	38.2	41.0	41.7	44.9	45.1	35.6	35.6	35.8
PPL/HL	28.1	28.5	27.7	27.5	27.3	27.8	29.0	28.7	28.2	27.7	28.3
DHI	25°	30°	26°	32°	30°	28°	32°	28°	35°	35°	34°
PPI	32°	38°	32°	38°	38°	35°	38°	35°	35°	40°	41°
SnA	72°	76°	68°	73°	73°	73°	73°	74°	70°	72°	68°
GI	43°	43°	42°	39°	45°	45°	37°	39°	35°	34°	29°

Table 6. Qualitative measurements and counts of *Haplochromis dichrourus* Regan, 1922, and *H. maisomei* spec. nov.

	Haplochromis dichrourus								*Haplochromis maisomei*		
Locality	Karenia		Grant Bay	Buganga	Jinja		Majita		Maisome I.		Standieri I.
Museum	BM(NH)		BM(NH)	Holotype BM(NH)	RMNH	BM(NH)	BM(NH)		Holotype RMNH	RMNH	RMNH
Reg.no.	1966.3.9.188-189		1962.3.2.510	1906.5.30.265	30564	1966.3.9.186	1966.3.9.183-184		30122	30121	30386
SL in mm	82.6	101.0	91.1	113.0	114.0	147.4	167.0	185.0	98.1	96.1	81.5
DHP	0(+)	0(+)	0(+)	0(+)	0(+)	0(+)	+	+	0	0	0(+)
Ppp	+	++	+	+(+)	+(+)	+	+	+	0(+)	+	+
LJAE	+	+	+	+	+	+	+	+	+	+	+
LSO	+	+	+	+	+	+	+	+	0	0	0
MP	+	0(+)	0(+)	0(+)	0	0	0	o	0	0	0
LTh	0	0	0	0	0	+	0(+)	0(+)	0	0	0
PB	0	0	0	0	0	0	0	0	0	0	0
PE	0	0	0	0(+)	0	0	0	0	0	0	0
MxPE	_	0	+	+	0	-	+	+	0	++	+
LLW	0	0	0	0	0	0	0	0	0	0	0
ScLL	33	32	32	32	32	33	34	33	33	32	32
ScDL	7	7	5	6	6	6	9	6	6	7	5
ScPP	7	7	6	5	7	8	8	5	7	7	6
ScCh	5	5	5	4?	6	5	5	5	5	5	5
Dorsal	XVI9	XV9	XVI8	XVI9	XV8	XVI10	XVI9	XVI9	XV9	XV10	XVI9
Anal	III9	III9	III9	III8	III10	III10	III9	III9	III9	III10	III9

— Implantation. Upper jaw, outer row; rostrally erect, laterally somewhat recumbent. The lateral teeth inclining somewhat suspensoriad. Lower jaw, outer row; erect. The lateral teeth somewhat suspensoriad inclined. In both jaws the inner row teeth implanted recumbent to strongly recumbent.

Pharyngeal teeth.— Counts: There are 21-24 teeth in the caudalmost transverse row and 11-12 in the two median rows.

— Shape. Most pharyngeal teeth are relatively fine and compressed, and are of the bevelled type. The two or three caudalmost teeth in the two median rows and four or five medial teeth in the caudalmost row of each half of the element are enlarged, hooked the blunt major cusps pointing rostro-dorsad. Tooth size increases from rostral to caudal and from lateral to medial.

— Osteology. The figures and description of the skeletal elements are based on BM(NH) 1966.3.9.187, SL c. 124 mm and RMNH 30564, SL 114 mm. As the lower pharyngeal element of the holotype had already been dissected it could also be examined.

— Neurocranium. Compared with the neurocranium of a generalized cichlid (*H. elegans*, Barel et al., 1976), the neurocranium of *H. dichrourus* is less broad and more dorso-ventrally compressed, both the otic region and the supraoccipital crest being shallower. The ethmovomerine block is longer than in *H. elegans* and less decurved. As in most piscivorous cichlids from Lake Victoria the pharyngeal apophysis is situated relatively far caudally. The postorbital process is broad.

— Oral jaws. Premaxilla dentigerous arm longer (1.23-1.28 ×) than ascending arm. Angle between the two arms 79-84°. Rostral part of dentigerous arm of BM (NH) 1966.3.9.187 slightly beaked. Ventral outline of dentigerous arm concave. Mandible: A relatively slender element, length/depth ratio 2.5-2.8. The coronoid process in specimen BM(NH) 1966.2.3.187 is relatively short. Tooth bearing part of jaw slightly more than half of the total jaw length.

— Lower pharyngeal element. The lower pharyngeal element longer than broad (Length/Width = 1.1-1.2) and relatively shallow, the keel rather deep for a piscivorous species. Dentigerous area only slightly longer than broad (length/width = 1.03-1.12).

— Vertebrae. There are 29-30 vertebrae, comprising 13 abdominal and 16-17 caudal elements. Specimen BM(NH) 1966.3.2.186 has 31 vertebrae.

Coloration.— Little information is available on the coloration of live specimens. When Regan (1922) described *H. dichrourus* he noted that the coloration of the anal fin and the lower half of the anal fin was bright red. This was sixteen years after the specimen had been caught. Greenwood (1974: 52) stated: "In *H. dichrourus*, although the sexes are differently coloured, the female is more polychromatic than the male (see Greenwood, 1967; these observations have since been confirmed and extended by additional specimens)." It should be noted that Greenwood (1967) erroneously based the description of live male coloration of *H. dichrourus* on a specimen which does not belong to this species (see page 57).

— Preserved coloration. The holotype, except for traces of head markings, is now almost completely colourless: Head and rope light brown, gill cover whitish, body creamy-white, area between lower jaws and gill-membrane sooty. Dorsal, anal and pectoral fins creamy-white. Caudal brownish basally, gradually becoming hyaline distally. Pelvics light basally, blackish distally. No trace of ocelli on the anal. Head markings: There is only a very faint bar left in the region where, in the drawing of Regan (1922), there is a broad lachrymal stripe (fig. 26). A nostril stripe runs from each nostril rostro-mediad but it is interrupted in the area of the premaxillary pedicel. Faint traces of the starting points of the interorbital stripe near the eyes, and of an extended lachrymal stripe on the eye and just above it. The area of the opercular blotch is darkened.

The four other specimens have retained more of their head markings. In their preserved coloration no differences are apparent between males and females. Ground colour of these specimens is dark brownish, gill-cover silver-grey. Area between the right and left side of lower jaw, and gill-membrane black. The two specimens from Karenia have traces of three or four vertical bands on the flank. Head-markings: A distinct, broad lachrymal stripe running from the rostro-ventral margin of the eye behind the caudal tip of the maxilla to the horizontal arm of the preoperculum. The lachrymal stripe is extended dorsally above the eye. The nostril stripe is continuous in only two of the specimens. Of the interorbital stripe only the lateral ends are present. A preopercular vertical stripe is present in two specimens one of which has also a black interopercular area.

Fins.— dorsal, pectoral and caudal brownish. In two specimens the ventral half of the caudal distinctly lighter than the dorsal part. Anal fin lighter brown with one or two dark-rimmed spots caudally. Pelvics black.

Ecology.— Since so few specimens are available and no details are known about the localities and techniques of capture, little can be said about the ecology of these specimens. Data from stomach content investigations by Greenwood (1967) make it apparent that *H. dichrourus* "Uganda" is a piscivorous species. From the presence of a small juvenile (± 10 mm TL) in the mouth of the holotype, which I consider to be a spent female, it may be deduced that the species is a female mouthbrooder.

2. **Haplochromis dichrourus** "Majita"

(figs 45, 46, 106, tables 5-6).

Material.— 1 ♂, 167 mm + 1 specimen (sex unknown)., 185 mm, BMNH 1966.3.9.183-4, Lake Victoria, beach North of Majita, Tanzania, EAFRO.

Description.— Habitus. The specimens of *H. dichrourus* "Majita" are relatively deep-bodied and relatively broad. Dorsal head profile gently curved from origin of dorsal fin to interorbital area, from where the profile is interrupted by the prominent premaxillary pedicel. Snout somewhat blunt. Mouth moderately oblique. Lips rather broad. Premaxilla not expanded medially or beaked. The exposed part of the maxilla small in the smaller specimen, rather large in the larger specimen; upper lip tapering caudad in this specimen. The vertical through the caudal end of the maxilla just reaching or passing the rostral eye margin. Lower jaw isognathous, slightly protruding. Rostral outline of lower jaw straight or slightly rounded, no mental prominence. Lateral sides of lower jaw relatively broad, moderately oblique. Vertical arm of preoperculum nearly vertical, the horizontal arm declining slightly ventrad. Eye relatively small, slightly elongate, pupil (because of preservation only faintly visible) seems circular. Cephalic lateral line openings relatively small, the canals on the lachrymal faintly visible.

Scales.— As in Uganda specimens.

Fins.— Pectoral shorter than pelvic fin, the pelvics just reaching the anal fin. In the smaller specimen, posterior tip of dorsal not reaching the caudal fin. Anal fin of smaller specimen and dorsal and anal of the larger specimen reaching the base of the caudal fin. First pelvic fin ray produced in both specimens. Caudal fin outline with rounded angles; slightly emarginate, posterior margin very slightly oblique in the smaller specimen.

Gill rakers.— Eight or nine gill rakers on the lower part of the first gillarch of the left side. The lowermost one reduced, conical, the following three rakers short, broadly flattened, and the upper four or five also relatively short with expanded

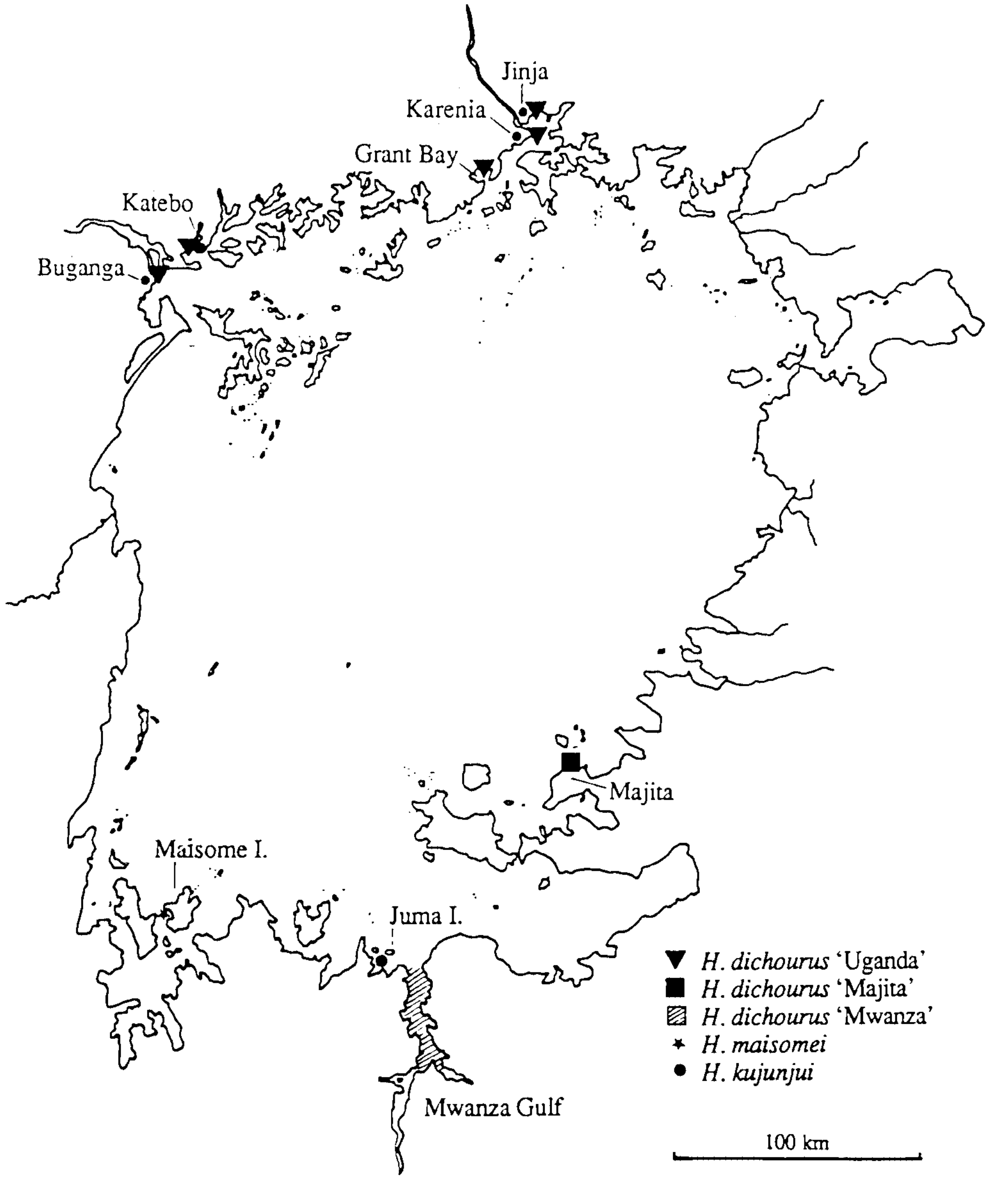


Fig. 44. Catch localities of specimens of *Haplochromis dichrourus* Regan, *H. maisomei* spec. nov., and *H. kujunjui* spec. nov. in Lake Victoria.

heads; simple, bifid or trifid.

Viscera.— No information is available on the length and configuration of the intestines.

Oral teeth.— Shape: In both specimens the teeth in the outer rows of both jaws are all relatively stout, rounded and acutely pointed unicuspids. The whole tooth moderately to strongly curved, teeth of upper jaw more strongly curved over the distal half. Teeth embedded in a thick mucosa thus giving the impression that they are rather small. Tooth size gradually decreases from rostral to caudal. The teeth of the inner rows are smaller replicas of the outer row teeth. Teeth of first inner row relatively large.

— Dental arcade and toothband: Dental arcade rounded (to somewhat acute in lower jaw). Distance between outer row and first inner row slightly larger than distance between inner rows. There are three or four inner rows rostrally in the lower jaw and four inner rows rostrally in the upper jaw decreasing to zero in the caudal part of the jaws.

— Outer row occupying 4/5 of the premaxillary dentigerous arm and reaching the coronoid wing in the lower jaw. A small medial gap in both jaws.

— Counts and setting. In smaller specimen approximately 66 teeth in the outer row of the upper jaw, 76 in the larger specimen. Lower jaw of the smaller specimens with 49 teeth in the outer row, the lower jaw of the larger specimen with at least 42. Outer row teeth regularly and rather closely set at a distance less than the tooth diameter at its base.

— Implantation. Outer row teeth in the upper jaw erect (medially) to slightly recumbent (caudally). Outer row teeth in the lower jaw slightly procumbent (medially) to erect (laterally). Inner row teeth in upper jaw are recumbent to strongly recumbent. In the lower jaw the teeth of the first inner row erect, the other ones slightly to moderately recumbent.

Pharyngeal teeth.— Counts: About 20 teeth in the caudalmost row and 12-14 in the median series.

— Shape. Most teeth are relatively stout, bluntly pointed teeth of the bevelled type. Three or four caudalmost teeth in the median row and the three medialmost teeth of the caudal row are enlarged, hooked teeth with a blunt rostro-dorsal directed major cusp. Tooth size increases from rostral to caudal and from lateral to medial.

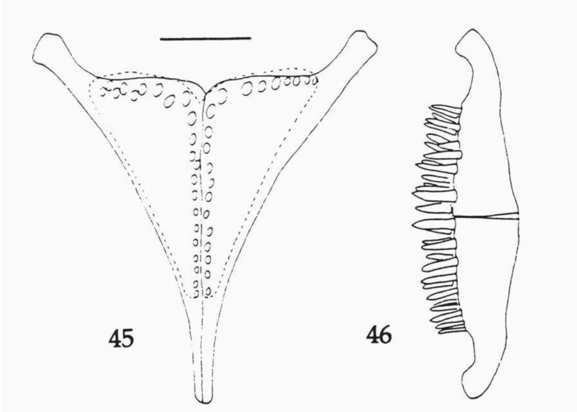
Osteology.— As no skeletal material is available, little is known about the shape of the skeletal elements. However, in both specimens the lower pharyngeal element had already been cut loose and can therefore be described.

— Lower pharyngeal element rather shallow, very slightly longer than broad (length/width = 1.05-1.11). Dentigerous area as long as broad. Horns making an angle of c. 32° with the median. Suture straight.

— Vertebrae. Both specimens have 30 vertebrae comprising 13 abdominal and 17 caudal elements.

Coloration.— There is no information available on the live coloration of the two specimens.

— Coloration of preserved male(s?): Head and body with a dark brownish ground colour. Chest dark (blackish) ventrally, belly black. Dorsal head area, interorbital area, dorsal part of snout and preopercular horizontal arm, interoperculum and sides of jaws lighter than surrounding areas. Light lower jaw and preopercular area



Figs 45-46. *H. dichrourus* "Majita", lower pharhyngeal bone. Fig. 45. Dorsal view. Fig. 46. Caudal view. Scale = 5 mm.

strongly contrasting with black branchiostegal membrane and the black intermandibular area. Head markings: A distinct lachrymal stripe running from the rostro-ventral margin of the eye behind the end of the maxilla to the rostral end of the preoperculum; an extension of the lachrymal stripe above the eye; a faint nape blotch; a distinct but interrupted interorbital stripe and a continuous nostril stripe. The nostril stripe is broader medially. Rostro-ventrally to the two ends equally distinct dark spots are present on the snout. However, these spots are not connected with the nostril stripe. An opercular blotch is present. On the body of the smaller specimen a faint midlateral band can be seen, whereas on the body of the larger specimen traces of 4 or 5 vertical bands are present. Fins: except for the black pelvics, all fins with a uniformly light brownish colour. The dorsal part of the caudal fin only slightly darker than the ventral part. In a slightly darker area dorso-caudal on the anal fin one light ocellus in the smaller specimen and two light ocelli in the larger specimen. Both specimens with small light spots between the last rays of the dorsal fin.

Ecology.— Detailed information on the precise catch locality or habitat is lacking.

— Food. For his redescription of *H. dichrourus*, Greenwood (1967) investigated the stomachs of specimens from four different localities including one from Majita. All specimens were found to have cichlid remains in their stomachs.

— Breeding and Growth. The 167 mm SL specimen is a sexually active male. The gonads of the other (185.0 mm SL) specimen have been removed along with the intestines. The sex of this specimen therefore is indeterminable.

3. **Haplochromis dichrourus** "Mwanza"
(figs 5, 21-28, 83, 107, 108, tables. 7-9).

Material.— Material from the Mwanza Gulf collected by G.Ch. Anker & C.D.N. Barel; 1 ♂, 115.0 mm, BMNH 1977.1.28.32, 9.vi.1975; 2 ♀♀, 104.0, 109.0 mm, RMNH 30061-62, 9.vi.1975; 1 ♂, 95.5 mm, RMNH 30063, 24.vi.1975. Material from the Mwanza Gulf collected by HEST; 1 ♂, 98.0, RMNH 30064, 7.x.1977; 1 ♀, 136.8 mm, RMNH 30065, 4.xi.1977; 1 ♀, 124.8 mm, RMNH 30066, 18.xi.1977; 2 ♀♀, 111.7, 122.5 mm, RMNH 30067-68, 8.xii.1977; 2 ♀♀, 100.9, 117.6 mm, RMNH 30069-70, 30.xii.1977; 1 ♀, 109.3 mm, RMNH 30071, 6.i.1978; 1 ♂, 107.0 mm, MNHN 1987-1667, 5.v.1978; 1 ♀, 131.5 mm, RMNH 30090, 19.v.1979; 6 ♀♀, 94.5-136.2 mm, RMNH 30073-78, 31.v.1978; 1 ♀, 94.1 mm, RMNH 30079, 21.vii.1978; 1 ♂, 86.3 mm, RMNH 30080, 11.viii.1978; 1 ♀, 132.0 mm RMNH 30060, 18.viii.1978; 2 ♀♀, 128.0, 141.0 mm, RMNH 30081-82, 18.viii.1978; 2 ♂♂, 95.1, 106 mm + 3 ♀♀, 114.2-126.8 mm, RMNH 30081-89, 1978; 1 ♀, 119.6 mm, ANSP 168242, 1978; 1 ♀, 107.5 mm. BMNH 1988.2.4.20, 5.v.1978; 1 ♂, 117.5 mm, RMNH 30091, 19.i.1979; 3 ♀♀, 111.7-137.0 mm, RMNH 30092-94, 4.v.1979; 1 juv., 70.5 mm, RMNH 30095, 7.ix.1979; 1 ♀, 108.9 mm, BMNH 1988 ?? , 5.iv.1980; 1 ♀, 108.2 mm, MNHN 1987-1667, 21.iv.1980; 2 ♀♀, 118.3-126.8 mm, RMNH 30098-99, 21.iv.1980; 2 ♀♀, 111.8, 122.5 mm, RMNH 30100-01, 22.iv.1980; 1 ♀, 121.8 mm, RMNH 30102, 23.iv.1980; 1 ♂, 96.5 mm, RMNH 30103, 22.1.1981; 2 ♀♀, 97.1-122.2 mm, RMNH 30104-05, 26.1.1981; 2 ♂♂, 96.3-98.0 mm, RMNH 30106-07, 11.xi.1981; 1 ♂, 93.0 mm, RMNH 30108, 24.viii.1983; 2 ♂♂, 88.9, 90.2 mm + 4 ♀♀, 86.9-119.1 mm, RMNH 30109-14, 21.ix.1983; 1 ♂, 111.5 mm + 1 ♀,109.2 mm, RMNH 30116-17, 4.vi.1985.

Description.— Based on 57 specimens of 70.5-141.0 mm SL.

Habitus.— Body moderately slender. Dorsal head profile slightly convex, the premaxillary pedicel slightly to noticeably prominent. Premaxilla slightly expanded medially, not beaked. Lips normal. A small part of the maxilla visible caudally and dorso-caudally of the premaxilla. The vertical through the caudal tip of the maxilla not reaching the eye in most specimens. Mouth moderately oblique, lateral snout outline slightly prognathous, the lower jaw protruding. Mental area rounded in most specimens, in some with a small prominence. Lateral sides of lower jaw only slightly oblique. Horizontal arm of preopercular horizontal, the vertical arm vertical or inclining slightly ventrad rostrally. Lateral line canals and openings on lachrymal not enlarged. Eye and pupil subcircular to slightly elongated in a horizontal direction.

Scales.— As in Uganda specimens.

Fins.— As in Uganda specimens.

Gill apparatus.— Gill rakers have been counted in 15 specimens. Number of gill rakers on lower part of the first gill arch on right side 8-9. Lower 3-4 reduced, conical, numbers 4-5 elongate with a conical head, and the upper 3 or 4 elongate and expanded with bifid, trifid or more complicated tips. About 132 gill filaments on the first hemibranch.

