Identification of the Cichlid Fishes of Lake Malawi/Nyasa Part 1: Cyrtocarina (the ‘benthic’ or ‘hap’ sub-radiation).

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ABSTRACT: With an estimated 800-1000 species, the cichlid fishes of Lake Malawi represent the largest known adaptive radiation of vertebrates from a single common ancestor in a limited geographical area, in this case a single lake. They provide an outstanding opportunity to study the rapid diversification of form and function on a limited genetic background and to attempt understand why lineages vary so much in their propensity for diversification and how this may be influenced by their environment. However, they present formidable difficulties in terms of the reconstruction of phylogenetic relationships, not only because of their low degree of genetic differentiation, exacerbated by issues of incomplete lineage sorting and introgression among non-sister taxa, but also because of the tremendous difficulties in species identification. This is likely partly a result of taxonomic neglect (at least half of plausible species remain undescribed) but also because of the tendency of species to attain a high degree of reproductive isolation on the basis of minimal morphological differentiation, often through divergence of signal systems including (but probably not limited to) differences in male courtship colours and display structure (bower) form. To this end, a major programme of genome sequencing is in progress, covering the entire radiation. However, a major challenge has been encountered in accurate identification of the specimens sampled. The present work reports on progress in the identification of these specimens, assessing evidence from examination of newly collected specimens and photographs in conjunction with studies of type material and literature. Here, I focus on the Cyrtocarina (‘benthic clade’), of which an estimated 500+ known species are considered. It is intended that this work should appear as a supplement to the main collaborative genomic paper, but will also be available as a free-standing pre-print which can be modified as identifications are improved and species formally described.

Introduction

The cichlid fishes of the African Great Lakes have been the subject of many studies, covering behaviour, morphology, genetics and systematics, but taxonomically they remain poorly known, with many undescribed species (Snoeks 2004; Konings 2016). This is reflection of the difficulties in distinguishing among many closely-related species (Snoeks 2004), as well as the lack of interest in traditional taxonomy among researchers (Bouchet et al. 2023). A further problem is raised by the difficulty in working around old descriptions which retain taxonomic priority despite often being based on a small number of specimens which are sometimes poorly preserved and/or lacking key diagnostic features, such as knowledge of live coloration or accurate collecting locality. Future progress is likely to be hindered by difficulties in obtaining access to freshly collected material by researchers based externally as a result of administrative hurdles raised in response to Access and Benefits legislation through the Nagoya Protocols (Bouchet et al. 2023; Sherman et al. 2025). At present, there is considerable interest in applying a range of modern methods to study the evolution and genetics of African lake cichlids at a large scale (e.g. Malinsky et al. 2018; Svardal et al. 2019; Ronco et al. 2020a; Meier et al. 2023 etc). While the fauna of Lake Tanganyika is reasonably well-known (Ronco et al. 2020b), there are substantial gaps in current knowledge of the cichlid fishes of Lakes Victoria and Malawi. Identification to species-level is often problematic and uncritically labelled sequences and other information may be storing up problems for future researchers. The purpose of the present work is to provide a primer to the identification of Lake Malawi's cichlid fauna, in particular to support recent and planned publications based on genomic data (Malinsky et al. 2018; Svardal et al. 2019; Turner et al. 2022; Sawasawa et al. 2024, Blumer et al 2025), but it is hoped that it will assist in future field work and taxonomic studies.

Recently, a number of nomenclatural issues have been straightened out by Oliver (2024). The tribe 'Haplochromini' has been found to be a junior synonym of the tribe Pseudocrenilabrini, on the basis that the genus *Pseudocrenilabrus* is the type genus of the family-level name Pseudocrenilabrinae used for the cichlid subfamily that includes all African cichlids. A follow-on effect of this is that any if the subfamily is split into further divisions using family-level names, any that contain *Pseudocrenilabrus* have to take this name, but with the ending appropriate to a particular taxonomic level. A confusing consequence of this is that any derived informal name, 'pseudocrenilabrine' could refer to the subfamily (pseudocrenilabrinae: all African cichlids), the tribe (pseudocrenilabrini: 'haplochromines') or the subtribe (pseudocrenilabrina: *Pseudocrenilabrus* and close relatives). As the term 'haplochromine' is widely used in taxonomic and other literature, it is here retained as an informal name for the tribe Pseudocrenilabrini.

Oliver (2024) also created formal subtribal names for the Lake Malawi endemic haplochromines, among others, and these will be used here. The present volume will cover the Cyrtocarina (benthic subradiation: Oliver 2024), with future volumes to cover the Pseudotropheina (mbuna, mainly rocky shore fish) and the Rhamphochromina (pelagic cichlids) plus others including the non-endemic genera (*Astatotilapia, Coptodon, Oreochromis, Pseudocrenilabrus, Serranochromis, Tilapia*). It is intended that these documents remain as open access preprints which will be updated to reflect additional collections and nomenclatural changes.

Methods

Most of the evidence for Lake Malawi cichlid species identification comes from photographs, either of live fish underwater, recently collected specimens from food fisheries or experimental surveys or from illustrations of preserved specimens. Colour and overall body shape are the most useful features in species identification. In cases where preserved specimens are available, useful information can be obtained from examination of oral and pharyngeal dentition, cephalic lateral line pores and gillrakers.

With experience of working on this group for over 35 years, I consider osteology, X-rays, fin ray and scale counts to be largely useless in species identification. They may be interesting for their own sake, and show patterns of adaptive divergence among divergent lineages, but among similar taxa, they don't really tell us much. For example, elongated fish tend to have larger numbers of lateral line scales and vertebrae, so these counts seldom provide additional information to just visualising the body shape. The angle that the ethmovomerine process makes with the main axis of the neurocranium is used to distinguish among some genera of the Pseudotropheina. This does not really add much to just looking at the angle of the snout profile and in any case, this is operational at the generic level rather than among closely related species.

I would go further and say that I don't actually think morphometrics is much use either. Many counts and morphometric ratios that distinguish among similar species in traditional descriptions and keys do so because they are based on a small number of specimens: add more specimens and most of the counts and ratios overlap. Most of the useful things can be seen by eyeballing the specimens and comparing a large number of specimens or photographs. If you can't see a consistent difference, there won't be anything useful in morphometrics either. Often if you can see a difference, it doesn't show up in standard ratios.

The authors of many taxonomic papers (including myself) often respond to these issues by counting and measuring more things on more specimens, or by undertaking complicated statistical procedures, including multivariate analysis. This is time consuming and largely serves to provide a spurious air of objectivity and technical swagger. It rarely adds much to species identification and is usually done post-hoc on specimens that have already been identified by other methods. Unquestionably, such analyses can be useful in the study of adaptive divergence or geographic variation, which are important and interesting topics in their own right (e.g. Malinsky et al. 2018). But in species descriptions, these practices mainly serve to make the descriptions exceedingly laborious to prepare, at a time when many should really be done as quickly as possible. It is reckoned that at current rates it will take several centuries to complete the species description of all marine invertebrates (Boucher et al. 2023). The situation seems much the same for Lake Malawi cichlids.

In recent years, I have been fortunate to collaborate with a number of colleagues employing analysis of whole genome sequences of Malawi cichlids. This has been helpful in some situations where morphology has not been clear-cut in the identification of specimens. Much of that work for the Cyrtocarina has been published by Blumer et al. (2025) but in some cases I have called on earlier, unpublished analysis by the same team: it is hoped that these will be published fully in time.

In future, it is likely that with provision of an adequate data set of images of identified specimens, artificial intelligence will be able to identify many species, as is the case with online apps, such as iNaturalist, for well-known taxa such as European flowers, butterflies or birds. At present, we are a long way short of this for Lake Malawi cichlids, because there isn't a 'training set' of images. In most cases, the key to identification lies in the hands of a relatively small number of experienced non-artificial intelligences. Unfortunately, the hardware of such systems is of limited durability. The present work is an attempt to download as much relevant software content as possible from one such entity to enable it to be uploaded by other systems.

Where possible, in the following pages, presentation of species identification features has involved reference to original species descriptions, including text, illustrations and type specimens, although the task of investigating the latter is far from complete. Fortunately, many of the early taxonomic works are now in the public domain, particularly through the Biodiversity Heritage Library (BHL). I have also had kind permission to use original illustrations which remain the intellectual property of individuals or public institutions, such as museums. In a few cases, original species descriptions have been copyrighted by for-profit organisations who have not responded to requests to place their materials into the public domain, so resort has been made to present images of putative conspecifics produced by authorities with experience with the particular species, ideally having examined the type material.

Species including all known undescribed taxa are listed alphabetically. Genera that are not monotypic are discussed briefly before listing the species. This work is intended to remain as a permanent preprint: I have no interest in paying APCs or putting the work behind a paywall. As a preprint is not considered a valid taxonomic work by the International Council for Zoological Nomenclature (despite being a permanent record), I will make no new taxonomic proposals but retain existing published names (formal and informal) where possible. In a few cases, I have had to make a decision about competing taxonomies. In general, I have tried to follow Eschmeyer's Online Catalog (Fricke et al. 2025) which is comprehensive, regularly updated and free to access. In a few cases, I have had to coin new informal names, generally for taxa not previously recognised. At present, around half of all Lake Malawi cichlids remain undescribed, but the great majority of those are known by informal names, a practice stretching back to Ribbink et al.'s (1983) monograph on rocky shore fishes. It is highly probable that a substantial number of additional species particularly in deep water habitats have not yet been recognised, while species concepts in use with the majority of terrestrial vertebrates would probably assign species status to a great many geographically restricted populations of rocky shore cichlids, many of which show clear differentiation in male breeding colour (for example, see recent papers by Pauers and collaborators). The number of species presented in this work is likely to be a considerable underestimate.

Photographs are credited to the photographer where known, with the following abbreviations: AK = Ad Konings; GFT = George Turner; HS= Hannes Svardal; HSlab= Lab of Hannes Svardal; MJG= Martin Genner. Line drawings are mostly credited to the source publication with the artist uncredited. A strange anomaly in that regard lies in the work of Trewavas (1931, 1935) and Eccles & Trewavas (1989): most of the species descriptions in the papers from the 1930s were extremely brief and in most cases, no illustration of the types was provided. It was intended to produce full redescriptions, and excellent line drawings were prepared in the 1930s by the professional artist Elizabeth Fasken. However, the full redescriptions did not actually appear for more than half a century, in the work of Eccles & Trewavas in 1989 (and not all taxa were actually re-examined). Most, but not all, of the Fasken drawings eventually appeared in Eccles & Trewavas, but sometimes the reproduction was not particularly good. The work of Eccles & Trewavas has not yet appeared online and I have not yet been able to source the original Fasken drawings (they are likely to be archived somewhere in the London Natural History Museum), but I have got hold of a good set of annotated photocopies of many of them, including some that did not appear in Eccles & Trewavas, and so are published here for the first time.

Alticorpus Stauffer & McKaye 1988: species MC1-10.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Alticorpus mentale* Stauffer & McKaye 1988.

Contained valid species: *Alticorpus geoffreyi; Alticorpus macrocleithrum; Alticorpus mentale; Alticorpus peterdaviesi; Alticorpus profundicola*.

Proposed underscribed taxa: *Alticorpus* sp. ‘bicuspid bis’; *Alticorpus* sp. ‘bicuspid small-scale’; *Alticorpus* sp. ‘deep bicuspid’; *Alticorpus* sp. ‘mentale bicuspid’ (all in Snoeks & Walapa 2004); *Alticorpus* sp. ‘greenface’ (present work).

Taxa considered invalid: *Alticorpus pectinatum* Stauffer & McKaye 1988 is considered a junior synonym of *A. peterdaviesi* (Snoeks & Walapa 2004; Konings 2016).

Taxa of uncertain status: *Alticorpus* sp. ‘deep’ (in Turner 1996) could not be clearly distinguished from *A. geoffreyi* by Snoeks & Walapa 2004); *Alticorpus* sp. 'dwarf mentale', proposed tentatively by Turner (1996) from a few specimens was not identified by Snoeks & Walapa (2004), but considered possibly conspecific with one or other of their proposed undescribed taxa.

Generic reviews & diagnoses: Stauffer & McKaye 1988; Eccles & Trewavas 1989; Snoeks & Walapa 2004.

Generic diagnosis: “Deep-bodied species with 5 to 7 dark vertical bars below dorsal fin; jaws isognathous or lower jaw prognathous and with clear mental processus; sensory canals on the head with enlarged to strongly enlarged pores. Deep-water dwelling species, occurring from around 30-40m depth probably down to the oxygen limit. Dentition of the *Haplochromis* type, i.e. unlike in similarly coloured *Lethrinops* species, in *Alticorpus* the outer tooth row in the lower jaw continues posteriorly as a singly row beyond the inner rows” (Snoeks & Walapa 2004).

Field Diagnosis: Any Lake Malawi cichlid with large pits underneath the head and a strong bump on the underside of the middle of the lower jawbones is an *Alticorpus*. All known species attain fairly large sizes, maturing at about 10cm SL or longer. Mature males have prominent vertical barring and generally brightly coloured heads. *Alticorpus* are not known to show flank spots, oblique stripes or horizontal bands.

Phylogenetic comments: Analysis of sequences of 4 species indicated that genus is polyphyletic (Blumer et al. 2025): *A. mentale* and *A. geoffreyi* appear as sister taxa, but *A. macrocleithrum* and *A. peterdaviesi* have evolved independently and are more closely related to taxa currently placed in *Aulonocara*. *Alticorpus* is distinguished from *Aulonocara* entirely on the basis of the pronounced mental process (bony knob under the lower jaw symphysis). The mental process is expanded in many other Malawian cichlids, but aside from *Alticorpus* v *Aulonocara*, no attempt has been made to use this trait in generic classification. This trait would seem to be readily produced in parallel and may also be less likely be exhibited by smaller individuals, making small-maturing species more likely to be placed into *Aulonocara*, irrespective of their affinities. Cladistically, the genus could be subsumed into *Aulonocara*. However, it appears that *Aulonocara* as presently defined is not monophyletic either and is mixed up with the extremely species-rich polyphyletic deep-water *Lethrinops* and *Placidochromis*. All four of these genera are currently ‘operational’ in that new species can be assigned to them with reasonably clarity, but none of them can be defined cladistically except through genome-wide sequencing.

Ecomorphological notes: *Alticorpus* species are all found in deep water, over soft sediments. Where known, the diets of most species are comprised of benthic invertebrates, although larger *A. mentale* are piscivorous. Dentition is generally weak and consistent with them simply swallowing small prey items captured in a mouthful of sediment. In general, their expanded cephalic lateral line canals are likely used to detect prey hidden in the sediment, as observed in those *Aulonocara* species that have been studied. Their larger sizes and large mouths may be consistent with a more predacious lifestyle in general. The function of the mental process is not known and it may be a consequence of having large, strong mandibular bones. Perhaps it helps to reinforce them. *Alticorpus* species generally have large eyes and are presumed to use visual cues as well as lateral line cues in their deep-water environments: this is consistent with the strong sexual dimorphism in the colour of mature adults. None of the species seem to have been observed alive, either through underwater observation or through the aquarium trade, so nothing is known of their social behaviour, although they can be assumed to be maternal mouthbrooders, along with all other known Pseudocrenilabrini.

MC1. *Alticorpus geoffreyi* Snoeks & Walapa 2004

Alticorpus geoffreyi was described by Snoeks & Walapa (2004). Before the formal description, it was well known in the Fisheries Research Unit in Monkey Bay under this name, and was reported by Turner (1996). It is diagnosed as a member of the genus *Alticorpus* by its enlarged cephalic lateral line pits and the prominent mental process. It has relatively few gillrakers 9-13 v 14-19 for *A. peterdaviesi*: (Snoeks & Walapa 2004) and a smaller mouth than *A. mentale*. *Alticorpus* sp. 'deep' reported by Turner (1996) is believed to be the same species (Snoeks & Walapa 2004).

Fig. 1.1: Holotype of *Alticorpus geoffreyi* from original description.

Fig. 1.2: *Alticorpus geoffreyi*, 2004.A65; SE Arm, 13 Aug 2004 [MJG}

Fig. 1.3: *Alticorpus geoffreyi* D14-C08, no voucher, trawled from 95-105m off Domwe Island, 4th March 2016 [HS]

D14-B07, UCZM 2016.44.13

D14-B10, UCZM 2016.44.15

D14-C01, UCZM 2016.44.8

D14-C05, no voucher specimen

Fig. 1.5: *Alticorpus geoffreyi*, trawled from 95-105m off Domwe Island, 4th March 2016 [HS]

MC2. *Alticorpus macrocleithrum* Stauffer & McKaye 1985

Alticorpus macrocleithrum was described by Stauffer & McKaye in 1985 as *Cyrtocara*, which was then in use as a replacement for *Haplochromis* following the restriction of that genus to a few endemic species of the Lake Victoria radiation (fig. 2.1). It was included in their new genus *Alticorpus* in 1988 by the same authors. The species is very distinctive, with its projecting bony chest. Our sequenced specimen was collected from a trawl catch in 2004 (fig. 2.2). It is a deepwater species found over soft bottoms- Turner (1996) reported it as shallow as 60m, but it was mostly found at 90m or deeper. Stomach contents included chironomids, oligochaetes and detritus (Darwall 2003).

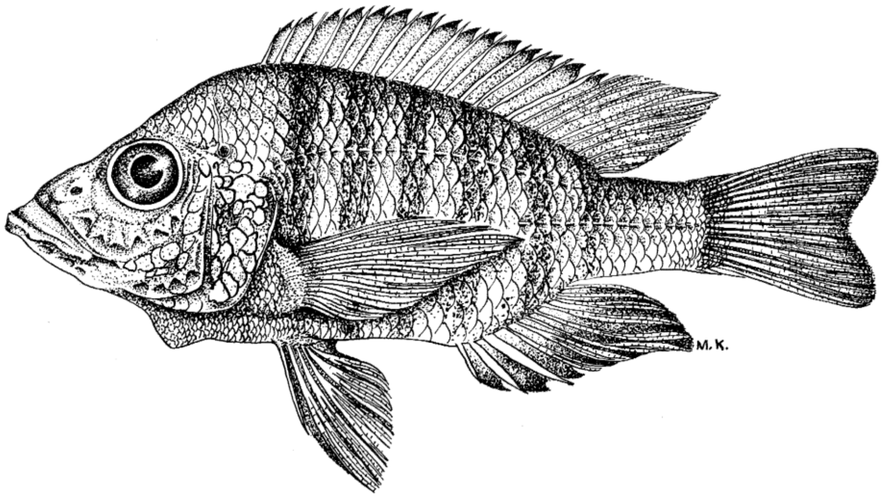


Fig. 2.1: Drawing of the type of *Alticorpus macrocleithrum* from the original description.

Fig. 2.2: *Alticorpus macrocleithrum,* 2004.A14; SE Arm, 19 October 2004.

MC3. *Alticorpus mentale* Stauffer & McKaye 1988

Alticorpus mentale was described by Stauffer & McKaye from 8 specimens. Species in the genus *Alticorpus* are distinguished by their expanded cephalic lateral line organs, in common with species of *Aulonocara.* They differ from *Aulonocara* in having a noticeable mental knob. *A. mentale* is distinguished by its large mouth and deep cheek. The low number of gillrakers distinguished it from any other described Alticorpus apart from *A. geoffreyi*. Mature adults are much bigger than any other known species with expanded lateral line canals. Males are dark, almost black on the head, flanks and fins apart from the pectorals, with dark flank bars (fig 3.3). The species is a deep water piscivore. A single specimen was sequenced (fig 3.2).

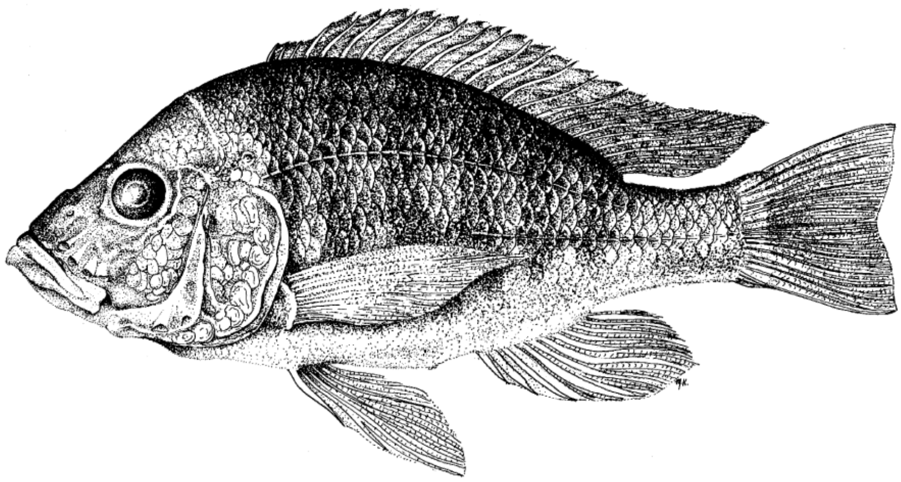


Fig. 3.1: Drawing of the type *Alticorpus mentale* used in the original description.

Fig. 3.2: *Alticorpus mentale*, D11-B06, UCZM 2016.40.77; trawled from 85-95m off Monkey Bay, 2 March 2016. [HS]

Fig. 3.3: *Alticorpus mentale*, mature male trawled off Monkey Bay, 1990s [GFT]

MC4. *Alticorpus peterdaviesi* Burgess & Axelrod 1973

Alticorpus peterdaviesi was originally described as *Trematocranus peterdaviesi* by Burgess & Axelrod in 1973, from 2 specimens collected at 43 fathoms (~80m) depth off Monkey Bay in the south of the lake. *Alticorpus pectinatum* Stauffer & McKaye 1988 (see also Turner 1996) is now believed to be the same species (Snoeks & Walapa 2004; Konings 2016). The species was studied from a large sample by Snoeks & Walapa (2004) who found that it could be easily identified from a combination of the distinguishing features of the genus (expanded cephalic lateral line canals, mental process on lower jaw) along with the high number of lower arch gill-rakers (16-21 v 14-16 in *A. profundicola*) and the generally smaller head (31.7-35.6% SL v 37.4-38.2% in *A. profundicola*). Adult males are strongly barred, with a bright yellow head and nape, and a yellowish dorsal fin with a white margin and black submarginal band (Burgess & Axelrod 1973; Turner 1996). 18 sequenced specimens were collected from deep water trawls in the south of the lake (Table 12). Common at depths below 90m (Turner 1996), stomach contents indicate a diet dominated by chironomids and oligochaetes (Darwall 2003).

Fig. 4.1: Holotype of *Alticorpus peterdaviesi*, from Snoeks & Walapa (2004).

Fig. 4.2: *Alticorpus peterdaviesi*, D14-B03, male, trawled from 95-105m off Domwe Island Bay, SE Arm, 4 March 2016 [HS]

Fig. 4.3: *Alticorpus peterdaviesi*, apparent female, D11-H02, trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016

Table 4.1. Summary of *Alticorpus peterdaviesi* specimens sequenced.

Code	Voucher	Photo	Location	Date	**Sequence Code**	Coverage
2005.28	??	N	Southeast Arm	14-Feb-05	**ILBCDS5879560**	17.9
D11-E10	2016.40.10	Y	Monkey Bay trawl 85-95m	02-Mar-16	**cichlid7020246**	17.2
D11-G08	2016.40.11	Y	Monkey Bay trawl 85-95m	02-Mar-16	**cichlid7020251**	17.7
D11-H02	2016.40.44	Y	Monkey Bay trawl 85-95m	02-Mar-16	**cichlid7020253**	15.9
D14-B01	2016.44.3	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020156**	18.9
D14-B02	2016.44.11	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020157**	18.3
D14-B03	2016.44.4	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020158**	19.3
D14-B05	2016.44.6	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020159**	18.1
D14-B06	2016.44.12	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020160**	17.1
D14-B08	2016.44.14	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020162**	20.7
D14-B09	2016.44.7	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020163**	17.6
D14-C02	N	Y	95-105m off Domwe Island	04-Mar-16	**CICHM16429755**	41.6
D14-C03	N	Y	95-105m off Domwe Island	04-Mar-16	**CICHM16429756**	40.1
D14-C04	N	Y	95-105m off Domwe Island	04-Mar-16	**CICHM16429757**	30.6
D14-C06	N	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020167**	19.4
D14-C07	N	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020168**	18.3
D14-C09	N	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020170**	16.2
D14-C10	N	Y	95-105m off Domwe Island	04-Mar-16	**cichlid7020171**	16.8

MC5. *Alticorpus profundicola* Stauffer & McKaye 1988

Not sequenced. Described from preserved specimens collected at the Monkey Bay Fisheries Lab from deep water at Nkhotakota in 1978, the species has never been photographed alive and there are no published records of the species since its description. Male breeding colours unknown.

MC6. *Alticorpus* sp. 'bicuspid bis'; MC7. *Alticorpus* sp. 'bicuspid small-scale'; MC8. *Alticorpus* sp. 'deep bicuspid'

Not sequenced. These undescribed species were illustrated from preserved material, and detailed taxonomic counts and measurements presented by Snoeks & Walapa (2004), but they have never been photographed alive and there are no published records of any of these species since 2004. Male breeding colours unknown.

MC9. *Alticorpus* sp. 'greenface'.

Not yet sequenced: first collected in 2023 from a trawl in the far north of the lake. Males are dark with dark vertical bars, and a blue-green sheen on the snout and cheeks.

MC10. *Alticorpus* sp. 'mentale bicuspid'

Not sequenced. Another undescribed species illustrated and discussed by Snoeks & Walapa (2004), but never photographed alive, nor recorded since 2004. Male breeding colours unknown.

MC11. *Aristochromis christyi* Trewavas 1935

Aristochromis christyi was described by Trewavas and placed in a monotypic genus where it has remained since. The species (and genus) is distinguished by its strongly laterally compressed head, huge beaked jaws, long, prominent premaxillary pedicels and thin oblique stripe on flanks. The jaw teeth are relatively small and simple. Males are bright blue. The species is sometimes seen in the aquarium trade, referred to as the 'Malawi hawk'. The species is a predator of small benthic fishes: Konings (2016) describes it as moving steadily well above the substrate and when it attacks, descends rapidly and strikes with a sideways movement of the head, often taking large prey up to 1/3 of its own size. They are often seen hunting over rocks but are taken in reasonable numbers by trawls and seine nets operating over soft-bottomed habitats (Turner 1996). Our specimen was collected from a shallow water trawl off Makanjila and identification seems unambiguous.

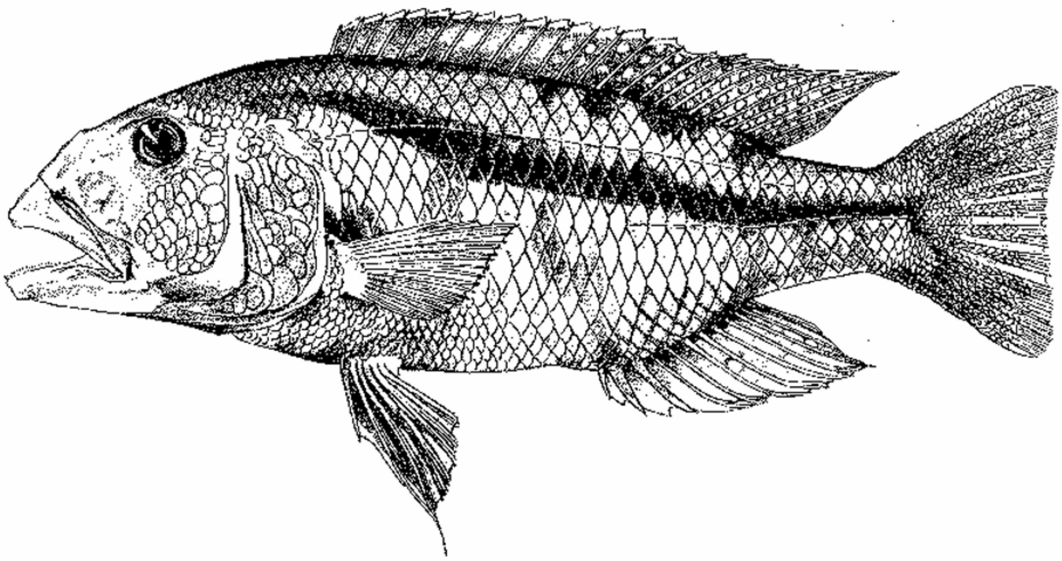


Fig. 11.1: Drawing of lectotype of *Aristochromis christyi*, from Eccles & Trewavas 1989.

Fig. 11.2: *Aristochromis christyi*, D12-D08, UCZM 2016.41.26, trawled from 20m depth off Makanjla, SE Arm, 2 Mar 2016 [HS].

Aulonocara Regan 1922: species MC12-66.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Aulonocara nyassae* Regan 1922.

Species considered valid: *Aulonocara aquilonium; Aulonocara auditor; Aulonocara baenschi; Aulonocara brevinidus; Aulonocara ethelwynnae; Aulonocara gertrudae; Aulonocara guentheri; Aulonocara hueseri; Aulonocara jacobfreibergi; Aulonocara kandeense; Aulonocara koningsi; Aulonocara korneliae; Aulonocara maylandi; Aulonocara nyassae; Aulonocara rostratum; Aulonocara saulosi; Aulonocara stonemani Aulonocara stuartgranti, Aulonocara trematocephalum*.

Proposed undescribed taxa: *Aulonocara* sp. 'big dark'; *Aulonocara* sp. 'brevirostris nkhata'; *Aulonocara* sp. 'brown black-pelvic'; *Aulonocara* sp. 'brown piper'; *Aulonocara* sp. 'brunei'' *Aulonocara* sp. 'burnt dorsal'; *Aulonocara* sp. 'cf. macrochir'; *Aulonocara* sp. 'chitande type kande'; *Aulonocara* sp. 'chitande type masinje'; *Aulonocara* sp. 'chitande type mozambique'; *Aulonocara* sp. 'chitande type nkhomo'; *Aulonocara* sp. 'chitande type north'; *Aulonocara* sp. 'copper'; *Aulonocara* sp. 'deep'; *Aulonocara* sp. 'deep yellow'; *Aulonocara* sp. 'gold'; *Aulonocara* sp. 'green'; *Aulonocara* sp. 'jalo'; *Aulonocara* sp. 'long'; *Aulonocara* sp. 'lwanda'; *Aulonocara* sp. 'minutus'; *Aulonocara* sp. 'nyassae mumbo'; *Aulonocara* sp. 'orange'; *Aulonocara* sp. 'pyramid'; *Aulonocara* sp. 'red shoulder'; *Aulonocara* sp. 'sailfin'; *Aulonocara* sp. 'six-bar'; *Aulonocara* sp. 'slender yellow dorsal'; *Aulonocara* sp. 'stuartgranti maleri'; *Aulonocara* sp. 'trematocranus masinje'; *Aulonocara* sp. 'violet'; *Aulonocara* sp. 'walteri'; *Aulonocara* sp. 'white-tip'; *Aulonocara* sp. 'yellow'; *Aulonocara* sp. 'yellow black'; *Aulonocara* sp. 'yellow collar'. The majority of shallow-water taxa are known through the aquarium fish trade or the works of Konings (e.g. 2016), while deep-water taxa are mainly through Turner (1996) or the present work.

Taxa considered invalid: *Aulonocara macrochir* Trewavas 1935 is a junior synonym of *A. rostratum* (Konings 1995b). *Aulonocara hansbaenschi* Meyer, Riehl & Zetzsche, 1987 (type locality at 8 km south of Masinje, Lake Malawi, Malawi) regarded as junior synonym of *A. stuartgranti* by Konings (1999); *Aulonocara steveni* Meyer, Riehl & Zetzsche, 1987 (type locality at Kande Island) also regarded as junior synonym of *A. stuartgranti* by Konings (1995).

Taxa of uncertain status: *Aulonocara* sp.'blue-orange' (Turner 1986) = *A. nyassae*?. *Aulonocara auditor* and *Aulonocara trematocephalum* have yet to be positively identified since their description.

Generic reviews & diagnoses: Regan 1922; Trewavas 1935; Meyer et al. 1987; Eccles 1989.

Generic diagnosis: Eccles (in Eccles & Trewavas 1989) gave a very lengthy description labelled as a diagnosis, listing many non-diagnostic traits shared with the majority of Malawian endemic haplochromine genera. From comparison with the key to the genera given by Eccles & Trewavas (1989), a generic diagnosis can be extracted (with slight paraphrasing): "Malawian haplochromines; the sensory canals of the skull are greatly expanded, including those on the preorbital and infraorbital bones; the melanin pattern lacks any conspicuous horizontal or oblique elements and consists of vertical bars; chin weakly developed, lacking a mental knob".

Field Diagnosis: An *Aulonocara* is any Lake Malawi cichlid with large pits underneath the head and lacking a strong bump on the underside of the middle of the lower jawbones and also lacking flank spots, oblique stripes or clear-cut horizontal bands. In rock habitats, some females and immatures are dark brownish, with traces of darker vertical bars. Over soft-sediment and in some species that frequent rocky habitats, females and juveniles are pale and countershaded, with faint vertical bars. Males are generally brilliant metallic colours (blue, yellow, orange). Among species mainly found over soft sediments, especially in deep waters, the bright colours may be confined to the head, nape and chest, as well as the unpaired fins, with the flanks being silvery-grey with faint vertical bars, much like those of females and immatures. Male anal fins are generally ornamented with numerous, large, non-ocellated, yellowish spots and streaks.

Phylogenetic comments: Analysis of sequences of 16 species indicated that genus is polyphyletic (Blumer et al. 2025) and its species are mixed in with species from *Alticorpus, Lethrinops* and *Placidochromis* and single species currently placed in *Otopharynx*. All belong to the 'deepwater' clade. Overall, it seems that expanded cephalic lateral line pits have evolved 3 times and been lost once, or alternatively evolved twice and lost twice (these seem equally parsimonious). Taking the minimum value of 2, the separate evolutionary events would involve the rocky shore *Aulonocara*, mainly of the *A. stuartgranti* group, as one event, and all the rest (sandy shore and deepwater) including *Alticorpus* and the rock/sand interface *A. ethelwynnae* as the other.

It is not surprising that *Alticorpus* has derived from *Aulonocara* several times independently (at least 3 times), as it just seems that those taxa that have evolved bigger, stronger jaws, have also evolved the *Alticorpus*-diagnostic mental process. The intermingling with *Lethrinops* and *Placidochromis* indicates that cephalic lateral line canal expansion can also be gained or lost relatively easily: this trait has also evolved independently in the 3-spotted *Trematocranus*, as well as in Tanganyika cichlids. Members of *Alticorpus, Aulonocara*, *Placidochromis* and most *Lethrinops* share a melanic pattern of faint vertical barring on the flanks, sometimes more pronounced in mature males. None of them exhibit horizontal or oblique bands or spots on their flanks, apart from a number of shallow-water *Lethrinops* species, but that too is a polyphyletic genus and the shallow-water species are not closely-related to *Aulonocara*. The *Otopharynx* species in this clade is *O. panniculus* (MC309), which may show a faint suprapectoral spot amid the vertical flank barring pattern.

Ecomorphological notes: *Aulonocara* species are found in all benthic habitats, but are particularly diverse in deep waters, over soft sediments. Where known, the diets of all species are comprised of small benthic invertebrates. Dentition is generally weak and consistent with them simply swallowing small prey items captured in a mouthful of sediment. In general, their expanded cephalic lateral line canals are likely used to detect hidden prey in the sediment: many shallow water species have been observed underwater, particularly in clear habitats near rocks: these seem to 'hover' slightly head-down a short distance above the sediment, as if 'listening', before plunging their mouth into the sediment, and winnowing edible material from the smaller sand/mud fragments or moving on. Strangely, this basic feeding strategy seems to have permitted a tremendous diversification in the number of species, particularly among small deep-water forms which often differ subtly in body shape, but dramatically in male breeding dress. A number of species, particularly of the *A. stuartgranti* and *A. jacobfriebergi* groups are specialised to live in caves among rocks. These small fish generally feed in patches of soft sediment, and are often more conspicuous around dusk, when they venture further from their caves to forage. Males of these seem to permanently colourful and territorial, suggesting that there is little breeding seasonality, much like the rocky shore mbuna species. Other species tend to live in groups out over soft sediments, but aggregate near rocks, building bowers in the sediment. Many species are entirely confined to soft sediment areas, including shallow-water species like *Aulonocara guentheri* and *A. rostratum*. However, the majority of species are found in deep-water, where there are numerous undescribed and poorly known species. These may be seasonal lek breeders: often large numbers of colourful males are collected together in trawl catches and then not seen again for some time. It is likely that many further undescribed species remain to be characterised. Also, quite a number of rather conspicuously divergent geographic colour forms have been lumped together into taxa such as *Aulonocara stuartgranti*: quite a few of these have been formally described and would probably be regarded as far more distinct than many valid phylogenetic species in most taxonomic groups, such as tetrapods or among north temperate freshwater fishes. There is no indication that any of these represent ‘colour morphs’ that have a simple genetic basis and would be able to co-exist within a panmictic gene pool, in the manner of OB-morph mbuna or polymorphic female-limited mimic butterflies or host egg-mimicking cuckoo gens. Rocky shore *Aulonocara* species are of major importance in the pet trade, where there are known as Malawi Peacocks: wild-type fishes make up a relatively small proportion of the trade: the majority are hybrid *Aulonocara* x *Maylandia* in which the *Maylandia* OB/O genes have been bred into fishes which have essentially *Aulonocara* morphology (more graceful, longer-finned) and behaviour (less aggressive). This hybrid also has the advantage that juveniles and females are colourful, which is rarely the case in *Maylandia* or other mbuna, and never true of wild-type *Aulonocara*. The OB/O phenotypes are not known in wild *Aulonocara*.

MC12. *Aulonocara aquilonium*; MC13. *Aulonocara auditor*; MC14. *Aulonocara baenschi*; MC15. *Aulonocara brevinidus*.

None of these species were sequenced in the present study.

MC16. *Aulonocara ethelwynnae* Meyer *et al.* 1987

Aulonocara ethelwynnae was described by Meyer et al. from 13 specimens obtained from Chitande Island, near Chilumba, in 1987. The species can be distinguished by the male breeding colours: yellow-brown body with faint vertical bars, violet-blue fins with a thin black dorsal fin margin. Pharyngeal bone reported to have some molariform teeth in the medial posterior region. The species is well-known in the aquarium fish trade. The species seems to be confined to rocky coasts near Chilumba: specimens sequenced by Blumer et al. (2025) were collected near the jetty. It is reported to feed on benthic invertebrates hidden in the sediment. It is moderately popular in the aquarium trade.

Fig. 16.1: *Aulonocara ethelwynnae*, Chitande Island [AK]

Fig. 16.2: *Aulonocara ethelwynnae*, D06-C03. UCZM 2016.30.9; SCUBA Chilumba Jetty, 24 Feb 2016 [HS]

Fig. 16.3: *Aulonocara ethelwynnae*, D06-C04, UCZM 2016.30.2. SCUBA Chilumba Jetty, 24 Feb 2016 [HS].

17. *Aulonocara gertrudae;* 18. *Aulonocara guentheri* Eccles 1989; 19. *Aulonocara hueseri;* 20. *Aulonocara jacobfreibergi;* 21. *Aulonocara kandeense;* 22. *Aulonocara koningsi;* 23. *Aulonocara korneliae;* 24. *Aulonocara maylandi.*

Not sequenced in the present study.

MC25. *Aulonocara nyassae* Regan 1922.

Aulonocara nyassae was described by Regan in 1922 from 3 specimens, two of which were later described as *Aulonocara guentheri* by Eccles (1989). The remaining type was designated as the lectotype by Eschmeyer (1998). The species has been identified by Eccles (in Eccles & Trewavas 1989) and Konings (2016) with a population found in shallow soft-bottomed habitats in the south of the lake in which males have blue iridescence on the head, and an orange sheen on the nape and chest. This is probably the species identified as *Aulonocara* sp. 'blue-orange' by Turner (1996), and this is not known for the type of *A. nyassae*. It is not clear how well justified this is, because there are many similar-looking *Aulonocara* species that are best told apart by male breeding dress. It would probably make sense to designate a neotype with known male breeding dress. The species is a found in relatively shallow soft-bottomed habitats. Our sequenced specimen was trawled from shallow water in the south of the lake, and shows traces of the blue and orange male colours.

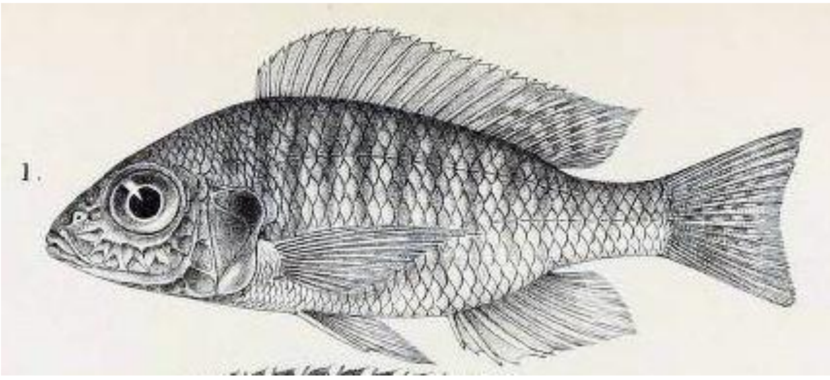


Fig. 25.1: Drawing of the lectotype of *Aulonocara nyassae* from original description. This is an unusually bad match for the specimen, assuming they have not been mixed up. The snout is much shorter, the body less deep at the anterior insertion of the dorsal fin and the posterior of the operculum more vertical in the drawing..

Fig. 25.2: *Aulonocara nyassae* lectotype, photo at London NHM, 2024 [GFT].

Fig. 25.3: *Aulonocara nyassae*, from Masasa Reef in the south of Lake Malawi [AK].

Fig. 25.4: *Aulonocara nyassae,* identified as *A.* sp. 'blue-orange' from 19m depth, SE Arm , off Malindi, 19-Jul-91, from Turner 1996 [GFT].

Fig. 25.5: *Aulonocara nyassae,* identified as *A.* sp. 'blue-orange' trawled from 15-23m, SE Armj Just NW of Boadzulu Is , 23-Oct-91 [GFT].

Fig. 25.6: *Aulonocara nyassae*, D12-G03. UCZM 2016.41.14; trawled from 20m off Makanjila, SE Arm, 2 March 2016 [HS].

MC26. *Aulonocara rostratum* Trewavas 1935.

Aulonocara rostratum was described by Trewavas (1935) from 27 specimens although more are listed by Eschmeyer (Fricke et al. 2025). This large species is distinguished by its long snout. It lives over soft-sediment habitats, generally shallower than 30m (Turner 1996). The type was from Vua in the far north, but the species is widely distributed. *Aulonocara macrochir* Trewavas 1935, was described from a single specimen which had a slightly larger eye and pectoral fin in relation to its head length, but the differences seem to be on the end of a continuum and no clear-cut alternative phenotype has emerged in later studies, so it is considered a junior synonym (Konings 2016). The three sequenced specimens were from widely separated places round the lake. The species feeds mainly on oligochaetes and small crustaceans (Darwall 2003).

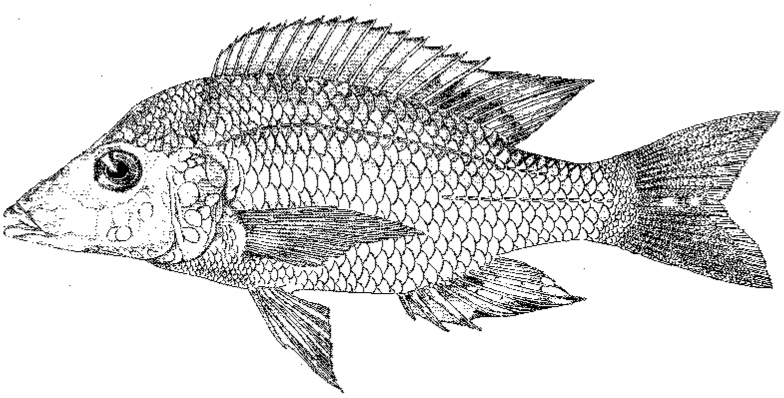


Fig. 26.1: Drawing of the lectotype of *Aulonocara rostratum* from Eccles & Trewavas (1989).

Fig. 26.2: *Aulonocara rostratum*, D12-H08, UCZM 2016.41.58; trawled from 30-40m off Makajila, 2nd March 2016 [HS]

Fig. 26.3: *Aulonocara rostratum*, D14-J08, UCZM 2016.45.33 trawled from 20m off Malembo, 4 March 2016 [HS].

Fig. 26.4: *Aulonocara rostratum*, D03-H02, UCZM 2016.22.5; seined from Chiweta Beach, Chilumba, 22 Feb 2016 [HS].

MC27. *Aulonocara saulosi*

Specimens sequenced by Blumer et al. (2025) under *Aulonocara saulosi* were collected from Chiofu Bay, close to the reported type locality for the species (8km South of Masinje, which is the village immediately to the south of Chiofu Bay on the map by Konings 2016: p. 11). In his book, Konings reports that there are three *Aulonocara* species in this area. They are not directly compared but rather presented as members of separate groups: *A. saulosi* (non-territorial, fig. 27.1), *A. stuartgranti* (rock-sand boundary, fig. 27.2), and *A. sp.* 'trematocranus masinje' (cave-dwelling, fig. 27.3) (see also MC65; Konings 2016). A problem is that all three seem to have more or less the same body shape and breeding dress, differing mostly in intensity/brightness. All three are generally blue with an orange band behind the head, orange pelvic fins and a white dorsal fin margin. The specimen shown as *A. sp.* 'trematocranus masinje' seems to have more orange on the head, while the specimen labelled *A. saulosi* has big bright eggspots. However, it is difficult to judge how much these differences are diagnostic, as opposed to individual or mood-related variation. The original description includes an illustration of a mature male which is generally dark, with little indication of the big bright eggspots shown by Konings (see fig. 27.1). The verbal description of male colour also mentions that the 'anal fin is dark brown with small greyish-yellow egg-dummies'. The orange colour is described as extending to the nape, which does seem to fit with the Konings image for *A. saulosi*, rather than for *A. stuartgranti*. Among several photos on the Cichlidroom Companion website, some show the orange nape and large eggspots, while others (including by Konings) do not. In all cases, the females are dark brown, as is also true for *A. stuartgranti*.

The original description by Meyer et al. (1987) was based on specimens supplied by the exporter Stuart Grant, and so does not include any behavioural or microhabitat information.

Aulonocara stuartgranti was described by Meyer and Riehl in 1985, from Mphanga Rocks, Chilumba. The 1987 paper provides a 'diagnosis' of *A. saulosi* and other new taxa, but like many others, this is really just a short description and makes no direct comparison with related taxa. Things are further complicated by the fact that Meyer et al's *A. hansbaenschi* is regarded by Konings as a junior synonym of *A. stuartgranti.* Konings (1995) reports that *A. stuartgranti* has no more than 1 cheek scale row, but while this corresponds to Meyer & Riehl's description, that is based on specimens from Chilumba and it does not correspond to the description of *A. hansbaenschi*, at least according to the Meyer et al. (1987) description, which states that it has 2-3 rows. Unfortunately this overlaps with *A. saulosi*, which is also reported to have 2 rows. The type localities for both *A. saulosi* and *A. hansbaenschi* are Masinje in the south east of the lake, not far from our collecting locality at Choifu. Close reading of the summaries of each species indicate some possible morphological differences, particularly in regard to the pharyngeal dentition:

	A. saulosi	*A. hansbaenschi*	*A. stuartgranti*
Cheek Scale Rows	2	2-3	0-1
Lateral line scale series	33	32	31-32
Posterior central Pharyngeal dentition	Fine	Enlarged or submolariform.	Enlarged, molariform or submolariform.

Our sequenced specimens clustered closely with several allopatric populations currently placed in *A. stuartgranti* (Blumer et al. 2025). Indeed, it may be that the populations around Chiofu include individuals adopting a range of behavioural strategies and that Konings is mistaken to use this to assign them to different species.

Fig. 27.1 According to Konings, this is *Aulonocara saulosi*, adult male, from the Malawi / Mozambique border [AK]

Fig. 27.2: According to Konings, this is *Aulonocara stuartgranti* from Chiloelo. This form is illustrated as inhabiting the coast from the Malawi/Mozambique border, into the SE Arm, covering the Chiofu Bay area [AK]

Fig. 27.3: According to Konings, this is *Aulonocara sp. 'trematocranus masinje'* from Gome. It is said to inhabit the coast from Meponda to Ntekete, covering the Chiofu Bay area [AK]

Male, Chiofu freshly collected on 28 Feb 2016 [HS] .

D09-F04, UCZM 2016.37.39; male, 28 Feb 2016 [HS]

D10-G03, UCZM 2016.38.29; 29 Feb 2016 [HS]

D10-G04, UCZM 2016.38.18, 29 Feb 2016 [HS]

Fig. 27.4: *Aulonocara saulosi* from Chiofu Bay. Additional specimens sequenced were D08-D10, UCZM 2016.36.27 and D10-G05, UCZM 2016.38.58 (not shown).

MC28 *Aulonocara* sp. 'big dark'; MC29 *Aulonocara* sp. 'brevirostris nkhata'; MC30 *Aulonocara* sp. 'brown black-pelvic'; MC31 *Aulonocara* sp. 'brown piper'; MC32 *Aulonocara* sp. 'brunei'; MC33 *Aulonocara* sp. 'burnt dorsal'; MC34 *Aulonocara* sp. 'cf. macrochir'; MC35 *Aulonocara* sp. 'chitande type kande'; MC36 *Aulonocara* sp. 'chitande type masinje'; MC37 *Aulonocara* sp. 'chitande type mozambique'; MC38 *Aulonocara* sp. 'chitande type nkhomo'; MC39 *Aulonocara* sp. 'chitande type north'.

Not yet sequenced.

MC40. *Aulonocara sp.* 'copper'

Aulonocara sp. 'copper' was first recorded by Turner (1996). The species has a small mouth, narrow head and a more upwardly angled mouth than is usual in *Aulonocara* species. However, it clusters with other deepwater/sand Aulonocara in the molecular phylogeny (Blumer et al. 2025). Mature males have distinctive dark copper vertical bars, head and fins. The four sequenced specimens came from the same trawl catch at 85-95m depth. Although there are small specimens and not in breeding dress, the overall body shape looks like a reasonable fit in terms of shape. It would be good to sequence a mature male to confirm the identification.

Fig. 40.1: *Aulonocara sp.* 'copper', not sequenced, from Turner (1996) [GFT]

D11-G03, UCZM 2016.40.19

D11-I03, UCZM 2016.40.34

D11-I09, UCZM 2016.40.59

D12-A05, no voucher specimen

Fig. 40.2: *Aulonocara* 'copper' four sequenced specimens trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016.

MC41. *Aulonocara sp* 'deep'

Aulonocara sp. 'deep' was first recorded by Turner (1996). It is a deep-bodied with 6 dark vertical bars under the dorsal fin. It has a short snout and a large eye. Generally, mature males are dark overall with dark fins and head. Some males have been reported with an orange head, and may represent a distinct species. It is generally found at 90m depth or deeper over soft-bottomed habitats. Females are pale with faint barring.

Fig. 41.1: *Aulonocara sp.* 'deep', male orange-headed variety, from Turner (1996) [GFT]

Fig. 41.2: *Aulonocara* sp. 'deep' D11-H08, UCZM 2016.40.32, trawled from 85-95m, off Monkey Bay, SE Arm, 2 March 2016 [HS]

Fig. 41.3: *Aulonocara* sp. 'deep' D11-J02, UCZM 2016.40.33, trawled from 85-95m, off Monkey Bay, SE Arm, 2 March 2016 [HS]

MC42 *Aulonocara* sp. 'deep yellow'.

Not yet sequenced

MC43. *Aulonocara sp.* 'gold'

Aulonocara sp. 'gold' is an undescribed species first identified by Turner (1996). Among *Aulonocara* species from soft-bottomed habitats, it is characterized by a relatively large size at maturity, deep body, and short snout. The male breeding dress is a metallic gold, with blue iridescence on the snout and cheeks. Our sequenced specimen is not fully coloured, but has appropriate body proportions and hints of both blue and gold. The species has been recorded at depths of 40-90m in the south of the lake. It is presumed to feed on benthic invertebrates.

Fig. 43.1: *Aulonocara* 'gold' full breeding dress, 1990s. (no tissue sample taken) [GFT]

Fig. 43.2: *Aulonocara* 'gold', 2004.A66, sequenced, SE Arm, 13 Aug 2004 [MJG]

MC 44 *Aulonocara* sp. 'green'; MC45 *Aulonocara* sp. 'jalo'; MC46 *Aulonocara* sp. 'long'; MC47 *Aulonocara* sp. 'lwanda'

Not yet sequenced.

MC48. *Aulonocara sp.* 'minutus'

Aulonocara sp. 'minutus' was recorded by Turner (1996). It is a small, slender species. Males have an orange head and nape, the flanks are pale with dark vertical bars (fig. 48.1). The dorsal fin has a dark margin. It is a small species, no more than 7 cm SL, but with a less ventral mouth and *A. stonemani*. It is found in deep water trawl catches. The 12 specimens sequenced in Blumer et al. (2025) all came from the same trawl haul (fig 48.2; table 48.1).

Fig. 48.1: Male *Aulonocara sp.* 'minutus' from Turner 1996 [GFT]

D11-H07

D11-J06

D11-J09

D11-J10

Fig. 48.2: *Aulonocara* 'minutus', trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016 [HS]

Table 48.1: Summary of sequenced specimens of *Aulonocara sp.* ‘minutus’.
All were obtained from a trawl from 85-95m depth off Monkey Bay, SE Arm, 2 March 2016

Code	Voucher	Sequence	Coverage
D11-H07	2016.40.20	**cichlid7020257**	16.3
D11-J06	2016.40.28	**cichlid7020266**	15.8
D11-J07	2016.40.29	**cichlid7020267**	16.4
D11-J08	2016.40.30	**cichlid7020268**	17.4
D11-J09	2016.40.84	**cichlid7020269**	16.6
D11-J10	2016.40.31	**cichlid7020270**	18.9
D12-A01	2016.40.21	**cichlid7020271**	18.0
D12-A02	2016.40.22	**cichlid7020272**	20.5
D12-A03	2016.40.23	**cichlid7020273**	16.5
D12-A04	2016.40.24	**cichlid7020274**	18.2
D12-A06	2016.40.25	**cichlid7020276**	17.3
D12-A07	2016.40.26	**cichlid7020277**	17.2

MC 49. *Aulonocara* sp. 'nyassae mumbo'

Not yet sequenced.

MC50. *Aulonocara* sp. 'Orange'

Aulonocara sp. 'orange' was first identified by Turner (1996), as a small species (<9.5cmTL) from trawl catches in the SE Arm of the lake. Females were generally silvery, countershaded, with orange pelvic and anal fins (Fig. 50.1). Males had an orange head, silvery flanks with 7 faint vertical bars under the dorsal fin and dark unpaired and pelvic fins, with black dorsal fin lappets. A sequenced male in partly developed/ faded breeding dress from Malembo in the SW Arm confirms well to this description and was recorded as *A.* sp. 'Malembo Orange' by Blumer et al. (2025).

Figure 50.1: Male (left) and female *Aulonocara* sp. 'orange' from Turner (1996), collected from trawls in the SE Arm of Lake Malawi [GFT].

Fig. 50.2: *Aulonocara* sp. 'orange' sequenced, D14-F07, UCZM 2016.45.9; trawled from 40m, off Malembo, SW Arm, 4 March 2016 [HS]

MC51 *Aulonocara* sp. 'pyramid'; MC52 *Aulonocara* sp. 'red shoulder'; MC53 *Aulonocara* sp. 'sailfin'

None of these species have been sequenced.

MC54. *Aulonocara sp* ‘six bar’

Aulonocara sp. ‘six bar’ is a small, rather stocky species with enlarged cephalic lateral line pits visible on the image. It is difficult to refer this to any of the species previously reported by Turner (1996), as although an apparent male, it does not seem to be in full breeding dress. The specimen sequenced by Blumer et al. (2025) was from a deep-water trawl catch in the south of the lake. The sequence indicates that it is not closely related to other small deep-water *Aulonocara*, such as *A.* sp. ‘minutus’, *A.* sp. ‘orange’, *A.* sp. ‘yellow’ or *A.stonemani*.

Fig. 54.1: *Aulonocara* ‘six-bar’, D14-D03, UCZM 2016.44.9; 95-105m, off Domwe, SE Arm, 4 March 2016 [HS]

MC55 *Aulonocara* sp. 'slender yellow dorsal'; MC56 *Aulonocara* sp. 'stuartgranti maleri'; MC57 *Aulonocara* sp. 'trematocranus masinje'; MC58 *Aulonocara* sp. 'violet'; MC59 *Aulonocara* sp. 'walteri'; MC60 *Aulonocara* sp. 'white-tip'.

None of these species have been sequenced.

MC61. *Aulonocara sp.* 'yellow'

Aulonocara sp. 'yellow' was first reported by Turner (1996). It is a small species of soft-sediment habitats with a yellow or orange colour on the lower parts of the head, with 7 dark bars under the dorsal fin and a white dorsal margin with black submarginal band. It was recorded from trawls at 40-95m depth (Turner 1996). Three sequenced specimens fit this description reasonably well: a brightly-coloured male collected in 2004 has very similar markings but the head colour is more orange than yellow. This may be due to state of maturity of preservation. In addition, we collected two specimens in a deep water trawl catch in 2016 that were very pale at the time they were photographed (fig. 419) but a photograph of an uncatalogued specimen from the same haul illustrates a male with a substantial area of bright yellow on the head (fig. 420).

Fig. 61.1: *Aulonocara sp.* 'yellow' from Turner (1996) shows paler yellow on the lower part of the head. NB similarity of dorsal fin markings to D14-D04. Depth range of the species was given as 40-95m.

Fig. 61.2: *Aulonocara sp.* 'yellow' 2004.A80, trawl catch, SE Arm, 13 August 2004 [MJG].

D14-D04, UCZM 2016.44.10

D14-D05, UCZM 2016.44.17

Fig. 61.3: *Aulonocara sp.* 'yellow', trawled from 95-100m off Domwe, SE Arm, 4 March 2016 [HS]

Fig. 61.4: Unlabelled male *Aulonocara sp*. ‘yellow’ from the same trawl haul as the specimens later photographed in fig. 61.3. This likely represents the fresh colours of mature male specimens [GFT]

MC 62: *Aulonocara* sp. 'yellow black'

Not yet sequenced. First collected in 2023 and not previously reported.

MC63: *Aulonocara* sp. 'yellow collar'

Not yet sequenced. A member of the ‘Chitande’ group, it is found on rocky shores around the Nankumba Peninsula (but not at Thumbi West and Mumbo Islands) and at Chemwezi Rocks (Konings 2016). It was first identified by Ribbink et al. (1983). Females and immatures live in schools in shallow water and males dig pits near rocks.

MC64. *Aulonocara stonemani* (Burgess & Axelrod 1973)

Aulonocara stonemani was described by Burgess and Axelrod in 1973 from a single specimens trawled from 43 fathoms (~80m), as *Haplochromis stonemani*. It was transferred to *Placidochromis* by Eccles & Trewavas (1989), following a redescription based on 5 specimens held in museums in Africa intended for description as 'Haplochromis nanus', examined earlier by Eccles, who also mentioned that he had examined the holotype (deposited in the USA) shortly after collection. However, neither description seems to have picked up the fact that the cephalic lateral line pits are greatly enlarged, as typical in *Aulonocara* species. This was noted by Turner (1996) based on the similarity in appearance and male breeding dress of specimens collected in the 1990s with the original illustration of the type specimen (which is under copyright to an aquarium fish magazine). This has been confirmed by examination of the type by Snoeks (in Hanssens 2004). Our two sequenced specimens were from trawl catches in the SE Arm of the lake, as was the holotype. The species is very small (type is 48mm SL) and is generally found in deep water. It probably feeds on small invertebrates hidden in the sediment.

Fig. 64.1: *Aulonocara stonemani*, male, illustrated by Turner (1996) [GFT]

Fig.64.2: *Aulonocara stonemani* male, D12-C03, UCZM 2016.40.27; trawled from 85-95m off Monkey Bay, 2nd March 2016 [HS]

Fig. 64.3: *Aulonocara stonemani,* 2004.A81; SE Arm, 13 August 2004 [MJG]

MC65. *Aulonocara stuartgranti* Meyer & Riehl 1985

Aulonocara stuartgranti was described by Meyer and Riehl in 1985 from 25 specimens collected at Mphanga Rocks, Chilumba by the SM Grant export team. A number of other populations have very different male breeding colours but are considered conspecific by Konings. We sequenced 10 specimens collected at Chilumba Jetty- these have the same colour phenotype as those at Mphanga Rocks, so this can essentially be considered the type locality (fig 65.1-3). Additional specimens of lithophilous *Aulonocara* that can probably be referred to this species were obtained from throughout the lake. The situation at Chiofu Bay is complicated: Konings (pers. comm.) reckons there are three species there: *A. stuartgranti, A. saulosi* and *A. sp.* 'trematocranus masinje' – these are provisionally identified as *A. saulosi* (see MC27).

Table 65.1. Summary of populations of *Aulonocara stuartgranti* sequenced.

Location	**Trade name**	**N**	**Source**	**Photos**
Chilumba Jetty	Stuartgranti	10	SCUBA	65.1-3
Chitimba Bay	Maisoni	1	Grant Export Facility	65.4
Usisya	Usisya	6	Bangor University	65.5
Kande Island	Steveni	1	Grant Export Facility	65.6
Nkhata Bay	Stuartgranti	3	SCUBA	65.7-8
Cape Maclear	Stuartgranti	1	SCUBA	65.10

Species of this group live at the rock-sand interface at depths of around 5-15m, often taking refuge in caves, but feeding out over the sand, detecting crustacean and insect larvae with their expanded lateral line organs. They are very popular in the aquarium fish trade, where they are known as 'Malawi peacocks'.

Fig. 65.1: *Aulonocara stuartgranti* male photographed underwater at Chilumba Jetty [Larry Johnson]

Fig. 65.2: *Aulonocara stuartgranti* 'Chilumba', D06-C02, UCZM 2016.30.10; SCUBA, Chilumba Jetty, 24 Feb 2016 [HS]

Fig. 65.3: *Aulonocara stuartgranti*, D06-G06, UCZM 2016.30.8; SCUBA, Chilumba Jetty, 24 Feb 2016 [HS]

Table 65.2: Summary of Sequenced Specimens of *Aulonocara stuartgranti* Chilumba.

Code	Voucher	Photo	Location	Date	Sequence code	Coverage
D06-B09	2016.30.3	YES	Chilumba Jetty	24-Feb-16	**cichlid6994143**	18.7
D06-B10	2016.30.11	YES	Chilumba Jetty	24-Feb-16	**cichlid6994144**	17.0
D06-C01	2016.30.12	YES	Chilumba Jetty	24-Feb-16	**cichlid6994145**	17.5
D06-C02	2016.30.10	YES	Chilumba Jetty	24-Feb-16	**cichlid6994146**	18.1
D06-G02	2016.30.5	YES	Chilumba Jetty	24-Feb-16	**cichlid6994184**	15.7
D06-G03	2016.30.1	YES	Chilumba Jetty	24-Feb-16	**cichlid6994185**	18.6
D06-G04	2016.30.6	YES	Chilumba Jetty	24-Feb-16	**cichlid6994186**	18.9
D06-G05	2016.30.7	YES	Chilumba Jetty	24-Feb-16	**cichlid6994187**	18.8
D06-G06	2016.30.8	YES	Chilumba Jetty	24-Feb-16	**cichlid6994188**	17.2
D06-G07	2016.30.4	YES	Chilumba Jetty	24-Feb-16	**cichlid6994189**	19.5

Fig. 65.4: *Aulonocara stuartgranti* 'maisoni' 2012.430, from Stuart Grant's export facility (probably from Chitimba Bay in far north), 23 Sept 2012 [MJG]

Fig. 65.5: *Aulonocara stuartgranti* 'usisya' from Bangor University Aquarium stock [GFT]

Fig. 65.6: *Aulonocara stuartgranti* 'steveni' male, 2012.429; from S.M.Grant's aquarium fish export facility, presumed collected from Kande Island, 2012 [MJG]

Fig. 65.7: *Aulonocara stuartgranti* male, D03-G05, UCZM 2016.21.12; SCUBA, Nkhata Bay, 22 Feb 2016. Female/juvenile D03-G06; UCZM 2016.21.13 (not shown) was also sequenced. [HS]

Fig. 65.8: *Aulonocara stuartgranti*, male, D01-E10,UCZM SCUBA, Nkhata Bay, -20 Feb 2016 [HS]

Fig. 65.10: *Aulonocara stuartgranti,* male, underwater at Nkhata Bay 2016[HS]

Fig. 65.11: *Aulonocara stuartgranti* D23-C03, UCZM 2021.40.15; SCUBAl Thumbi West, Cape Maclear 28 Jan 2017[HS]

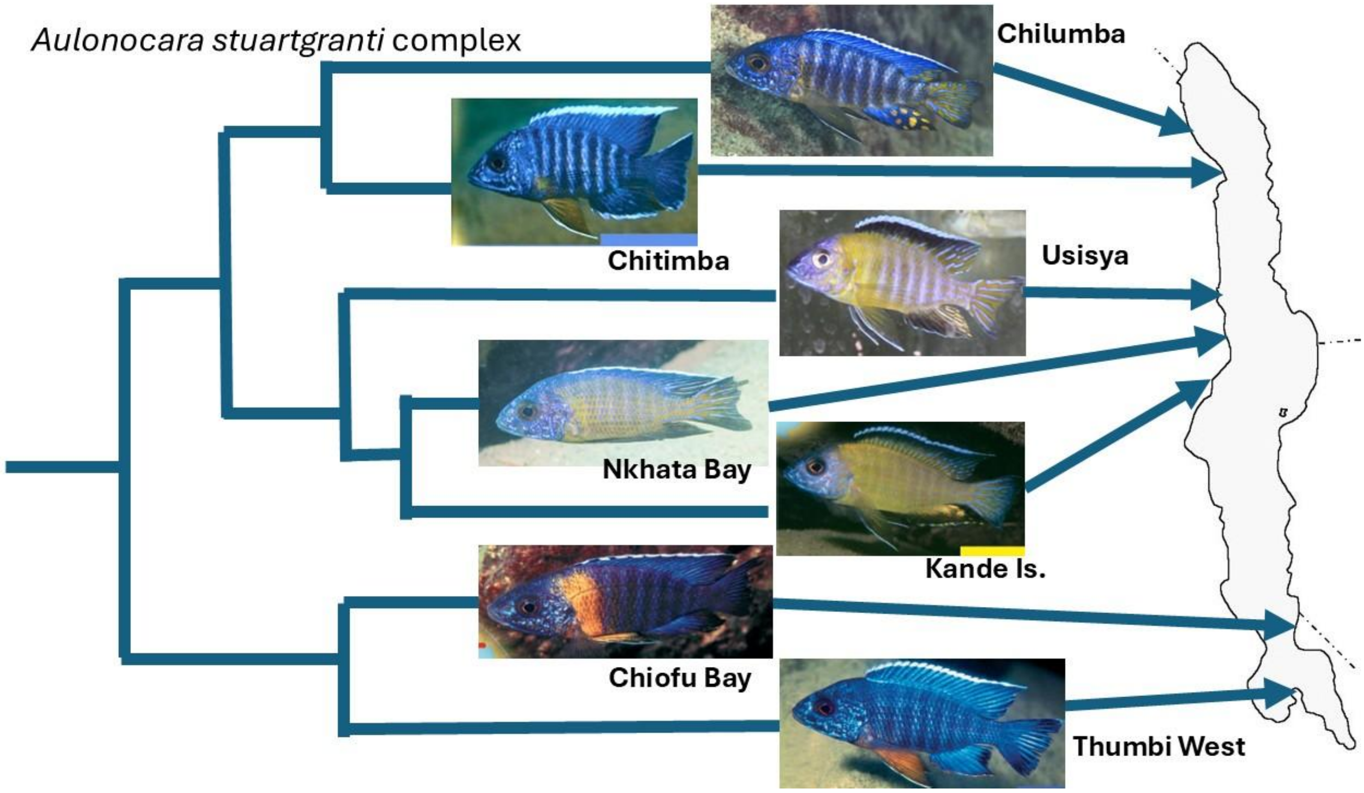


Fig. 65.12. Phylogeny of the lithophilous *Aulonocara* based on whole genome sequences (redrawn from Blumer et al. 2025) is constent with the seven populations being allopatric sister species or even geographic variants of a single species, as proposed by Konings (2016). It also suggests that the Chiofu Bay specimens sampled are best interpreted as *Aulonocara stuartgranti* rather than one of the other similar looking species reported from the same locality [photos by AK, HS, GFT]

MC66. *Aulonocara trematocephalum* (Boulenger 1901)

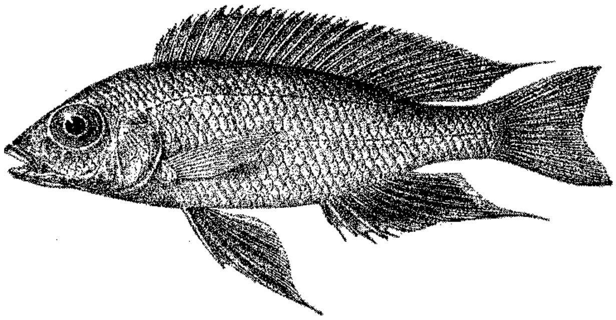



Figure 66.1: Holotype of *Aulonocara trematocephalum* (Boulenger 1901), mature male, 72mm SL, collected by J.E.S. Moore. Original drawing (left) and photograph [AK].

This species has not been sequenced: indeed, it has not been identified since its original description by Boulenger in 1901, when it was erroneously assigned as a Lake Tanganyikan species. It has 3 rows of cheek scales, which is unusually high for species from soft-sediment habitats but consistent with the *A. jacobfriebergi* group (Eccles 1989), and a uniformly dark colour for what appears to be a mature male, which suggests a rock species. 36 LL scales and 12-13 LGR.

Buccochromis Eccles & Trewavas 1989

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Paratilapia nototaenia* Boulenger 1902.

Contained valid species: *Buccochromis heterotaenia* (Trewavas 1935), *Buccochromis lepturus* (Regan 1922), *Buccochromis nototaenia* (Boulenger 1902), *Buccochromis oculatus* (Trewavas 1935), *Buccochromis rhoadesii* (Boulenger 1908), *Buccochromis spectabilis* (Trewavas 1935).

Proposed underscribed taxa: *Buccochromis* sp. 'large mouth' (of Snoeks & Hanssens 2004).

Taxa considered invalid: *Buccochromis atritaeniatus* Trewavas 1935 (probably a junior synonym of *B. nototaenia* or *B. oculatus*).

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Predatory haplochromines endemic to Lake Malawi characterised by having a dark diagonal stripe from nape to caudal base as the principal component of their melanin pattern and by having large mouths with numerous closely-spaced teeth which are bicuspid in juveniles and unicuspid in adults, recurved, with the greatest curvature near the tip. The chin is moderately deep, with the symphysis at 80 to 90 degrees to the occlusal plane, but there is no mental prominence. There are 32 to 36 vertebrae of this 14 to 16 are abdominal. The snout is slightly convex. Differ from *Champsochromis* in the more closely-spaced teeth and usually in the deeper body and lower number of vertebrae (Eccles & Trewavas 1989).

Field Diagnosis: Any Lake Malawi cichlid with an oblique stripe, large mouth, steep head profile and deep head & cheek is a *Buccochromis.*

Phylogenetic comments: Analysis of sequences of 5 species indicated that genus is monophyletic, except for the inclusion of *Otopharynx speciosus* (Blumer et al. 2025). This species bears a strong superficial resemblance to species of *Buccochromis*, but has a broken rather than continuous oblique stripe. It might be worth investigating if moving *O. speciosus* into *Buccochromis* could be achieved while retaining a workable diagnosis for both genera that does not rely on use of genomic data.

Ecomorphological notes: *Buccochromis* species are found in all benthic habitats, shallower than about 45m. I have frequently observed *Buccochromis heterotaenia* hunting over rocky areas: larger individuals move quickly, covering a large area, occasionally striking at fish that are near the bottom. Juveniles sometimes join hunting packs dominated by *Nimbochromis polystigma* and *Placidochromis johnstonii*. Solo juveniles will sometimes hang around near fry-guarding females. Juvenile *Buccochromis lepturus* can be seen behaving similarly in shallow sandy areas. In general, they appear to be restless pursuit hunters.

MC67. *Buccochromis heterotaenia* (Trewavas 1935).

Buccochromis heterotaenia was described (as *Haplochromis*) by Trewavas in 1935 from 2 specimens. It has a relatively deep body and narrow head. In the original description, it was reported that the oblique stripe is generally below the posterior part of the upper lateral line (Fig. 67.1). However, this can be hard to tell in some specimens, as the stripe is often hard to make out, with the dominant melanin pattern consisting of wide vertical stripes (Fig. 67.2, 67.3). However, this is also diagnostic, as it is not seen in other *Buccochromis* species. The sequence in Blumer et al. (2025) is from a small juvenile collected at Chiofu Bay (fig. 67.2). The species is a piscivore, but unlike congenerics, it mainly hunts over rocky habitats. It is reported to grow very large: 42cm SL, 1kg (Konings 2016), but is still sometimes exported as an aquarium fish.

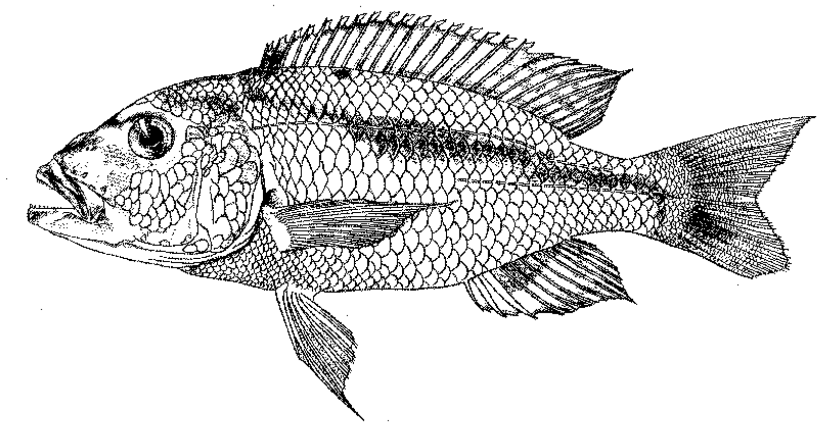


Fig. 67.1: Drawing of the lectotype of *Buccochromis heterotaenia*, from Eccles & Trewavas (1989)

Fig. 67.2: *Buccochromis heterotaenia*, sequenced specimen, D09-C07, UCZM 2016.37.22; SCUBA, Chiofu, 28 Feb 2016

Fig. 67.3: *Buccochromis heterotaenia*, photographed underwater at Thumbi West Island, 2016, H. Svardal

Fig. 67.4. *Buccochromis heterotaenia*, adult male, purchased from angler, Cape Maclear, April 1992 [GFT].

MC68. *Buccochromis lepturus* (Regan 1922).

Buccochromis lepturus was described (as *Haplochromis*) by Regan in 1922 from 5 specimens, one of which had been one of the types of *B. rhoadesii*. It has a relatively more slender body and a steeper head profile / shorter snout than *B. rhoadesii*. Females and immatures are greenish dorsally with a faint oblique stripe and are whiteish ventrally, lacking the orange lower fins seen in *B. rhoadesii* and *B. nototaenia*. Two sequences are available, from opposite ends of the lake: the specimen from the SE Arm appears to be a maturing male developing hints of orange and blue that will dominate its breeding dress. It is a fast-moving predator of small fishes in shallow sandy areas. Despite its large size, the species is occasionally exported as an aquarium species, and is sometimes rather needlessly referred to as *Buccochromis* 'lepturus green'.

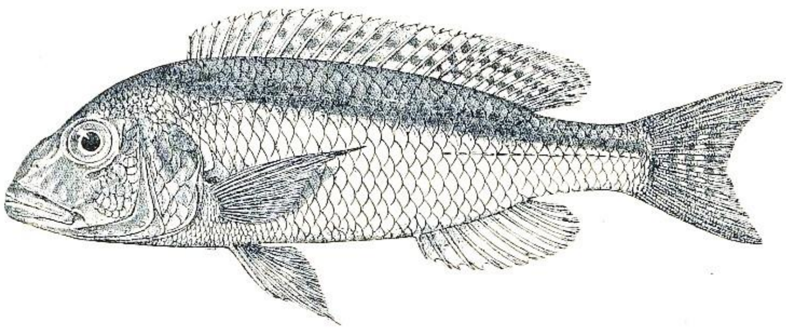


Fig. 68.1: Drawing of the lectotype of *Buccochromis lepturus* from Regan 1922.

Fig. 68.2: *Buccochromis lepturus,* sequenced: D06-J07, UCZM 2016.32.8; bought from fish traders, Ngara, Chilumba, 25 Feb 2016 [HS]

Fig. 68.3: *Buccochromis lepturus,* sequenced: 2004-A91, trawled in SE Arm, 13 August 2004, [MJG]

MC69. *Buccochromis nototaenia* (Boulenger 1902).

Buccochromis nototaenia was described (as *Paratilapia nototaenia*) from a single specimen by Boulenger in 1902. The specimen was already reported to be badly preserved and it has never been illustrated prior to now (Fig 69.1). It has been recognised by its deep-body, steep head profile, wide head and continuous oblique stripe which is mostly above the upper lateral line as far back as the posterior end of the spinous dorsal fin. In the field, it has mainly been recognised from the orange fins of the female and the patch of red behind the operculum in males. It is possible that this species actually remains quite small and that it has been confused with a different species in which females and immatures have whitish pelvic and anal fins. Our two specimens are both from the south of the lake: a small juvenile with clearly orange fins and a large mature male, ~23cm SL. These cluster together on the tree, suggesting that this is not too small when mature! The species is reported to pursue small haplochromine cichlids over sand (Konings 2016).

Fig. 69.1. *Buccochromis nototaenia* type, 190mm SL, at the London Natural History Museum 2023 [GFT]

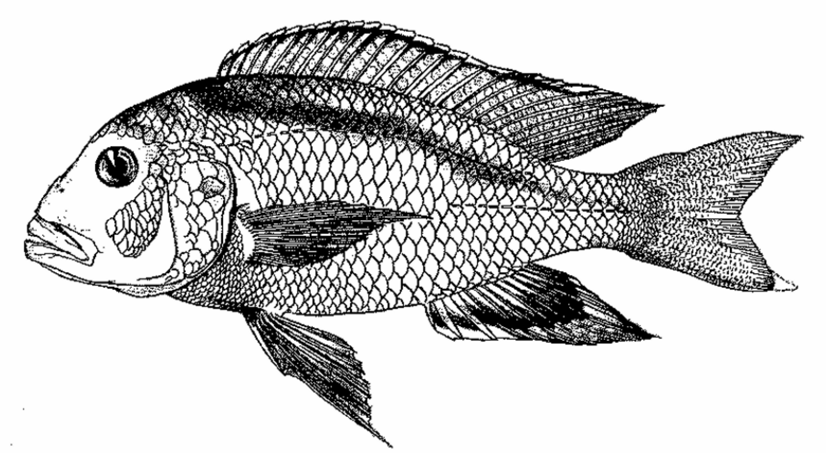


Fig. 69.2: Non-type specimen, male 266mm SL, figured as *Buccochromis nototaenia* in Eccles & Trewavas (1989): BMNH 1935.6.14.1374-75.