Viscera.— Intestine length of six examined specimens ranges from 1.0-1.4 times the standard length. Following the definitions of Zihler (1982) the arrangement of the digestive track of adults of Mwanza Gulf specimens of *H. dichrourus* is of type D (with backflap).

Oral teeth.— Shape. In the outer rows all specimens, even the smallest ones, have only slender, acutely pointed unicuspids, rounded in the rostral and lateral parts of the jaws, but caudo-laterally somewhat compressed. In the compressed teeth the sides of the crown are somewhat concave in labial view. All teeth moderately to strongly curved. Upper jaw teeth generally more strongly curved than lower jaw teeth. In comparison with other piscivores the teeth are of a moderate size. The size of the teeth is not easily to determine in intact specimens as they are embedded in a thick mucosa. Tooth size gradually decreasing from rostral to caudal. Inner rows in smaller specimens consist of a mixture of slightly to moderately compressed shouldered unicuspids and tricuspids, the former dominating. In larger specimens all teeth of the inner rows are rounded, slender, conical, acutely pointed unicuspids, small replicas of the outer row teeth. All inner row teeth strongly curved.

— Dental arcade and toothband. Dental arcade rounded. Outer tooth row in premaxilla covers whole length of dentigerous arm, inner rows about two thirds. Two or three inner rows in rostral part of premaxilla, decreasing to zero in caudal part. Rostrally a distinct gap between outer row and first inner row. In the lower jaw the outer row proceeds slightly further caudad than the inner row, and just reaches the coronoid wing. Two rows of inner teeth in the lower jaw. Rostrally a distinct gap between the outer row and the first inner row.

— Counts and setting. There are 54-64 teeth in outer row of premaxilla, and 36-44 in outer row of lower jaw. Teeth regularly and rather closely set, the neck-distance varying between less than 1/4 to nearly equalling the neck diameter. A small medial gap in both jaws.

— Implantation. Outer row teeth in upper jaw erect to slightly recumbent rostrally, gradually merging into strongly recumbent caudally; lateral teeth somewhat suspendoriad inclined. Outer row teeth in lower jaw erect rostrally and laterally, slightly recumbent caudo-laterally. Lower jaw teeth relatively more suspensoriad inclined than teeth of upper jaw. Inner rows; in both jaws the inner row teeth are moderately to strongly recumbent.

Pharyngeal teeth .— Counts. There are 18-24 teeth in the caudalmost transverse row and 10-12 in the two median rows.

— Shape. Most pharyngeal teeth are relatively fine and flattened and are of the bevelled type. The two or three caudalmost teeth in the two median rows and about five medial teeth in the caudalmost row on each side enlarged, stout, bevelled teeth with a large and blunt major cusp pointing rostro-dorsad or dorso-rostrad. Tooth size increasing from rostral to caudal and from lateral to medial.

Osteology.— Osteological descriptions are based on skeletal elements of 3 specimens (RMNH 30076, 30078 and 30079, SL 94.1-136.2 mm). Descriptions of oral teeth based on all specimens.

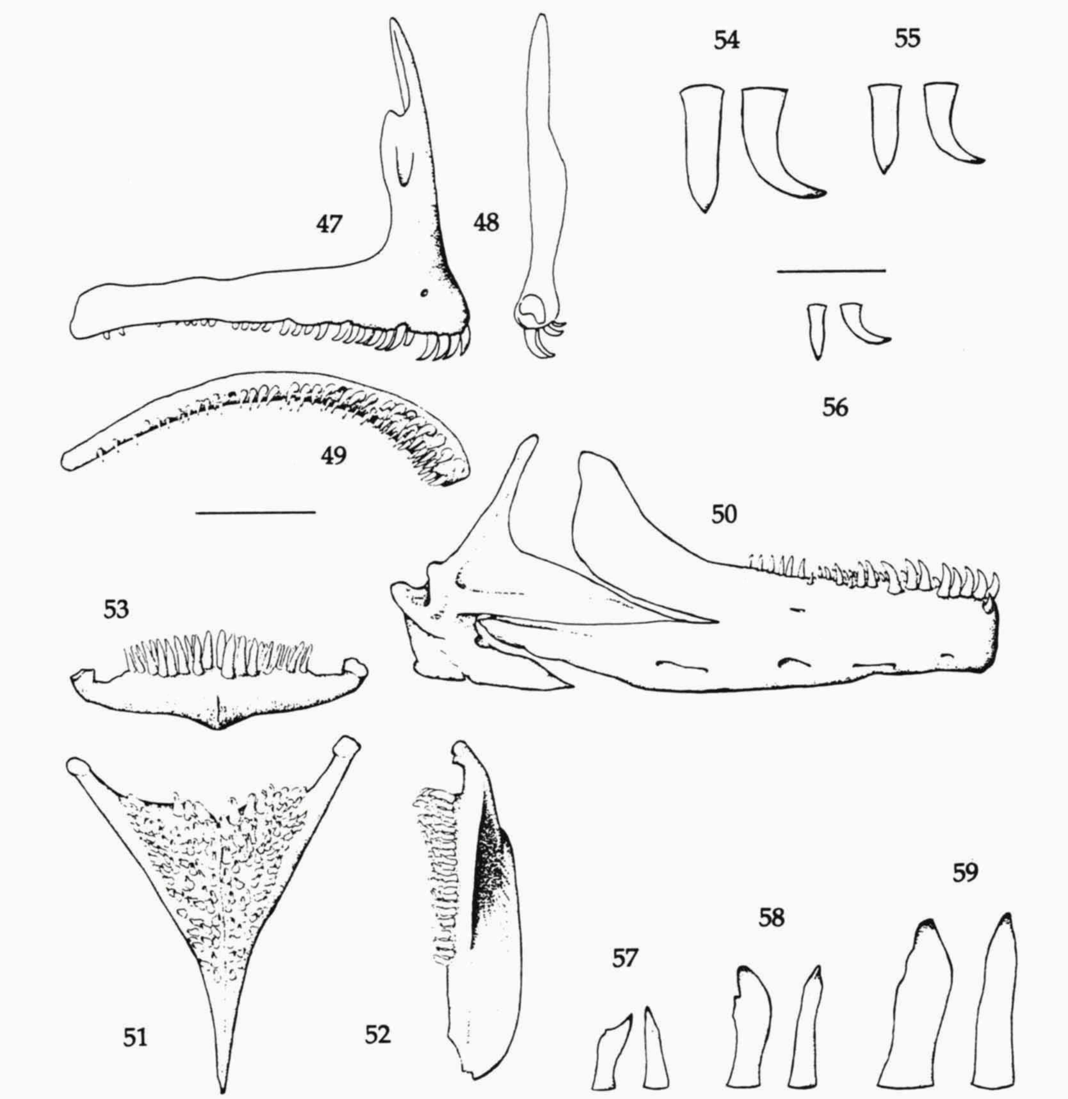
— Oral jaws. Premaxilla dentigerous arm longer (1.25×) than ascending arms, angle between the arms 79-88°. Rostral part of dentigerous area slightly expanded rostrad, ventral outline of dentigerous area slightly concave. Lower jaw moderately slender, length/depth ratio 2.3. Length of tooth-bearing part of the dentary is 0.4 × lower jaw length.

— Lower pharyngeal element relatively shallow with the keel area well developed. The element is slightly longer than broad (length/width = 1.16), dentigerous area as long as broad.

— Vertebrae. There are 29 vertebrae comprising 13 abdominal and 16 caudal elements (n = 8).

Coloration.— Mwanza Gulf specimens of *H. dichrourus* caught by HEST have confirmed the colour description for male *H. dichrourus* as given in Greenwood & Barel (1978) although the red flush in the dorsal fin may be much more distinct than was previously described. The red colours of the caudal and anal fins are usually brighter than those of the dorsal fin. Females of *H. dichrourus* are less polychromatic and brightly coloured than males, although much more colourful than the females of most Lake Victoria haplochromine cichlid species.

— Live colours of sexually active males. Head: Lower jaw and lateral aspects of snout green, cheek and ventral part of operculum dark green, ventral side of head and branchiostegal membrane dark green to black. Dorsal part of operculum, dorsal part of snout and dorsal head surface dark blood red. Eye: iris black, with a thin silvery inner ring. Markings: a broad, ventrally somewhat indistinct lachrymal stripe running from the rostro-ventral margin of the eye behind the mouthcorner to the horizontal arm of the preoperculum. The lachrymal stripe is extended through and



Figs 47-59. *Haplochromis dichrourus* "Mwanza". Fig. 47. Premaxilla, lateral view. Fig. 48. Premaxilla, view perpendicular to dentigerous area. Fig. 49. Premaxilla, medial view of ascending arm. Fig. 50. Lower jaw, lateral view. Fig. 51. Lower pharyngeal element, dorsal view. Fig. 52. Lower pharhyngeal element, lateral view. Fig. 53. Lower pharhyngeal element, caudal view. Figs. 54-56. Premaxillary teeth, labial and lateral view. Fig. 54. Second tooth of outer row. Fig. 55. Fourteenth tooth of outer row. Fig. 55. Fifth tooth of first inner row. Figs. 57-59. Lower pharhyngeal teeth, lateral and rostral view. Fig. 57. Tenth lateral tooth. Fig. 58. Nineth medial tooth caudalmost row. Fig. 59. Second medial tooth of caudalmost row. Scale of bony elements = 5 mm, scale of teeth = 1 mm.

above the eye, the stripes of both sides meeting medially. Snout crossed by a broad nostril stripe and an equally broad interorbital stripe running just dorsally to the premaxillary pedicel tip. In all but one specimen the nostril stripe laterally is extended in a rostral direction giving this "stripe" the "M" shape which is characteristic for the specimens from the Mwanza Gulf (figs. 28, 53). Halfway between the dorsal margin

Table 7. Ranges of linear measurements of *Haplochromis dichrourus* "Mwanza" Regan, 1922. For convenience the ratios are multiplied by 100.

SL in mm	81.7-88.9	90.2-98.0	100.9-109.3	110.9-119.1	121.2-128.0	132.0-141.0
N	5	14	9	11	3	6
BD/SL	31.8-35.9	30.4-33.9	31.1-35.3	31.5-36.9	33.2-36.2	33.3-37.4
PFL/SL	25.6-29.3	25.1-29.4	26.4-28.8	25.5-29.8	25.6-28.5	26.7-28.0
CPL/SL	14.1-16.0	13.7-18.7	14.4-17.2	12.9-16.1	13.1-16.8	13.3-15.1
CPD/SL	11.5-12.3	10.8-12.4	10.9-13.3	10.4-12.5	11.1-12.6	11.2-12.6
CFL/SL	23.4-25.3	23.1-25.4	22.1-25.6	22.8-25.3	21.7-24.7	22.0-23.0
HL/SL	35.7-38.4	34.8-38.9	36.1-39.5	34.4-38.4	35.3-38.3	35.8-37.6
SnL/HL	30.4-33.5	29.2-34.3	31.6-35.8	31.8-35.5	32.4-36.8	34.8-36.0
SnW/HL	28.3-33.8	28.1-33.8	29.9-33.5	30.1-34.8	30.0-35.0	31.8-35.7
HW/HL	40.0-43.8	39.5-44.8	40.4-44.7	40.8-45.5	40.8-44.8	41.3-45.0
IOW/HL	19.8-21.0	18.7-22.3	18.7-22.0	20.2-23.8	20.0-23.4	21.7-23.7
POW/HL	24.6-26.8	24.3-27.1	25.3-28.1	25.3-28.5	25.0-27.7	24.5-28.5
LaW/HL	27.5-29.1	23.5-28.7	25.7-28.4	25.8-30.6	26.1-30.7	26.8-30.9
POD/HL	16.5-18.5	17.4-19.4	17.9-23.2	17.5-20.2	17.8-20.0	17.9-20.1
EyL/HL	21.5-26.3	20.9-25.6	21.4-24.1	20.5-26.1	21.4-25.6	19.4-22.4
ChD/HL	21.8-23.1	21.2-24.2	22.4-25.3	23.0-27.9	23.7-26.8	23.1-28.9
LJL/HL	47.9-50.6	46.2-52.5	50.2-53.1	49.8-53.0	49.8-53.2	51.1-56.8
LJW/HL	19.8-23.3	18.6-23.6	19.5-23.8	20.9-26.8	21.2-26.2	21.4-25.1
UJL/HL	37.5-40.3	36.6-41.8	37.7-41.5	38.9-41.7	38.3-42.3	39.6-45.3
PPL/HL	26.9-29.4	25.0-30.4	26.8-29.6	26.5-30.3	26.9-32.4	26.6-28.1

Table 8. Means and standard deviations of linear measurements of *Haplochromis dichrourus* "Mwanza" Regan, 1922. For convenience the ratios are multiplied by 100.

SL in mm	70.5	81.7-88.9	90.2-98.0	100.9-109.3	110.9-119.1	121.2-128.	132.0-141.0
N	1	5	14	9	11	13	6
BD/SL	31.0	32.7±1.4	32.4±1.1	32.6±1.9	34.6±1.4	34.2±0.8	35.0±1.5
PFL/SL	24.4	26.9±1.8	27.1±1.3	27.3±0.8	27.5±1.1	26.8±0.9	27.2±0.5
CPL/SL	16.7	15.5±0.9	14.9±1.1	15.2±0.8	14.4±0.8	14.7±1.0	14.3±0.6
CPD/SL	12.1	11.8±0.2	11.5±0.4	11.6±0.7	11.8±0.6	11.6±0.4	11.9±0.5
CFL/SL	24.6	24.4±0.5	24.3±0.7	23.7±1.0	23.9±0.7	23.5±0.8	22.6±0.2
HL/SL	37.3	37.0±0.9	36.5±1.1	36.9±0.6	36.6±1.1	36.8±0.9	36.9±0.7
SnL/HL	30.4	31.7±1.5	32.1±1.2	33.0±1.7	34.1±1.1	34.3±1.3	35.1±0.4
SnW/HL	30.2	30.6±1.9	31.2±1.4	31.8±1.9	33.1±1.7	33.3±1.6	32.4±2.5
HW/HL	41.0	41.2±0.8	41.4±1.6	42.0±1.3	42.9±1.5	42.8±1.0	42.8±1.7
IOW/HL	19.3	20.2±0.6	20.7±0.9	20.8±1.1	22.0±1.0	21.8±0.8	22.3±0.9
POW/HL	25.8	25.9±0.8	25.5±1.1	26.4±0.9	26.1±2.1	26.4±0.7	26.7±1.3
LaW/HL	26.4	27.6±1.1	26.3±1.8	27.3±1.0	28.2±1.6	28.1±1.3	28.3±1.9
POD/HL	15.7	17.1±1.0	18.1±0.6	19.9±2.0	18.6±0.7	19.1±0.6	19.1±0.6
EyL/HL	26.2	26.4±0.6	25.0±1.5	23.6±1.0	23.2±2.0	22.7±1.1	22.1±0.6
ChD/HL	20.9	22.3±0.9	22.8±0.8	24.0±1.0	24.8±1.4	25.3±0.9	26.4±2.0
LJL/HL	47.5	49.4±1.6	48.8±1.8	51.6±0.9	51.2±1.0	51.5±0.9	53.6±2.0
LJW/HL	17.6	20.7±2.2	20.9±1.9	20.6±1.5	23.5±1.8	22.7±1.4	22.5±1.0
UJL/HL	37.6	38.5±1.1	39.0±1.2	39.3±1.2	39.5±0.4	40.6±1.1	41.9±2.4
PPL/HL	27.3	27.8±0.9	27.8±1.3	28.0±0.9	27.9±1.4	28.5±1.3	27.5±0.6

of the operculum and the dorsal outline of the nape a broad nape band runs mediad. The opercular blotch is extended rostrad. Body: Rostral part of flank (above pectoral fin origin) and rostral part of dorsum dark blood red, the remaining part of flank and caudal peduncle green, darkest ventrally. In some specimens 4-6 faint vertical bands are present on the dorsum and dorsal part of the flank. Scales on the centre of the flank with a light-green iridescent flush. Fins: Pectoral hyaline, pelvics black. Dorsal greyish-hyaline with a dark red flush rostrally, dark grey lappets, and dark red spots between the rays. Anal hyaline, with a dark red flush rostrally and proximally, and with two round dark orange spots with a white inner and grey outer margin dorsocaudally. Caudal fin light red, more intensely red ventrally. A grey flush on the dorsal half of the fin in some specimens.

— Live colours of sexually active females. Head: Black ventrally, dark blue-grey with a red sheen dorsally. Scaled part of the cheek lighter in some specimens. Lower jaw with a blue sheen. A red sheen above the operculum. Markings: In spite of the

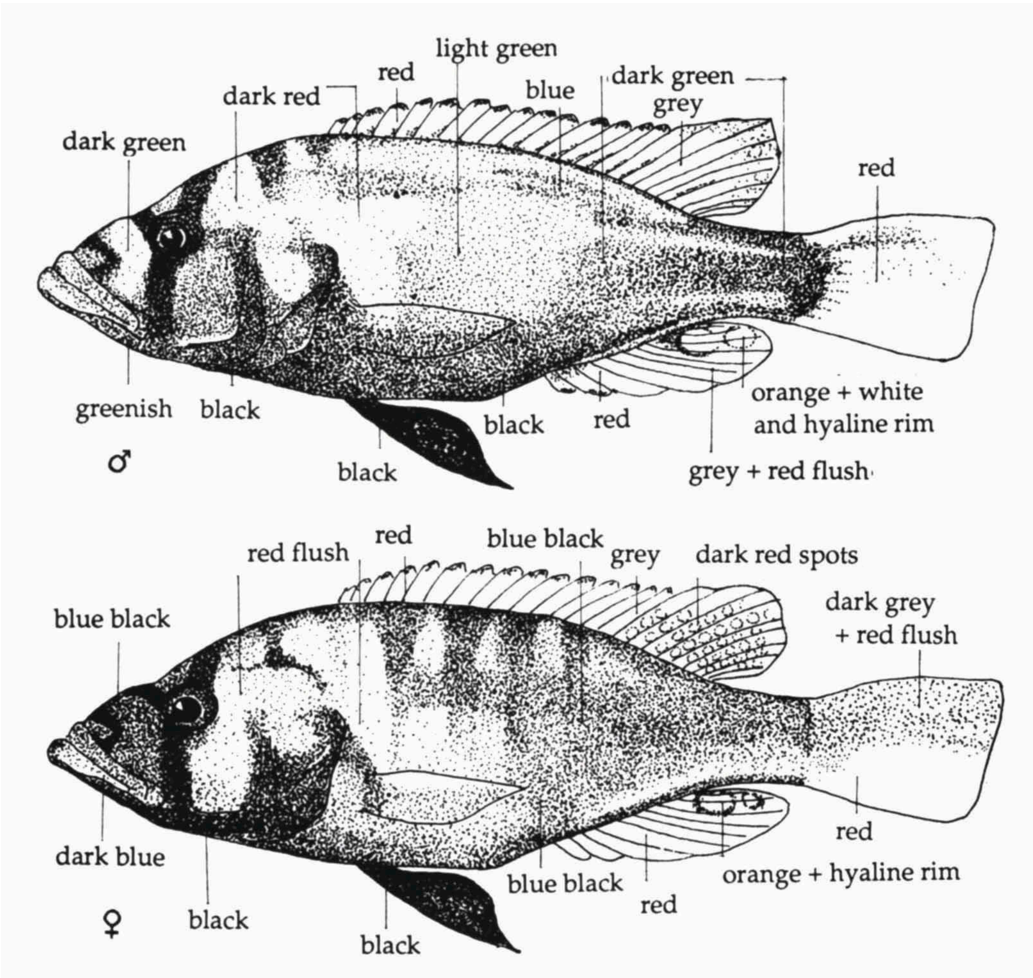


Fig. 60. *Haplochromis dichrourus* "Mwanza". Live colours and markings of a sexually active male and a ripe female.

very dark head colours, a broad lachrymal stripe, which is extended above the eye, as well as an M shaped nostril stripe, an interorbital stripe and a nape band can be seen. Body: Dark green to black with a red sheen rostro-dorsally, Fins: Pectoral hyaline, pelvics black. Dorsal greyish-hyaline, rostrally with a red flush, lappets dark grey. Small, dark red, round spots between the rays. Anal dark red rostrally and proximally, lighter caudally. One or two large, round, light orange or red spots with a grey margin dorso-caudally on the fin. Caudal dark grey with a red flush on the dorsal half, red on the ventral half.

— Preserved coloration. It is not possible to separate the sexes on the basis of their preserved coloration since the colour pattern is the same for males and females. Ground colour brownish. Head with a distinct, broad, long lachrymal stripe extended above the eye, a broad characteristically M-shaped nostril stripe, a broad interrupted interorbital stripe and a broad but irregular nape band (fig. 108). A nape blotch may also be present. Most specimens also have a distinct vertical preopercular band. Lower jaw sometimes with a dark mental area, otherwise light laterally and ventrally. Branchiostegal membrane black, gill-cover and interopercular area dark. Body usually darkest ventrally, crossed dorsally by 5-8 vertical stripes. All fins hyaline, but the caudal grey dorsally. Dark spots between the rays of the dorsal fin, and in a few specimens, in the dorsal half of the caudal fin. Anal fin in males always, in females often, with one or two large, lightly coloured, dark rimmed, round spots between the caudal rays.

Ecology.— Occurrence. In the northern part of the Mwanza Gulf *Haplochromis dichrourus* was a rare species. Despite the fact that we were keen to collect specimens of this conspicuously coloured species, three years of intensive sampling and inspecting many thousands of specimens in the Mwanza Gulf did not yield more than approximately 60 specimens. Up to 1987 trawl catches in the south of the Mwanza Gulf (at the entrance of the Smith Sound) still yielded specimens of *H. dichrourus*. Apparently this species survived the Nile perch longer than *H. bareli*.

—Habitat. All specimens except one, were caught in a bottom trawl in the open water of the Mwanza Gulf, at many different localities, with bottom depths ranging from 2-15 m. These catches had in common that they were made over soft mud bottoms. One specimen (SL 70.5 mm) was caught in the Kisenda Bay at a depth between 1 and 2 m. *H. dichrourus* inhabits relatively shallow and relatively open waters with a mud bottom.

— Food. Stomachs and intestines of 13 specimens were examined. Two of these were empty, but all others contained remains of haplochromine cichlids. Specimens of 56-81 mm contained remains of haplochromines of 11-15 mm and in specimens of 114-148 mm, prey length ranged from 25-45 mm. In two smaller specimens, apart from fish remains, unidentifiable insect remains and remains of chironomid larvae were found. *H. dichrourus* "Mwanza" is a predator of juvenile haplochromines.

— Breeding and growth. No information is available on the type of brood-care. Ripe females were caught in January, May, June, August, November and December. Size of ovaries and ripe eggs is within the range of other, equally sized piscivorous species. The left ovary is always larger than the right one. Egg sizes measured in ripe ovaries were ± 3.2 × 2.4 mm in a female of 109 mm SL, and 3.6 × 2.8 mm and 3.8 × 3.0 mm in females of 126 and 121.2 mm SL, respectively. Remarkably, only 10 of the 53 specimens caught by HEST are males. Sexually active males were caught only in

January and June. All specimens with over 100 mm SL are mature. Females grow to a larger size than males: the largest specimen, 141 mm SL, is a female; the largest male is 117 mm. The smallest sexually active male is 88.9 mm, the smallest ripe female 97.1 mm.

Comparison of the populations

Comparison of the three allopatric groups of specimens of *H. dichrourus* is hampered by the fact that there is a difference in size of the groups as well as a difference in size of the specimens belonging to the groups. Still, each group seems to have its own facies with a particular head and body shape and pattern of head markings. There are also minor differences in dental characters. Immediately apparent is the difference in Body Depth between the groups. The specimens from Uganda have the most shallow body, and the Mwanza Gulf specimens the deepest body (fig. 61). And although they seem to be more laterally compressed the specimens of *H. dichrourus* "Mwanza" have relatively broader heads (expressed in relatively higher measurements for POW/HL and HW/HL). The Majita specimens seem to have a more rounded, "smooth" profile with slightly broadened lips. As for the dental characters, in all groups the teeth in the oral jaws are moderately to strongly curved unicuspids, only in the holotype some shouldered unicuspids and one unequally bicuspid occur. The specimens from Majita have more inner rows than the specimens from the other groups (PIR 4 vs 2-3, LIR 3-4 vs 2), but this might be explained by their larger size. The Uganda specimens have more teeth in the outer rows of the oral jaws than the other groups. Finally there are slight differences in implantation.

There is a remarkable difference in the shape of the head markings between the groups (fig. 62). In the holotype and the specimen from Katebo (BM(NH) 1966.3.9.187) there is a relatively short, distinct lachrymal stripe which ends above the mouth corner. The nostril stripe is interrupted medially and of the interorbital stripe only the lateral ends are present. In the other specimens from Uganda the lachrymal stripe is extended till the horizontal preopercular arm. In two specimens the nostril stripe is continuous.

In the specimen from Majita the lachrymal stripe runs from the eye till the horizontal preopercular arm, the interorbital stripe is distinct but interrupted medially and the nostril stripe is continuous and broader medially. Rostrally between the lateral ends of the nostril stripe and the lips an isolated dark spot is present.

In the Mwanza Gulf specimens the long lachrymal stripe sometimes runs past the horizontal preopercular arm to the branchiostechal membrane. A distinct, interrupted

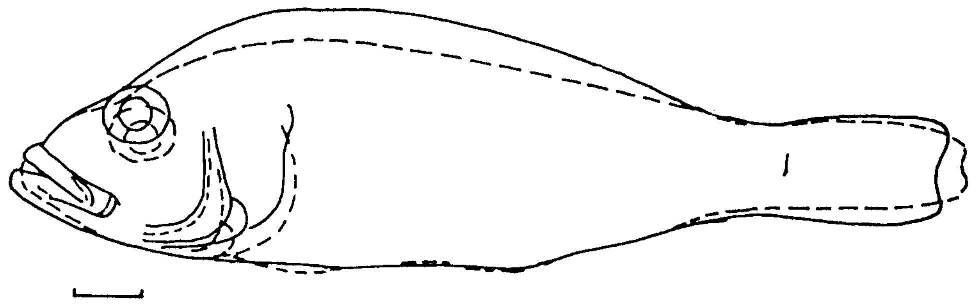


Fig. 61. Body outline of equally sized specimens of *H. dichrourus* "Mwanza" (continuous line) and *H. dichrourus* "Uganda". Scale equals 10 mm.

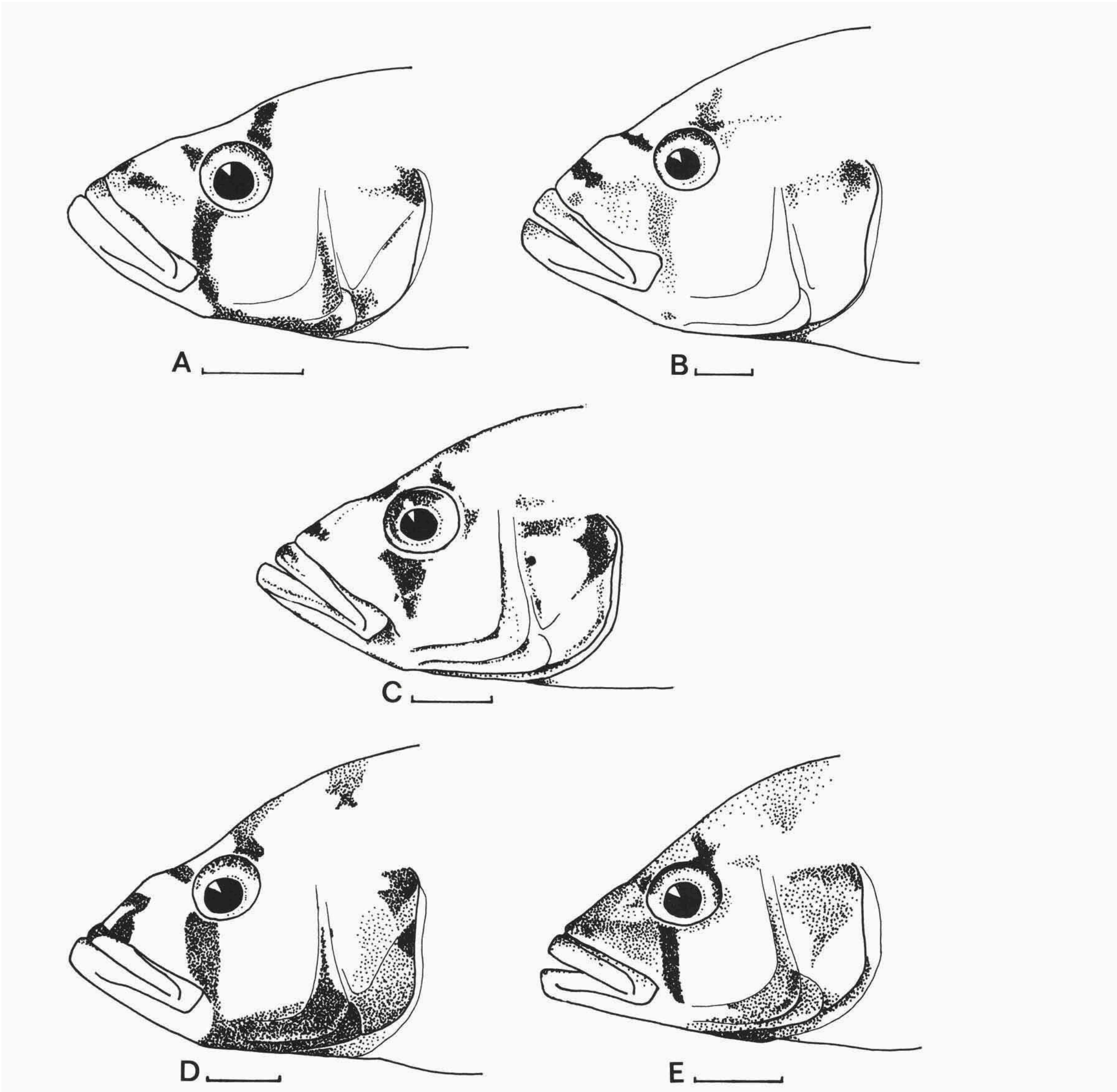


Fig. 62. Head markings in A) *Haplochromis dichrourus* "Uganda", B) *H. dichrourus* "Majita", C) holotype of *H. dichrourus* Regan, 1922 (shape of markings taken from fig. 6 of Regan, 1922, D) *H. dichrourus* "Mwanza", E) *H. maisomei* spec. nov.

or continuous interorbital stripe and a nape band are present. The nostril stripe has a characteristic M-shape. The lateral ends being extended rostrally to the lips.

Although it is known that environmental factors may have an effect on certain aspects of the morphology (Witte & Witte-Maas, 1987), it is not known if the shape of head markings can change under the influence of environmental conditions. The different head markings may well be genetically determined and could be a reflection of genetical isolation. It is likely that the head markings are part of the Specific Mate Recognition System (Paterson, 1978; Ribbink et al., 1983) but it is not known whether the differences in headmarking would prevent the members of the populations of *H. dichrourus* to mate and interbreed should they meet in a natural environment.

Table 9. Angular and qualitative measurements, and counts of *Haplochromis dichrourus* "Mwanza " Regan, 1922.

		range		mean and standard deviations
Dorsal Head Inclination		26°-37°		31.1°±3.1°
Premaxillary Pedicel Inclination		28°-42°		35.9°±3.6°
Snout Acuteness		64°-78°		72.2°±3.2°
Gape Inclination		30°-42°		35.7°±3.1°
Dorsal Head Profile (curvature)		0(+)		
Premaxilla Pedicel Prominence		0/+(+); mainly +		
Lower Jaw: anterior extension		+		
Lateral Snout Outline		0/+; mainly +		
Mental Prominence		0/+; mainly 0 and 0(+)		
Lip Thickening		0		
Premaxillar Beaked		0		
Premaxillar Expanded		0/0(+); mainly 0		
Maxillary Posterior Extension		+		
Cephalic lateral line Pores: Width		0		
Lateral Line Scales	29 (f= 1);	30 (f= 3);	31 (f= 25);	32 (f= 11)
Lateral Line-Dorsal Fin (Sc.rows)	5 (f= 10);	6 (f= 28);	(f= 2)	
Pectoral Pelvic Fin Bases (Sc.rows)	5 (f= 3);	6 (f= 20);	7 (f= 15);	8 (f= 3)
Cheek (Vertical Sc.rows)	3 (f= 2);	4 (f= 21);	5 (f= 18)	
Dorsal Fin (Spines/Rays)	XIV 10 (f= 1);	XV 9 (f= 14);	XV 10 (f= 13);	XVI 9 (f= 12);
	XVI 10 (f= 1)			
Anal Fin (Spines/Rays)	III 8 (f= 3);	III 9 (f= 21);	III 10 (f= 5)	

Haplochromis maisomei spec. nov.
(figs 61E, 109, tables 5, 6).

Material.— Holotype, ♂, 98.1 mm, RMNH 30122, Mikassa Bay, Maisome Island, Tanzania, Lake Victoria, 20.vi.1985, HEST; paratype, ♀, 96.1 mm, RMNH 30121, Mikassa Bay, Maisome Island, Tanzania, Lake Victoria, 20.vi.1985, HEST. Other material: juv. ♀, 81.5 mm, RMNH 30386, sand spit South of Standieri Island, Tanzania, Lake Victoria, 5.xii.1984, HEST.

Etymology.—The specific name is deduced from the name of the island in a bay of which the type specimens were captured.

Diagnosis.— A medium sized piscivorous species with strongly recurved unicuspid teeth in the outer row of the oral jaws. Female coloration contains elements usualy restricted to male coloration such as black pelvic fins, a brightly coloured caudal and anal fin, an egg dummy on the anal fin and distinct head markings. The male is yellowish pink on the cheek, the gill cover, the flank and the caudal peduncle. Its head markings include a distinct lachrymal stripe which is extended above the eye.

Description.— Based on the holotype, a sexually active male 96.1 mm SL and one paratype, an adult ripening female 98.1 mm SL.

Habitus.— Body relatively slender and moderately laterally compressed. Dorsal part of head profile convex, the lower part slightly concave (in the male) or straight (in the female specimen). Premaxillary pedicel hardly (male) or distinctly (female) interrupting the profile. Mouth slightly to moderately oblique. Lips normal. Premaxilla not expanded medially or beaked. The exposed part of the maxilla small. The vertical through the caudal tip of the maxilla passing the rostral eye margin. Lower jaw isognathous and slightly protruding. Rostral outline of lower jaw rounded, no mental prominence. Lateral sides of lower jaw very slightly oblique. Horizontal arm of preoperculum in female horizontal, in male ventrad inclined rostrally. The vertical arm vertical in female, reclining caudad in the male. Eye circular, pupil slightly elongated in rostro-ventral direction, a small aphakic aperture rostroventrally to the lens. Cephalic lateral line openings relatively small, the canals on the lachrymal faintly visible.

Scales.— Cheek, gill-cover, dorsal head surface and greater part of dorsum with cycloid scales. Flank, caudal part of dorsum and caudal peduncle with ctenoid scales. Chest mainly with cycloid scales, some weakly ctenoid scales laterally. A gradual size transition between scales of chest and flank. Caudal fin scaled on its proximal two-third part.

Fins.— Pectorals slightly longer than pelvics, only in the male just reaching the anal fin. First pelvic fin ray slightly produced. Dorsal and anal fin not reaching base of caudal. Caudal fin outline subtruncate and straight.

Gill apparatus.— Eight gill rakers on lower part of first gill arch on right side. The first one reduced, conical, numbers 2-5 flattened, simply tapering, 6 and 7 broadened, square topped and the last one more rounded and tapering distally. Number of gill filaments on the first hemibranch 116 and 118.

Viscera.— Intestine length of the two specimens equals the standard length. Following the definitions of Zihler (1982) the arrangement of the digestive track is of type D (with backflap).

Oral teeth.— Shape. In the outer row of both jaws slender, rounded, acutely pointed unicuspids dominate, teeth on the caudal half of the dentary are somewhat compressed. In the lower jaw of the female specimen some weakly bicuspids and shouldered unicuspids are found laterally and caudally. All teeth are moderately to strongly curved, in upper jaw teeth the curvature is stronger. Tooth size gradually decreasing caudad. Inner rows consist of a mixture of moderately curved, slightly compressed unicuspids and shouldered unicuspids.

— Dental arcade and toothband. Dental arcade rounded. A distinct medial gap in the lower jaw. Two rows of inner teeth in both jaws. Outer tooth row seems to cover whole length of dentigerous arm of the premaxilla, and seems to reach the coronoid wing on the lower jaw.

— Counts and setting. There are 49 and 53 teeth in outer row of premaxilla of the male and female specimen, respectively; 30 and 32 in the outer row of the lower jaw. Teeth are regularly set at a distance varying between half to slightly less than the diameter of the toothbase.

— Implantation. Outer row of upper jaw erect to slightly recumbent rostrally, and strongly recumbent caudally. Outer row of lower jaw erect to slightly procumbent rostrally, slightly recumbent caudally. Inner rows: upper jaw strongly recumbent, lower jaw recumbent.

Osteology.— The two Maisome specimens have not been dissected to obtain skeletal material.

— Vertebrae. There are 30 vertebrae in both specimens, comprising 13 abdominal and 17 caudal elements.

Coloration.— Live colours of a ripening male: Ground colour yellowish-pink on caudal part of lower jaw, cheek, gill-cover, flank and caudal peduncle. Snout, dorsal area of head, dorsum and ventral side light blue. Lips light bluish laterally, dark rostrally. Ventral aspects of cheek, gill-cover and branchiostegal membrane bluish-grey. Ventral side of chest and belly sooty. Head markings: a distinct broad lachrymal stripe extended above the eye, a nostril stripe, an interorbital stripe, a nape band, a nape blotch and a preopercular vertical stripe. Fins: Dorsal light blue, with a pinkish flush proximally, lappets dark grey. Pectorals hyaline, pelvics black. Anal pinkish-red rostrally, turning whitish distally on the rostral half of the rayed part. Caudal part of the anal hyaline with two bright orange egg dummies with a thin white rim. Caudal fin bright red on its ventral half, dorsal half greyish-hyaline with dark streaks between the rays.

— Live coloration of a ripening female: Ground colour on head and body dark blue. A faint reddish flush on the nape and the area just above the gill-cover. Lateral parts of lips and lower jaw, and horizontal arm of preoperculum light blueish contrasting with black interopercular and intermandibular area and rostral part of the branchiostegal membrane. Headmarkings: A distinct lachrymal stripe extended above the eye, a fainter nostril stripe, lateral ends of the interorbital stripe and a large opercular blotch. Fins: Dorsal dark blue proximally, light blue distally, lappets dark grey. Pectoral hyaline. Pelvics black. Anal dark red, caudalmost area around a bright orange ocellus hyaline. Caudal fin bright red ventrally, the dorsal half greysih hyaline with dark streaks between the rays.

— Preserved male coloration. Ground colour of head brownish grey, lateral parts of lips, caudo-lateral part of lower jaw and rostral area of horizontal arm of preopercular ivory, contrasting with dark grey to black intermandibular area and branchiostegal membrane. Headmarking: a distinct lachrymal stripe, extended above the eye. The two extensions do not meet medially. A vague nostril stripe. Of the interorbital stripe only the lateral ends are present. The nape bands medially merge into a nape blotch. Opercular blotch vague. Body uniformly brownish-grey. Dorsum and ventral side of belly and chest slightly darker, a small elongate area above the anal fin ivory. Fins: pectoral and dorsal greyish, lappets dark grey. Pelvic black. Anal ivory, caudally with two ivory spots in a hyaline area. Caudal greyish basally, ivory on the ventral half, grey with dark streaks between the rays dorsally.

— Preserved female coloration. Head: cheek, snout and dorsal head surface grey-brown. Lateral side of lips and lower jaw and horizontal arm of preoperculum ivory, contrasting with black intermandibular area, interoperculum and branchostegal membrane. A distinct black lachrymal stripe running from the rostro-ventral border of the eye behind the maxilla to the cheek margin. Just caudal to the lower jaw a black spot lies in the extension of the lachrymal stripe which is also extended above the eye. On the dorsal snout surface a vague nostril stripe and the lateral tips of an interorbital stripe can be seen. Opercular blotch large, more distinct than in male. Body dark grey rostrally and dorsally, ventral side of chest sooty. Caudo-ventral part of body ivory. A vague midlateral band rostrally starting thin in the grey area and ending broadly on the base of the caudal fin. Fins: pectorals and dorsal grey, lappets of dorsal darker grey. Pelvics black, anal ivory with a dark rimmed ivory spot caudally. Caudal greyish basally, ivory on the ventral half, and grey with dark streaks on its dorsal half.

Distribution.— *H. maisomei* is only known from Lake Victoria. The type specimens were caught in the Mikassa Bay of Maisome Island, and another specimen was caught south of Standieri Island.

Ecology.— Habitat. Both type specimens were caught in a bottom trawl over a mud bottom of 10-14 m depth in the relatively open water. The third specimen was caught with a botom trawl, over sand in relatively open water with a depth of 4-7 m.

— Food. The digestive tract of both type specimens was examined. No food remains were found in the male and the stomach of the female was also empty. However, in the gut of the female specimen remains of a small haplochromine cichlid, c. 20 mm SL and remains of insect larvae were found.

— Breeding and growth. The type specimens are mature, the specimen of 81.5 mm SL is immature.

Resembling species.— Specimens of *H. maisomei* are easily mistaken for *H. dichrourus* because of their great similarity in dentition and colour pattern. Compared to specimens of *H. dichrourus* "Uganda" of a similar size, specimens of *H. maisomei* have a slightly deeper body, a slightly longer caudal peduncle, a slightly larger interorbital width and a slightly larger eye. The dorsal head inclination is steeper and the mouth less oblique. Specimens of *H. maisomei* have in common with the holotype of *H. dichrourus* the presence of some shouldered unicuspids and unequally bicuspids caudally in the oral jaws. The large size gap between *H. maisomei* and the specimens of *H. dichrourus* "Majita" make a comparison difficult but it is clear that the *H. maisomei* specimens have a less convex dorsal head profile and a much more laterally compressed body. Compared to similarly sized specimens of *H. dichrourus* "Mwanza" the specimens of *H. maisomei* have a less convex dorsal head profile and a more pronounced incurvation above the eye, making the area rostral to the eye less deep. Dorsal head inclination is relatively steeper in *H. maisomei*. There is a great similarity in morphometric measurements; only the ratio's for CFL/SL and UJL/HC are smaller in *H. maisomei*. Specimens of *H. maisomei* can be distinguished from specimens of *H. dichrourus* "Mwanza" by the number of gill-filaments viz. 116-118 vs ca. 132. The lower number in *H. maisomei* might be a correlated with the more open and consequently better oxygenated water in which the species is found. The most important difference between the species is the coloration of the live male. Males of *H. dichourus* "Mwanza" have dark red areas on the dorsal parts of head and body which are not present in the male of *H. maisomei*. The male coloration of *H. maisomei* is much lighter than that of *H. dichrourus* "Mwanza". The headmarkings of *H. maisomei* differ from all *H. dichrourus* specimens as the nostril stripe is vaque, only the lateral parts of the interorbital stripe are faintly visible and the nape band is absent (fig. 28).

The specimens of *H. maisomei* demonstrate the importance of data on live colours for the identification of haplochromine cichlids. If the data on male live coloration of the specimens from Maisome island had not been available, the specimens certainly would have been considered as representatives of another population of *H. dichrourus*. It is possible that the specimens of *H. dichrourus* from Uganda or Majita differed in male live coloration from those of the Mwanza Gulf. In that case they too should have been considered separate species. With the data now available it can only be concluded that the specimens from the Mwanza Gulf and those from Maisome Island belong to different species. As the holotype of *H. dichrourus* has more morphological characters in common with the *H. dichrourus*-like specimens from the Mwanza Gulf than with those of the Maisome specimens, I consider the Mwanza Gulf specimens to be representatives of *H. dichrourus*.

Haplochromis kujunjui spec. nov.
(fig. 101, tables 10, 11)

Material.— Holotype, ♀, 102.8 mm SL, RMNH 30466. Sand spit south of Standieri Island, Tanzania, Lake Victoria, 5.vi.1985, HEST.

Etymology.— The name of the species refers to the name of a landmark (Kujunju point) to the north-east of which the specimen was caught.

Diagnosis.— A medium sized, slender, piscivorous species with strongly recurved unicuspid teeth in the oral jaws. Female live coloration; whole body and head uniformly brown, median fins red. Anal fin with distinct, relatively large, orange egg dummies. Pelvic fins black.

Description.— Based on the holotype only.

Habitus.— A relatively slender species with a spindle shaped body. As the preserved specimens has its mouth open, the upper jaw is slightly protruded and the suspensoria abducted, the description of the headshape may be biased. Dorsal head outline slightly convex with a small incurvation above the eye. The premaxillary pedicel probably slightly interrupting the dorsal head profile. Snout somewhat blunt. Eye almost circular, pupil somewhat elongate in the horizontal axis thus forming a small ophakic space rostral to the lens. Mouth slightly oblique. Premaxilla not expanded medially but lips seem somewhat broadened. Posterior tip of the maxilla probably just not reaching a vertical through the anterior eye margin. Lower jaw isognathous, slightly protruding. Rostral outline of lower jaw slightly convex, mental area smoothly rounded. Ventral outline or lower jaw almost straight, lower jaw sides very slightly oblique. Cephalic lateral line openings not enlarged.

Scales.— Cheek, gill-cover, nape, neck, dorsum and ventral side of chest with cycloid scales. Weakly ctenoid scales on lateral parts of chest. Remaining parts of body with ctenoid scales. A gradual size transition between chest and scales of flank. Small, elongate cycloid scales present on the proximal two-third of the caudal fin.