Fig. 69.3: *Buccochromis nototaenia*, D08-B05, UCZM 2016.35.37; SCUBA, Chiofu, 28 Feb 2016.

Fig. 69.4: *Buccochromis nototaenia*, 2010-H07 (BNO), male, ca. 23cm SL, SE Arm, experimental trawl at 11-58m, 19 Nov 2010 [GFT].

Fig. 69.5: *Buccochromis nototaenia*, photographed in the aquarium, showing the patch of red scales behind the operculum in mature males. Females of this form have orange lower fins [AK].

MC70. *Buccochromis oculatus* (Trewavas 1935).

Buccochromis oculatus was described (as *Haplochromis*) by Trewavas in 1935 from 2 specimens (fig. 70.1), although many more specimens from the 1925-26 Christy collection were added to the full description by Eccles & Trewavas (1989). From their study, it is suggested that it has a relatively deep body and steep head profile, but a slightly larger eye and narrower preorbital bone than the very similar *B. nototaenia*. Blumer et al. (2025) include a sequence is from an individual with white pelvic and anal fins (as opposed to the orange fins of specimens generally assigned to *B. nototaenia*), provisionally assigned to this species (fig. 70.2). It may be that fin colour is a relatively easy way to distinguish the species from *B. nototaenia* in the field, but further work is needed on this. Certainly, the white-finned and orange-finned specimens are not grouped closely on their phylogenetic tree. The sequenced specimen was collected from Chiweta Beach, near Chilumba and it may be that this species is more common in the north, although the type is from Monkey Bay. However, a white-finned specimen (fig. 70.3) collected in SE Arm, not far from Monkey Bay, by Turner in 1992 was provisionally identified as *B. oculatus* (Turner 1996). The species is little known from life, but is assumed to be a piscivore, mainly hunting over shallow sandy areas.

Fig. 70.1: Lectotype of *Buccochromis oculatus*, London NHM, 2023 [GFT]

Fig. 70.2: *Buccochromis oculatus* D03-G08, 2016.22.8; bought from seine fishermen, Chiweta Beach, Chilumba 22 Feb 2016. Sequenced. [HS]

Fig. 70.3: *Buccochromis oculatus* trawled from 35m depth, SE Arm, Chirombo Bay, 13-Apr-92 [GFT]

MC71. *Buccochromis rhoadesii* (Boulenger 1908).

Buccochromis rhoadesii was described (as *Paratilapia rhoadesii*) by Boulenger in 1908. One of the types was later considered by Eccles & Trewavas (1989) to be a specimen of *Buccochromis lepturus*. It has a longer snout and less steep head profile than other *Buccochromis*, and often shows a lot of yellow on the lower half of the body, in contrast to *B. nototaenia* where the yellow-orange colour is generally confined to the pelvic, anal and caudal fins. In larger specimens, the oblique stripe is very faint or absent and instead there are brownish vertical bars. The three sequenced specimens from Blumer et al. (2025) seem to match well with the typical phenotype of this species. It is a predator of small fish and lives in shallow sandy habitats.

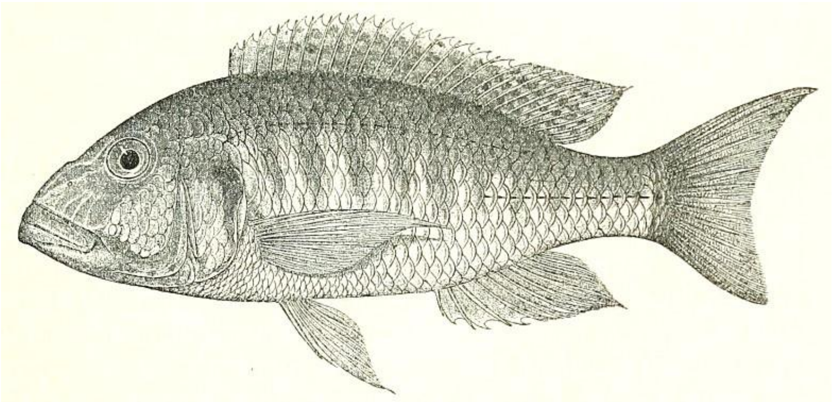


Fig. 71.1: *Buccochromis rhoadesii*, lectotype, from Boulenger 1915.

Fig. 71.2: *Buccochromis rhoadesii*, D08-C03, UCZM 2016.35.44; SCUBA, Chiofu, 28 Feb 2016. At this size, they have more slender bodies and more orange on the head than *B. nototaenia*.

Fig. 71.2: *Buccochromis rhoadesii* D07-A03, UCZM 2016.32.15; bought from fishermen at Ngara, Chilumba, 25 Feb 2016

Fig. 71.2: *Buccochromis rhoadesii* D03-G07, no voucher specimen; bought from seine fishermen at Chiweta, Chilumba, 2 Feb 2016

MC72. *Buccochromis* sp. 'large mouth'

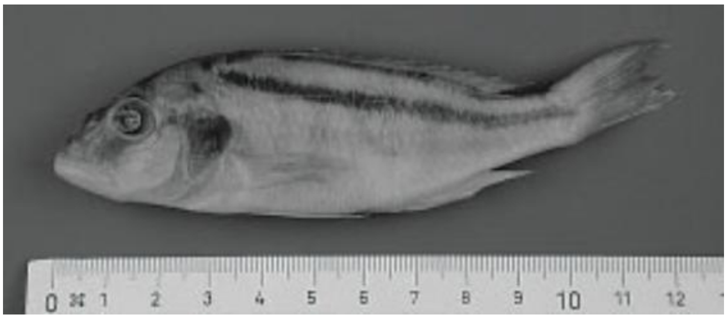


Figure 72.1: *Buccochromis* sp. 'large mouth', 10cm SL, collected from Nkhotakota, from Snoeks & Hanssens (2994)

Not sequenced. This name was assigned to a single preserved specimen by Snoeks & Hanssens (2004). Little is said about the supposed diagnostic features of this taxon, except that it did not fit the descriptions of *B. atritaeniatus* or *B. oculatus*.

MC73. *Buccochromis spectabilis* (Trewavas 1935)

This species was not sequenced by Blumer et al. (2025), but was collected in 2023.

MC74. *Caprichromis liemi*; MC75. *Caprichromis orthognathus*

These species were not sequenced by Blumer et al. (2025), but were collected in 2023.

Champsochromis Boulenger 1915

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Paratilapia caerulea* Boulenger 1908.

Contained valid species: *Champsochromis caeruleus* (Boulenger 1908); *Champsochromis spilorhynchus* (Regan 1922)

Proposed undescribed taxa: None.

Taxa considered invalid: None.

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: "Haplochromines endemic to Lake Malawi characterised by having a melanin pattern dominated by a diagonal stripe from the nape to the base of the caudal, with elongated head and body and a total of 33 to 35 vertebrae, of which 14 to 16 are abdominal. The lower jaws are powerful and are more than 40% of the head length. The teeth in both jaws at all sizes examined are strong, simple and slightly recurved and are well-spaced the gaps between being more than the diameter of the teeth. There are fewer than 50 teeth in the outer row of the upper jaw" (Eccles & Trewavas 1989). The elongated body and oblique stripe can be confused with *Buccochromis* and *Mylochromis*, which both have elongated species. Few of these features actually distinguish the species from the more elongated *Buccochromis* species, such as *B. spectabilis* or *B. leputurus*. For example, the vertebral counts are largely overlapping. Eccles & Trewavas (1989) mention that the teeth have a slight even curvature (*Buccochromis* has erect teeth, curved at the tips) and that they are widely-spaced, leading to the relatively low tooth counts (*Buccochromis* has counts above 50). Elongated *Mylochromis* species have smaller mouths and bicuspid teeth.

Field Diagnosis: Elongated predatory Lake Malawi cichlids with a strong oblique stripe, large mouth but lacking a steep head profile and deep head & cheek are *Champsochromis.*

Phylogenetic comments: Eccles & Trewavas (1989) suggest that *Champsochromis* is likely to be the sister group to *Buccochromis*. Analysis of sequences does not support this: *C. caeruleus* emerges as the sister to a group comprised of *Tyrannochromis* + *Aristochromis*.

Ecomorphological notes: *Champsochromis* are fast-moving, shallow-water predators, found over sandy areas.

MC76. *Champsochromis caeruleus* (Boulenger 1908)

Large specimens of *Champsochromis caeruleus* are very distinctive: an elongated predatory species with an oblique stripe. The mouth is large mouth and teeth long, simple and widely-spaced. The oblique stripe in larger fish tends to be fainted than the more heavily-built *C. spilorhynchus*. The latter species has a deeper head, bigger mouth and a more prominent lachrymal stripe. Mature males, including the type, have spectacularly elongated fins (Fig 76.1). Juveniles can be harder to distinguish. Four specimens were sequenced by Blumer et al. (2025). Two sequences were extracted from finclips pooled without individual voucher specimens or photographs by Turner from a trawl catch in 2010: a sample photo of one of the specimens is unambiguously an adult *C. caeruleus* (Fig. 76.2). A small specimen obtained through the aquarium trade, was recorded as having been collected in Tanzanian waters (Fig. 76.3). The fourth specimen was obtained by SCUBA from Chiofu Bay (Fig. 76.4) has a strong lachrymal stripe and prominent premaxillary pedicel (suggesting *C. spilorhynchus*), but a very slender body (suggesting *C. caeruleus*), but at such a small size, it is hard to match this specimen with either species. However, it lies within the clade formed by the other three specimens, suggesting that it is in fact *C. caeruleus*.

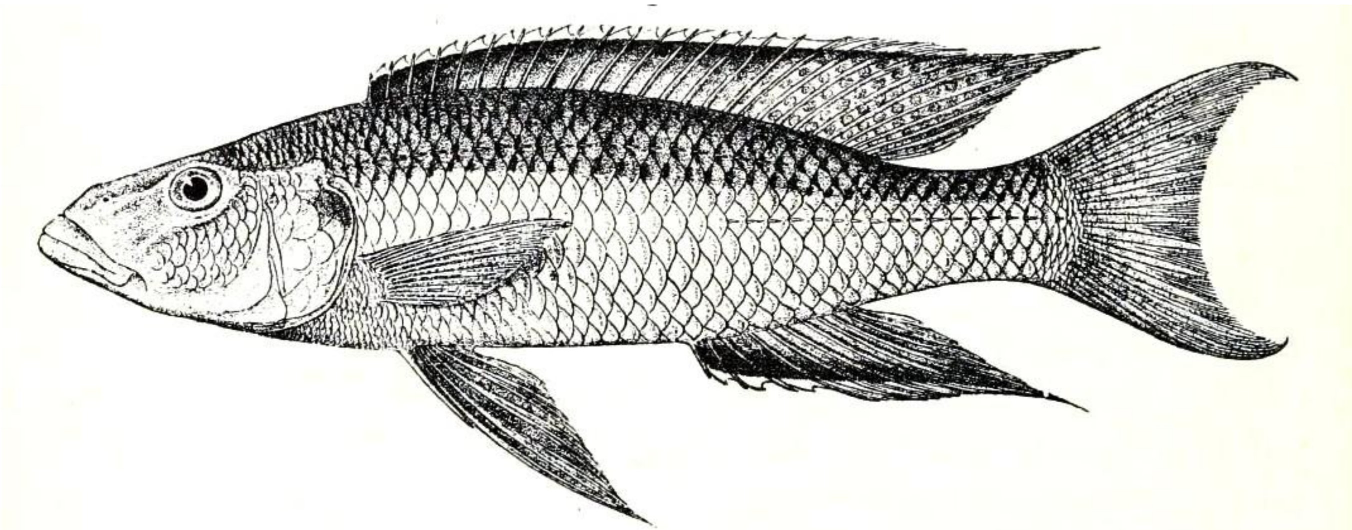


Fig. 76.1: Drawing of type of *Champsochromis caeruleus* from Boulenger (1915). Development of fins and markings, as well as the colour notes in the original description and the specific name (meaning blue) suggest this is a mature male.

Fig. 76.2: *Champsochromis caeruleus*, CH1 or CH2, trawled from 11-58m, Nkhudzi Bay, SE Arm, 19 Nov 2010, representative of two specimens sequenced this collection [GFT].

Fig. 76.3: *Champsochromis caeruleus*, D16-A02, Sequenced aquarium specimen from Tanzania.

Fig. 76.4: *Champsochromis caeruleus*. D07-J09, UCZM 2016.35.32, collected by SCUBA, Chiofu Bay, 28 Feb 2016 [HS]

MC77. *Champsochromis spilorhynchus* (Regan 1922)

Not sequenced. *Champsochromis spilorhynchus* is generally deeper bodied, less streamlined and has a stronger lachrymal stripe between the eye and mouth than *C. caeruleus* (fig. 77.1). Rarely seen since the 1990s (figs. 77.2, 77.3), Konings (2016) suggests the species has suffered from the heavy beach seine fishing operating on all sandy/mud beaching in the Malawian part of Lake Malawi.

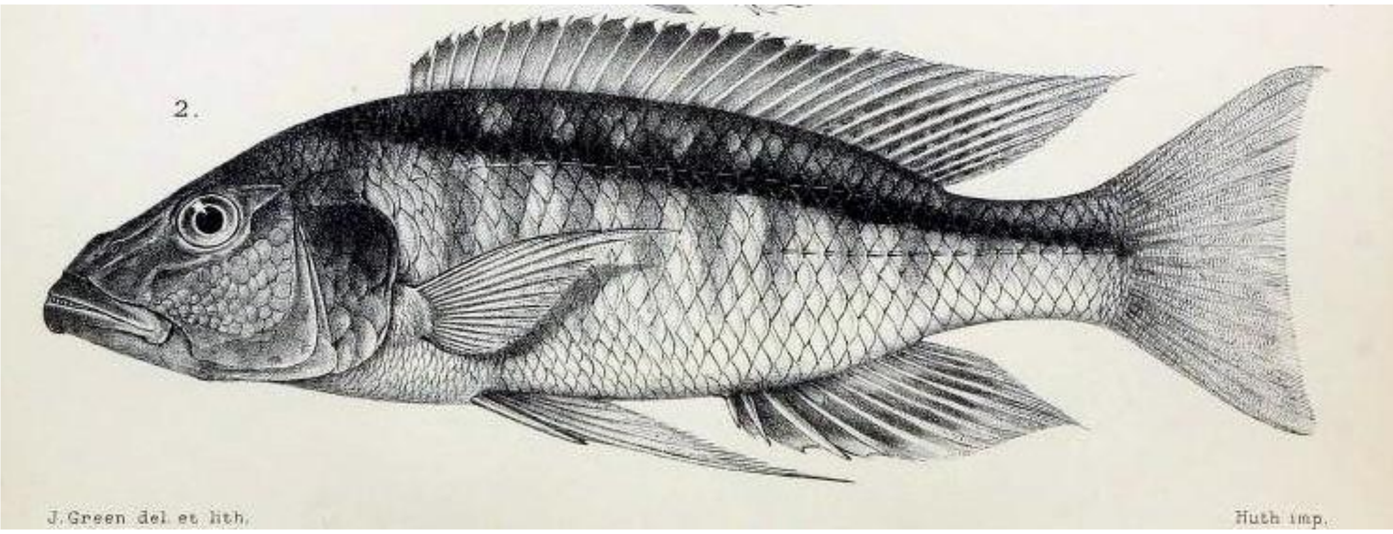


Fig. 77.1: Drawing of one of the type series of *Champsochromis spilorhynchus* from original description by Regan (1922), showing the relatively deeper body and less streamlined head shape than *C. caeruleus*.

Fig. 77.2: *Champsochromis spilorhynchus*, beach seine, Monkey Bay, 30-Apr-92 [GFT]

Fig. 77.3: *Champsochromis spilorhynchus*, purchased from gillnet fisher, Manda Port, Tanzania, 30 May 2003 [J.Hellon]

MC78. *Cheilochromis euchilus* (Trewavas 1935)

Haplochromis euchilus was originally described by Trewavas in 1935 from 2 specimens from Chilumba in the north of the lake from the Christy collection of 1925-26. Additional smaller specimens from Monkey Bay were not included in the type series but mentioned in the full description by Eccles & Trewavas in 1989 which placed the species in a new monotypic genus *Cheilochromis*. A suggestion by Eschmeyer et al. (2024) that this genus is actually a junior synonym of *Pseudohaplochromis* Allgayer 1981, not cited by Eccles & Trewavas, is not in fact the case, as *Pseudohaplochromis* was not actually described but rather floated as a possible idea for a new genus to house all the Malawi species that had formerly been included in *Haplochromis* after that genus was restricted by Greenwood (1979) to a few Lake Victoria region species. Subsequently, Konings (1995) proposed moving the species into *Chilotilapia* on the basis of the similarity in markings of the female and juveniles. Although this was not accepted by Snoeks and Hanssens (2004), Konings has maintained this since (e.g. Konings 2016). However, it is not accepted by Eschmeyer's Catalog (Fricke et al. 2024), which maintains *Cheilochromis euchilus* as valid. We generally follow Eschmeyer, and also note that transfer of *C. euchilus* into *Chilotilapia* would require an entirely novel generic definition of *Chilotilapia*, which has not been proposed by Konings. As no revised definition of *Chilotilapia* exists which would include *C. euchilus*, this genus would be 'non-operational', in the sense that a taxonomist dealing with a newly discovered species could not look up a definition of *Chilotilapia* to see whether or not the species belonged in that genus. Therefore, I retain the generic definitions of Eccles & Trewavas (1989) for both *Cheilochromis* and *Chilotilapia*, as they are operational. Phylogenetic analysis of sequences by Blumer et al (2025) supports Konings' suggestion, but this does not generate a workable generic definition. It is equally compatible with regarding *Cheilochromis* and *Chilotilapia* as sister taxa (which was proposed by Trewavas 1935).

Cheilochromis: "haplochromines endemic to Lake Malawi, characterized by possessing a variant of the plesiomorphic melanin pattern, with continuous midlateral and supralateral stripes and with the lips forming continuous fold around each jaw and produced into elongated median lobes. The anterior teeth of the outer row are unequally bicuspid and inclined somewhat towards the symphysis" (Eccles & Trewavas 1989).

Cheilochromis euchilus is a very distinctive species, characterised by its combination of expanded fleshy lips and strong dark horizontal bands on a golden-yellow background. Eccles & Trewavas (1989) describe the dentition as being an apomorphic trait: the anterior outer teeth are unequally bicuspid and inclined towards the symphysis. Preserved whole specimens are available for all five individuals sequenced by Blumer et al. (2025), but there are photographs for only 4 of them (Fig. 78.1).

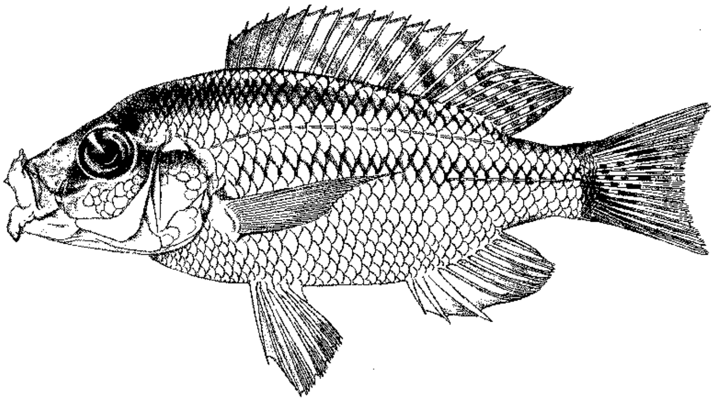


Figure 78.1: *Cheilochromis euchilus* (Trewavas), lectotype, 96mm SL, from Chilumba, drawn by M. Fasken in 1935, from Eccles & Trewavas (1989).

Figure 78.2: *Cheilochromis euchilus* (Trewavas), mature male, purchased from gillnet fisher, 1991, not sequenced [GFT].

D07-F02, UCZM 2016.31.3; caught by divers at Chitande Island Chilumba, 25 Feb 2016

D10-H03, UCZM 2016.38.63; caught by snorkeller at Chiofu, 29 Feb 2016

D10-H04, UCZM 2016.38.24; caught by snorkeller at Chiofu, 29 Feb 2016

D10-H05, UCZM 2016.38.56; caught by snorkeller at Chiofu, 29 Feb 2016

Fig. 78.3: Photographs [HS] were available of four out of the five *Chilotilapia euchilus* sequenced by Blumer et al. (2025): all seemed to correspond well to the typical juvenile phenotype of this species. No photograph was found for D08-J09, which was also collected by divers at Chiofu on 28 Feb 2016 but a whole specimen is available (UCZM 2016.37.9).

MC79. *Chilotilapia rhoadesii* Boulenger 1908

Chilotilapia was described as a monotypic genus by Boulenger (1908): "Teeth in several rows with obtuse or rounded crowns; maxillary exposed; lips thick. 3 anal spines." The single specimen available was described as being dark blue with dorsal and anal fins broadly edged with orange, and is thus likely to be a mature male (fig. 79.1).

A revised generic diagnosis (more like a short description) was given by Eccles & Trewavas (1989): "Malawian haplochromine fishes without regular ocellated spots on the anal fin of males, with a specialized crushing dentition of the jaws. In the adult the mouth is broad, left and right rami of the jaws meeting at almost 180°. Teeth of the outer two to three rows have crowns shaped like a grain of wheat, with a groove on the occlusal surface and with the apex acute and directed orally. Teeth of the inner two to three (irregular) rows are smaller, strap-shaped, directed inwards. Shafts of all teeth are short and stout. In the young, however, the teeth are more compressed and in specimens of 57 and 65 mm SL a few outer are bluntly bicuspid and the inner may have a pair of minute lateral cusps as well as a compressed major cusp (Fig. 49 and also Greenwood, 1983: figs. 1 & 6). The melanin pattern is also unusual, consisting of a dorso-lateral band paralleling but separated from the base of the dorsal fin and ending on the upper surface of the caudal peduncle, and a mid-lateral band from the opercular spot to the base of the caudal. The lower band is usually irregular and crossed by incomplete transverse bars."

The jaw and oral tooth morphology of the species was investigated in detail by Greenwood (1983), who noted similarities with *Macropleurodus bicolor* from Lake Victoria. Adults have wide bands of large concave teeth in short, wide jaws along with a very steep head profile. This species is an 'oral sheller', a molluscivore that uses its powerful oral jaw apparatus to smash mollusc shells. This 'heavy-headed' appearance, coupled with the strong horizontal melanin markings on a golden yellow background, makes the species very distinctive. It is generally found in shallow areas with a muddy bottom. Konings' (2016) report that Eccles & Trewavas recorded the species from 90 or 100m is erroneous (they said it was once recorded from 45m depth off Nkhotakota where many species were found unusually deep). Generally, it is found at around 20m or shallower. Eighteen specimens were sequenced by Blumer et al. (2025): 3 from the SE Arm collected by Turner in 2010 (fig. 78.2), 14 collected from 2016 in the SE and SW Arms (representative specimens shown in figure 78.3), and 1 specimen collected at Mangochi in 2011. All formed a clade with the 'Eukambuzi' group of large shallow-water benthic species, with *Cheilochromis euchilus* as the sister species. Collectively, these were resolved as part of a clade containing the majority of the *Protomelas* species sequenced (*P. kirkii, P. similis, P. pleurotaenia, P. taeniolatus, P. ornatus*), along with *Placidochromis johnstonii, Pl. milomo* and *Otopharynx tetraspilus*.

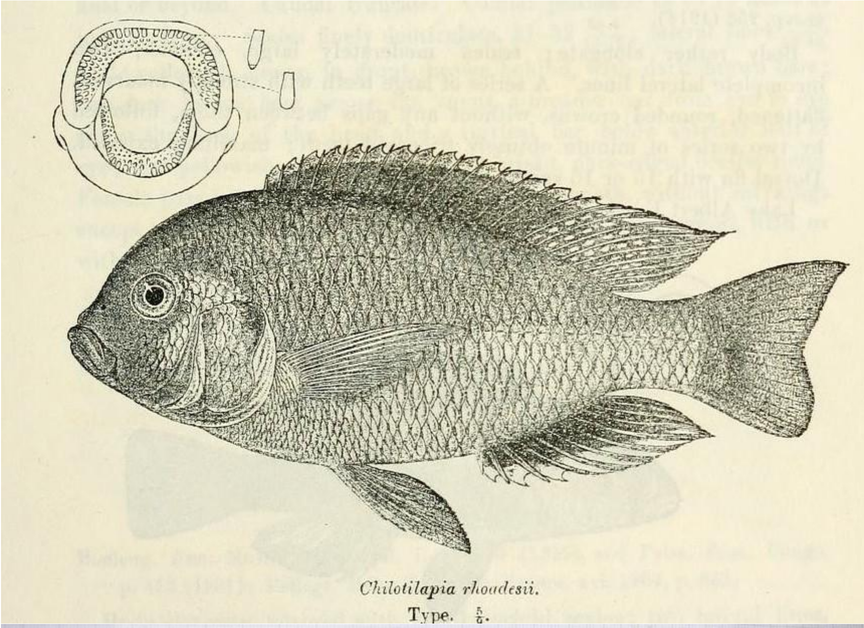


Figure 78.1: Type of *Chilotilapia rhoadesii*, illustrated in Boulenger (1915).

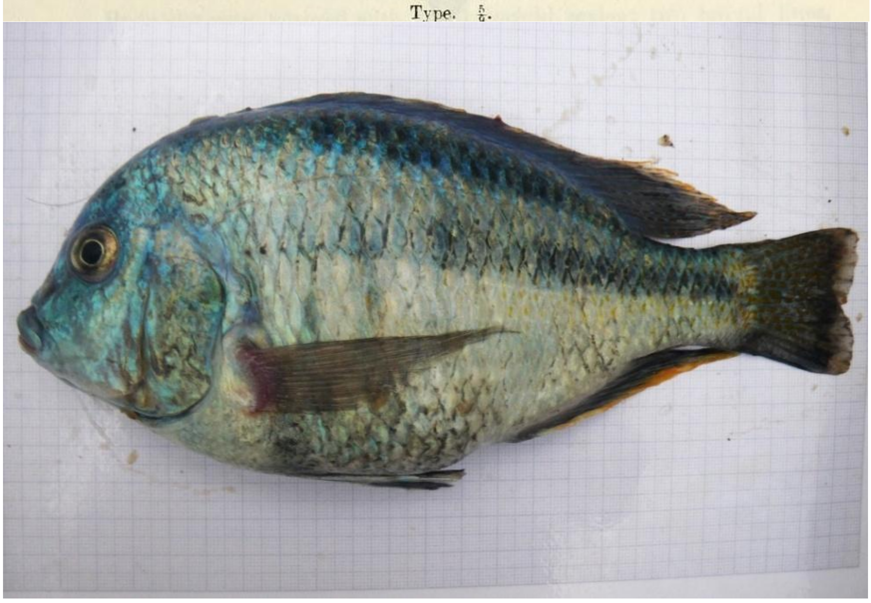


Figure 78.2: Sequenced specimens CHR1-3 were collected by G.F.Turner from a trawl survey on 19 Nov 2010 at depth of 11-58m from around 14 10.769S, 35 08.138E, in the middle of the SE Arm. Three fin clips were pooled in a single vial and a single individual (mature male) photographed as representative [GFT].

Table 78.1: Collecting information on *C. rhoadesii* specimens sequenced by Blumer et al. (2025).

Code	Whole Specimen	Photo	Collecting information
Chr1	None	One of batch	Trawled from SE Arm, 11-58m, Nov 2010
Chr2	None	One of batch	Trawled from SE Arm, 11-58m, Nov 2010
Chr3	None	One of batch	Trawled from SE Arm, 11-58m, Nov 2010
227a	None	No	Mangochi, 20 Jan 2011
D12-E06	None	Yes	trawled from 20m off Makanjila, 2nd March 2016
D12-E07	2016.41.46	Yes	trawled from 20m depth off Makanjila, 2nd March 2016
D13-D05	None	Yes	trawled from SE Arm, 3rd March 2016
D13-D07	None	Yes	trawled from SE Arm, 3rd March 2016
D13-E02	None	Yes	trawled from SE Arm, 3rd March 2016
D14-I05	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-I06	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-I07	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-I08	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-I09	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-I10	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-J01	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-J02	None	Yes	19-22m, from SW Arm, 3th March 2016
D14-J03	None	Yes	19-22m, from SW Arm, 3th March 2016

D12-E06 (not preserved), Adult male trawled from 20m depth off Makanjila, 2nd March 2016

D12-E07, UCZM 2016.41.46. Adult male trawled from 20m depth off Makanjila, 2nd March 2016

D13-D05, not preserved, apparent female, trawled from SE Arm, 3rd March 2016

13-E02, not preserved, male, trawled from SE Arm, 3rd March 2016

D14-J02, not preserved, male, trawled at 19-22m, from SW Arm, 3th March 2016

D14-J03, not preserved, male, trawled at 19-22m, from SW Arm, 3th March 2016

Figure 78.3: Six representatives of the 14 specimens of *C. rhoadesii* collected in 2016, sequences published by Blumer et al. (2025). The two from Makanjila and all three from the SE Arm clearly show the typical phenotype of the species (apparent female 13-D06, SE Arm, not shown), as do the nine specimens from the SW Arm (all males, photos of the other seven specimens inspected but not shown).

Copadichromis Eccles & Trewavas 1989: Species MC80-133.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis quadrimaculatus* Regan 1922.

Contained valid species (25): *Copadichromis atripinnis; Copadichromis azureus; Copadichromis borleyi; Copadichromis chizumuluensis; Copadichromis chrysonotus; Copadichromis cyaneus; Copadichromis cyanocephalus; Copadichromis diplostigma; Copadichromis geertsi; Copadichromis ilesi; Copadichromis insularis; Copadichromis jacksoni; Copadichromis likomae; Copadichromis mbenjii; Copadichromis melas; Copadichromis mloto; Copadichromis nkatae; Copadichromis parvus; Copadichromis pleurostigma; Copadichromis pleurostigmoides; Copadichromis quadrimaculatus; Copadichromis trewavasae; Copadichromis trimaculatus; Copadichromis verduyni; Copadichromis virginalis.*

Proposed undescribed taxa (28): *Copadichromis* sp. 'azureus jalo'; *Copadichromis* sp. 'chitimba', *Copadichromis* sp. 'chizumuluensis londo'; *Copadichromis* sp. 'fire-crest'; *Copadichromis* sp. 'flavimanus lundu'; *Copadichromis* sp. 'goldcrest'; *Copadichromis* sp. 'grey'; *Copadichromis* sp. 'kawanga no-spot'; *Copadichromis* sp. 'kawanga'; *Copadichromis* sp. 'likomae masinje'; *Copadichromis* sp. 'liuli'; *Copadichromis* sp. 'lupingu blue'; *Copadichromis* sp. 'maisoni'; *Copadichromis* sp. 'makanjila'; *Copadichromis* sp. 'mbenji blue'; *Copadichromis* sp. 'orange fins'; *Copadichromis* sp. 'pictus maleri'; *Copadichromis* sp. 'quadrimaculatus yellow'; *Copadichromis* sp. 'reef'; *Copadichromis* sp. 'stigma'; *Copadichromis* sp. 'taiwan yellow'; *Copadichromis* sp. 'tumbi two-spot'; *Copadichromis* sp. 'undu'; *Copadichromis* sp. 'virginalis chitande'; *Copadichromis* sp. 'virginalis gold'; *Copadichromis* sp. 'yellow black lupingu'; *Copadichromis* sp. 'yellow jumbo'. It is also believed that there are 3 species conforming to the description of *C. mloto,* but it has not yet been established which of these are undescribed: these are provisionally referred to as *Copadichromis mloto* B, *Copadichromis mloto* YB and *Copadichromis mloto* YY.

Taxa considered invalid: *Copadichromis* sp. 'chrysonotus black' (Turner 1996).

Generic reviews & diagnoses: Eccles & Trewavas (1989); Stauffer & Konings (2006). The genus was erected by Eccles & Trewavas (1989) to accommodate a group of zooplankton-feeding shoaling species, recognised by the local name of 'utaka' within Malawi. This 'utaka' group had already been recognised by T.D. Iles, who described numerous species in a single paper in 1960, but all were kept in *Haplochromis,* then in use for the majority of Cyrtocarina species. Since the original description, there has been a lot of work in this group. Stauffer & Konings (2006) removed several species to the new genus *Mchenga*: *Tilapia inornata* Boulenger, 1908; *Haplochromis eucinostomus* Regan, 1922; and *Haplochromis flavimanus* Iles, 1960, along with three species that Stauffer et al. (1993) had previously added to *Copadichromis*: *Copadichromis conophoros* Stauffer, LoVullo & McKaye, 1993; *Copadichromis cyclicos* Stauffer, LoVullo & McKaye, 1993 and *Copadichromis thinos* Stauffer, LoVullo & McKaye, 1993. Stauffer & Konings (2006) also moved *Haplochromis prostoma* and *Haplochromis boadzulu* from *Copadichromis* to *Nyassachromis*.

Furthermore, 13 additional species were described between 1990 and 2006: *Copadichromis mbenjii* Konings 1990, *Copadichromis verduyni* Konings 1990, *Copadichromis azureus* Konings 1990, *Copadichromis ilesi* Konings 1999, *Copadichromis geertsi* Konings 1999, *Copadichromis trewavasae* Konings 1999, *Copadichromis atripinnis* Stauffer & Sato 2002, *Copadichromis melas* Stauffer & Konings 2006, *Copadichromis chizumuluensis* Stauffer & Konings 2006, *Copadichromis diplostigma* Stauffer & Konings 2006, *Copadichromis insularis* Stauffer & Konings 2006, *Copadichromis cyanocephalus* Stauffer & Konings 2006 and *Copadichromis parvus* Stauffer & Konings 2006.

Stauffer & Konings (2006) also recognised three groupings within *Copadichromis*: the *C. mbenjii*, *C. quadrimaculatus* and *C. virginalis* groups. Apart from *C. geertsi* and *C. ilesi,* all the species described since 1990 are members of the *mbenjii* group, along with a further 8 taxa regarded by Konings as undescribed species (Konings 2016).

Generic diagnosis: "Small to medium sized plankton-feeding shoaling cichlids attaining 80 to 160 mm SL and distinguished by the structure of the mouth. This is small, with weak jaws, the lower usually 2.4 to 2.8 times in head length. The teeth are small, numerous, recurved simple or bicuspid usually in 2 or three series anteriorly, the outer extending weIl backwards. The premaxillary pedicels are elongated and the bones can drawn forwards so that the mouth is protruded to form a short sucking tube reminiscent of that in marine fishes of the families Zeidae and Gerreidae. The lower pharyngeal jaws have small, compressed teeth. The number of gillrakers on the lower outer arch is elevated, varying from a minimum of 13 to 16 in *C. prostoma* to more than 22 in several species." (Eccles & Trewavas 1989).

In the light of many new species descriptions and decisions to reallocate several species to other genera, Stauffer & Konings (2006) offered a revised diagnosis: "*Copadichromis* is comprised of small to medium-sized plankton-feeding cichlids endemic to Lake Malawi, frequenting open water and rocky habitats. A small mouth, weak jaws, small recurved simple or bicuspid teeth in juveniles and females, elongated premaxillary pedicels that can be extended forward forming a protrusible mouth, small, compressed teeth on the lower pharyngeal bone, and an elevated number (12-28) of rakers on the first ceratobranchial separate *Copadichromis* from all other described Lake Malawi genera. Species of *Copadichromis* breed in association with rocks. Territorial males either defend rocky spawning sites or construct bowers at the sand/rock interface of which rocks or a single stone form an integral part".

The use of breeding locality as part of the definition is not very helpful for taxonomists working with preserved material or specimens collected by methods such as trawling. It is also clearly false, as at least 2 species breed in Lake Malombe, which has no rocky habitats, while males apparently in breeding dress of several species are often taken in large numbers by trawlers well away from rocky areas.

Field Diagnosis: Laterally compressed generally small species with small, terminal, generally protrusible mouths and large numbers of long, slender gillrakers. Generally silvery, countershaded with no obvious flank markings or a series of small spots.

Phylogenetic comments: Analysis of genome sequences reveals that *Copadichromis* is clearly polyphyletic (Blumer et al. 2025). All three sequenced species from the *C. mbenjii* group cluster deep with the 'Eukambuzi' group of mainly shallow benthic species. They do not form a clade, but rather seem to have diversified prior to the radiation of a group of mainly smallish elongate predators currently mainly grouped in *Sciaenochromis* and *Stigmatochromis*. The majority of the 'traditional' *Copadichromis* lie basal within the Cyrtocarina, again not being resolved a clade, with a group of 7 taxa (including *C. mloto* and *C. virginalis*) lying basally, and a second group including *C. borleyi* and *C. pleurostigma* lying as sister to the rest of the Cyrtocarina. *Copadichromis chrysonotus* appears to be distantly related to all of these groups, having branched off the main line of the Cyrtocarina after the divergence of the *Alticorpus*/ *Aulonocara*/ deepwater *Lethrinops* group. The *Mchenga* species removed from *Copadichromis* by Stauffer & Konings (2006) are not closely related to any of these groups.

Ecomorphological notes: All *Copadichromis* are plankton-feeders. Fishes of the *C. mbenjii* group generally attain smaller adult body sizes, and swim alone or in small loose groups near the bottom over rocky habitats. Males dig a bower among rocks, with some species tunnelling under the rock and others digging a depression up against the rock (Konings 2016). Many of these species are exploited in the aquarium fish trade, where unfortunately many of them seem to include the name 'mloto' in their common name, despite the lack of physical, behavioural or genetic similarity to the true *C. mloto*. Members of the 'true' *Copadichromis* (pre-1990 species, plus *C. geertsi* and *C. ilesi*) are known as 'utaka', although particular species sometimes have or had more specific names. They form large schools feeding in midwater, particularly in areas of upwelling near rocky headlands of underwater 'sea-mounts' known as a 'chirundu' (plural 'virundu'). Fishers of the Tonga and Tumbuka people from around Nkhata Bay and further north developed a D-shaped kind of lift-net/ midwater trawl hybrid called a Chirimila/ Chilimila which can be used to catch utaka shoals in these areas, or with smaller mesh lining added, can be used in a light-attraction fishery at night for *Engraulicypris* (usipa). These fishers migrated to southern areas such as Msaka on the Nankumba peninsula where they continued to use these fishing methods. A few species are also major components of trawl fisheries, while 2 species are found in Lake Malombe where they are caught by offshore seines known as Nkacha nets. More recently, these fishes have been exploited by small-meshed monofilament gillnets, which are not likely to be sustainable. These are illegal but in widespread use. Male utaka breed in a variety of ways: some build sandcastle bowers, others dig near rocks, some defend the top of a large boulder. *Copadichromis chrysonotus* males defend territories above rocks but females actually lay their eggs in midwater, spinning round to catch them as they fall, a tactic shared with at least some Rhamphochromina taxa.

MC80 *Copadichromis atripinnis*; MC81. *Copadichromis azureus*;

Not sequenced.

MC82. *Copadichromis borleyi* (Iles 1960)

Copadichromis borleyi was initially described by Iles in 1960, as *Haplochromis* and is easily identified based on colour. Unusually for *Copadichromis* species, females and immatures are generally a dark bronze colour, often with orange pelvic and anal fins (there is quite a lot of geographic variation). Pelvic fins are generally long, particularly in males. Males have blue heads and orange flanks with a dark blue dorsal fin with a broad white margin. The anal fin is also dark blue with a broad yellow margin. The species is very distinctive and well-known in the aquarium trade and among diving-based researchers. It is common on rocky shores and shows some geographic variation, notably in colour. Both of our sequenced specimens were mature males (figs. 82.1-82.2). The species is a rock-associated midwater feeding zooplanktivore (Konings 2016).

Fig. 82.1: *Copadichromis borleyi*, male, D04-G03, UCZM 2016.23.38; SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS].

Fig. 82.2: *Copadichromis borleyi*, male, 2012.428, SM Grant export facility, 23 Sept 2012 [MJG].

MC83. *Copadichromis chizumuluensis*

Not sequenced. *C. mbenjii* group.

MC84. *Copadichromis chrysonotus* (Boulenger 1908)

Copadichromis chrysonotus was originally described (as *Paratilapia*) by Boulenger (1908) from 20 specimens. It is characterised by its large eye, three flank spots and male breeding dress (fig. 84.1) which is dark blue with a pale blue upper surface and white dorsal fin. Oddly, males are sometimes dark-grey to black with the dorsal fin and upper surface yellow-white. This is responsible for the name, which means 'marked with gold'. In the 1990s, Turner (1996) only found black and yellow forms in Lake Malombe and other shallow muddy areas, such as Monkey Bay, and speculated that this might represent a different species (*Copadichromis* sp. 'chrysonotus black'), but this was not supported by sequence analysis (Blumer et al. 2025). Females and juveniles often have a greenish cast dorsally. The species is well-known from rocky shores, where it often seen by divers and snorkellers, males courting females in midwater (Konings 2016), but is also abundant in Lake Malombe, which is shallow and muddy (Turner 1996). Many specimens were collected for a population genomic study which is in progress, and only two representative specimens are illustrated here (fig. 84.2-84.3). The species is an inshore midwater feeding zooplanktivore.

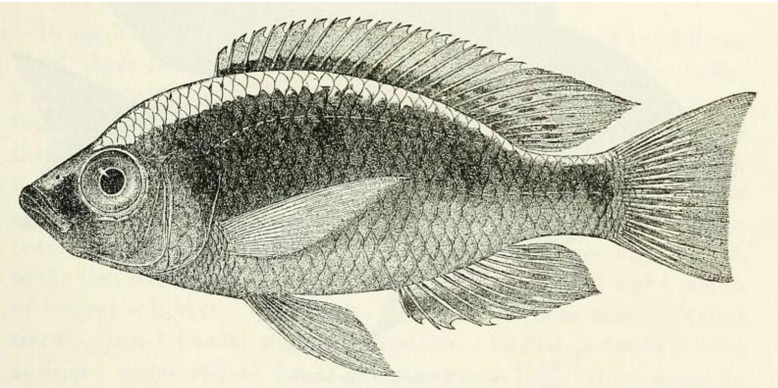


Fig. 84.1: Drawing of type of *Copadichromis chrysonotus* from Boulenger (1915)

Fig. 84.2: *Copadichromis chrysonotus*, D10-G08, UCZM 2016.38.67; Chiofu, snorkelling, 29 Feb 2016 [HS]

Fig. 84.3: *Copadichromis chrysonotus,* apparent female, D21-G10, no voucher specimen; South West Arm (Malembo), bought from handline fishermen, 25 Jan 2017 [HS]

85. *Copadichromis cyaneus* (Trewavas 1935)

This species has not been sequenced. The specimens listed under this name in Blumer et al. (2025) are now considered to represent the undescribed *Copadichromis* sp. ‘orange fins’. *Copadichromis cyaneus* is believed to be common around the Nankumba peninsula and females/immatures are characterised by having a single dark spot on the caudal peduncle. Konings reports that the species is found all round the lake on rocky habitat and that female vary in whether or not they have a dark caudal spot or orange fins. Immatures are reported to often have all fins yellow except the pectorals.

Figure 85.1: Lectotype of *Copadichromis cyaneus* BMNH 1935.6.14.1910. Probable male, 112 mm SL, Monkey Bay, coll. Christy. [NHM].

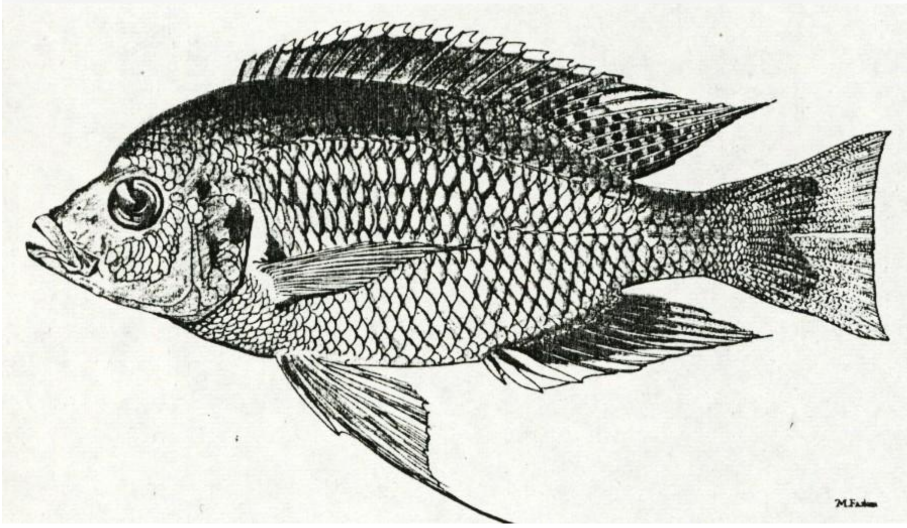


Figure 85.2: Male specimen included in the original type series of *Haplochromis cyaneus* BMNH 1935.6.14.1896-98 & drawn by Fasken in 1935. However, it was not included in the type specimens by Eccles & Trewavas (1989) and this drawing has never previously been published. The identity of this specimen is still unresolved [NHM].

Figure 85.3: Female specimen from Minos Reef, identified as *C. cyaneus* by Konings (2016).

Figure 85.:4 Male specimen from Zimbawe Rock, identified as *C. cyaneus* by Konings (2016).

MC86. *Copadichromis cyanocephalus;* MC87. *Copadichromis diplostigma*; MC88. *Copadichromis geertsi.*

These species have not been sequenced.

MC89. *Copadichromis ilesi* Konings 1999

Copadichromis ilesi was described by Konings in 1999 from 9 specimens collected from Gome on the Malawian East coast near the Mozambican border (fig. 89.1), but a very similar specimen is shown from Kirondo in Tanzania. Although photographs show males with a pale blue dorsal 'blaze', the description mentions considerable geographic variation. The male breeding pattern shown is very similar to that of *C. virginalis*: Konings (1999) key suggests that *C. ilesi* is slightly more slender with a longer snout. Females were not illustrated in the original description but were said to lack dark spots or any other melanic markings on their flanks. The sequenced specimen was purchased through the aquarium fish trade, reportedly from Nkanda in Tanzania in the far NE of the lake. It shows overall similarity to illustrations of males of the species in terms of body shape and the strongly forked tail (fig. 89.2). The specimen is resolved as the sister taxon to a clade of 14 *C. virginalis* specimens, all from Nkhata Bay.

Fig. 89.1: *Copadichromis ilesi* male alive underwater from Gome, from original description [AK]

Fig. 89.2: *Copadichromis ilesi* female, sequenced: D16-A01, bought from aquarium fish trade, reported as collected from Nkanda, Tanzania [HS]

MC90. *Copadichromis insularis*;

Not yet sequenced.

MC91. *Copadichromis jacksoni* (Iles 1960)

Copadichromis jacksoni was first described by Iles in 1960. The description indicates that it is relatively slender with a rounded head profile and 2 flank spots. It was described as having a greenish cast, but this may not be apparent in a dead specimen. The specimen sequenced by Blumer et al. (2025) came from Thumbi West Island in the south of the lake. Genetically, this species belongs in the main 'utaka' group, along with species such as *C. virginalis* and *C. quadrimaculatus*.

Fig: 91.1: Probable *Copadichromis jacksoni* photographed underwater, Konings 2016.

Fig. 91.2: *Copadichromis jacksoni*, D22-F04, no voucher specimen kept, purchased from chirimila fishermen at Thumbi West Island, Cape Maclear, 27 Jan 2017 [HS].

MC92. *Copadichromis likomae* (Iles 1960)

Copadichromis likomae was described by Iles in 1960 and recognised by its high gillraker count, pointed snout and 2 spots on the flanks of females and juveniles. Male breeding dress was not reported, but it has been illustrated by Konings (2016: Fig. 92.1). The breeding pattern is reminiscent of species of the *Mchenga* group, with a dark underside of the head and trunk, a dark upper and lower margins to the caudal fin and a row of yellow spots along the margin of the anal fin, including the spinous part (fig. 92.1). This pattern was evident in the specimen sequenced, which was collected at Metangula, Mozambique (fig. 92.2).

Fig. 92.1: *Copadichromis likomae* photographed underwater from Konings 2016.

Fig. 92.2: *Copadichromis likomae*, male, 2014.12, Metangula, 30th August 2014 [MJG].

MC93. *Copadichromis mbenjii*; MC94. *Copadichromis melas*.

Neither of these species have been sequenced.

MC95. *Copadichromis mloto* (Iles 1960) 'B'.

Copadichromis mloto was described (as *Haplochromis*) by Iles in 1960, but some of the deeper bodied specimens including all males in breeding dress, were included in *C. virginalis*, mostly as the 'Kajose' form. This has led to considerable confusion (Turner et al. 2022). It is now believed that *Copadichromis* mloto consists of three phenotypically and genetically different male colour forms, which represent cryptic species. We have not yet found any phenotypic traits on which we can distinguish the plain coloured females or juveniles, and unfortunately, this includes the holotype of *C. mloto*. We have nicknamed Yellow Head Yellow Dorsal (*C. mloto* YY- Clade A of Sawasawa et al. 2024), Yellow Head Black Dorsal (*C. mloto* YB- Clade B) and Black Head (*C. mloto* B- Clade C). All appear to be found throughout Lake Malawi, but only *C. mloto* YY has been reported in Lake Malombe, suggesting that they have different microhabitat preferences (Sawasawa et al. 2024). All three forms frequent soft-bottomed habitats and are caught by trawls. They are zooplankton feeders. Many specimens of the *C. mloto* complex have been sequenced and will be listed in publications in progress, so we will not duplicate this here. Intriguingly, *C. mloto* B seems to experience more gene flow from *C. virginalis* that the other taxa. Breeding males of *Copadichromis mloto* B are distinguished by the lack of any yellow colour on the upper surface of the head or abdomen, but have a yellow & white margin to the dorsal fin, which is wider anteriorly and narrows posteriorly (fig 91.2).

Fig. 95.1: *Copadichromis mloto* holotype, collected from Nkhata Bay by Iles, Natural History Museum, London [GFT]

Fig. 95.2: *Copadichromis mloto*, B male, D12-I04, UCZM 2016.41.20; trawled from 30-40m depth off Makanjila, 2 March 2016 [HS]

Fig. 95.3: *Copadichromis mloto*, B male, D14-E01, UCZM 2016.41.20; trawled from 40-48m, SW Arm, 4 March 2016 [HS]

MC96. *Copadichromis mloto* (Iles 1960) 'YB'.

Copadichromis mloto YB males have extensive areas of yellow and creamy white (occasionally blue) on the head, extending down around the eye, and a dorsal fin that it is black along the entire base, but has a narrow yellow or white marging. It frequents soft-bottomed habitats and is often caught by trawls, as well as chirimila nets. This form has not been recorded in Lake Malombe. It is listed as *C. mloto* clade B in Sawasawa et al. (2024). They are zooplankton feeders.

Fig. 96.1: *Copadichromis mloto*, YB male, D06-E04, UCZM 2016.28.5; beach seine at Chiweta, Chilumba 24 Feb 2016 [HS]

Figure 96.2 *Copadichromis mloto* YB male, D27-E05, Msaka, SW Arm, Beach Seine, 04.02.17, not sequenced [HS].

Figure 96.3 *Copadichromis mloto* YB male, Cape Maclear, 4 Sept 2014, not sequenced. [MJG]

MC97. *Copadichromis mloto* (Iles 1960) 'YY'.

When Iles described *Copadichromis mloto* in 1960, a number of larger, more deep-bodied specimens were also included in the new species *Copadichromis virginalis*. Iles recognised two different phenotypes, known as the 'Kaduna' and 'Kajose' forms: the type of *C. virginalis* is a female of the Kaduna form, while a number of the paratype are clearly *C. mloto* 'YY' specimens, including males in breeding colour (Turner et al. 2022). Males of this phenotype have yellow/white colour of the upper surface of the head, and the dorsal fin is yellow anteriorly, right to the base, although the yellow margin becomes narrower more posteriorly.

C. mloto YY is the only one of the three species reported in Lake Malombe, suggesting that they have different microhabitat preferences. It is also known throughout Lake Malawi, on soft-bottomed habitats, where it is caught by trawls and seines as well by chirimila nets. They are zooplankton feeders.

Fig. 97.1: *Copadichromis mloto* 'YY' male morph from Nkhata Bay, specimen registered as a paratype of *Haplochromis virginalis* (Kajose form) by Iles, Natural History Museum, London [GFT]

Fig. 97.2: *Copadichromis mloto* YY male, D20-E07, sequenced, no voucher specimen; Lake Malombe 24 Jan 2017 [HS]

Fig. 97.3: *Copadichromis mloto* YY male, trawled from 74m depth, Kolowilo, Domira Bay 28 Sept 91 [GFT]

MC98. *Copadichromis nkatae;* MC99. *Copadichromis parvus*

Neither of these species have been sequenced.

MC100. *Copadichromis pleurostigma* (Trewavas 1935)

Copadichromis pleurostigma was described as *Haplochromis* by Trewavas (1935) from a single specimen. The species is heavily built, with a large prominent midlateral spot. It has a less protrusible mouth than most other *Copadichromis* species, and only 17-18 lower gillrakers. The pharyngeal bone is said to be more like that of an algal feeder than a zooplanktivore, having convex posterior margins and closely-packed small teeth. Among similar species, *Copadichromis trimaculatus* has 3 well-defined spots, while *Copadichromis pleurostigmoides* has more than 21 lower gillrakers. All three species have yellow-orange pelvic and anal fins. Our two sequenced specimens were from trawl catches in the south of the lake. Sequences suggest an affinity with *Copadichromis borleyi*.

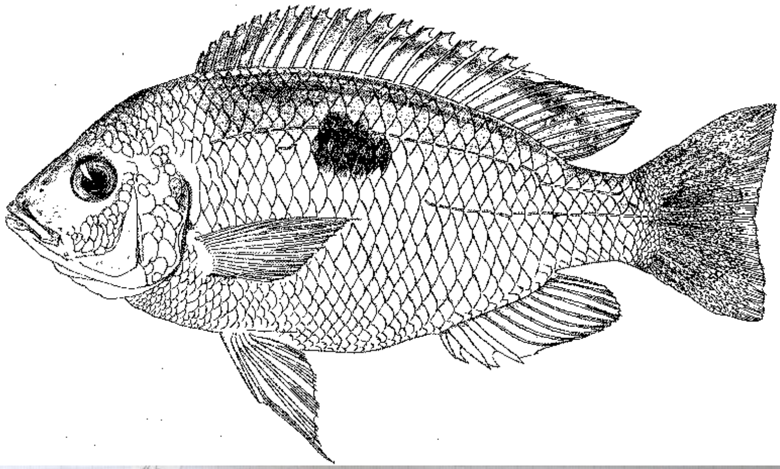


Fig. 100.1: Drawing of type of *Copadichromis pleurostigma*, from Eccles & Trewavas (1989)

Fig. 100.2: *Copadichromis pleurostigma*, 2010.B5 (CT), trawled from 58-71m in SE Arm, 18 Nov 2010 [GFT].

Fig. 100.3: *Copadichromis pleurostigma*, D21-J01, no voucher specimen, bought from seine fisherman at Msaka, SW Arm, 21 Jan 2017 [HS]

MC101. *Copadichromis pleurostigmoides*

Not yet sequenced.

MC102. *Copadichromis quadrimaculatus* (Regan 1922).

Copadichromis quadrimaculatus was first described by Regan in 1922, as *Haplochromis,* from 7 specimens. Trewavas's (1935) redescription was based on 85 specimens, but Iles (1960) felt these represented a mixture of species, and designated a lectotype, which was first illustrated by Eccles & Trewavas in 1989 (fig 102.1). It attains a large size and has 22-27 lower arch gillrakers (Eccles & Trewavas 1989). It has 4 prominent dark spots (including the opercular)- Konings suggests that on the east coast, females often have fewer spots but given the highly mobile nature of the species such geographic variation seems unlikely, so perhaps they represent another species. Females have dark pelvic and anal fins, and dark grey spots on most of the flank scales, in contrast to the silvery sides of most *Copadichromis*. Males are reported to be bright blue and have a yellow/white margin to the dorsal fin, which extends to the base of the fin anteriorly and along the upper surface of the head (Eccles & Trewavas 1989, see fig. 102.3). Our sequenced specimen (fig. 102.2) was obtained from fish traders at Nkhata Bay. This species is reported to be the only *Copadichromis* species to spend part of its life cycle in the offshore waters above the anoxic zone, where it feeds mainly on crustacean zooplankton and small chaoborus larvae, occasionally taking adults from the surface (Allison et al. 1996b).

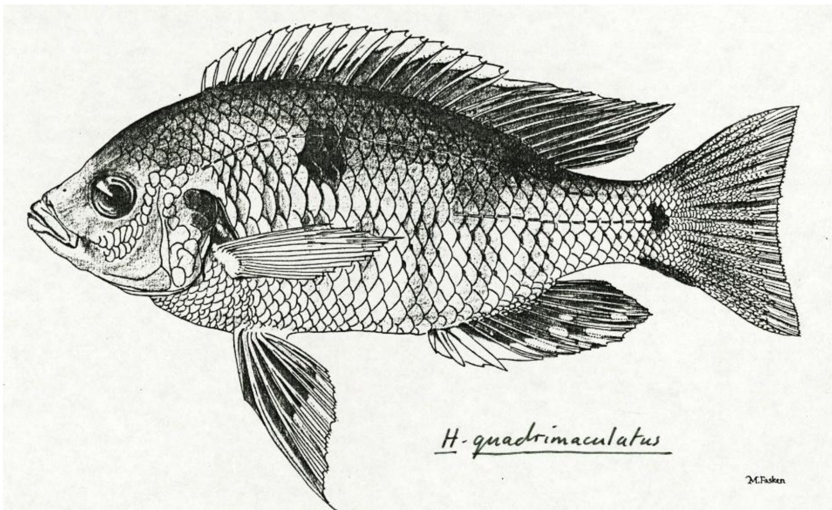


Fig. 102.1: Fasken's drawing of *Copadichromis quadrimaculatus*, from Eccles & Trewavas (1989). Lectotype, mature male.

Fig. 102.2: *Copadichromis quadrimaculatus*, D02-C04, preserved at Cambridge University Zoology Museum, but uncatalogued, purchased from fishermen Nkhata Bay, 21 Feb 2016 [HS].

Fig. 102.3: Probable *Copadichromis quadrimaculatus*, mature male, not sequenced, collected from trawl at 46-50m, SE Arm (Chirombo-Nkhudzi), 29-Jul-91 [GFT]

MC103. *Copadichromis* sp. 'azureus jalo'; MC104. *Copadichromis* sp. 'chitimba'; MC105. *Copadichromis* sp. 'chizumuluensis londo'; MC106. *Copadichromis* sp. 'fire-crest'; MC107. *Copadichromis* sp. 'flavimanus lundu'; MC108. *Copadichromis* sp. 'goldcrest'; MC109. *Copadichromis* sp. 'grey'; MC110. *Copadichromis* sp. 'kawanga no-spot'

Not yet sequenced.

MC111. *Copadichromis* sp. 'kawanga'

Copadichromis sp. 'kawanga' is an undescribed species illustrated by underwater photos taken by Konings (2016) and others. It is widely distributed on rocky coasts in the northern half of the lake, on both eastern and western shores. Northeastern males show a white 'blaze' on the forehead, but this is not seen in western populations. It appears to be the only member of this group found at Nkhata Bay, where we collected the single specimen sequenced to date. It is popular in the aquarium trade. It is a member of the *Copadichromis mbenjii* group (Konings 2016) comprised of small plankton feeding species that unlike the 'true utaka' do not shoal in midwater, but tend to swim alone or in small groups close to the bottom, feeding on plankton. Sequence analysis shows this species, like others of the mbenjii group, is not closely related to the 'true' Utaka.


Fig. 111.1: Male (left) and female *Copadichromis* sp. kawanga' photographed underwater by Konings (2016).

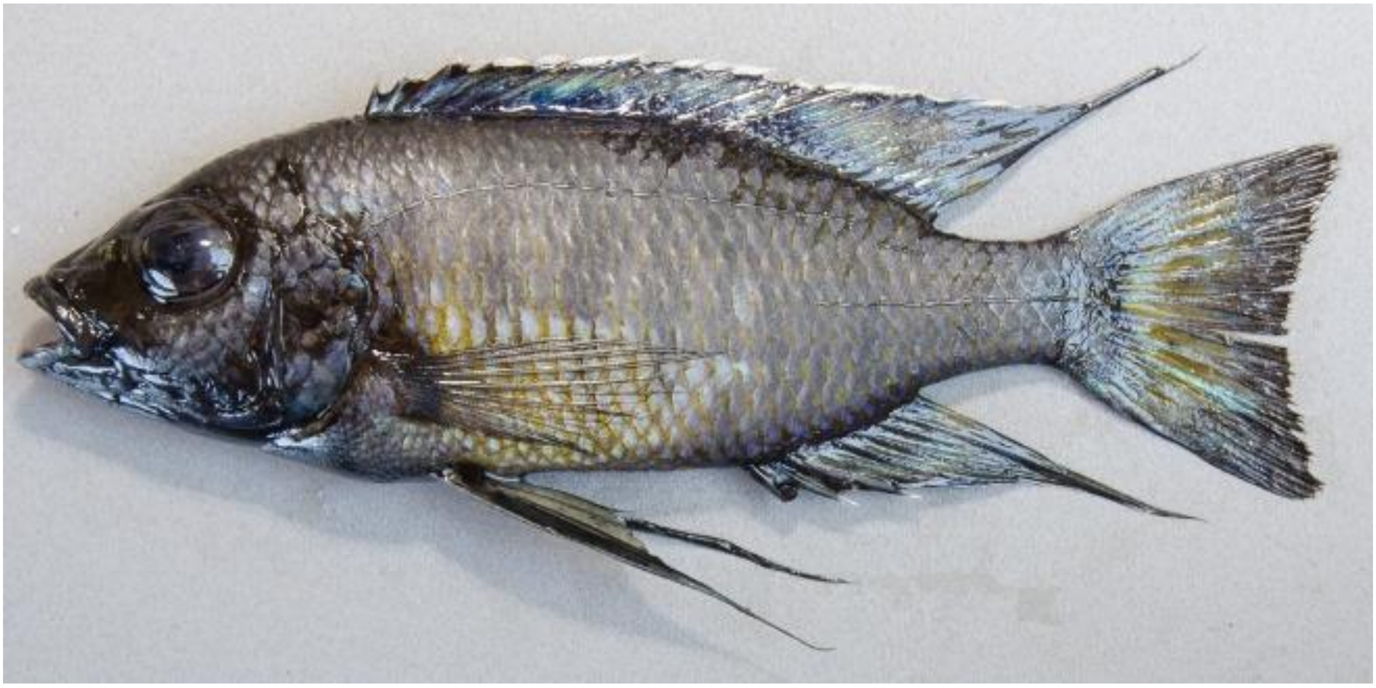


Fig. 111.2: *Copadichromis sp.* 'kawanga', mature male, D01-D07, UCZM 2016.16.27; SCUBA, Nkhata Bay, 20 Feb 2016.

MC112. *Copadichromis* sp. ‘likomae masinje’; MC113. *Copadichromis* sp. ‘liuli’; MC114. *Copadichromis* sp. ‘lupingu blue’; MC115. *Copadichromis* sp. ‘maisoni’; MC116. *Copadichromis* sp. ‘makanjila’; MC117. *Copadichromis* sp. ‘mbenji blue’

Not yet sequenced.

MC118. *Copadichromis* sp. 'orange fins'

Copadichromis sp. 'orange fins' has historically been confused with *C. quadrimaculatus*, which is another large, deep-bodied species with a pointed snout found over soft-bottomed habitats. However, it differs from *C. quadrimaculatus* in having orange (v white to dark grey) pelvic and anal fin, and in lacking dark spots on the flanks (usually 3 in *C. quadrimaculatus*). Distinguishing features of male breeding colours of the two species have not been investigated, but we have collected a number of specimens which have dark dorsal fins and lack a bright forehead blaze. This species was not previously distinguished in the field and appears to be undescribed. Our female/immature specimen was collected from a commercial fishery landing at Msaka in the SW Arm (fig 118.1) and no voucher specimen was kept. The male (fig. 118.2) was collected from a trawl catch in the SE Arm in 2004 and no voucher specimen has been located. The specimen was matched with the orange-finned immature/female based on similarity of the genome sequences, but the body shapes are similar. Both specimens have a distinctive pattern of elongated dark spots in the centre of the caudal fin, forming two separate arcs. The male notably lacks a pale dorsal fin margin, but it is not yet clear whether this is due to maturity stage or if this this is a feature that can be used to distinguish the species from *C. quadrimaculatus*, similar to the specimen collected at Bandawe in November 2023 in a catch with several orange-finned female/immature fish which also shows hints of yellow-orange behind the opercula (fig. 118.3). This species was often caught in trawls over sandy areas in the 2023 survey and seems likely to be a sand-associated species.

Fig. 118.1: *Copadichromis sp.* 'orange fins' D21-J02, sequenced, no voucher specimen, gillnet fisherman, Msaka, SW Arm, 26 Jan 2017 [HS].

Fig 118.2: *Copadichromis sp.* 'orange fins', male, 2004.A74, sequenced, SE Arm 13th August 2004 [MJG].

Fig 118.3: *Copadichromis sp.* 'orange fins', male, Trawl at 47-75m off Bandawe (NW Lake Malawi), not sequenced, 4th November 2023 [GFT].

MC119. *Copadichromis* sp. 'pictus maleri'; MC120. *Copadichromis* sp. 'quadrimaculatus yellow'; MC121. *Copadichromis* sp. 'reef'; MC122, *Copadichromis* sp. 'stigma'; MC123. *Copadichromis* sp. 'taiwan yellow'; MC124. *Copadichromis* sp. 'tumbi two-spot'; MC125. *Copadichromis* sp. 'undu' ; MC126. *Copadichromis* sp. 'virginalis chitande'; MC127. *Copadichromis* sp. 'virginalis gold'; MC128. *Copadichromis* sp. 'yellow black lupingu'; MC129. *Copadichromis* sp. 'yellow jumbo';

Not yet sequenced.

MC130. *Copadichromis trewavasae* Konings 1999

Copadichromis trewavasae was described by Konings in 1999. It is another member of the *Copadichromis mbenjii* group and behaves much like *C. sp.* ‘kawanga’, but has a distinctive male breeding dress, rather reminiscent of *Copadichromis chrysonotus*- dark blue to black with a bright metallic blue upper half, including the dorsal fin (fig. 130.1). It is quite widely distributed along the north-eastern part of the lake, including Likoma and Chizumulu Islands. Our specimen was purchased from the SM Grant export facility and presumably came from Likoma or Chizumulu (fig. 130.2).

Fig. 130.1: Male *Copadichromis trewavasae* photographed underwater by Konings (2016).

Fig. 130.2: *Copadichromis trewavasae*, male, 2012-427, purchased from SM Grant aquarium fish export facility, 23 Sept 2012; [MJG]

MC131. *Copadichromis trimaculatus*

Not yet sequenced.

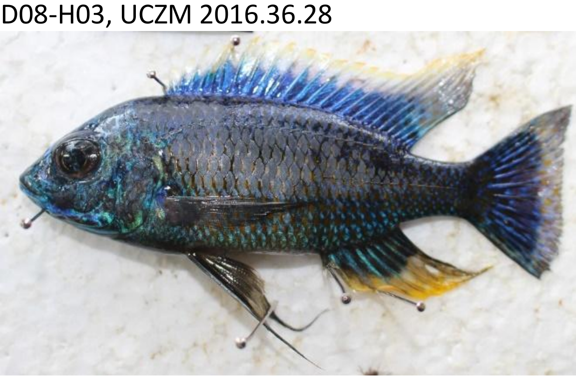
132. *Copadichromis verduyni* Konings 1990

Copadichromis verduyni was described by Konings in 1990. It is another member of the *C. mbenjii* group and has similar morphology, behaviour and diet. It is reported to inhabit rocky coasts from Chimwalani Reef to Gome, which is basically the area from the Mozambique/Malawi border to around Makanjila. The only similar species in the area is the undescribed *Copadichromis sp.* 'makanjila' known from around Makanjila Point, but this variety has males with a bright forehead 'blaze' and females with 2 spots (Konings 2016), so our identification should be straightforward: males are blue with orange spots on their flanks, a pale dorsal and orange anal fin margins, while females have 3 spots (fig. 132.1). The specimens sequenced by Blumer et al. (2025) were collected from Chiofu Bay (fig. 132.2). Like other Mbenjii group species, this is not closely-related to any of the 'true utaka'.

Fig. 132.1: *Copadichromis verduyni* male (Left) and female (above) photographed underwater by Konings (2016).

D08-H03, UCZM 2016.36.28

D10-I01, no voucher specimen



D10-I06, no voucher specimen

D10-I07, no voucher specimen

Fig. 132.2: *Copadichromis verduyni* collected from Chiofu Bay on 28-29 Feb 2016 by SCUBA and snorkel divers [HS].

133. *Copadochromis virginalis* (Iles 1960)

Copadichromis virginalis was originally described (as *Haplochromis*) by Iles in 1960. There has been a longstanding confusion between this species and *C. mloto*, partly resulting from the original type series of *C. virginalis* being composed of two rather divergent 'morphs'. One of these- the Kajose morph- is now recognised as deep-bodied specimens of *C. mloto* (which in turn is now recognised as a complex of three species – see MC95-97, above. The holotype belongs to the 'kaduna morph' (fig. 133.1), which is therefore distinguished as the true *C. virginalis* (see Turner et al. 2022). Females and immatures of both species lack spots, but those of *C. mloto* are rather more slender. Male *C. virginalis* have a distinct breeding dress: largely black but with a bright yellow-white 'blaze' on the upper surface of the head, nape and back on either side of the dorsal fin, which is also largely yellow-white, but has a thin black line along the base which ticks abruptly up in the posterior part of the soft dorsal (fig. 133.2). Twenty-one specimens were sequenced, all collected on 21 Feb 2016, purchased from fish traders at Nkhata Bay- the type locality (D02-G08-D02-I08). All were males in breeding dress and all looked very similar (see fig. 133.3). There are no voucher specimens for D02-H06 to D02-I08 and no photographs for D02-I02 to D02-I08, but there is no reason to doubt their identity. The species is shoaling, midwater-feeding zooplanktivore that is found in the vicinity of rocky habitats. Sequence analysis indicates it is related to most other 'true utaka'.

Fig. 133.1: *Copadichromis virginalis,* holotype, female, at the London Natural History Museum [GFT]

Fig. 133.2: *Copadichromis virginalis* male paratype (Kaduna form), at the Natural History Museum, London [GFT]

Fig. 133.3: *Copadichromis virginalis*, male, D02-G09, UCZM 2016.19.19, purchased from fishermen, Nkhata Bay 21 Feb 2016 [HS]

Corematodus Boulenger 1897

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Corematodus shiranus* Boulenger 1897.

Contained valid species: *Corematodus shiranus* Boulenger 1897; *Corematodus taeniatus* Trewavas 1935

Proposed undescribed taxa: None.

Taxa considered invalid: None.

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: "Small to medium-sized Haplochromines endemic to Lake Malawi characterised by the structure of the jaws, which bear broad shelves on the labiad surfaces, carrying numerous rows of small, close set, compressed teeth forming a flat, rasp-like surface" (Eccles & Trewavas 1989).

Field Diagnosis: The wide flat bands of numerous tiny teeth are distinctive. Superficially the jaws are a lot longer than those of similarly-marked species.

Phylogenetic comments: Unusually, Eccles & Trewavas (1989) retained two species into the same genus despite their strikingly different melanin patterns. They proposed that the melanin pattern of *C. shiranus* was derived, and mimicked its prey, *Oreochromis* of the *Nyasalapia* complex found in the lake. Unfortunately, we do not have a sequence for *C. shiranus*, which has not been positively recorded in Snoeks & Hanssens (2004). However, sequencing (Blumer et al. 2025) indicates that the sister taxon to C*. taeniatus* is *Mylochromis melanonotus*, which shares its oblique stripe.

Ecomorphological notes: These species are specialised for scraping scales off their prey.

MC134. *Corematodus shiranus* Boulenger 1897.

Corematodus shiranus has not been sequenced and has not been seen in the lake since a specimen collected for a project that finished in 2001 (Snoeks & Hanssens 2004): GBIF reports two records from 1997. A photo and formalin-fixed specimen are available from 1991 (Fig. 134.1).

Figure 134.1: *Corematodus shiranus*, collected from a commercial trawl catch from the SE Arm of Lake Malawi 11 Nov 1991.This is the only known photo of a freshly collected specimen [GFT].

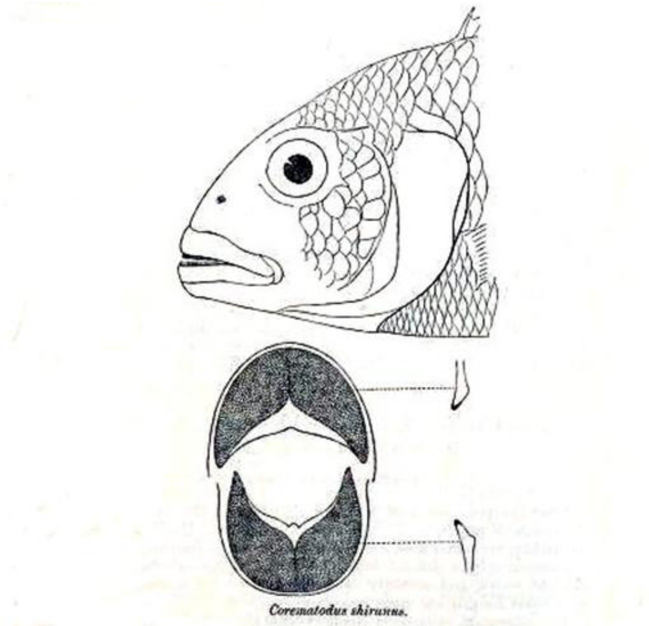


Fig. 134.2: Oral dentition of *Corematodus shiranus*, from original description by Boulenger (1897).

135. *Corematodus taeniatus* Trewavas 1935

The genus *Corematodus* was first described by Boulenger in 1897 for the species *C. shiranus*, which had remarkably wide bands of recurved teeth set on flat jaws (Fig. 135.1). A second species with similar dentition was described by Trewavas (1935) distinguished by its prominent oblique stripe, as opposed to the wide vertical bars shown by *C. shiranus* (Fig. 135.2). Both species are believed to feed on scales of other cichlid fish species, with *C. shiranus* attacking *Oreochromis (Nyasalapia)* species and *C. taeniatus* focussing on shallow water sand-dwelling species. The colour patterns are believed to mimic an *Oreochromis* and a sand-dwelling *Mylochromis* respectively. Our sequenced specimen of *C. taeniatus* collected off Makanjila in the SE Arm of the lake in 2016 clearly shows the oblique stripe and characteristic jaws (Fig. 135.3).

Fig. 135.1: *Corematodus taeniatus,* lower jaw [AK]

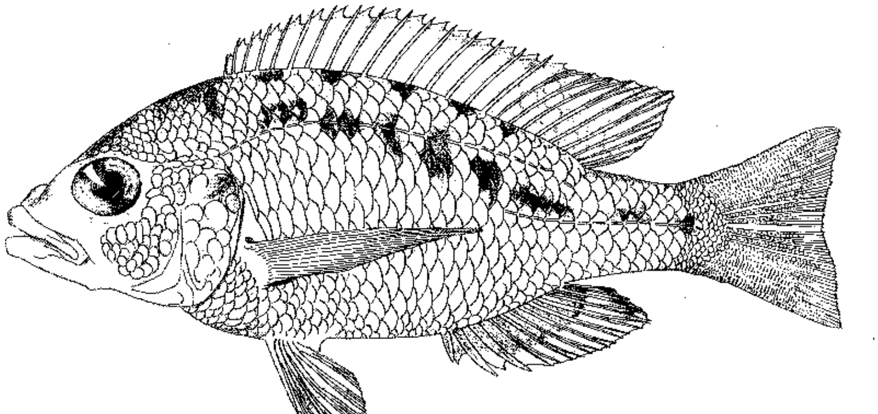


Fig. 135.2: *Corematodus taeniatus,* holotype, drawing from Eccles & Trewavas 1989.

Fig. 135.3: *Corematodus taeniatus* D12-E08, UCZM 2016.41.1, sequenced specimen trawled off Makanjila, SE Arm, at 20m, 2 March 2016 [HS]

Ctenopharynx Boulenger 1897

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Hemichromis intermedius,* Günther 1864:

Contained valid species: *Ctenopharnyx intermedius, C. pictus, C. nitidus.*

Proposed undescribed taxa: None.

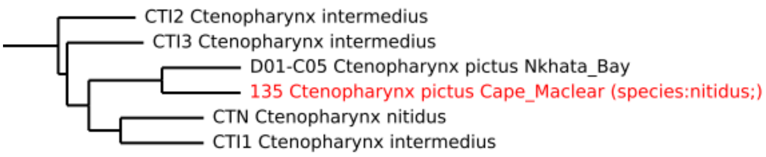
Taxa considered invalid: None.

Generic reviews & diagnoses: Eccles & Trewavas 1989; Snoeks & Nyasulu 2004.

Generic diagnosis: "Small to medium-sized haplochromines endemic to Lake Malawi attaining about 170 mm SL. Characterised by the melanin pattern, which is dominated by a suprapectoral spot lying on the upper lateral line and a supraanal spot between the lateral lines and usually contacting the upper. The suprapectoral spot may be elongated by a narrow extension from the antero-dorsal corner towards the nape. The number of gill-rakers on the lower outer arch is high (16 to 41). The jaws and dentition are weak." (Eccles & Trewavas 1989).

Field Diagnosis: The species are usually quite readily distinguished by their flank spots, large mouths low down on the head and large number of gillrakers.

Phylogenetic comments: The specimens of *Ctenopharynx* cluster closely together, but their position in the tree is unstable. Blumer et al. (2025) report that *C. intermedius* is not monophyletic, but has 2 specimens of *C. pictus* nested within it. The aquarium specimen of *C. nitidus* (CTN) was removed due to uncertainties over its origin and lack of voucher specimens or photos. However, it does suggest the possibility that perhaps one of the specimens labelled as *C. intermedius* (CTI1) could be *C. nitidus*.



Ecomorphological notes: These species are benthic sediment feeders.

MC136. *Ctenopharynx intermedius* (Günther 1864)

Ctenopharynx intermedius was one of the first six Lake Malawi cichlids to be described, by Günther in 1864 (as *Hemichromis*). The type was a skin and was not illustrated in the original description, but it appears to be a mature male (generally dark with large pale spots on the anal fin), but no mention is made of the two most distinctive features of the species- the three flank spots and the high number of gillrakers. However, the flank spots are clearly visible on the illustration (Fig. 136.1) purporting to be of the type that appeared in Boulenger (1915) who based his redescription on a total of 10 specimens. Eccles & Trewavas (1989) included a drawing of a non-type specimen which looks rather different in its overall body shape and melanin pattern (Fig. 136.2). Some of this may be allometric: according to Eccles & Trewavas (1989) the type is 157mm SL, while their illustrated specimen is 136mm SL. *Ctenopharynx intermedius* was made type species of the new genus *Ctenopharyx* by Eccles & Trewavas in 1989. Turner (1996) suggested there might be two species - a deeper-bodied one found in trawl catches he had examined, and a smaller one with a relatively larger head and flat ventral profile illustrated by Eccles & Trewavas (1989), photographed by Konings (1995) and collected by Robinson (1995) in shallow water near Monkey Bay. However, a very different illustration appeared under *C. intermedius* in later editions of Koning's book (e.g. 2016), conforming more closely to the Boulenger illustration. Snoeks & Nyasulu (2004) could not find any differences between deep (>30m) and shallow water specimens, but perhaps the difference is more between rock and sand/mud associated specimens. *Ctenopharynx intermedius* can be distinguished from most other 3-spotted haplochromines by its high number of gillrakers (36-39 lower arch, according to Snoeks & Nyasulu 2004), and from *C. pictus* by its relatively smaller head and premaxillary pedicels.

The three sequenced specimens (CTI1-3) were obtained from trawls in 2010 and although the exact photos have not been matched to the tissue sample, both possibilities (Fig. 200, 201) appear to represent the 'high-backed' form shown in the drawing of the type. Konings (2016) has reported *C. intermedius* feeding in sediment and on plankton, and although mainly found on sand, also reports it from among rocks. Turner (1996) reported a depth preference of 60m or shallower, and a diet of small crustaceans (copepods, cladocera) zooplankton and insect larvae.

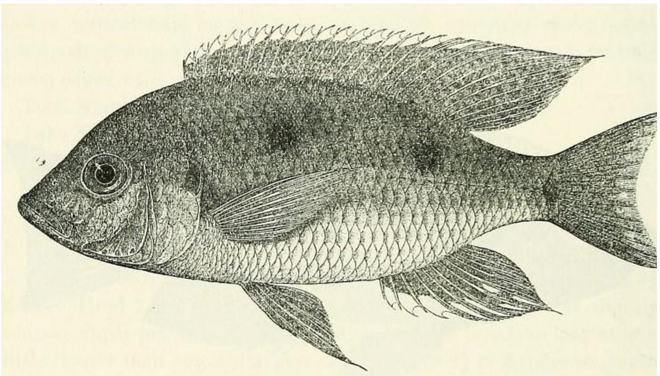


Fig. 136.1: Drawing of *Ctenopharynx intermedius* from Boulenger (1915).

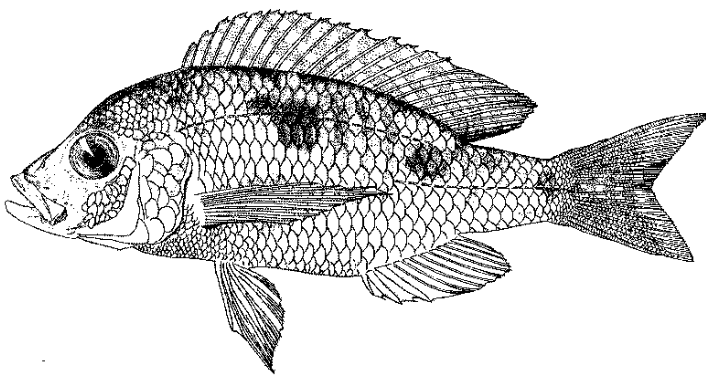


Fig. 136.2: Drawing of *Ctenopharynx intermedius,* non-type BMNH 1935.6.14.1800, from Eccles & Trewavas (1989).

Fig. 136.3: *Ctenopharynx intermedius* G9 (CTI1-CTI3?) Trawled from 11-58m SE Arm 19 Nov 2010 [GFT]

Fig. 136.4: *Ctenopharynx intermedius* A4 (CTI1-CTI3?), Trawled from 58-71m SE Arm 18 Nov 2010 [GFT]

MC137. *Ctenopharynx nitidus* (Trewavas 1935)

Ctenopharynx nitidus was described by Trewavas (1935) from 11 specimens (as *Haplochromis*) and put into the genus *Ctenopharynx* by Eccles & Trewavas (1989). The species has an overall resemblance to the other two species in the genus, with large flank spots (often taking the form of a broken stripe), and a large mouth with thin lips set low on the head (fig. 202). The number of gillrakers is relatively high, but much lower (15-18 lower outer arch) than in *C. intermedius* and *C. pictus* (32-39). The most similar species outside the genus is *O. decorus*, but this has a relatively smaller head, more slender body and fewer gillrakers (11-12). Snoeks & Nyasulu (2004) report that the melanin pattern of *C. nitidus* can range from relatively short, well-spaced spots to an almost continuous oblique stripe.

A specimen was sequences (CTN), taken from an aquarium specimen imported alive from an unknown location and maintained at Bangor University around 2010. No photograph or voucher specimen has been located, but there is no particular reason to doubt the identification, but the sequence was removed from the final analysis published by Blumer et al. (2025). Specimens are available, for which there is a full voucher specimen, tissue sample and photograph (Fig. 137.2). The species is found on shallow sandy bottoms, but has been reported as deep as 65m (Turner 1996). It is observed to sort through silt. Stomachs contain small benthic invertebrates (e.g. copepods) along with sand, detritus and plant remains (Turner 1996).

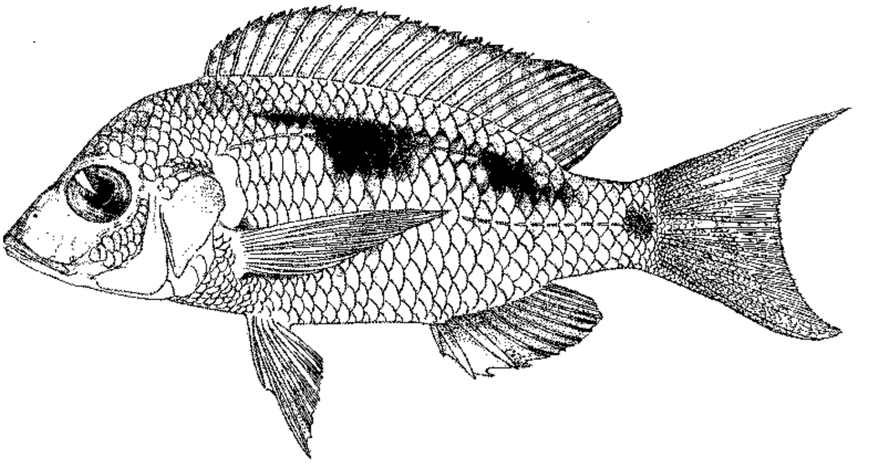


Fig. 137.1: Drawing of the lectotype of *Ctenopharynx nitidus* from Eccles & Trewavas (1989).

Fig. 137.2: *Ctenopharynx nitidus* D14-H03, UCZM 2016.45.18; from 20m depth in SW Arm, 4 March 2016 (specimen not sequenced).

MC138. *Ctenopharynx pictus* (Trewavas 1935)

Ctenopharynx pictus was described by Trewavas (1935) from 8 specimens (as *Haplochromis*) and put into the genus *Ctenopharynx* by Eccles & Trewavas (1989). The species can be distinguished from *C. intermedius* by its relatively longer head and premaxillary pedicels and from *C. nitidus* (and other 3-spotted species) by its more numerous gillrakers (32-38 lower arch). One of the specimens sequenced by Blumer et al (2025) was obtained from Nkhata Bay on a rocky shore and the voucher specimen has numerous long slender gill rakers. The other was obtained at Cape Maclear (and area with both rocky and sandy shores) in 2014, and the photograph shows a very similar phenotype. The species mainly inhabits shallow rocky areas and scoops through loose sediment, mostly feeding on benthic copepods. Snoeks & Nyasulu (2004) report that it occasionally been caught in trawls on soft bottoms, on one occasion as deep as 78m. Phylogenetically, this species falls within the *Ctenopharynx* clade, part of the shallow benthic group (Blumer et al. 2025).

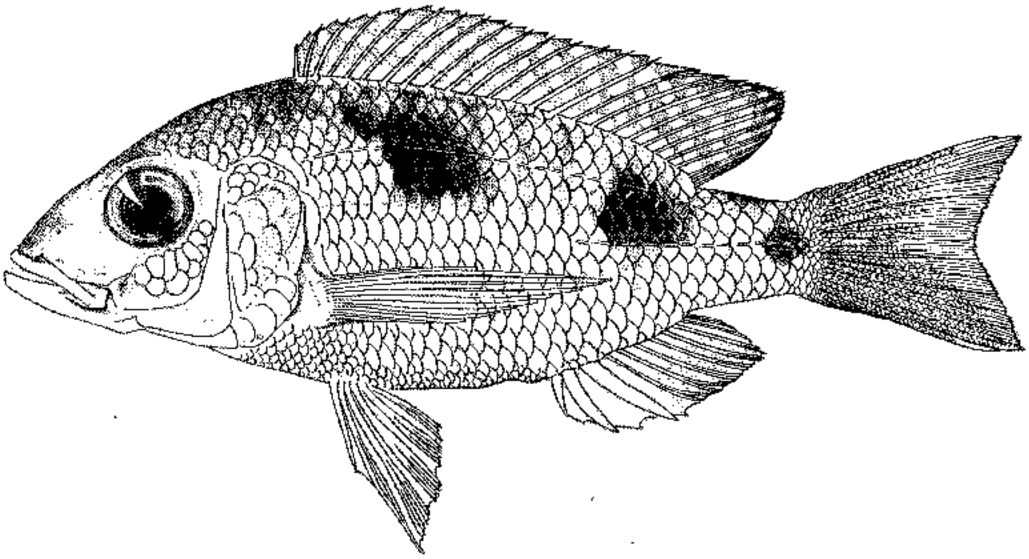


Fig. 138.1: Drawing of the lectotype of *Ctenopharynx pictus* from Eccles & Trewavas (1989).

Fig. 138.2: *Ctenopharynx pictus*, D01-C05, UCZM 2016.16.36; maturing male, sequenced, Nkhata Bay, SCUBA, 20 Feb 2016

Fig. 138.3: *Ctenopharynx pictus*, 2014.135; sequenced, Cape Maclear, 9 Sept 2014

MC139. *Cyrtocara moorii* Boulenger 1902

Cyrtocara moorii was originally described by Boulenger in 1902 from a single specimen. The prominent nuchal hump is unique among Lake Malawi cichlids. Large specimens are uniformly blue, have unicuspid teeth and a continuous dorsal fin margin (see *P. annectens*). The species is well-known to divers and aquarists- it is popularly known as the Dolphin Cichlid or Blue Dolphin. Our specimen was a mouthbrooding female caught in a shallow sandy area among rocks at Nkhata Bay. The species lives on shallow sandy areas and habitually follows large *Taeniolethrinops* and grabs small invertebrates stirred up by their feeding action (Konings 2016). The 'host' is aggressively defended (Konings 2016). The species is not presented in the phylogeny by Blumer et al. (2025), but in earlier analyses, it was a member of the 'shallow sand' clade with *Mchenga*, *Otopharynx argyrosoma* and a number of similar slender species, but also *Protomelas annectens* another species that shows blue colour in females and juveniles and which has been observed to follow feeding *Taeniolethrinops*.

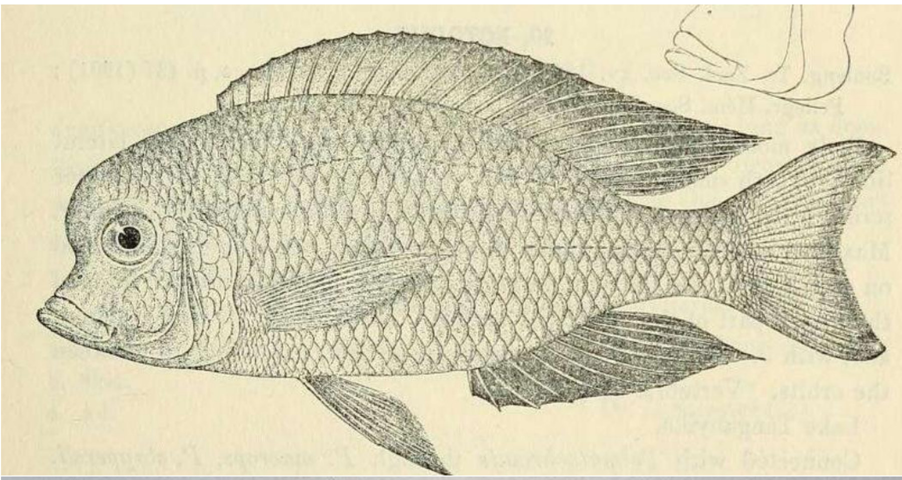


Fig. 139.1: Drawing of the type of *Cyrtocara moorii* from Boulenger 1915.

Fig. 139.2: *Cyrtocara moorii*, D02-D07, sequenced, Cambridge University Zoology Museum, uncatalogued, SCUBA, Nkhata Bay, 21 Feb 2016 [HS].

Fig. 139.3: *Cyrtocara moorii*, underwater, Nkhata Bay, 21 Feb 2016: probably the same specimen as in Fig. 139.2 [HS].

Dimidochromis Eccles & Trewavas 1989

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Dimidiochromis strigatus,* Regan 1922.

Contained valid species: *Dimidiochromis compressiceps, D. dimidiatus, D. kiwinge, D. strigatus*

Proposed undescribed taxa: None.

Taxa considered invalid: *Haplochromis fuelleborni* Ahl (=*D. kiwinge*).

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: "Predatory haplochromines endemic to Lake Malawi characterised by a deep lower jaw, strongly developed chin and well-spaced caniniform teeth in fish over 60 mm SL. In smaller individuals of some species there may be some unequally bicuspid teeth anteriorly in the outer row. Melanin pattern of females and young based on the plesiomorphic type, with the vertical element absent but with the mid-lateral band well developed. In one species the dorso-lateral band, and in another the dorso-lateral and dorsal bands are also developed. No melanin feature below the midlateral. 33 to 36 scales in a longitudinal series; 32 or 33 vertebrae, of which 13 or 14 are abdominal." (Eccles & Trewavas 1989).

Field Diagnosis: Silvery predatory-looking fish with a narrow horizontal stripe. A bit deeper bodied than *T. holotaenia*.

Phylogenetic comments: The specimens of *Dimidochromis* sequenced so far represent 3 out of the 4 known species, and all are quite closely-related, but are mixed together with some *Hemitaeniochromis* species.

Ecomorphological notes: These species are all shallow-water piscivores, but with a range of lifestyles.

MC140. *Dimidiochromis compressiceps* (Boulenger 1908)

Paratilapia compressiceps was described by Boulenger in 1908, moved to *Haplochromis/Cyrtocara* and then moved to *Dimidiochromis* by Eccles & Trewavas in 1989. It is very distinctive species with a strongly laterally compressed body, horizontal stripes and a large mouth with thick lower jaw. No photos were available for our sequenced specimen 2011.230A, collected at Mangochi on the Upper Shire River on 20th Jan 2011, but this is a very distinctive species and it would be surprising if there was an issue with the ID. It is commonly known as the 'Malawi eye-biter', following a report by Fryer (1959) citing the opinions of local fishermen. In fact, as Fryer also reported, it is actually a predator of small fish, which it stalks in a head-down posture generally in shallow weedy areas, and there is no evidence that it feeds on the eyes of other fish. It is a common aquarium fish.

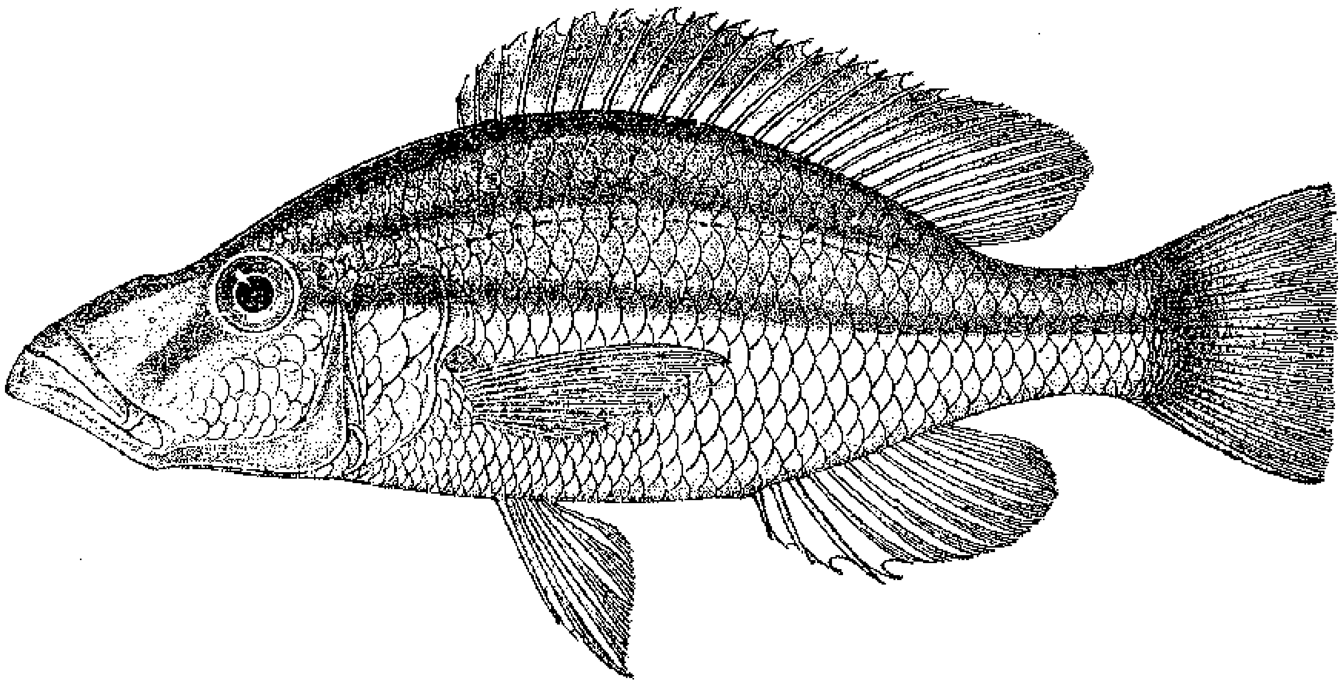


Fig. 140.1: Drawing of the holotype of *Dimidiochromis compressiceps*, from Eccles & Trewavas (1989).

MC141. *Dimidiochromis dimidiatus*

This species has not been sequenced.

MC142. *Dimidiochromis kiwinge* (Ahl 1927)

Haplochromis kiwinge was described by Ahl 1927 from specimens at the natural history museum in Berlin. The species was moved to *Dimidiochromis* by Eccles & Trewavas in 1989, along with other predatory haplochromines with a horizontal stripe which begins behind the operculum (excluding those showing the traits of *Rhamphochromis*). The type does not appear to have ever been illustrated, so the identification of this species relies on the original description and examination of the Berlin material by Trewavas prior to the second world war and to the subsequent description in later works, such as Eccles & Trewavas (1989) who illustrated non-type material from London (Fig. 142.1). Trewavas also considered that Ahl redescribed the same species as *Haplochromis fuelleborni* later in the same paper. The species has a much more streamlined body that *D. strigatus* and *D. compressiceps*, but is deeper-bodied than the (now) very rare *D. dimidiatus*. The 10 specimens we sequenced all seem clear-cut (Fig. 142.2).

The species is well known to fieldworkers: males dig large craters in sand, often near rocks, while females often guard large groups of fry on the surface of large boulders. Fry feed on zooplankton, but as they grow they become more piscivorous, often attacking schools of usipa (*Engraulicypris*). They tend to stay near the surface, but do not venture too far from the shore.

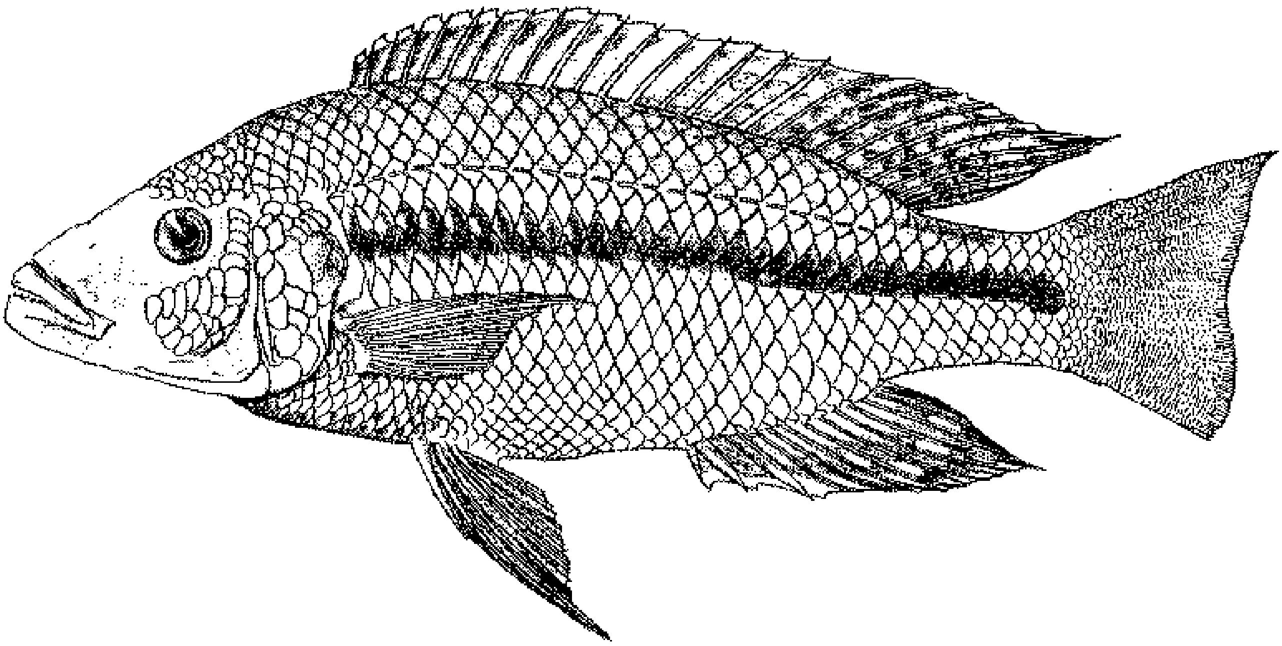


Fig. 142.1: Drawing of *Dimidiochromis kiwinge* from Eccles & Trewavas 1989.

D01-B05, UCZM2016.16.35; *Dimidiochromis kiwinge*_Nkhata Bay, SCUBA 20 Feb 2016

D01-B06, UCZM2016.16.22; *Dimidiochromis kiwinge*_Nkhata Bay, SCUBA 20 Feb 2016

D02-F01, UCZM2016.19.30; *Dimidiochromis kiwinge*_Nkhata Bay, bought from fishermen 21 Feb 2016

D02-G04, UCZM2016.19.38; *Dimidiochromis kiwinge*_Nkhata Bay, bought from fishermen 21 Feb 2016

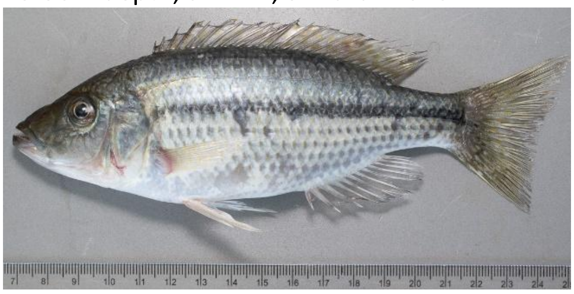
D08-A05, UCZM2016.35.43; *Dimidiochromis kiwinge*_Chiofu, SCUBA 28 Feb 2016

D08-D05, UCZM2016.35.14; *Dimidiochromis kiwinge*_Chiofu, SCUBA 28 Feb 2016

D13-G08 *Dimidiochromis kiwinge*, trawled at 45-50m depth, SE Arm, 3 March 2016

D13-G09 *Dimidiochromis kiwinge*, trawled at 45-50m depth, SE Arm, 3 March 2016

D13-G10 *Dimidiochromis kiwinge*, trawled at 45-50m depth, SE Arm, 3 March 2016

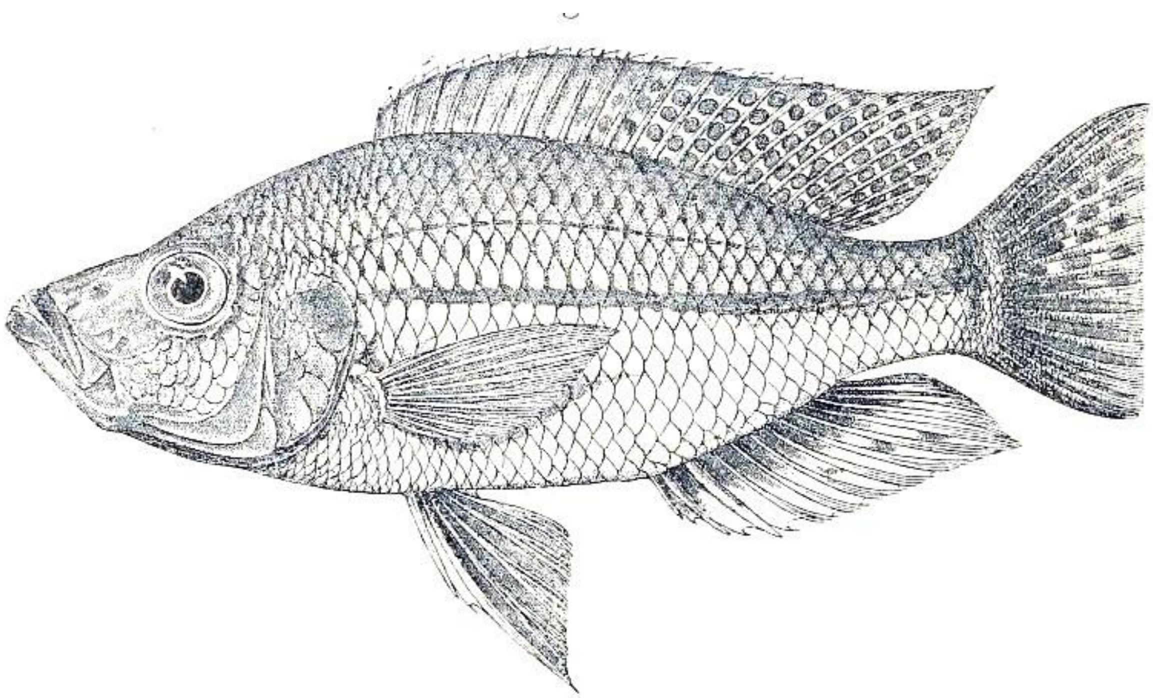


D13-H01 UCZM2016.43.28; *Dimidiochromis kiwinge*, trawled at 45-50m depth, SE Arm, 3 March 2016

Fig. 142.2: All of the sequenced specimens of *Dimidiochromis kiwinge* conform to the expected phenotype of the species. No voucher specimens are available for D13-G08, G09, G10 [HS].

MC143. *Dimidiochromis strigatus* (Ahl 1927)

Haplochromis strigatus was described from 3 specimens by Regan in 1922, and moved to *Dimidiochromis* by Eccles & Trewavas in 1989, who also designated a lectotype. When young, it can be difficult to distinguish from *D. kiwinge*, although its behaviour is very different: solitary, slow-moving and lurking among reeds, while young *D. kiwinge* tend to be fast moving in groups near the surface. Larger specimens tend to be quite deep-bodied, with a concave head profile and both the premaxillary pedicel and posterior of the lower jaw jutting out in profile. Mature males are greenish with a patch of red scales behind the head and a bright red anal fin with prominent eggspots. The species is an ambush predator frequenting shallow weedy areas.



Haplochromis strigatus. ½.

Fig. 143.1: Drawing of lectotype of *Dimidiochromis strigatus* from Regan 1922.

Fig, 143.2: *Dimidiochromis strigatus*, 2005-147, mature male, Senga Bay, Salima, 4 May 2005 (one of a pair of clips) [MJG].

Dimidiochromis strigatus, 2014-162, Cape Maclear, 12 Sept 2014, [MJG]

Dimidiochromis strigatus, 2014-39, mature male, Mangochi, Upper Shire River 29 Aug 2014, [MJG]

Dimidiochromis strigatus, D02-F03, UCZM 2016.19.41 Nkhata Bay purchased from fishermen, 21 Feb 2016, [HS]

Dimidiochromis strigatus, D14-H06, UCZM 2016.45.26, trawled from 20m depth off Malembo, 4 March 2016 [HS]

Fig. 143.3: *Dimidiochromis strigatus* - the larger specimens show the typical deep-bodied appearance that develops in this species. The Nkhata Bay and Cape Maclear specimens shows the more slender appearance of smaller fish, but are less streamlined than would be expected for comparable sized *D. kiwinge*, so the ID seems sound.

MC144. *Docimodus evelynae*; MC145. *Docimodus johnstonii;* MC146. *Exochochromis anagenys.*

None of these species has been sequenced.

MC147. *Fossorochromis rostratus* (Boulenger 1899)

Fossorochromis rostratus, described by Boulenger in 1899 from a single specimen (as *Tilapia rostrata*), is one of the most easily recognisable Lake Malawi cichlids. Surprisingly, it was redescribed by Regan (1922) as *Haplochromis macrorhynchus*, based on differences in gillraker counts that seemed to be associated with differences in snout shape in a small sample of specimens. Examination of a larger sample led Trewavas (1935) to consider *H. macrorhynchus* a junior synonym of *H. rostratus*. It was placed in the monotypic genus *Fossorochromis* by Eccles & Trewavas in 1989. Snoeks & Hanssens (2004) mentioned a possible second species (*Fossorochromis sp.* 'oblique teeth'), with a similar melanin pattern to female *F. rostratus*, but with obliquely truncated teeth similar to *Hemitilapia oxyrhynchus*: this was recorded as a single specimen, which was not photographed and no voucher specimen or locality was given. Leaving this aside, *F. rostratus* is easily recognised from its multiple rows of squarish spots (occasionally blending into irregular vertical bars), long snout and bright yellowish background colour in females and immature males. Mature males are very dark blue with irregular patches of pale metallic blue on the head and upper surface.

The full dataset of Blumer et al. (2025) contains 39 *F. rostratus* sequences, from Malombe, SE and SW Arms, Cape Maclear, Salima, Chiofu & Chilumba and all seem consistent with the typical phenotype. Four specimens are from older collections (2004-2011) and may have preservation issues; three have relatively low coverage: 2004.C16, 2005.415, 2011.168A,B (see Table 147.1). The species is abundant in small groups over shallow sandy bottoms collecting small invertebrates (mainly chironomids) by plunging its snout into the sand (Konings 2016), but may accompany schooling piscivores such as *Nimbochromis polystigma* (Turner 1996).

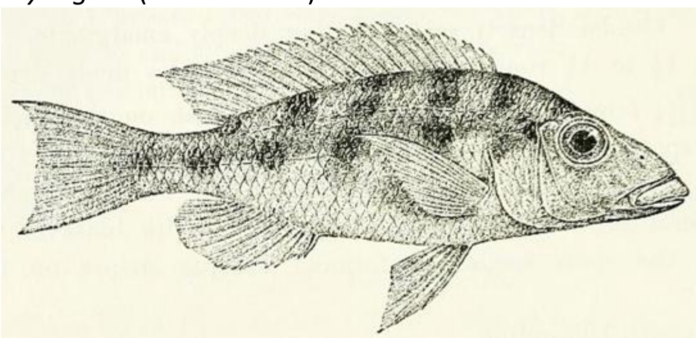


Fig. 147.1: Drawing of *Fossorochromis rostratus*, type from Boulenger 1915.

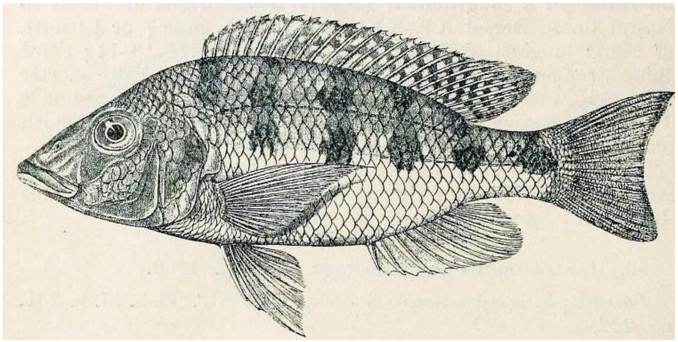


Fig. 147.2: *Fossorochromis rostratus*, type of *Haplochromis macrorhynchus* from Regan 1922.

Fig 147.3: *Fossorochromis rostratus* D08-A07, UCZM 2016.35.50; Chiofu, SCUBA, 28 Feb 2016 [HS]

Fig. 147.4: *Fossorochromis rostratus*, D08-A09 UCZM 2016.35.47, apparent maturing male, Chiofu, Chilumba, SCUBA, 28 Feb 2016 [HS].

Table 147.1: Summary of *Fossorochromis rostratus* specimens sequenced.

Field ID	Voucher	Photo	Location	Collection	Date	Sequence Code	Coverage
2004.C16	N	N	Cape_Maclear	Unknown	14-Aug-04	**ILBCDS5879566**	5.8
2005.415	N	Y	Salima	Unknown	30-May-05	**ILBCDS5879563**	17.3
2011.168A	N	Y	Chiofu	Unknown	17-Jan-11	**ILBCDS5879565**	6.6
2011.168B	N	Y	Chiofu	Unknown	17-Jan-11	**ILBCDS5879570**	16.5
D07-F04	2016.31.9	Y	Chilumba (Chitande Is)	SCUBA	25-Feb-16	**CICHM16429702**	23.8
D07-J04	2016.35.41	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994224**	15.5
D08-A07	2016.35.50	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994229**	14.4
D08-A09	2016.35.47	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994230**	16.4
D08-D01	2016.35.54	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994234**	18.5
D08-D02	2016.35.55	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994235**	18.8
D08-G09	Uncat.	Y	Chiofu	SCUBA	28-Feb-16	**cichlid6994242**	14.2
D19-A05	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7050706**	18.4
D19-A06	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7050707**	23.3
D19-A07	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7050708**	22.0
D19-A08	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7050709**	13.5
D19-A09	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020294**	18.3
D19-A10	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020295**	16.3
D19-B01	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020296**	16.3
D19-B02	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020297**	16.1
D19-B03	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020298**	15.0
D19-B04	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020299**	17.3

D19-B05	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020300**	16.0
D19-B06	N	Y	Lake_Malombe	Seine (Nkacha)	23-Jan-17	**cichlid7020301**	19.1
D19-J05	N	N	SE Arm (Palm Beach)	Beach Seine	24-Jan-17	**cichlid7020312**	15.7
D19-J06	N	N	SE Arm (Palm Beach)	Beach Seine	24-Jan-17	**cichlid7020313**	16.6
D19-J07	N	N	SE Arm (Palm Beach)	Beach Seine	24-Jan-17	**cichlid7020314**	18.8
D24-F02	N	Y	SW Arm (Malembo)	Pair Trawl	31-Jan-17	**cichlid7020382**	20.3
D27-F07	N	Y	SW Arm (Msaka)	Beach Seine	04-Feb-17	**cichlid7050724**	18.4
D27-F08	N	Y	SW Arm (Msaka)	Beach Seine	04-Feb-17	**cichlid7050725**	16.8
D28-A07	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050727**	16.4
D28-A08	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050728**	15.6
D28-A09	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050729**	17.9
D28-A10	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050730**	17.3
D28-B01	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050731**	17.2
D28-B02	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050732**	17.0
D28-B03	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050733**	16.9
D28-B04	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050734**	19.0
D28-B05	N	N	SE Arm (Nkope)	Beach Seine	07-Feb-17	**cichlid7050735**	13.1

Hemitaeniochromis Eccles & Trewavas 1989

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis urotaenia* Regan, 1922.

Contained valid species: *Hemitaeniochromis urotaenia, H. brachyrhynchus.*

Proposed undescribed taxa: *H.* sp. 'pumba', *H.* sp. 'spilopterus jalo'; *H.* sp. 'spilopterus kande' (possibly a synonym of *H.* sp. 'pumba'; *H.* sp. 'spilopterus yellow'

Taxa considered invalid: *H.* sp. 'insignis' (Turner 1996) and *H.* sp. 'deep' and *H.* sp. 'insignis mumbo' (Konings 2016) are probably all *H.* sp. 'pumba'.

Generic reviews & diagnoses: Eccles & Trewavas 1989; Oliver 2012, Tawil 2024.

Generic diagnosis: "Haplochromines endemic to Lake Malawi characterised by having a boldly marked melanin pattern consisting of a mid-lateral band confined to the posterior half of the flank but continued forwards as a series of spots and a supralateral band broken into a series or spots. Mouth large, lower jaw 2.0 to 2.2 in head length, with well developed mental region. Outer teeth unicuspid, slightly recurved, separated by spaces approximately equal to tooth diameter" (Eccles & Trewavas 1989).

"Pseudocrenilabrine cichlids of the tribe Haplochromini Poll (1986) endemic to Lake Malaŵi and the upper Shire River. Melanic color pattern modified from the plesiomorphic simple, horizontally striped and vertically barred haplochromine pattern as follows: Stripes darker than bars; midlateral stripe originating an eye length or more behind the operculum, this stripe fragmented into discontinuous spots at least on its anterior portion, more nearly continuous posteriorly, extending to end of caudal peduncle; supralateral stripe confined to anterior portion of flanks, also represented at least partly by discontinuous spots; 4 or 5 dorsal midline spots above supralateral stripe at dorsal-fin base. Jaw teeth in fishes >100 mm SL unicuspid, nearly conical, with interspaces about as wide as the tooth shafts; smaller individuals may have more closely spaced teeth with very unequally bicuspid crowns, the major cusp nearly conical. Gape inclination steep, ~50–60°. Upper lateral line bent downward at posterior end (the "Malaŵi kink"; Lippitsch, 1995), separated from lower lateral line by only one untubed or unpored scale, as in many (but not all) other Lake Malaŵi haplochromines." (Oliver 2012).

Konings in various publications has moved species between *Protomelas* and *Hemitaeniochromis*, but these moves have not been accepted by Fricke et al. and have been disputed by Tawil (2024). Konings (2016; p. 352) indicates which species he thinks should be in the genus, but does not give a revised definition: "the genus *Hemitaeniochromis* was originally regarded as monotypic, with *H. urotaenia* the sole species (Eccles & Trewavas, 1989), but in my opinion *H. spilopterus* belongs to this genus as it shares all its morphological characteristics. The only discrepancy is that the mid-lateral stripe is continuous in most specimens (see also below); some individuals (e.g. at Ntekete), however, do not exhibit a lateral stripe at all." This does not render revised genus 'operational' in the sense of providing researchers with guidance on how to decide which new species belong in it, apart from accepting Konings' list of included taxa, which of course may be incomplete.

Field Diagnosis: Species with heavy jaws and a broken horizontal stripe.

Phylogenetic comments: The genus was proposed for a single piscivorous species (*H. urotaenia*), but with the addition of *H. brachyrhynchus*, it as been proposed to include a number of paedophage species with a similar melanin pattern of broken horizontal stripes, then leading on to dropping the broken stripe from the definition and trying to accommodate species with continuous horizontal stripe, but with paenophage morphology. The specimens of *Hemitaeniochromis* sequenced so far are mixed together with some *Dimidiochromis* species. Tawil (2024) suggests that if the genera are combined, then (regrettably!) *Hemitaeniochromis* would be the senior synonym due to 'page priority' but page priority is a persistent taxonomic myth: no such rule exists. *Naevochromis* is also related, and it has paedophage morphology, like many *Hemitaeniochromis*, but a very different melanin pattern.

Ecomorphological notes: Piscivores or paedophages.

MC148. *Hemitaeniochromis brachyrhynchus* Oliver 2012

Described by Oliver in 2012, from two specimens (Monkey Bay, Nkhata Bay), *Hemitaeniochromis brachyrhynchus* closely resembles the previously-described *Protomelas spilopterus* (Trewavas 1935), but shows a blotchy horizontal stripe originating well behind the operculum (fig. 148.1) instead of a continuous one starting immediately behind the operculum. The eye is relatively larger and the pre-opercular (lachrymal bone) much shallower (fig. 148.2). Our sequenced specimen (D03-B02) was originally recorded as *P. spilopterus* but it has a shallow lachrymal (fig. 148.3). It clusters with *Hemitaeniochromis* rather than *Protomelas* specimens. Based on morphology, both *H. brachyrhynchus* and *P. spilopterus* are suspected to be paedophages, feeding on eggs or larvae of mouthbrooding female cichlids. *Protomelas spilopterus* has been found in shallow water on sand and rocks, but *H. brachyrhynchus* is known only from rocky habitats.

Fig. 148.1: *Hemitaeniochromis brachyrhynchus* Oliver 2012, holotype from original description.

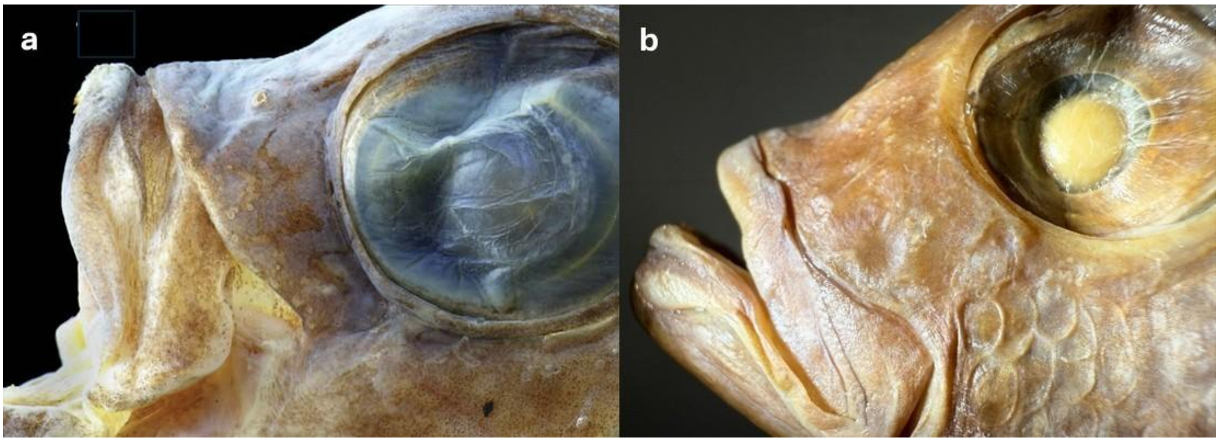


Fig. 148.2: Comparison of the lachrymal bone depths and eye sizes of (a) *Hemitaeniochromis brachyrhynchus* (holotype) and (b) *Protomelas spilopterus* (lectotype).

Fig. 148.3: *Hemitaeniochromis brachyrhynchus*, D03-B02, 2016.20.60; collected by SCUBA from rocky shore at Nkhata Bay, 21 Feb 2016, sequenced [HS].

MC149. *Hemitaeniochromis* sp. 'pumba'

This species was originally identified by Turner (1996) as *Hemitaeniochromis 'insignis'*, but this clearly not conspecific with *Protomelas insignis* (Snoeks & Hanssens 2004; Oliver 2012; Konings 2016) and a less confusing name is needed. Snoeks & Hanssens examined specimens they felt were conspecific with the Turner species, and noted its unusual dentition: 'predominantly bicuspid with some unicuspid teeth in the largest specimens. The crowns of the outer teeth in the lower jaw are typically curved outwards (labiad) and bear relatively small secondary cusps. The teeth in the upper jaw are sharper and more normally curved'. They also reported that the gape angle was quite around 45°. They reported the species occurring over a large depth range 10 to 141 m, with smaller fish in shallower water. It is possibly conspecific with the species illustrated by Konings (2016) as *Hemitaeniochromis sp.* 'insignis mumbo'. To avoid confusion with *Protomelas insignis* and reflecting the uncertainty of the identity of *Hemitaeniochromis* sp. 'insignis mumbo', we provisionally assigned this species to the temporary name of *Hemitaeniochromis sp*. 'deep', reflecting both the laterally compressed body and its occurrence in deep water (Blumer et al. 2025). A specimen tentatively assigned to this species has been sequenced (fig. 149.5), and was found to be closely related to morphologically similar paedophage species *Naevochromis chrysogaster* and *Hemitaeniochromis brachyrhynchus.* A species description is in progress, with the intention of naming H. sp. 'pumba' in recognition of its warthog-like outward projecting tusk-like teeth.

Fig. 149.1: *Hemitaeniochromis* sp. 'pumba' trawled from 24-28m off Palm Beach to Maldeco, SE Arm, 21 Oct 1991. Not sequenced. [GFT]

Fig. 149.2: *Hemitaeniochromis* sp. 'pumba' trawled from 53-69m, SE Arm, 19 Nov 2010. Not sequenced [GFT]..

Fig. 149.3: *Hemitaeniochromis* sp. 'insignis mumbo' male, possibly conspecific with *H.* sp. 'pumba', from Konings (2016)

Fig. 149.4: *Hemitaeniochromis* sp. 'insignis mumbo', brooding female, possibly conspecific with *H.* sp. 'pumba', from Konings (2016)

Fig 149.5: *Hemitaeniochromi s* sp. 'pumba', D12-B08, 2016.40.78,

trawled from 85-95m NE of Monkey Bay, 2 March 2016. Sequenced [HS].

MC150. *Hemitaeniochromis* sp. 'spilopterus jalo'; MC151. *Hemitaeniochromis* sp. 'spilopterus kande';

None of these species have been sequenced so far.

MC152. *Hemitaeniochromis* sp. ‘spilopterus yellow’

This widely distributed, but uncommon, species was first identified by Konings (1995) as *H.* sp. ‘urotaenia yellow’, with its nickname changed to *H.* sp. ‘spilopterus yellow’ in 2007. Little is known about it, except that males are sometimes seen guarding the surface of large rocks while attempting to court females. A couple of specimens were collected from a single trawl haul in the SW Arm in 2023, suggesting it is not confined to rocky habitats. Based on morphology, it is assumed to be a paedophage. Samples are available but results of sequence analysis are in progress.

Figure 152.1: Male *Hemitaeniochromis* sp. ‘spilopterus yellow’, male, Masasa Reef [AK].

Figure 152.2: Male *Hemitaeniochromis* sp. ‘spilopterus yellow’, apparent female, Tsano Rock [AK].

Figure 152.3: Male *Hemitaeniochromis* sp. ‘spilopterus yellow’, MWA 5151, trawled from 38-39m, SWA 6, 23S115, -14.218, 34.766, 2 Dec 2023 [HSlab].

Figure 152.4: Apparent female *Hemitaeniochromis* sp. ‘spilopterus yellow’, MWA 5152, trawled from 38-39m, SWA 6, 23S115, -14.218, 34.766, 2 Dec 2023 [HSlab].

MC153. *Hemitaeniochromis urotaenia* (Regan 1922)

Haplochromis urotaenia was described from 3 specimens collected by Rodney Wood, probably from Domira Bay, in the 1920s, and placed in the monotypic genus *Hemitaeniochromis* by Eccles & Trewavas (1989). The genus is distinguished by the flank markings, dominated by a midlateral band that is continuous posteriorly, but split into blotches anteriorly and starting well behind the operculum. The species has a large mouth and widely-spaced, simple outer jaw teeth. In life, specimens often have a brownish or yellowish cast. The sequenced specimens were both obtained from beach seine catches in northern Lake Malawi, and they seem pretty clear-cut in terms of identification. The species frequents shallow sandy areas, sometimes near rocky reefs and is believed to be a piscivore (Turner 1996; Konings 2016).

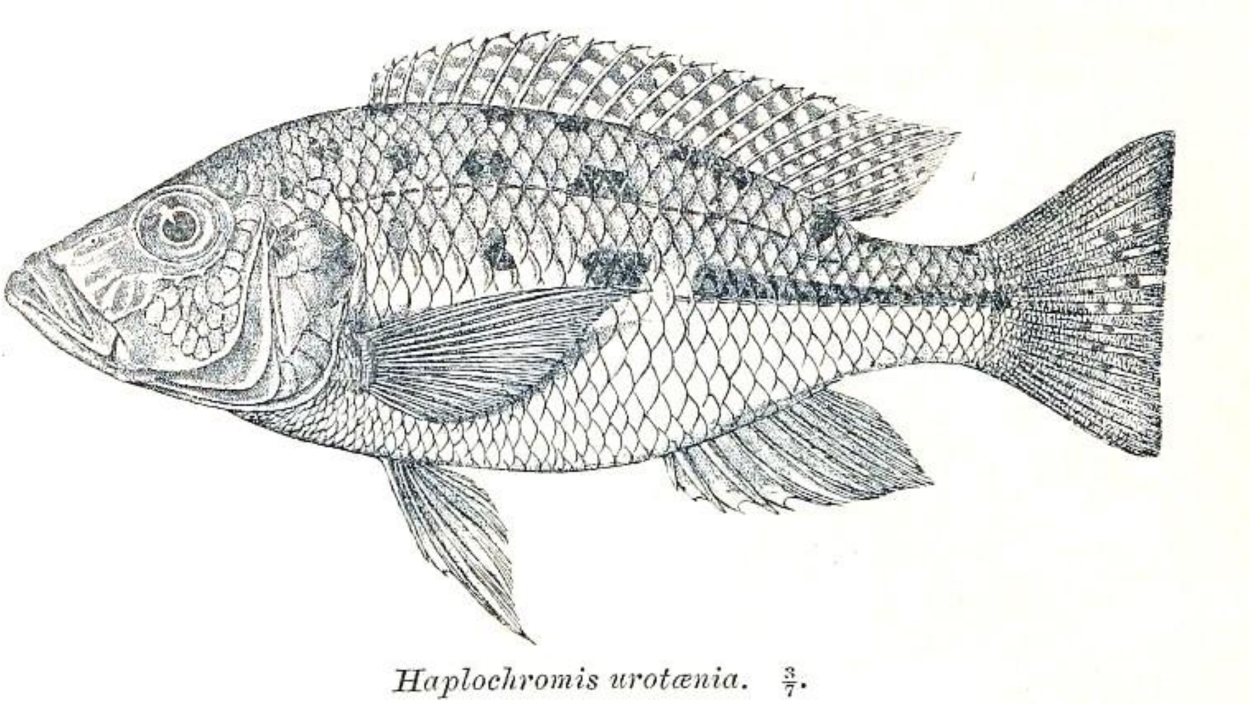


Fig. 153.1: Drawing of the lectotype of *Hemitaeniochromis urotaenia* from Regan's description.

Fig. 153.2: *Hemitaeniochromis urotaenia,* D03-G09, UCZM 2016.22.9, bought from beach seiners at Chiweta, near Chilumba, 22 Feb 2016 [HS].

Fig. 153.3: *Hemitaeniochromis urotaenia,* D06-J08, 2016.32.51; bought from beach seines at Ngara, Chilumba, 25 Feb 2016 [HS].

MC154. *Hemitilapia oxyrhynchus* Boulenger 1902

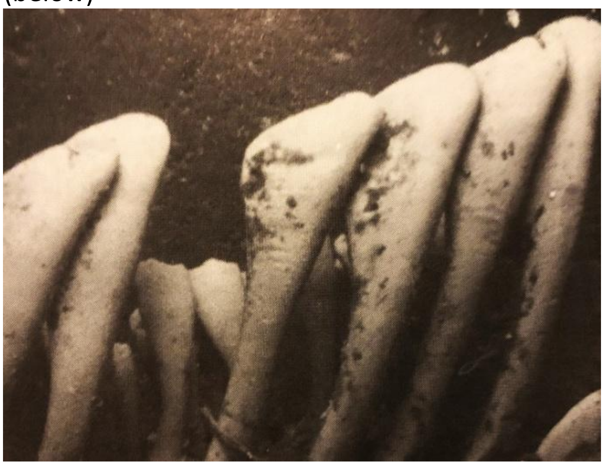
Hemitilapia oxyrhynchus was described by Boulenger in 1902, who placed it into a monotypic genus where it has remained ever since. It has distinctive oral jaw teeth, which are long, slender and inclined towards the symphyses, and which have wide, obliquely truncate crowns that together form a largely continuous blade (fig. 154.2). This is used to scrape biofilm from the surface of plant leaves in a sideways jerky motion, carried out by the fish when flipped over onto its side. Together with the long jaws set in a terminal mouth and the large flank spots which often extend to the dorsal surface, this species is fairly distinctive. It lives in shallow weedy areas and feeding groups move into shallower water in the afternoon, retreating to deeper water at night. Males aggregate in the shallows, digging small circular scrapes among the weeds. Both sequenced specimens were collected from Mangochi, which lies to the south of Lake Malawi on the Upper Shire River. Both sequenced specimens show the characteristic head and jaw shape of *H. oxyrhynchus* (fig. 154.1). Females and non-breeding males show an '*Otopharynx*' pattern of 3 flank spots (fig. 154.2, specimens not sequenced), but this is obscured in these specimens by male breeding dress. However, the identification seems straightforwards.

2012.1, 28 August 2012, Mangochi

2014.40, Mangochi 29 August 2014

Figure 154.1: *Hemitilapia oxyrhynchus* sequenced males collected from Mangochi, Upper Shire River [MJG]..

Fig. 154.2: Male and apparent female of *Hemitilapia oxyrhynchus* trawled from near Palm Beach, 30 July 1990 showing typical spot pattern (left), not sequenced [GFT]; close-up of outer oral jaw teeth, from Eccles & Trewavas 1989 (below)



Lethrinops Regan 1922

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Chromis lethrinus,* Günther 1894.

Contained valid species: *Lethrinops albus; Lethrinops altus; Lethrinops argenteus; Lethrinops atrilabris; Lethrinops auritus; Lethrinops borealis; Lethrinops chilingali; Lethrinops christyi; Lethrinops furcifer ; Lethrinops gossei; Lethrinops leptodon; Lethrinops lethrinus ; Lethrinops longimanus; Lethrinops longipinnis; Lethrinops lunaris; Lethrinops macracanthus; Lethrinops macrochir; Lethrinops macrophthalmus; Lethrinops marginatus; Lethrinops micrentodon; Lethrinops microdon; Lethrinops microstoma; Lethrinops mylodon; Lethrinops parvidens; Lethrinops stridei; Lethrinops turneri.*

Proposed undescribed taxa: *Lethrinops* sp. 'aulonocara type'; *Lethrinops* sp. 'auritus lion'; *Lethrinops* sp. 'auritus selewa'; *Lethrinops* sp. 'big-head'; *Lethrinops* sp. 'blue-orange'; *Lethrinops* sp. 'boadzulu'; *Lethrinops* sp. 'christyi fort maguire'; *Lethrinops* sp. 'deep-water albus yellow'; *Lethrinops* sp. 'deep-water albus'; *Lethrinops* sp. 'deep-water altus'; *Lethrinops* sp. 'domira blue'; *Lethrinops* sp. 'gossei white-bar'; *Lethrinops* sp. 'grey'; *Lethrinops* sp. 'longimanus likoma'; *Lethrinops* sp. 'longimanus red-head'; *Lethrinops* sp. 'longipinnis deepwater'; *Lethrinops* sp. 'longipinnis ntekete'; *Lethrinops* sp. 'longipinnis whitelappets'; *Lethrinops* sp. 'macrophthalmus goldhead'; *Lethrinops* sp. 'loweae' ; *Lethrinops* sp. 'macrochir mumbo'; *Lethrinops* sp. 'macrochir nkhudzi'; *Lethrinops* sp. 'macrostoma'; *Lethrinops* sp. 'makokola'; *Lethrinops* sp. 'marginatus liuli'; *Lethrinops* sp. 'matumbae'; *Lethrinops* sp. 'mbasi'; *Lethrinops* sp. 'mbenji deep' ; *Lethrinops* sp. 'mbenji roundhead'; *Lethrinops* sp. 'mdoka red'; *Lethrinops* sp. 'nyassae'; *Lethrinops* sp. 'oliveri'; *Lethrinops* sp. 'orange forehead'; *Lethrinops* sp. 'parvidens north'; *Lethrinops* sp. 'pits'; *Lethrinops* sp. 'red bar'; *Lethrinops* sp. 'red cap tsano'; *Lethrinops* sp. 'red cap'; *Lethrinops* sp. 'silver crescent'; *Lethrinops* sp. 'six-bar'; *Lethrinops* sp. 'yellow chest'; *Lethrinops* sp. 'yellow chin'; *Lethrinops* sp. 'yellow collar'; *Lethrinops* sp. 'yellow tail'; *Lethrinops* sp. 'yellow'; *Lethrinops* sp. 'zebra'.

Taxa considered invalid: *Lethrinops oculatus* (synonym of *L. marginatus*, according to Ngatunga & Snoeks 2004).

Generic reviews & diagnoses: Regan 1922. Trewavas 1931, Eccles & Trewavas 1989; Ngatunga & Snoeks 2004.

Generic diagnosis: Regan's original description (1922) distinguished *Lethrinops* from *Haplochromis* on the basis of having small, slender teeth, with the series interrupted at the symphysis. Only 4 species were included in the new genus. Trewavas's (1931) revision brought the number of species up to 23, although a few species were synonymised- perhaps wrongly. The revised diagnosis (which reads more like a short description) again emphasised the small, weak teeth in a few series interrupted at the symphysis, but also introduced the new criterion of the outer series in the lower jaw being arranged in a semicircular arcade, curving sharply round behind the inner row(s), instead of continuing more or less as a single straight line.

Eccles & Trewavas (1989) removed a number of species to the genera *Tramitichromis* (largely based on pharnyngeal bone shape) and *TaenioLethrinops* (largely based on melanin pattern) and presented a revised definition: "Haplochromines endemic to Lake Malawi, attaining 100 to 200 mm SL and characterised by the dentition. The teeth in the lower jaw arc in 2 to 5 series, the outer bicuspid or tricuspid anteriorly and unicuspid posteriorly, the outer series curving inwards posterior and ending with the inner. The melanin pattern is either the plesiomorphic one [mix of vertical and horizontal elements] or shows varying degrees of reduction of the horizontal components to form blotches. These may appear in the position of the supralateral spot of *Otopharynx*, but a supraanal spot is absent. In most species, only the vertical component is developed, as in *Alticorpus* and *Placidochromis*".

'Haplochromis' -type

Lethrinops (+*Tramitichromis* + *TaenioLethrinops*) species have a characteristic semicircular outer series dental arcade in the lower jaw (below) in comparison to typical Lake Malawi condition formerly called the '*Haplochromis*'-type (from Turner 1996). This is the only trait distinguishing deepwater *Lethrinops* and *Placidochromis* species and it appears to be highly prone to repeated evolutionary switching (homoplasy).

Lethrinops-type

By 2004, preliminary molecular work, mostly using mitochondrial sequences, was already showing that the *Lethrinops* species actually fell into two distinct groups, with the deepwater species clustering with *Aulonocara* and *Alticorpus* (and many deepwater *Placidochromis*), while shallow water species (including *Tramitichromis* and *Taeniolethrinops)* cluster with the majority of the shallow benthic group. This led Ngatunga & Snoeks (2004) to provide a key to the shallow water species only.

Field Diagnosis: Fairly laterally compressed fish with small, weak jaws. Females/ immatures generally drably coloured, sometimes with faint markings but generally plain.

Phylogenetic comments: Deep-water *Lethrinops* are generally deep-bodied usually with large eyes. Males often have brightly coloured heads, and strong dark barring on their flanks. They are clearly related to *Alticorpus, Aulonocara* and some deepwater *Placidochromis:* the main diagnostic features of the enlarged cephalic lateral line canals of *Aulonocara,* the mental process of *Alticorpus* and the distinct *Lethrinops* dentition all seem highly plastic and not phylogenetically informative. The shallow water *Lethrinops* seem to be only distantly related. They appear to be intermingled in a clade with *Tramitichromis* species and collectively form a sister group to *Taeniolethrinops*.

Ecomorphological notes: These species all feed among soft sediments, generally on small invertebrates or diatoms, although some species appear to be specialised molluscivores.

MC155. *Lethrinops albus* Regan 1922

Lethrinops albus was originally described by Regan in 1922, from a single specimen collected in 1896 from somewhere between Kondowe to Karonga in the far NW of the lake. It was taken to be *L. macrophthalmus* by Boulenger (1915). Trewavas (1931) assigned many additional specimens collected from Vua in 1925, not far from the type locality, to this species. However, Konings (2016 and earlier) records underwater observations of *L. albus* from Kande Island, over 150km to the south, while most of the specimens worked on by Ngatunga (2000) and Ngatunga & Snoeks (2004) were from Senga Bay around 350km to the south. All the recent specimens seem to come from very shallow water and populations of such inshore species are often geographically restricted. As such, the possible distinguishing features of this species derived from recent reports, such as male breeding dress, seem open to debate.

The specimen sequenced Blumer et al. (2025) was obtained from SM Grant's export facility at Senga Bay (the collecting site for Ngatunga's specimens). The collecting location is not known. The steep head profile (fig. 155.3) corresponds well to that of the holotype (the photo, Fig. 155.2, rather better than the original drawing, Fig. 155.1). The faint flank barring fits with Trewavas's (1931) reports that specimens often show about 10 vertical bars on the flanks. The male breeding dress corresponds well to Ngatunga's colour description - Konings specimens show fewer bars, a yellow-orange nape and a broad white margin to the dorsal fin. On the other hand, there are plentiful online aquarist reports of *Lethrinops albus* 'Kande Island', suggesting that specimens from an export facility are likely to be following Konings' ID. It would be useful to see the colours of males from north, around Vua-Karonga. We have not located a voucher specimen for this sequence, and so identification must be provisional. Like similar species, it is likely to live in shallow sandy habitats and sift sediment for small invertebrates. Phylogenetically, it is a clear-cut member of the shallow water *Lethrinops/ Tramitichromis* group. The species recorded *L. albus* (or 'deepwater albus) in trawl fishery statistics in Malawi is a completely different thing.

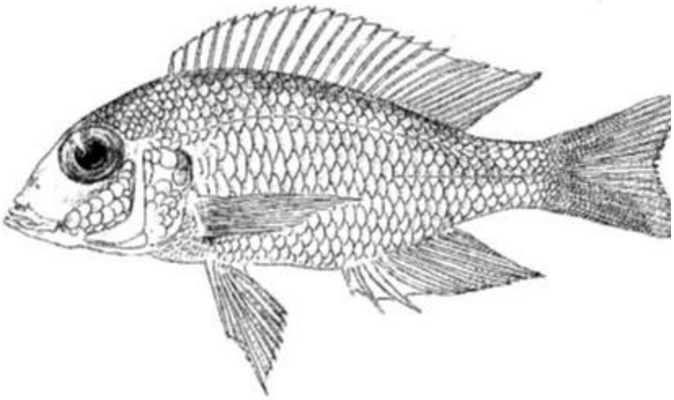


Fig. 155.1: Drawing of the holotype of *Lethrinops albus* from Regan 1922.

Fig. 155.2: Holotype of *Lethrinops albus* in 2023 – right side, image reversed [GFT]

Fig. 155.3: *Lethrinops albus* 2012.433; SM Grant export facility, 23 Sept 2012. [MJG]

MC156. *Lethrinops altus* Trewavas 1931

Lethrinops altus is a smallish, laterally compressed species, described from a single specimen of 122mm SL from the Christy collection (fig. 156.1, 3). Eccles & Trewavas (1989) reported the species from trawls at 10-70 fathoms (~20-130m). Turner (1996) suggested that the individuals caught in deeper water might represent a different species, nicknamed *Lethrinops* sp. 'altus deep' (a bit of a tautology!). A specimen in the 2016 collection appears to be *L. altus* and would be available for sequencing (fig. 156.2, 4), but this species has not been sequenced to date.

Fig. 156.1: Holotype of *Lethrinops altus*, at the London Natural History Museum.

Fig. 156.2: D02-F07, ca. 125mm SL, purchased from fishers, Nkhata Bay, 21 Feb 2016 [HS].

Fig. 156.3: Mouth of the holotype, showing the characteristic curved lower profile of the upper jaw.

Fig. 156.4: Mouth of specimen D02-F07 showing curved lower profile of the upper jaw.

Fig. 156.5: Male in breeding dress, not sequenced, trawled from 22-30m, SE Arm, White Rock to Centre off Namiasi, 30-Jul-91 [GFT]

MC157. *Lethrinops argenteus* Ahl 1927.

Lethrinops argenteus was described by Ahl in 1927 from 4 specimens collected at Langenberg in the north of the lake (south-east of Matema on the Tanzanian shore). It has a strongly laterally-compressed body, and a long, downward-angled snout with the tips of the closed jaws projecting beyond the snout profile (see fig. 157.2, 4). Overall, it is very similar to *Lethrinops longipinnis*. According to Snoeks & Hanssens, it has 9-11 lower gill rakers, with the lateral lobe short (v long in *Lethrinops longipinnis*). Around 15 sightly enlarged medial posterior teeth on the lower pharyngeal bone (v none in *L. longipinnis*). Teeth in 3-4 rows (usually 2, occasionally 3 in *L. longipinnis*). The two species differ clearly in male breeding dress. Breeding male *L. longipinnis* have strong dark bars, dark fins and a blue/green iridescence on the head. For *L. argenteus,* Ahl states "coloring (in alcohol) in males yellowish silver, with barely visible dark cross bands. Dorsal fin with rows of light spots, anal fin with 2 rows of large ocelli; caudal fin with an irregular, whitish transverse band; pelvic fins black, the first ray white on the outside" (Google Translate, from original German). In life, breeding males are believed to have an orange-red head and dark vertical barring (fig. 157.4), but presumed non-breeding males are often unbarred with conspicuous anal fin spots (fig. 157.5). The species tends to frequent shallower waters than *L. longipinnis* (Snoeks & Hanssens 2004). Our two sequenced specimens were from opposite ends of the lake: Chilumba & Makanjila. It is found over soft bottoms, mainly at depths of 10-70m (Snoeks & Hanssens 2004). In diet studies, it has not been reliably distinguished from *L. longipinnis*, and stomachs are reported to contain chironomids, oligochaetes, chaoborus and detritus (Eccles & Lewis 1979, Darwall 2003). Phylogenetically, sequence analysis indicates is a member of the 'deep-water *Lethrinops*' group (Blumer et al. 2025).

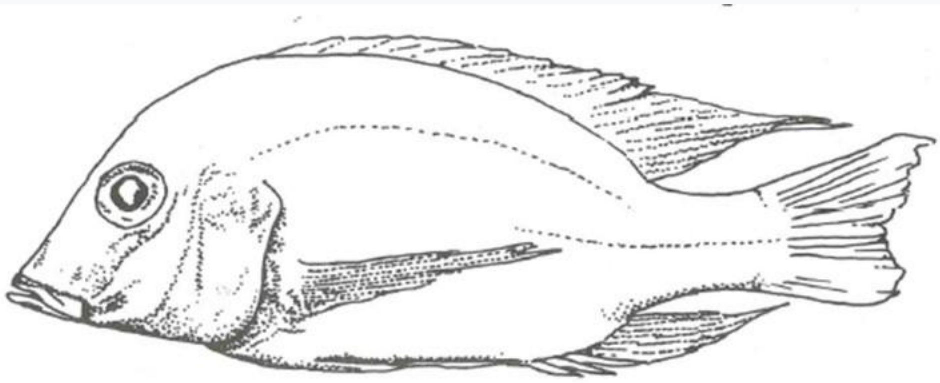


Fig. 157.1: *Lethrinops argenteus*, syntype, traced from photograph by Eccles & Lewis (1979).

Fig. 157:2: *Lethrinops argenteus* D12-J05, UCZM 2016.41.66; trawled from 30-40m off Makanjila, 2 March 2016. Sequenced. [HS]

Fig. 157.3: *Lethrinops argenteus* D06-A08, UCZM 2016.28.14; seined from Chiweta Beach, Chilumba, 24 Feb 2016. Sequenced [HS]

Fig. 157.4: *Lethrinops argenteus*, male, trawled off Chintheche, October 2023. Not sequenced, but tissue sample available[GFT]

Fig. 157.5: *Lethrinops argenteus*, male, trawled at 49-52m depth, SE Arm, NE of Boadzulu Island, 31 July 1991. Not sequenced [GFT]

MC158. *Lethrinops atrilabris* Turner 2022

Lethrinops artilabris was described by Turner in 2022 from 7 specimens trawled from deep water off Monkey Bay. It is a small, laterally compressed species with a large eye and short snout. Breeding males are strongly barred with black lips, chin and chest, and the dorsal fin is brown with a black margin and a broad white submarginal band. The pharyngeal bone is lightly built without enlarged teeth. There are 13-14 lower gillrakers. One sequenced specimen was obtained from deep water off Domwe Island, a short distance to the north of the type locality. Phylogenetically, it is a member of the deepwater clade, clustering with the the large deep-bodied *Lethrinops gossei*, and 3 small, relatively slender *Placidochromis*: *P. acutirostris, P. boops & P. mbunoides* (Blumer et al. 2025).

Fig 158.1: Type of *Lethrinops atrilabris* trawled from 90m off Monkey Bay SE Arm, 24th Feb 1992 [GFT]

Fig. 158.2: *Lethrinops atrilabris* D14-D02, UCZM 2016.44.18; trawled from 95-105m East of Domwe Island, SE Arm, 4th March 2016 [HS]

MC159. *Lethrinops auritus;* MC160. *Lethrinops borealis;* MC161. *Lethrinops chilingali*; MC162. *Lethrinops christyi*; MC163. *Lethrinops furcifer*.

Not yet sequenced.

MC164. *Lethrinops gossei* Burgess & Axelrod 1973

Lethrinops gossei was described by Burgess & Axelrod in 1973 from 2 specimens trawled from 43 fathoms (ca. 80m) depth off Monkey Bay. The species is characterized by its very deep, laterally compressed body, steep head profile, large eyes, and 18-19 lower arch gillrakers. A distinctive feature not mentioned in the original description is the prominent notch in the centre of the upper jaw. Mature males have prominent vertical bars and dark fins, sometimes with a purplish or greenish iridescence. 19 sequenced specimens were all from deep water trawls in the south of the lake. Stomach contents indicate a diet dominated by chaoborus larvae, with some chironomids, algae and detritus (Allison et al. 1996; Darwall 2003). Phylogenetically, it is a member of deep-benthics group, related to *L. atrilabris* and several small *Placidochromis* species (Blumer et al. 2025).

Fig. 164.1: *Lethrinops gossei*, D11-E04, UCZM 2016.40.69; trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016 [HS]

Fig. 164.2: *Lethrinops gossei*, D13-H06, UCZM 2016.44.39; trawled from 95-105m off Domwe Island, SE Arm, 4 March 2016 [HS]

Table 164.1 Summary of Sequenced Samples of *Lethrinops gossei*

Code	Voucher	Photo	Location	Date	Sequence Code	Coverage
A79	??	Y	SE Arm	08/08/2004	ILBCDS5422001	16.0
D11-E02	2016.40.65	Y	Monkey Bay, trawl at 85-95m	02/03/2016	cichlid7020241	17.5
D11-E03	2016.40.82	Y	Monkey Bay, trawl at 85-95m	02/03/2016	cichlid7020242	16.2
D11-E04	2016.40.69	Y	Monkey Bay, trawl at 85-95m	02/03/2016	cichlid7020243	17.0
D11-E05	2016.40.74	Y	Monkey Bay, trawl at 85-95m	02/03/2016	cichlid7020244	16.9
D11-E06	2016.40.90	Y	Monkey Bay, trawl at 85-95m	02/03/2016	cichlid7020245	18.3
D12-A09	N	Y	Monkey Bay, trawl at 85-95m	02/03/2016	CICHM16429747	44.4
D12-A10	N	Y	Monkey Bay, trawl at 85-95m	02/03/2016	CICHM16429781	28.1
D12-B01	N	Y	Monkey Bay, trawl at 85-95m	02/03/2016	CICHM16429749	30.0
D13-H04	N	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020137	16.4
D13-H05	2016.44.33	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020138	15.1
D13-H06	2016.44.39	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020139	17.8
D13-H07	N	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020140	15.6
D13-H08	2016.44.37	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020141	16.1
D13-H09	2016.44.25	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020142	14.2
D13-H10	2016.44.24	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020143	16.6
D13-I01	N	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020144	16.1
D13-I02	N	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020145	18.7
D13-I03	N	Y	Off Domwe, trawl 95-105m	04/03/2016	cichlid7020146	17.4
D24-H02	N	Y	Fish landing from Chinyankwazi	02/02/2017	cichlid7050711	16.5

MC165. *Lethrinops leptodon* Regan 1922

Lethrinops leptodon was described by Regan (1922) from 8 syntypes collected by Wood from an unknown location. One of these was later considered to be a different species, *L. lunaris*, of which it became one of the types (Trewavas 1931). The original illustration of the species (Fig. 165.1; Regan 1922) appears to show a mature male with a deep-body and strong vertical barring, but the key in Eccles & Trewavas (1989) emphasises that one of the distinguishing features of the species is that the melanin pattern is comprised of a single blotch. Eccles & Trewavas (1989) reprint Regan's illustration and caption it as the 'lectotype' but give no catalogue number or size measurement on which it can be distinguished (although visual examination of the type series indicated a probable match: fig 230). No lectotype is designated in the London Natural History Museum catalogue, which lists 8 syntypes (one of which is also a syntype of *L. leptodon*). Trewavas's redecription (1931) added material from the Christy collection, from Vua and Deep Bay, and Eccles & Trewavas (1989) suggested the species was confined to the north of the lake. Konings (2016) reports similar-looking (long-snouted, oblique blotched) specimens from Senga Bay, Chembe and Chiofu in the south and states that pharyngeal jaws sometimes have substantially enlarged, even molariform teeth, although this was not found in the specimens described. Clearly, the species needs further study.

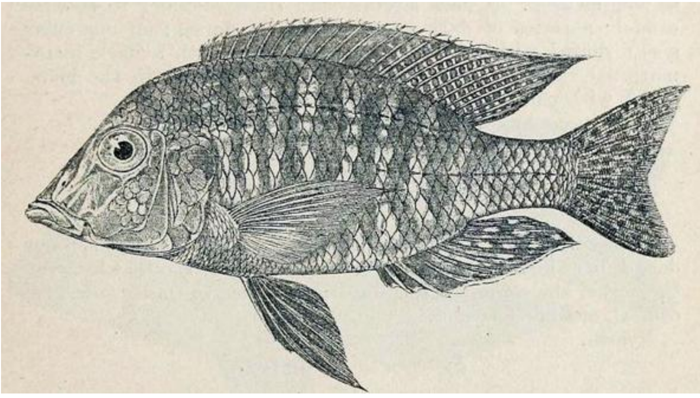


Fig. 165.1: Drawing of a syntype of *Lethrinops leptodon* from Regan (1922), labelled as lectotype by Eccles & Trewavas (1989).

Fig. 165.2: Syntype of *Lethrinops leptodon* in 2023, likely to be the one illustrated in Regan (1922) [GFT].

Fig. 165.3: *Lethrinops cf. leptodon,* male, Chiofu (left) and apparent female, Chembe (right) photographed underwater [AK]

The specimen sequenced by Blumer et al. (Fig. 165.5, 6) appears to be *Lethrinops leptodon*. It was collected in shallow water at Nkhata Bay. Its gillraker formula is 4/1/12, consistent with the reported 12-14 lower rakers in the type series. Its 4 rows in the lower jaw (mix of bicuspid & tricuspid teeth) is also consistent with a reported 3-4 in the type series and contrasts with 2 in the types of *L. lunaris*. It is an apparent female of 114mm SL, and shows an excellent overall phenotypic match- in head and body shape, as well as melanic markings- for the 128mm apparent female in the type series of *L. leptodon* (Fig. 165.4), particularly in the preserved state, where the melanic markings are clearer (fig. 165.5). It was originally misidentifed as *Lethrinops oculatus*, and appears under this name in Blumer et al. (2025). It is resolved a member of the shallow *Lethrinops/Tramitichromis* clade.

Fig. 165.4: *Lethrinops leptodon*, Syntype BMNH 1921.9.6.201-7; 128mm SL [GFT]

Fig 165.5: *Lethrinops leptodon*, D01-J08, UCZM 2016.15.1, sequenced specimen,collected from Nkhata Bay, by SCUBA, 20 Feb 2016; 114 mm SL, preserved [GFT]

Fig 165.6: *Lethrinops leptodon*, same specimen as fig. 165.5, but freshly collected [HS]

MC166. *Lethrinops lethrinus* (Günther 1894)

Chromis lethrinus was described by Günther in 1894 from a single specimen and later made the type of the genus *Lethrinops* by Regan in 1922. It is distinguished from all other species recorded in the main lake by its long snout, mouth low on head, *Lethrinops*-type oral jaw dentition and horizontal melanic markings. A similar species, *Lethrinops chilingali* Turner et al. 2023 is known only from the satellite Lake Chilingali (and neighbouring water bodies). It has a shorter snout and more broken midlateral band. The specimens sequenced by Blumer et al. (2025) comprise 10 wild-caught and 3 lab-bred fish. All seem clear-cut.

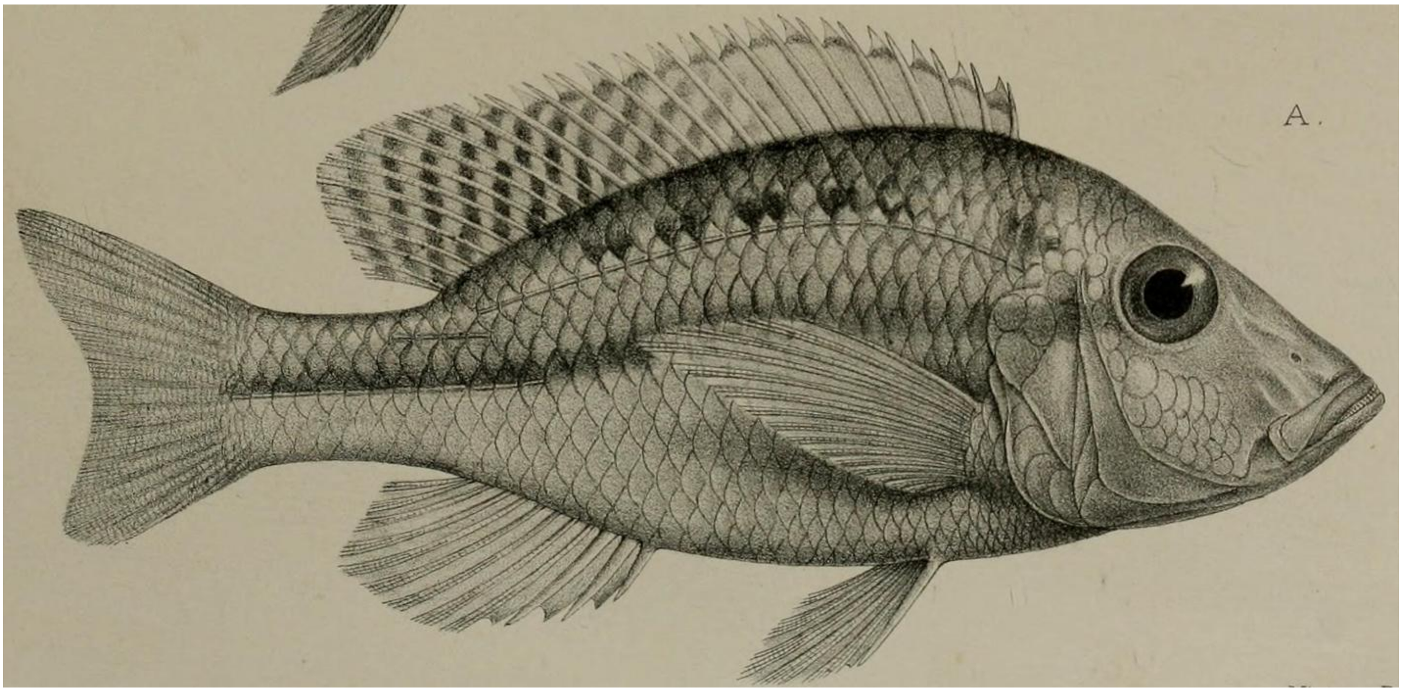


Fig. 166.1: Drawing of type of *Lethrinops lethrinus* from Günther (1894)

Table 166.1: *Lethrinops lethrinus* specimens sequenced. LLM, LLF, LLF1b are lab-bred fish from a strain originating from Mazinzi Reef.