Fins.— Pelvic fins not reaching, pectoral fins just not reaching anal fin origin. Dorsal and anal fins not reaching caudal fin base. Pelvic fins with first ray slightly produced. Caudal fin outline subtruncate, straight.

Gill apparatus.— Eight gill rakers on the lower part of the first gill arch; the lowermost two short, conical, the following two elongated, conical, and the remaining four flattened, the uppermost two with expanded tips. Approximately 125 gill filaments on the first hemibranch.

Viscera.— Intestine length is 1.1 times standard length. Following the definitions of Zihler (1982) the arrangement of the digestive tract is of type D (with backflap).

Oral teeth.— Shape: Outer rows in both jaws contain relatively slender unicuspids, rostrally circular in cross section laterally and caudally somewhat compressed. Several compressed teeth have a shoulder on one side, few with a very small cusp. Teeth in the lower jaw somewhat stouter than those in upper jaw. Lower jaw teeth slightly curved, those in the upper jaw moderately curved. Lateral teeth in upper jaw suspensoriad inclined. Tooth size gradually decreasing from rostral to caudal. Inner rows have a micture of bicuspids and tricuspid teeth with a protracted major cusp, in the lower jaw some shouldered unicuspids are also found. All inner teeth are compressed and moderately curved.

— Dental arcade and toothband. Dental arcade rounded. Two inner rows in lower jaw, three or four in upper jaw. Distance between outer row and first inner row normal.

— Counts and setting. There are 60 teeth in the outer row of the upper jaw and 46 in the outer row of the lower jaw. Outer row teeth are regularly set at a distance of slightly less than the toothbase diameter.

— Implantation. Outer teeth in upper jaw erect (rostrally) to recumbent (caudally), in lower jaw erect to slightly recumbent. Inner teeth recumbent to strongly recumbent. The teeth are inbedded in a thick layer of tissue which covers the proximal 4/5 part of the outer row teeth and almost the entire inner teeth.

Osteology.— The holotype was not dissected to obtain skeletal elements for a detailed description.

— Vertebrae. There are 30 vertebrae, comprising 13 abdominal and 17 caudal elements.

Coloration.— Male coloration is unknown.

— The live female has the dorsal part of head and body dark brown. Lips and cheek are dark greyish. A faint lachrymal stripe, which is more distinct dorsally, runs from the rostroventral margin of the eye to the preopercular horizontal arm. Ventral part of gill-cover black. Intermandibular area and branchiostechal membrane cream coloured. Chest and ventral parts of body and caudal peduncle darkish grey. Ventral side white. Dorsal fin dark brown to black basally, turning lighter distally. Lappets and distal area of the rayed part of the dorsal red. Pectoral fins hyaline. Pelvic fins black with a small red area on the medially part. Anal fin bright red except for the hyaline caudal part in which two bright orange spots are found. The rostal most, and larger spot seems to be surrounded by a black ring. Caudal fin dark brown proximally, bright red distally and along the ventral margin.

— The preserved female has a brown groundcolour. Chest and ventral side are light brownish. Lachrymal stripe very faint, a small opercular present. Dorsal fin hyaline with proximally darker areas between the spines and rays. Pectorals hyaline, pelvics darkish, Anal hyaline, with basally darks areas between the rays and one relatively large white spot surrounded by a dark ring near the caudal margin. Anal fin dark proximally, hyaline distally, with dark stripes between the rays of the dorsal half.

Distribution.— Only known from Lake Victoria.

Ecology.— Habitat. *Haplochromis kujunjui* was caught with a bottom trawl over a sand bottom with a depth of 5-8 m in a relatively exposed area.

— Food. Examination of stomach and gut contents showed that *Haplochromis kujunjui* is a piscivorous species. The gut was filled with the remains of at least 10 very small (postbuccal) haplochromine cichlids.

Table 10. Linear measurements of *Haplochromis kujunjui* spec. nov.

RMNH reg. no.		Holotype 30466
Standard Length		102.8
Body Depth	%SL	51.3
Pectoral Fin Length	%SL	24.4
Caudal Peduncle Length	%SL	15.0
Caudal Peduncle Depth	%SL	11.6
Caudal Fin Length	%SL	22.3
Head Length	%SL	35.9
Snout Length	%HL	35.9
Snout Width	%HL	29.7
Head Width	%HL	42.7
Interorbital Width	%HL	20.0
Preorbital Width	%HL	26.4
Lachrymal Width	%HL	27.0
Preorbital Depth	%HL	18.3
Eye Length	%HL	22.9
Cheek Depth	%HL	21.0
Lower Jaw Length	%HL	48.9
Lower Jaw Width	%HL	-
Upper Jaw Length	%HL	37.5
Premax. Pedicel Length	%HL	29.7

Table 11. Qualitative measurements and counts of *Haplochromis kujunjui* spec. nov.

Dorsal Head Profile (curvature)	0(+)
Premaxillary Pedicel Prominence	0(+)?*
Lower Jaw Extension	0(+)?
Lateral Snout Outline	0(+)?
Mental Prominence	0
Lip Thickening	0
Premaxilla Beaked	0
Premaxilla Expanded	0
Maxillary Posterior Extension	0
Cephalic Lateral Line Pores: Width	0
Lateral Line Scales	32
Lateral Line - Dorsal Fin (Sc.rows)	6
Pectoral - Pelvic Fin Bases (Sc.rows)	6
Cheek (Vertical Sc.rows)	5
Dorsal Fin (Spines/Rays)	XVI 9
Anal Fin (Spines/Rays)	III 9

*) ? = Measurements affected by protrusion.

— Breeding and growth. The holotype is a mature, almost ripe female. The right ovary is larger.

Resembling species.— *H. kujunjui* is distinguisable from all other haplochromine species of Lake Victoria by the female coloration. The species is treated with the *dichrourus*-complex because the female coloration greatly resembles that of a male; it has black pelvic fins (albeit with a red medial area), brigthly coloured anal and caudal fins, and two distinct egg dummies on the anal fin. However, this species does not posess simarly strongly curved teeth as *H. dichrourus* and *H. maisomei*.

Haplochromis pyrrhopteryx spec. nov.
(figs 6, 63-78, 111, tables. 12-14)

Haplochromis dichrourus (part); Greenwood, 1967: 65-69; specimen BM(NH) 1966.3.9.185.
Prognathochromis (P.) dichrourus (part); Greenwood, 1980: 19.
Haplochromis "redback"; van Oijen, 1982: 341.

Material.— Holotype, ♂, 154.3 mm, RMNH 30010, Mwanza Gulf, Lake Victoria, Tanzania, 25.viii, HEST. Paratypes: 1 ♂, 113.0 mm + 1 ♀, 105 mm, RMNH 30384-85, Mwanza Gulf, Tanzania, Lake Victoria, vi.1975, G.Ch. Anker & C.D.N. Barel; Other paratypes from the Mwanza Gulf, collected by HEST; 2 ♀♀, 95.1, 99.5 mm, RMNH 30011-12, 4.vi.1977; 2 ♀♀, 97.2, 112.9 mm, RMNH 30013-14, 18.xi.1977; 1 ♀, 91.1 mm, RMNH 30015, 16.xii.1977; 1 ♀, 134.0 mm, RMNH 30016, Mwanza Gulf, L.V., Tanzania, 4.1.1978; 1 ♀, 107.0 mm, RMNH 30017, 27.i.1978; 1 ♀, 99.1 mm, RMNH 30018, Tanzania 27.1.1978, HEST; 2 ♂♂, 107.0, 112.0 mm + 1 ♀, 192.5 mm, RMNH 30019-21, 6.ii.1978; 1 ♂, 91.0 mm, RMNH 30022, 10.iii.1978; 1 ♂ , 137.1 mm, RMNH 30023, 12.v.1978; 1 ♀ , 118.8 mm, RMNH 30024, 26.5.1978; 1 ♀, 107.4 mm, RMNH 30025, 19.vi.1978; 2 ♀♀, 87.6, 118.3 mm, RMNH 30027-28, 11.viii.1978; 1 ♀, 90.3 mm, RMNH 30029, 18.viii.1978; 3 ♂♂, 84.9-123.7 mm + 1 ♀, 103.5 mm, RMNH 30030-33, 7.xi.1978; 1 ♂, 75.4 mm, RMNH 30034, Butimba Bay, 27.xi.19781; ♀, 94.0 mm, RMNH 30035, 15.xii.1978;. 1 ♂, 107.0 mm, RMNH 30037, Nyegezi Bay, 23.x.1979; 1 ♀, 91.8 mm, RMNH 30382, 7.xii.1979; 1 ♀, 178.3 mm, RMNH 30038, 22.iv.1980; 3 ♂♂, 112.5-154.2 mm + 2 ♀♀, 95.9, 107.8 mm, RMNH 30039-43, 25.viii.1981; 1 ♂, 142.2 mm, BMNH 1988.2.4:16, 25.viii.1981; 1 ♀, 69.2 mm, RMNH 30048, 6.vii,1982; 1 ♀, 100.8 mm, RMNH 30045, 19.x.1982;; 1 ♂, 107.6 mm, RMNH 30047, 26.x.1982; 1 ♂, 116.0 mm, RMNH 30049, 17.1.1983; 1 ♀, 133.1 mm, MNHN 1987-1669, 17.i.1983; 1 ♀, 108.4 mm, ANSP 168241, 1978; 1 ♂, 115.8 mm, BMNH 1987.2.4.17, 1978; 5 ♂♂, 88.2-135.9 + 3 ♀♀, 93.4-150.8 mm, RMNH 30050-57, 1978. Paratypes from other localities collected by HEST; 1 ♀, 111.0 mm, RMNH 30046, Bukinga Bay, Tanzania, Lake Victoria, 22.x.1982; 1 ♀, 138.0 mm, RMNH 30026, off Nafuba Island, Speke Gulf, Tanzania, Lake Victoria, 2.viii.1978; 1 ♀, 117.0 mm, RMNH 30036, off Ukerewe Island, Tanzania, Lake Victoria, 6.vi.1979; 1 ♀, 77.2 mm, RMNH 30379, off Standieri Island, Tanzania, Lake Victoria, 22.iii.1983; . Other material: 1 ♂, 173.7 mm, BMNH 1966.3.9.185, off Soswa Island, Tanzania, Lake Victoria, J.D. Kelsall; 2 ♂♂, 123.0, 197.0 mm, RMNH 30380-81, Kavirondo Gulf, Kenia, Lake Victoria, 1976, R.S. Benda.

Etymology. The specificl name (from the Greek "πυρροδ" = reddish, yellow-red, and "πτερυε" = wing, fin) refers to the bright, orange-red coloration of the median fins which is present in live specimens of both sexes, juveniles as well as adults.

Diagnosis. A moderately large and slender piscivorous species with strongly recurved unicuspid teeth in the oral jaws. Live colours for males and females are black on ventral parts of head and body and orange dorsally. All median fins orange. Males and females have black pelvic fins.

Description.— Based on 49 specimens (including the holotype) 75.4-192.5 mm SL.

Habitus.— Body moderately elongate, the head having a rather "heavy" appearance. Dorsal head profile slightly curved, from nape to upper lip nearly straight in

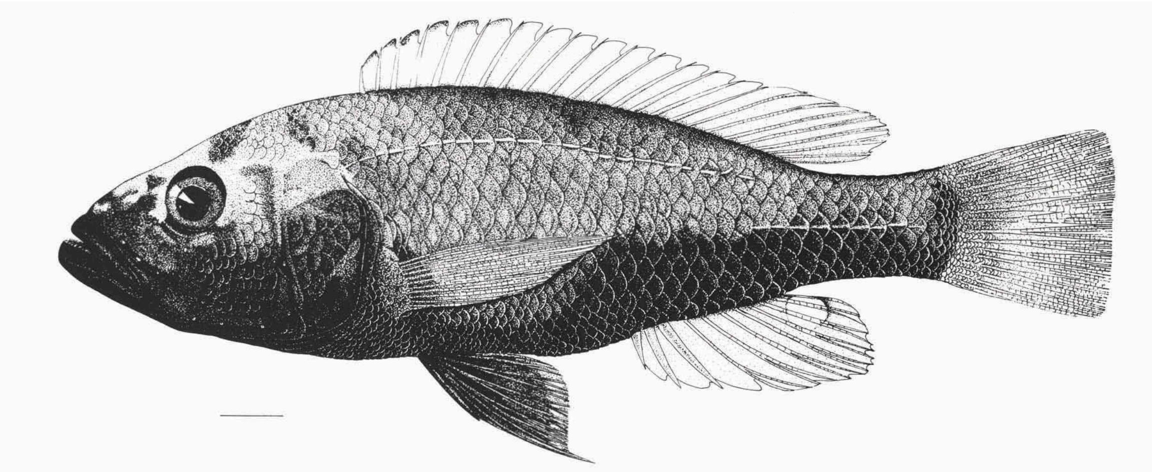


Fig. 63. *Haplochromis pyrrhopteryx* spec. nov., paratype (RMNH 30023), SL 137.1 mm, lateral view. Scale equals 10 mm.

some specimens. Premaxillary pedicel hardly to moderately interrupting the profile. Snout somewhat blunt. Mouth moderately oblique. Premaxilla not or slightly expanded medially. An elongate area of the maxilla exposed dorsally and caudally to the caudal part of the premaxilla. Posterior tip of the maxilla just passing or not quite reaching a vertical through the anterior eye margin. Lips not thickened, lower jaw isognathous or slightly prognathous, tip of the lower jaw always slightly protruding. Rostral outline of lower jaw slightly convex. Mental area rounded or with a small mental prominence. Sides of lower jaw slightly to moderately oblique. Horizontal arm of preoperculum horizontal, vertical arm vertical to slightly rostrad inclined. Cephalic lateral line openings not enlarged, lateral line canals on the lachrymal not visible. Eye moderately large and circular, pupil subcircular, a small aphakic space always present rostro-ventrally to the lens.

Scales.— Cheek and nuchal area with cycloid scales only, the gill cover with more cycloid scales than weakly ctenoid scales. Scales on nape and body ctenoid, those on nape and dorsum often weakly ctenoid, chest with rather small ctenoid scales. Small elongate scales on the proximal half of the caudal fin.

Fins.— Pectoral and pelvic fins not quite reaching the anal fin. Anal and dorsal fin not reaching base of caudal. Pelvics with the first soft ray slightly produced. Caudal fin outline truncate and slightly emarginate.

Gill apparatus.— Eight to ten gill rakers on the lower part of the first gill arch, the lowermost two or three reduced, the next two or three slender and pointed, and the remaining three or four flattened with the top rounded, bifid or trifid. There are approximately 132 gill filaments on the first hemibranch.

Viscera.— Intestine length ranges from 0.9 to 1.6 (mean 1.24) times the standard length (n= 13). Following the definitions of Zihler (1982) the arrangement of the digestive tracks of adults is of type D (with backflap).

Oral teeth.— Shape. All specimens have rather stout, rounded, strongly curved and acutely pointed unicuspids teeth in the outer row of both jaws. In smaller specimens (90 mm) a few weakly bicuspids may be present caudally. Curvature is almost confined to upper half of the teeth. Tooth size decreases gradually from rostral to caudal. In the inner rows, slightly compressed unicuspids dominate over weakly tri- and bicuspids. All inner row teeth are strongly curved and slightly compressed.

— Dental arcade and toothband. Dental arcade rounded. Outer row occupies 9/10 of premaxilla dentigerous arm, and on dentary does not reach coronoid wing. Both jaws have two inner rows. Length of inner row on premaxilla 1/2 outer row length, on dentary 4/5 of outer row length. Distance between outer row and first inner row only slightly larger than distance between inner rows.

— Counts and setting. There are 52-64 teeth in outer row of the premaxilla, and 36-56 teeth in outer row of the lower jaw. The number shows a positive correlation with standard length. Outer teeth somewhat irregularly set at a distance of a half to more than once the diameter of the tooth base. The irregular setting might be due to the fact that many of the described specimens have not yet reached an adult size.

— Implantation. In upper jaw rostral teeth slightly recumbent, caudal teeth moderately recumbent. Teeth in lower jaw are slightly procumbent rostrally and erect caudally. In both jaws the teeth are slightly suspensoriad inclined. Teeth of inner rows strongly recumbent, second inner rows implanted almost horizontally.

Pharyngeal teeth.— Counts. Approximately 22 teeth in caudalmost transverse row and 11 in the two median rows.

— Shape. Teeth of the caudalmost row and 2 or 3 caudally in the median row are hooked, the blunt major cusp pointing dorso-rostrad. Other teeth are relatively fine, acutely pointed and bevelled. Tooth size increases from rostral to caudal and from lateral to medial.

Osteology.— The osteological descriptions of neurocranium, premaxilla, lower jaw and pharyngeal element are based on five specimens, RMNH 30033, 30017, 30019, 30022 and 30050, SL 94.0 to 133.0 mm. Description of the oral teeth is based on all type specimens.

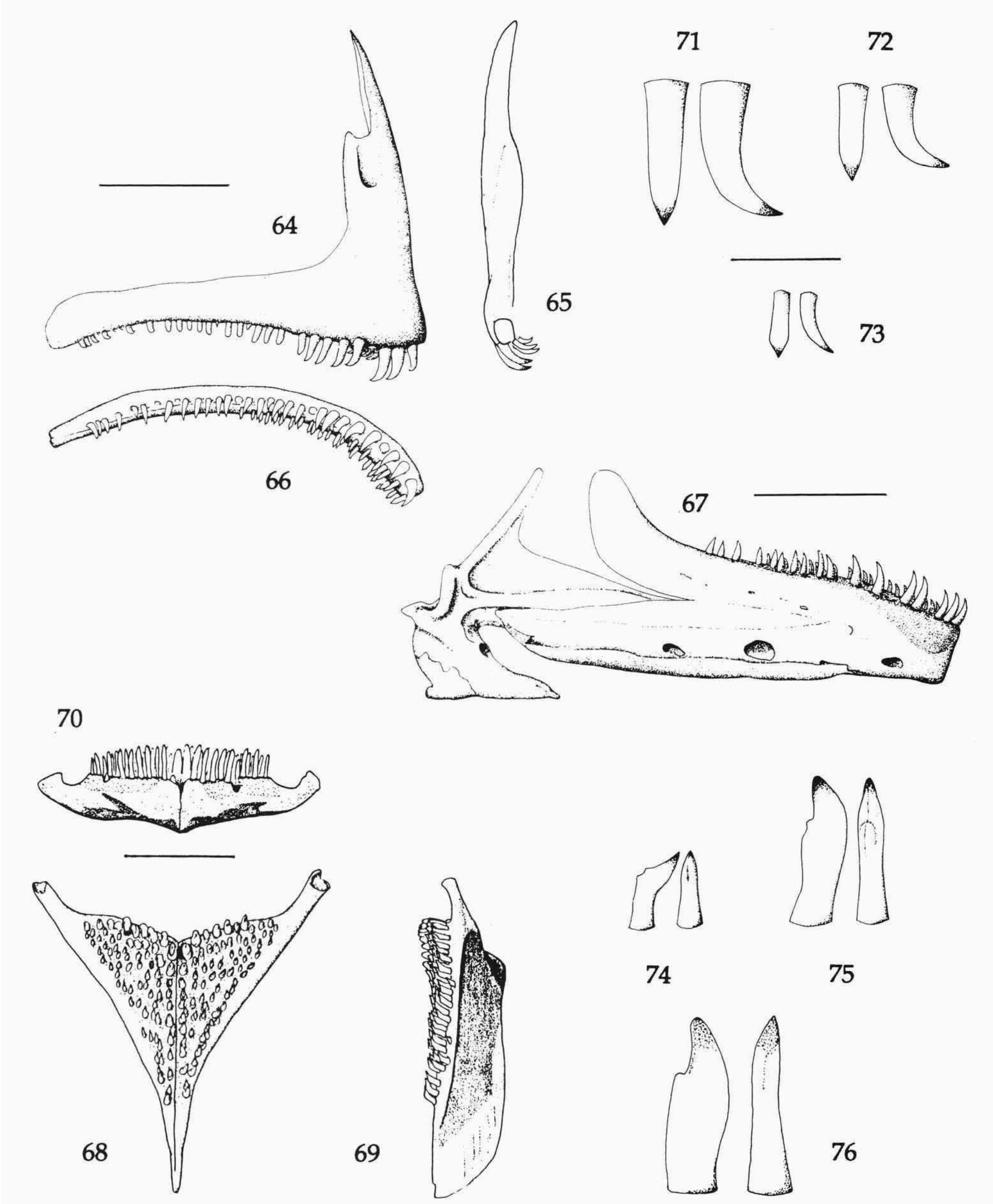
— Neurocranium. Compared to the neurocranium of a generalized cichlid, *Haplochromis elegans* (see Barel et al., 1976), that of *H. pyrrhopteryx* is more slender as it has a shallower otic region. The depth of the supraoccipital crest is approximately the same. The ethmovomerine block is relatively longer than in *H. elegans* and less decurved. The broad postorbital process is situated relatively high in the neurocranium. As in most piscivorous cichlids from Lake Victoria the pharyngeal apophysis is situated far caudally.

— Oral jaws. Premaxilla with ascending arm longer than dentigerous arm, angle between the arms 75-81°. Ascending arm with a slightly convex outline rostrally. Transition from ascending arm to relatively thin dentigerous arm broad. Outline of toothbearing side of dentigerous arm straight to slightly concave. Mandible with relatively long dentigerous part which is only slightly less than half of lower jaw length. Dentigerous area slightly decurved. Length/depth ratio of lower jaw 2.3.

— Lower pharyngeal element (fig. 40) rather shallow, slightly longer than broad (length/width = 1.1). Dentigerous area slightly broader than long (length/width = 0.9).

—Vertebrae: There are 29 or 30 vertebrae comprising 13 abdominal and 16 or 17 caudal elements.

Coloration.— Live sexually active males: Ethmoidal area and dorsal head surface bright orange-red, interrupted by dark and distinct nostril and interorbital stripes and a fainter supraorbital band, nape band and nape blotch. Dorsal part of gill-cover



Figs 64-76. *Haplochromis pyrrhopteryx* spec. nov. Fig. 64. Premaxilla, lateral view. Fig. 65. Premaxilla, view perpendicular to dentigerous area. Fig. 66. Premaxilla, medial view of ascending arm. Fig. 67. Lower jaw, lateral view. Fig. 68. Lower pharyngeal element, dorsal view. Fig. 69. Lower pharhyngeal element, lateral view. Fig. 70. Lower pharhyngeal element, caudal view. Figs. 71-73. Premaxillary teeth, labial and lateral view. Fig. 71. First tooth of outer row. Fig. 72. Seventh tooth of outer row. Fig. 73. Fifth tooth of 1st inner row. Figs. 74-76. Lower pharhyngeal teeth, lateral and rostral view. Fig. 74. Seventh lateral tooth. Fig. 75. Sixth medial tooth of caudalmost row. Fig. 76. Second medial tooth caudalmost row. Scale of bony elements = 5 mm, scale of teeth = 1 mm.

orange, a black opercular blotch present. Remaining lateral and ventral parts of head entirely black. Body: dorsum and flank bright orange, merging into a duller orange and finally black caudally, where iridescent green scales may be present. Lower part of the flank with a yellow sheen. Chest, central part of belly, ventral side and caudal peduncle black. Fins: pectoral hyaline, pelvics black. Anal light reddish rostrally turning into reddish-white caudally; two small yellow-orange eggdummies with a dark rim dorsally on the fin. Dorsal fin light orange-red. Some darker red streaks between the soft rays. Caudal fin bright light red.