Sample	Voucher	Photo	Location	Date	Sequence Code	Coverage
2012.3	N	Y	Upper Shire (Mangochi)	28-Aug-12	**ILBCDS5421990**	15.5
D17-J03	N	Y	SE Arm (Palm Beach)	22-Jan-17	**cichlid7050655**	21.3
D18-E10	N	Y	SE Arm (Palm Beach)	23-Jan-17	**cichlid7050674**	19.4
D18-F01	N	Y	SE Arm (Palm Beach)	23-Jan-17	**cichlid7050675**	23.8
D18-F02	N	Y	SE Arm (Palm Beach)	23-Jan-17	**cichlid7050676**	20.4
D20-A06	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020316**	18.2
D20-A07	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020317**	19.7
D20-A08	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020318**	16.4
D20-A09	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020319**	16.0
D20-A10	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020320**	19.3
D20-B01	N	Y	SE Arm (Palm Beach)	24-Jan-17	**cichlid7020321**	16.8
LLF1b	N	N	Aquarium (from SE Arm, Mazinzi)	?	**ILBCDS5438966**	45.4
LLM	N	N	Aquarium (from SE Arm, Mazinzi)	?	**ILBCDS5438965**	48.1

LLO	N	N	Aquarium (from SE Arm, Mazinzi)	?	**ILBCDS5438967**	37.1


2012.3, Mature male [MJG]

D18-E10 [HS]

D18-F02 [HS]

D18-F01 [HS]


D17-J03 [HS]

D20-A0 [HS]

D20-A07, [HS]

D20-A08, [HS]

D20-A09, [HS]

D20-A10, [HS]

(left) D20-B01 [HS]

Fig. 166.2: All illustrated specimens seem to be clear-cut *Lethrinops lethrinus*, although the snout appears unusually short on D20-B01

MC167. *Lethrinops longimanus* Trewavas 1931.

Lethrinops longimanus was described from a single specimen by Trewavas in 1931 and redescribed by Eccles & Lewis (1979) from a larger collection. It is strongly laterally compressed with an arched back, but has thicker lips and a shorter snout than some similar species, and lacks the characteristic upper jaw notch of *Lethrinops gossei*. It has a lower gillraker count of 15-18 and a lower pharyngeal bone with a few enlarged teeth in the central posterior area. Live specimens generally have a coppery cast with golden pectoral fins, and 7 (often faint) bars under the dorsal fin. Mature males are darker with a bronze iridescence, and blue highlights on the head. Abundant in trawls in the southern arms of the lake at depths of 50-70m (Turner 1996), and well-known to staff of the Monkey Bay Fisheries Research Unit. Stomach contents mainly chironomids, copepods and detritus (Darwall 2003). A member of the deep-water group, *Lethrinops longimanus* clustered with *L. argenteus* in earlier versions of the whole genome sequence tree, but was not included in the final version of Blumer et al. (2025).

Fig. 167.1: *Lethrinops longimanus* type at the Natural History Museum, London 2023 [GFT]

Fig. 167.2: *Lethrinops longimanus* D12-J06, sequenced, trawled from 30-40m off Makanjila, 2 March 2016 [HS].

MC168. *Lethrinops longipinnis* Eccles & Lewis 1978

Lethrinops longipinnis was described by Eccles & Lewis from 21 specimens. The holotype was trawled from around 80m depth off Monkey Bay. The species is distinguished by its strongly laterally compressed, deep body, long downwardly angled snout and low number of gillrakers (9-12). The tips of the jaws project beyond the snout profile. Mature males are dark with strong vertical barring, sometimes showing bright metallic blue on the head (fig. 168.2), sometimes golden flanks (fig. 168.3). Fins are generally dark without a pale dorsal margin or obvious spotting. Overall, it is very similar to *Lethrinops argenteus,* although the male colours are very different (blue head v red head in *L. argenteus*). Snoeks & Hannsens (2004) report that lower gill rakers have a long lateral lobe (v short in *Lethrinops argenteus*) and it generally lacks enlarged medial posterior teeth on the lower pharyngeal bone (v around 15 slightly enlarged in *L. argenteus*). Teeth in 2, occasionally 3, rows (v 3-4 in *L. argenteus*). *Lethrinops longipinnis* tends to be found in deeper water than *L. argenteus*. In diet studies, it has not been reliably distinguished from *L. argenteus*, and stomachs are reported to contain chironomids, oligochaetes, chaoborus and detritus (Eccles & Lewis 1979, Darwall 2003). Sequence analysis of a specimen from deep water near Monkey Bay shows it is a member of the deepwater clade (Blumer et al. 2025).

Fig. 168.1: Type of *Lethrinops longipinnis*, London Natural History Museum [GFT]

Fig. 168.2: *Lethrinops longipinnis*. Mature male, trawled from SE Arm, 1992, not sequenced [GFT]

Fig. 168.3: *Lethrinops longipinnis*. Mature male, trawled from 90m depth, off Monkey Bay, 24 Feb 1992, not sequenced [GFT]

Fig. 168.4: *Lethrinops longipinnis* D13-J01, sequenced, trawled from 95-105m East of Domwe Island, SE Arm, 4th March 2016 [HS]

MC169. *Lethrinops lunaris;* MC170. *Lethrinops macracanthus*; MC171. *Lethrinops macrochir*; MC172. *Lethrinops macrophthalmus*; MC173. *Lethrinops marginatus*; MC174. *Lethrinops micrentodon*; MC175. *Lethrinops microdon*; MC176. *Lethrinops microstoma*; MC177. *Lethrinops mylodon*;

None of these have been sequenced, as yet.

Lethrinops oculatus is now considered a junior synonym of *Lethrinops marginatus,* and so has not been given and MC number. A specimen identified as *L. oculatus* in Blumer et al. (2025) is now believed to be MC165 *Lethrinops leptodon*.

MC178. *Lethrinops parvidens* Trewavas 1931

Lethrinops parvidens was described from 8 specimens from Mangochi to Makanjila (SE Arm/Upper Shire); 2 rows of jaw teeth, 9-11 gill rakers, a few medial LPJ teeth enlarged, sometimes 10 vertical bars. Up to 128mm TL. Figured specimen (fig. 178.1) seems to be a ripe male, suggesting it is mature at 10cm SL, which is a lot smaller than max size in Eccles & Lewis. Re-described by Eccles & Lewis (1979) up to 14cm SL. Their illustration (fig. 178.2) does not bear a strong relationship to the one in Eccles & Trewavas (1989), having a relatively deep body and long snout, 9 vertical bars under the dorsal fin. Photographs of specimens collected by Turner (1996) do not really fit either of these illustration well, although they have similar gillraker counts (e.g. fig 178.3). A specimen sequenced by Blumer et al. (2025) under this name has a very steep head profile with a convex 'nose', more reminiscent of a *Tramitichromis* species and is now listed as *Tramitichromis* sp. 'trilineatus plain' (MC. 498).

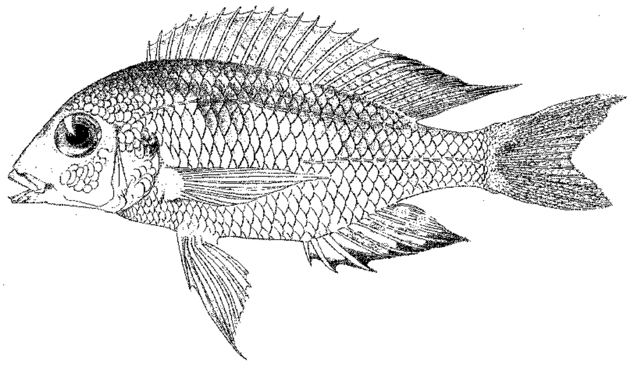


Fig. 178.1: Drawing of one of the types of *Lethrinops parvidens* from Eccles & Trewavas 1989.

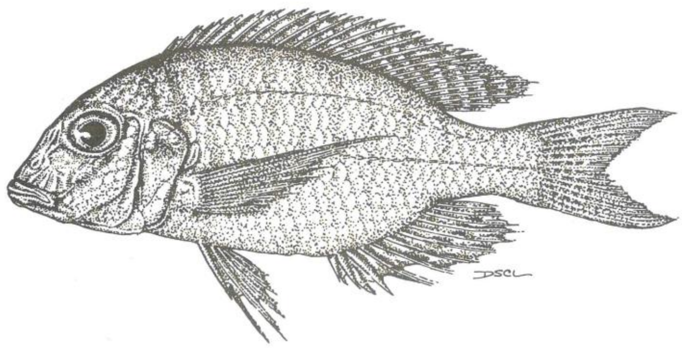


Fig. 178.2: Drawing of a non-type specimen putatively of *Lethrinops parvidens* from Eccles & Lewis 1979.

Fig. 178.3: *Lethrinops c.f parvidens* sensu Turner (1996), male, not sequenced trawled from 46-50m, SE Arm: Chirombo-Nkhudzi, 29-Jul-91 [GFT].

MC179. *Lethrinops* sp. 'aulonocara type'; MC18. *Lethrinops* sp. 'auritus lion'; MC81. *Lethrinops* sp. 'auritus selewa'; MC18. *Lethrinops* sp. 'big-head'; MC183. *Lethrinops* sp. 'blue-orange'; MC184. *Lethrinops* sp. 'boadzulu'; MC185. *Lethrinops* sp. 'christyi fort maguire';

MC186. *Lethrinops* sp. 'deep-water albus'

Lethrinops sp. 'deepwater albus' is a name for an undescribed species first recorded by Turner (1996) for a common deepwater species routinely misidentified as *Lethrinops albus* among trawl survey records in the Monkey Bay Fisheries Research Unit. It is a deep-bodied species with few gillrakers (ca 9), a steep head profile but shorter snout than members of the *Lethrinops longipinnis* complex. They have thin lips and the closed jaws project beyond the head profile. Two different male breeding colours have been observed, one with dark vertical bars and a blue head appears to have the same male breeding dress as the co-occurring *Lethrinops longipinnis* (MC168) but is morphologically indistinguishable from *Lethrinops* sp 'deepwater albus yellow' (MC187). A specimen collected from deep-water off Domwe Island was sequenced by Blumer et al. (2025) under the name *Lethrinops* sp 'albus green-head', or Le albus GH on the tree. It was not closely related to the other species, *Lethrinops* sp 'deepwater albus yellow' (MC187) and was also distinct from *Lethrinops longipinnis*. All three taxa were members of the deep benthic clade however.

Fig. 186.1: *Lethrinops* 'sp deep-water albus'. Mature male, trawled from 90m depth, off Monkey Bay, 24 Feb 1992, not sequenced [GFT]

Fig. 186.2: *Lethrinops* 'sp deep-water albus'. D13-I10, sequenced, trawled from 95-105m East of Domwe Island, SE Arm, 4th March 2016 [HS]

MC187. *Lethrinops sp.* 'deepwater albus yellow'

Lethrinops sp. 'deepwater albus' is a name for an undescribed species first recorded by Turner (1996) for a common deepwater species routinely misidentified as *Lethrinops albus* among trawl survey records in the Monkey Bay Fisheries Research Unit. It is a deep-bodied species with few gillrakers (ca 9), a steep head profile but shorter snout than members of the *Lethrinops longipinnis* complex. They have thin lips and the closed jaws project beyond the head profile. Two different male breeding colours have been observed, one with dark vertical bars and a blue head (MC186). Other individuals have an orange-brown body and blue-green snout and operculum and are nicknamed *L.* sp. 'deepwater albus yellow' (Blumer et al. 2025: Le albus deepwater; fig. 187.2). Sequence analysis indicates that both are members of the deep benthic clade, but are not closely-related (Blumer et al. 2025).

Fig.187.1: *Lethrinops* sp. 'deepwater albus yellow', male, C5, trawled from 74-78m, 10 Nov 2010 (not sequenced, but 5 clips available)

Fig. 187.2: *Lethrinops* sp. 'deepwater albus yellow', sequenced, D11-D05, UCZM 2016.40.48; trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016 [HS].

MC 188. *Lethrinops* sp. 'deep-water altus': this 'species' is now believed to be a mixture of *Placidochromis intermedius* Hanssens 2004 (19-22 lower gillrakers) and *Placidochromis communis* Hanssens 2004 (8-10 lower gillrakers, white dorsal submarginal band). A marker & MC code are left here to redirect readers and in case any additional phenotypes are found do not conform to either of those taxa.

MC 189. *Lethrinops* sp. 'domira blue'; MC190. *Lethrinops* sp. 'gossei white-bar'; MC191. *Lethrinops* sp. 'grey'; MC192. *Lethrinops* sp. 'longimanus likoma'

Not yet sequenced

MC193. *Lethrinops sp.* 'longimanus redhead'

Lethrinops sp. 'longimanus redhead' is an undescribed species first collected by M.J. Genner in 2004 and illustrated in Konings (2016). The species has relatively steep head profile, inflected above the eye, short snout, 7 bars under the dorsal fin, 8-9 lower arch gillrakers. The lower pharyngeal bone is slender with small crowded teeth. Male breeding dress is distinctive with a blue head and red nape. The species is a deep-water dweller, its morphology suggesting feeding on soft-bodied benthic invertebrates. A species description is in progress. Sequence analysis indicates it is a member of the deepwater clade (Blumer et al. 2025).

Fig. 193.1: *Lethrinops* sp. 'longimanus redhead', male, 2004.A64, SE Arm, 13 August 2004 [MJG]

Fig. 193.2: *Lethrinops* sp. 'longimanus redhead' D14-A08, UCZM 2016.44.22; trawled from 95-105m off Domwe Island, 4 March 2016 [HS]

Fig. 193.4: *Lethrinops* sp. 'longimanus redhead' D14-A08, UCZM 2016.44.22; lower pharyngeal jaw [GFT]

MC194. *Lethrinops* sp. ‘longipinnis deepwater’; MC195. *Lethrinops* sp. ‘longipinnis ntekete’;

Not yet sequenced.

MC196. *Lethrinops sp.* 'longipinnis white lappets'

Lethrinops sp. 'longipinnis white lappets' was first identified as distinct by Snoeks & Hanssens (2004), who distinguished 4 putative species that had previously been confused as *Lethrinops longipinnis* Eccles & Lewis 1978. All of these forms are similar in overall phenotype, having deep, laterally compressed bodies, a mouth low on the head at the end of a long snout, and relatively few gillrakers (modally 9-10 on lower outer arch). Four sets of male breeding colours were noted, each associated with subtle and often overlapping differences in body depth, gillraker count, pharyngeal bone form and depth preference. This preliminary work has not been followed up by formal or quantitative analyses and no photographs of males in breeding dress were published. However, only one of the four stated to have white dorsal fin lappets and it was nicknamed 'longipinnis white lappets'. The type of *L. longipinnis* is a female with its mouth fixed open, which does not give a good overview of the body shape or male breeding dress but at least shows the long-snouted appearance. Snoeks & Hanssens (2004) state that *L.* sp. 'longipinnis white lappets' is relatively elongate, which is certainly true of our sequenced specimen (Fig. 196.1) which also shows white lappets (Fig. 196.2) and prominent orange spots in the soft dorsal fin and spots and stripes in the caudal (Fig. 196.1), which are not seen in *L. longipinnis* (MC168), in which mature males have dark fins. Eccles & Lewis's description makes no mention of white lappets, but states that mature males have strongly barred flanks not seen in our 'white lappets' specimen. Prominent spotting in the unpaired fins is uncommon in deep-water *Lethrinops* species, and indeed genome sequences indicate that *Lethrinops* sp. 'longipinnis white lappets' is a member of the shallow benthics clade, in contrast to both *L. longipinnis* and the morphologically similar *L. argenteus*, which are both deep-water clade taxa. Its closest relatives appear to be *L. lethrinus* and *L. leptodon*, both relatively deep-bodied, long-snouted species (Blumer et al. 2025).

Fig. 196.1: *Lethrinops sp.* 'longipinnis white lappets' D24-E07, no voucher specimen found; Pair trawl, SW Arm (Malembo) 21 Jan 2017 [HS]

Fig. 196.2: *Lethrinops sp.* 'longipinnis white lappets' D24-E07: close-up of dorsal fin showing white lappets [HS]

MC197. *Lethrinops* sp. 'loweae'; MC198. *Lethrinops* sp. 'macrochir mumbo'; MC199. *Lethrinops* sp. 'macrochir nkhudzi'; MC200. *Lethrinops* sp. 'macrophthalmus goldhead'; MC201. *Lethrinops* sp. 'macrostoma'; MC202. *Lethrinops* sp. 'makokola'; MC203. *Lethrinops* sp. 'marginatus liuli'; MC204. *Lethrinops* sp. 'matumbae'; MC205. *Lethrinops* sp. 'mbasi'; MC206. *Lethrinops* sp. 'mbenji deep'; MC207. *Lethrinops* sp. 'mbenji roundhead'; MC208. *Lethrinops* sp. 'mdoka red'; MC209. *Lethrinops* sp. 'nyassae'

None of these have yet been sequenced.

MC210. *Lethrinops sp.* 'oliveri'

Lethrinops sp. 'oliveri' was first reported by Turner (1996; fig. 210.1) although the name was previously in wide use in the Monkey Bay Fisheries Research Unit. It is a medium-sized species with 17-21 lower gillrakers. Males have dark fins, with elongated filaments, a strongly forked tail and 7 vertical bars under the dorsal fin. The dorsal fin has a black margin and the snout has blue iridescence, while the nape, opercula and chest are yellow. Turner (1996) reported the species was common in trawls from depths greater than 60m in the south of the lake. A specimen sequenced by Blumer et al. (fig. 210.2) was collected from a trawl in the SE Arm of the lake in 2004. Stomach contents were dominated by diatoms and detritus, with a few varied invertebrates (Darwall 2003). Genome sequence analysis places it among the deep benthics, with its close relatively mostly species of the *Placidochromis* group (Blumer et al. 2025). However, it has 'Lethrinops-style' lower jaw dentition.

Fig. 210.1: *Lethrinops sp.* 'oliveri' trawled from 90m depth off Monkey Bay, 21-May-92 [GFT]

Fig. 210.2: *Lethrinops* 'oliveri', 2004.A77; trawled in the SE Arm, 13 August 2004 [MJG]

MC211. *Lethrinops* sp. 'orange forehead'; MC212. *Lethrinops* sp. 'parvidens north'; MC213. *Lethrinops* sp. 'pits'; MC214. *Lethrinops* sp. ‘red bar’; MC215. *Lethrinops* sp. ‘red cap tsano’; MC216. *Lethrinops* sp. ‘red cap’; MC217. *Lethrinops* sp. ‘silver crescent’; MC218. *Lethrinops* sp. ‘six-bar’; MC219. *Lethrinops* sp. ‘yellow chest’; MC220. *Lethrinops* sp. ‘yellow chin’; MC221. *Lethrinops* sp. ‘yellow collar’; MC222. *Lethrinops* sp. ‘yellow tail’; MC223. *Lethrinops* sp. ‘yellow’; MC224. *Lethrinops* sp. ‘zebra’; MC225. *Lethrinops stridei;* MC226*. Lethrinops turneri*

Not sequenced.

MC227. *Lethrinops sp.* 'blue chilumba'

Lethrinops sp. 'blue chilumba' is an undescribed species first collected by M.J. Genner in 2005 (fig. 227.1), but not previously mentioned in print. It has a relatively deep body, a straight head profile and terminal mouth. The male breeding colour of the specimen is probably not fully developed, but includes a blue snout and golden nape. Voucher specimens have not been located, so it is not possible to give an overview of other features such as dentition or gillrakers. Indeed, it may even have *Placidochromis* dentition. Sequences indicate it is a member of the deepwater clade (Blumer et al. 2025).

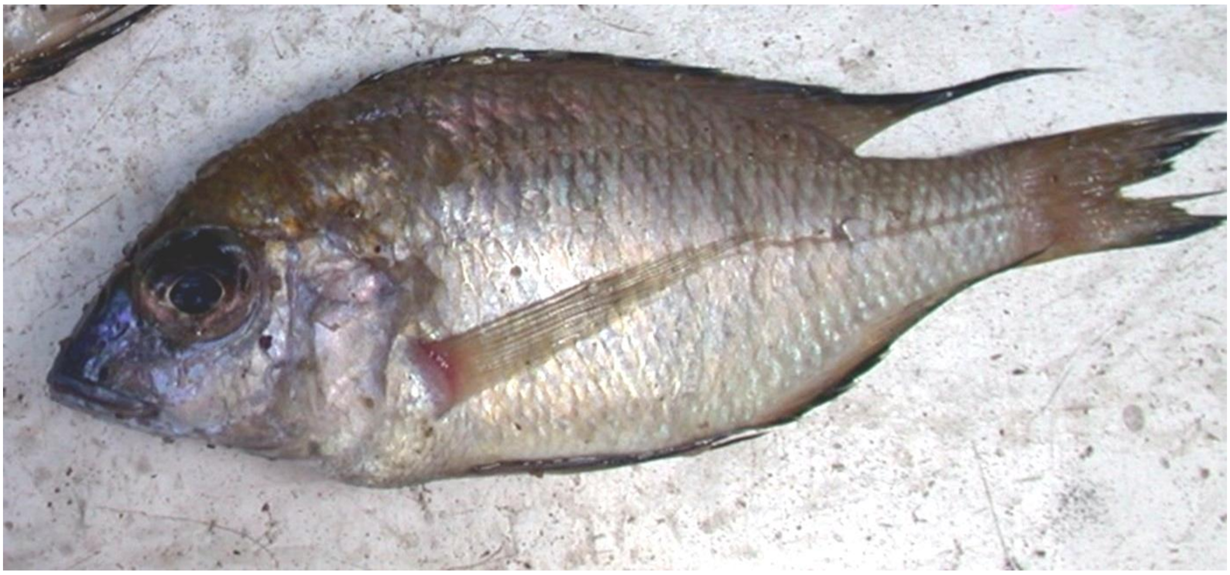


Fig. 227.1: *Lethrinops* sp. 'blue chilumba', 2005.275A, purchased from fish traders. Chilumba, 10 May 2005 [MJG]

MC228. *Lethrinops sp.* 'bluenose'

Lethrinops sp. 'bluenose' is a small species from soft bottomed habitats from 30-50m depth (fig. 228.1-3). Mature males have an orange-yellow head, nape and chest, with a blue snout and a wide white dorsal fin margin with yellow tips. It has a short, rounded snout and relatively large eyes. Mature adult males are around 50-62mm SL. The dental arcade is 'Lethrinops-style'. Lower jaw slightly retrognathous. Outer teeth erect, crowded, equally bicuspid. Inner teeth in 1-2 rows, pointed, tricuspid. Gillrakers simple (or finger with wider base), short and wide. 3/1/9-12. Cephalic lateral line pits not noticeably expanded- maybe a little below operculum. 2-3 rows of cheek scales. LL32, caudal scaled over lower ¼. D XIV-XVI, 9-10; A III, 8-9. The lower pharyngeal bone has a few enlarged teeth in the posteromedial area. It is possibly conspecific with *Lethrinops* sp. 'blue-orange' of Turner (1996): photographs of that species show a similar body shape but stronger vertical barring and a bright yellow head, with no blue iridescence on the snout (fig. 228.4). Sequences indicate it is a member of the deepwater clade (Blumer et al. 2025).

Fig. 228.1: *Lethrinops* sp. 'blue-nose', male 51mm SL, D13-E09, UCZM 2016.43.13; 45-50m, NE of Boadzulu Is, SE Arm, 3 March 2016 [HS] and lower pharyngeal bone [GFT]

Fig. 228.2: *Lethrinops* sp. 'blue-nose', male 54.5mm SL, D12-J01, UCZM 2016.41.32; trawled from 30-40m off Makanjila, SE Arm, 2 March 2016 [HS]

Fig. 228.3: *Lethrinops* sp. 'blue-nose', male 61.8mm SL, D13-E08, UCZM 2016.43.8; 45-50m, NE of Boadzulu Is, SE Arm, 3 March 2016 [HS]

Fig. 228.4: *Lethrinops sp* 'yellow', not sequenced, trawled from 40-50m, SE Arm, off Namalaka, 23-Oct-91 [GFT]

MC229. *Lichnochromis acuticeps* Trewavas 1935

Lichnochromis acuticeps was described by Trewavas (1935) from a single specimen. The species (and genus) were characterized by the oblique stripe, long snout and beak-like premaxillae with long slender teeth. The illustration of the type indicates quite thin looking lips with prominent long teeth, but this might be a preservation artifact, because other illustrations show specimens with quite fleshy lips. The species is reported to feed among rocks, squeezing its snout into crevices (Konings 2016). Although a specimen has been collected (in 2018), it has not yet been sequenced.

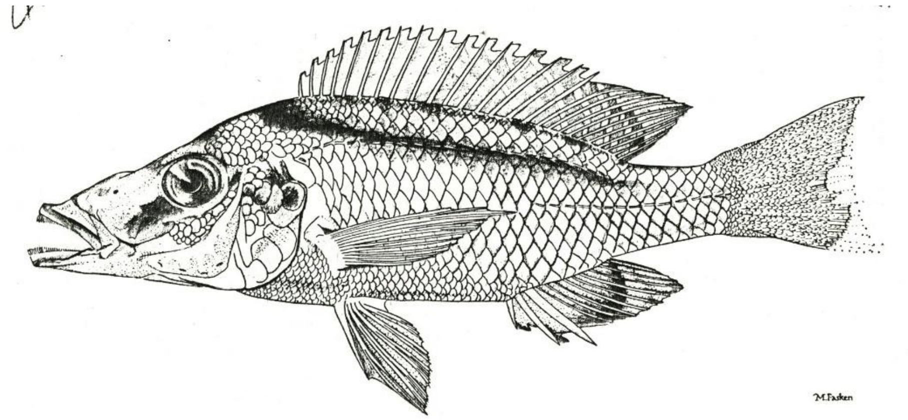


Fig. 229.1: *Lichnochromis acuticeps,* holotype, illustrated by Fasken & printed in Eccles & Trewavas (1989).

Fig. 229.2: *Lichnochromis acuticeps,* illustrated by Snoeks & Hanssens (2004).

Fig. 229.3: *Lichnochromis acuticeps,* photographed underwater [AK]

Fig. 229.4: *Lichnochromis acuticeps,* collected Nkhata Bay, 17 April 2018 [GFT]

Mchenga Stauffer & Konings 2006. MC230-239.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Copadichromis cyclicos* Stauffer et al. 1993.

Contained valid species: *M. conophoros, M. cyclicos, M. eucinostomus, M. flavimanus, M. inornatus, M. thinos.*

Proposed undescribed taxa: None.

Taxa considered invalid: None.

Generic reviews & diagnoses: Stauffer & Konings 2006.

Generic diagnosis: "Small, slender species with 10-18 gillrakers on first lower arch, protrusible mouth, lack of spots or stripes on flanks (sometimes faint vertical bars). Adult males have small bicuspid teeth in the outer row of oral jaws (v unicuspids in mature male *Copadichromis*). Where known, build bowers in sandy habitats" Stauffer & Konings 2006.

Field Diagnosis: Slender fish with pointed snouts; sandy coloured lacking obvious melanic markings.

Phylogenetic comments: The genus was created to accomodate a number of bower-building, sandy shore species which had formerly been included in *Copadichromis.* Molecular analysis supports this, although *Mchenga* itself may not be monophyletic.

Ecomorphological notes: Schooling plankton feeders from sandy shores, male build sand castle bowers.

MC230. *Mchenga conophoros* Stauffer et al. 1993

Mchenga conophoros was originally described (as *Copadichromis conophoros*) by Stauffer and colleagues in 1993. It is one of a complex of three species that had previously been identified as *Haplochromis* (or *Cyrtocara* or *Copadichromis*) *eucinostomus*. The main distinguishing features among the species were the form of their sand-castle bowers and body size, but differences in other traits, including gillrakers and eye diameter were also noted (fig. 230.1). There was some mention of differences in male colours, but it is not clear how much really was species-specific, as generally they are blue and yellow with dark upper and lower margins to the tail fin and prominent yellow spots on the anal fin margin (fig. 230.2). One specimen sequenced by Blumer et al. was collected by SCUBA from shallow water at Chiofu Bay in the south east of the lake. It had strong colours, including a blue head, dark snout and chin, with a lot of yellow below the eye and behind the operculum, consistent with those of adult male *M. conophoros, M. cyclicos* and *M. thinos* (fig. 230.3). The body shape overall looks like a breeding male of the larger *M. conophoros or M. cyclicos*. Lower gillraker count of 6/1/14 only fits with *M. conophoros* (LGR 13-15, mode 14: Stauffer et al. 1993). *M. cyclicos* has 10-12 LGR, *M. thinos* has 11-13, while *M. eucinostomus*, *M. flavimanus* and *M. inornata* all have 15+. Eye diameter is within the range of *M. conophoros* and *M. cyclicos*, but rather too small for *M. thinos* (32-35%). The type specimens of *M. thinos,* which are mature adults, range from 67.5-78.4mm SL, far smaller than our specimen's 93.2mm SL. The mouth angle seems within the normal range of all of these species. In the sequencing study of Blumer et al. (2025), this specimen is labelled as 'Mc Chiofu', and is nested with the 'slender sand clade' that include 2 further *Mchenga,* along with *O. aryrosoma, O. decorus, O. styrax, M. ensatus* etc. and the less slender *P. annectens*.

Table 230.1: Distinguishing features of known *Mchenga* species.

Species	Lower Gillrakers	% Eye/HL	Other features	Source
M. flavimanus	15-18 (mode 17)	31-36	Deep body, yellow pelvic & anal	1
M. eucinostomus	15-17 (types 17)	27-30		2,3
M. inornata	15-16	33		2
M. conophoros	13-15	27-32	Darker male caudal fin	3
M. thinos	11-13	32-35	Paler male caudal fin	3
M. cyclicos	10-12	29-37	Darker male caudal fin	3

1. Iles 1960; 2. Eccles & Trewavas 1989; 3. Stauffer et al. 1993

Table 230.2: Comparison of D07-G10 to types of *M. conophoros*, data from Stauffer et al. (1993).

	SL	Head Length	Body Depth	Eye Diameter	Snout Length
D07-G10	93.2mm	27.1mm	29.7mm	8.2mm	9.55mm
As %SL/HL	-	29.1% SL	31.9% SL	30.3% HL	35.2% HL
M. conophoros Types	90.5-111.0	24.9-32.0% SL	31.2-36.8% SL	26.9-32.2% HL	29.1-34.2% HL

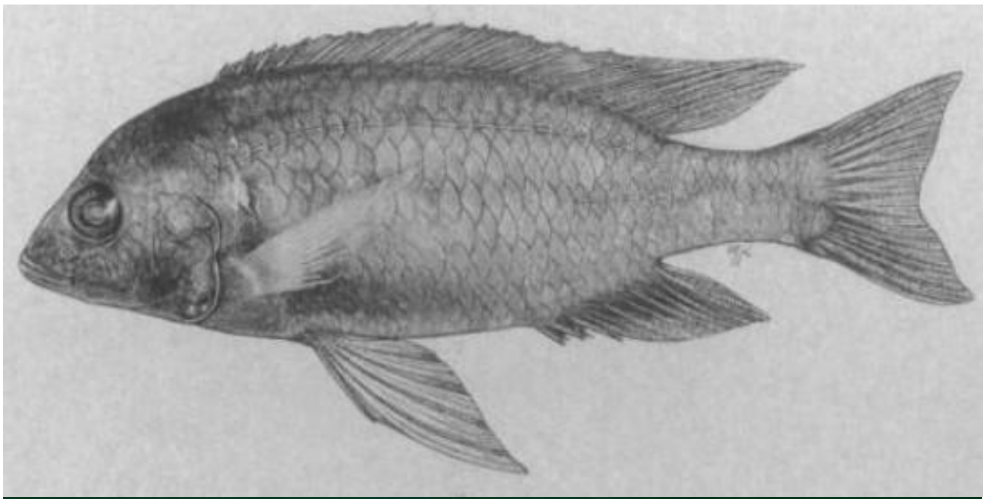


Fig. 230.1: *Mchenga conophoros* male. Drawing of holotype from original description. 109mm SL.

Fig. 230.2: *Mchenga conophoros* male, Chembe [AK]

Fig. 230.3: *Mchenga conophoros*, male, D07-G10, UCZM 2016.33.4; SCUBA, Chiofu, 26 Feb 2016 [HS]

Fig. 230.4: *Mchenga conophoros*, male, D07-G10, UCZM 2016.33.4; lower pharyngeal bone is slender with small teeth, typical of a plankton-feeder [GFT]

MC231. *Mchenga cyclicos* (Stauffer et al. 1993);

Mchenga cyclicos seems very similar to *M. conophoros*, but has a lower gillraker count and builds larger bowers at depths of 3-7m. It was not sequenced by Blumer et al. (2025).

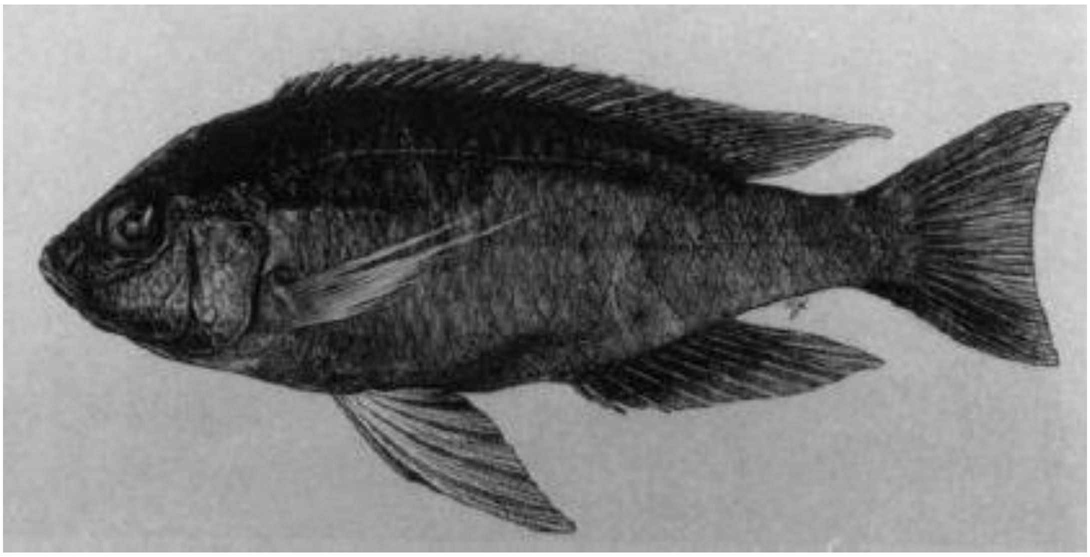


Fig.231.1: *Mchenga cyclicos* male. Drawing of holotype from original description. 116mm SL.

MC232. *Mchenga eucinostomus* (Regan 1922)

Described by Regan in 1922 from 2 specimens, it does not seem that this species has been recognised since, and it has not been sequenced. The gill raker counts (15-17 LGR) would allow it to be discriminated from the Stauffer et al. *Mchenga* species. For their redescription, Eccles & Trewavas (1989) included 22 additional specimens from the Christy collection (1925-26), all from the far north of the lake. Snoeks & Hanssens (2004) suspect these might represent more than one species. It is surprising that none of them had the low gillraker counts seen in the Stauffer et al. species.

Fig. 232.1: *Mchenga eucinostomus* lectotype. Male, 72mm SL. [GFT: 2023]

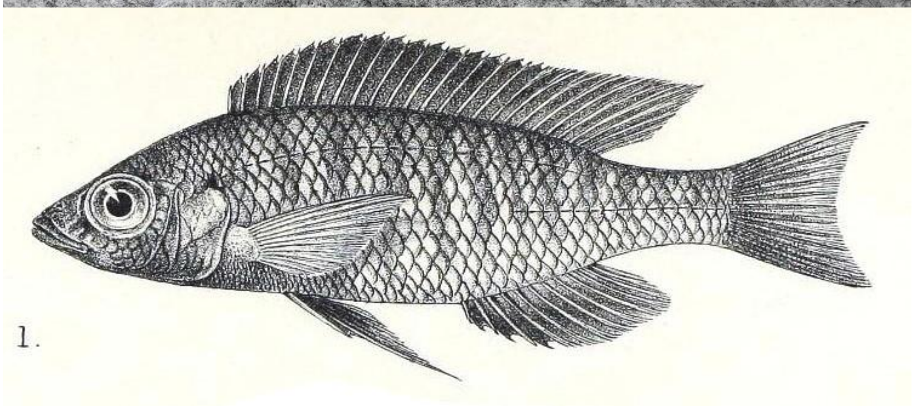


Fig. 232.2: *Mchenga eucinostomus.* Drawing of lectotype from Regan 1922. Male, 72mm SL.

MC233. *Mchenga flavimanus* (Iles 1960)

Mchenga flavimanus was described by Iles (1960) as *Haplochromis flavimanus*, from a large number of type specimens collected near Nkhata Bay. It is distinctive on the basis of its unspotted flanks, yellowish pelvic and anal fins and low number (15-18) of lower gillrakers. It is much deeper-bodied than any of the other *Mchenga* species. The mouth is not very protrusible. It has been placed in *Mchenga* on the basis of having small bicuspid outer teeth, but according to Stauffer & Konings (2006) this is a feature of mature males and none of the type series appear to be mature males, at least when judged from colouration. This species has not been positively identified since the collections by Iles, although Konings (2016) has the odd photo of juvenile fish with yellow fins that might be this species.

Fig. 233.1: *Mchenga flavimanus* holotype. Female, 84mm SL. [GFT 2023]

Fig. 233.2: Mchenga flavimanus paratype [GFT 2023]

Fig 233.3: *Mchenga flavimanus* (?) Kande Island [AK]

MC234. *Mchenga inornata* (Boulenger 1908)

Although described in 1908 by Boulenger (as *Tilapia inornata*), from two specimens, this small, rather non-descript species has not been positively identified since.

Fig. 234.1: *Mchenga inornata,* syntype – presumably paralectotype, 80mm SL, (direction reversed). [Konings]

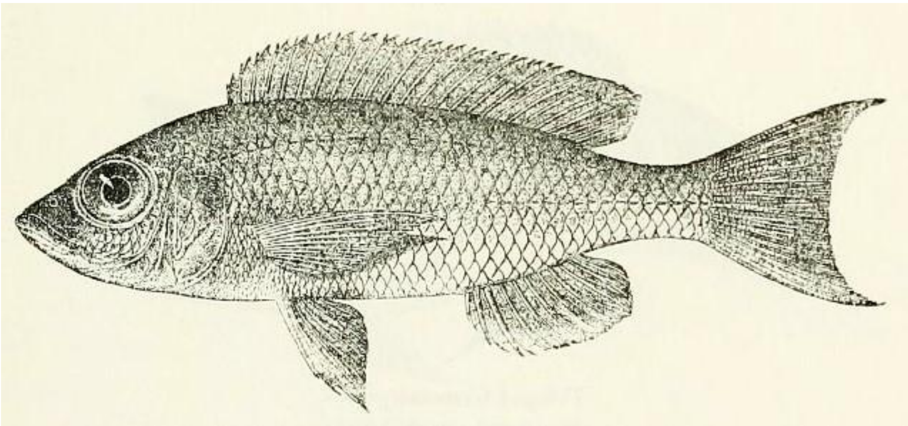


Fig. 235.1: *Mchenga thinos* male, drawing of lectotype from original description. 78mm SL.

MC235. *Mchenga thinos* (Stauffer et al. 1993).

Mchenga thinos was originally described (as *Copadichromis thinos*) by Stauffer and colleagues in 1993, as one of three species that had previously been identified as *Haplochromis eucinostomus,* later *Cyrtocara* or *Copadichromis eucinostomus.* All three species breed are plankton feeders that live over sand, breeding on leks (mating aggregations) in sandy areas, with males constructing 'sand castle' bowers. Females and immature males are generally sandy-coloured, slender fish with no obvious melanic markings, apart from sometimes showing faint vertical barring. Mature males are blue, yellow and black. The type specimens of M. thinos are smaller than those of the other two species, and they have a low gillraker count (11-13 LGR). Two sequenced specimens of *Mchenga* body shape were obtained from trawls at 45-50m. Stauffer et al. (1993) reported breeding arenas at 15-25m depth, rather deeper than usual for the other species, so it seems possible they might breed a little deeper in some areas, or that the fish we collected were in non-breeding shoals. The sequenced specimens both had gillraker counts of 5/1/11, which fits well with *M. thinos*. Their sizes fit well with the types of *M. thinos*, considering that the smaller one did not seem fully mature. Major morphometric ratios seem a good match too (Table 235.1).

Phylogenetically, they don't seem close to anything else, and lie in a rather basal position within the shallow water non-*Lethrinops* group, branching after the 'electra/anaphyrmus' group (Blumer et al. 2025: Labelled as Mc black Y). This is rather a surprise, because they seem very similar to *M. conophoros*, but Malawi cichlids are full of parallelisms!

Table 235.1: Comparison of the sequenced specimens to types of *M. thinos*, data for the latter from Stauffer et al. (1993).

	SL	**Head Length**	**Body Depth**	**Eye Diameter**	**Snout Length**
D13-G01	62.5mm	18.5mm	18.9mm	6.15mm	6.0mm
D14-H04	69.6mm	20.7mm	19.0mm	6.82mm	6.3mm
As %SL/HL	-	29.6-29.7% SL	27.3-30.2% SL	33.2-32.9% HL	31.7-33.1% HL
M. thinos Types	67.5-78.4mm	28.3-30.7% SL	29.6-34.2% SL	32.3-35.4% HL	29.4-33.6% HL

Fig. 235.1: *Mchenga thinos* male underwater, showing some of the range of expression of colours in a territorial male. [AK]

Fig. 235.2: Another *Mchenga thinos* male underwater. [AK]

Fig. 235.3: *Mchenga thinos*, recorded as *Nyassachromis* sp. 'eucinostomus yellow' by Turner (1996). Reported as having 10 lower gilrakers, trawled from 35m, SE Arm, Chirombo Bay, 13-Apr-92 [GFT].

Fig. 235.4: *Mchenga thinos* mature male, D14-H04, UCZM 2016.45.19 ; trawled from 20m off Malembo, SW Arm, 4 March 2016 [HS]

Fig. 235.5: *Mchenga thinos*, maturing male?, D13-G01, UCZM 2016.43.2; trawled from 45-50m depth, NE of Boadzulu Island, SE Arm, 3 March 2016 [HS]

MC236. *Mchenga* sp. 1 ('black & yellow'): see MC235. *Mchenga thinos*

MC237. *Mchenga* sp. 2 ('blue & yellow'): See MC230. *Mchenga conophoros.*

MC238. *Mchenga* sp. 3 ('blue & yellow'), see MC296. *Nyassachromis* sp. 'argyrosoma blue'

MC239. *Mchenga* sp. 4, see MC297. *Nyassachromis* sp. 'longsnout'

Mylochromis Regan 1920. MC240-281.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Chromis lateristriga* Günther 1864

Contained valid species: *Mylochromis anaphyrmus; Mylochromis balteatus; Mylochromis chekopae; Mylochromis durophagus; Mylochromis ensatus; Mylochromis epichorialis; Mylochromis ericotaenia; Mylochromis Formosus; Mylochromis gracilis; Mylochromis guentheri; Mylochromis incola; Mylochromis labidodon; Mylochromis lateristriga; Mylochromis melanonotus; Mylochromis melanotaenia; Mylochromis mola; Mylochromis mollis; Mylochromis obtusus; Mylochromis plagiotaenia; Mylochromis rotundus; Mylochromis sphaerodon; Mylochromis spilostichus; Mylochromis subocularis*

Proposed undescribed taxa: Mylochromis sp.'anaphymus spots'; Mylochromis sp.'anaphymus weak' Mylochromis sp.'balteatus mozambique'; Mylochromis sp.'chrysogaster line'; Mylochromis sp.'deep'; Mylochromis sp.'guentheri mbenjii'; Mylochromis sp.'guentheri molaform'; Mylochromis sp.'ikombe'; Mylochromis sp.'incola mumbo'; Mylochromis sp.'kande'; Mylochromis sp.'lateristriga makanjila'; Mylochromis sp.'lateristriga nkhata'; Mylochromis sp.'liemi small-mouth'; Mylochromis sp.'melanonotus deep'; Mylochromis sp.'mollis gallireya'; Mylochromis sp.'mollis likoma'; Mylochromis sp.'sphaerodon nkhomo'; Mylochromis sp.'steep-head broken-stripe'; Mylochromis sp.'torpedo elongate'

Taxa considered invalid: *Mylochromis semipalatus (=M. melanonotus).*

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas described the genus *Maravichromis* in 1989, type *Haplochromis ericotaenia* Regan, and offered a diagnosis.

“Haplochromines endemic to Lake Malawi, resembling *Buccochromis*, in which the principal component of the melanin pattern is an oblique band or series of spots from the nape to the base of the caudal, but having a smaller mouth with the lower jaw 2.3 to 3.4 times in head length and less numerous close-set outer teeth, 30 to 64 in outer series of upper jaw (58 to 92 in *Buccochromis*). Outer teeth usually bicuspid, but simple in adults of some species.” This diagnosis was really just a comparison with *Buccochromis,* yet there are numerous other Malawian genera in which some or all species can exhibit and oblique stripe.

Derijst & Snoeks (1992) pointed out that *Maravichromis* was a junior synonym of *Mylochromis* Regan 1920 – this genus had appeared in a footnote on a paper on Lake Tanganyika cichlids and then was not used in Regan’s own paper on Lake Malawi cichlids in 1922. It has been assumed that the diagnosis of *Maravichromis* moved across to *Mylochromis*. Konings (1989) initially included a number of species from other Eccles & Trewavas genera within *Maravichromis* (Konings 1989), seemingly not wanting to overwhelm his readership with too many new names! Some were moved back out in later editions, e.g. *Caprichromis* species. Konings (1993) decided that *Platygnathochromis melanonotus* was actually conspecific with *M. semipalatus*, resulting in his proposal that *Mylochromis melanonotus* was a senior synonym of the latter. Snoeks & Hanssens found this hard to believe, but Konings has persisted with this and it is generally accepted. Another change was Konings’ decision to move a *Haplochromis gracilis* and *H. spilostichus* from *Sciaenochromis* into *Mylochromis*. Again this was not accepted by Snoeks and Hanssens, but Konings has stuck to his guns and the reclassification is accepted in Eschmeyer's catalog (Fricke et al. 2025). Finally, Konings (2016) has also placed *Haplochromis subocularis* in *Mylochromis* instead of *Placidochromis*. None of these changes have been accompanied by a revised generic diagnosis, so it is assumed that the diagnosis of *Maravichromis* Eccles & Trewavas 1989 still applies to *Mylochromis*.

Field Diagnosis: Oblique striped species that can't be put into any of the other genera. None very predatory-looking or with strongly upwardly-angled mouths.

Phylogenetic comments: The genus seemed set up to be at least paraphyletic, given the large number of other genera containing oblique-striped species. *Mylochromis* seems to have evolved at least 6 times independently and the oblique stripe, which is unique to Lake Malawi haplochromines among all cichlids, has evolved at least 10 times within the Malawi radiation, although how much this may have been affected by ancient hybridisation is unclear. Of the changes proposed by Konings, *M. melanonotus* and *M. spilostichus* are not supported: both are distantly related to the main group of *Mylochromis*, but *M. subocularis* is supported. Other unrelated taxa are *M. anaphyrmus*, *M. ensatus*, and *M. obtusus*. The type species, *M. lateristriga*, was not sequenced by Blumer et al. (2025), but a sequence is available (York et al. 2018).

Ecomorphological notes: *Mylochromis* are very diverse, but are mainly benthic invertebrate feeders over shallow sandy or muddy areas including a number of specialist molluscivores. *Mylochromis anaphyrmus* is unusual in having a wide depth range. A few species seem to prefer rocky areas, including the specialised crab-eating *M. epichorialis*.

MC240. *Mylochromis anaphyrmus* Burgess & Axelrod 1973

Haplochromis anaphyrmus was described from a single specimen by Burgess & Axelrod in 1973, being transferred to *Maravichromis* by Eccles & Trewavas (1989), ending up in *Mylochromis* as a result of Derijst & Snoeks' (1992) finding that this was the senior synonym. It is a heavily built species with an oblique stripe, steep head profile and molariform pharyngeal dentition. The most similar known species, *M. sphaerodon*, is more lightly-built with a more pointed snout, and generally has bright yellow pelvic and anal fins (v whitish fins in *M. anaphyrmus*) (Turner 1996; Konings 2016). Four of the specimens 8 sequenced by Blumer et al. (2025) were collected as a batch (5 fin clips in a single vial) from a trawl in 2010. 2 representative specimens were photographed (figs. 240.1-2).

Fig. 240.1: *Mylochromis anaphyrmus*, MA1-5(field code A5), male, trawled from 51-71m depth, SE Arm, 18 November 2010

Fig. 240.2 *Mylochromis anaphyrmus*, MA1-5(field code A5), apparent female, trawled from 51-71m depth, SE Arm, 18 November 2010

Fig. 240.3: *Mylochromis anaphyrmus*, 2004.A95, male, SE Arm, 13 August 2004

Fig. 240.4: *Mylochromis anaphyrmus*, D12-D10, UCZM 2016.41.73; apparent female, trawled from 20m depth, off Makanjila, SE Arm, 2 March 2016

Fig. 240.5: *Mylochromis anaphyrmus*, D13-C03, 2016.42.12; apparent female, trawled from 14-24m depth, off Mazinzi, SE Arm, 3 March 2016

Fig. 240.6: *Mylochromis anaphyrmus*, D03-H01, 2016.22.10; apparent male, seine fishing Chiweta Beach, Chilumba, 22 Feb 2016

Other specimens were sampled individually in 2004 and 2016 (representatives are shown in figs 240.3-6). Turner (1996) reported it as often abundant in trawls down to 72m in the south of the lake and stomachs contained mainly crushed molluscan remains, along with sand, detritus, algae and arthropods. Sequence analysis indicated that the species is related to *Placidochromis electra, Otopharynx selenurus* and most closely to the molluscivore *Otopharynx* sp. 'interruptus', but not to any other species with a continuous oblique stripe (Blumer et al. 2025).

MC241. *Mylochromis balteatus*; MC242. *Mylochromis chekopae*;

Not yet sequenced.

MC243. *Mylochromis durophagus* Turner 2024

This undescribed species was originally identified in the field as *Mylochromis cf. mollis*, but on examination of preserved specimens, was readily distinguished from that species by its molariform pharyngeal dentition. The oblique stripe and lack of other distinctive features marks the species out as a member of the genus *Mylochromis* Regan as presently understood. Three known species of this genus have strongly molariform pharyngeal bones: *M. anaphyrmus*, *M. mola* and *M. sphaerodon*. All have more ventrally placed mouths and steeper head profiles, particularly *M. anaphyrmus*. *Mylochromis mola* is further distinguished by having a blotchy rather than continuous oblique stripe and longer teeth in the outer rows of the oral jaws and *M. sphaerodon* by having yellow, rather than translucent/grey, pelvic and anal fins. One specimen, collected from Nkhata Bay by SCUBA divers on 20 Feb 2016, has been sequenced (fig. 243.1). It has also been selected as the holotype of the species (Turner 2024). A further 2 specimens (Nkhata Bay, Mphanga Rocks) are paratypes. Underwater photos by Konings (2016) of this species have probably been labelled *Mylochromis* sp. 'mollis chitande' (fig 243.3). It is resolved as a member of a group of *Mylochromis* species by sequence analysis, but appears under the name *M. mollis* (Blumer et al. 2025).

Fig. 243.1: *Mylochromis durophagus*, holotype, sequenced, male, 89.7mm SL, D01-I07, University Museum of Zoology, Cambridge: UMZC 2016.18.13, collected by SCUBA at Nkhata Bay 20 Feb 2016. [HS].

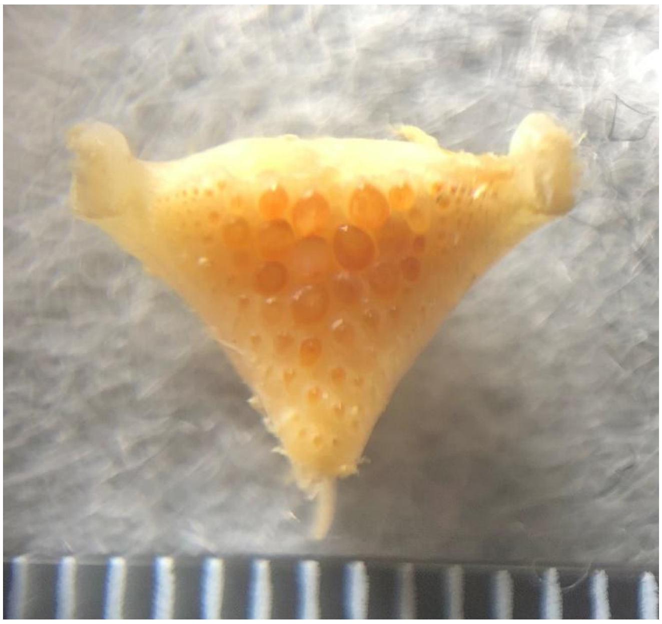


Fig 243.2: Heavily molarized lower pharyngeal bone of *M. durophagus*, female paratype, 80.0mm SL D04-J03, UMZC 2016.25.2, collected by SCUBA at Mphanga Rocks, Chilumba, 23 Feb 2016 [GFT].

Fig. 243.3: *Mylochromis* sp. 'mollis chitande' identified as probably *M. durophagus*. Top left: Male from Masimbwe, Bottom left: male from Maison Reef, Bottom right: female from Chitande Island. These locations are in a range reported by Konings (2016) from Mdoka (S of Ngara) to Maison Reef (S of Chilumba). [AK]

MC244. *Mylochromis ensatus* Turner & Howarth 2001

Mylochromis ensatus was described in 2001 by Turner & Howarth, from 10 specimens (fig. 244.-244.2). The species is distinguished by its elongated body, crescentic tailfin, oblique stripe and acutely pointed snout with mouth low on the head. It has bicuspid oral jaw teeth, in contrast to the unicuspid teeth of *Champsochromis*. A specimen sequenced by Blumer et al. (2025: fig. 244.3) was trawled from shallow water in the SE Arm, NW of Boadzulu Island, as were the type specimens. Nothing is known of its diet, but it has the morphology of a fast-moving predator of small benthic fishes.

Fig. 244.1: Holotype of *Mylochromis ensatus*, male in breeding colour, freshly collected, trawled from 15-23m depth NW of Boadzulu Island, 23 Oct 1991. [GFT].

Fig. 244.2: Paratype of *Mylochromis ensatus*, female, freshly collected, trawled from 15-23m depth NW of Boadzulu Island, 23 Oct 1991. [GFT].

Fig. 244.3: *Mylochromis ensatus*, D13-B09, UCZM 2016.42.13; trawled from 14-24m depth off Mazinzi, SE Arm, 3 March 2016 [HS]

MC245. *Mylochromis epichorialis* (Trewavas 1935)

Mylochromis epichorialis (formerly *Haplochromis, Maravichromis*) was described by Trewavas in 1935 from 2 specimens, the 166mm SL lectotype (designated by Eccles & Trewavas 1989: Fig, 245.1) and a 165mm paralectotype, both from Chilumba. The species is quite distinctive, with its huge head, long jaws and thick fleshy lips. The oblique stripe is very strong, wide and generally continuous. The lower pharyngeal bone is unusual in having lots of very large, stout, well-separated teeth, but pointed, not molariform (Fig. 245.1). The species is widely distributed and well-known from rocky shores, particularly where rocks are mixed with sand or other sediment. Adults have been observed to feed on crabs (Konings 2016). The specimen sequenced by Blumer et al. (2025) is a small juvenile (71.4mm SL), showing the distinctive stripe, but not the adult head shape (Fig 245.2). Much more clear-cut specimens are available (Fig. 245.3). It is possible that this small specimen might represent *Mylochromis incola*, which also has a large head. The specimen has bicuspid teeth in the outer series of the lower jaw, which is noted by Eccles & Trewavas (1989) to occur in smaller specimens of *M. incola*. Larger individuals of both *M. epichorialis* and *M. incola* have simple teeth, but no smaller *M. epichorialis* were examined by Eccles & Trewavas. The specimen also has a delicate lower pharyngeal bone with small teeth which doesn't fit with adults of either species (fig. 245.2). The species seems to be related to a clutch of other *Mylochromis*, but also to *Otopharynx* sp. 'heterodon Nankhumba' (Blumer et al. 2025).

Fig. 245.1: Lectotype of *Mylochromis epichorialis* BMNH 1935.6.14.2426 (left) and lower pharyngeal bone of the paralectotype BMNH 1935.6.14.2427 (right)

Fig. 245.2. *Mylochromis epichorialis* D01-D04, UCZM 2016.16.6, collected by SCUBA, Nkhata Bay, 20 Feb 2016 [HS] and lower pharyngeal bone [GFT].

UCZM 2016.16.6: 71.4mm SL, Head length 26.3mm, body depth 24.4mm, snout 10.3mm, lower jaw 10.8, upper jaw 7.8mm, eye 8.5mm, IO 5.7mm, Gill rakers 4/1/10; simple or lobed. Outer teeth bicuspid, inner pointed tricuspid 2 series. Lower pharyngeal bone small and delicate, fine teeth

Fig. 245.3. *Mylochromis epichorialis* D10-I08, UCZM 2016.38.72, collected by snorkellers, Chiofu Bay, 29 Feb 2016. Not yet sequenced.

MC 246. *Mylochromis ericotaenia*; MC247. *Mylochromis formosus*; MC248. *Mylochromis gracilis*;

Not yet sequenced.

MC249. *Mylochromis guentheri* (Regan 1922)

Not yet sequenced. Specimen formerly believed to be this species is now identified as *M. mollis* (Trewavas 1935). However some specimens from the 2023 trawl may be this species, if indeed it deserves to be treated as distinct from *M. mollis*.

Regan (1922) described *Haplochromis guentheri* from 9 specimens. It was later transferred to *Maravichromis* by Eccles & Trewavas, who erroneously identified a holotype, collected by Rhoades from an unknown location in Lake Nyasa (fig. 249.1), which has later been designed as the lectotype. This specimen had been included in *Tilapia lateristriga* by Boulenger (1915). Regan's type series included additional material collected later by Wood, presumably from Domira Bay. *Mylochromis guentheri* is the valid combination, as *Maravichromis* is now considered a junior synonym. The key feature of this species was said to be that the lower jaw tip lies behind that of the upper jaw, a retrognathous state, with the outer teeth of the lower jaw procumbent (fig 249.2; Regan 1922, Eccles & Trewavas 1989). However, the retrognathous state is not clear in all the type series (Fig. 249.2), and the central outer lower jaw teeth are sometimes damaged or missing, making their implantation state difficult to determine. *Mylochromis mollis* (Trewavas 1935) is essentially indistinguishable from *M. guentheri*, except that the outer teeth on the lower jaw are erect (see MC256; Trewavas 1935). It is possible that this might be a junior synonym of *M. guentheri*, but this is not the place for taxonomic revisions and more material is likely to be needed. The lower pharyngeal bone (of both species) is lightly-built and non-molariform, with numerous small, slender teeth (Fig. 249.3). The single specimen from Chiofu Bay sequenced by Blumer et al. (2025) has now reassigned *M. mollis* as currently understood, based on its erect lower jaw teeth. Little is known of the biology of the species. Morphology suggests they are benthic feeders eating small soft-bodied prey or detritus.

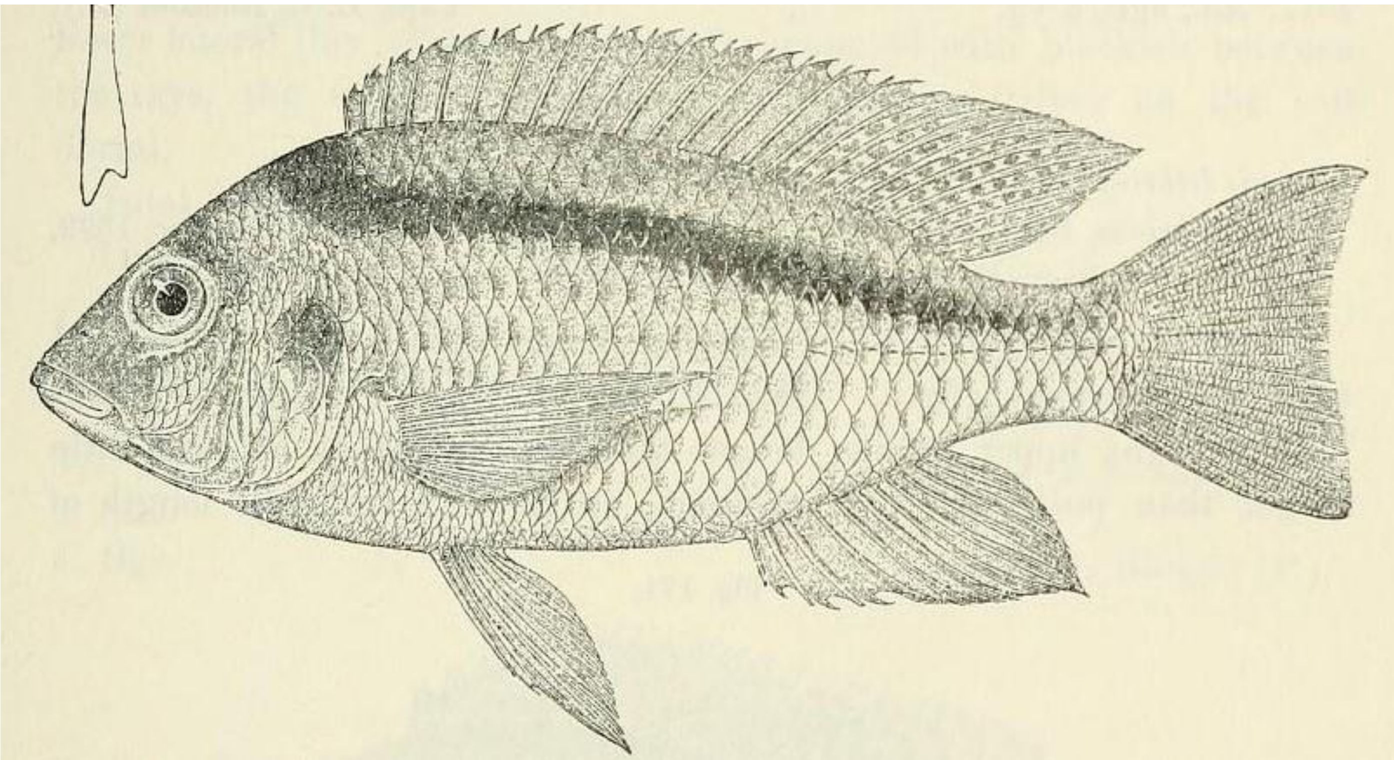


Fig. 249.1: *Mylochromis guentheri* (Regan 1922) Lectotype. BMNH 1908.10.27.85, collected by Rhoades from an unknown location in Lake Nyasa and originally illustrated in Boulenger as *Tilapia lateristriga*.

Fig 249.2: 'Overbite' of *M. guentheri*: Lectotype BMNH 1908.10.27.85 (above) and paralectotype BMNH 1921.9.6. 154-162; 148.5mm SL male (right).

Fig. 249.3: *Mylochromis guentheri* paralectotype BMNH 1921.9.6. 154-162; 122.6mm SL; with lower pharyngeal bone (right).

MC250. *Mylochromis incola*; MC251. *Mylochromis labidodon;*

It is probable that neither of these species have been sequenced. Some specimens once thought to be *M. labidodon* are actually *M. mola.* A specimen believed to be *M. epichorialis* might possibly be *M. incola*.

MC252. *Mylochromis lateristriga* Günther 1864

Mylochromis lateristriga was described (as *Chromis lateristriga*) by Günther 1864, as one of the first Lake Malawi endemics known, from a dried half-skin. Initially other oblique striped forms were included. For example, the representative illustration in Boulenger (1915) is in fact *Mylochromis guentheri*. The diagnostic features of the species are its relatively long forward-projecting snout, thick lips and slightly enlarged medial posterior lower pharyngeal teeth. Teeth in 3-4 series, outer bicuspid, 11-13 lower gillrakers. *Lichnochromis acuticeps* is similar, but has the same features in exaggeration, with a strikingly laterally compressed snout. Konings (2016) reports two apparently allopatric species. With *M. lateristriga* generally reported from the SE, SW Arms and Maleris*, M.* sp. 'lateristriga Makanjila' is reported from Ikombe in northern part of the Tanzania coast, south to Makanjila Point. This was also reported as *Mylochromis* sp. 'mchuse' by Spreinat (1994). On the north-west coast from Hora Mhango to Nkhata Bay, he reports a 3rd species, as M. sp. 'lateristriga Nkhata': the illustrated male seems a good fit but the female is less clear (she looks a bit like *M. rotundus*, which is known from this locality). It is notable that none of the ranges of these three taxa overlap. Provisionally, they would seem to be best considered as allopatric sister populations, probably conspecific. The Makanjila and Nkhata Bay populations are so far only known from underwater photos and aquarium reports, although one of specimens listed under *M. lateristriga* at the London Natural History Museum is from Vua in the far north. They are reported to feed on benthic arthropods in shallow sandy areas (Konings 2016). A single specimen from Thumbi West Island was sequenced by York et al. (2018), see figure 252.4.

Figure 252.1: *Mylochromis lateristriga*, type in 2025, [GFT]

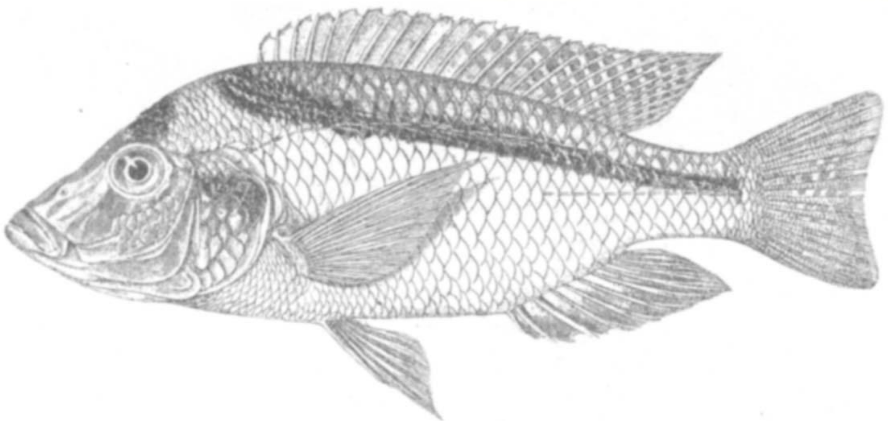


Figure 252.2: *Mylochromis lateristriga*, BMNH 1921.9.6.150, 155mmSL, collected by Wood, used to illustrate the redescriptions by Regan (1922) and Eccles & Trewavas (1989).

Figure 252.3: *Mylochromis lateristriga*, BMNH 1935.6.14. 1219-1222 Christy collection [GFT].

Figure 252.4: *Mylochromis lateristriga*, sequenced by York et al. 2018, collected from Thumbi West Island [Ryan York]

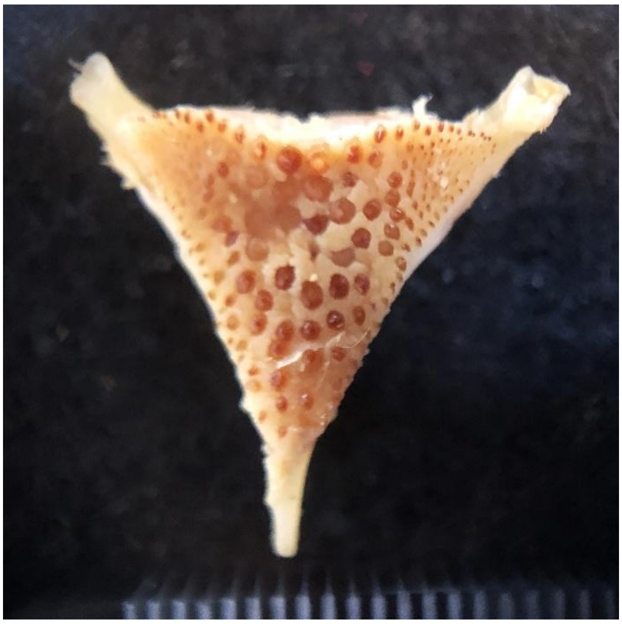


Figure 252.5: *Mylochromis lateristriga*, BMNH 1935.6.14. 1219-1222, lower pharyngeal bone [GFT].

Figure 252.6: *Mylochromis* lateristriga, male, Maleri [AK]

Figure 252.7: *Mylochromis* lateristriga, female, Maleri [AK]

Figure 252.8: *Mylochromis* sp. 'lateristriga makanjila', fry guarding female, Gome [AK]

Figure 252.9: *Mylochromis* sp. 'lateristriga makanjila', Lupingu [AK]

Figure 252.10: *Mylochromis* sp. 'lateristriga nkhata', male, Nkhata Bay [AK]

Figure 252.11: *Mylochromis* sp. 'lateristriga nkhata', ?? female, Nkhata Bay [AK]

MC253. *Mylochromis melanonotus* (Regan 1921)

Mylochromis melanonotus was described by Regan in 1922 as *Haplochromis melanonotus*. It has since been classed in *Cyrtocara* and *Platygnathochromis* – the latter erected as a monotypic genus by Eccles & Trewavas (1989), based on its unusual oral jaw morphology: the lower jaw is unusually flat near the symphysis, and there is a widened coronoid process with a large posterior hollow for the insertion of the adductor mandibulae (mouth-closing muscle). They also designated the larger of Regan's 2 specimens as the lectotype (fig. 253.1). However, Konings (1993) considered the jaw morphology to be variable within a single population and that some specimens had much less flattened lower jaws, corresponding to the morphology of the species *Mylochromis semipalatus* (Trewavas 1935), which he considered to be a junior synonym of *M. melanonotus*, with the latter accommodated within *Mylochromis*. Snoeks and Hanssens (2004) were not comfortable with the synonymy and suggest that the variation is too substantial to represent intraspecific diversity. However, examination of the types of *M. melanonotus* does indicate a lot of variation. The type of *M. semipalatus* is quite different looking: rather heavily built with a short snout. This needs more work, but one possibility is that *M. melanonotus* is indeed a very variable species, but that *M. semipalatus* is actually still a different species, just an uncommon one. For now, I am accepting Konings' synonymisation. The species tends to be found in shallow sandy areas, occasionally as deep as 50m. Konings (2016) reports a variety of possible feeding strategies: scooping small fish or invertebrates from sand, cleaning fins of other fishes, preying on fry of *Bagrus* catfishes. It is not clear how much evidence there is that these are commonplace. Stomach contents of a one 75mm individual contained cladocerans, copepods, algae and sand (Turner 1996). Accepting the synonymy of *M. melanonotus* and *M. semipalatus* means that the species is readily identified. Molecular phylogenetic analysis indicates that this species not closely related to the main group of *Mylochromis*, but rather to the specialised scale eater *Corematodus taeniatus* (Blumer et al. 2025). The generic name *Platygnathochromis* would still be available.

Fig. 253.1 Lectotype of *Mylochromis melanonotus* at the London Natural History Museum, 2023 [GFT].

Fig 253.2: *Mylochromis melanonotus,* freshly collected, sequenced, D14-G06 trawled from SW Arm, off Malembo at 20m, on 4 March 2016 [HS]

Fig. 253.3: Type of *Mylochromis semipalatus* at the London Natural History Museum, 2023 [GFT].

MC254. *Mylochromis melanotaenia*

Not sequenced.

MC255. *Mylochromis mola* (Trewavas 1935)

Haplochromis mola was described by Trewavas in 1935, based on 6 types from the Christy collection in 1925-26. It was placed in the new genus *Maravichromis* by Eccles & Trewavas (1989), but this was later found to be a junior synonym of *Mylochromis* Regan 1920. The species is distinguished by its heavily molariform pharyngeal dentition (Fig 255.3), slender body and melanin pattern of an oblique stripe, broken into a series of spots, often overlain with dark vertical barring, particularly on the upper part of the flanks (Fig. 255.1). Lips generally fleshy, with outer teeth deeply embedded. Outer oral jaw teeth are unequally bicuspid, blunt and rounded, obliquely truncated, with 3-4 inner rows of short, pointed simple, recurved teeth.

A clear-cut specimen collected at Chiofu Bay in 2016 (Fig.255.2) and sequenced by Blumer et al. (2025). In this specimen pharyngeal molarisation is well-developed (Fig. 255.4). Close relationships in genome sequences suggest that a further small specimen collected from Cape Maclear in 2014 that was initially identified as *Mylochromis ericotaenia* may well be a juvenile *M. mola* (Fig. 255.5). No voucher specimen is available and it was not examined closely. Also clustering with these are two specimens collected by G.F.Turner in 2008 as *Mylochromis subocularis* from Nanchengwa Lodge, SE Arm (PSU1 & PSU4): there are no photos or voucher specimens for these two, however.

Fig. 255.1: Lectotype of *Mylochromis mola* (Trewavas 1935): melanic markings rather faded in 2023 [GFT].

Fig. 255.2: *Mylochromis mola,* sequenced specimen D10-J02, 2016.38.43; Chiofu Bay, collected by snorkelling, 29 Feb 2016 [HS].

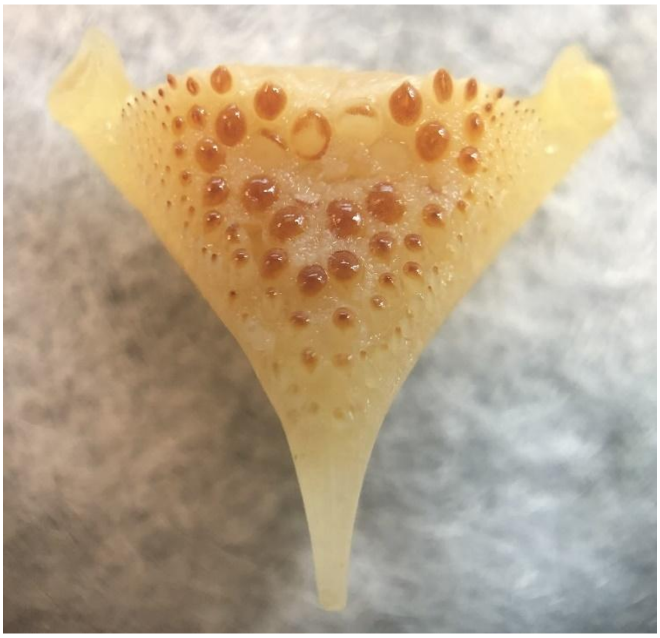


Fig. 255.3: Lower pharyngeal bone of the lectotype *Mylochromis mola* [GFT].

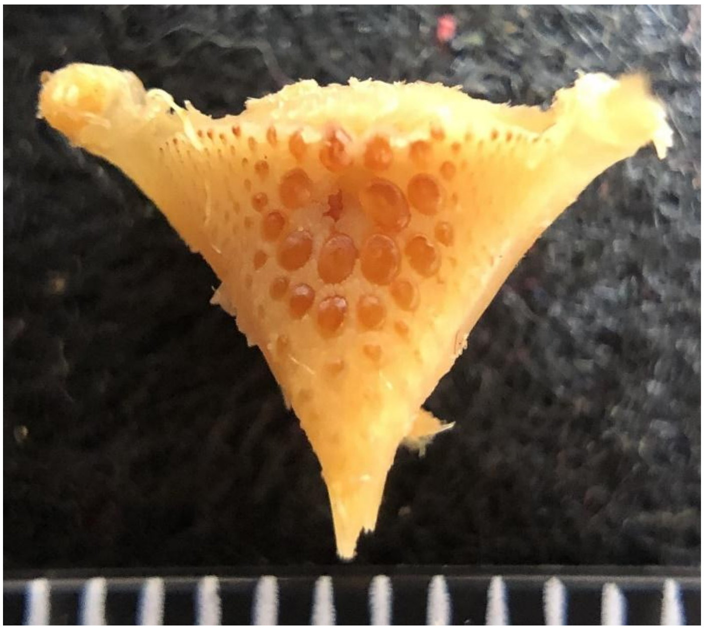


Fig. 255.4: Lower pharyngeal bone of *Mylochromis mola* D10-J02 [GFT].

Fig. 255.5: *Mylochromis cf.mola* 2014.119 (or 438) collected from Cape Maclear, M.J.Genner.

MC256. *Mylochromis mollis* (Trewavas 1935)

Mylochromis mollis (Trewavas 1935) is essentially indistinguishable from *M. guentheri*, except that the outer teeth on the lower jaw are erect (Trewavas 1935) rather than procumbent as in the latter species. It is possible that this might be a junior synonym of *M. guentheri*, but this is not the place for taxonomic revisions and more material is likely to be needed. The lower pharyngeal bone (of both species) is lightly-built and non-molariform, with numerous small, slender teeth (Fig. 249.3). Morphometrics and meristics are pretty similar. We have sequenced a single specimen from Chiofu Bay (D08-A10) which we have provisionally assigned to *M. mollis*, based on its erect lower jaw teeth. The overall body shape, curvature of the oblique stripe to end in the middle of the nape, faint spotting in unpaired soft fins – these features are all a good match. Little is known of the biology of the species. Morphology suggests they are benthic feeders eating small soft-bodied prey or detritus. Molecular analysis places the species in the main *Mylochromis* group (as *My guentheri* in Blumer et al. 2025).

Fig. 256.1: *Mylochromis mollis* lectotype BMNH 1935.6.14.1334; 131.9mm SL. [GFT].

Fig. 256.2: *Mylochromis mollis*, D08-A10; UCZM 2016.35.15; collected at Chiofu Bay by SCUBA, 8 Feb 2016, with lower pharyngeal bone (right) [HS, GFT].

MC257. *Mylochromis obtusus* (Trewavas 1935)

Mylochromis obtusus was described by Trewavas (1935) as *Haplochromis obtusus*, from a single large specimen (190mm SL), which appears to be a male in breeding dress collected from the SE Arm of the lake. It is unusual among *Mylochromis* species in having a rather upwardly-angled mouth. It also has rather fleshy lips, although this might be a male secondary sexual trait. The species is not well-known and the only available record of a live individual appears to be a photograph of an aquarium specimen (Konings 2016). The specimen sequenced by Blumer et al. (2025), (fig. 257.3) has an oblique stripe and upwardly-angled gape, but the jaws are not as fleshy as those of the type. However, it appears to be a small female or immature specimen. At present, it is provisionally identified as *M. obtusus*. It has been suggested that this species might be an egg-robber (Konings 2016). Phylogenetic analysis places this species within the main *Mylochromis* group, among the shallow benthic clade (Blumer et al. 2025).