— Quiescent males have smaller and less brigth orange areas on the flank. The orange-red flush on the medial fins is also reduced leaving the caudal parts of the fins hyaline.

— Live females have a coloration closely resembling that of quiescent males: Head black ventrally. Nape and neck sooty with an overlying orange flush. Interorbital area light orange, snout area orange barred by the black nostril and interorbital stripes. Crossbands on the dorsal head surface faint. Body black, with overlying light orange flush on the rostral parts of dorsum and flank. Fins: pectorals hyaline, pelvic black, anal light yellow-orange, becoming a less intense yellow-orange, almost hyaline distally, 1-4 orange spots on the caudal part. Dorsal light orange, darker orange spots between the soft rays. Caudal light orange-red.

— Juveniles have the same coloration as females, but the orange flush on dorsum and neck is very faint.

— Preserved males have dorsal part of snout, interorbital area and nape light ivory. Nostril stripe distinct, extended over the nostrils and, from a point slightly medial of this, extending rostrad to the upper lip. Interorbital stripes not reaching the eye margin and not meeting in the midline. Supraorbital band rather faint, nape band broad and distinct, nape blotch faint. From the eye a broad black area stretches across the lachrymal to the upper jaw. Cheek dark grey-brown, gill-cover darker, preoperculum black, lips darkish brown, lower jaw and ventral part of head black. Body generally darker grey, lighter dorsally. Chest, belly and ventral side black. Fins: pectoral greyish, pelvics black. Anal, dorsal and caudal very light yellowish.

— Preserved females and juveniles. Dorsal part of head light yellowish-grey. The bands in this area being much less distinct than in males (especially the band on the nape). Cheek dark brownish, snout slightly darker, remaining parts of head black. Body with a small area of the dorsal part light brownish and a larger dark brown-black area on the ventral part. In the lighter part 4 vertical bands may be visible on the dorsal flank. Fins: pectoral hyaline, pelvics black, anal, dorsal and caudal light yellowish.

Distribution.— *H. pyrrhopteryx* is only known from Lake Victoria. The majority of the specimens from the HEST collections were captured in the northern part of the Mwanza Gulf, but specimens were also collected off Ukerewe Island, and near Nafuba Island in the Speke Gulf. The specimen BM(NH) 1967.3.9.185 formerly included in *H. dichrourus* was caught off Soswa Island. Two specimens came from the Kavirondo Gulf (Kenya). Although the areas are relatively far apart the morphometric measurements and the coloration of the specimens (coloration of the specimens from the Kavirondo Gulf is known from photographs) are very similar.

Ecology.— Occurrence. In the period from 1977-1980 *H. pyrrhopteryx* was a rare species in the Mwanza Gulf area. Despite the fact that we searched the catches for

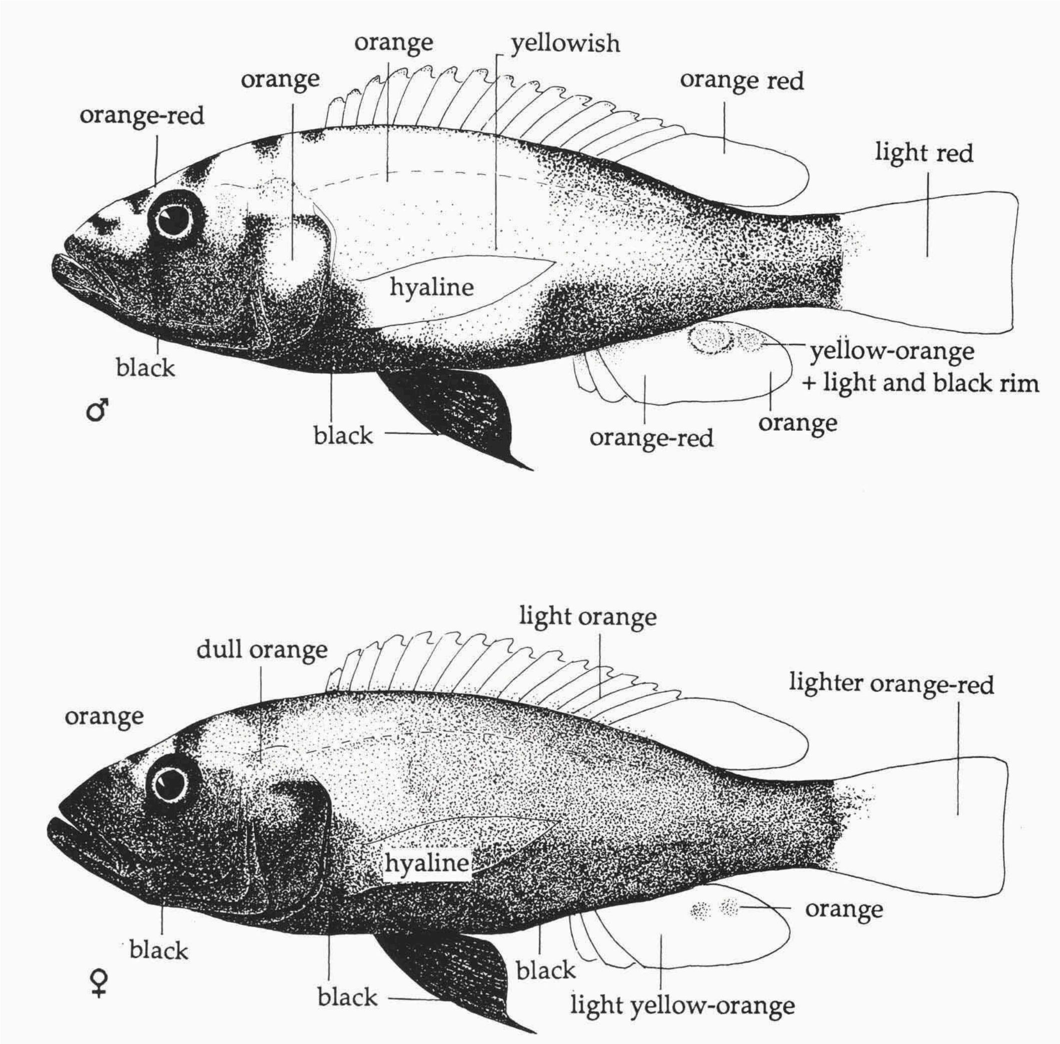


Fig. 77. *Haplochromis pyrrhopteryx* spec. nov. Live colours and markings of a sexually active male and a female.

specimens of this conspicuously coloured species, we collected only 45 specimens from 1977 to 1980. Since the explosive increase of the Nile perch population in the Mwanza Gulf *H. pyrrhopteryx* has disappeared from the catches.

— Habitat. Because of the few specimens encountered in the catches it is not easy to get an idea of the preferred habitat of this species. It is remarkable that almost all known specimens are immature. The smallest were caught in bays over a mud bottom at a depth of 2-4 meters. The length of the specimens seems to increase with the depth of the water in which they are caught. The majority of the specimens were caught in a bottom trawl over mud bottoms with a depth of 10-16 m. The largest specimen was caught at the entrance to the Mwanza Gulf at a depth of 20 m. This suggests that large specimens normally live in deeper, exposed waters with a muddy bottom and may come to shallow waters only to breed.

— Food. Thirteen intestines of 23 examined specimens of *H. pyrrhopteryx* contained remains of small haplochromine cichlids. Where the size of the prey could be calculated it was found that specimens of about 90 mm SL preyed on haplochromines of 15-25 mm, a specimen of 113 mm SL had fed on haplochromines of 35 mm, and specimens of 136 and 142 mm SL fed on haplochromines of respectively 40 and 60 mm. Therefore it seems that prey-size increases with predator size. In two speci-

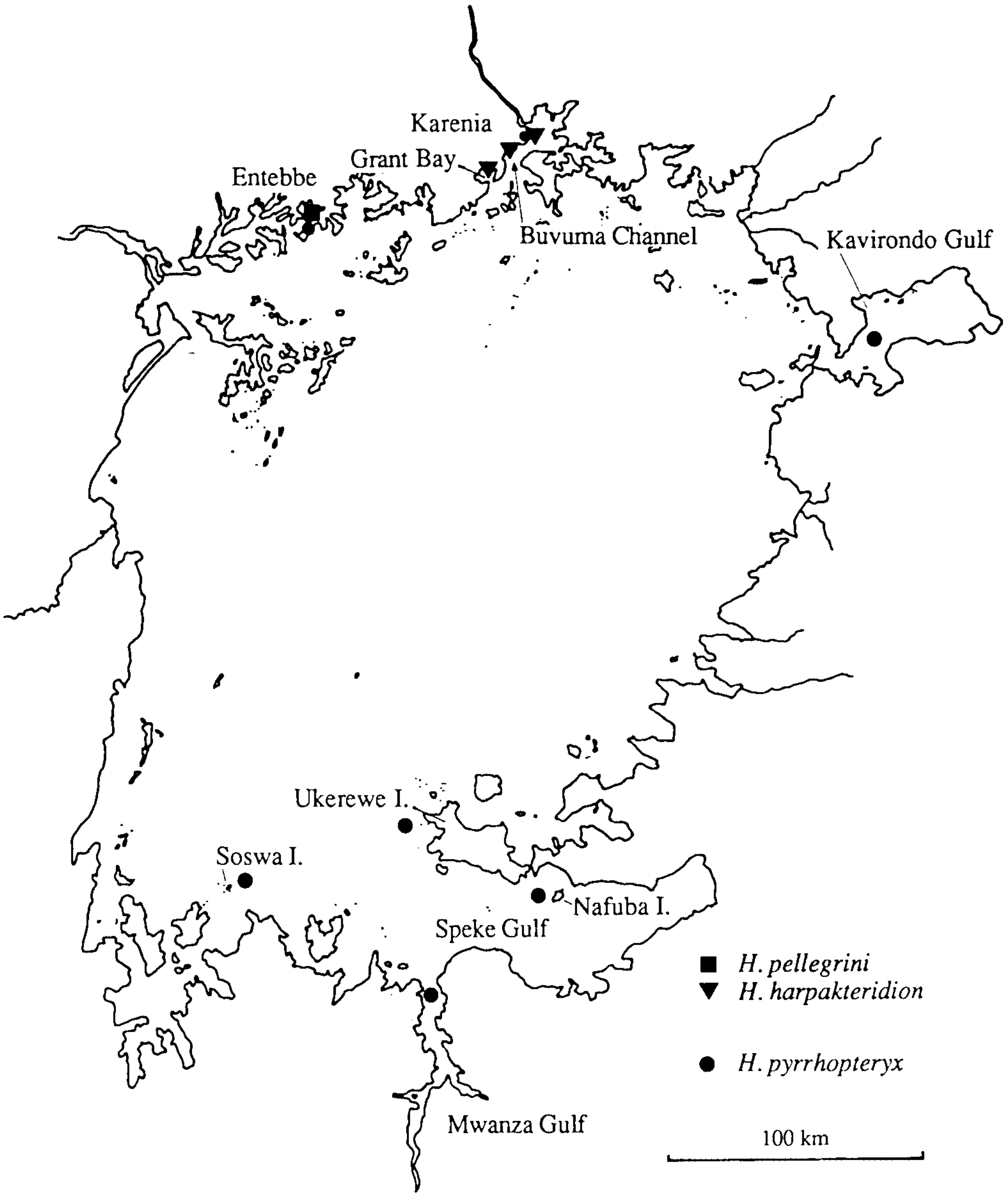


Fig. 78. Catch localities of *Haplochromis pyrrhopteryx* spec. nov., *H. pellegrini* Regan, 1922, and *H. harpakteridion* spec. nov. in Lake Victoria.

Table 12. Ranges of linear measurements of *Haplochromis pyrrhopteryx* spec. nov. For convenience the ratios are multiplied by 100.

SL in mm	75.4-88.2	91.0-99.5	100.8-108.14	110.0-118.8	123.7-138.0	142.0-154.3
N	4	11	10	9	6	5
BD/SL	28.4-31.6	28.5-32.3	28.3-32.4	30.7-33.2	29.3-30.4	31.8-33.7
PFL/SL	24.2-30.5	26.9-31.8	25.7-30.6	23.4-29.5	26.6-31.1	24.1-29.9
CPL/SL	16.7-18.9	15.5-18.1	14.6-18.8	14.8-17.1	14.2-18.0	14.4-16.6
CPD/SL	10.8-11.9	10.0-11.9	10.5-11.8	10.7-11.5	10.6-11.3	10.8-11.8
CFL/SL	19.0-23.8	20.7-25.3	21.0-24.1	21.6-23.4	21.6-23.7	20.8-22.2
HL/SL	35.8-36.8	35.6-38.1	35.6-38.1	35.8-37.9	35.6-37.8	34.9-37.6
SnL/HL	29.2-32.3	29.4-33.6	31.6-35.1	32.7-36.1	33.1-36.9	33.6-36.2
SnW/HL	31.3-35.2	27.7-32.7	28.7-36.6	29.5-37.4	30.4-38.0	31.0-36.4
HW/HL	42.5-45.2	38.2-44.1	39.9-42.8	40.0-46.0	41.5-44.5	42.9-47.2
IOW/HL	20.9-22.7	20.8-23.0	22.0-24.0	22.0-24.3	22.2-23.9	23.3-24.0
POW/HL	25.4-27.5	23.4-27.7	25.0-26.9	25.1-27.5	25.4-27.4	27.5-28.7
LaW/HL	26.4-29.8	22.7-29.3	24.5-28.2	26.8-29.1	25.2-30.1	26.7-30.9
POD/HL	15.1-17.5	15.7-17.8	17.0-20.1	16.8-20.3	19.0-19.5	18.1-19.7
EyL/HL	23.0-25.2	21.2-26.5	20.7-25.5	20.2-26.0	19.8-22.0	20.0-22.5
ChD/HL	21.8-22.2	20.9-22.7	21.4-24.3	21.6-24.0	23.0-27.9	25.3-27.9
LJL/HL	44.8-47.7	44.8-49.7	47.7-50.7	46.8-51.6	48.7-50.1	50.0-54.7
LJW/HL	19.8-21.2	18.2-22.2	18.2-22.5	18.3-25.6	19.2-26.5	20.1-25.7
UJL/HL	34.6-38.7	34.8-38.3	35.3-38.8	34.4-39.7	39.2-41.7	40.3-42.2
PPL/HL	25.3-28.3	25.9-29.5	27.0-29.7	26.7-30.0	27.8-29.4	26.7-27.7

Table 13. Means and standard deviations of linear measurements of *Haplochromis pyrrhopteryx* spec. nov. For convenience the ratios are multiplied by 100.

SL in mm	75.4-88.2	91.0-99.5	100.8-108.4	111.0-118.8	123.7-138.0	142.2-154.3	178.3	192.5
N	4	11	11	9	6	5	1	1
BD/SL	29.7±1.6	30.2±1.2	30.3±1.4	31.7±1.0	30.3±0.7	32.8±1.5	32.4	32.9
PFL/SL	27.6±2.6	28.1±1.2	28.5±1.2	28.4±1.2	28.7±3.6	27.4±2.0	29.3	27.6
CPL/SL	17.8±1.1	16.6±1.0	16.5±1.0	16.5±1.0	15.7±1.4	15.3±0.8	16.1	16.6
CPD/SL	11.4±0.5	11.0±0.5	11.0±0.4	11.2±0.2	10.9±0.3	11.2±0.3	11.2	11.0
CFL/SL	21.6±1.9	22.9±1.4	22.3±1.0	22.5±0.6	22.5±0.8	21.7±0.5	21.2	19.7
HL/SL	36.4±0.5	37.0±0.6	36.7±0.6	36.8±0.8	36.9±0.8	36.4±1.0	36.4	37.4
SnL/HL	31.0±1.6	31.6±1.2	33.4±1.3	33.4±1.3	34.2±1.1	35.0±0.9	37.2	39.8
SnW/HL	33.3±2.0	30.4±1.5	31.6±2.0	33.1±2.7	34.4±2.2	34.3±2.3	38.6	38.2
HW/HL	43.8±1.3	41.3±1.9	41.5±0.9	43.3±1.7	42.5±1.3	44.5±1.5	43.2	45.4
IOW/HL	21.9±1.0	21.5±0.6	21.6±0.6	22.6±0.6	22.7±0.7	23.6±0.4	23.5	25.5
POW/HL	26.2±1.0	25.4±1.3	24.4±2.2	26.5±0.8	26.3±0.8	27.9±0.6	26.6	29.4
LaW/HL	27.5±1.5	25.8±1.6	26.1±1.1	27.9±1.0	28.6±2.5	29.5±2.0	27.8	32.8
POD/HL	16.4±1.2	16.6±0.8	17.9±0.8	18.0±0.7	19.0±0.6	18.9±0.7	20.0	22.0
EyL/HL	24.0±1.1	22.2±0.6	23.4±1.9	23.4±1.9	22.1±1.6	21.2±0.9	20.4	20.5
ChD/HL	22.1±0.1	21.7±0.7	22.4±0.8	22.4±0.8	24.5±1.0	26.6±0.7	26.3	27.8
LJL/HL	45.8±1.5	47.0±1.8	48.8±1.3	48.8±1.3	49.6±0.5	52.5±2.2	54.1	58.6
LJW/HL	20.5±0.7	20.4±1.5	21.1±1.3	22.0±2.6	22.7±3.0	23.0±2.6	-	29.1
UJL/HL	36.7±1.7	37.3±1.3	37.2±1.1	38.0±1.7	40.0±0.8	41.6±1.5	41.3	41.0
PPL/HL	26.9±1.2	27.6±1.0	27.8±1.0	27.9±1.0	28.6±0.5	27.2±0.7	28.1	29.1

Table 14. Angular and qualitative measurements, and counts of *Haplochromis pyrrhopteryx* spec. nov.

		range		means and standard deviations	
Dorsal Head Inclination		19°-30°		24.4°±6.3°	
Premaxillary Pedicel Incl.		28°-40°		33.3°±5.4°	
Snout Acuteness		64°-78°		70.9°±4.1°	
Gape Inclination		32°-48°		39.0°±4.9°	
Dorsal Head Profile (curvature)		+			
Premaxilla Pedicel Prominence		0(+)/+			
Lower Jaw: Anterior Extension		+/++			
Lateral Snout Outline		0/+			
Mental Prominence		+			
Lip Thickening		0(+)			
Premaxilla Beaked		0			
Premaxilla Expanded		0			
Maxillary Posterior Extension		-/0			
Cephalic Lateral Line Pores: Width		0			
Lateral Line Scales	31 (f= 1);	32 (f= 12);	33 (f= 12);	34 (f= 6);	35 (f= 2)
Lateral Line - Dorsal Fin (Sc.rows)	5 (f= 2);	6 (f= 13);	7 (f= 13);	8 (f= 8)	
Pectoral - Pelvic Fin (Sc.rows)	5 (f= 2);	6 (f= 7);	7 (f= 18);	8 (f= 4);	9 (f= 1)
Cheek (Vertical Sc.rows)	3 (f= 2);	4 (f= 14);	5 (f= 15)		
Dorsal Fin (Spines/Rays)	XIV 9 (f= 1);	XV 9 (f= 5);	XV 10 (f= 7);	XVI 8 (f= 1);	
	XVI 9 (f= 14);	XVI 10 (f= 2);	XVII 9 (f=1)		
Anal Fin (Spines/Rays)	III 8 (f=3);	III 9 (f=22);	III 10(f=1)		

mens, 90 and 120 mm SL, remains of *Rastrineobola argentea* were found. In both specimens the length of the prey was c. 50 mm. Remains of a shrimps were encountered in one specimen, insect remains were found in two specimens and the intestines of 5 specimens were empty.

— Breeding and growth. Specimens of *H. pyrrhopteryx* mature at approximately 135 mm SL. Few adult specimens have been caught. The largest known specimen is a sexually quiescent female of 199 mm standard length. In all females the right ovary is larger than the left. No ripe females were caught, therefore the size of ripe eggs is unknown. In the mouth of one spent female, RMNH 30038, SL 178.3 mm, one egg of 3x2.5 mm was found. However, it is possible that this egg entered the mouth during capture of the specimen in the trawl-net.

Resembling species.— The combination of strongly recurved unicuspid teeth and the coloration of *H. pyrrhopteryx* immediately sets the species apart from all but one of the Lake Victoria haplochromine cichlids, viz. *H. dichrourus*. However, the coloration although similar in some respects, is distinct enough to separate the two species at once. The main colours of female *H. dichrourus* are blue-black and dark red, and of males greenish-black and dark red. The intensity of the dorsal fin coloration is variable, but it is usually less bright red than the caudal and anal fins. The caudal fin in females is red only on its ventral half. In *H. pyrrhopteryx* the main colours for both sexes are black and orange. All median fins are light or bright orange even in juveniles. Preserved specimens of the two species can also be separated by their coloration: the black colour of the ventral parts of the head and body of *H. pyrrhopteryx* are retained in the preserved condition, whereas preserved specimens of *H. dichrourus* loose part of the dark ventral colour, the cheek and especially the lower jaw becoming lighter, leaving the dark lachrymal stripe and the black intermandibular area and branchostegal membrane strongly contrasting. In *H. pyrrhopteryx* the cheeks and lower jaws remain black and the lachrymal stripe is only faintly visible. A number of morphometric features may be used to separate the species. Small differences are found in the ranges of the ratio's for Body Depth/Head Length, Preorbital Depth/Head Length and Interorbital Width/Head Length, while the ranges of the ratio's of Snoutlength/Head Length, Snout Width/Head Length, Cheek Depth/Head Length and Lower Jaw Length/Head Length show almost no overlap.

With *H. bareli*, *H. pyrrhopteryx* shares the strongly curved teeth and the dark ventral body coloration of males. However, there are differences in general body shape and in many morphometric measurements.