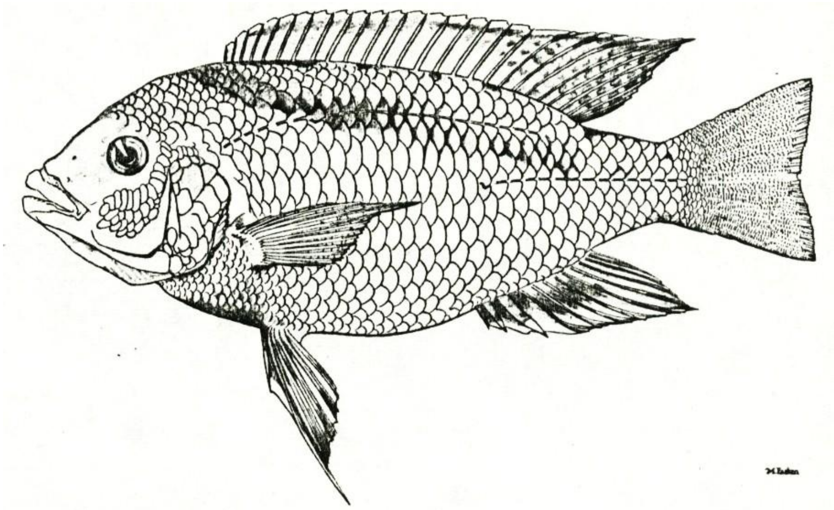


Fig. 257.1. Holotype of *Mylochromis obtusus,* drawn by Fasken around 1935, published in Eccles & Trewavas (1989).

Fig. 257.2. Holotype of *Mylochromis obtusus* photographed in the Natural History Museum, London, in 2023 [GFT].

Fig. 257.3: *Mylochromis obtusus,* sequenced, D12-G04, UCZM 2016.41.18; trawled at 20m off Makanjilia, 2 March 2016 [HS].

MC258. *Mylochromis plagiotaenia*; MC259. *Mylochromis rotundus; MC260. Mylochromis sp.'anaphymus spots'; MC261. Mylochromis sp.'anaphymus weak'; MC262. Mylochromis sp.'balteatus mozambique'; MC263. Mylochromis sp.'chrysogaster line'; MC264. Mylochromis sp.'deep'; MC265. Mylochromis sp.'guentheri mbenjii'; MC266. Mylochromis sp.'guentheri molariform'; MC267. Mylochromis sp.'ikombe'; MC268. Mylochromis sp.'incola mumbo'; MC269. Mylochromis sp.'kande'; MC270. Mylochromis sp.'lateristriga makanjila'* (see MC252)*; MC271. Mylochromis sp.'lateristriga nkhata'* (see MC252)*; MC272. Mylochromis sp.'liemi small-mouth'; MC273. Mylochromis sp.'melanonotus deep'; MC274. Mylochromis sp.'mollis gallireya'; MC275. Mylochromis sp.'mollis likoma'; MC276. Mylochromis sp.'sphaerodon nkhomo'; MC277. Mylochromis sp.'steep-head broken-stripe'; MC278. Mylochromis sp.'torpedo elongate'; MC279. Mylochromis sphaerodon;*

Not yet sequenced.

MC280. *Mylochromis spilostichus* (Trewavas 1935)

Mylochromis spilostichus was originally described by Trewavas from a single specimen, apparently a mature male. It was later placed into *Sciaenochromis* by Eccles & Trewavas (1989) and then into *Mylochromis* by Konings (1993). The species has an oblique stripe broken into blotches, and has a larger eye and shorter snout than the similar *M. gracilis*, which usually has a more continuous stripe. A re-examination of this species pair is probably warranted, if a larger sample of specimens is obtained. Although Snoeks and Hanssens (2004) preferred to retain these species in *Sciaenochromi*s, Konings (2016) has continued to use *Mylochromis*, and this is accepted as the valid combination by Eschmeyer's online catalogue. The three largest specimens sequenced by Blumer al. (2025) were readily assigned to this species, but the smallest one lacked clear melanin markings and could have been taken as a *Sciaenochromis* of some kind, but it shows strong genetic similarity to the others. All were taken from trawls at 14-24m in the south of the lake. This species is reported to be a piscivore inhabiting shallow sand areas. Phylogenetically, the species clusters with *Sciaenochromis benthicola* (but not the majority of this genus) as well as *Taeniochromis holotaenia*, and certainly not with any of the many groups of *Mylochromis* (Blumer et al. 2025).

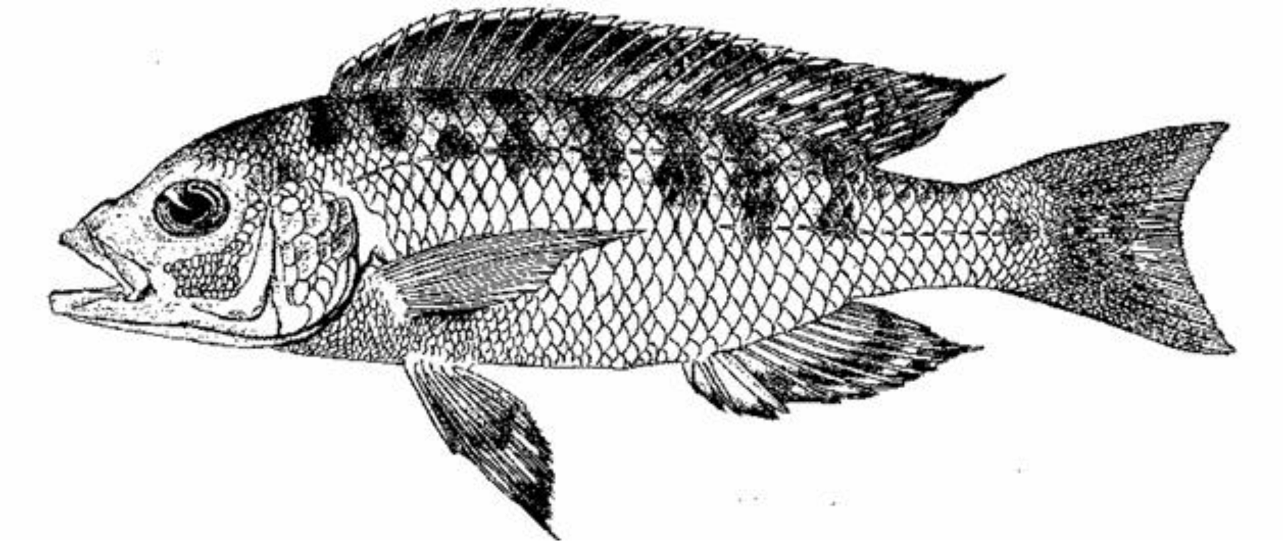


Fig. 280.1: Drawing of the type of *Mylochromis spilostichus* (Trewavas 1935).

Fig. 280.2. Holotype of *Mylochromis spilostichus* in the Natural History Museum, London, in 2023 [GFT].

D13-B08, UCZM 2016.42.6, trawled off Mazinzi, SE Arm, 14-24m, 16 Mar 2016.

D13-E04 no voucher; trawled off Mazinzi, SE Arm, 14-24m, 16 Mar 2016

D12-H10, UCZM 2016.41.75 trawled off Makanjila, SE Arm, 16-20m, 2Mar 2016

D13-A01, UCZM 2016.41.22 trawled off Makanjila, SE Arm, 16-20m 2Mar 2016

Fig. 280.3: Sequenced *Mylochromis spilostichus* specimens showed quite a lot of variation in head shape and markings.

MC281*. Mylochromis subocularis* (Günther 1894)

This was one of the first Malawi cichlids to be described from whole specimens, by Günther in 1894, as *Chromis subocularis*. No less than 12 type specimens were listed, but examination of these has indicated that 11 of them are actually specimens of *Astatotilapia calliptera* (Günther 1894), a species described in the same article. The largest specimen was illustrated and has been designated as the lectotype – it was erroneously referred to as the holotype by Eccles & Trewavas (1989). Placed in *Haplochromis, Cyrtocara* and *Placidochromis* in the past, it has most recently been considered to belong in *Mylochromis* by Konings (2016).

Individuals of this species have a mix of vertical bars and a series of blotches taking the form of an oblique stripe. The lachrymal stripe is usually well-developed. They are fairly slender with quite a long snout and small mouth. There are some rather prominent long teeth in the outer series of both upper and lower jaws: they are erect, stout, bicuspid, with a rounded tip to the major cusp, backed by 3-5 rows of smaller teeth, simple or notched- erect to recurved. This dentition differs from the superficially similar *Mylochromis labidodon* which has simple teeth and a more concave head profile. The lower pharyngeal bone of *M. subocularis* has a few enlarged posterior medial teeth, but is not molariform, which distinguishes the species from the superficially similar *Mylochromis mola*. In life, the body colour is rather brassy, the soft dorsal and caudal fins strongly spotted and the dorsal fin margin is red. Males are blue-green with a patch of red scales behind the head. Blumer et al. (2025) sequenced 20 specimens. Of these, there are no photographic records or voucher specimens for 6 of the specimens (PSU 2,3,5,6,7,8), collected in the SE Arm of the lake by Turner in 2008. Additionally, two specimens in this group cluster with *M. mola*, so the field identification was not entirely sound. Of the remaining 14, 13 come from the 2017 collecting trip. All specimens were from southern Lake Malawi. The species inhabits shallow weedy areas. Stomach contents indicate a diet of invertebrates including ephemeropterans, small molluscs, chironomids along with a few copepods and cladocerans and some algal material (Turner 1996). Phylogenetically, it is a member of the main *Mylochromis* clade (Blumer et al. 2025).

Table 281.1: Collecting information on *M. subocularis* specimens sequenced.

Code	Whole Specimen	Photo	Collecting information
PSU 2,3,5,6,7,8 (6)	None	None	SE Arm, bought from fishers, June 2008
D12-E09 (1)	Yes	Yes	Makanjila, trawled from 20m, 2 Mar 16
D17-G09- H10 (12)	None	Yes	Seined at Palm Beach, 22 Jan 2017
D23-D03 (1)	UCZM 2021.42.7	Yes	Chilimila seine, Thumbi W, 29 Jan 2017
D23-E02 (1)	UCZM 2021.42.9	Yes	Chilimila seine, Thumbi W, 29 Jan 2017

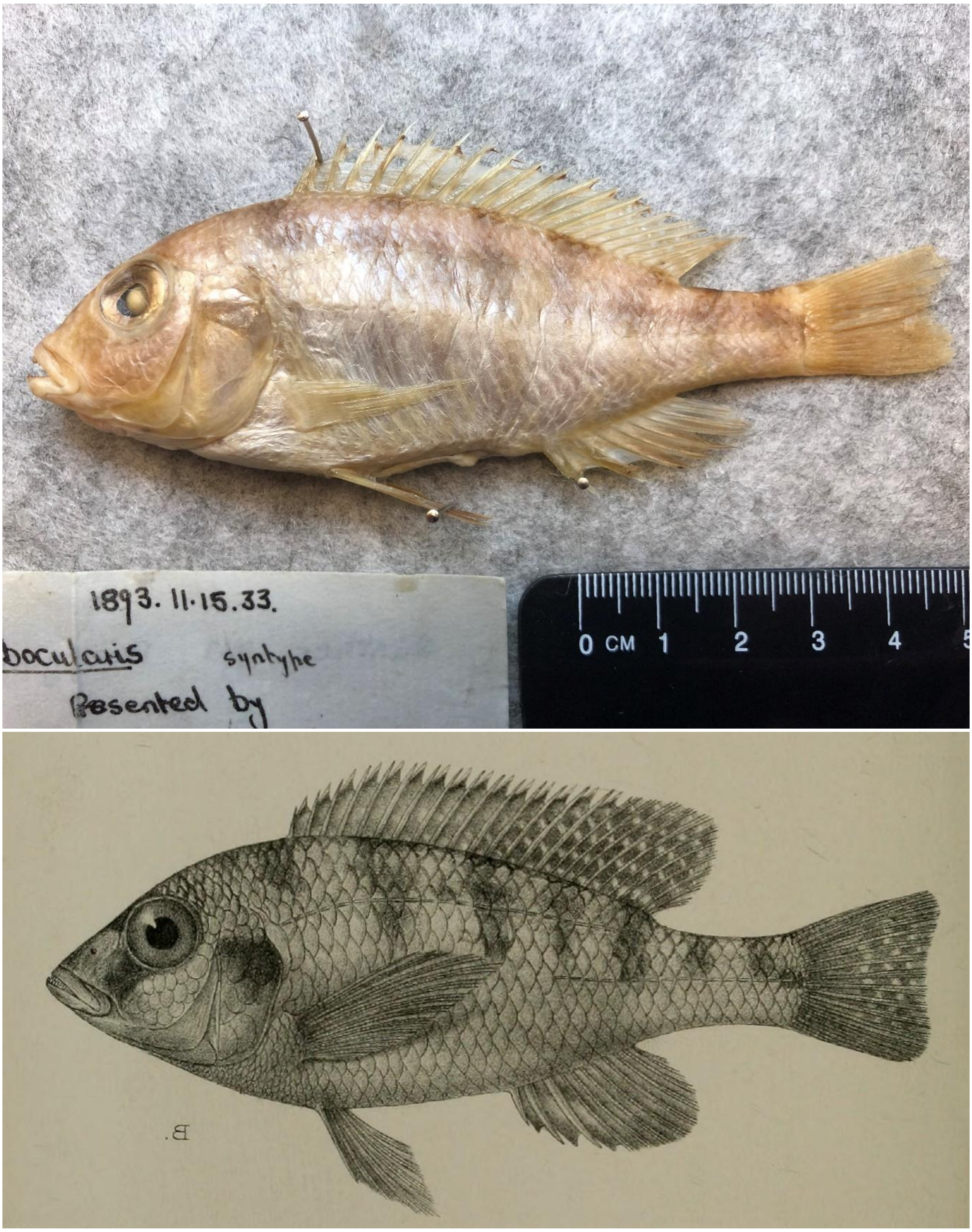


Fig. 281.2: *Mylochromis subocularis,* Lectotype. BMNH 1893.11.15.33. Photographed in 2023 (above) and drawn for Günther's 1894 paper (below, reversed).

D12-E09, male, trawled at depth, SW of Makanjila, 2016

D23-E02, apparent female, Cape Maclear, 2017

D23-D03, male, Cape Maclear, 2017

D17-G09, apparent female, SE Arm, 2017

D17-H02, juvenile, SE Arm, 2017

D17-H03, juvenile, SE Arm, 2017

Fig.281.3: *Mylochromis subocularis* representative specimens: 6 shown to cover range of localities and dates. ID confirmed from whole specimens D12-E09, D23-D03 and inspection of all 14 photos.

MC282. *Naevochromis chrysogaster* (Trewavas 1935)

Naevochromis chrysogaster was described by Trewavas in 1935 from 3 specimens from the Christy collection. Initially placed in *Haplochromis*, it was moved into the monotypic *Naevochromis* by Eccles & Trewavas in 1989. It is distinguished by its heavy lower jaw with short teeth deeply embedded in fleshy lips, slender body and spotted flank pattern (Fig. 282.1). As presently understood, this species is easily recognised. The specimen sequenced by Blumer et al. (2025) was a small one obtained from Chiofu Bay (Fig. 282.2). It seems to be mainly found in shallow rocky areas with patches of sandy substrate. It is presumed to be a paedophage, based on morphology (Konings 2016). Phylogenetically, it is related to *Hemitaeniochromis brachyrhynchus* and *H.* sp. 'pumba', both of which have similar jaws and teeth but different melanin patterns (Blumer et al. 2025).

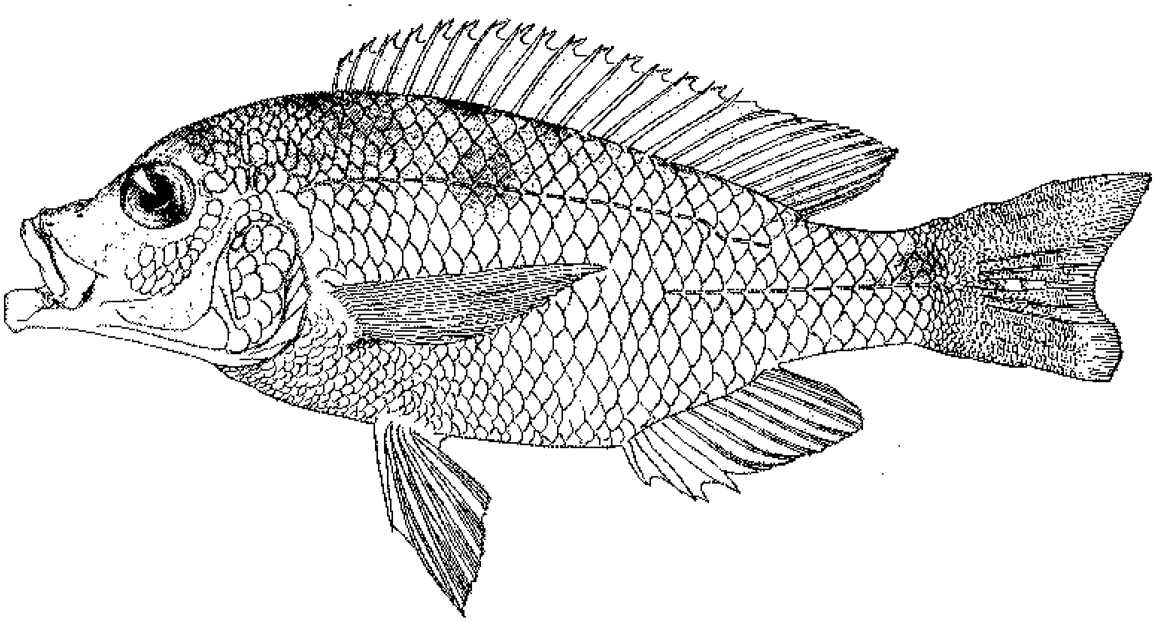


Fig. 282.1: Lectotype of *Naevochromis chrysogaster*, from Eccles & Trewavas (1989).

Fig. 282.2: *Naevochromis chrysogaster*, D10-H02, 2016.38.82, collected by SCUBA from shallow rocky shore at Chiofu Bay, 29 Feb 2016 [HS].

Nimbochromis Eccles & Trewavas 1989. MC283-287.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Hemichromis livingstonii* Günther 1893.

Contained valid species: *Nimbochromis fuscotaeniatus, N. linni, N. livingstonii, N. polystigma, N. venustus.*

Proposed undescribed taxa: None.

Taxa considered invalid: *Nimbochromis maculimanus, N. paradalis* (both synonyms of *N. polystigma*: Snoeks & Manuel 2004); *N. simulans* (= *N. venustus*: Trewavas 1931).

Generic reviews & diagnoses: Eccles & Trewavas 1989; Snoeks & Manuel 2004.

Generic diagnosis: Eccles & Trewavas: "The species of *Nimbochromis* are characterised by the melanin pattern, which is dominated by large lozenge-shaped or irregular blotches, and includes a series of ventro-lateral markings posterior to the base of the pectoral fin. This is unique among cichlids and is the defining synapomorphy for the genus, which also shows the apomorphic condition of simple, slightly recurved teeth in the mouth, but this occurs in many predatory groups and may represent parallelism."

Field Diagnosis: Predators with distinct blotches.

Phylogenetic comments: The genus is monophyletic, apart from *N. fuscotaeniatus,* which is distantly related and is rather a member of the *Tyrannochromis* group. This is based on a single specimen.

Ecomorphological notes: All *Nimbochromis* are benthic predators, largely piscivorous, with a variety of hunting tactics. *Nimbochromis livingstonii* has a wide habitat and depth range.

MC283. *Nimbochromis fuscotaeniatus* (Regan 1922)

Nimbochromis fuscotaeniatus was described by Regan (as *Haplochromis*) in 1922 and included in the new genus *Nimbochromis* by Eccles & Trewavas (1989). Oliver (1984) had previously cast doubt on its affinities with the rest of this group, and Konings has suggested affinities with *Tyrannochromis*, based on the way that the lateral blotches are drawn out into stripes (fig. 283.1). The species is fairly distinctive, with its large mouth, relatively elongate body and blotchy horizontal stripes. A specimen collected by SCUBA from Chiofu Bay is rather small compared to the type (fig. 283.2). The slender body shape and large eye are likely allometric effects, and the identification seems pretty clear-cut. The species is a solitary predator that frequents reedy areas. The specimen was omitted from the study by Blumer et al. (2025) but in earlier analysis of whole genome sequences, it clearly clustered with *Tyrannochromis* and not with other *Nimbochromis.*

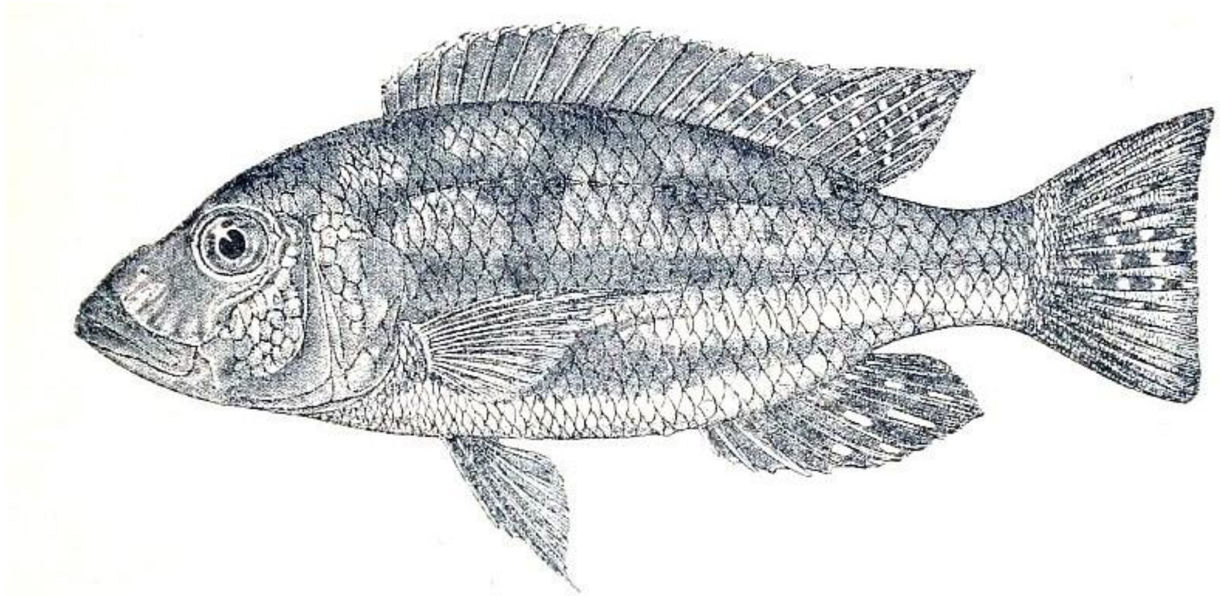


Fig. 283.: Drawing of type of *Nimbochromis fuscotaeniatus* from original description (Regan 1922).

Fig. 283.2: *Nimbochromis fuscotaeniatus*, D08-C08, UCZM 2016.35.13; SCUBA, Chiofu, 28 Feb 2016

MC284. *Nimbochromis linni* (Burgess & Axelrod 1974)

This very distinctive species was first described by Burgess & Axelrod in 1974 from a single specimen, and placed in the genus *Nimbochromis* by Eccles & Trewavas (1989). With its strongly decurved snout and mottled body and fins, the species is hard to confuse with anything else. The specimen sequenced by Blumer et al. (2925) was obtained from an aquarium fish exporter and the collecting location is unknown. It is a species generally found on rocky shores, where it can be seen stalking small fish that attempt to hide among rocks (Konings 2016). It is a member of the *Nimbochromis* clade.

Fig. 284.1: *Nimbochromis linni*, mature male, collected & photographed at Manda, Tanzania by J. Hellon 2003. Specimen not sequenced.

Fig 284.2: *Nimbochromis linni*, 2012-440, SM Grant export facility, 23 Sept 2012 [MJG].

MC285. *Nimbochromis livingstonii* (Günther 1894)

Nimbochromis livingstonii was described in 1894 by Günther from a single specimen. It is a very distinctive species, with a strongly contrasting pattern of dark brown blotches on a pale background. Unlike some related species, it lacks small spots on the body, but has spotted pectoral fins (Fig. 285.1). The species is never common, but widespread in a range of habitats from the shallows down to 114m. Two specimens were sequenced by Blumer et al. (2025), one from Chiofu Bay (Fig. 285.2) and another obtained from an aquarium exporter of unknown collecting location (Fig. 285.3). The species is a predator of small fish, often burying itself in the bottom sediment where its contrasting colour pattern breaks up its outline. It has also been suggested that it mimics a dead fish, although this seems unlikely (Turner 1996). It is a member of the *Nimbochromis* clade.

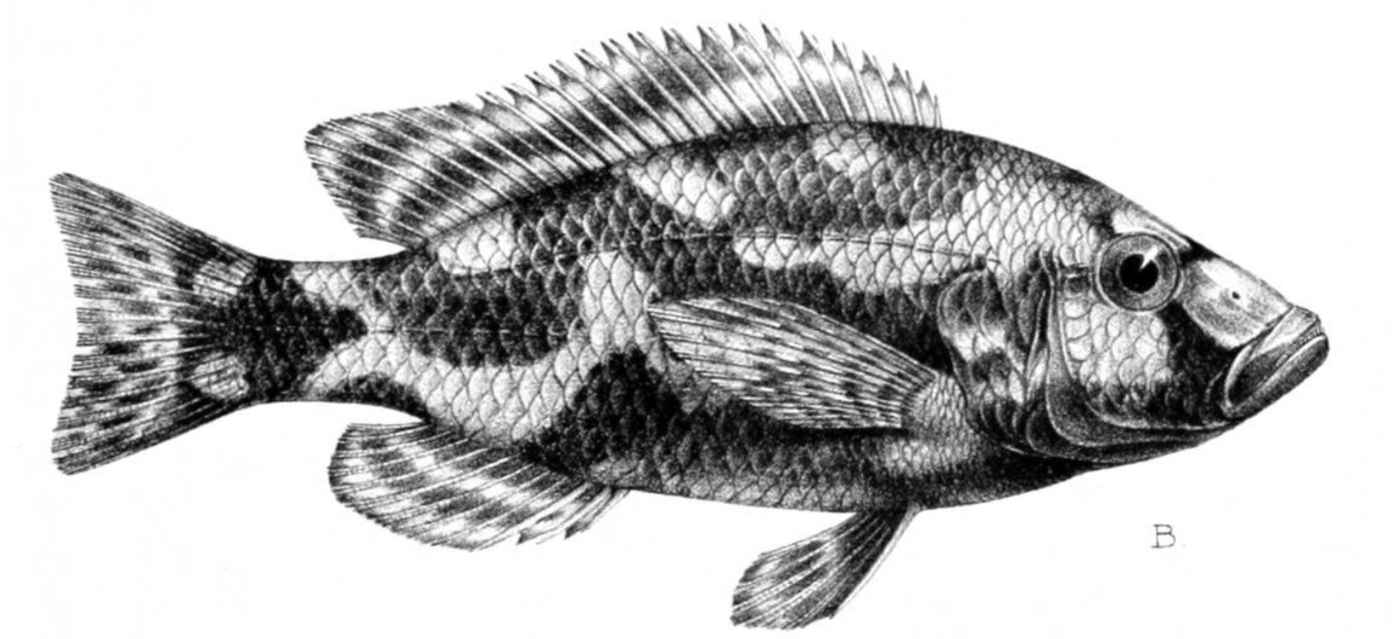


Fig 285.1: *Nimbochromis livingstonii* type, from Günther 1894

Fig. 285.2: *Nimbochromis livingstonii*, D07-I09, 2016.35.51; Chiofu Bay, SCUBA, 28 Feb 2016 [HS].

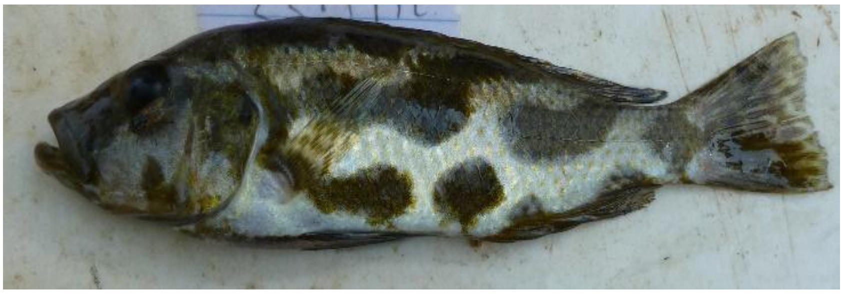


Fig 285.3: *N. livingstoni*, 2012.441, SM Grant export facility, 23 Sept 2012 [MJG].

MC286. *Nimbochromis polystigma* (Regan 1922)

Nimbochromis polystigma was described in 1922 by Regan from 6 specimens. *Haplochromis maculimanus* Regan 1922 and *Haplochromis pardalis* Trewavas 1935 are considered junior synonyms (Snoeks & Manuel 2004; Konings 2016). It is a distinctive species with large dark blotches on a pale background, covered with numerous tiny dark spots all over the body and fins. Even the pectoral fins are spotted. The specimen sequenced by Blumer et al. (2025) was collected from an aquarium fish exporter and the exact collecting site is unknown. However, the species is widely distributed and common, found over most kinds of habitat in relatively shallow water. Smaller individuals often hunt in packs, mixed in with species such as *Placidochromis johnstoni*, pursuing small fish or foraging in the sediment, perhaps for invertebrates. Larger specimens are sometimes seen hunting alone, sometimes lying on the bottom in apparent ambush. It is a member of the *Nimbochromis* clade.

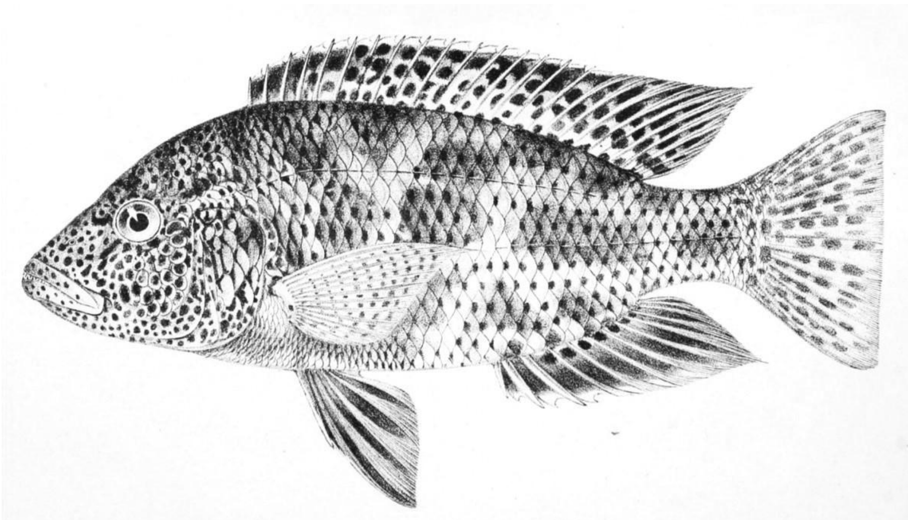


Fig. 286.1: *Nimbochromis polystigma* lectotype, from Regan 1922.

Fig. 286.2: *Nimbochromis polystigma*, 2012-401, SM Grant export facility, 23 Sept 2012 [MJG].

MC287. *Nimbochromis venustus* (Boulenger 1908)

Nimbochromis venustus was described in 1908 by Boulenger from 5 specimens. It is a distinctive species with large dark blotches on a pale background. It differs from other *Nimbochromis* species in lacking dark spotting on the body and fins. *Nimbochromis fuscotaeniatus* is more slender and has blotchy horizontal stripes on the flanks. Our sequenced specimen was trawled from the SE Arm at a depth of around 20m. It tends to be found over soft-bottomed habitats between 15-40m and is reported to be a predator of small fish and invertebrates. It is a member of the *Nimbochromis* clade.

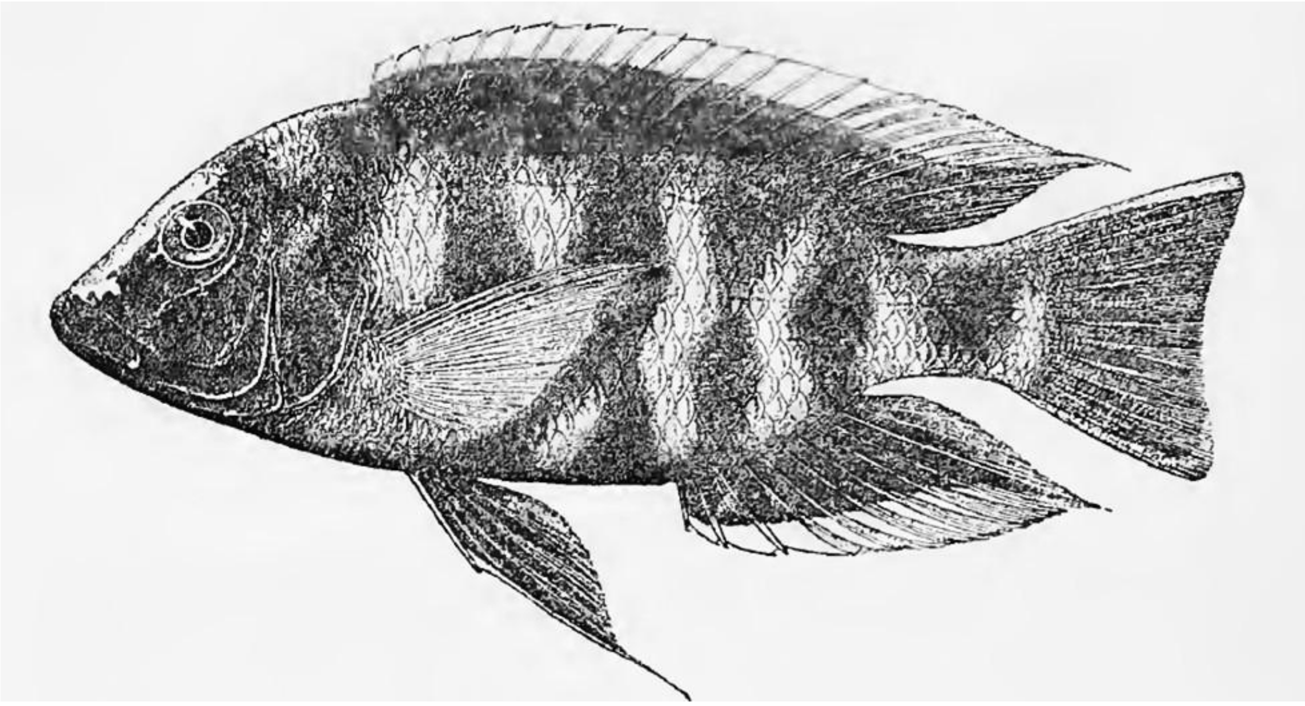


Fig. 287.1: Lectotype of *Nimbochromis venustus*, a male in partial breeding dress, from Boulenger 1915.

Fig. 287.2: *Nimbochromis venustus* D14-H01, 2016.45.16; SW Arm, trawled from 20m, 4 March 2016 [HS]

Nyassachromis Eccles & Trewavas 1989. MC288-299.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Hemichromis livingstonii* Günther 1893.

Contained valid species: *Nyassachromis boadzulu; Nyassachromis breviceps; Nyassachromis leuciscus; Nyassachromis microcephalus; Nyassachromis nigritaeniatus; Nyassachromis prostoma; Nyassachromis purpurans; Nyassachromis serenus.*

Proposed undescribed taxa: *Nyassachromis* sp. 'argyrosoma blue'. *Nyassachromis* sp. 'longsnout'; *Nyassachromis* sp. 'mphanga'; *Nyassachromis* sp. 'otter'.

Taxa considered invalid: Some of the taxa included by Konings (1989) and Turner (1996) may belong in other genera, such as *Mchenga* and *Otopharynx.*

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989): "Haplochromines endemic to Lake Malawi characterised by a relatively small head, less than one third of SL and slender caudal peduncle, 1.3 to 2.0 times as long as deep. The mouth is moderate, with the lower jaw 2.5 to 3.0 times in head length, 2 to 4 series of teeth in the jaws, the outer being bicuspid or in some larger fish, simple, 44 to 72 in the upper jaw. The lower pharyngeal is not enlarged and bears pointed bicuspied teeth. The number of vertebrae is somewhat above the plesiomorphic value of 29 to 30 varying from 32 to 34, with 13, 14, 15 or 16 abdominal. Melanin pattern, if present, based on the plesiomorphic form, with the mid-lateral band rising anteriorly and more prominent than the dorso-lateral, which is rarely evidence. In those species where the form of the gut is known (*N. breviceps, N. purpurans* and *N. leuciscus*), it is long and coiled."

Field Diagnosis: Species with small heads and a horizontal band on the flanks, or generally slender and unmarked sandy shore species.

Phylogenetic comments: The two undescribed sequenced species probably don't belong in the genus by its current definition. They are members of the 'shallow sand' group. None of the described species have been sequenced to date. The undescribed *Nyassachromis* sp. 'otter' appears to be close to *Mchenga conophoros* and *Otopharynx argyrosoma*, which are also members of the 'shallow sand' group (York et al. 2018).

Ecomorphological notes: All *Nyassachromis* species live in shallow sandy areas and appear to feed on small items, perhaps plankton or sediment.

MC288. *Nyassachromis boadzulu*; MC289. *Nyassachromis breviceps*; MC290. *Nyassachromis leuciscus*; MC291. *Nyassachromis microcephalus*; MC292. *Nyassachromis nigritaeniatus*; MC293. *Nyassachromis prostoma*; MC294. *Nyassachromis purpurans*; MC295. *Nyassachromis serenus*;

MC296. *Nyassachromis* sp. 'argyrosoma blue'

Nyassachromis sp. 'argyrosoma blue' was first identified by Turner (1996) but not yet described. The assignment to *Nyassachromis* is a bit of a historical oddity, but retained here because the information is in print. In the event of a description, it would probably end up in *Mchenga* or *Placidochromis* (or some new genus incorporating some of those species). After the Eccles and Trewavas (1989) monograph splitting the Malawi Haplochromis into numerous new genera, Konings had initially been reluctant to introduce too many new genera to his readership, largely of aquarium enthusiasts, and also had a tendency to move things around a bit (e.g. *Sciaenochromis / Mylochromis*). Konings (1995) put some of the slender sandy shore species, like *C. boadzulu* and *C. eucinostomus* into *Nyassachromis*. Turner (1996) had two taxa generally from trawl or seine catches shallower than 50m as referable to *O. argyrosoma*: slender, around 10 lower gillrakers, slightly enlarged medial lower pharyngeal teeth, not much of a melanin pattern, and put them both in *Nyassachromis*, along with *N. eucinostomus* and similar-looking things. One specimen sequenced by Blumer et al. corresponds well to this description, and it has a male colour pattern (including orange dorsal fin lappets) similar to a rather faded or partially developed breeding dress of 'argyrosoma blue'. The head shape, mouth position and eye size also fit well. It was obtained from a trawl catch at 45-50m depth to the NE of Boadzulu Island, which is within the typical range of 'argyrosoma blue' (which extends to ~60m). This species was reported to feed on zooplankton and diatoms, but also chironomids. Phylogenetic analysis of sequences (labelled Chirombo 1 in Blumer et al. 2025) places this species in the 'slender sand' group, in a basal position.

Fig. 296.1: *Nyassachromis* sp. 'argyrosoma blue', D13-F09, UCZM 2016.43.17; trawled from 45-50m depth, NE of Boadzulu Island, SE Arm, 3 March 2016 [HS]

Fig. 296.2: *Nyassachromis sp* 'argyrosoma blue', commercial trawl catch, SE Arm, 1991. [GFT]

Fig. 296.3: *Nyassachromis sp* ‘argyrosoma blue’ 25m depth, SW Arm, Maleri 1, 29-Sep-91 [GFT]

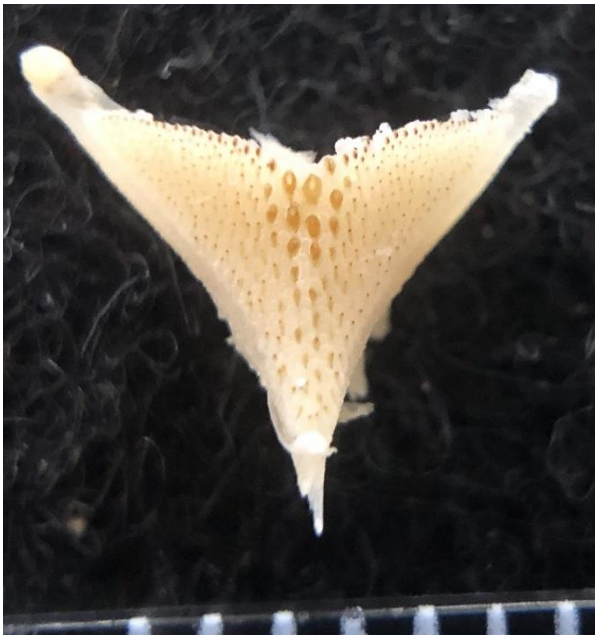


Fig. 296.4: *Nyassachromis* sp. ‘argyrosoma blue’, D13-F09, UCZM 2016.43.17 lower pharyngeal bone showing slightly enlarged postero-medial teeth, suggesting a benthic diet including hard-shelled prey [GFT]

MC297. *Nyassachromis* sp. 'longsnout'

Nyassachromis sp. 'longsnout' (initially recorded as *Mchenga* sp 4) was trawled from 45-50m depth north of Boadzulu Island in the SE Arm. It is a slender fish with hints of male breeding dress and a long snout and small mouth. It is placed in *Nyassachromis* largely because of its slender build coupled with slightly enlarged lower pharyngeal dentition, which would exclude it from *Mchenga*. The specimen is not obviously similar to any known species and could usefully be examined more closely. Under the name 'Mc Chirombo 2', this specimen was resolved within the 'slender sand clade', as sister taxon to *Otopharynx styrax* (Blumer et al. 2025).

Fig. 297.1: *Nyassachromis* sp. 'longsnout', D13-F10, UCZM 2016.43.12; trawled from 45-50m depth, north of Boadzulu Island, SE Arm, 3 March 2016 [HS].

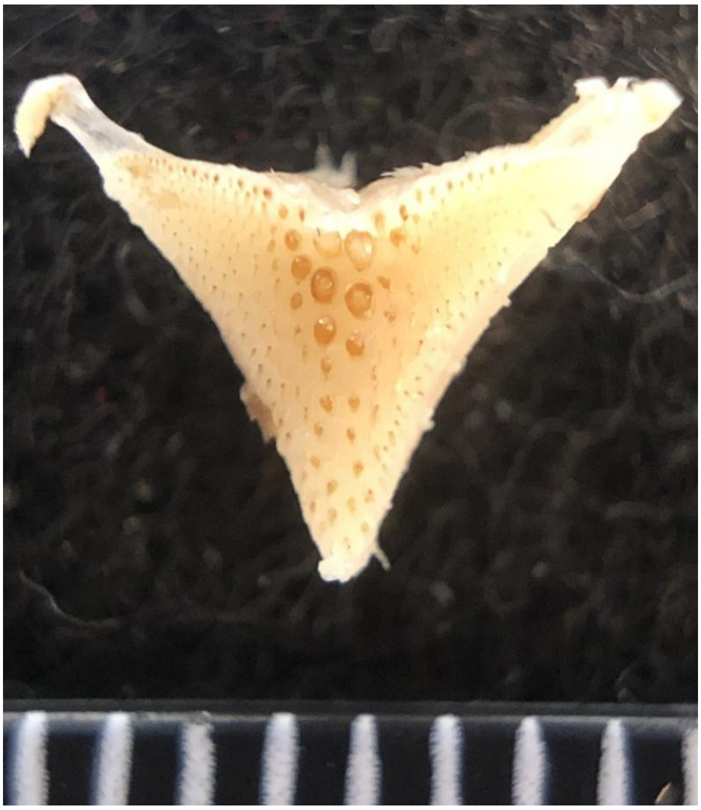


Fig.297.2: *Nyassachromis* sp. 'longsnout', UCZM 2016.43.12, lower pharyngeal bone with slightly enlarged medial posterior teeth, suggests some hard material in the diet and probably a benthic feeder [GFT]

MC298. *Nyassachromis* sp. 'mphanga'; MC299. *Nyassachromis* sp. 'otter'.

Not yet sequenced.

Otopharynx Regan 1920. MC300-350.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Tilapia auromarginata* Boulenger 1908.

Contained valid species (20): *Otopharynx aletes; Otopharynx alpha; Otopharynx antron; Otopharynx argyrosoma; Otopharynx auromarginatus; Otopharynx brooksi; Otopharynx decorus; Otopharynx heterodon; Otopharynx lithobates; Otopharynx mumboensis; Otopharynx ovatus; Otopharynx pachycheilus; Otopharynx panniculus; Otopharynx peridodeka; Otopharynx selenurus; Otopharynx speciosus; Otopharynx spelaeotes; Otopharynx styrax; Otopharynx tetraspilus; Otopharynx tetrastigma*.

Proposed undescribed taxa (31): Otopharynx sp. 'argyrosoma deep'; Otopharynx sp. 'argyrosoma large'; Otopharynx sp. 'auromarginatus goldhead'; Otopharynx sp. 'auromarginatus jakuta'; Otopharynx sp. 'auromarginatus mara'; Otopharynx sp. 'auromarginatus margrette'; Otopharynx sp. 'blue flat-jaw'; Otopharynx sp. 'circle'; Otopharynx sp. 'decorus featherfin'; Otopharynx sp. 'decorus jumbo'; Otopharynx sp. 'elongate-spot tanzania'; Otopharynx sp. 'flat jaw'; Otopharynx sp. 'golden blueface'; Otopharynx sp. 'golf-head blue'; Otopharynx sp. 'heterodon boadzulu'; Otopharynx sp. 'heterodon ikombe'; Otopharynx sp. 'heterodon likoma'; Otopharynx sp. 'heterodon longnose'; Otopharynx sp. 'heterodon low-spot'; Otopharynx sp. 'heterodon nankumba'; Otopharynx sp. 'high fin'; Otopharynx sp. 'high-fin low-GR'; Otopharynx sp. 'ilamba tetrastigma'; Otopharynx sp. 'interruptus'; Otopharynx sp. 'ovatus likoma'; Otopharynx sp. 'red flat-jaw'; Otopharynx sp. 'round head'; Otopharynx sp. 'silver torpedo'; Otopharynx sp. 'slender bignose'; Otopharynx sp. 'spots'; Otopharynx sp. 'tetraspilus molariform'

Taxa considered invalid: *Otopharynx walteri* (junior synonym or subspecies of *O. lithobates*)

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989): "Medium-sized haplochromines endemic to Lake Malawi attaining little more than 200mm SL, characterised by the possession of suprapectoral and supra-anal spots lying on or below the upper lateral line. Differ from *Hemitilapia* and *Trematocranus* in that the spots never extend to the dorsal surface, from *Ctenopharynx* in the dentition and usually lower number of gill-rakers on the lower outer arch and from *Stigmatochromis* and *Exochochromis* in the jaws and dentition." This was based on a mere 11 species.

Field Diagnosis: Anything with 1-3 flank spots that doesn't fit in any other group

Phylogenetic comments: The features of the genus as currently understood appear to have evolved at least 10 times independently, with the type species being unrelated to any of the other taxa sequenced.

Ecomorphological notes: *Otopharynx* is a very diverse group.

MC300. *Otopharynx aletes*; MC301. *Otopharynx alpha*; MC302. *Otopharynx antron*;

Not yet sequenced.

MC303. *Otopharynx argyrosoma* (Regan 1922)

Haplochromis argyrosoma was described by Regan in 1922 from a single specimen, 60mm SL, with 11 lower gill rakers and a few enlarged teeth in middle of posterior of the lower pharyngeal done. It was placed into *Otopharynx* by Eccles & Trewavas (1989) on the basis of its blotched melanin pattern. However, this is neither mentioned in the description, visible in the drawing of the type (fig. 303.1), nor apparent on the specimen. Presumably it must be derived from non-type material examined by Eccles & Trewavas and indeed, they illustrate their redescription with a very strongly marked specimen (fig 303.2). Snoeks & Hanssens (2004) examined these specimens and concluded that they were not conspecific with the type, but that the species reported by Turner (1996) as *O.* 'argyrosoma red' was a better fit (fig. 303.3-4). This has been followed by Konings (2016) and in the present work. Females and immatures occasionally show a very faint suprapectoral blotch, but are otherwise sandy coloured on top and silvery below.

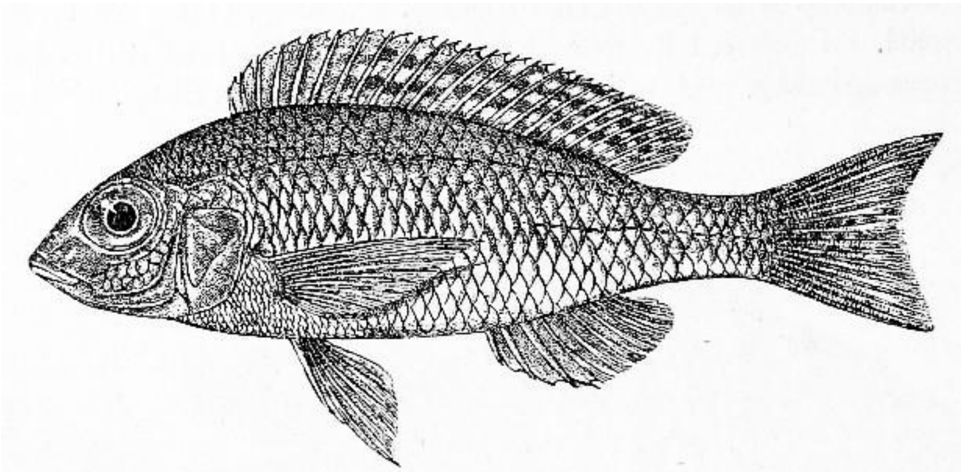


Fig. 303.1: Drawing of *Otopharynx argyrosoma* type from the original description.

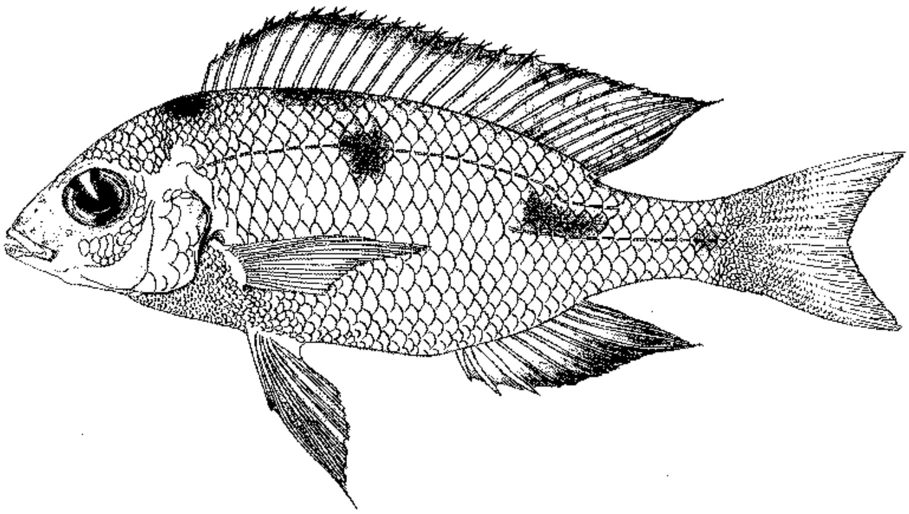


Fig. 303.2: Drawing of non-type specimen attributed to *Otopharynx argyrosoma* by Eccles & Trewavas. Snoeks and Hanssens (2004) believe that this represents an undescribed species. This degree of development of melanic markings has not been seen in the species we consider to be *O. argyrosoma*.

Fig. 303.3: Mature male of the species generally recognised as *Otopharynx argyrosoma*, seined off Palm Beach, SE Arm, 2017 [GFT]

Blumer et al. (2025) sequenced 38 specimens of *O. argyrosoma*, all from Lake Malombe and the far south of Lake Malawi at Palm Beach, all with a consistent phenotype (fig. 303.5; table 303.1). The species mainly lives in shallow muddy areas and stomach contents included small gastropods, copepods, cladocerans, chironomids, algae, sand and detritus (Turner 1996).

Fig. 303.4: Female *O. argyrosoma*, showing the typical weakly developed melanin pattern with a faint suprapectoral blotch (specimen not sequenced). Trawled from 20-28m, SE Arm (Namiasi to White Rock), 21-Oct-91 [GFT]

Table 303.1: Summary of sequenced specimens of *O. argyrosoma*.

Code	Voucher	Photo	Location	Date	Sequence Code	Coverage
D17-G03	No	Yes	SE Arm (Palm Beach)	22-Jan-17	cichlid7050634	16.6
D17-G04	No	Yes	SE Arm (Palm Beach)	22-Jan-17	cichlid7050635	18.0
D17-G05	**No**	**Yes**	**SE Arm (Palm Beach)**	**22-Jan-17**	**cichlid7050636**	**17.0**
D17-G06	**No**	**Yes**	**SE Arm (Palm Beach)**	**22-Jan-17**	**cichlid7050637**	**17.1**
D17-G08	**No**	**Yes**	**SE Arm (Palm Beach)**	**22-Jan-17**	**cichlid7050639**	**15.8**
D18-C04	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050661	15.2
D18-C05	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050662	15.4
D18-C06	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050663	16.8
D18-C07	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050664	18.1
D18-C08	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050665	17.6
D18-C09	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050666	16.6
D18-C10	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050667	18.6
D18-D07	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050668	15.8
D18-D08	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050669	16.2
D18-D09	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050670	17.4
D18-D10	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050671	17.7
D18-E01	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050672	20.6
D18-E02	No	Yes	SE Arm (Palm Beach)	23-Jan-17	cichlid7050673	18.2
D18-H10	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050686	21.0
D18-I01	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050687	23.3
D18-I02	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050688	13.2
D18-I03	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050689	13.9
D18-I04	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050690	14.2
D18-I05	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050691	15.7
D18-I06	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050692	25.6

D18-I07	**No**	**Yes**	**Lake_Malombe**	**23-Jan-17**	**cichlid7050693**	**16.5**
D18-I08	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050694	16.0
D18-I09	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050695	17.5
D18-I10	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050696	16.9
D18-J01	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050697	16.0
D18-J03	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050699	15.6
D18-J04	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050700	17.5
D18-J05	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050701	15.2
D18-J06	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050702	21.1
D18-J07	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050703	18.8
D18-J08	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050704	15.9
D18-J09	No	Yes	Lake_Malombe	23-Jan-17	cichlid7050705	16.8

D17-G05, male, SE Arm [HS]

D18-I07, male, Lake Malombe [HS]

D17-G06, apparent female, SE Arm [HS]

D17-G08, apparent female, SE Arm [HS]

Fig. 303.5: Examples of sequenced specimens of *Otopharynx argyrosoma* (see table 303.1 for additional sample details)

MC304. *Otopharynx auromarginatus* (Boulenger 1908)

Otopharynx auromarginatus was described by Boulenger in 1908 (as *Tilapia auromarginata*), from 3 specimens and placed in the monotypic genus *Otopharynx* by Regan in 1920 (in a footnote to a paper on Lake Tanganyika cichlids), put in *Haplochromis* by Regan (1922) and Trewavas (1935), was briefly in *Cyrtocara*, and then was put back into *Otopharynx* by Eccles & Trewavas (1989), who also designated a lectotype and illustrated it in a rather poor photograph. However, a nice drawing appeared in Boulenger's (1915) catalogue of the African Freshwater Fishes (Fig. 304.1). Two of the types are ripe males and the other a skeleton, but many female and immature fish are included in the Christy collection and have helped to clarify that the melanin pattern is comprised of three dark spots, often with faint vertical barring on the flanks. The midlateral spot is short. The species can further be diagnosed by the lack of enlarged pharyngeal teeth, large number of gillrakers (14-18 on lower arch), small head and jaws and relatively large adult size (over 20cm SL). The species is often encountered in shallow muddy or sandy areas, often in shoals. It seems to feed on or in sediment. Blumer et al. (2025) sequenced 2 specimens collected from a shallow water trawl in the SW Arm: they are related to *Trematocranus placodon*, but not closely to any other *Otopharynx* species sequenced to date.

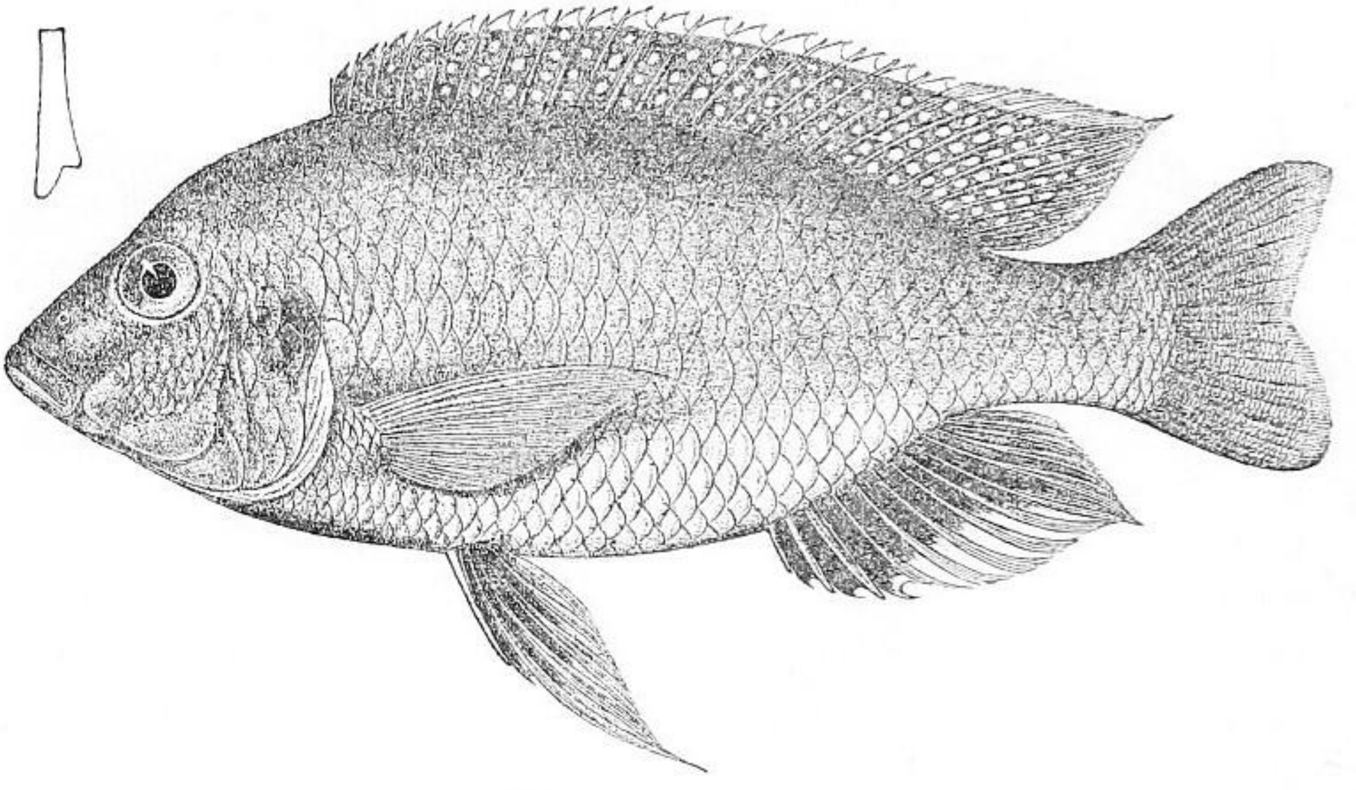


Fig. 304.1: Type of *Otopharynx auromarginatus* from Boulenger (1915). This adult male does not show the underlying melanin pattern of female and juvenile specimens.

Fig. 304.2: Adult male *O. auromarginatus* collected from a trawl at 5-18m depth, off Palm Beach, SE Arm Lake Malawi, 30-Jul-91. Not sequenced. This mature male conforms well to the phenotype of the type specimens, but also illustrates the underlying melanic markings on the flanks shown by the sequenced specimens [GFT]

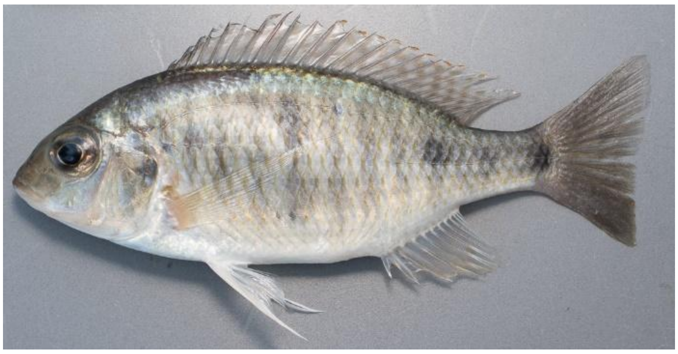


Fig. 106: *Otopharynx auromarginatus*, D14-G08, 2016.45.32 (left) and D14-G09 (right), trawled from 20m depth, SW Arm, 4 Mar 16. Both specimens conform well to the usual phenotype of females and juveniles of this species [HS].

MC305. *Otopharynx brooksi* Oliver 1989

Otopharynx brooksi was described by Oliver in his 1984 PhD thesis. However, this is not a valid publication for taxonomic purposes, and he did not go on to publish it in another medium. Along with a number of other species described by Oliver, an amended description appeared in Eccles & Trewavas (1989), which is a valid publication. The status of authorship seems contentious Eccles & Trewavas did not simply reprint Oliver's description, but rather said that they were redescribing it with additional material not seen by Oliver and deposited in South Africa at what is now the SAIAB museum and examined by Eccles. Oliver is given as the author, but his name placed in brackets, because he initially put the species in *Cyrtocara*, which was then being used as an interim substitute for *Haplochromis* which had been restricted to some Lake Victoria species by some authors. However, if Oliver's 1984 thesis was not a valid description and he did not write the description in Eccles & Trewavas, then surely the latter is not a redescription, but is the original description, which probably ought to be credited to Oliver & Eccles, with *Otopharynx* as the original genus. Anyhow, the species can be distinguished by its predatory facies, long head and elongated midlateral spot (fig. 305.1). Two specimens sequenced by Blumer et al. (2025) were trawled from deep water near Monkey Bay (fig. 305.2). Turner (1996) recorded specimens in trawls from 60m and deeper. It is presumed to be a predator, based on morphology. Phylogenetically, it is related to *Stigmatochromis modestus* and other small predatory species (Blumer et al. 2025).

Fig. 305.1: *Otopharynx brooksi*, holotype, right side photographically reversed, showing melanin pattern, from Oliver (1984).

D11-D04, UCZM 2016.40.40 D11-G09, UCZM 2016.40.72

Fig. 305.2: The sequenced specimens of *Otopharynx brooksi* correspond well to the type and were trawled from the area of the type locality, off Monkey Bay, at 85-95m on 26 March 2016. The more slender body is probably allometric, due to their relatively small size [HS].

MC306. *Otopharynx decorus* (Trewavas 1935)

Otopharynx decorus was described (as *Haplochromis*) by Trewavas (1935) from 6 specimens. Examination of the type series suggests that there are 3 species in the type series (a specimen of *Mylochromis chekopae* Turner & Howarth 2001, and an undescribed species). The lectotype (figured in Eccles & Trewavas 1989; fig. 306.1-2) has a slender body with a series of large blotches in the form of a wide broken oblique band. The snout is short and the eye large, there are 11-12 lower gillrakers on the anterior arch and there are a few enlarged medial posterior teeth on the lower pharyngeal bone. Turner (1996) identified *O. decorus* with the undescribed paralectotype and identified the true *O. decorus* as *Mylochromis* sp. 'double-spot' (Snoeks & Hanssens 2004; fig. 306.3). Snoeks & Hanssens (2004) illustrate something very similar as *Otopharynx* sp. 'shallow cheek', but it looks like this might be variation within *O. decorus*. The species prefers shallow sandy areas, although there is a record from a trawl at 64m. It is reported to be a solitary visual feeder on benthic invertebrates and may also act as a cleanerfish (Konings 2016). Four specimens fig. 306.4-7) sequenced by Blumer et al. (2025) were from the far north of the lake, in the Chilumba area, as was the lectotype. Phylogenetically, they are members of the 'shallow sand' group, along with *O. argyrosoma, O. styrax, Mchenga* sp, *Nyassachromis* sp., *Mylochromis ensatus* and *Protomelas annectens*).

Fig. 306.1: *Otopharynx decorus*, lectotype at Natural History Museum, London [GFT]

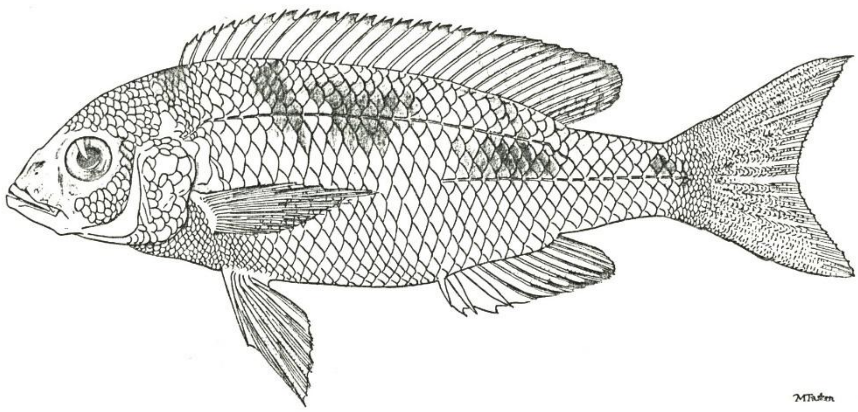


Fig. 306.2: *Otopharynx decorus*, lectotype, drawn by Fasken in the 1930s.

Fig. 306.3: *Otopharynx decorus*, SE Arm, 1990s, recorded by Turner 1996 as 'Mylochromis double-spot' [GFT].

Fig. 306.4: *Otopharynx decorus*, D07-G04, UCZM 2016.32.48; Seine, Ngara, Chilumba, 26 Feb 2016 [HS]

Fig. 306.5: *Otopharynx decorus*, D07-A01, UCZM 2016.32.16; Seine, Ngara, Chilumba, 25 Feb 2016 [HS]

Fig. 36.6: *Otopharynx decorus*, D06-A02, UCZM 2016.28.10; Seine, Chiweta, Chilumba, 24 Feb 2016 [HS]

Fig. 306.7: *Otopharynx decorus*, D06-A01, UCZM 2016.28.4; Seine, Chiweta, Chilumba, 24 Feb 2016 [HS]

MC 307. *Otopharynx heterodon;*

Not yet sequenced

MC308. *Otopharynx lithobates* (see MC334);

Blumer et al. (2025) sequenced a small juvenile initially identified as *Otopharynx lithobate*s (see MC334). However, this species has relatively large jaws and the midlateral spot tends to be more elongated (figs. 308.1-2), and it now seems more likely that the sequenced specimen is actually a juvenile of MC334 *O. sp.* 'heterodon nankhumba'. They cluster together on the molecular phylogeny.

Fig. 308.1: Holotype of *Otopharynx lithobates* (Oliver 1989) when freshly collected. Photo by Oliver.

Fig. 308.2: *Otopharynx lithobates* female/immature alive underwater. Photo by Konings.

MC309. *Otopharynx mumboensis*; MC310. *Otopharynx ovatus*; MC311. *Otopharynx pachycheilus*;

Not yet sequenced.

MC312. *Otopharynx panniculus* Oliver 2018

Otopharynx panniculus is a small species described by Oliver in 2018 from 10 specimens collected at around 42m depth in the SW Arm (Fig 312.1). The species is characterized by its pattern of thin vertical bars and a large square suprapectoral spot (with smaller supra-anal and caudal spots), a relatively large eye, 13-15 lower arch gillrakers and papilliform pharyngeal dentition. It was misidentified as *Trematocranus brevirostris* by Turner (1996), who presented photos of freshly collected specimens, showing that males have yellow cheeks, blue lips and a bluish cast on the flanks and nape (Fig. 312.5). Two of the specimens sequenced by Blumer et al. (2025) came from around 40m depth in the SW Arm, which is a good match for the type locality (Fig. 312.2-3). The third specimen was largely identified by its genetic similarity to the first two (Fig 312.4). It was purchased from commercial fishers. The species is found over soft sediments. Stomach contents included chironomids, gastropods, algae, detritus, with a few worms and ostracods (Turner 1996). Sequence analysis indicates that this species is not related to any other sequenced *Otopharyx*, and it isn't even a member of the 'shallow benthics' clade, but it is actually related to some deep-water *Placidochromis* species, including *P. elongatus, P. hennydaviesae* and *P. platyrhynchos:* none of those species have flank spots.

Fig. 312.1: *Otopharynx panniculus* holotype, from original description.

Fig. 312.2: *Otopharynx panniculus* recorded as *Trematocranus* sp. 'brevirostris yellow' by Turner (1996), trawled from 35-40m, SE Arm, NW of Boadzulu Island, 29-Jul-91 [GFT].

Fig. 312.3: *Otopharynx panniculus* male, freshly landed 4th March 2016: possibly the same specimen as fig. 312.4 [GFT]

Fig. 312.5: *Otopharynx panniculus* D14-F01, UCZM 2016.45.24; trawled from 40m depth, Malembo, SW Arm, 4 March 2016 [HS]

Fig. 312.4: *Otopharynx panniculus* D14-E04, UCZM 2016.45.1; male trawled from 40m depth, Malembo, SW Arm, 4 March 2016 [HS]

Fig. 312.6: *Otopharynx panniculus* D17-G07, no voucher specimen; Palm Beach, beach seine, SE Arm 22 Jan 2017 [HS]

MC313. *Otopharynx peridodeka*

Not yet sequenced.

MC314. *Otopharynx selenurus* Regan 1922

Otopharynx selenurus was described by Regan in 1922 from 2 specimens collected by Wood, presumably from Domira Bay. After being moved into *Haplochromis* by Trewavas (1935), it was returned to *Otopharynx* by Eccles & Trewavas (1989). The original description is of a bluish-grey fish with dark vertical bars, but Regan also mentions a smaller specimen (apparently not intended to be regarded as a type) as being more slender, 'silvery, with traces of several cross-bars; an oblong dark spot on lateral line below middle of spinous dorsal, and a band along lower lateral line'. The smaller specimen appears to be listed under the same accession number as the two larger types. The markings described for the smaller specimen seem to have been enough to justify including this species in *Otopharynx* - the figured lectotype just seems to have vertical bars (fig. 314.1), which would place it in *Placidochromis* under Eccles & Trewavas's definition), but the horizontal band is not mentioned in Eccles & Trewavas's redescription and sounds more like *Otopharynx alpha* Oliver 2018, which also has a strongly emarginate caudal fin, slightly enlarged medial posterior pharyngeal teeth (that of *O. selenurus* has not apparently been illustrated but was verbally described by Eccles & Trewavas) and 12-13 outer lower arch gill rakers (v 10-12). In addition, the Eccles & Trewavas description includes 17 specimens from the Christy collection which may account for the statements about a blotch below the dorsal fin. In addition, they mention 6 further specimens that they seemed uncertain about. Konings (2016) describes the species as being sexually monomorphic (fig. 314.2), with both sexes dark blue with faint vertical bars but the 'genus-typical' blotch pattern exhibited by juveniles up to 7cm (not sure whether this is SL or TL). Snoeks & Hanssens report no taxonomic problems with the species and show a very deep-bodied specimen with very faint vertical bars and with an obvious large suprapectoral blotch, stating that the lower pharyngeal bone has molariform medial teeth. Two specimens sequenced by Blumer et al. (2025) trawled from 30-40m depth off Makanjila in the SE of the lake (Figs. 261-262) conform well to the overall phenotype of this species. Konings (2016) reports little information about it, except that it is reported to feed by filtering crustaceans from the sand. Phylogenetically, it has been placed in a clade along with *Mylochromis anaphyrmus*, *Otopharynx* sp. 'interruptus' and *Placidochromis electra* (Blumer et al. 2025).

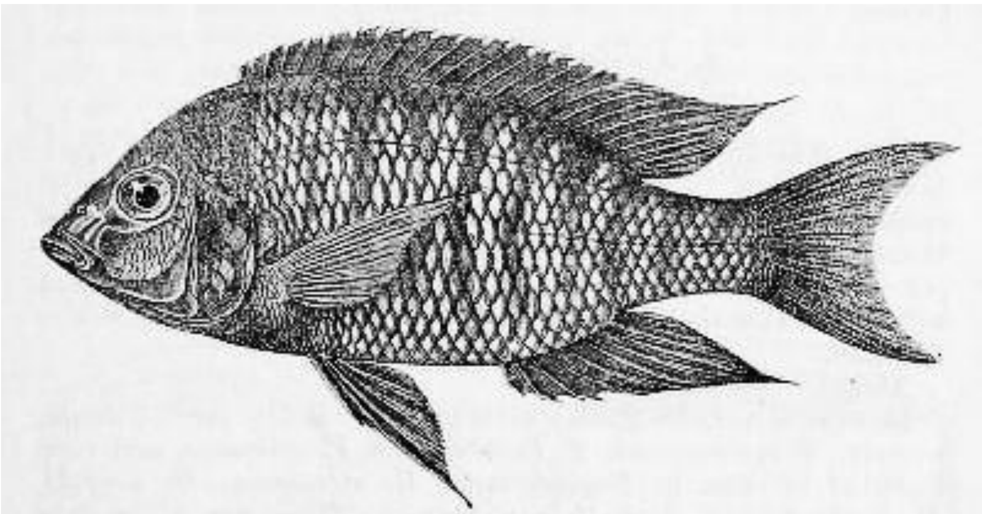


Fig. 314.1: Drawing of lectotype of *Otopharynx selenurus* Regan 1922.

Fig. 314.2: Aquarium specimen attributed to *O. selenurus* by Konings [AK]

Fig. 314.3: Preserved specimens from Senga Bay attributed to *O. selenurus* by Snoeks & Hanssens (2004).

Fig. 314.4: *Otopharynx selenurus* D12-H06, UCZM uncatalogued; sequenced, trawled from 30-40m off Makanjila, 3 March 2016 [HS].

Fig. 314.5: *Otopharynx selenurus* D12-H07, UCZM 2016.41.54; sequenced, trawled from 30-40m off Makanjila, 3 March 2016 [HS].

MC315. Otopharynx sp. 'argyrosoma deep'; MC316. Otopharynx sp. 'argyrosoma large'; MC317. Otopharynx sp. 'auromarginatus goldhead'; MC318. Otopharynx sp. 'auromarginatus jakuta'; MC319. Otopharynx sp. 'auromarginatus mara'; MC320. Otopharynx sp. 'auromarginatus margrette'; MC321. Otopharynx sp. 'blue flat-jaw'; MC322. Otopharynx sp. 'circle'; MC323. Otopharynx sp. 'decorus featherfin'; MC324. Otopharynx sp. 'decorus jumbo'; MC325. Otopharynx sp. 'elongate-spot tanzania'; MC326. Otopharynx sp. 'flat jaw'; MC327. Otopharynx sp. 'golden blueface'; MC328. Otopharynx sp. 'golf-head blue'; MC329. Otopharynx sp. 'heterodon boadzulu'; MC330. Otopharynx sp. 'heterodon ikombe'; MC331. Otopharynx sp. 'heterodon likoma'; MC332. Otopharynx sp. 'heterodon longnose'; MC333. Otopharynx sp. 'heterodon low-spot';

Not yet sequenced

MC334. *Otopharynx* sp. 'heterodon nankumba'

This species, possibly still undescribed, was first identified by Konings in 1990. As no description of specimens is available, the species can only be identified by overall appearance and locality. Nankumba (sometimes Nankhumba) refers to the peninsula between the SW and SE Arms of the lake, which includes Monkey Bay and the area generally known as Cape Maclear and associated islands. The species is distinguished by the spotted flank pattern, including a large midlateral spot and several large spots at the base of the dorsal fin. The overall body shape is quite rounded with a relatively large terminal mouth on a rather acutely pointed snout (Fig. 334.1). The relationship between this and the described species *O. heterodon* (Trewavas 1935; Fig. 334.2) remains unclear, but for now they are considered heterospecific. Two adult males were sequenced by Blumer et al. (2025), collected by divers at Cape Maclear (Fig. 334.3). Voucher specimens are available and could be used in a future comparison or species description. A small juvenile originally collected as *O. lithobates* is probably a juvenile of this species (Fig. 334.4). Konings (2016) reports that *O.* sp. 'heterodon nankhumba' inhabits shallow areas of mixed rocks and soft sediment, has been observed feeding among sediment at the base of rocks, perhaps collecting invertebrates. The species is related to a clutch of *Mylochromis* species, and not closely to any other sequenced *Otopharynx*.

Fig. 334.1: *Otopharynx* sp. 'heterodon nankhumba', male and female, from Konings 2016.

Fig 334.2: Lectotype of *Otopharynx heterodon*, BMNH 1935.6.14.1586. Photo from 2023 [GFT] (above) and drawing from 1930s (Eccles & Trewavas 1989), Right.

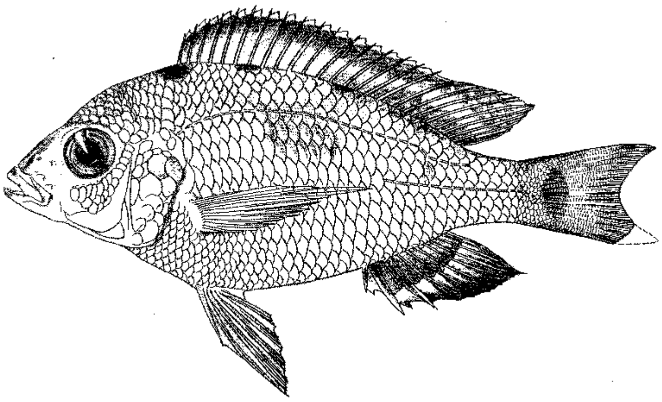


Fig 332.3: D26-D01, UCZM 2021.46.1; *Otopharynx sp.* ‘heterodon Nankumba’ collected by SCUBA, Cape Maclear, Thumbi West, 4 Feb 2017 [HS].

D26-D02, UCZM 2021.46.2; *Otopharynx sp.* ‘heterodon Nankumba’ collected by SCUBA, Cape Maclear, Thumbi West, 4 Feb 2017 [HS].

Fig. 332.4: *Otopharynx sp*. 2014.131 from Cape Maclear, 9th September 2014. Originally identified as *Otopharynx lithobates*, but now believed to be a juvenile *O. sp.* ‘heterodon nankhumba’.[MJG].

MC335. Otopharynx sp. 'high fin'; MC336. Otopharynx sp. 'high-fin low-GR';

Not yet sequenced.

MC337. Otopharynx sp. 'tetrastigma ilamba'

In 2011, a population of 3-spotted cichlids was discovered in Lake Ilamba, a Tanzanian crater lake within the Lake Malawi catchment (Turner et al. 2019). These have yet to be examined in detail and have not been formally described. They are superficially similar to *Otopharynx tetrastigma* and are here referred to as *O. sp.* 'tetrastigma Ilamba'. A single sequence has been obtained from an adult male collected as a batch in a single vial (Fig. 337.1). Females from the same lake show the characteristic 3 small spots of this species (Fig. 337.2).

Fig. 337.1: *Otopharynx sp*. 'tetrastigma Ilamba' mature male, 2011.116 (one of a batch of 5), Lake Ilamba, 16 July 2011. [MJG].

Fig. 337.2: *Otopharynx sp.* 'tetrastigma ilamba' 2011.153, female/immature specimens showing dark flank spots, Lake Ilamba, 16 July 2011. Specimens not sequenced. [MJG].

MC338. *Otopharynx* sp. 'interruptus'

A single specimen was sequenced of this species by Blumer et al. (2025). It had a steep head profile, large eye and blotched/interrupted oblique flank markings. It was collected from a deep water trawl off Domwe Island in 2016 (Fig. 338.1). It had not previously been recognised, but search of archives indicated that another two similar-looking specimens had been collected from a deep-water trawl nearby (Monkey Bay-Nkudzi) in 2004 (figs. 338.2-3), under the nickname *Otopharynx sp.* ‘high’. It appeared in Blumer et al. as *Trematocranus sp.* ‘Cape Maclear’ but the flank spots do not extend to the dorsal fin base, which is presently the main identification feature of *Trematocranus*, making it yet another *Otopharynx* species, provisionally called *O*. sp. ‘interruptus’*.* The voucher specimen has strongly developed molariform pharyngeal jaws (fig. 338.4). Sequence analysis indicates it is the sister species to *Mylochromis anaphyrmus,* a species that it is very similar, but differs in having a continuous oblique stripe and blue breeding males. Additional specimens were collected in the 2023 trawl survey, all from the southern half of the lake, but extending the known range to the SW Arm and as far north as Bana.

Fig. 338.1: *Otopharynx sp. 'interruptus',* D14-D10, UCZM 2016.44.35, sequenced; trawled from 95-105m off Domwe, 4 March 2016 [HS]

Fig. 338.2: *Otopharynx sp. 'interruptus',* 2004.A73, not sequenced, trawled from Monkey Bay-Nkhudzi 13 Aug 2004 [MJG]

Fig. 338.3: *Otopharynx sp. 'interruptus',* 2004.A72, not sequenced, apparent male, trawled from Monkey Bay-Nkhudzi 13 Aug 2004 [MJG]

Fig. 338.4: Heavily molariform lower pharyngeal bone of *Otopharynx sp. 'interruptus',* D14-D10, UCZM 2016.44.35; trawled from 95-105m off Domwe, 4 March 2016 [GFT]

MC339. Otopharynx sp. 'ovatus likoma'; MC340. Otopharynx sp. 'red flat-jaw'; MC341. Otopharynx sp. 'round head';

Not yet sequenced

MC342. Otopharynx sp. 'silver torpedo'

Konings variously used the names *Sciaenochromis* sp. ‘silver torpedo’ (1989), *Maravichromis* sp. 'Silver Torpedo' (1990), *Mylochromis* sp. 'silver torpedo' (1995) before settling down to *Otopharynx* sp. 'silver torpedo' (2001, 2016). There may also be some confusion in the literature with *Otopharynx styrax*, but that species has a very slender body and acutely angled snout profile. *Otopharynx* sp. 'silver torpedo' sensu Konings has a less acute snout, and females/immatures have faint blotches. Breeding males are shown to have relatively deep bodies, blue heads and yellow flanks and a wide white dorsal fin margin (fig. 342.1), while females had yellowish pelvic and anal fins. Konings only recorded them from Senga Bay. This species might be the best available match to a series of specimens taken in the north in shallow water trawls in 2023, although the eggspots of figs 342.1 and 342.3 are quite different. The specimen illustrated in fig. 342.3 was 140.5mm SL, Head length 37.4mm, lower Jaw Length 13.1mm, had a low gillraker count: 3/1/10 (3/1/11 for fig. 342.9), and high longitudinal scale count 38. Its mouth was small and downwardly protrusible. Konings suggested that the species reported by Snoeks & Hanssens as *O.* sp. ‘productus sharp snout’ might be conspecific, but actually that looks more like *O. styrax* (*O.* sp. ‘productus’ sensu Turner 1996). A better fit might be *O.* sp. ‘productus’ sensu Snoeks & Hanssens, which is definitely not the same as the Turner species. This might be a deep-bodied adult male silver torpedo (fig 342.5). Specimens collected in 2023 came from shallow water trawls, ranging widely from Karonga to the SW Arm.

The species is yet to be sequenced, but tissue samples have been collected. I expect it will fall into the ‘shallow sand’ group along with *O. argyrosoma, O. styrax* and *M. ensatus*.

Fig. 342.1: *Otopharynx* sp. 'silver torpedo', male, aquarium specimen [AK].

Fig. 342.2: *Otopharynx* sp. ‘silver torpedo’, male. MWA 5144: S114, SWA7, West of Malembo, -14.229, 34.751; 16-20m, 2 Dec 2023 [HS lab].

Fig. 342.3: *Otopharynx* sp. ‘silver torpedo’, male. MWA 2872, S14, KA 18; -10.20, 34.11 (Ngara, Karonga), Bottom trawl 13-16m, 2 Nov 2023 [HS lab].

Fig. 342.4: *Otopharynx* sp. ‘silver torpedo’, freshly collected male. Collection details as fig. 342.3. [GFT]

Fig. 342.5: *Otopharynx* sp. ‘productus’ sensu Snoeks & Hanssens 2004. MRAC 99-41-P-5206-5210, Senga Bay, Malawi.

Fig. 342.6: *Otopharynx* sp. ‘silver torpedo’, non-breeding male. Senga Bay [AK].

Fig. 342.7: *Otopharynx* sp. ‘silver torpedo’, female, aquarium [AK].

Fig. 342.8: *Otopharynx* sp. ‘silver torpedo’, unsexed, MWA5147 trawled from 16-20m, S114,, South West arm, Station SWA7, -14.2285, 34.7507, 2 Dec 2023 [HS lab].

Fig. 342.9: *Otopharynx* sp. ‘silver torpedo’,MWA 2874: female, trawled from 13-16m depth, Karonga, S14, KA18, -10.201, 34.1104, 2 Nov 2023. 3/1/11 Gill rakers. [HS lab].

MC343. Otopharynx sp. 'slender bignose'; MC345. Otopharynx sp. 'spots'; MC346. Otopharynx sp. 'tetraspilus molariform'

Not yet sequenced.

MC346. *Otopharynx speciosus* (Trewavas 1935).

Otopharynx speciosus was described (as *Haplochromis*) by Trewavas in 1935 from 2 specimens from the far north of the lake, near Vua (fig. 346.1). It has a relatively deep body, heavy head, deep cheek and large mouth with simple teeth. It resembles some of the species of *Buccochromis* but was placed in *Otopharynx* by Eccles & Trewavas (1989) on the basis that it has a spotted flank melanin pattern, rather than a continuous stripe. However, the spots are often large and look like a broken stripe, often with a conspicuous blotch on the nape and a partial stripe stretching anteriorly from the large midlateral blotch. The six specimens sequenced by Blumer et al. (2025) were obtained from a variety of locations around the lake and all seem clearly identifiable as *O. speciosus* (fig. 346.2-4). Turner (1996) reported the species as being common in trawl catches at 40-70m depth and occasionally as deep as 100m. Eccles & Trewavas (1989) reported it could be found as shallow as 18m, but it has rarely been observed by divers (Konings 2016). It appears to be a piscivore favouring soft-sediment habitats. Phylogenetically, it is nested within the *Buccochromis* clade (Blumer et al. 2025).

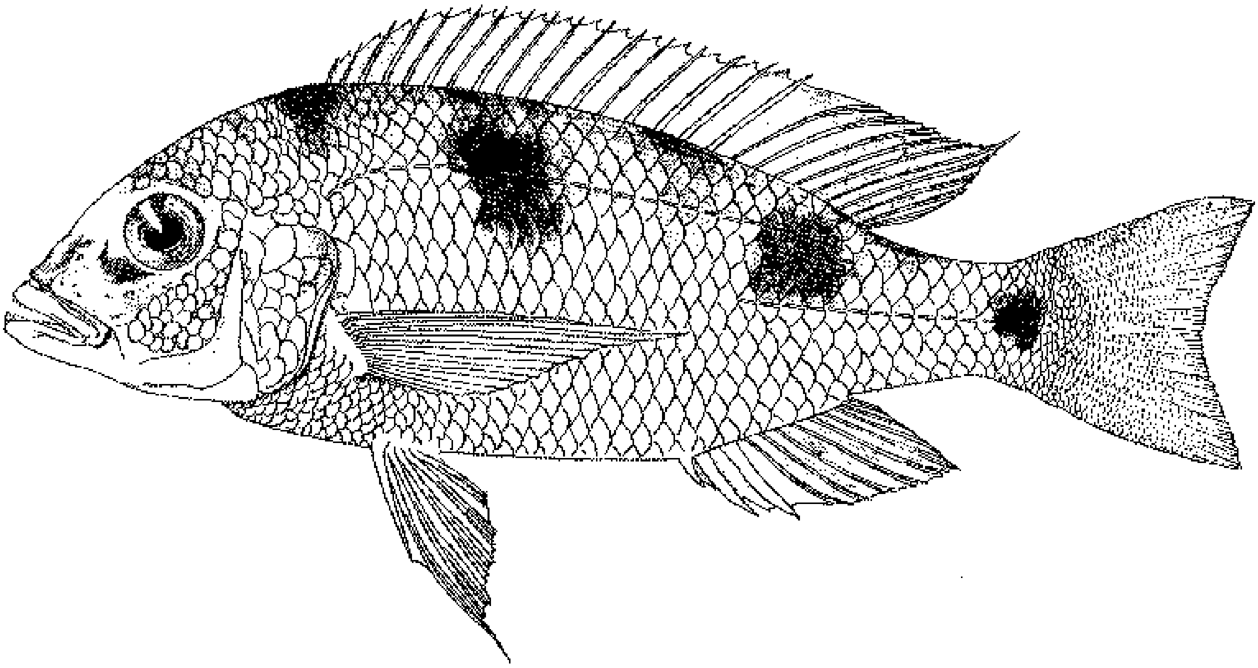


Fig 346.1: Drawing of the lectotype of *Otopharynx speciosus* from Eccles & Trewavas 1989.

Fig. 346.2: *Otopharynx speciosus*, D14-G03, uncatalogued voucher specimen at University of Cambridge Zoology Museum, Trawled at 19-22m, SW Arm, 4 March 2016 [HS]

D05-J08, UCZM 2016.28.13

D05-J09, UCZM 2016.28.8

D03-G10, UCZM 2016.22.11

Fig. 346.3: *Otopharynx speciosus*, 3 specimens purchased from beach seiner at Chiweta, Chilumba, at the north end of the lake, 25 Feb 2016 [HS].

Fig. 346.4: *Otopharynx speciosus*, 2010-A07 (OS1 & 2), trawled from 51-71m depth SE Arm, 18 Nov 2010. The fin clips from these specimens were pooled in a single vial so they cannot be individually identified; voucher specimens have not been located. [GFT].

Fig. 346.5: *Otopharynx speciosus*, male in (partial?) breeding dress. Trawled from 23-32m depth, SE Arm, SW of Boadzulu Island, 29-Jul-91 [GFT].

MC347. *Otopharynx spelaeotes* Cleaver, Konings & Stauffer 2009

This small, cryptic cave-dwelling species appears to be an allopatric sister species to *Otopharynx lithobates*, replacing the latter over most of the lake except the far south. Males lack the forehead/dorsal fin 'blaze' of white/yellow seen in some populations of *O. lithobates* (fig. 347.1), although this is not a diagnostic feature, as populations at the Maleri Islands, currently regarded as *O. lithobates walteri* also lack this trait (Konings 2016). Its distribution overlaps with the very similar *O. antron* around the Mozambique/Malawi border south to Gome. *Otopharynx spelaeotes* and *O. lithobates* have bicuspid teeth in their outer jaw series, in contrast to the simple teeth seen in *O. antron* (Konings 2018). It has not been sequenced.

Fig. 347.1. Male *O. spelaeotes*, Manda [AK]

Fig. 347.2. Female *O. spelaeotes,* Lundu, [AK].

M348. *Otopharynx styrax* Oliver 2018

Otopharynx styrax was described by Oliver in 2018. It was formerly known as *Otopharynx* 'productus' (e.g Turner 1996). Its main diagnostic features are the slender body, acute snout, large elliptical eye and presence of one or more elongated dark blotches on the flanks (figs. 348.1-3). The specimen sequenced by Blumer et al. (2025) is a large mature male, and relatively deep-bodied (fig. 348.4). The acute snout shape is not visible in the field photo (Fig. 348.3), but can be seen on the preserved specimen if the floor of the mouth is held shut (Fig. 348.5). The species lives in shallow sandy areas and feeds on a variety of benthic arthropods and occasionally small fish. Phylogenetically, it is a member of the 'shallow sand' clade, along with *Otopharynx argyrosoma, Mylochromis ensatus, Mchenga spp.* etc (Blumer et al. 2025).

Fig. 348.1: *Otopharynx styrax*, holotype, from original description [MKO].

Fig. 348.2: *Otopharynx styrax*, mature male, from original description, showing elongated blotches [Mark Smith].

Fig. 348.3: *Otopharynx styrax,* apparent female, trawled from 5-10m depth, SE Arm, Chapola Shoal, E of Boadzulu Island, 31-Jul-91 [GFT]

Fig. 348.4*:Otopharynx styrax*, sequenced male, D06-A10, UCZM 2016.28.15; Beach Seine, Chiweta, Chilumba, 24 Feb 2016 [HS]

Fig. 348.5::*Otopharynx styrax*, D06-A10, UCZM 2016.28.15; preserved specimen, showing shape of snout when floor of the buccal cavity is held closed in a more lifelike position [GFT].

MC349. *Otopharynx tetraspilus* (Trewavas 1935)

Haplochromis tetraspilus was described by Trewavas in 1935 and moved to *Otopharynx* by Eccles & Trewavas (1989), who provided the first full description of the species (Fig. 349.1). Among *Otopharynx*, it has short jaws, a strongly laterally compressed body, a lower pharyngeal bone with numerous small, closely-packed teeth and 11-13 lower gillrakers. Eccles & Trewavas listed 99 specimens in the London Natural History Museum collection, all from the Christy collection in 1925-26. Several specimens were collected between the 1960s-1980s (GBIF records), but subsequent to that, just a single specimen was collected by Turner from a shallow-water trawl off Palm Beach, SE Arm of Lake Malawi in 1991, and a single specimen was collected in 2017, again from near Palm Beach (Fig. 349.3). Konings (2016) discussed and illustrated some aquarium fish that had been collected in the south of the lake and traded as 'yellow fin mloto' (why is everything mloto?) in the 1980s, which could possibly have been this species, but otherwise seemed to be unaware of it. *Otopharynx tetraspilus* appears once to have been numerous, but now appears to be rare, perhaps because it favours shallow beaches with submerged macrophytes, a habitat almost completely destroyed by beach seine fisheries. At the time of writing (2025), it is listed as 'Least Concern' on the IUCN red list, which certainly seems inappropriate. It is reported to feed on algae, plant fragments and small crustacea (Eccles & Trewavas 1989). Analysis of the sequence indicated that it is related to a group of *Protomelas* species including the rocky shore *P. taeniolatus*, but also shallow soft-sediment species such as *P. similis, P. kirkii* and *P. pleurotaenia* (Blumer et al. 2025).

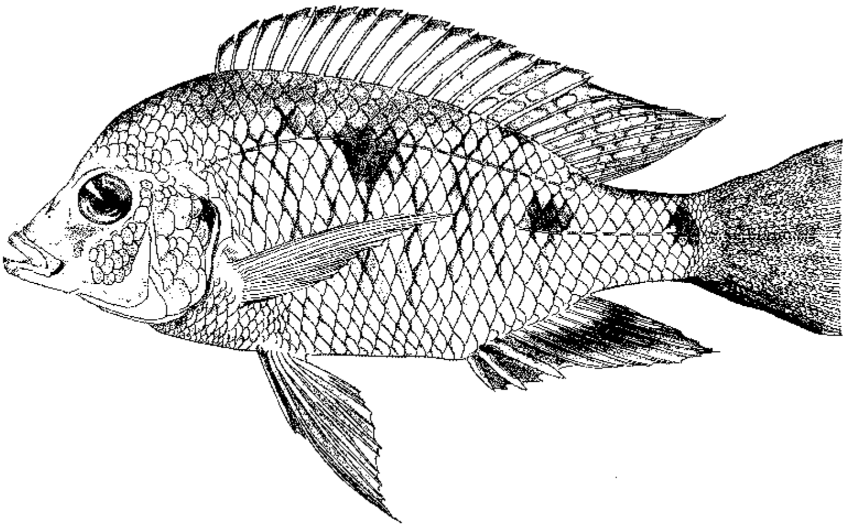


Fig. 349.1: Fasken's drawing of the lectotype of *Otopharynx tetraspilus*, from Eccles & Trewavas 1989.

Fig. 349.2: *Otopharynx tetraspilus,* trawled from 5-18m depth off Palm Beach, SE Arm of Lake Malawi on 30 July 91 [GFT].

Fig. 349.3: *Otopharynx tetraspilus* D20-C06, BMNH 2022.11.2.4, collected from the SE Arm of Lake Malawi, in 2016 [GFT].

MC350. *Otopharynx tetrastigma* (Günther 1894)

Otopharynx tetrastigma was described (as *Chromis*) by Günther in 1894 from four specimens collected in 1892 from Mangochi on the Upper Shire River and transferred to *Otopharynx* by Eccles & Trewavas (1989). It is a small, fairly laterally compressed species with 3 short squarish flank spots, a straight head profile, rather acute snout and 9-11 gillrakers on the lower, outer arch (fig. 350.1-2). It has a few pharyngeal teeth that are slightly enlarged. Blumer et al. (2025) sequenced 6 specimens collected in the South East Arm of Lake Malawi and in Lake Malombe, which seem unambiguous (fig. 350.3-4). The species lives in shallow, sheltered muddy areas and is known to feed on small snails, a variety of arthropods and algae (Turner 1996). Notably, it was abundant even in heavily fished areas such as Palm Beach and Lake Malombe in 2016-2017 surveys and it is regularly found in the ornamental fish trade: young males tend to show a metallic green iridescence (fig. 350.5), but larger ones tend towards a more clearly blue colour. Sequence analysis suggests that it is closely related to *Placidochromis longimanus*, that frequents similar shallow weedy areas and has a similar blue-green male breeding dress, but lacks flank spots (Blumer et al. 2025).

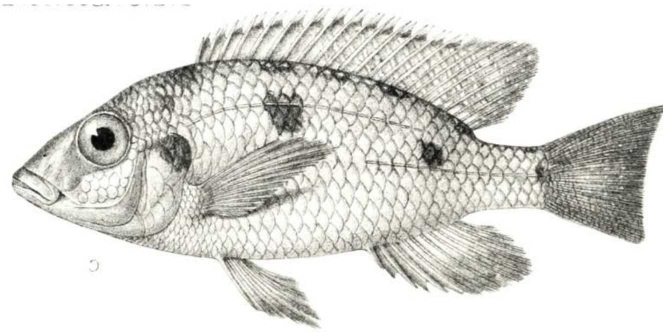


Fig. 350.1: Drawing of the lectotype of *Otopharynx tetrastigma* from Günther 1894 (reversed).

Fig. 350.2: The lectotype photographed in 2023; the snout looks somewhat shorter and more decurved than in the drawing from 1894 [GFT].

Fig. 350.3: *Otopharynx tetrastigma* male, D19-B09 (no voucher specimen); purchased from seine netters, Chimwala, Lake Malombe, 23 Jan 2017 [HS].

D21-B01 (no voucher), Lake Malombe, 24 Jan 2017

D17-I10, Bangor University MB2311F; SE Arm, 22 Jan 2017

D17-J01, Bangor University MB2311F; SE Arm, 22 Jan 2017

D20-C05, Bangor University MB2311 C,D; SE Arm, 24 Jan 2017.

Fig.350.4: Five of the 6 *Otopharynx tetrastigma* sequences from southern Lake Malawi/ Malombe have photos showing suitable phenotypes (see also fig. 351.3), but no photo is available for D19-B10 (Lake Malombe 23 Jan 2017). Three voucher specimens are temporarily housed at Bangor University, with the intention of moving them to a permanent collection. All specimens were purchased from beach/nkacha seine fishers [GFT].

Fig. 350.5: *Otopharynx tetrastigma*, young male in partial breeding dress, aquarium strain [GFT].

Placidochromis Eccles & Trewavas 1989. MC351-418.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis longimanus* Trewavas, 1935.

Contained valid species (42): *Placidochromis acuticeps; Placidochromis acutirostris; Placidochromis argyrogaster; Placidochromis boops; Placidochromis borealis; Placidochromis chilolae; Placidochromis communis; Placidochromis domirae; Placidochromis ecclesia; Placidochromis electra; Placidochromis elongatus; Placidochromis fuscus; Placidochromis hennydaviesae; Placidochromis intermedius; Placidochromis johnstoni; Placidochromis koningsi; Placidochromis lineatus; Placidochromis longimanus; Placidochromis longirostris; Placidochromis longus; Placidochromis lukomae; Placidochromis macroceps; Placidochromis macrognathus; Placidochromis mbunoides; Placidochromis milomo; Placidochromis minor; Placidochromis minutus; Placidochromis msakae; Placidochromis nigribarbis; Placidochromis nkhatae; Placidochromis nkhotakotae; Placidochromis obscurus; Placidochromis ordinarius; Placidochromis orthognathus; Placidochromis pallidus; Placidochromis phenochilus; Placidochromis platyrhynchos; Placidochromis polli; Placidochromis rotundifrons; Placidochromis trewavasae; Placidochromis turneri; Placidochromis vulgaris.*

Proposed undescribed taxa (26): *Placidochromis* sp. 'big eye'; *Placidochromis* sp. 'big mouth'; *Placidochromis* sp. 'blue otter'; *Placidochromis* sp. 'blue-head piper'; *Placidochromis* sp. 'blue-yellow stripe'; *Placidochromis* sp. 'chinyankwazi'; *Placidochromis* sp. 'deep'; *Placidochromis* sp. 'deep cheek'; *Placidochromis* sp. 'electra blue'; *Placidochromis* sp. 'electra deep'; *Placidochromis* sp. 'elongate thin bar'; *Placidochromis* sp. 'green orange deep'; *Placidochromis* sp. 'hennydaviesae IV'; *Placidochromis* sp. 'hennydaviesae V'; *Placidochromis* sp. 'jalo'; *Placidochromis* sp. 'longimanus mumbo'; *Placidochromis* sp. 'longimanus namiasi'; *Placidochromis* sp. 'longimanus thumbi'; *Placidochromis* sp. 'mbamba'; *Placidochromis* sp. 'pale elongate blunt snout'; *Placidochromis* sp. 'pale elongate dull'; *Placidochromis* sp. 'phenochilus gissel'; *Placidochromis* sp. 'phenochilus tanzania'; *Placidochromis* sp. 'retrognathous'; *Placidochromis* sp. 'white-orange dorsal'; *Placidochromis* sp. 'yellow-black dorsal'

Taxa considered invalid: *Haplochromis sexfasciatus* Regan, 1922 (synonym of *P. johnstonii*); a number of the informally named species of Turner (1996) were described by Hanssens, but some of these were misidentified as *Lethrinops*. Not all of these have been worked out fully to date.

Generic reviews & diagnoses: Eccles & Trewavas 1989; Hanssens 2004.

Generic diagnosis: Eccles & Trewavas (1989): “Small to medium sized haplochromines endemic to Lake Malawi with adult sizes ranging from about 55 to 150 mm SL. Distinguished by the absence or poor development of the horizontal element of the plesiomorphic melanin pattern, of which the vertical bars predominate or, in *P. subocularis*, by such bars sometimes intensified by an oblique series of spots overlying the bars. Teeth in 2 to 5 series, the outer bicuspid or tricuspid, continuing posteriorly as a single series which are usually simple. Differ from *Alticorpus*, which has a similar melanin pattern, in lacking a mental knob and lacking hypertrophied sensory canals on the preorbital. Differs from *Lethrinops* species with a similar pattern in the dentition, with a single series posteriorly in the lower jaw.” This was based on a mere 7 species, but *Placidochromis subocularis* was removed by Konings (so that section of the diagnosis would be irrelevant), but he also moved in *Haplochromis phenochilus* (which had been ‘incertae sedis’ in Eccles & Trewavas 1989). Later, Hanssens (2004) added *Lethrinops polli* and 35 new species. Additional species have been informally assigned to the genus by other authors (Konings 1989-2016, Turner 1996, Hanssens 2004; Snoeks & Hanssens 2004). A few previously-unreported taxa have been added from recent surveys. Some of Hanssens' informal species were accompanied by detailed descriptions but no illustration was provided and the voucher specimens had been lost. Hanssens attempted to give a revised generic diagnosis specifically v *Aulonocara* (lack of enlarged cephalic lateral line canals) and *Sciaenochromis* (bicuspid/tricuspid v simple or slightly shouldered outer series teeth in the lower jaw) but admitted that the latter in particular is not clear-cut.

Field Diagnosis: Anything with strong, wide vertical barring on the flanks and lacking other bright colours or eggspots is likely to be a *Placidochromis* - specifically *P. johnstonii* or *P. milomo*, but not *M. subocularis* which sometimes shows an oblique line of blotches nor one of the barred *Sciaenochromis*, which look a bit predatory. Anything without strong any strong melanic markings at all might be a *Placidochromis*, so long as it is isn't predatory-looking, isn't planktivorous looking, doesn't have expanded lateral line canals under the head and doesn't look like a medium-large *Lethrinops*. Things with strong vertical barring as part of the male breeding dress might also be *Placidochromis*, subject to such caveats, so long as no other strong melanic pattern is overlain or visible in the females and young. It is the ultimate dustbin for Malawi cichlids of the Cyrtocarina.

Phylogenetic comments: The features of the genus as currently understood appear to have evolved at least 9 times independently, with the type species (*P. longimanus*) being unrelated to any of the other taxa in the genus sequenced to date (Blumer et al. 2025). The contrast between 'Lethrinops-type' and '*Placidochromis*-type' lower jaw dentition seem to have phylogenetic relevance in the shallow water species, but not in the deep-water group.

Ecomorphological notes: *Placidochromis* is a very diverse group of benthic-feeding, largely non-piscivorous cichlids.

MC351. *Placidochromis acuticeps* Hanssens 2004

Placidochromis acuticeps was described by Hanssens (2004) from 8 specimens taken near Mvunguti in the south of the lake, from unknown depth. It is a moderate-sized (up to 103mm SL) species with tricuspid jaw teeth, a slender pharyngeal bone with small teeth and 10-11 lower gillrakers. Turner (1996) reported the species from depth of 70-125m from the vicinity of Monkey Bay in the south of the lake. It is mainly identified by its distinctive, head shape, with quite a long snout, but a rather upwardly-angled mouth gape, and generally 'beak-like' mouth, and prominent premaxillary pedicels. The species has not yet been sequenced.

Fig. 351.1: Holotype of *Placidochromis acuticeps*.

Fig. 351.2: *Placidochromis acuticeps*, male, trawled from 84-94m, SE Arm, Off Monkey Bay, 13-Apr-92 [GFT]

Fig. 351.3: *Placidochromis acuticeps*, immature male?, trawled from 70m depth, SE Arm, Off Monkey Bay, 18-Jul-91 [GFT]

MC352. *Placidochromis acutirostris* Hanssens 2004

Placidochromis acutirostris was described by Hanssens in 2004 from 8 specimens trawled from deep water (30-61m) in the far north of the lake (Wissman Bay). It is a fairly elongate, laterally compressed species, with a very acutely pointed snout and concave head profile. It has a short bicuspid teeth, compared to the slender unicuspid teeth of the very similar *P. polli*, which is only known from the south of the lake. Three specimens sequenced by Blumer et al (2025) were collected from a seine net catch at Chiweta Beach, Chilumba, in the far north of the lake. The species would not have been distinguished from *P. polli* in previous studies: stomach contents consisted largely of oligochaetes, plant material and detritus (Darwall 2003). Phylogenetic analysis suggests it is related to other deep-water benthic species, such as *Placidochromis boops, P. mbunoides, Lethrinops atrilabris* and *L. gossei* (Blumer et al. 2025).

Fig. 352.1: Holotype of *Placidochromis acutirostris* Hanssens 2004.

Fig. 352.2: *Placidochromis acutirostris,* D03-H06, UCZM 2016.22.12; seined from Chiweta Beach, Chilumba, 22 Feb 2016 [HS].

Fig. 352.3: *Placidochromis acutirostris,* D03-H03, UCZM 2016.22.1; seined from Chiweta Beach, Chilumba, 22 Feb 2016 [HS].

Fig. 352.4: *Placidochromis acutirostris,* D03-H04, UCZM 2016.22.7; seined from Chiweta Beach, Chilumba, 22 Feb 2016. [HS]

MC353. *Placidochromis argyrogaster*

Not yet sequenced.

MC354. *Placidochromis boops* Hanssens 2004

Placidochromis boops was described by Hanssens in 2004 from 8 specimens trawled from deep water (74-125m) in the south of the lake. It is stocky species with a long acutely-pointed snout, relatively large upwardly-angled mouth, and large eye. Gillrakers long and slender, 16-19 on the lower arch. The single sequenced specimen is from deep water in the south of the lake, and has quite a strongly upwardly-angled mouth, but otherwise fits the description well. Nothing is known of its diet. Phylogenetically, it is close to other deep-water benthic species, such as *Placidochromis acutirostris, P. mbunoides, Lethrinops atrilabris* and *L. gossei* (Blumer et al. 2025).

Fig. 354.1: Holotype of *Placidochromis boops* from original description.

Fig. 354.2: *Placidochromis boops,* D11-I01, UCZM 2016.40.36; trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016 [HS]

MC355. *Placidochromis borealis*; MC356. *Placidochromis chilolae*

MC357. *Placidochromis communis* Hanssens 2004

Placidochromis communis was originally described by Hanssens in 2004 from 6 specimens of 69-76.5mm SL, collected in deep water in Young's Bay, Chilumba, Malawi (fig. 357.1). It has a generally 'deep-water Lethrinops' phenotype, with a laterally compressed body, pointed snout, mouth low on head, 6 vertical bars under the dorsal fin, 8-9 lower gill rakers, small unicuspid or shouldered tricuspid outer teeth with simple inner teeth in 1 or occasionally 2 rows, a lightly built pharyngeal bone with small teeth. The lower profile of the upper jaw is slightly concave, reminiscent of *Lethrinops altus*, leading to this species originally being recognised by Turner (1996) as part of *Lethrinops* sp. 'deepwater altus'. Males in breeding dress have a broad white submarginal band in the dorsal fin, black lappets and orange brown spots on the dorsal and caudal fins (fig. 357.2-3). The species has been found in a variety of locations around the lake, in deep waters. The species has not yet been sequenced.

Fig. 357.1: *Placidochromis communis*, 76.5mm SL, holotype, Young's Bay (Malawi); depth 145-147 m from Hanssens 2004.

Fig. 357.2: *Placidochromis communis*, adult male, 75.5mm SL,
D11-E01, not sequenced, trawled at 85-95m, NE of Monkey Bay, -14.002, 34.975, 2 March 2016, 11 lower gillrakers [HS]

Fig. 357.3: *Placidochromis communis,* mature male, #2005.184, not sequenced, purchased from fishers, 10km south of Tukombo, 6 May 2005 [MJG].

Fig. 357.4. *Placidochromis communis*, MWA 2762, trawled from 80-88m depth, S9, Karonga, 1 Nov 2023. 79.4mm SL, 8 lower gillrakers [HSlab]

Fig. 357.5. *Placidochromis communis*, MWA 2765, trawled from 80-88m depth, S9, Karonga, 1 Nov 2023 [HSlab]

MC358. *Placidochromis domirae* Hanssens 2004

Not yet sequenced.

MC359. *Placidochromis ecclesi* Hanssens 2004

Placidochromis ecclesi was described by Hanssens (2004) from 4 specimens of 58.5-63mm SL. Recorded from Kande and Lukoma at depths of 96-125m (fig. 359.1). Specimens had 17-21 lower gillrakers, small bicuspid outer lower jaw teeth, 1-2 rows of shouldered tricuspid inner teeth, lightweight pharyngeal bone with small teeth. Since then, it was collected near Nkhata Bay in 2023 in a deepwater trawl catch (fig. 359.2). Not yet sequenced.

Fig. 359.1: *Placidochromis ecclesi*, holotype, 58.5mm SL from Hanssens (2004).

Fig. 359.2: *Placidochromis ecclesi,* MWA 3129, trawled from Nkhata Bay site S17, -11.866, 34.221. Depth unknown, but community suggests ~100m. 4 Nov 2023. 17 lower gill rakers, 6 vertical bars. [HS lab].

MC360. *Placidochromis electra* (Burgess 1979)

Placidochromis electra was described (as *Haplochromis*) by Burgess (1979) from 14 specimens obtained through the aquarium trade, at least some of which were reported to have been collected at 20-30m depth near Likoma Island. The species is distinguished by the presence of a strongly marked vertical bar or two behind the operculum, with other bars being progressively fainter, on a silvery background. The lachrymal stripe is usually particularly strong and the pelvic and anal fin margins dark (fig. 360.1). Mature males retain the same markings but are dark blue (fig. 360.2), which can sometimes obscure the melanic markings. The only other species known to have this pattern of stronger anterior bars is an undescribed form known as *Placidochromis* sp. 'phenochilus Tanzania' (or 'star sapphire'). Females and juveniles look a lot like *P. electra*, but in the mature males, apparently random flecks of pale metallic blue overlie the generally dark blue background colour (Konings 2016). Mature males of this species are also rather deep-bodied, compared to those of *P. electra*. Meristic and morphometric features are not available for *P. sp.* 'phenochilus Tanzania', but the two are allopatric, with *P. electra* mainly known from Likoma and the Mozambican coast, while *P.* sp. 'phenochilus Tanzania' is mainly known from the NE coast. The specimen sequenced by Blumer et al. (2025) was obtained from the S.M.Grant aquarium fish holding facility, probably collected at Likoma. Although the black barring is largely obscured by dark blue male breeding colours (fig. 360.3), the species is well-known in the ornamental fish trade and is unlikely to have been misidentified. According to Konings (2016), this species lives on sand or mixed rock/sand habitats and tends to feed among clouds of debris disturbed by large bottom-feeders, such as *Taeniolethrinops sp*. Phylogenetically, sequence analysis places the species in a small clade along with *Mylochromis anaphyrmus, Otopharynx* sp. 'interruptus' and *Otopharynx selenurus* (Blumer et al. 2025).

Fig. 360.1: *Placidochromis electra* MWA2300, female/juvenile, not sequenced, Maingano Island, Likoma, Oct 2023 [HS lab]

Fig. 360.2: *Placidochromis electra* MWA2335, mature male, not sequenced, Maingano Island, Likoma, Oct 2023 [HS lab]

Fig. 360.3: *Placidochromis electra*, 2012.439, sequenced, SM Grant export facility, 23 Sept 2012 [MJG]

MC361. *Placidochromis elongatus* Hanssens 2004

Placidochromis elongatus was described by Hanssens in 2004, from 7 specimens trawled from 43-54m deep water in the south of the lake. The species was known to Turner (1996) as *Placidochromis* 'long' and reaches about 12cm TL. It has a fairly characteristic appearance: elongate, with an acute snout with the tip of the mouth more or less in line with the posterior lateral line, and the upper and lower body profiles very similar. The eye is large, the premaxillary pedicel not obvious in profile and there are usually 6 bars under the dorsal fin (fig. 361.1). Males in breeding dress have a bluish snout, dark chin and chest, dark fins and large bright eggspots on the anal fin, with smaller yellow spots in the centre of the caudal fin and on the soft dorsal. The dorsal fin has a thin white margin. There are 11-13 lower gillrakers, and the oral and pharyngeal teeth are all small. Five specimens sequenced by Blumer et al. were all trawled from depths of 30-50m in the S Arm. Nothing much is known of its biology. Phylogenetically, it belongs to a small clade that lies basally within the 'deepwater' clade, along with *P. hennydaviesae*, *P. platyrhynchos* and *Otopharynx panniculus* (Blumer et al. 2025).

Fig. 361.1: Paratype of *Placidochromis elongatus* from original description.

Fig. 361.2: *Placidochroms elongatus*, mature male, trawl catch 1990 (Turner 1996). No tissue sample available. [GFT]

Fig. 361.3: *Placidochromis elongatus,* male, sequenced, D13-F07, UCZM 2016.43.9; 45-50m NE of Boadzulu Island, SE Arm, 3 March 2016. [HS]


D12-I02, 2016.41.40; trawled from 30-40m off Makanjila, 2 March 2016


D12-J02, 2016.41.8; trawled from 30-40m off Makanjila, 2 March 2016


D13-A10, 2016.41.31;, trawled from 30-40m off Makanjila, 2 March 2016


D13-F08, 2016.43.3; trawled 45-50m NE of Boadzulu Island, SE Arm, 3 March 2016

Fig. 361.4: *Placidochromis elongatus*, 4 specimens sequenced, collected in the SE Arm at 30-50m. [HS]

MC362. *Placidochromis fuscus*

Not yet sequenced.

MC363. *Placidochromis hennydaviesae* (Burgess & Axelrod 1973)

Placidochromis hennydaviesae was described (as *Haplochromis*) by Burgess & Axelrod from a single specimen in 1973, collected from a trawl at around 78m depth off Monkey Bay in the south of the lake. It is a small laterally compressed species with a large eye, a rather upwardly-angled mouth, faint vertical bars and relatively few (9-11) long, slender, gill deeply forked gillrakers on the anterior lower arch. The outer oral teeth are tricuspid and the pharyngeal teeth all small. Mature males have more prominent vertical barring, darker fins, chin and chest and a white dorsal fin margin, tipped with red lappets. The species was previously collected by Turner (1996) and Hanssens (2004; Fig. 363.1), who was able to compare the new material with the type. The specimens sequenced by Blumer et al. correspond well to previous descriptions and come from a similar depth and locality (Figs. 363.2-3). Phylogenetically, it belongs to a small clade that lies basally within the 'deepwater' clade, along with *P. elongatus*, *P. platyrhynchos* and *Otopharynx panniculus* (Blumer et al. 2025).

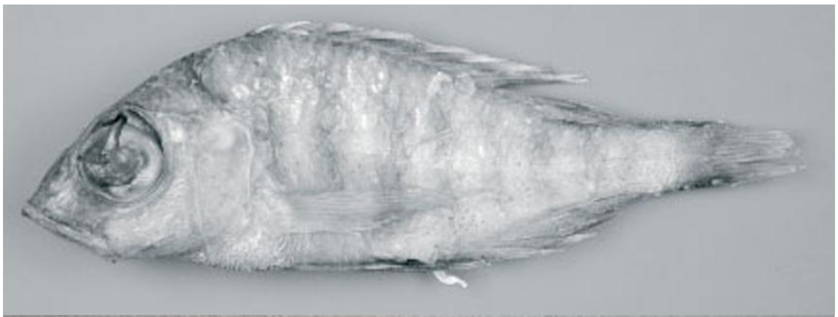


Fig. 363.1: *Placidochromis hennydaviesae*, from redescription by Hanssens (2004)

Fig. 363.2: *Placidochromis hennydaviesae*, sequenced, D11-H10, UCZM 2016.40.43; trawled from 85-95m off Monkey Bay, 2 March 2016 [HS]

Fig. 363.3: *Placidochromis hennydaviesae,* sequenced, D11-I10, UCZM 2016.40.17; trawled from 85-95m off Monkey Bay, 2 March 2016 [HS]

MC 364. *Placidochromis intermedius* Hanssens 2004

Placidochromis intermedius was described by Hanssens (2004) from 2 individuals, 66-72mm SL, collected in 1997 from a trawl transect across the SE and SW Arms at a depth of 98-100m (fig. 364.1). Specimens had 19-22 slender lower gillrakers, small, mainly shouldered unicuspid outer oral teeth, with a few triscuspid and simple teeth. Inner oral teeth unicuspid, in 2 rows. Lower pharyngeal jaw lightly built, with all teeth fine and slender, densely packed. Males have prolonged filaments on the dorsal and anal fins and dark dorsal fin lappets, but no pale submarginal band – in contrast to the superficially similar *P. communis*. Turner (1996) did not distinguish this species from *P. communis*, and discussed both as *Lethrinops* sp. 'deepwater altus'. A single specimen was sequenced by Blumer et al., collected in 2016, from an experimental trawl at a depth of 85-95m off Monkey Bay (fig. 364.2). It had 19 lower arch gillrakers and is labelled as 'Le. deepwater A'. It clustered within the 'deep-benthic clade' in a subclade along with three other vertically-barred species with high gillraker counts: *Placidochromis nkhotakotae* (27-30 lower gill rakers, LGR), *Lethrinops* sp. 'oliveri' (17-21 LGR) and *Placidochromis obscurus* (18-21 LGR).

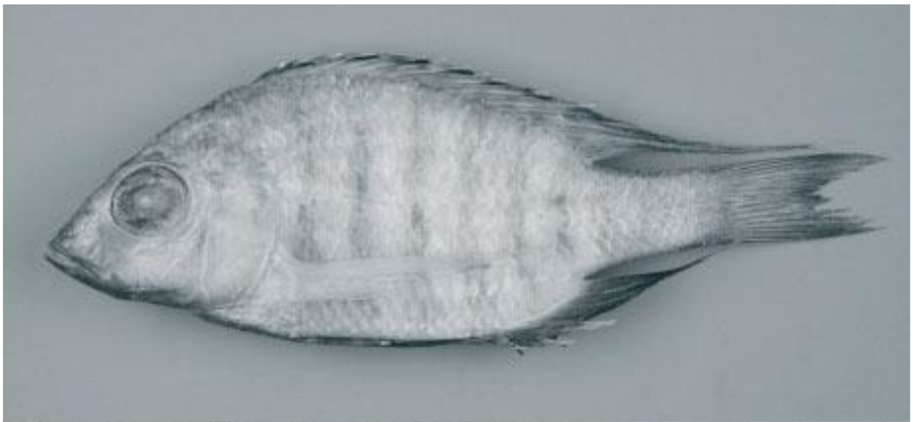


Fig. 364.1: *Placidochromis intermedius*, holotype, 72mm SL.

Fig. 364.2: *Placidochromis intermedius,* male, D11-D10, UCZM 2016.40.46; trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016, sequenced [HS].

MC365. *Placidochromis johnstoni* (Günther 1894)

Placidochromis johnstoni was described by Günther 1894 as *Chromis johnstoni*, based on a single specimen from Fort Johnson, modern Mangochi, on the Upper Shire River (fig. 365.1). It was placed into *Placidochromis* by Eccles & Trewavas in 1989, on the basis of its vertically barred pattern and lack of any other obviously distinctive features. Among species with similar markings, it can be identified by the possession of strong, wide, rather tapering bars and its long straight snout and relatively large jaws. Of four specimens sequenced by Blumer et al. (2025), three were from Chiofu Bay, the other unknown. The species frequents shallow weedy areas and often hunts in packs for small invertebrates and fish fry, sometimes in mixed species groups including *Nimbochromis polystigma, Champsochromis* etc. Konings (2016) suggested affinities with *Protomelas* spp. This is supported by phylogenetic analysis (Blumer et al. 2025) in which the species is placed in a clade with *Protomelas* both from rocks (*P. taeniolatus* complex) and shallow weeded areas (*P. similis, P. kirkii* etc). Other members of the clade are *Chilotilapia*, *Cheilochromis* and *Placidochromis milomo*).

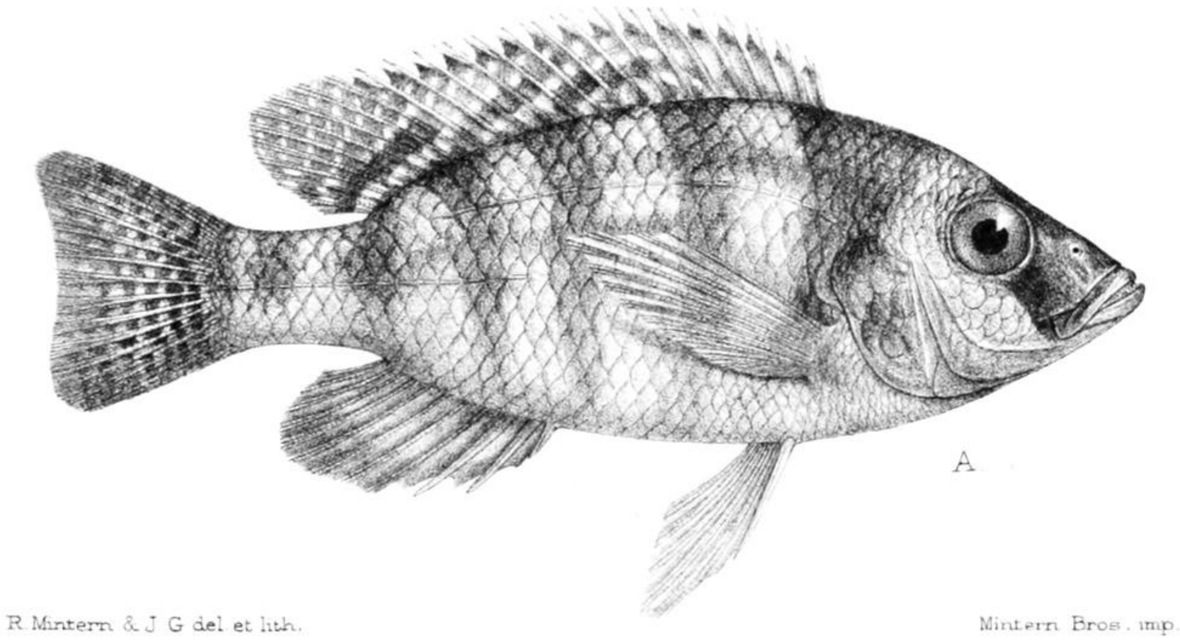


Fig.365.1: Drawing of the type of *Chromis johnstoni* Günther 1894 from original description.

2012.438, male, from SM Grant fish exporter, 23/9/2012, origin unknown [MJG}.

D7-J02, 2016.35.53, male, caught by divers at Chiofu Bay, 28 Feb 2016 [HS]

S07-H09, 2016.35.40, caught by divers at Chiofu Bay, 28 Feb 2016 [HS]

D07-J10, 2016.35.26, caught by divers at Chiofu Bay, 28 Feb 2016 [HS]

Figure 365.2: All sequenced specimens conformed well to the typical phenotype of *Placidochromis johnstoni*.

MC366. *Placidochromis koningsi*; MC367. *Placidochromis lineatus*

Not yet sequenced

MC368. *Placidochromis longimanus* (Trewavas 1935)

Placidochromis longimanus was described by Trewavas (as *Haplochromis*) from 40 specimens collected in the south of Lake Malawi in the 1920s (fig. 368.1). It was made the type species of the new genus *Placidochromis* by Eccles & Trewavas in 1989. In the original description, it was suggested that it was closely related to *Haplochromis micrentodon*, mainly differing in the number of gillrakers, but that species was moved into *Lethrinops* on the basis of the arrangement of teeth at the posterior of the lower jaw (outer row curving inwards behind inner rows in *Lethrinops*, largely straight and prolonged as a single row in *Placidochromis*). However, it does indicate that *P. longimanus* doesn't really seem very similar to most of the other species in this genus. *Placidochromis* is defined on the basis of its species having vertical flank bars and lacking any other traits considered suitable to define other genera, but *P. longimanus* has very faint bars, or often none at all. The overall body shape is reminiscent of many *Lethrinops* species, laterally compressed with a high back, little visible melanin pattern and a small head and mouth, thin jaws, small largely bicuspid teeth and pharyngeal jaws light with many small teeth. There are 11-14 (usually 12-13) gillrakers on the lower outer arch. Males in breeding dress are generally pale metallic blue with a broad white margin to the dorsal, edged with red (Turner 1996). The species is generally found in shallow muddy areas and can be distinguished from similar-looking species in the same habitat, such as *Otopharynx tetrastigma*, *Protomelas similis* and *Lethrinops lethrinus* by the absence of melanic markings on females and non-breeding males and by its deep body and small head and jaws. Five tissue samples were sequenced from specimens collected from the Chia Lagoon in 2004, where they were collected as a batch of 5 finclips sharing a vial. Voucher specimens were not located, but photographs show no obvious melanic markings (fig. 368.2-3). Eccles & Trewavas (1989) report that *P. longimanus* is largely confined to beds of rootless demersal macrophytes (*Ceratophyllum* and *Najas*) at depths of 7-15m, where it can be very abundant, in both Lakes Malawi and Malombe. This habitat is now virtually non-existent, probably as a result of seine-netting removing the vegetation and agricultural run-off leading to siltation and reduction in water clarity. Nothing is known of its diet, but based on morphology, it seems likely to be a sediment feeder. Sequence analysis indicates that the species is closely related to *Otopharynx tetrastigma* (Blumer et al. 2025), a species that lives in similar habitats and has very similar male breeding dress. It is not closely related to the large number of deep water species described by Hanssens (2004).

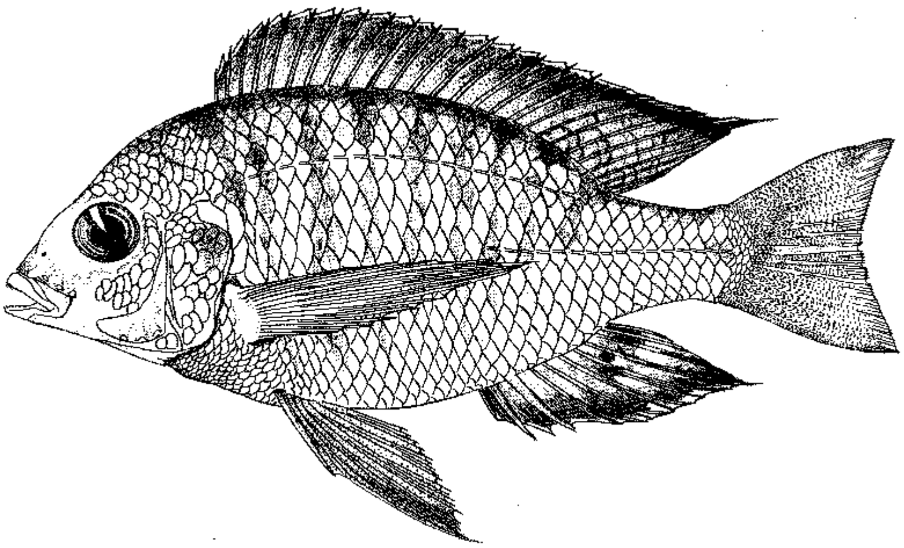


Fig. 368.1: Drawing of lectotype of *Placidochromis longimanus* from Eccles & Trewavas (1989).

Fig. 368.2: *Placidochromis longimanus* 2004.40, male (one of 5) bought from fishermen from Chia Lagoon, 9 July 2004 [MJG].

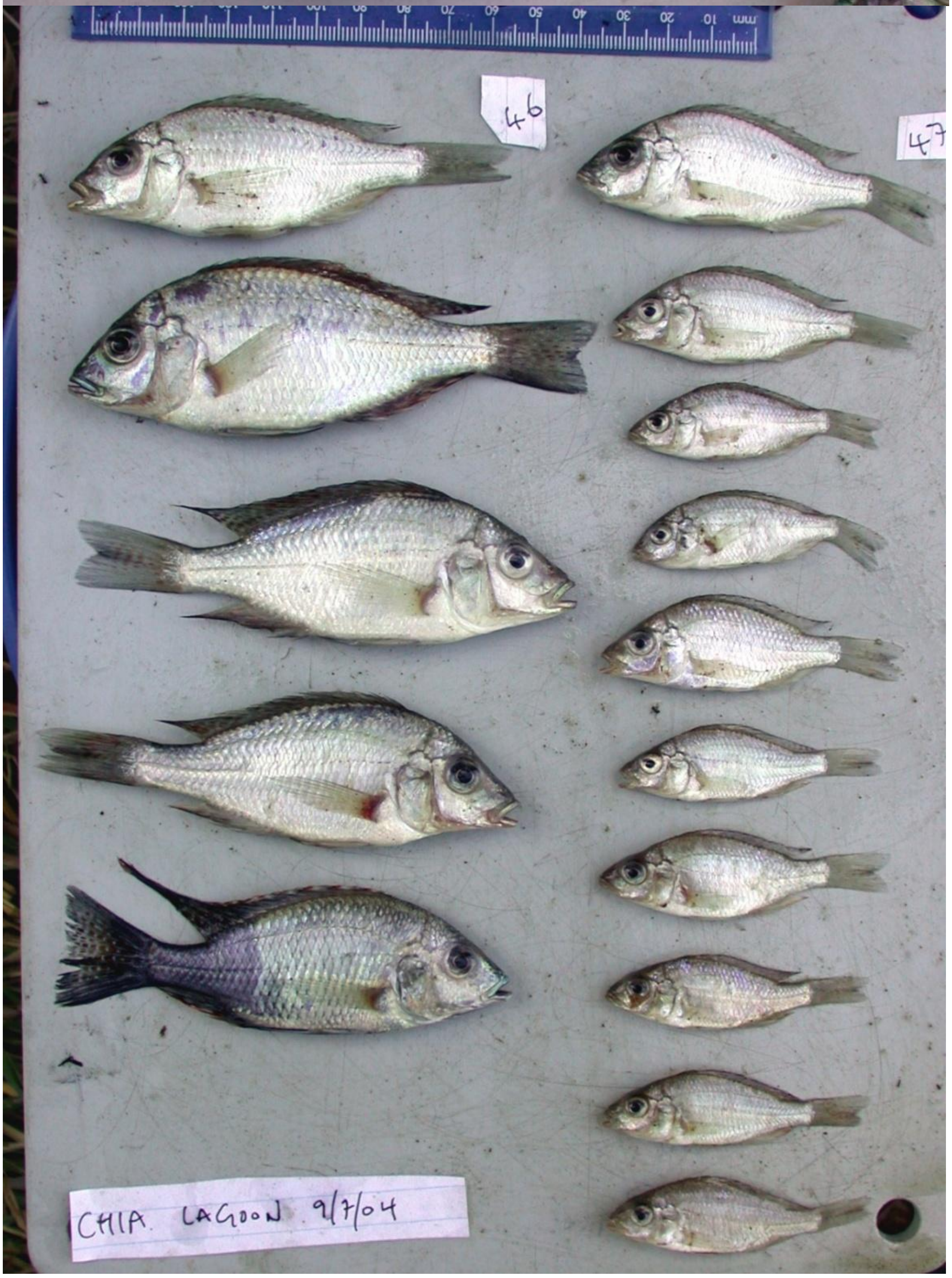


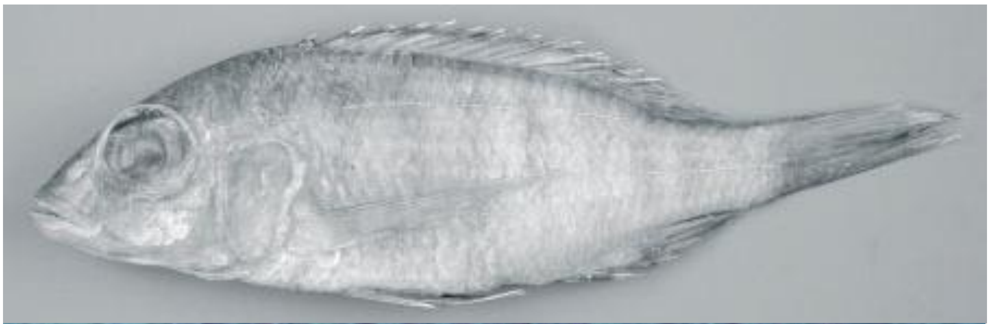
Fig. 368.3: This sample from the same collection as 2004.40 shows females and immatures on the right, clearly lacking the melanic markings of *O. tetrastigma*, and in some cases showing faint vertical bars, supporting the identification of this sample as *P. longimanus* [MJG].

MC369. ***Placidochromis longirostris*; MC370.** ***Placidochromis longus*; MC371.** ***Placidochromis lukomae;*** **MC372.** ***Placidochromis macroceps*; MC373** ***Placidochromis macrognathus*;**

Not yet sequenced.

MC374. *Placidochromis mbunoides* Hanssens 2004

Placidochromis mbunoides was described by Hanssens in 2004 from 5 specimens, 61-72.5mm SL, trawled from deep water (98-114m) in the south of the lake, with a specimen from Nkhotakota (fig. 374.1). It is a small, fairly elongate species with a straight head profile and a moderately long snout and large eye. Gillrakers short and slender, 9-10 on the lower arch. Pharyngeal bone is lightly built with small teeth, oral teeth small with outer teeth largely bicuspid. It is very likely the same species as *Placidochromis sp.* 'carnivore' by Turner (1996) (fig. 374.2): 6 specimens preserved ranged from 65.6-77.1mm SL, had 9-11 lower gillrakers and generally simple teeth, although these were all mature males. They were collected by trawling at 80-94m in the south of the lake (off Monkey Bay or Mnema III in Domira Bay). The single sequenced specimen is from deep water in the south of the lake and fits the description well (fig 374.3). Nothing is known of its diet or ecology. It is related to *P. boops, P. acutirostris, Lethrinops atrilabris* and *L. gossei*, all members of the 'deepwater benthic' clade (Blumer et al. 2025)..



Fig, 374.1: Holotype of *Placidochromis mbunoides* Hanssens 2004

Fig. 374.2: *Placidochromis mbunoides,* trawled from 84-94m, SE Arm, off Monkey Bay, 13-Apr-92. Not sequenced [GFT].

Fig. 374.3: *Placidochromis mbunoides,* D12-A08, UCZM 2016.40.41; trawled from 85-95m off Monkey Bay, SE Arm, 2 March 2016 [HS].

MC 375. *Placidochromis milomo* Oliver 1989

Placidochromis milomo was described by Oliver (1984), as *Cyrtocara milomo* in his PhD thesis, but this was not a taxonomically valid publication. His description was presented within the monograph of Eccles & Trewavas (1989) and credited to Oliver (1989), given in brackets to indicate this was not the original generic combination, which is surely incorrect if the 1984 publication was invalid. The species is very distinctive, with its enlarged fleshy lips and wide vertical bars (Figs 375.1-2). The specimen sequenced in Blumer et al. was collected from the export facility of SM Grant, and its original collection location is unknown (Fig. 375.3). The species is found on rocky habitats and sucks small fish and invertebrates out from clefts among the rocks, with the lips apparently partially sealing the cleft and allowing more powerful suction when the oral cavity is enlarged. Phylogenetically, it belongs in a clade of shallow benthic species, along with many species of *Protomelas*, but also *Cheilochromis euchilus* which has similar lips, and *Protomelas ornatus* which has less extremely enlarged lips, and *Placidochromis johnstoni*, which has similar broad vertical bars (Blumer et al. 2025).

Fig. 375.1: *Placidochromis milomo* holotype, mature male, photo Oliver.

Fig. 375.2: *Placidochromis milomo* paratype, mature female, photo Oliver.

Fig. 375.3: *Placidochromis milomo* 2012.437 sampled in 2012 from SM Grant's fish exporting facility, original source unknown. The single specimen is unambiguous, based on its hypertrophied lips and broad dark flank bars. [MJG]

MC376. *Placidochromis minor*; MC377. *Placidochromis minutus*; MC378. *Placidochromis msakae*; MC379. *Placidochromis nigribarbis*; MC380. *Placidochromis nkhatae*

Not yet sequenced

MC381. *Placidochromis nkhotakotae* Hanssens 2004

Placidochromis nkhotakotae was described by Hanssens in 2004 from 8 specimens all collected from water deeper than 100m, off Nkhotakota. The species has an acutely pointed snout, flat lower jaw, 5-6 bars under the dorsal fin and 27-30 lower gillrakers. Turner (1996) reported 2 similar species, under than names *Placidochromis* sp. 'hennydaviesae II' (with 5 vertical bars under the dorsal fin, 25-28 lower gillrakers) and *Placidochromis* sp. 'hennydaviesae III' (with 6-7 vertical bars under the dorsal fin, 20-23 lower gillrakers), but also some populations with 6 bars and 26-29 gillrakers, but with some variation in depth preferences. These may all be the same species, or there may have been some confusion with *P. intermedius*. The specimen sequenced by Blumer et al. (2025) was from the SW Arm of the lake and had around 25 lower gillrakers. The overall body shape and markings fit very well with *P. nkhotakotae*. It clustered within the 'deep-benthic clade' in a subclade along with three other vertically-barred species with high gillraker counts: *Placidochromis intermedius* (19-22 lower gill rakers, LGR), *Lethrinops* sp. 'oliveri' (17-21 LGR) and *Placidochromis obscurus* (18-21 LGR).

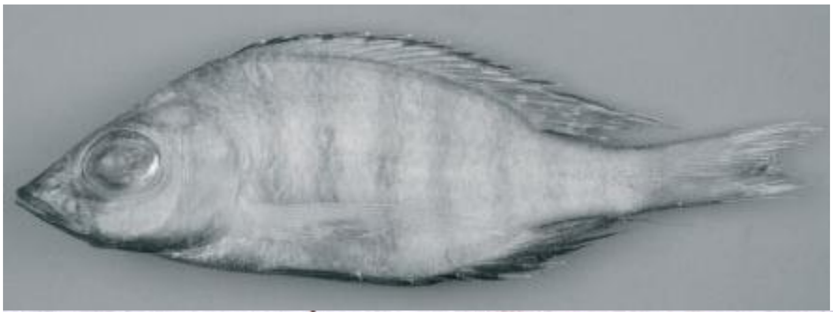


Fig. 381.1: Type of *Placidochromis nkhotakotae* from original description.

Fig. 381.2: *Placidochromis nkhotakotae,* male, sequenced, D22-D06, UCZM 2021.39.5; pair trawl catch landed at Msaka, 26 Jan 2017 [HS]

MC382. *Placidochromis obscurus* Hanssens 2004

Placidochromis obscurus is a small species with a large number of gillrakers (18-21 on the lower arch). Males have dark fins, with elongated filaments, a strongly forked tail and 7 vertical bars under the dorsal fin. Turner (1996) reported a species *Lethrinops sp.* 'dark' which roughly conformed to this description and found it to be common in trawl catches at depths of 22-64m. Hanssens (2004) reported it from 65-125m depth. The specimen sequenced by Blumer et al. (2025) has roughly the right body proportions, and a forked tail, but is not a male in breeding dress, so the identification is provisional. It clustered within the 'deep-benthic clade' in a subclade along with three other vertically-barred species with high gillraker counts: *Placidochromis intermedius* (19-22 lower gill rakers, LGR), *Lethrinops* sp. 'oliveri' (17-21 LGR) and *Placidochromis nkhotakotae* (27-30 LGR).

Fig. 382.1: *Placidochromis obscurus* type from original description.

Fig. 382.2: *Placidochromis obscurus*, male, 49-52mm, SE Arm, NE of Boadzulu Island, 31-Jul-91 [GFT]

Fig. 382.3: *Placidochromis obscurus*, D14-F03, UCZM 2016.45.5; trawled from 95-105m, Domwe, SE Arm, 4 March 2016 [HS].

MC383. *Placidochromis ordinarius*; MC384. *Placidochromis orthognathus*; MC385. *Placidochromis pallidus*; MC386. *Placidochromis phenochilus*;

Not yet sequenced.

MC387. *Placidochromis platyrhynchos* Hanssens 2004

This small, distinctive species was described by Hanssens in 2004, from 6 specimens trawled from deep water at either end of the lake (fig 387.1). The species was already well known by this name (or platyrhynchus), which had been in use at the Monkey Bay Fisheries Research Unit since the 1970s (as *Haplochromis*). It is easily identified by its elongate body, vertical barring, very large elliptical eyes and acute snout with flat lower jaw. Females and immatures are sandy-coloured with faint barring, but males have dark vertical bars, dark fins and a broad white margin to the dorsal fin, tipped with orange/ red (fig. 387.1). The species lives in deep water (generally 74m or deeper) and feeds largely on shrimp (*Caridina*) and other small crustaceans (Darwall 2003). The largest type specimen was 100mm SL. Phylogenetically, it clusters with *Placidochromis hennydaviesae, P. elongatus* and *Otopharynx panniculus* as the basal branch of the deep-benthic clade (Blumer et al. 2025).

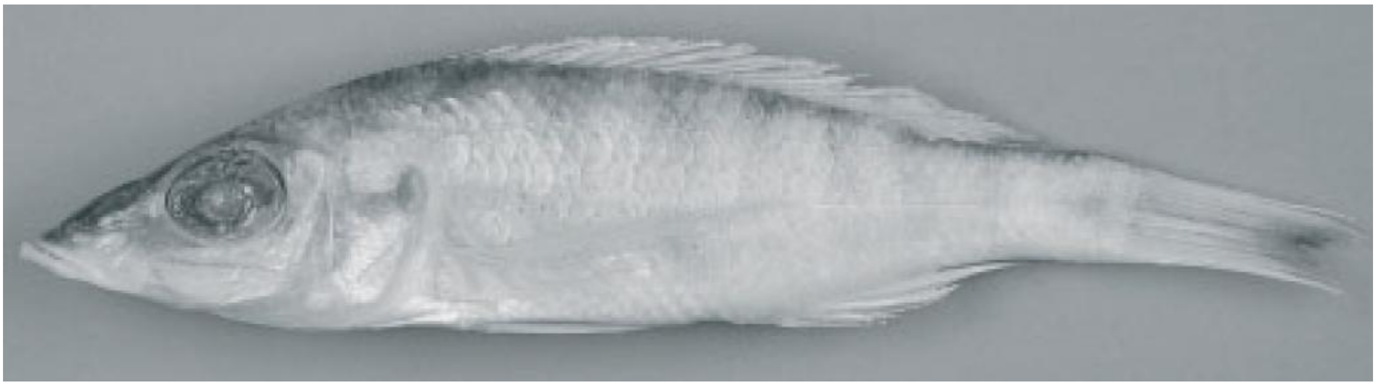


Fig. 387.1: Holotype of *Placidochromis platyrhynchos*, from the original description.

Fig. 387.2: *Placidochromis platyrhynchos*, D22-D04, UCZM 2021.39.3, pair trawl landed at Msaka, SW Arm, 26 Jan 2017. [HS].

MC388. *Placidochromis polli*; MC389. *Placidochromis rotundifrons*; MC390. *Placidochromis* sp. 'big eye'; MC391. *Placidochromis* sp. 'big mouth'; MC392. *Placidochromis* sp. 'blue otter'; MC393. *Placidochromis* sp. 'blue-head piper'; MC394. *Placidochromis* sp. 'blue-yellow stripe'; MC395. *Placidochromis* sp. 'chinyankwazi'; MC396. *Placidochromis* sp. 'deep'; MC397. *Placidochromis* sp. 'deep cheek'; MC398. *Placidochromis* sp. 'electra blue'; MC399. *Placidochromis* sp. 'electra deep'; MC400. *Placidochromis* sp. 'elongate thin bar'; MC401. *Placidochromis* sp. 'green orange deep';

Not yet sequenced.

MC402. *Placidochromis* sp. 'hennydaviesae IV'

This species was first identified by Turner (1996) from preserved material obtained from trawling in the northern part of the SE Arm during the 1990s. It was assigned to the informal 'P. hennydaviesae group' on the basis of its melanin pattern of vertical bars, large eye, pointed snout and lower jaw that is flat in cross section (Turner 1996). Subsequently, a number of these species were described by Hanssens (2004). This one superficially resembles *P. trewavasae*, but differs in gillraker count (10-12 v 21-24 in *P. trewavasae*). It appears that this species remains undescribed. The gillrakers are short and not forked as they are in *P. hennydaviesae*. The specimen illustrated in fig. 402.1 has 4/1/10 gillrakers (confirming Turner 1996). It has small sharp unequally bicuspid teeth in three rows, with a rather Lethrinops-style lower jaw dental arcade. The lower jaw has a strong mental process. There are 7 vertical bars under the dorsal fin. The species was recorded from waters of 90m deep or more.

Blumer et al. (2025) sequenced 6 specimens from the northern part of the SE Arm, from a range of depths (fig. 402.2-7). The mature males are strongly barred, yellowish on the back and darker ventrally. Originally thought to be *P. trewavasae* Hanssens 2004, examination of the preserved material indicated that they have around 10 lower gillrakers, which is consistent with *Placidochromis* sp. 'hennydaviesae IV' and ruling out *P. trewavasae*. The sequenced specimens belong in deep-benthic clade, but have no close relatives (Blumer et al. 2025).

Fig. 402.1: *Placidochromis* sp. 'hennydaviesae IV', male, trawled from 128m depth, mid-North station, 22 May 1991 [GFT].

Fig. 402.2: *Placidochromis trewavasae*, D12-H01, UCZM 2016.41.7; trawled from 20m depth off Makanjila, 2 March 2016 [HS]

Fig. 402.3: *Placidochromis trewavasae*, D12-H02, UCZM 2016.41.30; trawled from 20m depth off Makanjila, 2 March 2016 [HS]

Fig. 402.4: *Placidochromis trewavasae*, D11-F07, UCZM 2016.40.56 ; trawled from 85-95m off Monkey Bay, 2 March 2016 [HS]

Fig.402.5: *Placidochromis trewavasae*, D11-F08, UCZM 2016.40.15; trawled from 85-95m off Monkey Bay, 2 March 2016 [HS]

Fig. 402.6: *Placidochromis trewavasae*, D12-B05, UCZM 2016.40.58; trawled from 85-95m off Monkey Bay, 2 March 2016 [HS]

Fig. 402.7: *Placidochromis trewavasae*, D12-G10, UCZM 2016.41.15; trawled from 20m depth off Makanjila, 2 March 2016 [HS]

MC403. *Placidochromis* sp. 'hennydaviesae V'; MC404. *Placidochromis* sp. 'jalo'; MC405. *Placidochromis* sp. 'longimanus mumbo'; MC406. *Placidochromis* sp. 'longimanus namiasi'; MC407. *Placidochromis* sp. 'longimanus thumbi'; MC408. *Placidochromis* sp. 'mbamba'; MC409. *Placidochromis* sp. 'pale elongate blunt snout'; MC410. *Placidochromis* sp. 'pale elongate dull'; MC411. *Placidochromis* sp. 'phenochilus gissel'; MC412 Placidochromis sp. ‘phenochilus metangula’; MC413. *Placidochromis* sp. 'phenochilus tanzania'; MC414. *Placidochromis* sp. 'white-orange dorsal'; MC415. *Placidochromis* sp. 'yellow-black dorsal';

Not yet sequenced.

MC416. *Placidochromis trewavasae* Hanssens 2004

This small species was described by Hanssens in 2004, from 4 specimens trawled from 50-70m depth in Mazinzi Bay in the northern part of the SE Arm. The species has barred flanks, a moderately elongated body, big eye and acutely pointed snout with mouth low on head and a rather flat lower jaw. There are 21-24 lower gillrakers. Six specimens sequenced by Blumer et al. were provisionally assigned to this species, but examination of preserved specimens indicated that they have around 10 lower gillrakers, consistent with the undescribed species *P.* sp. 'hennyadaviesae IV' (MC402) and ruling out *P. trewavasae*. Therefore, it appears that this species has not been recorded since its original description and it has not been sequenced.

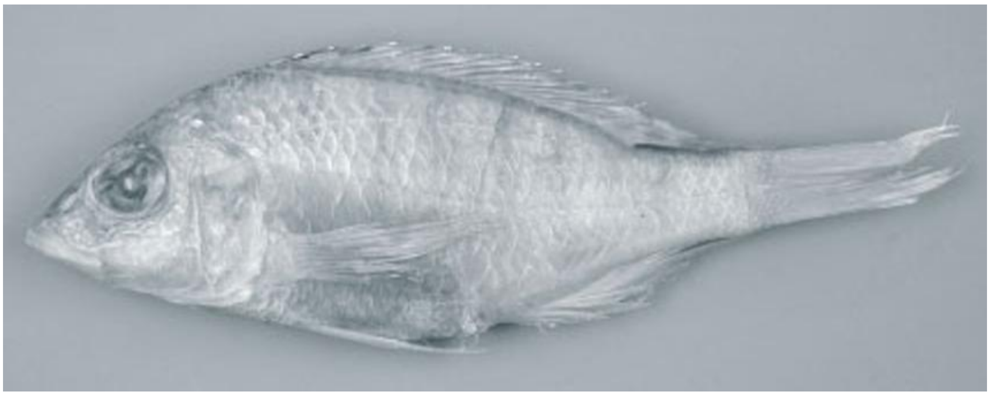


Fig. 416.1: *Placidochromis trewavasae* holotype, 64mm SL collected from SE Arm between Mazinizi and Kadango at 50-70m, from original description.

MC417. *Placidochromis turneri*; MC418. *Placidochromis vulgaris*.

Not yet sequenced.

Protomelas Eccles & Trewavas 1989. MC419-447.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Chromis kirkii* Günther 1893.

Contained valid species (16): *Protomelas annectens; Protomelas fenestratus; Protomelas insignis; Protomelas kirkii; Protomelas krampus; Protomelas labridens; Protomelas macrodon; Protomelas marginatus; Protomelas ornatus; Protomelas pleurotaenia; Protomelas similis; Protomelas spilopterus; Protomelas spilonotus; Protomelas taeniolatus; Protomelas triaenodon; Protomelas virgatus*

Proposed undescribed taxa (13): *Protomelas* sp. 'hertae'; *Protomelas* sp. 'johnstoni solo'; *Protomelas* sp. 'mbenji thick-lip'; *Protomelas* sp. 'multitooth'; *Protomelas* sp. 'oxyrhynchus mix'; *Protomelas* sp. 'snoeksi'; *Protomelas* sp. 'spilonotus likoma'; *Protomelas* sp. 'spilonotus mozambique'; *Protomelas* sp. 'spilonotus tanzania'; *Protomelas* sp. 'steveni black belly'; *Protomelas* sp. 'steveni imperial'; *Protomelas* sp. 'steveni taiwan'; *Protomelas* sp. 'virgatus luwala'

Taxa considered invalid: *Protomelas dejunctus* (synonym of *P. taeniolatus*), *Haplochromis festivus* (synonym of *P. ornatus*), *Haplochromis lobochilus* (synonym of *P. ornatus*).

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a description rather than a differential diagnosis: “Small to medium sized haplochromines endemic to Lake Malawi with moderate sized mouths. Melanin pattern based on the plesiomorphic, with the longitudinal bands usually predominating. In some species, or in some moods, only the mid-lateral band well developed. The jaws are not greatly elongated and premaxillary pedicels do no exceed one third of the head length, even in the two species, *P. annectens* and *P. spilopterus*, in which the lower jaw may exceed 40% of the length of the head. Anterior teeth of outermost row in jaws usually bicuspid, at least in young, but maybe replaced in adults by unicuspids, which, however, are not widely spaced. Posterior teeth of outer row mainly simple. Pharyngeal teeth various, from the plesiomorphic conditions with relatively few compressed, firm and bicuspid to, on the one hand, inclusion of a group of enlarged molariform teeth and, on the other, to more numerous, slender and crowded teeth. Caudal fin from slightly to crescentically emarginate, scaled for half or more of the length in larger individuals. Scales in longitudinal series 31 to 36 in overlapping shorter ranges characteristic of each species. The total number of vertebrae ranges from 30 to 33 with 13 to 15 abdominal”.

Eccles & Trewavas (1989) also recognised the genus *Eclectochromis* Eccles & Trewavas 1989, type *Haplochromis ornatus* Regan 1922, but also including *Haplochromis festivus* Trewavas 1935 and *Haplochromis lobochilus* Trewavas 1935. Konings (1989) did not use *Eclectochromis,* placing the species in ‘Haplochromis’, a quasi-generic formulation incompatible with ICZN nomenclature. He regarded ‘H’. *ornatus* and ‘H’. *lobichilus* as valid distinct species, but ‘H’. *festivus* as a probably junior synonym of the former. In his 1995 book, *Eclectochromis* is subsumed within *Protomelas* and *Haplochromis festivus* is also taken as a junior synonym of *P. ornatus*. Two additional undescribed ‘thick lip’ species are recognised: *P.* sp. ‘hertae’ and *P.* sp. ‘mbenji thicklip’. Additionally, Konings (1995) moved *Protomelas spilopterus* to *Hemitaeniochromis* (followed by Turner 1996, but not by Snoeks & Hanssens 2004, nor Oliver 2012). No revised diagnosis of *Protomelas* has been published to accommodate these changes. Eccles & Trewavas’s definition of *Eclectochromis* is rather brief ('moderate-sized mouths'.. 'somewhat hypertrophied lips'.. 'modification of the plesimorphic melanin pattern, usually with spots emphasised and with cross-bars'). It can probably be accommodated in the existing broad *Protomelas* diagnosis. *Protomelas krampus* (a paedophage with a steeply-angled gape) was added by Dierickx & Snoeks in 2020, but they did not revise the genus either.

Field Diagnosis: Non-predatory-looking species with a thin midlateral stripe generally extending to the rear of the operculum, but excluding the small-headed *Nyassachromis*. Also includes the *P. taeniolatus* group: deep bodied, small headed rocky-shore non-mbuna with a variety of melanic patterns on a silvery background.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group, the majority lying in a single clade (along with some *Placidochromis*, plus *Chilotilapia* and *Cheilochromis).* This includes *Protomelas ornatus*. However, *Protomelas insignis, Protomelas triaenodon* and *Protomelas annectens* are not closely related to this clade nor to each other. The position of *P. spilopterus* is unclear.

Ecomorphological notes: *Protomelas* is a very diverse group of benthic-feeding, largely non-piscivorous (but sometimes paedophagous?) cichlids.

MC419. *Protomelas annectens* (Regan 1922)

Protomelas annectens was described as *Cyrtocara annectens* by Regan (1922) from 4 specimens. The original illustration shows a specimen with uniformly dark blue colouration and a very deep body and steep head profile (fig. 419.1). It is reported to have unicuspid teeth and a continuous margin to the dorsal fin (in most cichlids the membrane is detached from the spine behind for a few millimetres, forming lappets). Both of these traits are shared with *Cyrtocara moorii*, explaining the initial classification. Juveniles (and freshly collected) specimens sometimes exhibit a combination of vertical and horizontal dark markings (see fig. 419.3). The specimen sequenced by Blumer et al. (fig. 419.2-3) was bought from a seine net fisher at the far north of the lake (Ngara). The species lives on shallow sandy areas and is reported to sometimes follow large *Taeniolethrinops* and grab small invertebrates stirred up by their feeding action (Konings 2016). It is kept as an aquarium fish. Phylogenetic analysis groups *P. annectens* with a number of slender species generally found in shallow sandy areas, including *Mchenga sp, Mylochromis ensatus* and *Otopharynx argyrsoma*. *Cyrtocara moorii* also appeared in this clade in earlier analyses, but has been omitted in the published tree by Blumer et al. (2025).