Haplochromis chrysogynaion spec. nov.
(figs 79-82, 84-87, 112, tables 15, 16)

Introduction.— When, in the course of our investigations in the southern part of Lake Victoria we caught gold coloured specimens there were two possibilities for their taxonomic status; either they represented colour polymorphs of an existing species (e.g. as described for *Cichlasoma citrinellum* in Nicaraguan Lakes, see Barlow, 1983; McKaye, 1980) or they represented a new golden cichlid species (a golden cichlid, *Pseudotropheus barlowi* from Lake Malawi was described by McKay & Staufer, 1986 and Ribbink *et al.*, 1983). Because of their distinctive tooth shape; viz. strongly recurved unicuspids, the three specimens (all female) clearly belonged to the "*dichrourus*" group. Comparison of the morphometric data of the specimens with those of similar sized specimens of the species of the *dichrourus* group revealed that they differ from *H. pyrrhopteryx* in BD/SL, ChD/HL, PPL/HL and from *H. bareli* in BD/SL, PFL/SL, IOW/HL, SnL/HL, PPL/HL ratio's. The morphometric measurements of the golden females fit in the ranges of the Mwanza Gulf population of *H. dichrourus*. However, closer examination of the habitus of the two groups revealed differences in body and head shape which are difficult to quantify. Comparison of some skeletal elements of the largest golden female (91.3 mm) with those of a similarly sized (93.1 mm) specimen of *H. dichrourus* from the Mwanza Gulf revealed differences in tooth shape and number of teeth (figs. 80, 83). Therefore I believe the golden females are representatives of a different species. Although no male conspecifics of the females are known, it seems appropriate to describe here a new species based on the females only.

Material.— Holotype; ♀, 89.0 mm, RMNH 30118, Mikassa Bay, Maisome Island, Tanzania, Lake Victoria, 25.vi.1985, HEST. Paratypes: 1 ♀, 75.3 mm, RMNH 30119, Mikassa Bay, Maisome Island, Tanzania, Lake Victoria, 25.vi.1985, HEST; 1 ♀, 91.3 mm, RMNH 30120, Mwanza Gulf, Tanzania, Lake Victoria, 8.xii.1977, HEST.

Etymology.— The name chrysogynaion is composed of the Greek words for golden; "Χρυσο" and "χυνχιον"; the diminutive for female, and refers to the golden live coloration of the females of this species.

Diagnosis.— The females of this species are separable from all other haplochromine cichlid species by their live coloration. Preserved females differ from most other piscivorous species in having strongly recurved unicuspid teeth. From other piscivorous species which have similar teeth they can be distinguished by their uniform cream coloration and lack of all markings.

Description.— Based on the holotype and two paratypes 75.3-91.3 mm SL.

Habitus.— A moderately deep bodied, relatively small sized species. Dorsal head profile nearly straight, divided into two slightly convex parts by a slight incurvation above the eye . Premaxillary pedicel visible but smoothly merging into the head profile. Cephalic lateral line openings not enlarged, the canals on the lachrymal barely visible. Eye circular, pupil subcircular with a small aphakic aperture rostro-ventrally to the lens. Mouth moderately oblique. Premaxilla not expanded or beaked. The exposed part of the maxilla small. Posterior tip of maxilla reaching a vertical posterior to the eye margin. Lips normal. Jaws equal anteriorly, lower jaw tip slightly protruding. Rostral outline of lower jaw and mental area rounded. Lower jaw sides slightly to moderately oblique.

Scales.— Cheek, gill-cover and dorsal head surface covered with cycloid scales. Rostral part of dorsum with a mixture of cycloid and weakly ctenoid scales, those on the caudal part ctenoid. Chest laterally with ctenoid, ventrally with cycloid scales. A gradual size change between chest scales and scales of surrounding areas. Scales on remaining part of body ctenoid. Caudal fin scaled with elongate, weakly ctenoid scales on its proximal half to two thirds. No basal scale sheath on dorsal and anal fin.

Fins.— Pectorals reaching anal in one specimen, pelvics not reaching anal. Dorsal and anal fins not reaching base of caudal fin. First pelvic ray slightly produced. Outline of caudal fin truncate or subtruncate and slightly emarginate.

Gill apparatus.— Eight or nine gill rakers on lower part of first gill arch. Lowermost two reduced, conical, third and fourth short and conical or fourth flattened tapering, fifth to seventh flattened with broadened simple or bifid heads, last ones less flattened, tapering. On the lateral hemibranch of the first gill arch the number of gill filaments is about 110.

Viscera.— Intestine length from 1.0-1.3 times standard length. Following the definitions of Zihler (1982) the configuration of the intestines is of type D (with backflap).

Oral teeth.— Shape. In the outer row of both jaws unicuspid teeth dominate weakly bicuspid teeth. The unicuspids are slender, round and acutely pointed. Laterally, some unicuspids are slightly compressed distally and have a shoulder on one side. At the base of this shoulder a very small cusp may be present. The inner row teeth in the upper jaw are all weakly tricuspids, in the lower jaw shouldered unicuspids dominate weakly bicuspids and tricuspids. All teeth are strongly recurved.

— Dental arcade and toothband. Dental arcade rounded. Outer row covers nearly length of dentigerous arm of premaxilla, inner rows about 3/5 part. Two or three inner rows of teeth in rostral part of premaxilla, decreasing to one at 1/2 inner row length. The gap between the outer row and the first inner row rostrally is relatively small. Outer row of mandible reaching rostral part of coronoid wing. The longer of

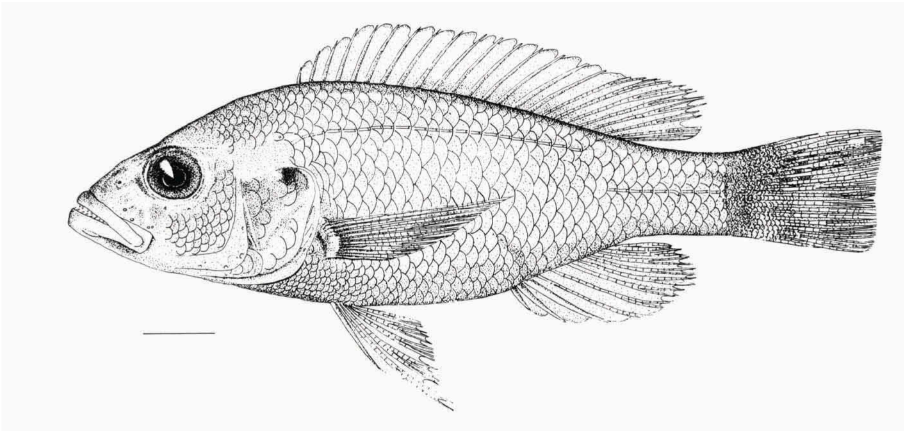
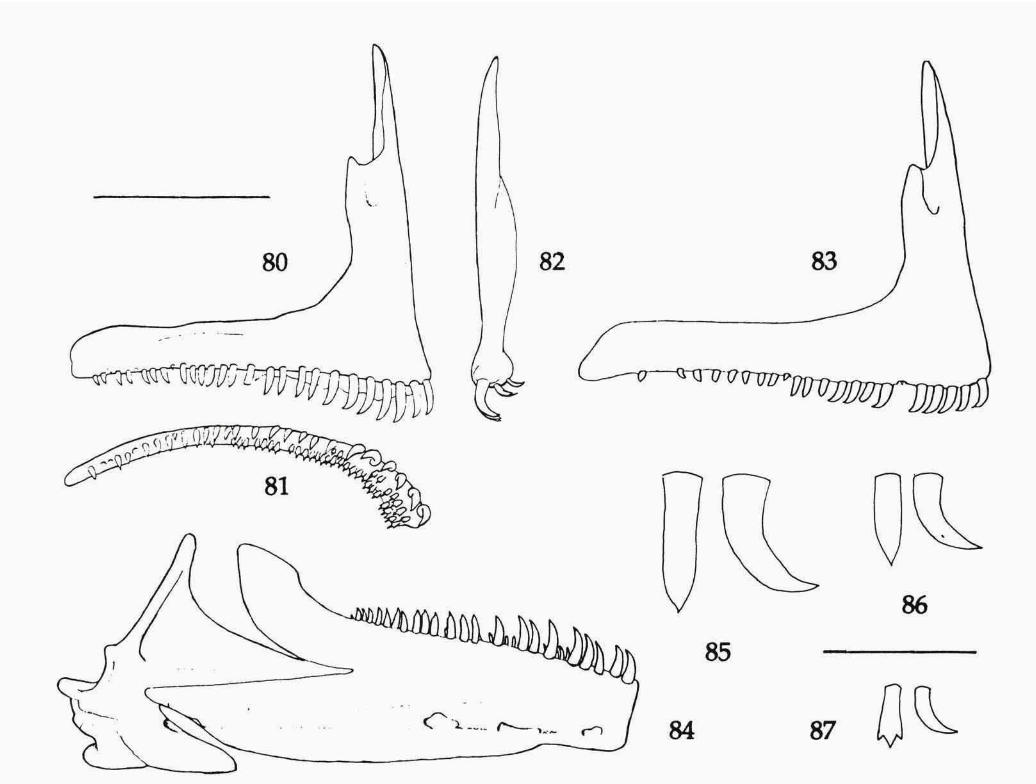


Fig. 79. *Haplochromis chrysogynaion* spec. nov. Paratype RMNH 30120, SL 91.3 mm, lateral view. Scale equals 10 mm.



Figs 80-82, 84-87. *Haplochromis chrysogynaion* spec. nov. Fig. 83. *Haplochromis dichrourus* "Mwanza". Fig. 80, 83. Premaxilla, lateral view. Fig. 81. Premaxilla, perpendicular view of dentigerous area. Fig. 82. Premaxilla ascending arm, medial view. Fig. 84. Lower jaw, lateral view. Fig. 85-87. Premaxillary teeth, labial and lateral view. Fig. 85. Second tooth of outer row. Fig. 86. Thirteenth tooth of outer row. Fig. 87. Seventh tooth of 1st inner row. Scale of bony elements = 5 mm, scale of teeth = 1mm.

the two inner rows occupies 3/4 of outer row length and does not reach the coronoid wing.

— Counts and setting. 52-57 teeth in outer row of upper jaw, 38-46 in outer row of lower jaw. Teeth regularly set in both jaws, distance between tooth bases about equal to diameter of toothbase. As tooth size decreases caudad the absolute distance between the teeth also decreases. No medial gap in either jaw.

— Implantation. Upper jaw, outer row teeth rostrally erect to slightly procumbent, rostro-laterally slightly recumbent, caudally moderately recumbent. Upper jaw inner row teeth strongly recumbent. Lower jaw outer row teeth erect rostrally, slightly recumbent caudally. Lower jaw inner row teeth slightly to moderately recumbent.

Pharyngeal teeth.— Counts: 24 teeth in the caudal transverse row and 10-11 in the two median rows.

— Shape. Except for the teeth in the cadalmost row, which are hooked, all teeth are of the bevelled type. Tooth size increases from rostral to caudal and from lateral to medial. The bevelled teeth are small, slender and acutely pointed, the hooked teeth are slightly larger and blunt. In one specimen the tips of the hooked teeth are blackish.

Osteology.— The lower pharyngeal element was dissected in three, the right premaxilla in two specimens, the right lower jaw was dissected in one paratype. Because of the few specimens available no specimen was dissected for obtaining a neurocranium.

— Oral jaws. Premaxilla dentigerous arm longer (1.1 ×) than ascending arm, angle between the two arms 78°-80°. Transition of dentigerous and ascending arm relatively broad. Ventral outline of dentigerous arm slightly convex. Lower jaw: moderately slender, length/depth ratio 2.3. Length of toothbearing part of the dentary 0.5 times lower jaw length.

— Lower pharyngeal element: a relatively shallow element, slightly longer than broad (length/width = 1.1). Dentigerous area slightly broader than long (length/width = 0.87-0.9).

— Vertebrae. There are 29 or 30 vertebrae comprising 13 abdominal and 16 (f = 1) or 17 (f = 2) caudal elements.

Coloration.— Live colours of maturing and juvenile females. Tip of upper lip and dorsal parts of snout, gill-cover, head, body and caudal peduncle deep yellow-orange (golden). Middle part of flank and caudal peduncle yellowish with an orange flush. Ventral half of head, branchiostegal membrane, chest, belly and ventral side bright white, with a silver sheen on the cheek, ventral part of gill-cover and ventral side. (The specimen from the Mwanza Gulf had a green and yellow flush on the dorsal part of the gill cover and a green tip on the upper lip). Inner ring of eye golden. Fins: Dorsal yellowish proximally, hyaline distally, white streaks between the rays. Pectorals yellowish hyaline, pelvics hyaline with white rays. Anal white between the spines, hyaline with a yellowish flush between the rays, proximal part of the rays white. Dorso-caudally on the anal fin one or two small round, orange spots with a thin white rim. Caudal fin dark orange proximally, hyaline distally.

— Preserved coloration of maturing and juvenile females. Head and body almost entirely uniformly cream coloured. Snout and dorsal parts of head and dorsum darker greyish. A small faint orange area on the dorsal part of the lachrymal is present in the Mikassa Bay specimens. All specimens have a faint opercular blotch. All fins hyaline, small grey streaks between the rays of dorsal and caudal fin.

Table 15. Linear and angular measurements of *Haplochromis chrysogynaion* spec. nov.

RMNH reg.no.		30119	Holotype 30118	30120
Standard Length		75.3	89.0	91.3
Body Depth	%SL	32.2	33.7	33.0
Pectoral Fin Length	%SL	25.3	26.4	30.1
Caudal Peduncle Length	%SL	16.6	16.7	16.5
Caudal Peduncle Depth	%SL	11.8	11.5	11.5
Caudal Fin Length	%SL	23.9	23.9	22.5
Head Length	%SL	36.5	35.0	35.9
Snout Length	%HL	32.2	31.7	30.7
Snout Width	%HL	29.8	32.0	32.6
Head Width	%HL	43.2	42.9	44.8
Interorbital Width	%HL	21.0	19.8	21.3
Preorbital Width	%HL	25.4	26.2	25.9
Lachrymal Width	%HL	25.4	25.6	25.9
Preorbital Depth	%HL	17.4	16.6	16.4
Eye Length	%HL	26.1	25.6	25.3
Cheek Depth	%HL	22.1	23.0	23.4
Lower Jaw Length	%HL	44.0	46.4	46.4
Lower Jaw Width	%HL	21.0	20.1	21.3
Upper Jaw Length	%HL	36.3	36.8	36.5
Premax. Pedicel Length	%HL	28.3	28.5	29.8
Dorsal Head Profile Inclination		30°	32°	32°
Premaxillary Pedicel Inclination		36°	38°	40°
Snout Acuteness		67°	69°	68°
Gape Inclination		35°	32°	32°

Table 16. Qualitative measurements and counts of *Haplochromis chrysogynaion* spec. nov.

Dorsal Head Profile (curvature)	0		
Premaxillary Pedicel Prominence	0(+)		
Lower Jaw: anterior Extension	+		
Lateral Snout Outline	0		
Mental Prominence	0		
Lip Thickening	0		
Premaxilla Beaked	0		
Premaxilla Expanded	0		
Maxillary Posterior Extension	+		
Cephalic Lateral Lines Pores: width	0		
Lateral Line Scales	31 (1);	32(1);	33(1);
Lateral Line - Dorsal Fin (Sc. rows)	5(1);	6(2)	
Pectoral - Pelvic Fin Bases (Sc. rows)	5(1);	6(2)	
Cheek (Vertical Sc. rows)	4(2);	5(1)	
Dorsal Fin (Spines/Rays)	XV 9 (1);	XVI 8 (1);	XVI 9 (1)
Anal Fin (Spines/Rays)	III 8 (1);	III 9 (1);	III 10 (1)

Distribution.— *Haplochromis chrysogynaion* is only known from Lake Victoria. Specimens were collected at two localities only; in the Mikassa Bay of Maisome Island and in the northern part of the Mwanza Gulf.

Ecology.— Habitat. The two catch localities of the specimens of *Haplochromis chrysogynaion* were both relatively sheltered areas bordering on open water. The bottom at both localities was mud and the depth between 12-15 m.

—Food. Stomach and intestines of two specimens were examined. In the intestines of the smallest specimen (75.3 mm) remains of a shrimp (*Caridina nilotica*) and several *Chaoborus* larvae were found. Stomach and intestines of the largest specimen (93.1 mm) contained remains of a small haplochromine cichlid, standard length about 27 mm.

—Breeding & growth. The female of 75.4 mm SL is a juvenile, the female of 89.0 mm SL is ripening (probably maturing), and the 91.3 mm SL female seems immature.

Redescription of *Haplochromis pellegrini* Regan, 1922

Greenwood (1962) in his redescription of *Haplochromis pellegrini* states that the description was based on twenty-five specimens (71-104 mm SL) including the lecto- and paratype. However, in the paragraph on food he mentions thirty-five examined specimens, and in the tabel 'study material and distribution records' he lists 38 specimens. In the BM(NH) jar with the listed registration numbers I found no labels indicating which specimens were used for the redescription of morphometric and meristic characters. Examination of the 36 E.A.F.R.O. specimens of *H. pellegrini* in the BM(NH) collection revealed that amongst these specimens was one specimen of *H. dichrourus* (BM(NH) 1962.3.2.510) SL 91.1 mm (see page 31). Three more specimens diverged from the majority. One of these specimens, a female of 74.3 mm SL (from lot BM(NH) 1962.3.2.516-544), is a specimen of *H. perrieri* (Pellegrin, 1904). The largest specimen of lot BM(NH) 1962.3.2.516-544, an immature female of 85 mm SL, also differs from the majority of specimens in certain morphometric and semiquantitative measurements; at present I am not sure where to place this specimen. A third specimen (BM(NH) 1982.3.2.509) a sexually active male of 85.7 mm SL, differs in its dentition and preserved coloration from all other specimens Greenwood identified as *H. pellegrini*, as well as from all other described species. The description of a new species on the basis of this single specimen would be justified, but I prefer to wait until other material has been examined. After Greenwood's (1962) redescription was made, one specimen of BM(NH) 1962.3.2.510-12 was dissected to obtain information on the neurocranial shape . Unfortunately no photographs were taken prior to the dissection and morphometric data were not preserved, so this specimen could also not be included in the following description.

The 31 remaining E.A.F.R.O. specimens identified by Greenwood (1962) as *H. pellegrini* differ from the type series of this species in head shape, morphometric and meristic characters, and dentition. In my opinion the types of *H. pellegrini*, which have a standard length of 103.8 and 100.0 mm, are both immature, whereas all E.A.F.R.O. specimens (68 to 84 mm SL) are mature or nearly so. This observation strengthens my view that the E.A.F.R.O. specimens belong to a separate taxon. For this reason *H. pellegrini* is redescribed (on the basis of its type material only) and the remaining specimens are described as a new species. Unfortunately, eight years of collecting by HEST in the Mwanza Gulf area did not yield any additional specimens of either species, so the descriptions are based on the BM(NH) material only.

Haplochromis pellegrini Regan, 1922
(figs 78, 88, 113, tables 17, 18)

Paratilapia prognatha Pellegrin (part); Boulenger, 1915: 333.
Haplochromis pellegrini Regan, 1922: 185, fig. 11.
Haplochromis pellegrini (part; types only); Greenwood, 1962: 186-189, fig. 16 & 1974:, 89, 91, fig. 58.
Prognathochromis (*P.*) *pellegrini* (part; types only); Greenwood, 1980: 20.

Material.— Lectotype, ♀, 103.8 mm, BMNH 1906.5.30.253, Lake Victoria, near Entebbe, Uganda, E. Degen; Paralectotype; ♂, 100.0 mm, BMNH 1906.5.30.254, Lake Victoria, near Entebbe, E. Degen.

Diagnosis.— Probably a medium sized (both type specimens are immature), moderately slender, moderately laterally compressed piscivorous species with slightly curved unicuspid teeth in the outer row of the oral jaws.

Description.— Based on the lectotype, a subadult female, and the paralectotype, an immature male.

Habitus.— Probably (both specimens being immature) a medium sized or moderately large piscivorous species with a rather slender and fairly compressed body. Dorsal head profile slightly convex, premaxillary pedicel fairly prominent. Premaxilla slightly expanded medially in both specimens, slightly beaked in the paralectotype. Lips rather thin. A small part of the maxilla visible caudally and dorsocaudally to the premaxilla. The vertical through the caudal tip of the maxilla not reaching the rostral eye margin. Mouth moderately oblique. Lateral snout outline isognathous in the paratype, slightly prognathous in the lectotype, lower jaw protruding in both specimens. Mental prominence small. Lateral sides of lower jaws moderately oblique. Horizontal arm of preoperculum slightly declining ventrad, the vertical arm slightly reclining caudad. Lateral line canals and openings on lachrymal normal. Eye subcircular, the pupil slightly ellipsoid on a horizontal length axis.

Scales.— Scales of head, rostral part of dorsum and belly cycloid, chest with a mixture of cycloid and ctenoid scales. Scales on remainder of body ctenoid. Small elongate scales on proximal part of the caudal fin, those near the margin barely reaching the second half of the fin.

Fins.— Pectoral and pelvics just reaching anal. Dorsal and anal not reaching base of caudal fin. In the lectotype the dorsal reaches further caudad than the anal, in the paralectotype the anal fin extends slightly further caudad. Caudal fin outline subtruncate, slightly emarginate and slightly oblique.

Gills.— Ten (lectotype) or nine gill-rakers on the lower part of the first gill-arch of the right side. The lower three small and conical, numbers four and five elongate, and the uppermost three or four elongate and broadened, the head conical or bifid.

Viscera.— The intestines and stomachs of both specimens were not removed, so no information is available about their length and configuration.

Oral teeth.— Shape. All outer row teeth in both jaws relatively small, slightly curved, acutely pointed unicuspids. In upper jaw and rostrally in lower jaw the teeth are slender and rounded, laterally and posterio-laterally in lower jaw the teeth are somewhat compressed and shouldered. Inner rows consist of slightly curved, relatively long, rounded unicuspids rostrally, mixed with somewhat compressed, shouldered unicuspids laterally. The size of the outer row teeth diminishes gradually, from rostral to caudal.

—Dental arcade and toothband. Dental arcade rounded. Outer row covers whole length of premaxillary dentigerous arm, inner rows about two thirds. Four inner rows on rostral part of premaxilla decreasing to zero on caudal part. Gap between outer row and inner row distinct. In lower jaw the outer row occupies rostral part of coronoid wing. Two to three inner rows on rostral part of lower jaw. Gap between outer row and first inner row distinct.

— Counts and setting. There are 65 and 62 teeth in outer row of upper jaw, and 40 and 38 in outer row of lower jaw for the lectotype and paralectotype, respectively. The teeth are regularly set, neck distance in upper jaw and rostrally in lower jaw equal to or slightly more than neck width, decreasing to half neck width caudally in the lower jaw.

— Implantation. Outer row teeth recumbent in upper and lower jaw. Inner rows slightly recumbent to recumbent in lower jaw, recumbent to strongly recumbent in upper jaw.

Pharyngeal teeth.— Counts. Twenty teeth in the caudalmost transverse row and 9 or 10 in the median rows.

— Shape. In lateral view, teeth of caudalmost row enlarged, hooked and rather sharp, other teeth bevelled. Tooth size increases from rostral to caudal and from lateral to medial.

Osteology.— As only the lectotype and paralectotype of this species are available no description can be given of skeletal elements. However, in the lectotype the lower pharyngeal element had been disected previously, and is described below.

— Lower pharyngeal element: Lower pharyngeal element of the generalised type, shallow, slightly longer than broad (length/width = 1.2). Dentigerous area as long as broad.

— Vertebrae: Both type specimens have 29 vertebrae, comprising 13 abdominal and 16 caudal elements.