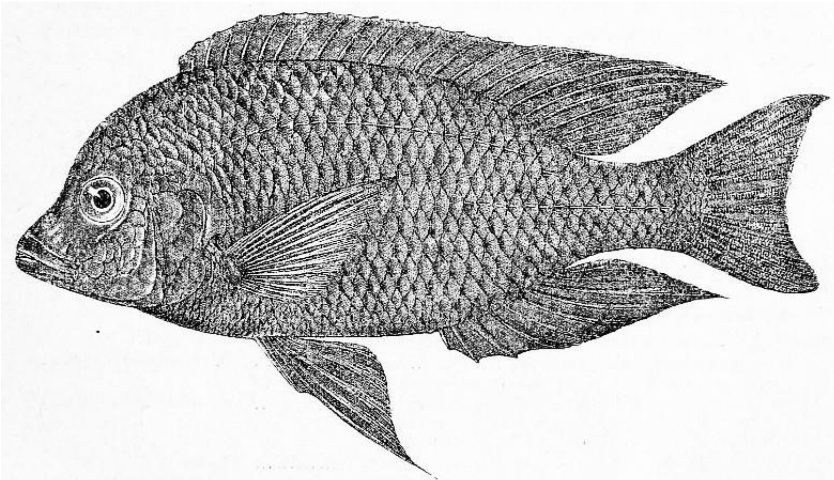


Fig. 419.1: Drawing of the lectotype of *Protomelas annectens* from original description.

Fig. 419.2: *Protomelas annectens,* D06-J05, UCZM 2016.32.17; Seine, Ngara, Chilumba, 25 Feb 2016, sequenced [HS]

Fig. 419.3: *Protomelas annectens,* same specimen as in fig. 419.2, but freshly landed [GFT]

MC420. *Protomelas fenestratus* (Trewavas 1935)

Haplochromis fenestratus was described by Trewavas in 1935 from specimens in the Christy collection (1925-1926). The lectotype (fig. 420.2) and most of the paralectotypes were from the northern part of the lake, around Chilumba. The species was placed in the genus *Protomelas* by Eccles & Trewavas (1989) who provided the first full description of the species. It is very similar to both *P. taeniolatus* and *P. virgatus*, and all three species are believed to inhabit rocky areas. A specimen sequenced by Blumer et al (fig. 420.1) is provisionally referred to this species. It was collected from the rocky habitat at 'Kampango Point', Nkhata Bay on 20 Feb 2016, by SCUBA divers. The lower pharyngeal bone lacks enlarged teeth, ruling out *P. virgatus*. *Protomelas taeniolatus* generally has a relatively larger eye and more strongly developed horizontal melanin pattern. Overall, *P. fenestratus* is reported to differ from *P. taeniolatus* in having fewer and larger teeth in the outer row of the upper jaw and on the pharyngeal bone, and in having more fleshy lips which partly obscure the posterior teeth in the upper jaw. There is also reported to be a difference in the lower gillraker count, but this is heavily overlapping: 10-13 in Pf v 11-13 in Pt. Finally, the distinction of *P. fenestratus* from the undescribed *P. sp.* 'steveni imperial' (see Konings 2016) is not currently possible, as the latter, if it is a valid species, remains undescribed and morphological traits are unknown apart from general appearance and colour as seen in underwater photographs. No preserved specimens available to examine. Blumer et al. (2025) also sequenced an individual (figure 430.3), also from SCUBA collections at Nkhata Bay (Viking Reef; 20 Feb 2016): phenotypic traits like body shape and melanin pattern are much less clear on this specimen and the species ID is likely to be largely based on the similarity of the sequence to those of other *Protomelas* specimens, and so far it has tended to cluster with the specimen shown in fig. 420.1. The specimen has small pharyngeal teeth, consistent with *P. fenestratus* or *P. taeniolatus*, but not *P. macrodon* or *P. virgatus*.

Protomelas fenestratus is reported to occur where rocks are mixed with sand/mud and to feed by blowing sediment away to reveal invertebrates hidden beneath (Ribbink et al. 1983; Konings 2016). Males construct simple spawning pits in the mud; females guard free-swimming fry (Konings 2016). Phylogenetically, it is a member of the main *Protomelas* group (Blumer et al. 2025, shown under *P. taeniolatus*).

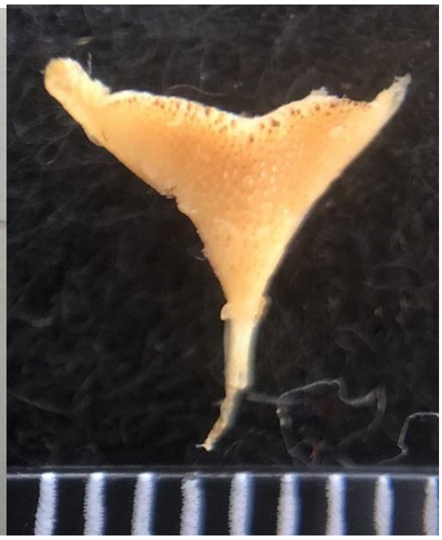


Fig. 420.1. *Protomelas fenestratus,* D01-B04, UCZM 2016.16.2, collected by SCUBA, 20 Feb 2016 at Kampango Point, Nkhata Bay. [HS] and lower pharyngeal bone indicating lack of expanded posteriomedial teeth that would be typical of *P. virgatus* [GFT]

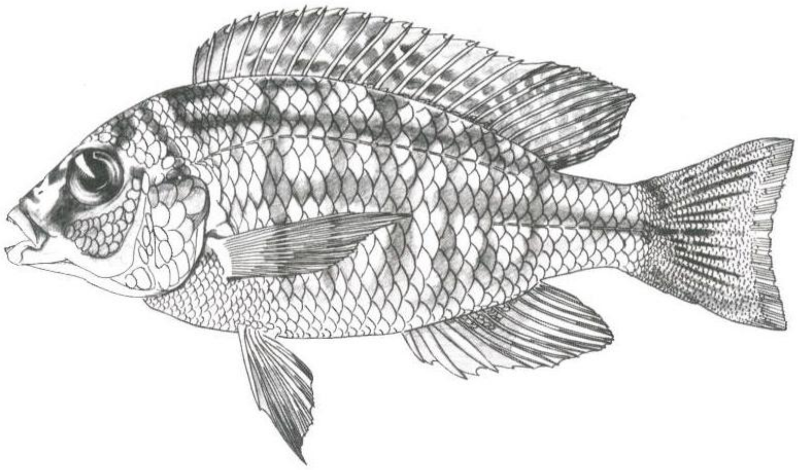


Fig. 420.2: Drawing of the lectotype of *Protomelas fenestratus*, from Eccles & Trewavas 1989.

MC421. *Protomelas insignis* (Trewavas 1935)

Described from 5 specimens in 1935 by Trewavas, it was moved from *Haplochromis* to *Protomelas insignis* by Eccles & Trewavas (1989), who also designated a lectotype and presented an illustration and full description (fig. 421.1, 3-4). The genus *Protomelas* is defined on the basis of the included species possessing a mixture of horizontal and vertical melanic elements on the flanks, but in *P. insignis* the midlateral stripe is more oblique and generally broken into a series of blotches, with another series dorsally in the anterior part of the flanks. Generally, the head and jaws are relatively small, and the mouth rather upwardly-angled. Larger specimens have mainly unicuspid teeth in the outer jaw series and the pharyngeal bone lacks enlarged teeth (fig. 421.6). Turner (1996) confused this species with an undescribed and distantly-related species labelled *Hemitaeniochromis* sp. 'insignis', which is covered under MC149, *Hemitaeniochromis* sp. 'pumba' above.

The specimen sequenced by Blumer et al. (Fig. 421.3) is a mature male in breeding dress and the melanic markings are harder to see, being reduced to an oblique midlateral stripe on the posterior flank, but the overall proportions fit well with the type material and other female/immature specimens observed in the area. *Protomelas insignis* is reported to feed on the eggs of lek-breeding cichlids, which it snatches from the substrate. Phylogenetically, it is not closely related to other *Protomelas* species, but is closest to *Mylochromis obtusus* and is a member of a clade that is mainly comprised of predators and plankton feeders (Blumer et al. 2025).

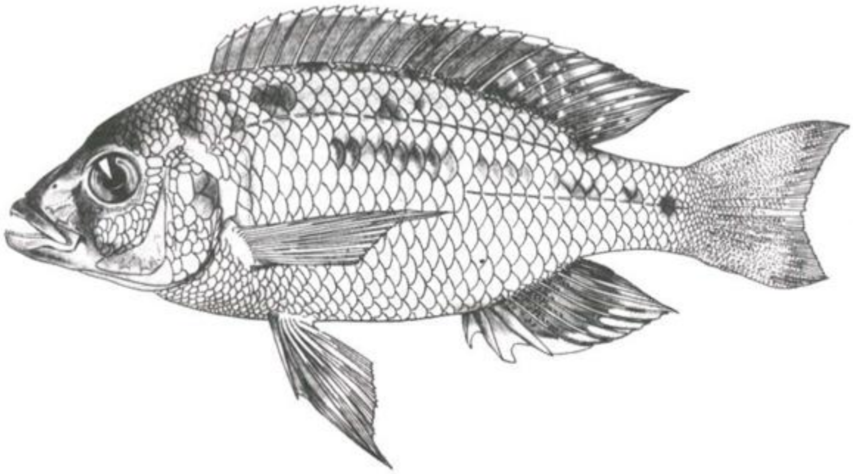


Fig. 421.1: Fasken's drawing of the lectotype of *Protomelas insignis*, a mature male from Eccles & Trewavas (1989).

Fig. 421.2: *Protomelas insignis,* D01-B08, UCZM 2016.16.51; male, Nkhata Bay, SCUBA over rocks. 20 Feb 2016. Sequenced [HS].

Fig. 421.3: Adult male, lectotype of *Protomelas insignis* in 2024 [GFT]

Fig. 421.4: Paralectotype of *Protomelas insignis* in 2024 [GFT]

Fig. 421.5: Juvenile *Protomelas insignis* at Chiofu Bay in 2016 [HS]

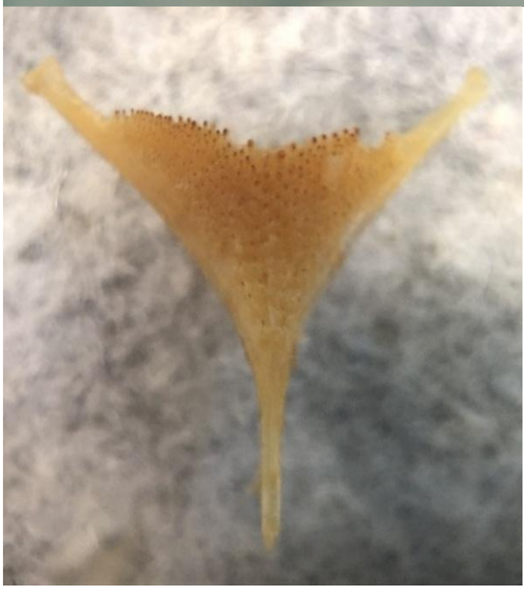


Fig. 421.6: Lower pharyngeal bone of lectotype of *Protomelas insignis* in 2024, showing crowded small teeth on a delicate bone [GFT]

MC422. *Protomelas kirkii* (Günther 1893)

Chromis kirkii was described by Günther in 1893 from specimens collected by A. Whyte, working under Sir H.H. Johnston, British Governor of Central African territories (Fig. 422.1). The expedition focussed on southern Lake Malawi, Lake Malombe and the Shire River, primarily at Fort Johnston, present day Mangochi on the Upper Shire River. It was selected as the type species of the genus *Protomelas* by Eccles & Trewavas (1989).

It is currently identified as one of a group of *Protomelas* species associated with shallow weedy habitats, which have golden-brown body colour and a prominent but thin dark midlateral stripe (Fig. 422.2). Mature males are brilliant greenish with a white dorsal fin margin tipped with red and bright yellow anal fin spots and stripes. They dig shallow pits in shallow muddy areas, usually among weed beds. It is distinguished from the other species in the group by its relatively longer jaws and snout, straight head profile and having a few enlarged teeth on the lower pharyngeal bone. It is reported to feed on small molluscs and other invertebrates (Konings 2016).

Specimens sequenced by Blumer et al. (2025) included a mature male bought from fishermen on Lake Malombe in 2017 (fig. 422.3); a mature male bought from fishermen at Nkhata Bay, in 2016 (fig. 422.4) and a mature male bought from fishers at Liwonde in 2004. These conform well to the typical phenotype of this well-known species. Sequence analysis places the species in the main *Protomelas g*roup (Blumer et al. 2025).

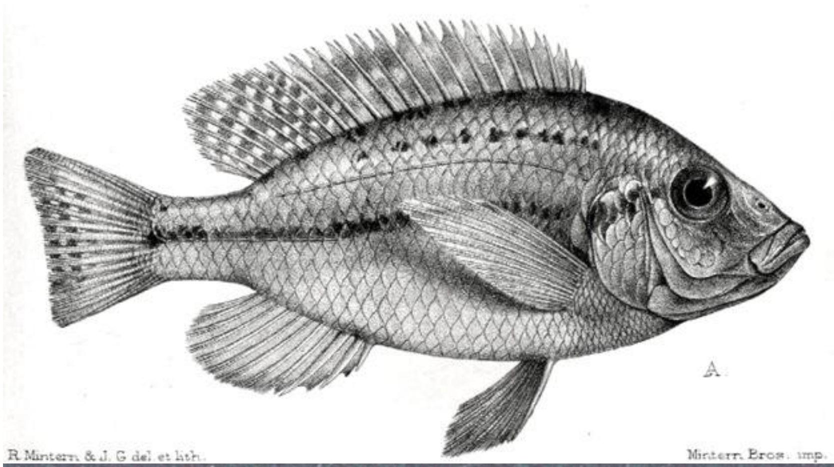


Fig. 422.1: Drawing of the lectotype of *Chromis kirkii*, from Günther 1894.

Fig. 422.2*. Protomelas kirkii*, apparent female collected from trawl at 5-18m off Palm Beach, 30 July 1991 (not sequenced) [GFT].

Fig. 422.3: *Protomelas kirkii*, adult male, D19-D04, no voucher specimen, bought from fishermen, Lake Malombe, 23 Jan 2017 [HS]

Fig. 422.4: *Protomelas kirkii*, adult male D02-G07, UCZM 2016.19.12, bought from fishermen, Nkhata Bay, 21 Feb 2016: specimen placed in alcohol before photography [HS].

Fig. 422.5: *Protomelas kirkii,* male, 2014-173 Liwonde, Middle Shire [MJG]

MC423. *Protomelas krampus*

Not yet sequenced.

MC424. *Protomelas labridens* (Trewavas 1935)

Haplochromis labridens was described by Trewavas in 1935 from 51 specimens collected by Christy from the southern part of the lake (where known) and moved to *Protomelas* by Eccles & Trewavas (1989), who provided the first full description. The species is recognised by its thick lips, short upwardly-angled mouth (fig. 424.1-3) and a group of enlarged medial posterior teeth on the lower pharyngeal bone. Eccles & Trewavas state that it is a shallow-water species, and that its morphology suggests it feeds on molluscs. Konings (2016) says it picks tiny snails off plant leaves and inhabits shallow weedy areas. A specimen sequenced by Blumer et al. (2025) bought from the Nkhata Bay fish market in 2016 was originally thought to represent this species (fig, 424.2). It has short, upwardly angled jaws but the lips are rather thin. The pharyngeal bone is lightweight with no enlarged teeth and it is now believed to be *P. similis* (Blumer et al. 2025). Specimens previously identified as *P. labridens* by Turner (1996; fig. 424.4), Konings (2016, fig. 424.5), (Oliver, fig. 424.6) lack the fleshly lips seen in the types and must be considered dubious. Thus, *P. labridens* is not considered to be sequenced, and indeed may not have been collected since the original description.

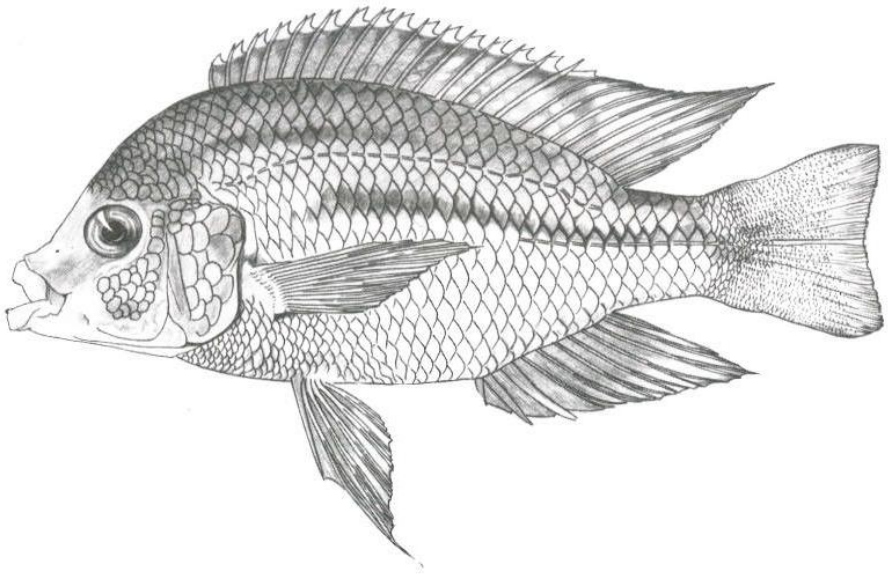


Fig. 424.1: Drawing of the lectotype of *Protomelas labridens* from Eccles & Trewavas (1989).

Fig. 424.2: Paralectotype of *Protomelas labridens* BMNH1935.6.14. 1001-1005, at the London Natural History Museum, 2023, with head profile and jaws similar to the individual drawn by Fasken, fig. 424.1 [GFT].

Fig. 424.3: Paralectotypes of *Protomelas labridens* BMNH1935.6.14. 1001-1005, at the London Natural History Museum, 2023. The upper specimen in particular has a straight head profile, but also has short fleshy lips [GFT].

Fig. 424.4: Specimen identified as *Protomelas labridens* trawled from 15-18m, SE Arm (Shire-White Rock), 30 Jul 1991 (not sequenced). Although it has a concave head profile and upwardly-angled mouth gape, it does not have fleshly lips [GFT].

Fig. 424.5: This adult male specimen identified as *Protomelas labridens* from Chiofu Bay does not have fleshy lips, a concave head profile nor an upwardly angled mouth [AK].

Fig. 424.5: This specimen collected from Chembe, Cape Maclear in 1980 was identified as *Protomelas labridens.* It has a concave head profile and slightly upwardly angled mouth, but the lips are not very fleshy, [Mike Oliver].

MC 425. *Protomelas macrodon*; MC 426. *Protomelas marginatus*

Not yet sequenced.

MC427. *Protomelas ornatus* (Regan 1922)

Haplochromis ornatus was described by Regan in 1922 and moved to *Eclectochromis* by Eccles & Trewavas (1989), who designated it as the type species of a genus also containing the species *Haplochromis festivus* Trewavas 1935 and *Haplochromis lobochilus* Trewavas 1935. Konings (1989) considered all three to be conspecific, and placed them in the genus *Protomelas*. At that time Konings was reluctant to introduce too many new genera to his readership, and often later restored Eccles & Trewavas's generic names. Snoeks and Hanssens (2004) agreed in synonymising the species but preferred to keep the genus *Electochromis*. However, Konings (2016) has persisted in the generic synonymy, and *P. ornatus* is presently considered to be the valid combination. Regan did not give a type locality, but Konings (2009) reports that the collection by Rodney Wood from which it came was from Domira Bay. The types of *H. festivus* and *H. lobochilus* are from Monkey Bay and Chilumba respectively, indicating a wide distribution. The species is characterized by its laterally compressed body, long pointed snout, expanded fleshy lips (less obvious in smaller specimens), spotted dorsal and caudal fins, and a melanin pattern mixing horizontal bands with vertical stripes and spots. It is reported to feed on invertebrates and small fish caught from crevices among rocks. It tends to turn on its side to feed in horizontal crevices. It is reported to have a preference for areas of small rocks scattered on sand/mud at depths of less than 10m, and is widely distributed. Males construct small raised platforms among large rocks and tend to aggregate. Females are reported to guard fry for 1-2 weeks (Konings 2016). 14 specimens were sequenced by Blumer et al. (2025) from a variety of locations around the lake: 2 wild-caught aquarium-trade fish from an unspecified locality within Lake Malawi (), 4 specimens from Chilumba in the northwest of the lake (Fig 427.3), and 8 specimens from Chiofu in the south-east of the lake (Fig. 427.4). For specimens PRO1 and PRO2 no photo or specimen is available. All the Chiofu and Chilumba fish were collected in shallow rocky habitats by SCUBA divers and snorkellers. All conformed well to the typical phenotype of the species and formed a single clade within the main *Protomelas* group.

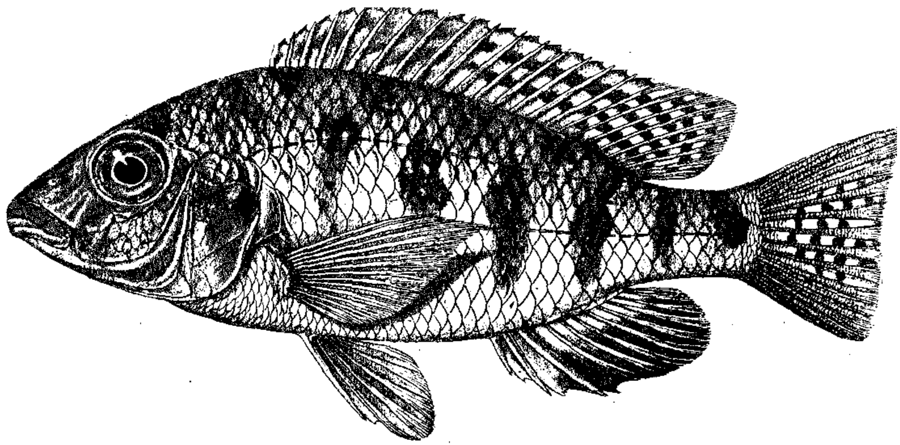


Fig. 427.1: Drawing of the type of *Haplochromis ornatus* Regan 1922 from the original description. BMNH 1921.9.6.112, 117mm SL, from Domira Bay.

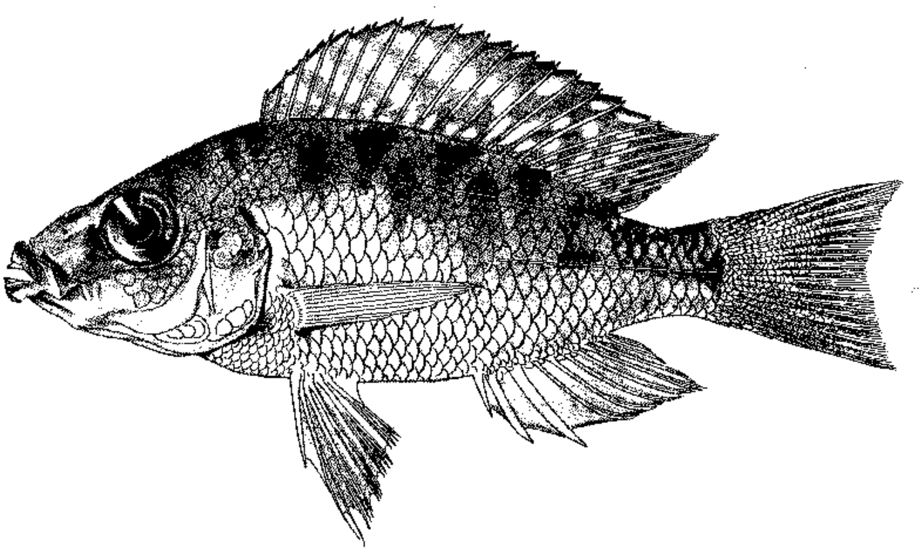


Fig. 427.2: Drawing of the type of *Haplochromis lobochilus* Trewavas 1935 from Eccles & Trewavas (1989). 100mm SL, from Chilumba.

D05-B06 2016.27.66; Luwino Reef 24 Feb 2016

D05-B09 2016.27.57; Luwino Reef 24 Feb 2016

D07-F05 2016.31.7; Chitande Island 25 Feb 2016

D07-F06 2016.31.5; Chitande Is. 25 Feb 2016

Fig. 427.3: The four specimens from Chilumba labelled as *Protomelas ornatus* seem to be typical specimens of this species [HS].


D10-E04, no voucher specimen recorded


D10-E05, 2016.38.93

Fig. 427.4: Two of the *P. ornatus* from Chiofu were males in breeding dress. Again, these seem typical for the species.


D08-G07; 2016.36.34


D08-H09; 2016.37.54


D08-H10; 2016.37.52


D09-A10; 2016.37.7


D09-I04; no voucher specimen recorded

Fig. 427.5: Five of the *P. ornatus* from Chiofu show brownish female/non-breeding colours and are typical specimens of the species. Superficially they seem more strongly barred than the specimens from Chilumba, but this may be a preservation artifact. The greater lip development in specimens such as D08-G07 and D09-I04 is likely to be allometric- associated with larger body size. No photograph could be found for D08-G10 and no voucher specimen is recorded in the Cambridge Zoology Museum catalogue.

Fig. 427.6: Male *Protomelas ornatus*, freshly collected at Chiofu Bay, 2016 [GFT].

MC428. *Protomelas pleurotaenia* (Boulenger 1901)

Tilapia pleurotaenia was described by Boulenger in 1901 from specimens collected by J.E.S. Moore, labelled as coming from Lake Tanganyika. Trewavas (1946) reattributed them to Lake Malawi, largely based on morphology, and knowledge that Moore had visited both lakes on a single collecting expedition. She placed the species in *Haplochromis*. It was reassigned to *Protomelas* in 1989 by Eccles & Trewavas. Numerous specimens in the London Natural History Museum are assigned to this species including material from the far north (Vua, Chilumba, Karonga) and far south of the lake (Monkey Bay).

The specimen sequenced by Blumer et al. was collected from a seine net catch on a sandy beach at Ngara, near Chilumba in northern Lake Malawi on 25 Feb 2016 (fig. 428.1). The specimen has been re-examined and compared to the types at the London Natural History Museum (fig. 428.2-3) as well as the original drawing of the lectotype (fig. 428.4). Body shape and melanin pattern, along with the prominent spotting in the dorsal and caudal fins conform well to *Protomelas pleurotaenia*. The very small mouth rules out other sandy shore *Protomelas* species. The specimen has 10 lower gill rakers (LGR) and the lower pharyngeal jaw has numerous tiny crowded teeth, with none noticeably enlarged. This does not fit with any of the described *Nyassachromis* species: the only *Nyassachromis* with fewer than 13 LGR is *N. leuciscus* (10-14) which is more slender and is described as occasionally showing a faint midlateral stripe (not apparent in the lectotype). According to Eccles & Trewavas (1989), *Protomelas pleurotaenia* has 11-12 LGR, but that doesn't not seem sufficient mismatch to rule out this species. Both *P. pleurotaenia* and *N. leuciscus* have a few slightly enlarged LPJ teeth. However, examination of the types suggests these are only slightly enlarged and this is a variable trait in many species. It is felt that the specimen D07-B05 is a good fit for *P. pleurotaenia*.

Little is known about the biology of this species. Eccles & Trewavas (1989) mentions that males assigned to this species live in the intermediate habitat (rocks on sand/mud) and that males construct 'nests' on rocks, but it is not clear how reliable this identification is. Konings (2016) reports that the species lives in the deeper parts of weedbeds and feeds by blowing away sediment to detect and capture small invertebrates. He also illustrates male breeding dress. However, the identification seems to be based on observations and illustrations of live specimens seen underwater, and his published photograph of a female/immature (fig. 428.5) does not seem to fit very well with the type material. He also reports that live specimens have a strong red dorsal fin margin, not visible in the sequenced specimen. Therefore aspects of the biology depending on underwater observations might not refer to *P. pleurotaenia*.

Phylogenetic analysis places the species (given the name *Protomelas* 'chilumba') within the main *Protomelas* clade (Blumer et al. 2025).

Fig. 428.1: *Protomelas pleurotaenia,* D07-B05 freshly collected, bought from seine net fishers at Ngara, Chilumba, northern Lake Malawi. Note prominent spotting on the dorsal and caudal fins [HS]

Fig. 428.2:. Lectotype of *P. pleurotaenia* BMNH1906.9.6.139 , female 87mmSL, 2023 [GFT]..

Fig.428.3. One of the paralectotypes of *P. pleurotaenia,* BMNH 1906.9.6. 140-143 [GFT].

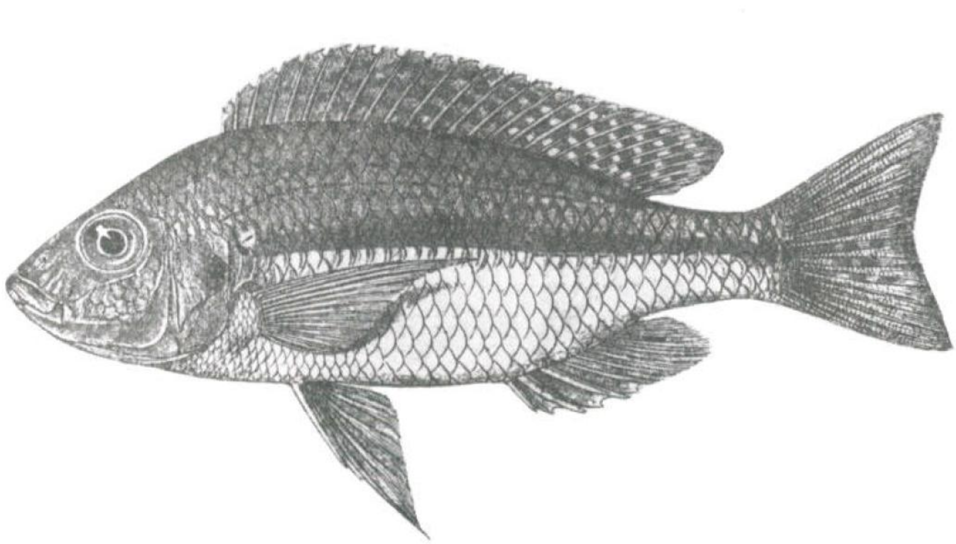


Fig. 428.4. Drawing of *Protomelas pleurotaenia* lectotype from Regan (1921) and Eccles & Trewavas (1989), showing markings visible when specimen was relatively fresh, including strongly spotted dorsal and caudal fins.

Fig. 428.5. Konings (2016) assigned this specimen to *P. pleurotaenia*, but relatively large eye, strong upper stripe and spots at the base of the dorsal fin along with lack of strong spotting in the soft dorsal and caudal fins suggest it is not conspecific [AK].

MC429. *Protomelas similis* (Regan 1922)

Haplochromis similis was described by Regan in 1922 from 5 specimens collected by Wood from an unknown location in the lake and moved to *Protomelas* by Eccles & Trewavas (1989). In practice, the species is usually most likely to be confused with *P. kirkii*: both commonly occur in the same microhabitat, and have similar male and female coloration- *P. similis* tends to have a shorter snout and smaller jaws (fig. 429.1). Dissection of the lower pharyngeal bone confirms that *P. similis* lack the enlarged posterior medial teeth seen in *P. kirkii*. The species frequents shallow weedy areas, and is often seen feeding from macrophytes. Konings (2016) reports that it bites pieces off leaves, perhaps to obtain algae; Fryer (1959) reports guts containing detritus and dead plant material. At the time of writing, it was still a widespread and abundant species in its favoured habitat and is relatively straightforward to recognise once the observer has become accustomed to recognising the difference in head shape from *P. kirkii*. Specimens sequenced by Blumer et al. (2025) came from Nkhata Bay (fig 429.2), Chiweta (fig. 429.3) and Chiofu Bay (fig. 429.4). They were resolved as members of the main *Protomelas* clade.

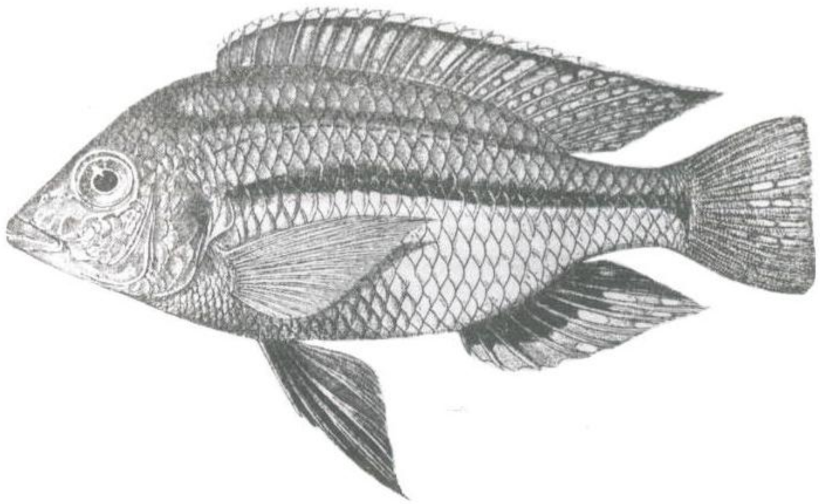


Fig. 429.1: Drawing of the lectotype of *Protomelas similis* (from Regan 1922, Eccles & Trewavas 1989).

Fig. 429.2: *Protomelas similis*, apparent female, D03-F02 (UCZM 2016.21.16), apparent female caught by snorkelling at Viking Reef, Nkhata Bay West Central Lake Malawi, 22 Feb 2016; [HS]

Fig. 429.3: *Protomelas similis*, apparent female, D06-A04, UCZM 2016.28.2, from beach seine at Chiweta, Chilumba, north western Lake Malawi, 24 Feb 2016 [HS]..

Fig. 429.4: *Protomelas similis,* mature male, D08-B10, UCZM 2016.35.49, collected by SCUBA, from Chiofu Bay, SE Lake Malawi, 28 Feb 2016. Note that it has a slightly deeper body and larger jaws than the females [HS].

Fig. 429.5: *Protomelas similis*, D02-G03 from Nkhata Bay has the short snout and small upward-pointing mouth typical of *P. labridens*, but the lips are not noticeably thickened and the pharyngeal dentition fitted better with *P. similis*.

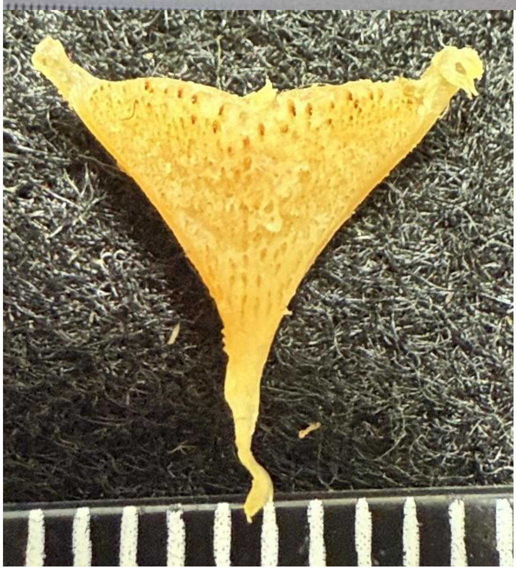


Fig. 429.6: Lower pharyngeal bone of *P. similis* specimen shown in fig, 429.5. The description in Eccles & Trewavas states: 'Lower pharyngeal broad, the toothed area expanded with broadly rounded postero-lateral extremities and its posterior border almost in line with the ends of the horns; teeth small, bicuspid, all pointed but those of the two posterior rows enlarged and more widely spaced than the anterior, about 35 across the posterior border of the bones'. By contrast, for *P. labridens*: 'Lower pharyngeal bone stout, triangular, with the middle teeth enlarged and blunt'. [GFT]

MC430. *Protomelas spilopterus* (Trewavas 1935)

Haplochromis spilopterus was described by Trewavas (1935) from 27 specimens from the collection of Christy in 1925-26, easily recognised by its broad, upwardly-angled mouth, large eye and narrow preorbital bone. The full description and designation of the lectotype was made by Eccles & Trewavas in 1989, who also mentioned 15 paralectotypes and 11 specimens of 'other material' (but these were surely included in the 1935 description and I don't think you can retrospectively remove specimens from a type series in a later redescription!). Eccles & Trewavas also placed the species in their new genus *Protomelas*. The melanic pattern was described as 'a blackish stripe or series of spots, from opercular spot to base of caudal: when complete, slightly curved anteriorly; sometimes another above lateral line; a series of 5 blackish spots at based of spinous dorsal; in some, 10 or 11 vertical bars'. Konings (1995) moved the species into *Hemitaeniochromis*, previously monotypic, containing only *H. urotaenia*, on the basis that 'it shares all its morphological characteristics. The only difference is that the midlateral stripe is continuous in most specimens'. This is a big change to the generic definition, as the main definition of *Hemitaeniochromis* is that is has a partial stripe, indeed it means 'half-striped chromis'. This was followed by Turner (1996) but not by Snoeks and Hanssens (2004). Oliver (2012) in a revision of *Hemitaeniochromis* does not accept it either, nor does Dierickx & Snoeks (2020), and it is listed as *Protomelas spilopterus* in Eschmeyer (Fricke et al. 2025) but as *Hemitaeniochromis* in the IUCN red list (Kazembe & Konings 2019) and by Konings (2016). Following Fricke et al., it is here retained in *Protomelas*. It is unclear whether this species has been sequenced. Initially three sequences were assigned this species: one clustered with *Hemitaeniochromis* species, but it may be that this specimen is actually *Hemitaeniochromis brachyrhynchus*, described Oliver in 2012 (MC148 above). The other two specimens clustered with *P. kirkii*: one of these, collected in 2014, could actually be *P. kirkii*, judging by the photo (fig. 422.5) and no photo or voucher specimen has been located for the other (2005.233). A difficulty lies in discriminating *P. spilopterus* from *H. brachyrhynchus*, which is very dependent on the completeness of the horizontal stripe, which may be a variable trait (including within the types of *P. spilopterus*). However, there are some very clear-cut specimens of *P. spilopterus* that could be sequenced (e.g. fig. 430.2-3).

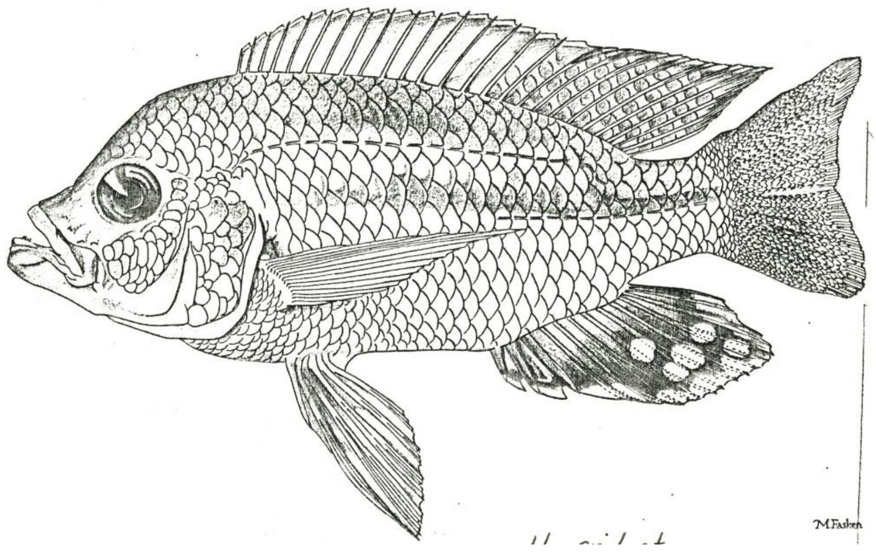


Fig. 430.1: *Protomelas spilopterus*, lectotype, 147mm SL male from Bar to Nkhudzi (SE Arm) drawn by Fasken and printed in Eccles & Trewavas 1989.

Fig. 430.2: *Protomelas spilopterus*, D12-D09, 2016.41.69; adult male trawled from 20m depth near Makanjila, 2nd March 2016 [HS].

Fig. 430.3: *Protomelas spilopterus*, D24-F01, adult male, purchased from pair trawl catch landed at Malembo, SW Arm, 21 Jan 2017; not sequenced [HS].

MC431. *Protomelas* sp. 'hertae'; MC432. *Protomelas* sp. 'johnstoni solo'; MC433. *Protomelas* sp. 'mbenji thick-lip'; MC434. *Protomelas* sp. 'multitooth'; MC435. *Protomelas* sp. 'oxyrhynchus mix'

Not yet sequenced.

MC436. *Protomelas sp.* 'snoeksi'

This undescribed species was illustrated by Snoeks & Hanssens (2004) as *Otopharynx* sp. 'brooksi striped' (fig. 436.1). It is very similar to *Otopharynx brooksi*, but the midlateral and supra-anal spots are joined into a stripe. It is a little more slender and inhabits shallower waters, particularly on rocky coasts in the north of the lake, while *O. brooksi* is generally found in deep water trawl catches in the south. Snoeks & Hanssens suggest that the species illustrated by Konings (2016) as *Hemitaeniochromis sp.* 'urotaenia tanzania' is likely to be the same species. On the basis of current definitions, the largely continuous midlateral stripe would place the species in *Protomelas*. The sequenced specimens were collected near Nkhata Bay, one in shallow water by divers. It is presumed to be a predator. Phylogenetically, it is not sister to *O. brooksi* and is not a *Hemitaeniochromis*, but is related to some of the small *Sciaenochromis* species including *S. fryeri* (Blumer et al. 2025, as 'O. brooksi S').

Fig. 436.1: *Protomelas sp* 'snoeksi'. MRAC 99-41-P-5186-5187, Lukoma Bay, Tanzania. Not sequenced.

Fig. 436.2 *Protomelas sp* 'snoeksi' D03-B03, UCZM 2016.20.61; collected by SCUBA, Nkhata Bay, 21 Feb 2016 [HS].

Fig. 436.3: *O Protomelas sp* 'snoeksi' 2005-115, bought from fishers, Nkhata Bay, 6 Feb 2005 [MJG].

MC437. *Protomelas* sp. 'spilonotus likoma'; MC438. *Protomelas* sp. 'spilonotus mozambique'; MC439. *Protomelas* sp. 'spilonotus tanzania'; MC440. *Protomelas* sp. 'steveni black belly'; MC441. *Protomelas* sp. 'steveni imperial'; MC442. *Protomelas* sp. 'steveni taiwan'; MC443. *Protomelas* sp. 'virgatus luwala'; MC444. *Protomelas spilonotus*;

MC445. *Protomelas taeniolatus* (Trewavas 1935)

Haplochromis taeniolatus was described by Trewavas in 1935 from specimens in the Christy collection (1925-26). The lectotype and most of the paralectotypes were from the southern part of the lake (fig. 445.1). The species was placed in the genus *Protomelas* by Eccles & Trewavas (1989) who provided the first full description of the species. A specimen sequenced by Blumer et al (2025) shows a similar melanin pattern and body shape to the drawing of the lectotype (fig. 445.2). According to Konings (2016), the species shows considerable geographic variation in male and female colour pattern. This is consistent with its strict preference for rocky habitats, which tend to be patchily distributed. Southern specimens that he has assigned to this species show very similar markings to our specimen and to the lectotype (fig. 445.3). No voucher specimen is available, but the photograph allows convincing identification of this common and well-known species. The species is a rocky-shore specialist, feeding largely on biofilm (aufwuchs) from rock surfaces, but also taking invertebrates and plankton (Ribbink et al. 1983). Brilliantly coloured males defend territories on rocks (fig. 455.4). Females actively defend free-swimming fry on the surface of rocks, sometimes in groups. Phylogenetic analysis places the species within the main *Protomelas* clade.

The specimen from Nkhata Bay (fig. 445.3) is harder to identify. The pharyngeal bone rules out *P. virgatus*. The melanic markings are more like *P. taeniolatus* than *P. fenestratus*, so it is provisionally assigned here. Phylogenetically, it clusters with the specimen identified as *P. fenestratus* from Nkhata Bay, but this may indicate gene flow in sympatry.

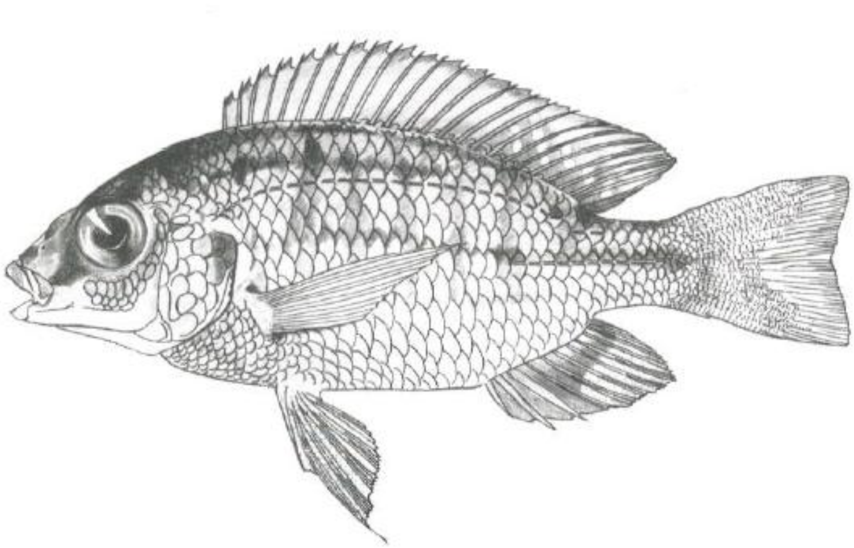


Fig. 445.1. Lectotype of *P. taeniolatus* from Eccles & Trewavas (1989) is a good fit with D23-D07 in both shape and melanic markings.

Fig. 445.2: *Protomelas taeniolatus* sequenced specimen, D23-D07, caught by snorkelling on rocky habitat on the south side of Thumbi West Island, Cape Maclear on 29 Jan 2017 [HS].

Fig. 445.3: D01-J04 *Protomelas cf. taeniolatus, SCUBA,* Nkhata Bay. 74.2mm SL [HS] & pharyngeal bone [GFT]

Fig. 445.4: *Protomelas taeniolatus* female, guarding fry at Chimwalani Reef, in the SE Arm of Lake Malawi. This illustrates the southern variant with strong horizontal elements [AK].

Fig. 445.5: *Protomelas taeniolatus* male, Nkhata Bay, 2016 [HS].

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MC446. *Protomelas triaenodon* (Trewavas 1935)

Protomelas triaenodon was described by Trewavas in 1935 (as *Haplochromis*) from 26 specimens collected by Christy from the southern part of Lake Malawi in the 1920s. The species is distinguished by its horizontal bands and tricuspid teeth in the outer series of the oral jaws (there are sometimes some bicuspids too). In life, they have an overall straw-gold colour, two prominent, thin dark horizontal bands, with dark markings at the base of the dorsal fin and a red tip to the dorsal fin. Two specimens have been sequenced, although the Chilumba specimen is rather small and difficult to be certain about (Fig. 446.2). They tend to be found in relatively shallow sand/mud areas and are commonly encountered in shallow trawl and seine catches at depths of less than 45m (Turner 1996). Phylogenetically, it belongs in the shallow benthic group, but has no close relatives among the taxa sequenced to date (Blumer et al. 2025).

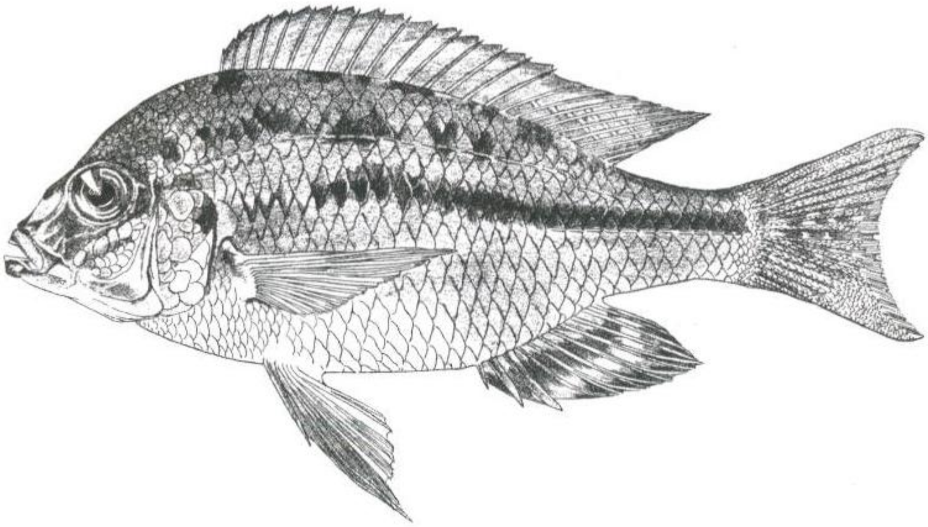


Fig. 446.1: *Protomelas triaenodon*, lectotype, from Eccles & Trewavas (1989).

Protomelas triaenodon D07-G05, UCZM2016.32.14; Chilumba, seined from sandy beach at Ngara, 25 Feb 2016 [HS]

Protomelas triaenodon D14-I04. SW Arm, trawled from 19-22m depth, 12 March 2016 [HS]

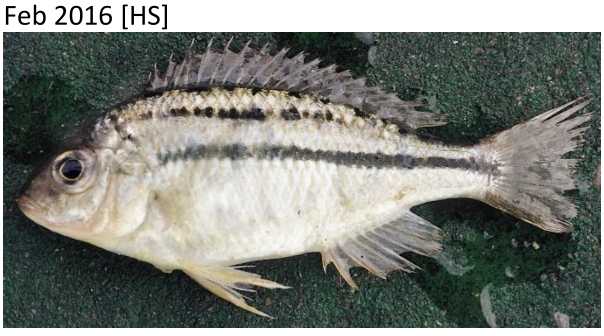


Fig. 446.2: Left: a typical specimen of *P. triaenodon,* trawled from 5-18m, Palm Beach, 30 Jul 1990, Palm Beach not sequenced, [GFT] has a similar melanin pattern to the two sequenced specimens (above), but generally has a smooth head profile and the deepest part of the body well behind the insertion of the dorsal fin. D14-I04 may be a spent individual and D07-G05 a juvenile.

MC447. *Protomelas virgatus* (Trewavas 1935)

Haplochromis virgatus was described from a single specimen from Monkey Bay (Trewavas 1935), exhibiting enlarged pharyngeal teeth- lacking in both *P. fenestratus* and *P. taeniolatus*. It is reported to have slightly different oral jaw morphology, too. This species was excluded from consideration in the identification of the Nkhata Bay specimens sequenced by Blumer et al. (2025) after examination of lower pharyngeal jaw morphology. The Cape Maclear specimen could also be excluded on the basis of its melanin pattern, with a strong horizontal element. Not yet sequenced.

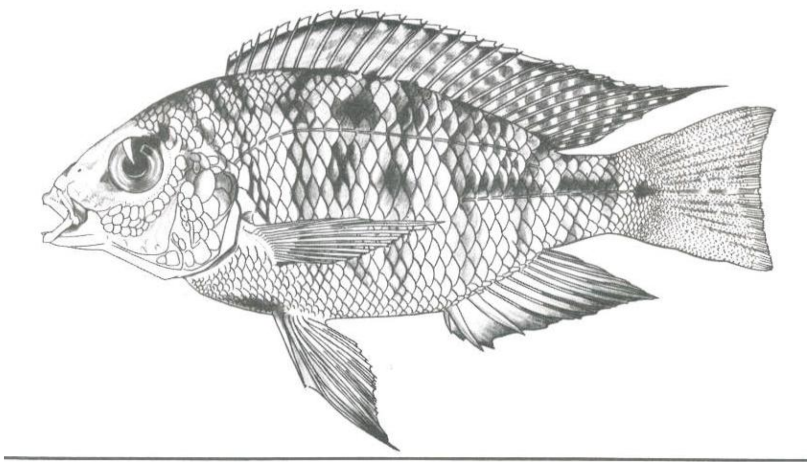


Figure 447.1: Drawing of the type of *Protomelas virgatus* (Trewavas 1935), from Eccles & Trewavas (1989).

Sciaenochromis Eccles & Trewavas 1989. MC448-462.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis ahli Trewavas 1935.*

Contained valid species (4): *Sciaenochromis ahli; Sciaenochromis benthicola; Sciaenochromis fryeri; Sciaenochromis psammophilus* [sensu Konings]

Proposed undescribed taxa (12): Sciaenochromis sp. 'deep'; Sciaenochromis sp. 'deep water'; Sciaenochromis sp. 'elongate'; Sciaenochromis sp. 'nyassae'; Sciaenochromis sp. 'psammophilus broad'; Sciaenochromis sp. 'small interorbital'; Sciaenochromis sp. 'spilostichus deep-water'; Sciaenochromis sp. 'spilostichus makanjila'; Sciaenochromis sp. 'spot bicuspid'; Sciaenochromis sp. 'stripe tanzania'; Sciaenochromis sp. 'torpedo head'

Taxa considered invalid: *Haplochromis serranoides* Ahl 1926 (=Sciaenochromis ahli)

Generic reviews & diagnoses: Eccles & Trewavas 1989, Konings 1993.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Predatory haplochromines endemic to Lake Malawi with the mouth slightly oblique. Lower jaw strong, with the symphysis almost perpendicular to the dental plane. Teeth in 3 or 4 series, simple or with a very slight shoulder, not closely crowded, but spaces between outer teeth less than tooth diameter. About 84 in outer series of upper jaw, the last few enlarged; 55 to 65 in outer row of lower jaw, with a group or shorter teeth near the symphysis. Lower pharyngeal bone with small teeth. 11 or 12 gill-rakers on lower part of anterior arch. Melanin pattern consisting of an oblique series of spots, usually also with traces of the vertical component of the plesiomorphic pattern." This was based on three species, *S. ahli, S. gracilis* and *S. spilostichus.* Konings (1993) drastically revised the genus, firstly recognising that *S. ahli* was not the rocky shore species with bright blue males that had been thought by all previous researchers and aquarists, but proposing that this was a relative uncommon sand species and describing the 'electric blue' hap as *S. fryeri*. He also ejected the species with an oblique row of spots (key to the generic definition) into *Mylochromis*, and added new species *S. benthicola* and *S. psammophilus*, which had predominantly vertical barred patterns (although *S. benthicola* also has flank spots, in the '*Otopharynx*' pattern). Snoeks & Hanssens (2004) did not accept the expulsion of the species with the oblique row of spots, but Konings persisted with his revision (2016) and it is accepted by Fricke et al. (2025) and so is adopted here. Konings (1993) provided a revised generic diagnosis:

"Predatory haplochromines endemic to Lake Malawi with the mouth slightly oblique. Lower jaw strong, with the symphysis almost perpendicular to the dental plane. Teeth in 3 or 4 series, outermost simple or with a very slight shoulder, not closely crowded, but spaces between outer teeth less than tooth diameter. Premaxillary pedicel 3.9 to 5.2 times in head length. Lower pharyngeal bone with The melanin pattern consists of 9 to 12 vertical bars of a width varying between one and three scales. The bars are permanently visible although weak in some live individuals. Under certain circumstances one or two vertical bands may have a deeper coloured centre which appears as a spot. Such spots, however, do not, in the material examined, definitively indicate a suppressed longitudinal element, either diagonal or horizontal. The statement in the former generic diagnosis that an oblique series of spots is present was probably due to the inclusion in *S. ahli* of specimens now excluded. *Stigmatochromis* is seen as the species group with the closest relation to *Sciaenochromis*. Species of the genus *Stigmatochromis* are distinguished from those of *Sciaenochromis* by their melanin pattern consisting of three spots on the flank, by having a longer premaxillary pedicel (3.0 to 3.5 times in head length in *Stigmatochromis* and 3.9 to 5.2 times in *Sciaenochromis*), and by the wider spaced setting of the outer teeth on the jaws.

Field Diagnosis: Elongate, predatory-looking species with vertical barring, or with small 3-spot pattern. Head rounded and eye large and generally elliptical.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group. Three small vertically-barred species (including *Sc. fryeri*) form a clade, related to the *Stigmatochromis* species (as predicted by Konings 1993). *Sc. benthicola* (added by Konings 1993) and *M. spilostichus* (kicked out by Konings 1993) turn out to be sister taxa, not closely related to the other *Sciaenochromis* nor to any other *Mylochromis* sequenced to date.

Ecomorphological notes: Not much is known of most species apart from *S. fryeri*, but *Sciaenochromis* are generally predators of small fish.

MC448. *Sciaenochromis ahli*

Not sequenced.

MC449. *Sciaenochromis benthicola* Konings 1993

Sciaenochromis benthicola was described by Konings in 1993 from a single specimen from Kaporo in the far north of the Malawian part of the lake. It has quite a similar body shape (perhaps a bit deeper-bodied) to *M. spilostichus* or *S. sp* 'deepwater', but is distinguished by its melanin pattern of 8-9 thin irregular bars under the dorsal fin, with 2-3 more on the caudal peduncle. Three small spots are sometimes visible on the flanks, particularly the supra-anal and caudal spots. Specimens sequenced by Blumer et al. include 4 large individuals from a deep-water trawl in the south of the lake that clearly show the usual phenotype of this species. A smaller individual from the same location is very likely conspecific, although the body shape and melanic markings are less distinctive. Two further individuals from Chilumba were collected from a beach seine catch. They also seem quite deep-bodied and one seems to be showing signs of male breeding dress at a small size. It is possible that these represent a related species. *Sciaenochromis benthicola* is a piscivore usually caught over soft bottoms at depths of 44m or greater (Turner 1996). It belongs to the shallow benthic clade, and is closely related to *Mylochromis spilostichus* (Blumer et al 2025).

Fig. 449.1: Holotype of *Sciaenochromis benthicola* from original description.

Fig. 449.2: *Sciaenochromis benthicola* D11-C08, UCZM 2016.40.88;
trawled from SE Arm, off Monkey Bay at 85-95m, on 26 March 2016 [HS]

D11-C07, UCZM 2016.40.87

D11-H06, UCZM 2016.40.47

D11-D02, UCZM 2016.40.66

D11-G10, UCZM 2016.40.71

Figure 449.3: In addition to D11-C08 (fig. 151), a further 4 sequenced specimens from the same deep water (85-95m) trawl catch off Monkey Bay on 26 March 2016, correspond well to the usual phenotype of *Sciaenochromis benthicola*. The specimen D11-H06 is rather small and shows little melanin pattern, but it is plausible that this is a juvenile of this species [HS].

D06-A05, UCZM 2016.28.12

D06-A07, UCZM 2016.28.3

Fig. 449.4: Two sequenced specimens from Chiweta Beach, near Chilumba in the far north of the lake, (24 Feb 2016) resemble *S. benthicola*, in shape and barring pattern, but are small, particularly considering the male secondary sexual traits (orange anal fin and large pale spots) developing in D06-A05 (11cm SL). These are coded as *S. cf. benthicola* [HS]

Fig. 449.5: *Sciaenochromis benthicola*, breeding male, trawled from 60m depth, Domira Bay, Mnema 3, 28-Sep-91. Not sequenced. [GFT]

MC450. *Sciaenochromis fryeri* Konings 1993

Sciaenochromis fryeri was described by Konings in 1993 for a small rocky shore predator population long known in the aquarium trade as the 'electric blue hap'. This species had previously been identified as *Haplochromis* or *Sciaenochromis ahli*, but Konings identified that name with a different species- a relatively rare species occasionally recorded over sandy patches among rocks: these could be differentiated in museum specimens by the longer premaxillary pedicel of *S. fryeri* (23.8-25.6% in *S. fryeri* v 19.2-19.6% Head Length in *S. ahli*)-. *Sciaenochromis fryeri* has a slender body, convex head profile and 9-12 dark vertical bars which are generally obscured by the overall dark brown colour of females and immature males. It has a smaller mouth and snout than the similarly dark *Stigmatochromis modestus*. Mature males are normally bright blue with a pale 'blaze' on top, all year round, even when hunting. It is a popular aquarium fish, and several artificially-selected colour variants have been produced, some very likely via hybridisation. The specimens sequenced by Blumer et al. appear to be female/immature specimens from shallow rocky shores at Chiofu Bay and Nkhata Bay. It is a predator of small fishes, particularly non-mbuna. Over rocks, it sometimes makes a rocking motion believed to mimic certain algal-feeding mbuna. It is also known to attack shoals of small cichlids that aggregate around the nests of kampango catfish, *Bagrus meridionalis* (Konings 2016). Sequence analysis suggests the species is closely related to two other vertically barred *Sciaenochromis* species, here recorded as *S.* sp. 'nyassae' and *S.* sp. 'deepwater', but not to *S. benthicola* nor *M. spilostichus* (Blumer et al. 2025).

Fig. 450.1: *Sciaenochromis fryeri,* mouthbrooding female photographed by Konings (2016), author of the original description.

Fig. 450.2: *Sciaenochromis fryeri*, sequenced specimen, D09-C01, UCZM 2016.37.75; SCUBA divers at Chiofu, 28 Feb 2016 [HS].

Fig. 450.3: *Sciaenochromis fryeri.* D02-J08, UCZM 2016.20.44; Nkhata Bay, SCUBA, 21 Feb 2016 [HS].

Fig. 450.4: *Sciaenochromis fryeri.* Mature male photographed by Konings (2016).

MC451. *Sciaenochromis psammophilus*; MC452. *Sciaenochromis* sp. 'deep'; MC454. *Sciaenochromis* sp. 'elongate'

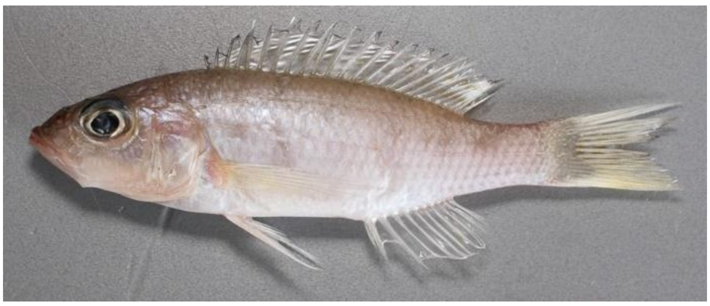
Not yet sequenced.

MC453. *Sciaenochromis sp.* 'deepwater'

Sciaenochromis sp. 'deepwater' is a small undescribed species first identified by Turner (1996). It has 6 faint bars under the dorsal fin, which distinguishes it from *Placidochromis longus* Hanssens 2004 which has 8-9 bars, *Sciaenochromis* sp. 'nyassae' 8-9 bars and 3 spots and *Sciaenochromis benthicola* Konings 1993 which has around 10 bars, sometimes with small spots. It also has a relatively rounded snout, unlike *Placidochromis elongatus* Hanssens 2004 and *Placidochromis minor* Hanssens 2004 which both have rather acute snouts. *Sciaenochromis ahli* Trewavas has 6-7 bars under the dorsal, but grows to a larger size, has a deeper cheek and relatively smaller eye, is found in shallower waters and appears to be confined to the northeastern shores of the lake (Konings 2016). The overall facies of this taxon fits within the revised definition of *Sciaenochromis* by Konings (1993) in which species with vertical bars were included but those with oblique markings moved to *Mylochromis*, although Snoeks & Hanssens (2004) were not inclined to accept this and suggest that some of these species may have affinities with the deepwater *Placidochromis* species. *Sciaenochromis* sp 'deepwater' was first reported by Turner in 1996, and recorded from depths of 100-128m off Domwe and Chinyankwazi Islands in the northern part of the SE Arm. Specimens sequenced by Blumer et al. were from trawls at 85-95m depth off Monkey Bay, which is a reasonable match (fig. 453.2-3). Turner (1996) records a maximum total length of 12cm. The species is presumed to be a benthic predator of some kind. Sequence analysis indicates that it is closely related to *S. fryeri* and *S.* sp. 'nyassae' (Blumer et al. 2025) and not to *S. benthicola* nor *M. spilostichus* and certainly not to any deepwater *Placidochromis* yet sequenced.

Fig. 453.1: *Sciaenochromis* sp. 'deepwater' from a trawl in the SE Arm, 1990s [GFT]

Fig. 453.2: *Sciaenochromis* 'deepwater' D11-J01, UCZM 2016.40.54; apparent male, trawled from 85-95m NE of Monkey Bay, 2 March 2016 [HS].



D11-H03, UCZM 2016.40.14.

D11-H04, UCZM 2016.40.7.

Fig. 453.3: *Sciaenochromis* sp. 'deepwater' trawled from 85-95m NE of Monkey Bay, 2 March 2016 [HS]

MC455. *Sciaenochromis sp.* ‘nyassae’

This undescribed species was photographed and illustrated by Konings (2016). It is characterised by its numerous thin vertical bars (~9 under dorsal fin), sometimes underlain with 3 spots. The lachrymal stripe seems to be prominent. It has a big eye, short snout and prominent premaxillary pedicel (fig. 455.1). Konings reports the species from the southern half of the lake, in areas where rocks are mixed with sand/sediment. The specimen sequenced by Blumer et al. was collected in shallow water in Chiofu Bay (fig. 455.2). Konings reports that it has been seen hunting small fish. Sequence analysis indicates that it is closely related to *S. fryeri* and *S.* sp. ‘deep-water’ (Blumer et al. 2025).

Fig. 455.1: *Sciaenochromis sp.* ‘nyassae’ photographed underwater by Konings (2016).

Fig. 455.2: *Sciaenochromis sp.* ‘nyassae’ D10-H06, UCZM 2016.38.15; caught by snorkellers Chiofu Bay, 29 Feb 2016 [HS].

MC456. *Sciaenochromis* sp. 'psammophilus broad'; MC457. *Sciaenochromis* sp. 'small interorbital'; MC458. *Sciaenochromis* sp. 'spilostichus deep-water'; MC459. *Sciaenochromis* sp. 'spilostichus makanjila'; MC460. *Sciaenochromis* sp. 'spot bicuspid'; MC461. *Sciaenochromis* sp. 'stripe tanzania'; MC462. *Sciaenochromis* sp. 'torpedo head'.

Not yet sequenced.

Stigmatochromis Eccles & Trewavas 1989. MC463-474.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis woodi* Regan 1922.

Contained valid species (6): *Stigmatochromis macrorhynchos; Stigmatochromis melanchros; Stigmatochromis modestus; Stigmatochromis pholidophorus, Stigmatochromis pleurospilus, Stigmatochromis woodi***.**

Proposed undescribed taxa (6): *Stigmatochromis* sp. 'big eye'; *Stigmatochromis* sp. 'big head'; *Stigmatochromis* sp. 'modestus mbenji'; *Stigmatochromis* sp. 'pholidophorus smooth'*;* *Stigmatochromis* sp. 'pleurospilus mdoka'; *Stigmatochromis* sp. 'spilostichus type'.

Taxa considered invalid:

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Somewhat elongated predatory haplochromines endemic to Lake Malawi characterised by the lower jaw extending forward of the tips of the premaxillae. Teeth in specimens over 80 mm SL mostly simple, not crowded. Principal components of melanin pattern consisting of a small suprapectoral spot below the upper lateral line, a small supra-anal spot between the lines, and a spot at the end of the caudal peduncle. The vertical component of the plesiomorphic pattern is also present as a series of faint bars.' This was based on 4 taxa. Stauffer et al (2011) added two additional species but continued to adopt the expanded diagnosis of Cleaver et al. (2009) carried out in the course of a description of a couple of *Otopharynx* species. They pointed out that the anterior two spots of *Stigmatochromis* do not extend to the base of the dorsal fin, separating *Stigmatochromis* from *Hemitilapia, Trematocranus*, and *Tramitichromis intermedius*. Additionally, the presence of a series of small spots along the base of the dorsal fin distinguishes *Stigmatochromis* from spotted *Copadichromis*, which lack such spots. Finally, they stated that in members of *Stigmatochromis* greater than 60 mm SL, the snout is longer or equal to the postorbital-head length, which differentiates them from the species of *Otopharynx*, in which the snout length is always shorter than the postorbital-head length.

Field Diagnosis: Predatory-looking species with thin vertical barring and small 3-spot pattern (unless obscured by generally dark body colour or male breeding dress). Head pointed, mouth large and not strongly upwardly angled, lower jaw prominent.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group and are all closely related, but share a clade with the smaller *Sciaenochromis* species, *Otopharynx brooksi* and *Protomelas* sp. 'snoeksi'.

Ecomorphological notes: *Stigmatochromis* are generally predators of small fish, but may including invertebrates in their diet.

MC463. *Stigmatochromis macrorhynchos* Stauffer et al. 2011

This species was described in 2011 from 5 specimens collected in deep water (>100m) in the south of the lake (fig. 463.1). It has been known from trawl surveys for some time, going under the name 'Haplochromis guttatus' since the 1970s, and later *Stigmatochromis* 'guttatus' (Turner 1996). Like other *Stigmatochromis*, it combines a predatory facies (large prognathous mouth & strong simple teeth, prominent premaxillary pedicel) with three small flank spots, although these are often overlain by vertical barring or male breeding dress. It is generally less deep-bodied than most congenerics and has a larger mouth and more acutely pointed snout than *S. pholidophorus*. The four sequenced specimens correspond well to this phenotype, although there is quite a bit of variation in gape angle (fig. 463.2). The species is found on soft-bottomed habitats and has a wide depth range, occasionally being trawled from as shallow as 24-34m (Turner 1996). It is presumed to be a predator. Phylogenetically, it is related to other *Stigmatochromis*, but actually forms a clade with the vertically barred *Sciaenochromis* species and *Otopharynx brooksi* (Blumer et al. 2025).

A

Fig. 463.1: Preserved holotype of *Stigmatochromis macrorhynchos* Photo Stauffer et al.

D11-C09, UCZM 2016.40.52; trawled from 85-95m off Monkey Bay, 2 Mar 2016

D11-D01, UCZM 2016.40.45; trawled from 85-95m off Monkey Bay, 2 Mar 2016

D11-G02 UCZM 2016.40.39; trawled from 85-95m off Monkey Bay, 2 Mar 2016

D21-J03, no voucher specimen; gillnet catch landed at Msaka, SW Arm, 26 Jan 2017

Fig. 463.2: All four sequenced specimens conform well to the expected phenotype of *Stigmatochromis macrorhynchos* [HS].

MC464. *Stigmatochromis melanchros* Stauffer et al. 2011

Stigmatochromis melanchros Stauffer, Cleaver-Yoder & Konings 2011 (formerly known as *Stigmatochromis sp.* 'tolae') is very similar to *S. woodi*, but is reported to have a slightly deeper body, and a smaller, more upwardly angled mouth, although no direct comparison as made in the original description. In the diagnosis of *S. melanchros*, the only feature given as distinguishing it from *S. woodi* is the smaller horizontal eye diameter (25.2–26.9% HL v 27.0–32.6% in *S. woodi*). These figures are based on 4 and 12 specimens respectively and although not overlapping, have not real daylight between them. With a very large number of different ratios and counts compared, one is quite likely be non-overlapping in a comparison of relatively small samples drawn from the same population. Konings (2016) does not use eye diameter as a diagnostic feature but mentions that *S. melanchros* has a smaller mouth (in Stauffer et al. 2011, lower jaw as % head length overlaps between the species), more upwardly-angled gape and deeper body. Stauffer et al. (2011) did not measure gape angle or body depth. The two species have similar dark male breeding dress. The distinction instead seems to be based on breeding strategy: *S. melanchros* males are reported to defend the vertical face of a large boulder near the end of a rocky reef, while *S. woodi* males defend large bowers over open sand. Whether this is truly a species-specific feature is unclear. For example, *Dimidiochromis kiwinge* and *Mchenga* males may defend sand bowers, while adjacent territorial conspecifics defend the surface of boulders. In any event, it is not a very useful diagnostic feature for the identification of preserved specimens, females, juvenile or any individuals collected by seines or trawls. Thus, it did not prove feasible to differentiate these species from preserved material, but *S. melanchros* is reported to be a rock-associated species, at least when breeding, while *S. woodi* is commonly encountered in a variety of habitats and is reported to breed on open sand. The specimens sequenced by Blumer et al. (2025) were obtained from seines and trawls on open soft-sedimented areas, so are provisionally assigned to *S. woodi*, although some had been labelled as *S. melanochros* in the publication. *Stigmatochromis melanchros* species does not seem to have been sequenced.

Fig. 464.1: *Stigmatochromis melanchros*, preserved adult male holotype from original description by Stauffer et al.

Fig. 464.2: *Stigmatochromis melanchros*, mature female photographed underwater, from original description by Stauffer et al.

MC465. *Stigmatochromis modestus* (Günther 1894)

Stigmatochromis modestus was described by Günther in 1894 (as *Hemichromis*). It is distinguished by its predatory facies, slender body, large head and jaws and its uniformly dark body colour (fig. 465.1). The species was placed in the new genus *Stigmatochromis* by Eccles & Trewavas (1989). It is a small species that lives in caves among rocks and hunts fish fry. The four sequenced specimens conform well to the phenotype of the species (fig. 465.2). It is related to other *Stigmatochromis* species (Blumer et al. 2025).

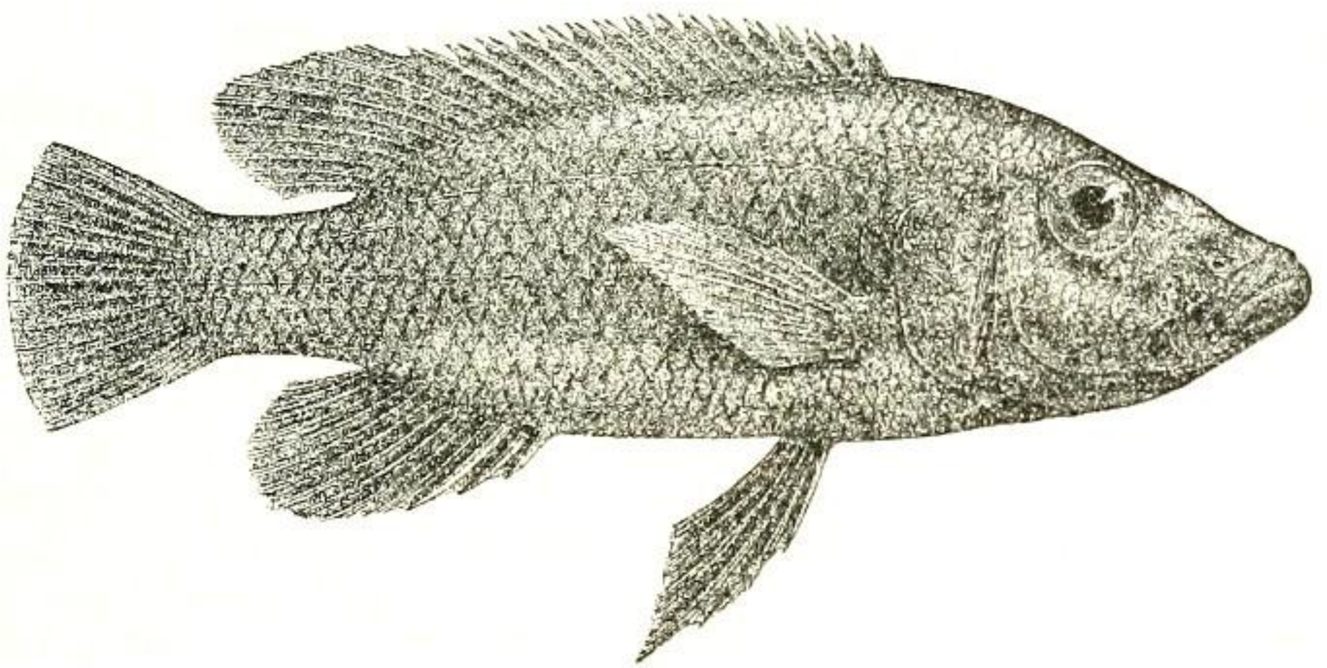


Fig. 465.1: A drawing of the type of *Stigmatochromis modestus*, from Günther's 1894 description.

2014-118, Cape Maclear, 9 Sept 2014

D08-F04, UCZM 2016.36.8; SCUBA, Chiofu 28 Feb 2016,

D05-B07, UCZM 2016.27.26; SCUBA Luwino Reef (Chilumba), 24 Feb 2016

D06-G08 UCZM 2016.29.17; SCUBA Chitande Island (Chilumba), 24 Feb 2016

Fig. 465.2: All four sequenced specimens of *Stigmatochromis modestus* look appropriate for the phenotype of this species [HS].

MC466. *Stigmatochromis pholidophorus* (Trewavas 1935)

Haplochromis pholidophorus was described by Trewavas (1935) from a single specimen, and moved into the genus *Stigmatochromis* by Eccles & Trewavas in 1989. The genus is characterized by the melanin pattern of three small spots and predatory facies, with relatively large projecting lower jaws and simple teeth (in larger specimens). Specimens identified with this species by Konings (1989, 2016) and Turner (1996) have smoother head profile. The specimen illustrated by Snoeks and Hanssens (2004) seems a better fit, with a rather pointed head, strongly jutting lower jaw, expanded mental process, so the Konings/Turner species is now regarded as an undescribed species, *S.* sp. 'pholidophorus smooth'.

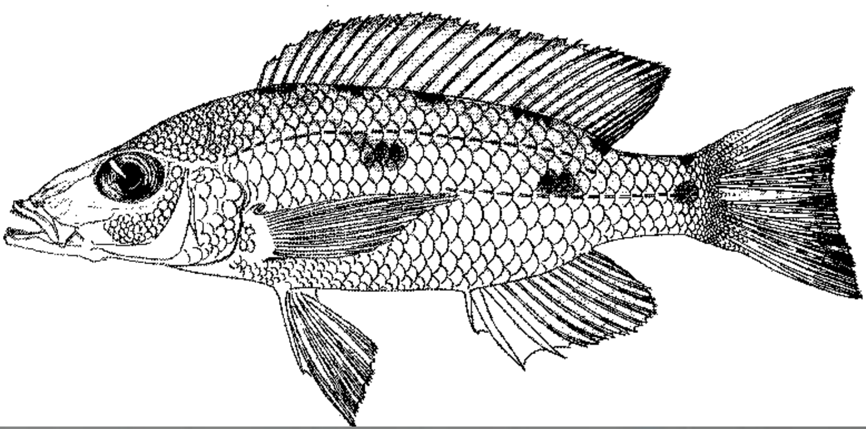


Fig. 466.1: Drawing of the type of *Stigmatochromis pholidophorus* from Eccles & Trewavas (1989). Note that the jaws are protruded. 86mm SL.

Fig. 466.2: *Stigmatochromis pholidophorus* as identified by Snoeks & Hanssens (2004). Collected at Tchilouelo Point, Mozambique.

MC467. *Stigmatochromis pleurospilus* (Trewavas 1935)

Described by Trewavas (1935), as *Haplochromis*, from a single 40mm SL juvenile (fig 467.1). Snoeks & Hanssens reported collection of two specimens, apparently adult or near adult, at only 7 and 9cm SL. Characterised by their large eyes and relative short snouts, they have sharp bicuspid jaw teeth in their outer rows (fig. 467.2). A single juvenile was sequenced by Blumer et al. (2025), initially under this name, but it is now believed to be a juvenile *S. woodi*, based on its larger mouth and projecting lower jaw (fig. 467.3). Phylogenetic analysis put this sequence nested within those of *S. woodi.* It is currently thought that *S. pleurospilus* has not yet been sequenced.