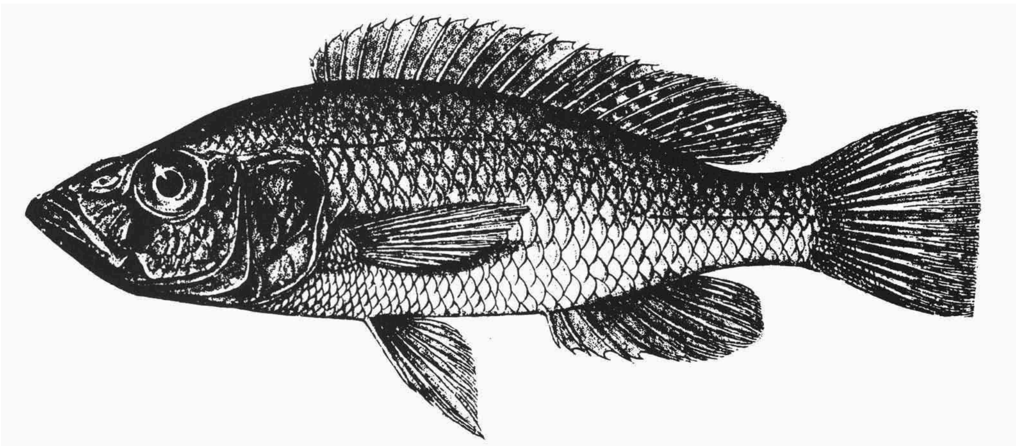


Fig. 88. *Haplochomis pellegrini* Regan, 1922. Holotype, BMNH.5.30.253, SL 103.8 mm. From Regan, 1922.

Table 17. Linear and angular measurements of *Haplochromis pellegrini* Regan, 1922 and *H. harpakteridion* spec. nov.

		Haplochromis pellegrini		*Haplochromis harpakteridion*	
		Lectotype	Paralecto-type	30 specimens incl. Holotype range	mean ± st.dev.
Standard Length		103.8	100.0	66.2-80.5	75.1±3.6
Body Depth	% SL	30.0	31.0	29.5-34.3	31.5±1.1
Pectoral Fin Length	% SL	23.3	20.6	9.7-23.7	21.7±1.0
Caudal Peduncle Length	% SL	16.1	16.0	13.0-16.7	15.0±0.8
Caudal Peduncle Depth	% SL	12.3	12.3	10.8-13.2	11.9±0.5
Caudal Fin Length	% SL	24. 2	25.1	21.5-24. 5	22.9±0.7
Head Length	% SL	34. 8	36.3	35.4-38.6	36.8±0.6
Snout Length	% HL	33.1	33.1	29.1-33.9	32.0±1.1
Snout Width	% HL	30.1	30.1	27.9-33.4	29.8±0.5
Head Width	% HL	37.2	36.2	37.2-42.9	40.4±1.2
Interorbital Width	% HL	20.7	21.4	19.2-21.9	20.6±0.6
Preorbital Width	% HL	26.5	25.3	23.4-27.3	25.2±0.8
Lachrymal Width	% HL	24.5	25.3	24.2-28.8	27.0±1.2
Preorbital Depth	% HL	19.8	20.6	15.7-20.0	17.0±3.0
Eye Length	% HL	27.0	26.9	24.2-28.5	26.3±1.2
Check Depth	% HL	22.6	23.6	20.0-23.8	21.6±1.0
Lower Jaw Length	% HL	48.6	46.8	45.1-51.0	47.0±1.2
Lower Jaw Width	% HL	16.5	15.4	16.8-23.5	19.3±1.9
Upper Jaw Length	% HL	38.3	38.0	33.8-39.4	37.3±1.1
Premax. Pedicel Length	% HL	25.4	25.6	27.9-32.0	29.5±1.1
Dorsal Head Profile Inclination		30°	30°	21° - 30°	26.0° ± 3.0°
Premaxillary Pedicel Inclination		40°	35°	25° - 40°	33.0° ± 4.4°
Snout Acuteness		73°	62°	50° - 70°	65.7° ± 2.9°
Gape Inclination		40°	42°	31° - 40°	36. 6° ± 3.1°

Coloration.— Coloration of preserved specimens. Both specimens are almost completely bleached by their long preservation and no differences could be traced between the male and the female specimen. Head, dorsum and dorsal part of caudal peduncle light brown. Gill-cover, chest, belly, flank and ventral part of body silvery-white. Pelvic, pectoral, dorsal and anal fins hyaline, caudal brownish. Traces of dark spots and stripes between the rays of dorsal and caudal fin. The three ocelli Regan (1922) described on the posterior part of the anal fin of one specimen (paralectotype) are now very faint. Apart from traces of an opercular blotch in both specimens there are no head and body markings.

Distribution.— *H. pellegrini* is only known from Lake Victoria. Both specimens come from the same locality: Entebbe (Uganda). No details of capture are know and nothing is known about the habitat.

Remarks.— As no adult specimens are available and nothing is known about the live coloration, specimens of this species should be compared with preserved juveniles of other species. Head shape and dentition are rather similar to that of some specimens now included in *H. prognathus* but until this species is redescribed nothing

Table 18. Qualitative measurements and counts of *Haplochromis pellegrini* Regan, 1922 and *H. harpakteridion* spec. nov.

	Haplochromis pellegrini	*H. harpakteridion*
Dorsal Head Profile (curvature)	0	0(+)
Premaxillary Pedicel Prominence	+	+/++
Lower Jaw: anterior Extension	+	+
Mental Prominence	0(+)	0
Lip Thickening	0	0
Premaxilla Beaked	0	0/+
Premaxilla Expanded	0	0/+
Maxillary Posterior Extension	+	+
Cephalic Lateral Line Pores: width	0	0
Lateral Line Scales	30 (f= 1); 32 (f= 2);	31 (f= 7); 33 (f= 2)
Lateral Line-Dorsal Fin (Sc. rows)	6	4 (f= 1); 5 (f= 13); 6 (f= 6)
Pectoral-Pelvic Fin (Sc. rows)	5	4 (f= 3); 5 (f= 10); 6 (f= 5)
Cheek (Vertical Sc. rows)	4; 5	3 (f= 1); 4 (f= 17); 5 (f= 2)
Dorsal Fin (Spines/Rays)	XIV 11	V 9 (f= 6); XV 10 (f= 6); XVI 9 (f= 2); XVI 10 (f= 2)
Anal Fin (Spines/Rays)	III 9	III 8 (f= 5); III 9 (f= 9); III 10 (f=3)

precise can be said about the relationship of these species. In the absence of skeletal material it is difficult to establish the relationship with *H. mento* Regan, 1922, and *H. estor* Regan, 1922, species which according to Greenwood (1962) have a similar body form. The dentition in *H. pellegrini* is strikingly different from that in these two species. Greenwood's suggestion of a resemblance between *H. pellegrini* and *H. percoides* must have been based on the EAFRO specimens described below.

Haplochromis harpakteridion spec. nov.
(figs 78, 89-103, 114, tables 17, 18)

H. Pellegrini (part); Greenwood, 1962: 186-189 & 1974: 90-91.
Prognathochromis (P.) pellegrini (part); Greenwood, 1980: 20.

Material.— Holotype, ♀, 72.3 mm, BMNH 1962.3.2.516, Lake Victoria, near Karenia, near Jinja, Uganda, EAFRO. Paratypes: 1 ♀?, 68.9 mm, BMNH 1962.3.2.512, Grant Bay, Lake Victoria, Uganda, EAFRO; 3 ♀♀, 74.0-80.5 mm, BMNH 1962.3.2.513-515, Beach in Buvuma Channal, Lake Victoria, Uganda, EAFRO; 9 ♂♂, 72.9-80.0 mm + 17 ♀♀, 69.1-79.5 mm, BMNH 1962.3.2.517-542, Lake Victoria, Karenia, near Jinja, Uganda, EAFRO.

Etymology. The name is derived from the diminutive of the Greek απνακνπ (robber) referring to the predatory habits of this small species.

Diagnosis.— A very small, moderately slender, piscivorous species with moderately curved teeth. Live females have a uniformly chocolate brown colour on head and body. All fins are blackish-brown.

Description.— Based on 31 specimens (including the holotype) 66.2-80.5 mm SL.

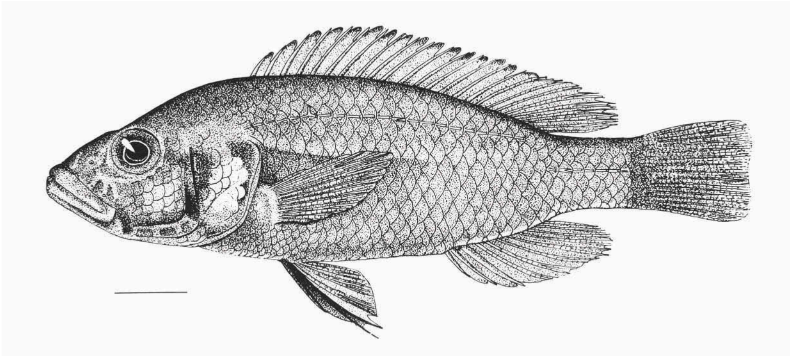


Fig. 89. *Haplochromis harpakteridion* spec. nov. BM(NH) 1962.3.517, SL 78.6 mm, lateral view. Scale equals 10 mm.

Habitus.— A small, moderately slender piscivorous species. Dorsal head profile straight to slightly concave, divided in two slightly convex areas viz; the nape, and the part of the head from the concavity above the eye to the snout tip. Premaxillary pedicel prominent, but in most specimens smoothly merging into the concavity above the eye. Lips normal, premaxilla not expanded medially or beaked. A relatively small part of the maxilla visible caudally to the premaxillary dentigerous arm. Vertical through the posterior end of the maxilla not reaching the rostral eye margin. Mouth slightly to moderately oblique. No mental prominence. Lateral snout outline isognathous. Lower jaw slightly protruding, the lateral sides moderately oblique. Horizontal arm of preoperculum nearly horizontal, the vertical arm reclining caudad. Canals and openings of lateral line system on lachrymal small. Eye and pupil slightly elongated in horizontal direction, the pupil in some specimens an aphakic space is visible rostro-ventrally to the lens.

Scales.— Head, rostral part of dorsum, chest and belly with cycloid scales. Scales on remaining part of the body weakly ctenoid. Body scales implanted relatively deep. Size change between scales of chest and flank gradual. Caudal fin with small elongate scales on its basal half, the scales near the margins extending somewhat further.

Fins.— Except for one sexually active male in which the pelvics just reach the first anal spine, pectoral and pelvics do not reach the anal. Dorsal and anal fin just not reaching caudal fin base. Caudal fin outline subtrunctate, slightly emarginate and slightly oblique.

Gill rakers.— Gill rakers have been counted in 12 specimens. Number of rakers on lower part of first gill arch on the right side 8 or 9. The lower 3 small and conical, numbers 4-6 elongate and the upper 2 or 3 slightly broadened, sometimes with a slightly expanded bifid or trifid head.

Viscera.— As the stomachs and intestines of the described specimens had been removed previously, no information is available on their lengths and configuration.

Oral teeth.— In the preserved specimens only a small part of the teeth is visible above the gums and lips; the teeth therefore seem rather small. However, when seen in a skeletal preparation they appear to be of a normal size.

— Shape. Outer row in both jaws with a mixture of acutely pointed, slightly to moderately curved, unequally bicuspids, weakly bicuspids and (rostrally) a few true unicuspids. The number of unicuspids teeth in the upper jaw is higher than that in the lower jaw. Rostrally, the teeth are slightly compressed, laterally and caudally they are moderately compressed. Bicuspids have a rounded neck and a compressed, basally expanded crown. Major cusp equilateral, tip bent somewhat suspensoriad. Minor cusp very small, equilateral to isoscelene, cusp gap narrow or (mostly) non-existent.(The dissected specimen of *H. "pellegrini"* in the BM(NH) collection is exceptional in having only unicuspid teeth in the outer row of both jaws.) Inner rows have small, compressed, tricuspid or weakly tricuspid teeth, the rostral ones with a relatively long medial cusp. Tooth size in outer row greatest rostrally, decreasing in size caudad where the teeth are less than half the size of the rostral ones.

— Dental arcade and toothband. Dental arcade rounded. Outer tooth row covers whole length of premaxillary dentigerous arm, inner rows less than two-thirds. Three (rarely four) inner rows in rostral part of premaxilla, decreasing to zero caudally; gap between outer row and first inner row relatively small rostrally, diminishing caudad. In lower jaw outer row extends to the rostral part of coronoid wing. Two inner rows in rostral part of lower jaw decreasing to zero just before the coronoid wing. Gap between outer row and first inner row of similar size rostrally and laterally. Just before coronoid wing outer row bends mediad continuing the line of the first inner row.

— Counts and setting. 55 - 58 teeth in outer row of the premaxilla, 40 - 48 in the lower jaw. Teeth regularly set in both jaws. Neck distance of the teeth less than 1/2 of diameter at toothbase, crown distance laterally less than 1/4 crown width, crowns often almost touching each other. Caudally and laterally, teeth more closely set than rostrally. No medial gap in the upper jaw, a small one in the lower jaw.

— Implantation. Outer row teeth of premaxilla slightly procumbent rostrally, erect rostro-laterally and laterally, and slightly recumbent caudally. Outer row teeth of mandible erect rostrally and laterally, caudalmost teeth slightly recumbent. Inner row teeth of mandible moderately recumbent, inner row teeth of premaxilla strongly recumbent.

Pharyngeal teeth.— Counts. Twenty two teeth in caudal transverse row, 11 and 13 in the two median rows.

— Shape. Teeth of caudalmost row, and two or three caudal teeth of the median rows hooked and blunt; other teeth bevelled. Tooth size increases from rostral to caudal and from lateral to medial.

Osteology.— The osteological description of the oral jaws and the lower pharyngeal element are based on specimen BM(NH) 1962.3.2.544, SL 77.4 mm. The description of the oral teeth is based on all specimens. As I am not sure about the identity of the BM(NH) skeletal material labelled *H. pellegrini* (oral teeth differing from all other specimens of *H. harpakteridion*) I have not used this material for the description.

— Oral jaws. Premaxilla. Dentigerous arm longer than ascending arm, angle between the arms 76°. Ventral outline of dentigerous arm concave. Ventral quarter of ascending arm expanded rostrad. Mandible: moderately stout and short, length/depth ratio 2.1. Tooth-bearing part of mandible slightly less than half total mandible length. Caudalmost teeth of outer row just reaching coronoid wing.

— Lower pharyngeal element. Lower pharyngeal element of generalized type, slightly longer than broad (length/width = 1.1). Dentigerous area slightly longer than broad (length/width = 1.05).

— Vertebrae. There are 28 (f= 5) or 29 (f= 1) vertebrae, comprising 12 (f= 4) or 13 (f= 2) abdominal and 15 (f= 1) or 16 (f= 5) caudal elements.

Coloration.— Greenwood (1962) described the live colours of female *H. pellegrini* from the EAFRO collections. As the coloration of the erroneously included female of *H. perrieri* is known te be different (pers. obs.) and two of the three other erroneously included specimens are males, the data are believed to be applicable to the females of *H. harpakteridion*.

— Live coloration of females: According to Greenwood (1962: 188) "Live females have a dark chocolate-brown ground colour, lighter on the chest and belly. All the fins are blackish-brown." The uniformly dark coloration of the fins, especially of the pelvic fins, is rare amongst females of the Lake Victoria haplochromine cichlid species.

— Live coloration of males is unknown.

— Preserved coloration of males. Body and head uniformly dark brown, dorsal head surface and dorsum blackish. Gill-cover and chest area with a lighter bronze hue. Markings: a small opercular blotch and a distinct lachrymal stripe extending from ventral eye border to below mouth corner. All fins dark brown, the pelvics black laterally and distally, dark streaks between rays of dorsal and caudal. Lappets of dorsal fin black rostrally. Two small egg spots with a dark margin on the caudal part of the anal fin.

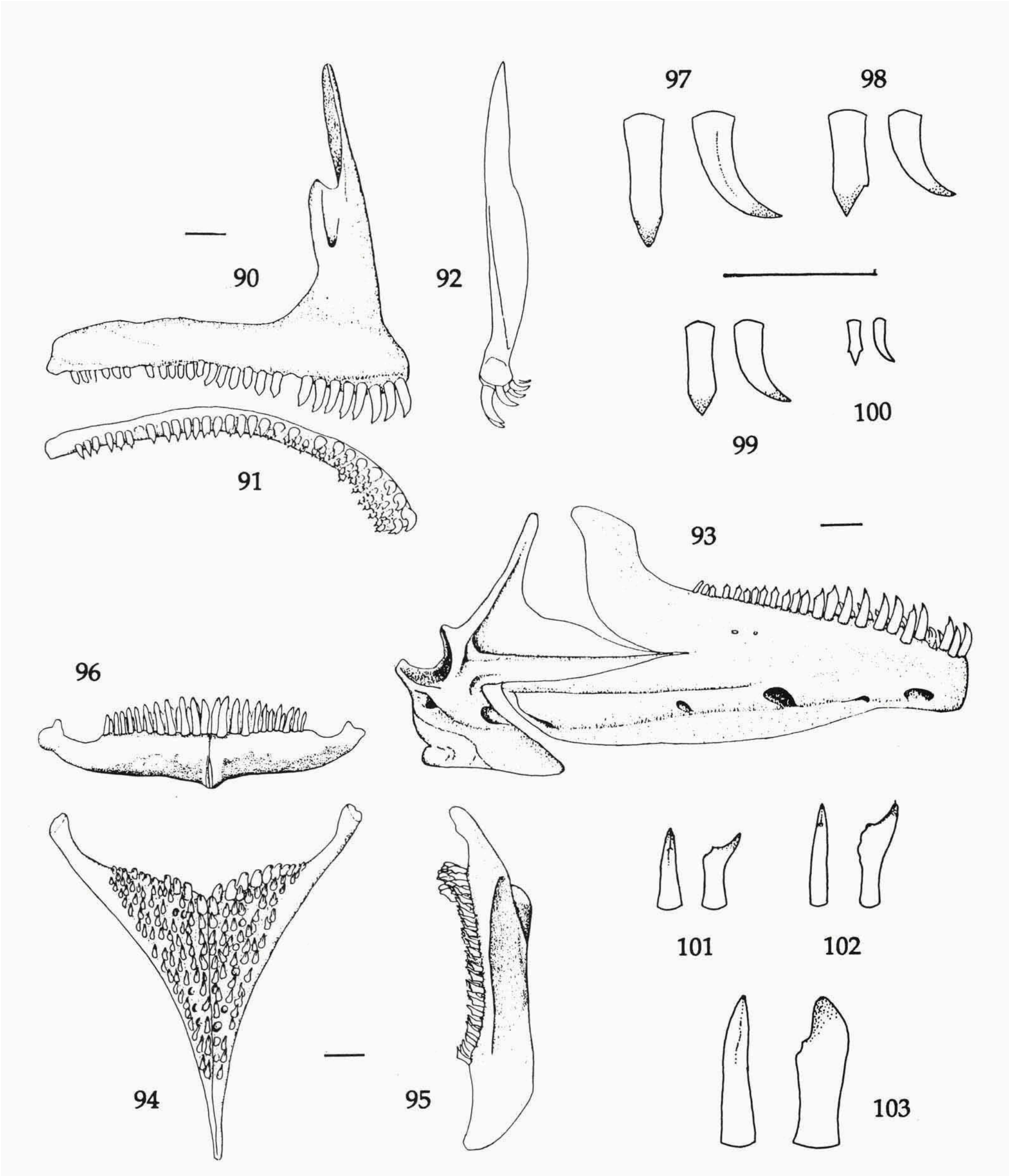
— Preserved coloration of females. Body and head uniformly brown, the darkness of which differs (possibly as a result of preservation?) from light brown to very dark brown. Two brooding females have the lighter coloration. Generally the operculum and chest area lighter than the surrounding areas. All fins uniformly brownish, the pelvics with black tips and lateral sides in a few specimens. Most specimens have an opercular blotch, and a lachrymal stripe, distinct or faint, is present in all specimens.

Distribution.— *Haplochromis harpakteridion* is only known from Lake Victoria. All specimens were collected by workers of E.A.F.R.O. at three localities situated relatively closely together in the northern part of the lake (i.e. Grant Bay, Karenia, and Buvuma Channel). Extensive sampling in the Mwanza Gulf did not yield any representatives of this species, possibly because its preferred habitat is rare in the Mwanza Gulf.

Ecology.— Habitat. According to Greenwood (1962: 188) all specimens were collected at relatively exposed sandy beaches near dense stands of submerged and emergent plants.

— Food. According to Greenwood (1962: 188) "Of the thirty-five specimens examined, twenty-five had ingested material in the gut. In three fishes, this material was an unidentifiable sludge, in one there was sludge plus insect remains, five had fed only on insects (principally Ephemeropteran pupae and larval Diptera) one on insects and small fishes, and fifteen had fed exclusively on fishes. The fish remains were very fragmentary but in most cases were identifiable as cichlids. The size range of the prey is 10-15 mm, that is immediately post-larval fishes". Two of the four specimens which I removed from the group mentuioned above are known to be piscivorous. Judging from the morphology, the other two may also be piscivores.

— Breeding and growth. *H. harpakteridion* is a female mouthbrooder. Lot BM(NH) 1962.3.2.513-515 contains a female of 80.5 mm SL which carries embryos (± 8 mm TL) with a large yolk sac, a female of 72.8 mm SL carrying eggs (length 3.5×2.7



Figs 90-103. *Haplochromis harpakteridion* spec. nov. Fig. 90. Premaxilla, lateral view Fig. 91. Premaxilla, perpendicular view of dentigerous area. Fig. 92. Premaxilla, medial view of ascending arm. Fig. 93. Lower jaw, lateral view. Fig. 94. Lower pharyngeal element, dorsal view. Fig. 95 Lower pharhyngeal element, lateral view. Fig. 96. Lower pharhyngeal element, caudal view. Figs. 97-100. Premaxillary teeth, labial and lateral view. Fig. 97. Second tooth of outer row. Fig. 98. Eighth tooth of outer row. Fig. 99. Thirteenth tooth of outer row. Fig. 100. Fifth tooth of first inner row. Figs. 101-103. Lower phahyngeal teeth, rostral and lateral view. Fig. 101. Tenth tooth of lateralmost row. Fig. 102. Second tooth of formost caudal row. Fig. 103. Third medial tooth of caudalmost row. Scale = 1 mm.

mm), and a third female with a distended buccal cavity and spent ovaries which may also have been brooding at the time of capture. No information is available on the date of capture. All examined specimens are adults or subadults.

Resembling species.— Notwithstanding the small size of the adults, *H. harpakteridion* is immediately recognizable as a piscivorous species by its slender body, its relatively large head, its long lower jaw and by the shape of its teeth. From the other small piscivores, *H. martini* (Blgr., 1906), *H. perrieri*, *H. percoides* Blgr., 1915, and *H. nanoserranus* Greenwood & Barel, 1976, it is immediately separable by its body shape and colour pattern. Apart from the smaller size of the adults *H. harpakteridion* can be distinguished from *H. pellegrini* by its more convex dorsal head profile, its less oblique mouth, its generally more prominent premaxillary pedicel, its rounded mental area, the presence of a lachrymal stripe and by its dentition. Morphometric ratio ranges of LJW/HL and PPL/HL show no overlap and those of HW/HL, CFL/HL, SnL/HL, LaW/HL and POD/HL show only very slight overlap. The shape of the head is comparable with that of some specimens now included in *H. prognathus* (Pellegrin, 1904).

Concluding remarks

With the exception of *H. pellegrini* the species described here exhibit some characters rarely found amongst the Lake Victoria haplochromine cichlids. Whereas females of most species are drably coloured, with greyish silver or sandy ground colours predominating (Greenwood, 1974; pers. obs.), females of *H. bareli*, *H. dichrourus*, *H. maisomei*, *H. kujunjui*, *H. pyrrhopteryx*, *H. chrysogynaion*, and *H. harpakteridion* have distinct colours on body and fins. In *H. dichrourus* and *H. pyrrhopteryx* the coloration of the females greatly resembles that of the males. Coloration of live males of *H. harpakteridion* is unknown, but as preserved coloration of the sexes does not differ much, females of this species may also resemble males in live coloration. In *H. bareli* the resemblance of female and male coloration is not so striking although the black area of the lateral side in female is variable: most females have only the ventral half of the body black but in some specimens the black area stretched from the dorsal fin base down to the ventral side (which always remains bright white). An important aspect of male coloration - dark or black pelvic fins - present in females of *H. dichrourus*, *H. maisomei*, *H. kujunjui*, *H. pyrrhopteryx* and *H. harpakteridion*, is not found in females of *H. bareli* and *H. chrysonotus*. The coloration of *H. dichrourus*, *H. pyrrhopteryx* and *H. harpakteridion*, and the males of *H. bareli* is also exceptional in that the body is darkest ventrally instead of countershaded as in most other haplochromine species.

H. bareli, *H. dichrourus*, *H. maisomei*, *H. pyrrhopteryx* and *H. chrysonotus* all possess strongly curved unicuspids teeth in the outer rows of the oral jaws. The teeth of *H. harpakteridion* and *H. kujunjui* are slightly less recurved and those of *H. harpakteridion* only partly unicuspid. In teeth recurvation as well as in female coloration (male mimicry; van Oijen, in prep.) *H. pyrrhopteryx* and *H. dichrourus* are the most divergent species. *H. bareli* and *H. chrysonotus* are closer to these species in dentition, while *H. harpakteridion* (and probably *H. kujunjui*) might be closer in aberrant female coloration and headmarkings.

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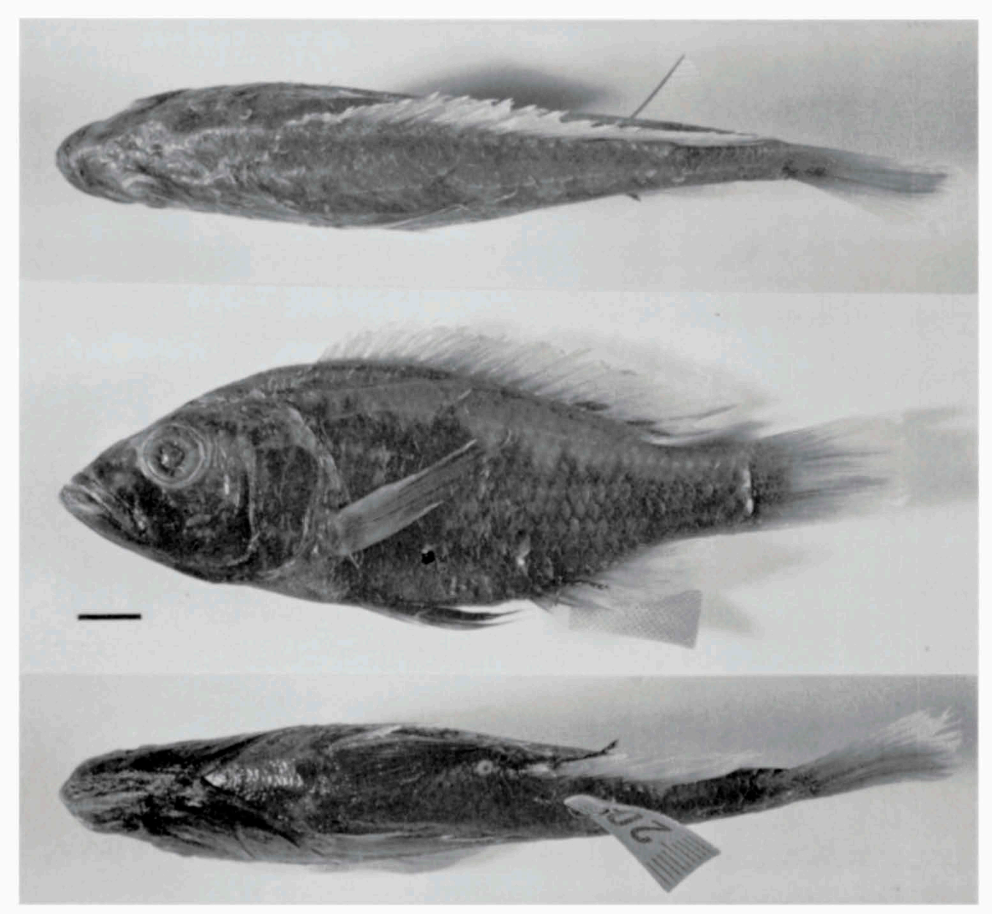

Fig. 104. *Haplochromis bareli* spec. nov. Holotype, RMNH 29600, dorsal, lateral and ventral view. Scale equals 10 mm.

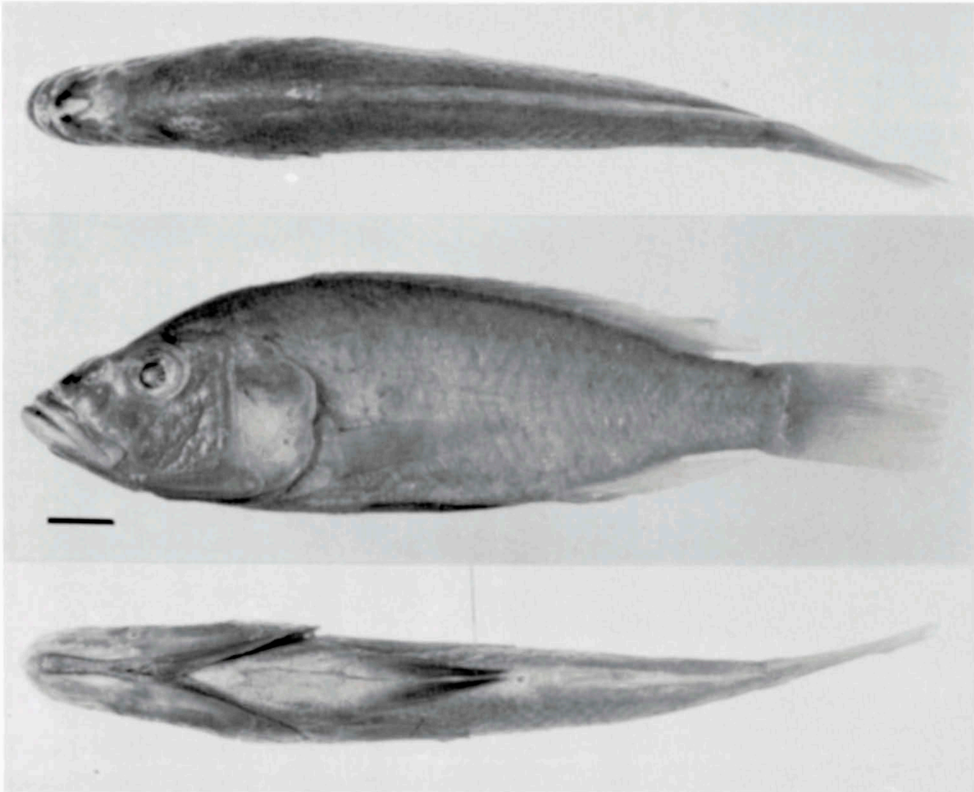

Fig. 105. *Haplochromis dichrourus* Regan. Holotype, BM(NH) 1906.5.30:265, dorsal, lateral and ventral view. Scale equals 10 mm.

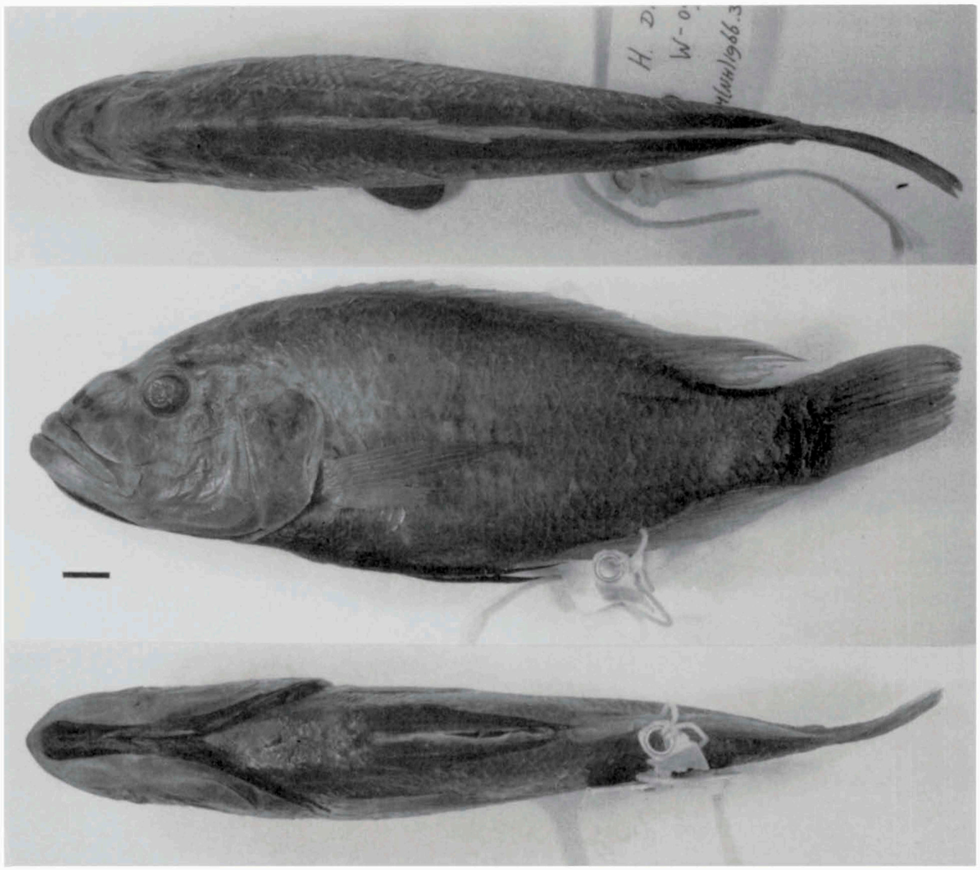

Fig. 106. *Haplochromis dichrourus* "Majita". BM(NH) 1966.3.9.183, SL 167.0 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

Fig. 107. *Haplochromis dichrourus* "Mwanza". RMNH 30060, SL 132.0 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

Fig. 108. *Haplochromis dichrourus* "Mwanza". RMNH 30088, dorsal view of head showing M-shaped nasal band.

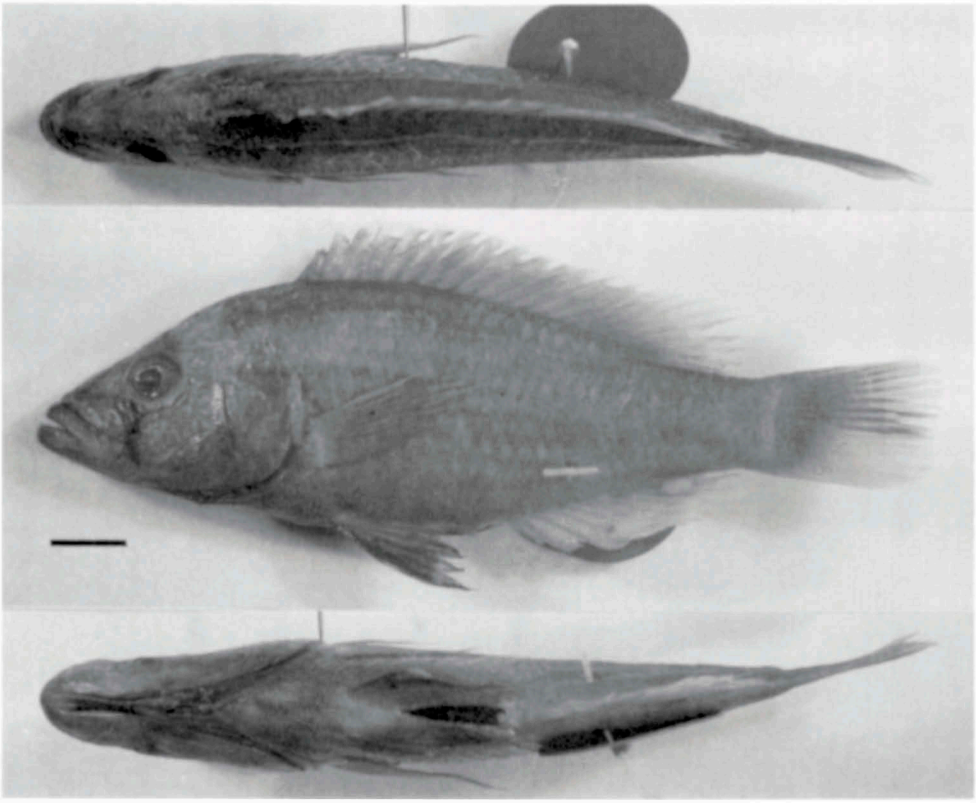

Fig. 109. *Haplochromis maisomei* spec. nov. Holotype, RMNH 30112, SL 96.1 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

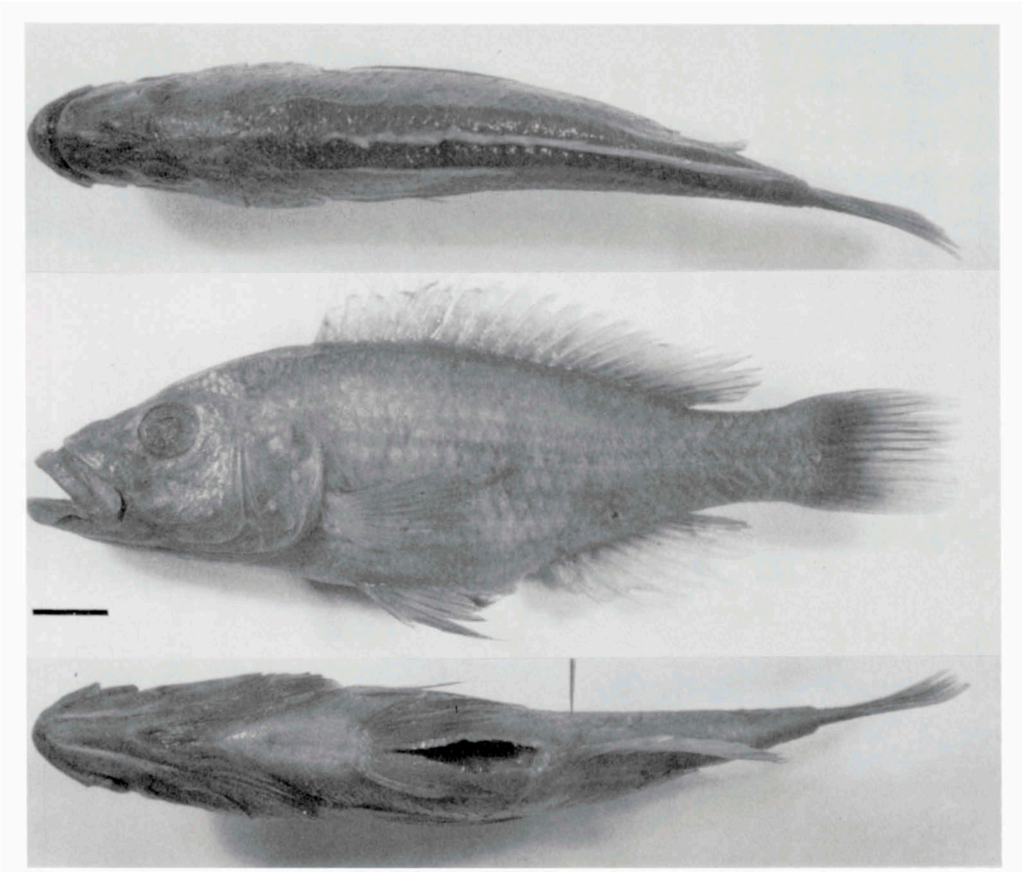

Fig. 110. *Haplochromis kujunjui* spec nov. Holotype, RMNH 30466, SL 102.8 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

Fig. 111. *Haplochromis pyrrhopteryx* spec. nov. Holotype, RMNH 30010, SL 154.3 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

Fig. 112. *Haplochromis chrysogynaion* spec. nov. Holotype, RMNH 30118, SL 89.0 mm, dorsal and lateral view. Scale equals 10 mm.

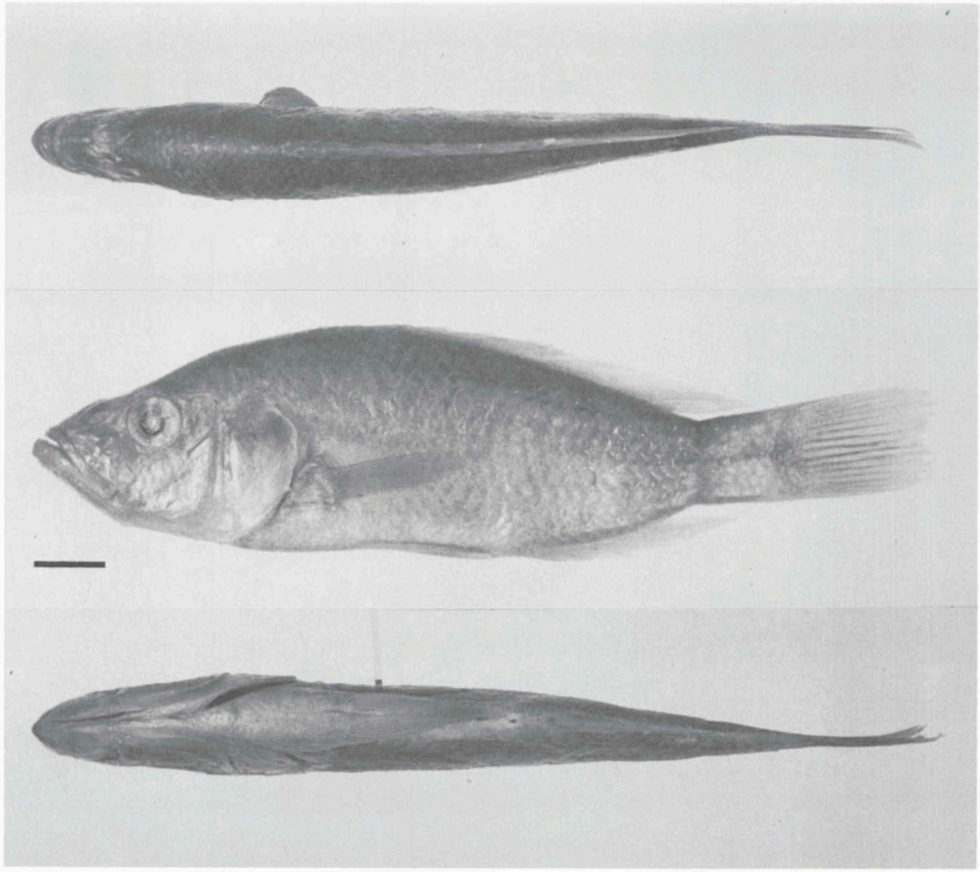

Fig. 113. *Haplochromis pellegrini* Regan. Lectotype, BM(NH) 1906.5.30.253, SL 103.8 mm, dorsal, lateral and ventral view. Scale equals 10 mm.

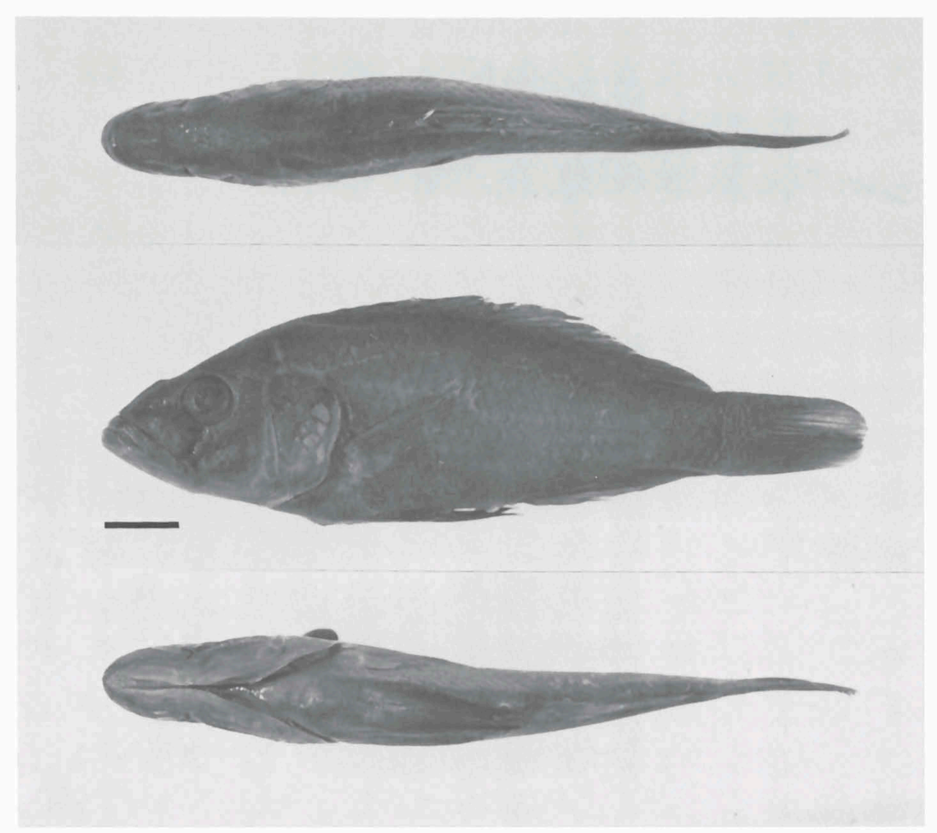

Fig. 114. *Haplochromis harpakteridion* spec. nov. Holotype, BM(NH) 1962.3.2.516, SL 72.3 mm, dorsal, lateral and ventral view. Scale equals 10 mm.