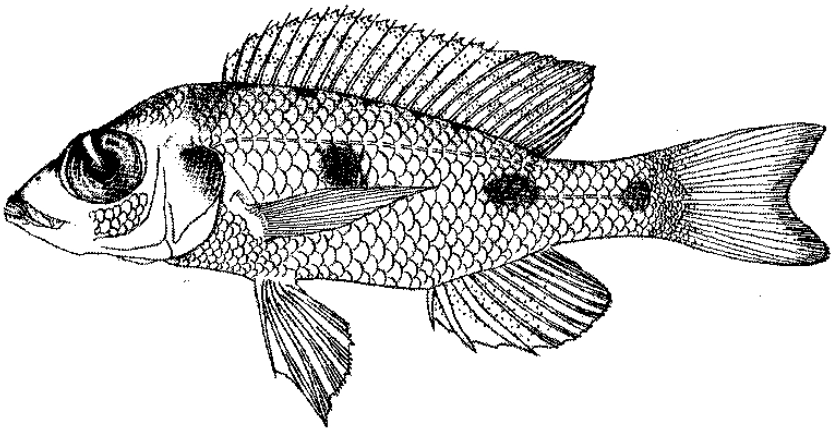


Fig. 467.1: *Stigmatochromis pleurospilus,* holotype, 40mm SL juvenile from the Lupembe Sand bank in Tanzania [drawing by Fasken].

Fig. 467.2: *Stigmatochromis pleurospilus,* Ifungu, Tanzania from Snoeks & Hanssens 2004.

Fig. 467.3: Probable *Stigmatochromis woodi* juvenile, 2014.116, Cape Maclear, 9 Sept 2014 [MJG]

MC468. *Stigmatochromis* sp. 'big eye'; MC469. *Stigmatochromis* sp. 'big head'; MC470. *Stigmatochromis* sp. 'modestus mbenji'

Not yet sequenced.

MC471. *Stigmatochromis* sp. 'pholidophorus smooth'

For many years, *Stigmatochromis pholidophorus* was identified as a species common in rocky habitats, with a relatively smooth head profile, generally (but not always) rather bent into a 'roman nose' shape by the projecting upper end of the premaxillary pedicel, but without a jutting lower jaw angle or strong mental process (Konings 1989-2016, Turner 1996, figs. 471.1-2). Unfortunately, this does not really fit well with illustrations of the type of *S. pholidophorus*, and the taxon illustrated by Snoeks & Hanssens (2004) seems to a better match (see MC466). For this reason, the species is here provisionally considered to be an undescribed species and renamed, *S. sp.* 'pholidophorus smooth'. Konings (2016) reports this species often swimming high above the substrate and striking rapidly downwards to catch small fish. It is occasionally taken by trawls in shallow water, so must spend some time over soft sediment habitats. Three specimens of *S.* sp 'pholidophorus smooth' have been sequenced, all collected by divers at Chiofu Bay in 2016. They cluster with other *Stigmatochromis s*pecies in a clade also including some *Sciaenochromis*, plus *Otopharynx brooksi* and *Protomelas* sp. 'snoeksi'.

Fig. 471.1: *Stigmatochromis* sp 'pholidophorus smooth' photographed underwater by Konings.

Fig. 471.2: *Stigmatochromis* sp 'pholidophorus smooth', trawled from 15-18m, SE Arm, Shire Bar to White Rock, 30-Jul-91 [GFT].

Fig. 471.3: *Stigmatochromis sp.* 'pholidophorus smooth', D07-I06, UCZM 2016.35.25; SCUBA at Chiofu, 28 Feb 2016 [HS].

D07-I07, UCZM 2016.35.33

D08-D03, UCZM 2016.35.24

Fig. 471.4: *Stigmatochromis sp.* 'pholidophorus smooth', SCUBA at Chiofu, 28 Feb 2016 [HS].

MC472. *Stigmatochromis* sp. 'pleurospilus mdoka'; MC473*. Stigmatochromis* sp. 'spilostichus type'

Not yet sequenced.

MC474. *Stigmatochromis woodi* (Regan 1922)

Haplochromis woodi was described by Regan in 1922 from six specimens, and placed in the genus *Stigmatochromis* by Eccles & Trewavas in 1989. The genus is characterized by the melanin pattern of three small spots and a predatory facies, with a large, strong, projecting lower jaw, and strong unicuspid teeth (in large specimens). *Stigmatochromis woodi* has a deep, laterally compressed body, acute snout and large mouth (fig. 474.1). Prior to the description of *S. melanchros* (known from 4 types and some underwater photographs: Stauffer et al. 2011), *S. woodi* was seen as highly distinctive and easy to identify, so was not closely studied for identification features. To date, there are no reliable diagnostic features for differentiation of preserved specimens of *S. melanchros* v *S. woodi* (see MC464). Breeding *S. melanchros* are reported to be associated with rocky areas, while *S. woodi* may have a wider habitat preference. Unless there is a good reason to assume otherwise, specimens collected over soft sediment are assumed to be *S. woodi*, although the possibility of cryptic species ought to be borne in mind when interpreting results.

Nine specimens were sequenced by Blumer et al. (2025). Three specimens were collected from trawls in shallow water off Makanjila (fig. 474.2-3). Voucher specimens are available for all. There are 6 more problematic sequences. Specimen 2014-116 (Fig. 474.4) was collected from Cape Maclear, an area of mixed rocky and soft-sediment habitats. It was initially identified as *S. pleurospilus*, a poorly known species (see MS467). The photograph shows a rather battered specimen with an unusually large midlateral spot, but the head and jaw shape and body depth fit well with *S. woodi* or *S. melanchros*. No voucher specimen has been found. It is provisionally assigned to *S. woodi*. A further 5 specimens were collected in 2017: 3 juveniles from beach seines at Palm Beach- a muddy area in the far south of the lake (D17-J04-J05; D19-J08) and 2 mature males from pair trawl catches landed at Malembo in the SW Arm (D24-D10-E01). There are no voucher specimens for any of these and no photo for D19-J08 (beach seine, Palm Beach, 24 Jan 2017). Looking at the photographs of the other four (fig. 474.5), there is no obvious morphological difference between these and the more definite *S. woodi* from the 2016 collection. *Stigmatochromis woodi* is piscivorous species found in a variety of habitats in relatively shallow water. Sequence analysis places all specimens in a single subclade within a broader clade including other *Stigmatochromis,* barred *Sciaenochromis* species, *Otopharynx brooksi* and *Protomelas* sp. 'snoeksi'. There is some indication of differentiation between the Makanjila 2016 specimens and the more southern 2017 specimens, with the Cape Maclear specimen intermediate.

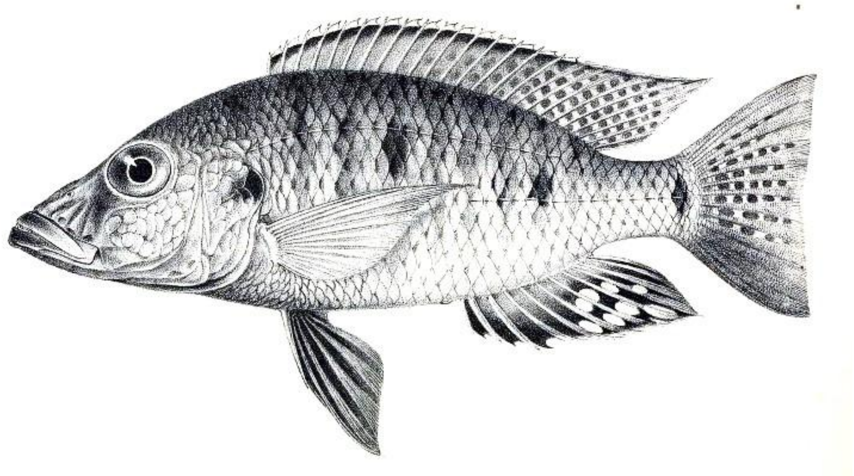


Fig. 474.1: Drawing of lectotype *of Stigmatochromis woodi* from Regan 1922.

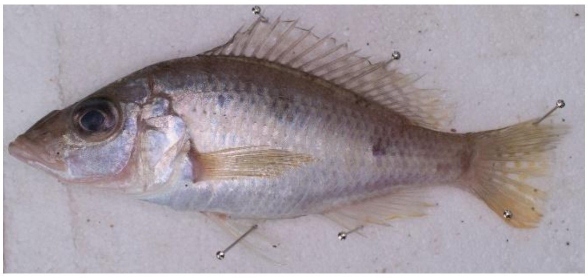
Fig 474.2: *Stigmatochromis woodi*, D12-E03, UCZM 2016.41.47;
trawled from 20m depth off Makanjila, 2 March 2016

D12-E01, UCZM 2016.41.45

D12-E02, UCZM 2016.41.71

Fig. 474.3: *Stigmatochromis woodi*, trawled from 20m depth off Makanjila, 2 March 2016

Fig. 474.4: 2014.116, *Stigmatochromis cf. woodi* Cape Maclear, 9 Sept 2014



D17-J04, Palm Beach SE Arm, 22 Jan 2017

D17-J05, Palm Beach SE Arm, 22 Jan 2017

D24-D10, pair trawl landed at Malembo, SW Arm, 31 Jan 2017

D24-E01, pair trawl landed at Malembo, SW Arm, 31 Jan 2017

Figure 474.5: Four specimens collected in 2017 include 2 adult males showing elements of breeding dress. These are provisionally assigned to *S. woodi*.

MC474. *Taeniochromis holotaenia* (Regan 1922)

Taeniochromis holotaenia was described from a single specimen by Regan (1922) as *Haplochromis holotaenia*, but was moved into the monotypic *Taeniochromis* by Eccles & Trewavas (1989). The species (and genus) is distinguished by the presence of a prominent horizontal stripe which is continuous from the eye to the caudal peduncle, usually along with a stripe between the eyes across the snout (fig. 474.1). It is a slender species with a large mouth and closely-packed unicuspid teeth. A specimen was sequenced, from a tissue sample collected from Mozambique in 2014 by M.J. Genner, but there is no associated photograph or voucher specimen. However, it is such a distinctive species, it seems unlikely that it could have been confused with anything else. Notwithstanding, it would be good to get a sequence from another specimen (e.g. D14-G04, which has photo, voucher specimen and accurate collecting information, fig 474.2). This species is reportedly a piscivore, often pack-hunting in shallow sandy areas, and attains a length of 22cm (Konings 2016). Phylogenetic analysis indicates that it is the sister species to the clade containing *Sciaenochromis benthicola* and *Mylochromis spilostichus*, predators of generally similar size and shape, but with very different melanin patterns and depth preferences (Blumer et al. 2025).

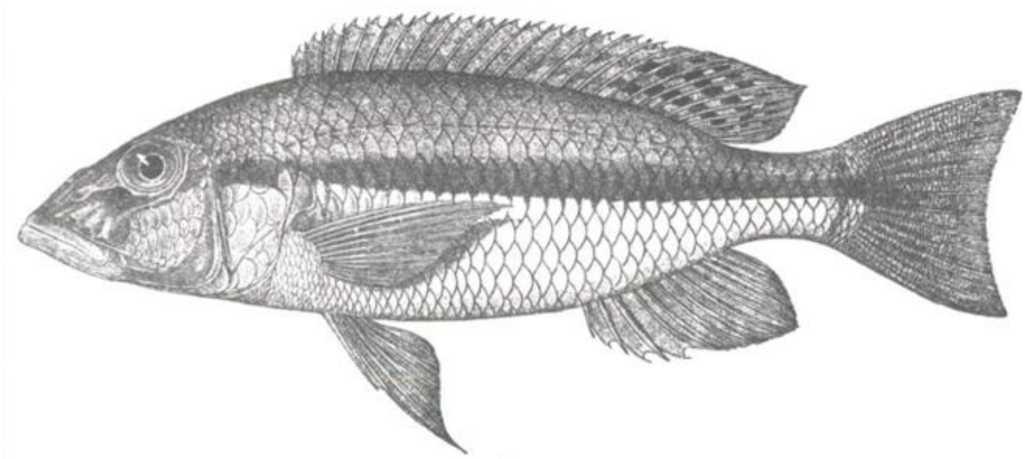


Fig: 474.1: Type of *Taeniochromis holotaenia*, from Eccles & Trewavas (1989)

Fig. 474.2: *Taeniochromis holotaenia*, D14-G04, UCZM 2016.45.29, collected from trawl at 19-22m depth, off Malembo, SW Arm, 4th March 2016, not sequenced [HS].

Taeniolethrinops Eccles & Trewavas 1989. MC475-483.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis praeorbitalis* Regan 1922.

Contained valid species (6): *Taeniolethrinops cyrtonotus; Taeniolethrinops fasciatus; Taeniolethrinops furcicauda; Taeniolethrinops laticeps; Taeniolethrinops macrorhynchus; Taeniolethrinops praeorbitalis*

Proposed undescribed taxa (4): *Taeniolethrinops* sp. 'furcicauda liuli'; *Taeniolethrinops* sp. 'furcicauda ntekete'; *Taeniolethrinops* sp. 'furcicauda yellow'.

Taxa considered invalid:

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Medium sized cichlids attaining from about 90 to 250 mm SL. Characterised by an oblique dark band from nape to caudal base and by the dentition. The teeth in the lower jaw are in 3 to five 5 series, the outer bicuspid anteriorly and unicuspid posteriorly, the outer series curving inwards posteriorly and ending with the inner. Caudal densely scaly." Note that (i) this diagnosis does not seem to exclude *Tramitichromis brevis* and (ii) some of the species don't actually have an oblique stripe, probably including the type species, *T. praeorbitalis*. However, the genus as currently defined is one of the few among Malawi cichlids that seems to be a clade.

Field Diagnosis: Big deep-bodied species with long snouts and mouths low on heads. Tend to have an oblique stripe and/or orange-yellow lower fins.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group and form a clade which is sister to the *Tramitichromis*/shallow *Lethrinops* clade.

Ecomorphological notes: *Taeniolethrinops* feed on invertebrates winnowed from sediment.

MC475. *Taeniolethrinops cyrtonotus* Trewavas 1931.

Taeniolethrinops cyrtonotus was described (as *Lethrinops*) from a single specimen in 1931 from an unknown location within Lake Malawi. The specimen had a noticeably arched back, leading to some suggestions that it was a deformed individual of some other species (fig. 475.1). However, Ngatunga (2001) in an unpublished thesis report 4 additional specimens from Kande in Malawi and Lukoma Bay in Tanzania, collected in 1997-98, in very shallow water (Fig. 475.2). They could be distinguished from similar species by their high gillraker counts (12-13 v 8-11 in *T. furcicauda*) and short snout (v *T. praeorbitalis* and *T. laticeps*). However, Ngatunga's specimens were collected as part of the SADC/GEF project, and many of the specimens collected in that project were intended to be archived in the collections of the three countries in which the lake lies (as well as Belgium and South Africa). Unfortunately, none of these have a national Natural History Museum collection and there are still no accessible records of the specimens, if indeed they remain. The consignment intended for Mozambique was apparently lost. There is also a record of a specimen at SAIAB collected in Mozambique in 1999, perhaps from this project. The largest known specimen is 165.5mm SL. A large adult male possibly of this species, was collected off Ngara in a shallow water trawl in 2023. It had an arched back and curved stripe, but rather a long snout. Unfortunately, the specimen was not kept (fig 475.3). Very little is known of this species and it has not yet been sequenced.

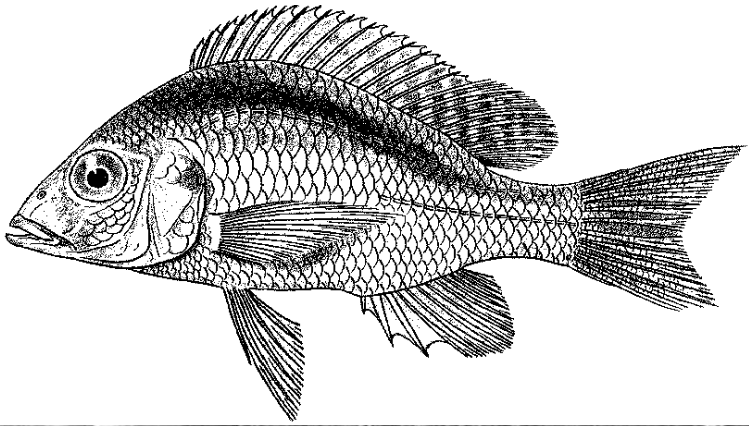


Fig. 475.1: *Taeniolethrinops cyrtonotus,* holotype.

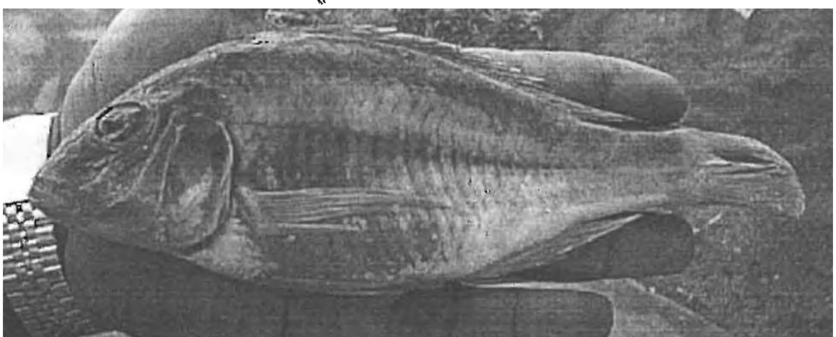


Fig. 475.2: *Taeniolethrinops cyrtonotus,* from Ngatunga 2001.

Fig. 475.3: *Taeniolethrinops cf. cyrtonotus,* trawled from shallow water off Ngara 2023 [GFT].

MC476. *Taeniolethrinops fasciatus* (Ahl 1927)

Taeniolethrinops fasciatus was described by Ahl in 1927 (as *Lethrinops*) from 8 specimens collected at Langenburg (near Matema), Tanzania by Fülleborn in 1897. The species was synonymized with *T. praeorbitalis* by Trewavas in 1931 and has apparently not been re-examined since. The original description did not include an illustration, but the description of the colour makes no mention of an oblique stripe, nor indeed of orange fins, but mentions 10-11 faint vertical bars on the flanks as well as transverse bands on the dorsal and caudal fins (perhaps rows of spots?). The species is described as having a snout that is longer than the postorbital part of the head. A specimen sequenced by Blumer et al (2025) has a long snout, and has faint vertical bars, no oblique stripe and no orange or yellow colour. It has rows of spots forming transverse bands in the dorsal and caudal fins. It is from Ngara in the far north of the lake (Fig. 476.1). This might be a good fit for *T. fasciatus*, suggesting that this might not, after all, be conspecific with *T.praeorbitalis*. On a recent trawl survey, similar phenotypes were observed from trawls near Chilumba, again in the far north of the lake (Fig. 476.2-3), suggesting this is a consistent phenotype. Sequence analysis did not cluster this specimen (labelled *T. praeorbitalis* N in Blumer et al.) with southern *T. praeorbitalis,* again supporting the idea that *T. fasciatus* might well be a distinct species. Ahl's type material should be rexamined.

Fig. 476.1: *Taeniolethrinops cf. fasciatus* D07-D09, UCZM 2016.32.53; Ngara Beach Seine, 25th Feb 2016 [HS]

Fig. 476.2: *Taeniolethrinops cf. fasciatus* trawled from 12-31m depth off Chilumba, 1 Nov 2023 [GFT]

Fig. 476.3: *Taeniolethrinops cf. fasciatus* male trawled from 12-31m depth off Chilumba, 1 Nov 2023 [GFT]

***Taeniolethrinops fasciatus*, UCZM 2016.32.53 (D07-D09)**

	mm	%SL		mm	%HL
Standard Length (SL)	115.7		Head Width	17.2	30.7
Body Depth	42.4	36.6	Interorbital Width	10.2	18.2
Head Length (HL)	43.4	37.5	Snout Length	20.3	36.3
Caudal Peduncle Length (CPL)	20.7	17.9	Preorbital Depth	16.3	29.1
Caudal Peduncle Depth (CPD)	14.8	12.8	Eye Diameter	9.7	17.3
			Premaxillary Pedicel	14.6	26.1
CPL/CPD		1.40	Cheek Depth	14.9	26.6
			Lower Jaw Length	17.2	30.7

Gill rakers long pointed, with wide lateral flanges, 4/1/9. Lower Jaw outer teeth closely-packed, erect, equally bicuspid, blunt, recurved at tips. Inner teeth in 4 series, small, simple, recurved, pointed. Dorsal XVI, 11; Anal III, 9; Longitudinal scales 33, caudal densely scaled, 3 rows of cheek scales.

MC477. *Taeniolethrinops furcicauda* Trewavas 1931

Taeniolethrinops furcicauda (Trewavas 1931: described as *Lethrinops*, from 19 specimens) is readily distinguished from all the other described species of the genus by its relatively shorter snout. It has a strong oblique stripe, mentioned in the original description and illustrated in Eccles & Trewavas's 1989 redescription (Fig. 477.1). This oblique stripe is seen also in other specimens from the northern part of the lake (Fig. 477.3). All but one of the syntypes was collected in the north (Mwaya, Karonga, Kaporo), with the single southern specimen not showing a strong oblique stripe (Fig. 483.3). This probably represents a distinct species. No lectotype appears to have been designated, but the specimen shown in Fig. 477.2 is probably the one figured by Eccles & Trewavas (1989), and it shows a clear oblique stripe. As with *T. praeorbitalis*, specimens collected in the southern part of the lake consistently lack the oblique stripe and show a strong yellow ventral colour (Turner 1996). Provisionally we consider them to be an undescribed species, *T. sp.* 'furcicauda yellow' (MC483). A tissue sample was obtained from a specimen (coded simply as #25) collected off Metangula, Mozambique, by M.J.Genner. No voucher specimen or photograph are available, but a specimen photographed there by Turner in 1999 had a strong oblique stripe (fig. 477.3). The sequence analysed by Blumer et al. (2025) does not cluster with the southern 'furcicauda yellow' specimens but with the strongly striped *T. laticeps* and *T. macrorhynchus* specimens. It may be that this is indeed *T. furcicauda*, but it would be desirable to confirm this by analysing a sequence of a better documented specimen.

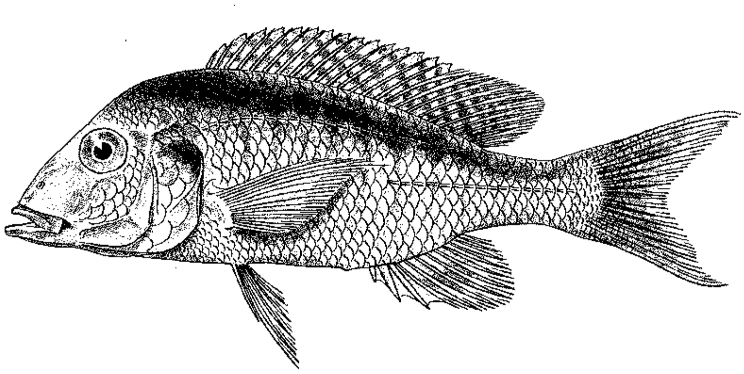


Fig. 477.1: *Taeniolethrinops furcicauda*, syntype, drawn by Fasken and printed in Eccles & Trewavas 1989

Fig. 477.2: *Taeniolethrinops furcicauda*, syntype BMNH 1930.1.31.210, collected from Mwaya, Tanzania, London 477. History Museum 2023 [GFT]

Fig. 477.3: *Taeniolethrinops furcicauda*, trawled off Metangula, 1999, not sequenced [GFT]

MC478. *Taeniolethrinops laticeps* Trewavas 1931.

Taeniolethrinops laticeps was described by Trewavas (1931) as *Lethrinops laticeps* from 13 specimens, 2 from the south, but the rest from the far north of the lake (fig. 478.1-2). It was stated to have a relatively broader head than *T. praeorbitalis*. Recalculating as percentages, Trewavas's key distinguished *T.laticeps* as having a Head Width of 42.9-45.4% Head Length v 37.5-42.9% in *T. praeorbitalis*. This comparison is of course influenced both by Snout Length and Head Width. There also isn't any daylight between the measures, suggesting it might be an arbitrary cut off! Furthermore, the presence or absence of dark oblique band is not considered diagnostic, with some specimens of *T. praeorbitalis* showing this marking and some not. Trewavas also noted that the two species differed in their modal counts of lower gill rakers and dorsal spines, although the ranges overlapped. Things were further confused by the inclusion of *T. macrorhynchus* (known only from the type, which has a strong oblique stripe) within *T. praeorbitalis*. A key by Eccles & Trewavas (1989) also used head width/ head length as a diagnostic feature, but additionally gave figures for praeorbital depth in head length and interorbital width in head length. Both of these ratios were substantially overlapping and in any case both again may simply reflect head width and snout length. Full redescriptions are not presented, nor are lists of material examined, indicating that essentially these species have probably not been re-examined since 1931. Furthermore, Eccles & Trewavas suggest that *T. laticeps* may not in fact be distinct from *T. praeorbitalis*. Further work is clearly needed, on the basis of field work and study of photographs, it appears that there is a broad-headed species with a strong oblique band and white pelvic and anal fins that can be identified with the types of *T. laticeps* (fig. 478.3-4), which is distinct from three more narrow headed forms, one with yellowish pelvic and anal fins (*T. praeorbitalis*), one with white pelvic and anal fins and faint vertical bars (provisionally, *T. fasciatus*) and one with a strong oblique stripe and yellowish fins (provisionally, *T. macrorhynchus*). The situation is somewhat complicated by the possibility that the type of *T. macrorhynchus* may in fact be conspecific with *T. laticeps,* which might then be a junior synonym. A single small specimen from Nkhata Bay has been sequenced by Blumer et al. (2025). Based on its heavy head and white fins, with a hint of an oblique stripe, it may be *T. laticeps* or perhaps a juvenile T. *furcicauda* (fig. 478.5). An underwater photo of *T. laticeps* was taken at the same site on the day before collection of the specimen (fig. 478.6), supporting the ID. It would be desirable to sequence more clear-cut specimens. The sequence clusters in the *Taeniolethrinops* clade.

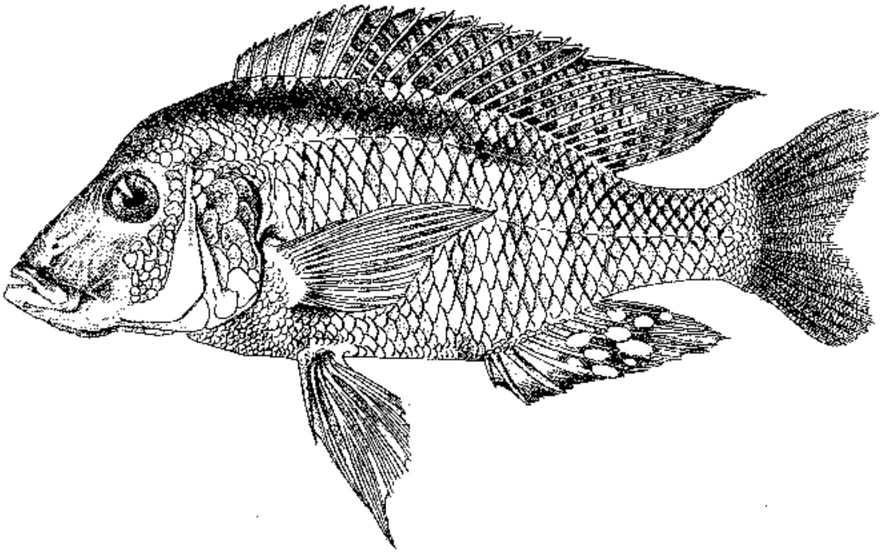


Fig. 478.1: *Taeniolethrinops laticep*s, apparent mature male from Eccles & Trewavas (1989). Specimen unknown, presumably one of the syntypes.

Fig. 478.2: One of the syntypes of *Taeniolethrinops laticeps* (BMNH 1930.1.31.222), from Deep Bay (Chilumba) in London Natural History Museum, 2023 [GFT].

Fig. 478.3: *Taeniolethrinops laticeps,* 2010.A6, collected from trawl at 58-71m, SE Arm, -13 590, 35 037, 18-Nov-10, not sequenced but tissue sample available [GFT].

Fig. 478.4: *Taeniolethrinops laticeps,* collected from trawl at 46-50m depth, SE Arm, Chirombo-Nkhudzi, 29-Jul-91, not sequenced [GFT].

Fig. 478.5: *Taeniolethrinops cf. laticeps*, D01-C06, UCZM 2016.16.43; Nkhata Bay, SCUBA, 20 Feb 2016 [HS]

Fig. 478.6: *Taeniolethrinops laticeps*, Nkhata Bay, SCUBA, 190 Feb 2016 [HS]

MC379. *Taeniolethrinops macrorhynchus* Regan 1922

Taeniolethrinops macrorhynchus was described (as *Lethrinops*) by Regan in 1922 from a single specimen collected by Whyte (presented by Johnson), from the north of the lake (Kondowe to Karonga). No illustration was provided and the species was synonymized with *T. praeorbitalis* by later workers (Trewavas 1931, Eccles & Trewavas 1989). The type has a long snout, distinguishing it from *T. furcicauda* and strong oblique band, differing from *T. praeorbitalis* (Fig. 379.1). After examination of the type, Turner (1996) proposed that the species was distinct from *T. praeorbitalis* and maybe should used for individuals with a long snout and slender (like *T. praeorbitalis*) but a strong oblique stripe (like *T. laticeps*), based on some small preserved individuals found in the Monkey Bay Fisheries Research Unit field collection, collected at Nkhata Bay. Konings (2016) picked this up and used *T. macrorhynchus* for a number of underwater photographs, but it may be that these could be *T. laticeps* (Fig. 379.2). A difficulty is that type of *T. macrorhynchus* has been cut in half, making it difficult to carry out a full range of measurements (fig. 379.1). But it might well be conspecific with *T. laticeps* (which would then be a junior synonym). Two specimens collected in 2016 were sequenced by Blumer et al. (2025). These correspond well to T. macrorhynchus sensu Turner (1996), having long snouts, slender heads and strong oblique bands (fig. 379.3-4). Interestingly, they both have orange pelvic and anal fins. Phylogenetically, these cluster with the *Taeniolethrinops* clade, but not with *T. praeorbitalis*, although they are close to the possible *T. laticeps* specimen. There are also two sequences from tissues collected in Mozambique by M.J. Genner, but there are no photographs or voucher specimens to accompany these, and given the difficulties with identification in this group, it is not clear whether these are suitable for publication.

Fig. 379.1: Type of *Taeniolethrinops macrorhynchus* in 2023 [GFT]

Fig. 379.2: Konings' illustration of a female *T. macrorhynchus* looks very much like *T. laticeps*, although quite similar to the type [AK].

Fig. 379.3: *Taeniolethrinops macrorhynchus* D06-G10, UCZM 2016.28.16; Chiweta Beach Seine, 24th Feb 2016 [HS]

Fig. 379.4: *Taeniolethrinops macrorhynchus*, D08-C01, UCZM 2016.35.57; Chiofu, SCUBA, 28 Feb 2016 [HS]

***Taeniolethrinops macrorhynchus*, UCZM 2016.28.16 (D06-G10)**

	mm	%SL		mm	%HL
Standard Length (SL)	144.9		Head Width	22.3	39.8
Body Depth	49.8	34.4	Interorbital Width	14.3	25.5
Head Length (HL)	56	38.6	Snout Length	26.8	47.9
Caudal Peduncle Length (CPL)	23.2	16.0	Preorbital Depth	19.8	35.4
Caudal Peduncle Depth (CPD)	16.7	11.5	Eye Diameter	12.6	22.5
			Premaxillary Pedicel	17.8	31.8
CPL/CPD		1.39	Cheek Depth	19.2	34.3
			Lower Jaw Length	22.5	40.2

Gill rakers long pointed, with wide lateral flanges, 4/1/11. Lower Jaw outer teeth well spaced, strongly unequally bicuspid, recurved, sharply pointed. Inner teeth in 4 series, small, simple, recurved, pointed. Dorsal XVI, 11; Anal III, 10; Longitudinal scales 34, caudal densely scaled, 3 rows of cheek scales.

MC480. *Taeniolethrinops praeorbitalis* (Regan 1922)

Taeniolethrinops praeorbitalis was described (as *Haplochromis*) by Regan (1922) from two specimens collected by Wood, probably in Domira Bay. Regan gave an illustration of an apparent mature male (fig. 239). Although later descriptions mention an oblique stripe and indeed this is taken as one of the defining characteristics of the genus by Eccles & Trewavas (1989), there is no trace of it on the drawing of the type, it is not mentioned in Regan's description and there is no sign of this marking on the second type specimen, which is an apparent female. The addition of strongly stripe specimens into the concept of this species appears to have occurred during a revision of the species by Trewavas, with the addition of non-type material from the Christy collection. These might well be referable to *T. macrorhynchus* sensu Turner (1996), which do not cluster with the unstriped *T. praeorbitalis* in phylogenetic analysis of sequences by Blumer et al. (2025), supporting their distinctness.

Our two sequenced specimens from the south of the lake likewise show no oblique stripe, but are generally brownish with strong orange-yellow on the snout and ventral areas, conforming well to the usual phenotype of this species in the south of the lake (Turner 1996). The species lives of soft-bottomed habitats to depths of around 32m and plunges its snout into the substrate- stomach contents mainly contain chironomids (Turner 1996).

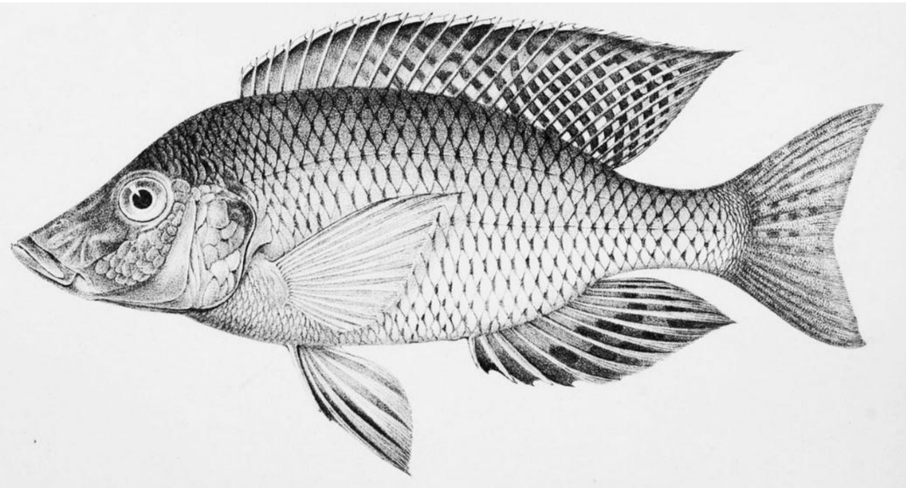


Fig. 480.1: Drawing of a syntype (apparent male) of *Taeniolethrinops praeorbitalis* from Regan 1922.

Fig. 480.2: The second syntype of *Taeniolethrinops praeorbitalis*, an apparent female, London Natural History Museum, in 2023 [GFT].

Fig. 241: *Taeniolethrinops praeorbitalis*, D12-F02, UCZM 2016.41.59; trawled from 20m depth off Makanjila, SE Arm, 2 March 2016 [HS]

Fig. 242: *Taeniolethrinops praeorbitalis*, 2014.31, no voucher, Upper Shire River, Mangochi 29 August 2014 [MJG]

***Taeniolethrinops praeorbitalis*, UCZM 2016.41.59 (D12-F02)**

	mm	%SL		mm	%HL
Standard Length (SL)	139.7		Head Width	21.8	40.8
Body Depth	53.4	38.2	Interorbital Width	12.9	24.2
Head Length (HL)	53.4	38.2	Snout Length	24.7	46.3
Caudal Peduncle Length (CPL)	23.4	16.8	Preorbital Depth	20.6	38.6
Caudal Peduncle Depth (CPD)	17.1	12.2	Eye Diameter	13.1	24.5
			Premaxillary Pedicel	17	31.8
CPL/CPD		1.37	Cheek Depth	19.2	36.0
			Lower Jaw Length	19.8	37.1

Gill rakers large, widely spaced, 4/1/8. Lower Jaw outer teeth well spaced, moderately unequally bicuspid, recurved, moderately sharply pointed. Inner teeth in 3 series, small, simple, recurved, pointed. Dorsal XIV, 11; Anal III, 9; Longitudinal scales 33, caudal densely scaled, 4 rows of cheek scales.

MC481. *Taeniolethrinops* sp. 'furcicauda liuli'; MC482. *Taeniolethrinops* sp. 'furcicauda ntekete'

These taxa, known only from underwater photos by Konings (2016) have not been sequenced. It is not clear whether or not they are *Taeniolethrinops.*

MC483. *Taeniolethrinops sp.* 'furcicauda yellow'

Taeniolethrinops sp. ' furcicauda yellow' is a short-snouted species similar to *T. furcicauda* (MC477), but it does not show a strong oblique bar prominent in the type of that species. The pelvic fins and at least part of the anal fin are bright yellow-orange, as is the lower part of the head and snout. The contrast is analogous to *T. praeorbitalis* v *T. laticeps* and *T. macrorhynchus*. Turner (1996) recorded the yellow-bellied species that was common in southern trawl catches as *T. furcicauda*, as was customary at the Monkey Bay Fisheries Research Unit at the time, probably following the identification of D.H. Eccles. It now appears that these are distinct species. Most of the syntypes of *Taeniolethrinops furcicauda* were collected in the north, but the one southern specimen does not show a strong oblique stripe (Fig 483.1). Assuming a lectotype is selected from the northern specimens (MC477), the southern yellow form would be an undescribed species, here referred to as *T.* 'furcicauda yellow'. Two specimens sequenced by Blumer et al. (Figs 483.2-3) came from the south of the lake, trawled in shallow water off Makanjila and Malembo. There were recorded as *T.* furcicauda Y in the main tree. or T. furcicauda-yellow in the supporting database. Turner (1996) reports the species to be common in trawls shallower than 32m, and occasionally taken as deep as 55m. Stomach contents mainly contained chironomids and copepods with some other insect larvae, small bivalves, sand and detritus (Turner 1996). Phylogenetically, the species clusters in the *Taeniolethrinops* clade within the shallow benthic. It is sister to *T. praeorbitalis* and not to the specimen labelled *T. furcicauda* from Metangula.

Fig. 483.1: *Taeniolethrinops* sp. 'furcidauda yellow', syntype of *Lethinops furcicauda*, BMNH 1930.1.31.211, collected from east side of SE Arm, London Natural History Museum 2023 [GFT]

Fig. 483.2: *Taeniolethrinops* sp. 'furcicauda yellow' D12-F04, UCZM 2016.41.52; trawled from 20m depth off Makanjila, SE Arm, 2 March 2016 [HS].

Fig.483.3: *Taeniolethrinops* sp. 'furcicauda yellow' D14-I01, UCZM 2016.45.34 trawled from 20m depth off Malembo, SW Arm, 4 March 2016 [HS]

Tramitichromis Eccles & Trewavas 1989. MC484-501.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Tilapia brevis* Boulenger 1908.

Contained valid species (5): *Tramitichromis brevis; Tramitichromis intermedius; Tramitichromis lituris; Tramitichromis trilineatus; Tramitichromis variabilis*

Proposed undescribed taxa (13): *Tramitichromis* sp. 'brevis magunga'; *Tramitichromis* sp. 'brevis two'; *Tramitichromis* sp. 'chembe circle'; *Tramitichromis* sp. 'chembe shallow'; *Tramitichromis* sp. 'east-coast shallow'; *Tramitichromis* sp. 'false lituris'; *Tramitichromis* sp. 'kande'; *Tramitichromis* sp. 'lituris yellow'; *Tramitichromis* sp. 'maculae'; *Tramitichromis* sp. 'mvunguti'; *Tramitichromis* sp. 'red gular'; *Tramitichromis* sp. 'trilineatus plain'; *Tramitichromis* sp. 'variabilis likoma'

Taxa considered invalid:

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Haplochromines endemic to Lake Malawi and resembling *Lethrinops* in the dentition of the lower jaw, with the outermost row of teeth curving round the posterior ends of the inner rows. Lower pharyngeal bone with 3 or more rows of teeth extending to the anterior end of the toothed area, which is rounded (c.f. only two rows and an acute apex to the toothed area in other genera) and with the axis of the anterior blade steeply inclined ventrally. Pharyngeal either bicuspid (as in other genera) or unicuspid with the blunt tips of the anterior teeth turned backwards (Trewavas, 1931, fig 4; Figs. 150 and 151). Gill rakers few, 5 to 10 on lower part of first arch, the first very short and thick."

Field Diagnosis: Small shallow-water *Lethrinops*-type fishes with weak jaws low on head and a steep head profile, usually with a strong kink above the eye (a bit like *Tropheops* species). Very few lower gillrakers. Males are very colourful. Females tend not to show vertical barring.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group and form a clade along with shallow *Lethrinops* species, which is sister to the *Taeniolethrinops* clade.

Ecomorphological notes: *Tramitichromis* feed by winnowing the sediment for small invertebrates and other edible material.

MC484. *Tramitichromis brevis* (Boulenger 1908)

Tramitichromis brevis was described (as *Tilapia*) by Boulenger in 1908 from two syntypes and then moved to *Haplochromis* by Regan (1922), *Lethrinops* by Trewavas (1931) and to *Tramitichromis* by Eccles & Trewavas (1989). With its stocky build, steep head profile and strong oblique band, it can only be confused with some of the species of *Mylochromis*, (plus a couple of undescribed species named after it) but it has very few lower gillrakers (7-8), the first very short and thick, a pharyngeal bone with very fine teeth and a sharply downturned blade and *Lethrinops*-type oral jaw dentition, with the outer series curving inwards behind the inner series posteriorly. Ngatunga (2000) reported a similar species (*T.* 'brevis 2') with smaller eyes, longer jaws and a less prominent oblique stripe. Konings reports an apparently identical form *T.* sp. 'brevis magunga' from a single site in Tanzania which produces a different bower form. The specimens sequenced by Blumer et al. (2025) were not from this location and nothing is known of their bowers, and they have large eyes and strong oblique stripes (fig. 484.2). *Tramitichromis brevis* is said to inhabit shallow areas where mud is interspersed with rocks and both the Blumer specimens were caught on rocky coasts. It seems to sift sediments for small invertebrates, such as chironomids (Eccles & Trewavas 1989; Konings 2016).

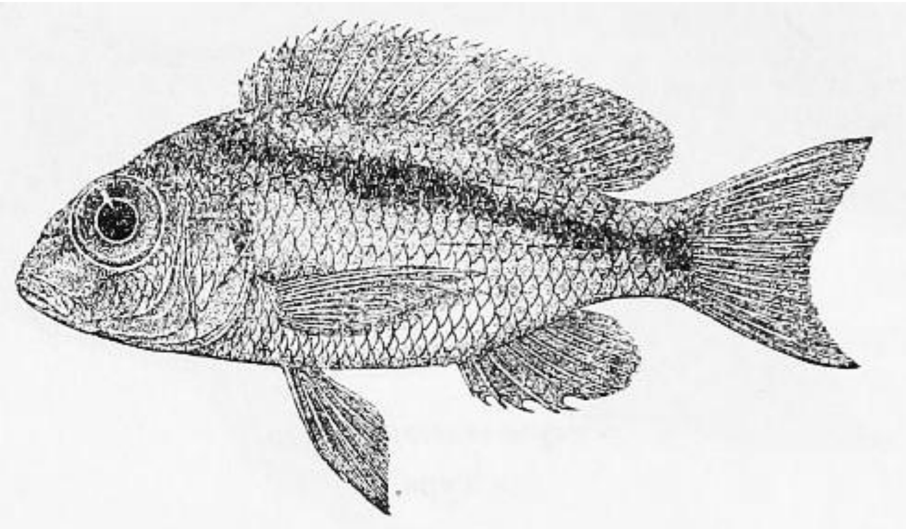


Fig. 484.1: Drawing of a type specimen of *Tramitichromis brevis* in Boulenger 1915.

D01-C01, UCZM 2016.16.23; Nkhata Bay, SCUBA, 20 Feb 2016

D07-H03, UCZM 2016.33.3; Chiofu, SCUBA, 27 Feb 2016

Fig. 484.2: Both sequenced specimens of *Tramitichromis brevis* conform to the typical phenotype of this species.

MC484. *Tramitichromis intermedius* (Trewavas 1935)

Described as *Lethrinops intermedia* from 6 specimens in 1935 by Trewavas, this species was reclassed as *Tramitichromis intermedius* by Eccles & Trewavas in 1989, who suggested that one of the specimens was actually a different species (having a wider tooth band and *Haplochromis*-style dentition). The snout is less decurved than other *Tramitichromis* species, and the lower pharyngeal bone has a few slightly enlarged medial posterior teeth, but it has characteristic *Lethrinops*-type oral jaw dentition, a decurved pharyngeal tooth blade and 8-10 short wide gillrakers. Females and immatures are generally greyish with 3 flank spots, but these are obscured in mature males. Our sequence comes from a mature male in which the midlateral spot is faintly visible. Unfortunately, no voucher specimen has been located. The species is said to frequent shallow areas of sediment-covered sand in muddy bays, where it feeds on small benthic invertebrates.

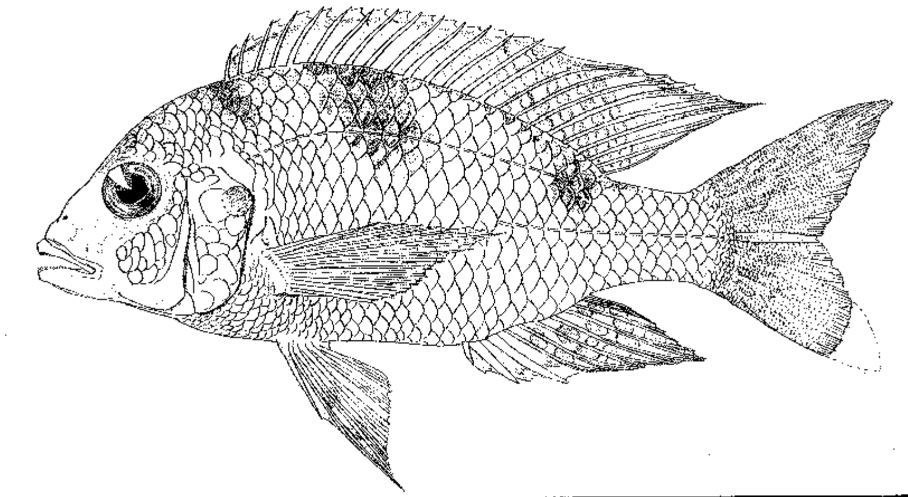


Fig. 484.1: Drawing of the lectotype of *Tramitichromis intermedius* from Eccles & Trewavas 1989.

Fig. 484.2: Male *Tramitichromis intermedius* underwater [AK].

Fig. 484.3. *Tramitochromis intermedius*, D21-F02, Malembo, SW Arm 25 Jan 2017 [HS].

MC486. *Tramitichromis lituris*; MC487. *Tramitichromis* sp. 'brevis magunga'; MC488. *Tramitichromis* sp. 'brevis two'; MC489. *Tramitichromis* sp. 'chembe circle'; MC490. *Tramitichromis* sp. 'chembe shallow';

Not yet sequenced.

MC491. *Tramitichromis sp.* ‘east coast shallow’

Tramitichromis sp. ‘east coast shallow’ has been identified by Konings (2016 and earlier), but remains undescribed (Fig. 491.1). In the absence of preserved specimens, it is not clear that it actually possesses the morphological features that distinguish *Tramitichromis* species from those of *Lethrinops*, but the general appearance seems to fit. Konings found males defending bowers at depths of around 1-2m off Liwani, just south of the Nsinje River. Two specimens sequenced by Blumer et al. (2025) were mature males collected from Chiofu Bay, just north of the Nsinje River, by SCUBA and snorkel- the latter suggesting a preference for breeding in the shallows. The locality and breeding depth would suggest they are conspecific with ‘east coast shallow’, as does the male colour, slender body and rather acute snout (fig. 491.2-3). This species is presumed to be a shallow-water sediment sifter, feeding on benthic invertebrates.

Fig. 491.1: *Tramitichromis sp.* ‘east-coast shallow’ male, underwater at Liwani [AK]

Fig. 491.2: *Tramitichromis sp.* ‘east-coast shallow’ D08-C09, UCZM 2016.35.35; Chiofu, SCUBA 28 Feb 2016 [HS]

Fig. 491.3: *Tramitichromis sp.* ‘east coast shallow’ D10-F08, UCZM 2016.38.6; Chiofu, snorkelling 29 Feb 2016 [HS]

MC492. *Tramitichromis* sp. 'false lituris';

Not yet sequenced

MC493. *Tramitichromis sp.* 'Kande'

Tramitichromis sp. 'Kande' has been identified by Konings (2016 and earlier), but remains undescribed (fig. 493.1). In the absence of preserved specimens, it is not clear that it actually possesses the morphological features that distinguish *Tramitichromis* species from those of *Lethrinops*, but the general appearance seems to fit. Konings found males defending bowers at depths of around 8m off Kande Island, and stated that the distinct gold-orange patch was characteristic. A specimen sequenced specimen from Nkhata Bay conforms well to Konings' photo (fig. 493.2). The photo of the 2012 specimen from the Grant's facility is harder to identify with certainty, with no information on collecting locality, no voucher specimen and a photo with the fins closed, but certainly it looks superficially similar and it clusters with the Nkhata Bay specimen (fig. 493.3). This species is presumed to be a shallow-water sediment sifter, feeding on benthic invertebrates.

Fig. 493.1: Male *Tramitichromis sp.* 'Kande' photographed underwater [AK].

Fig. 493.2: *Tramitichromis sp*. 'Kande', D01-G10, 2016.18.2; Nkhata Bay, SCUBA, 20 Feb 2016 [HS]

Fig 493.3: *Tramitichromis sp.* 'Kande' 2012.435; SM Grant facility, 23 Sept 2012 [MJG]

MC494. *Tramitichromis* sp. 'lituris yellow'; MC495. *Tramitichromis* sp. 'maculae'; MC496. *Tramitichromis* sp. 'mvunguti';

Not yet sequenced

MC497. *Tramitichromis sp.* 'red gular'

Tramitichromis sp. 'red gular' has been identified by Konings (2016 and earlier), but remains undescribed (fig. 497.1). In the absence of preserved specimens, it is not clear that it actually possesses the morphological features that distinguish *Tramitichromis* species from those of *Lethrinops*, but the general appearance seems to fit. Konings found males defending bowers at depths of around 2-3m depth off Songwe Hill, in the SE Arm. Blumer et al. (2025) sequenced a mature male collected from Palm Beach, SE Arm in a seine net catch, so likely to have been in shallow water. Males had a relatively deep body and rounded head, as well as a pink-red throat and chest. The caudal fin markings with multiple blue and orange stripes on the upper and lower portions are also similar (fig. 497.2). This species is presumed to be a shallow-water sediment sifter, feeding on benthic invertebrates.

Fig. 497.1: *Tramitichromis sp.* 'red gular' at Songwe Hill, SE Arm {AK]

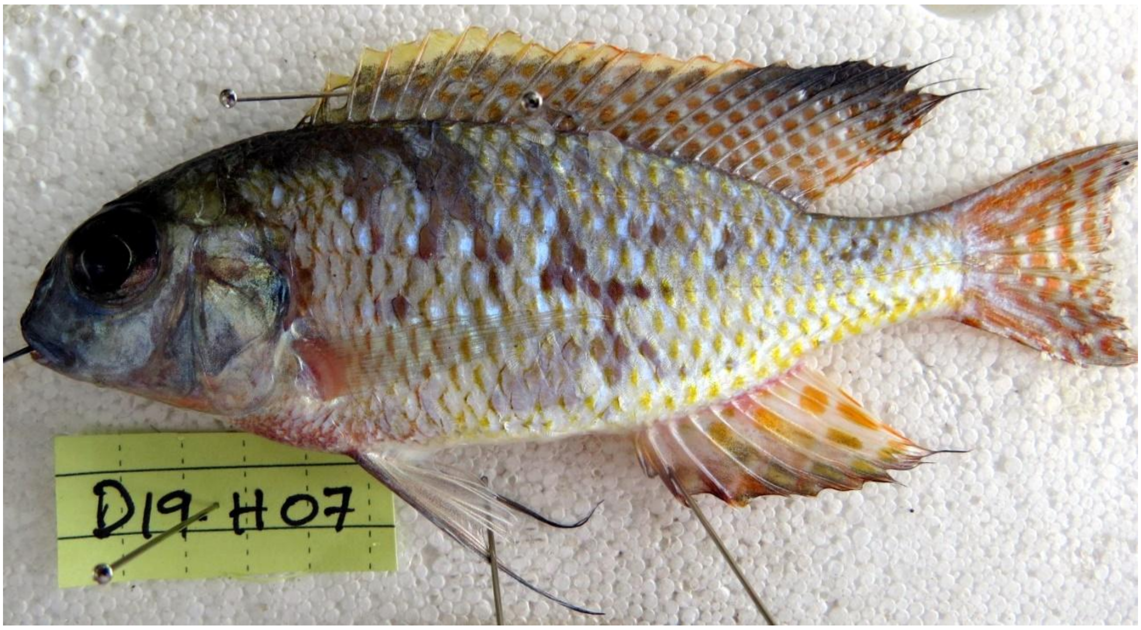


Fig. 497.2: *Tramitichromis* sp. 'red gular' D19-H07, no voucher specimens located; Palm Beach, SE Arm, 24 Jan 2017 [HS]

MC498. *Tramitichromis* sp. 'trilineatus plain'

A small plain coloured specimen was sequenced by Blumer et al. (2025). Based on superficial examination, it was provisionally assigned to *Lethrinops parvidens* (Fig. 498.1). Examination on the specimen showed a downward-angled blade, wide rows of anterior pharyngeal teeth, and few gillrakers (fig. 498.3). Overall, this was consistent with *Tramitichromis trilineatus*, but the specimen was lacking the conspicuous melanic markings characteristic of that species (fig. 498.2). It would be difficult to compare with any of the Konings species (underwater pictures of colourful males v morphological analysis of female/immature specimen). Phylogenetic analysis of the species shows it clusters with other *Tramitichromis* species.

Fig. 498.1: *Tramitichromis* sp. 'trilineatus plain', sequenced specimen D12-F07 UCZM 2016.41.12; trawled from 20m depth off Makanjila, SE Arm, 2 March 2016 [HS].

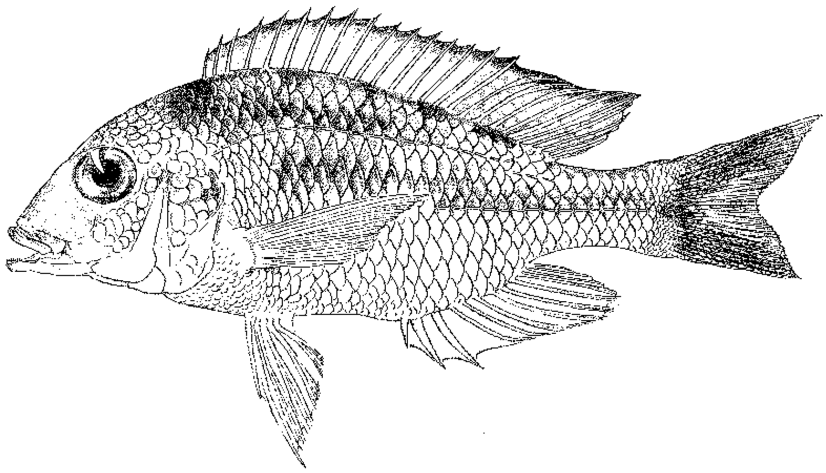


Fig. 498.2: *Tramitichromis trilineatus,* holotype, from Eccles & Trewavas (1989).

Fig. 498.3: Pharyngeal dentition of D12-F07 is consistent with that of *Tramitichromis trilineatus*. [GFT].

MC499. *Tramitichromis* sp. 'variabilis likoma'; MC500. *Tramitichromis trilineatus*; MC501. *Tramitichromis variabilis*

Not sequenced.

Trematocranus Trewavas 1935. MC502-506.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Trematocranus microstoma* Trewavas 1935.

Contained valid species (5): *Trematocranus brevirostris; Trematocranus labifer; Trematocranus microstoma; Trematocranus pachychilus; Trematocranus placodon.*

Proposed undescribed taxa:

Taxa considered invalid:

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Haplochromines endemic to Lake Malawi and of moderate size, attaining over 160 mm SL. Characterised by the melanin pattern, which consists of large suprapectoral and supraanal spots situated on the upper lateral line and extending to the base of the dorsal fin, together with an opercular spot and a spot at the end of the caudal peduncle. These are usually overlaid on fainter bars representing the vertical element of the plesiomorphic pattern. Mouth moderate, lower jaw 2.4 to nearly 3.0 in head length. Teeth in 4 to 8 series in lower jaw, the outer long and recurved, bicuspid or simple." This diagnosis does not really fit *T. brevirostris*, which Eccles & Trewavas placed in *Aulonocara*, but probably fits better in *Otopharynx*, although that genus is polyphyletic.

Field Diagnosis: Species with three spots, individually identified by the species.

Phylogenetic comments: All species sequenced to date belong to the shallow benthic group and form a clade along with shallow *Lethrinops* species, which is sister to the *Taeniolethrinops* clade.

Ecomorphological notes: *Trematocranus placodon* is a benthic-feeding molluscivore. Not much is known about the rest.

MC502. *Trematocranus brevirostris* Trewavas 1935

Trematocranus brevirostris was described by Trewavas in 1935 from 2 small individuals (57, 42mm SL) from the far south of the lake (fig. 502.1). It was later moved into the genus *Aulonocara* by Eccles & Trewavas (1989). Other workers have persisted with *Trematocranus* (Turner 1996, Konings 2016, Oliver 2018), but Dierickx et al. (2018) restricted *Trematocranus* to four larger species, but without decisively placing *T. brevirostris* elsewhere. It probably should be placed in *Otopharynx* under present definitions. The species has slightly enlarged cephalic lateral line pits: Eccles & Trewavas says they are enlarged on the pre-orbital, dentary and nasal bones, but only on the first of the infra-orbitals. They are not so enlarged as in other *Aulonocara.* It also three spots, a pattern not seen in any known *Aulonocara* species. However, the other *Trematocranus* species are all much larger, more heavily-built fish, when adult and have large spots, sometimes extending to the dorsal surface. There are a number of similar-looking small species placed in the genus *Otopharynx*, such as *O. panniculus*, but these generally have a single suprapectoral spot that is relatively elongated, covering around 3-4 scales. A single male specimen (fig. 502.2) has been sequenced, which was collected from the type locality (Palm Beach at the far southern tip of the lake) and which appears to have appropriate body shape markings and perhaps enlarged cephalic lateral line pores, also seen on a female specimen from the same catch (fig. 502.3). Unfortunately, neither specimen was preserved as a voucher. The specimen clustered in the *M. anaphyrmus/P.electra* clade in earlier versions of the phylogeny but was excluded from Blumer et al. (2025).

Fig. 502.1: Lectotype of *Trematocranus brevirostris* [AK].

Fig. 502.2: *Trematocranus brevirostris* male, D17-I08, seined from Palm Beach, SE Arm, 22 Jan 2017 [HS].

Fig. 502.3: *Trematocranus brevirostris* D17-J02, not sequenced, seined from Palm Beach, SE Arm, 22 Jan 2017 [HS].

MC503. *Trematocranus labifer* Trewavas 1935

Trematocranus labifer was described (as *Haplochromis*) by Trewavas in 1935 from 6 specimens. It was transferred to *Trematocranus* by Eccles & Trewavas (1989). Like most other species in the 1935 paper, there was no illustration, just a key and few comments. Full illustrated descriptions were planned but did not appear until the Eccles & Trewavas monograph in 1989. Strangely, the 1989 redescription was illustrated with a drawing of a mature male paralectotype which does not show the typical body shape or markings of the species (fig. 503.4). This may be a contributory factor in the fact that this species has hardly ever been recognised in the wild in the last century. Oddly, an illustration of the female lectotype has been available since in the 1930s- like most of the Trewavas species an excellent line drawing by Elizabeth Fasken, published here for the first time below (fig. 503.1), along with the first photograph of the lectotype (fig. 503.2). A photograph by Mike Oliver on his website is also a good match for the species, and appears to be the only known illustration of the species freshly collected and the last known sample of the species, from 1980 or earlier (fig. 503.3). The species has a lightweight pharyngeal bone, in contrast to the molariform bones of *T. placodon* and *T. microstoma*. The oral jaw teeth are in 3-4 series, outer simple or unequally bicuspid, inner simple or unequally tricuspid. 11-13 lower gillrakers. It has a relatively elongated body with a straight head profile, small jaws and big flank spots. It has not been sequenced.

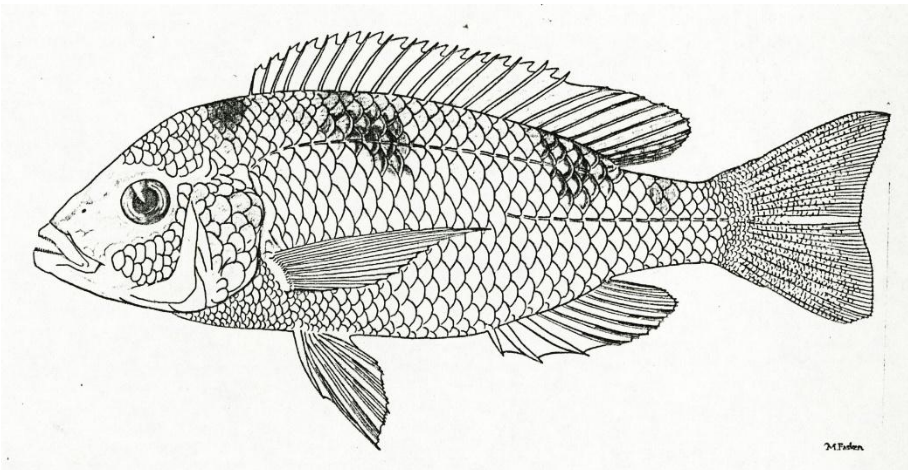


Fig. 503.1: *Trematocranus labifer* lectotype, drawn by E. Fasken in the 1930s and never previously published.

Fig. 503.2: *Trematocranus labifer* lectotype, in the London Natural History Museum, 2024 [GFT].

Fig. 503.3. *Trematocranus labifer* photographed in the 1970s [M. K. Oliver].

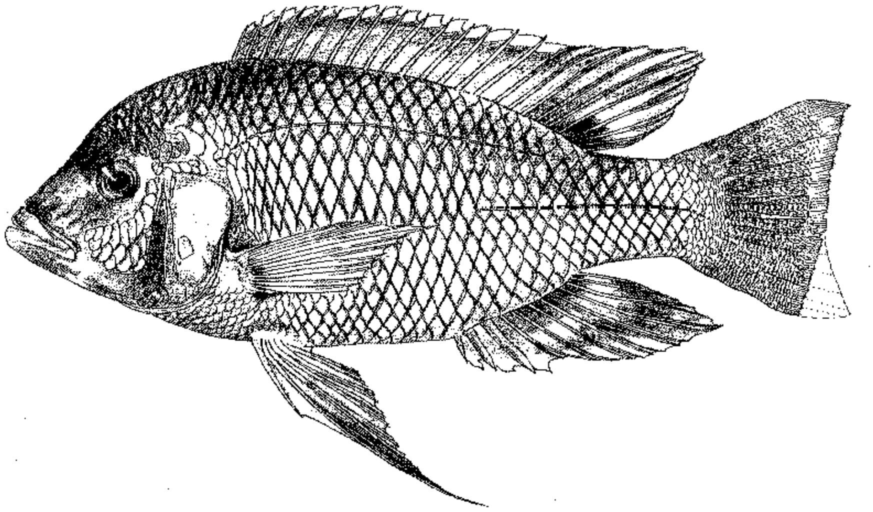


Fig. 503.4. *Trematocranus labifer* male paralectotype, drawn by Fasken in the 1930s and illustrated in Eccles & Trewavas (1989).

Fig. 503.5: *Trematocranus labifer,* lower pharyngeal bone of paralectotype BMNH 1935.6.14.1646 [GFT].

MC504. *Trematocranus microstoma*; MC505. *Trematocranus pachychilus*

Not yet sequenced.

MC506. *Trematocranus placodon* (Regan 1922)

Haplochromis placodon was described by Regan in 1922 (fig. 506.1), from 5 specimens collected by Wood, probably from Domira Bay, but transferred to the pre-existing but redefined genus *Trematocranus* Trewavas 1935 by Eccles & Trewavas in 1989. The species is characterised by a 3-spot melanin pattern, with the spots often extending upwards to the base of the dorsal fin. In addition, the pharyngeal jaws are heavily molarised. The specimen figured in the original description (Fig. 506.1), a mature male but showing underlying melanic markings, was designated the lectotype by Eccles & Trewavas (1989). Blumer et al. (2025) sequenced 32 specimens (Table 506.1): for most the identification seemed unambiguous (e.g. Fig. 506.2), but particular attention was paid to the specimen D07-D07, as it was the only specimen from the north of the lake and seemed rather small and delicate, considering the fins were strongly spotted, perhaps suggesting maturity. However, it seemed to be consistent with *T. placodon* in all features examined including the heavily molarized lower pharyngeal bone (Fig. 506.3). The species is a molluscivore, living over sand/mud bottoms from the shore down to depths of around 20m (Turner 1996). Of species sequenced to date, phylogenetic analysis suggests that *Otopharynx auromarginatus* is the closest relative (Blumer et al. 2025).

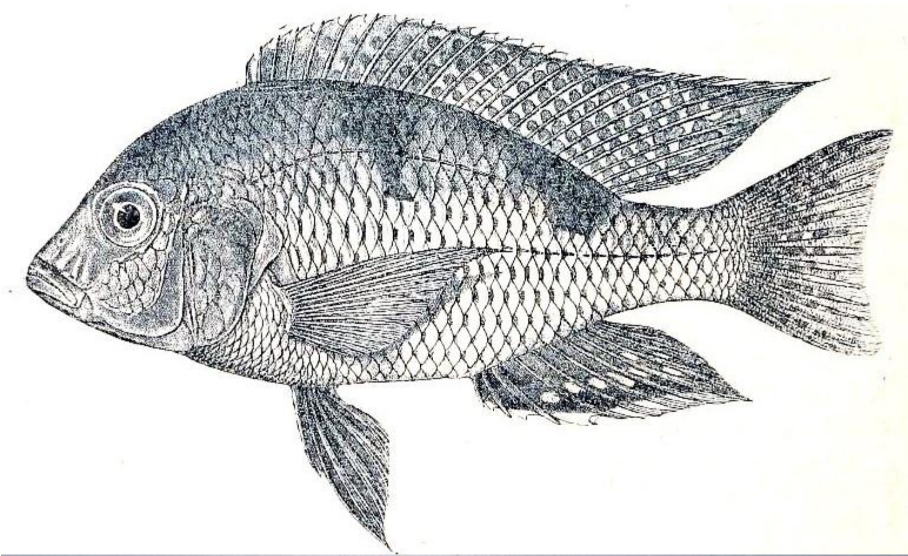


Fig. 506.1: Drawing of lectotype of *Trematocranus placodon* from Regan 1922.

Fig. 506.2: *Trematocranus placodon*, D13-C07 male, trawled 14-24m, SE Arm, 3 Mar 2016, conforms closely to the phenotype of the lectotype [HS].

Fig. 506.3: the Chilumba specimen D07-D07 (UCZM 2016.32.28) is very small for a mature male, but meristics and pharyngeal bone molarization (right) are consistent with *T. placodon* [HS, GFT].

Table 506.1: Collecting information on *T. placodon* specimens sequenced.

Code	Whole Specimen	Photo	Collecting information
TP1-4	None	One of batch of 4	Trawled from SE Arm, 11-58m, Nov 2010
2004.A96	None	Yes	Trawled from Monkey Bay to Nkhudzi, SE Arm, 13 Aug. 2004
D07-D07	UCZM 2016.32.28	Yes	Seine Fisher, Ngara, Chilumba 25 Feb 2016
D07-J01	UCZM 2016.35.52	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D08-A01	UCZM 2016.35.38	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D08-A08	Yes	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D08-B08	UCZM 2016.35.3	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D08-D04	UCZM 2016.35.42	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D08-D06	UCZM 2016.35.28	Yes	SCUBA, Chiofu Bay, 28 Feb 2016
D10-H10	UCZM 2016.38.100	Yes	SCUBA, Chiofu Bay, 29 Feb 2016
D13-B10, C01, C02	None	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C04	UCZM 2016.42.10	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C05	UCZM 2016.42.19	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C06	UCZM 2016.42.8	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C07	None	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C08	UCZM 2016.42.20	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C09	UCZM 2016.42.14	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D13-C10	UCZM 2016.42.15	Yes	Trawled off Nkhudzi Bay, 3th March 2016
D14-G07	UCZM 2016.45.25	Yes	Trawled at 19-22m, SE Arm, 4th March 16
D14-J09, J10, D15-A01, A02, A03, A04, A05, A07	None	Yes	Trawled at 19-22m, SE Arm, 4th March 16
D24-E02	None	Yes	Bought from trawl fisher, Malembo, SW Arm, 31 Jan 17.

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Tyrannochromis Eccles & Trewavas 1989. MC507-509.

Family: Cichlidae; **Subfamily:** Pseudocrenilabrinae; **Tribe:** Pseudocrenilabrini; **Subtribe:** Cyrtocarina.

Type species: *Haplochromis macrostoma* Regan 1922

Contained valid species (2): *Tyrannochromis macrostoma; Tyrannochromis nigriventer*

Proposed undescribed taxa (1): *Tyrannochromis* sp. 'macrostoma short pedicel'

Taxa considered invalid: *Tyrannochromis maculiceps; Tyrannochromis polyodon* (both junior synonyms of *T. macrostoma)*

Generic reviews & diagnoses: Eccles & Trewavas 1989.

Generic diagnosis: Eccles & Trewavas (1989) provide a diagnosis: "Medium to large-sized haplochromines, reaching a standard length of at least 250 mm. Differ from the other endemic Malawian genera in having long heads, contained no more than 2.8 times in the SL, lower jaws 1.9 to 2.3 times in the head length, teeth small, unicuspid in specimens over 80 mm SL, numerous, in 3 to 11 series, largely buried in the lips, with the posterior teeth of the outer row in the upper jaw directed inwards. 14 abdominal + 18 caudal vertebrae in the two species for which data are available. Melanin pattern a variant of the plesiomorphic type as shown in *P. kirkii*, sometimes with vertical bars also expressed. The pectoral fins are short (0.5 to 0.6 of head length). In at least two of them, the belly is black".

Field Diagnosis: Predators with heavy heads and big mouths: melanic markings horizontal or vertical. Sometimes with a black belly.

Phylogenetic comments: The two species are closely related and form a clade with *Nimbochromis fuscotaeniatus*, related to *Aristochromis* and *Champsochromis*.

Ecomorphological notes: Both species are piscivores found on rocky shores.

MC507. *Tyrannochromis macrostoma* (Regan 1922)

Tyrannochromis macrostoma was described (as *Haplochromis*) by Regan (1922) from a single specimen (fig. 507.1) and later placed in *Tyrannochromis* by Eccles & Trewavas (1989). The species is recognised from its huge mouth and premaxillary pedicels. It also has a distinctive horizontal stripe pattern. In life, most larger individuals (apart from breeding males) and even some very small ones are very dark brown to black on the lower half of the body (fig. 507.4), although they seem to be able to change quickly to the paler striped pattern. *Tyrannochromis maculiceps* (Ahl 1926) and *Tyrannochromis polyodon* (Trewavas 1935) were accepted as valid species by Eccles & Trewavas (1989) but each was originally described from a single specimen, and it is now considered that any differences reflect individual within-population variation and that both are junior synonyms of *T. macrostoma* (Konings 2016; Fricke et al. 2025). Some aquarium enthusiasts continue to maintain that these are distinct species. If the synonymy of *T. maculiceps* and *T. polyodon* is accepted, *T. macrostoma* is relatively easy to identify. Two specimens sequenced by Blumer et al (2025) seem clear-cut (fig. 507.2-3). The species is a piscivore on rocky shores, stalking fairly large cichlids with a head-down, tilted body posture.

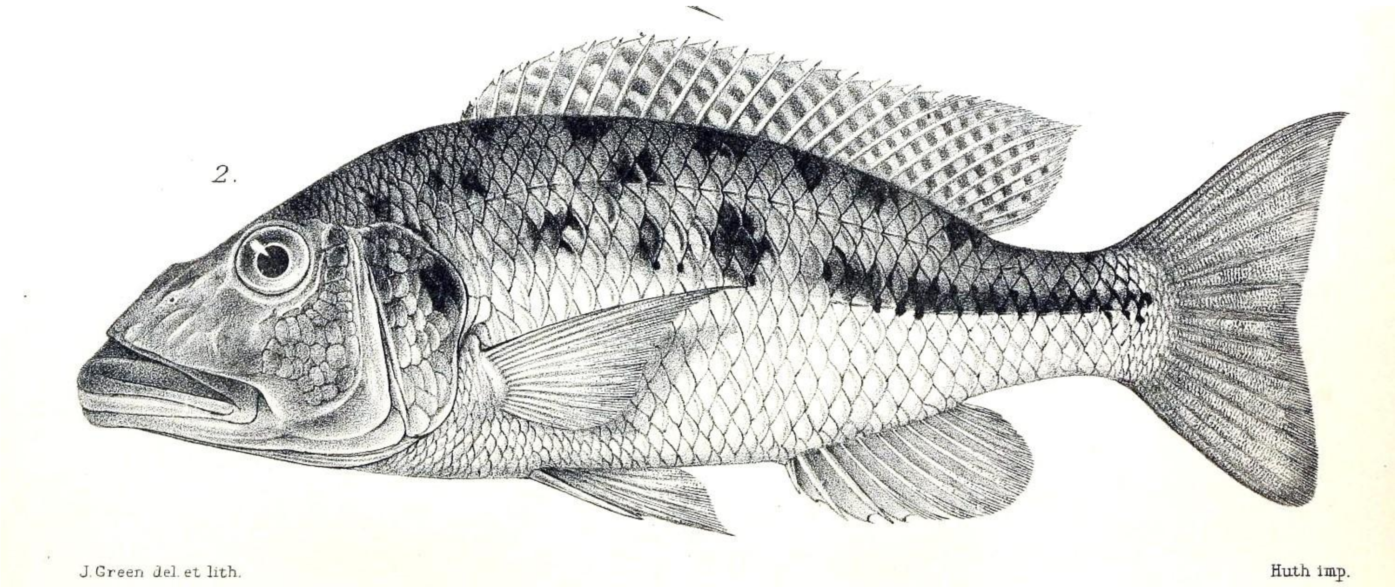


Fig.507.1: Drawing of the type of *Tyrannochromis macrostoma*, from Regan 1922.

Fig. 507.2: *Tyrannochromis macrostoma* D09-I05 UCZM 2016.37.103; SCUBA, Chiofu, 26 Feb 2016 [HS].


Fig. 507.3: *Tyrannochromis macrostoma* D07-E09, UCZM 2016.31.14; SCUBA Chitande Island, Chilumba, 25 Feb 2016 [HS].


Fig. 507.4: *Tyrannochromis macrostoma* photographed underwater at Nakantenga Island by Konings (2016), showing the black-bellied colour.

MC508. *Tyrannochromis nigriventer* Eccles 1989.

Tyrannochromis nigriventer was described by Eccles (in Eccles & Trewavas 1989), from 2 specimens, the type from Nkhata Bay and the paratype from Monkey Bay. Both of these specimens had been collected many years earlier (1950s, 1948) and were examined only as preserved specimens, which were probably faded. Eccles was aware that there was a predator of this group which had a conspicuously dark underside and believed that this was what he was describing (hence the name!), but it is now known that the black-bellied form is in fact *T. macrostoma* (recognised by its relatively longer premaxillary pedicels, among other things). The type specimen of *T. nigriventer* shows faint vertical barring, as is common among specimens of this species in the north of the lake. We have several sequenced specimens from around the lake. Konings (2016) reports that this species is a stealth hunter, often striking from behind a rock, capturing mbuna up to 6cm long. It is largely rock-associated.

Fig 508.1: *Tyrannochromis nigriventer* type, in the London Natural History Museum, 2023 [GFT]

Fig.508.2: *Tyrannochromis nigriventer*, D08-F07, UCZM 2016.36.30; male, SCUBA Chiofu, 28 Feb 2016 [HS]

D06-J01, UCZM 2016.31.12 SCUBA Chitande Island, Chilumba, 25 Feb 2016

D03-A02, UCZM 2016.20.58; SCUBA Nkhata Bay, 21 Feb 2016

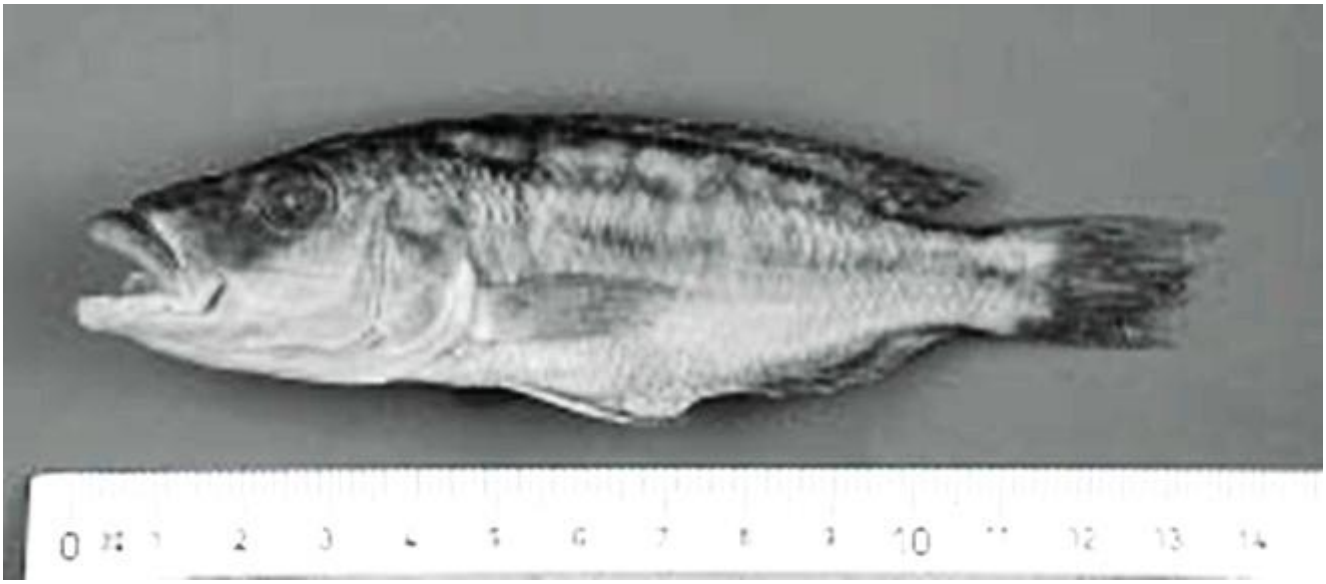
D02-D03, UCZM 2016.20.10; SCUBA Nkhata Bay, 21 Feb 2016

D07-G08, UCZM 2016.33.7; SCUBA Chiofu, 27 Feb 2016

Figure 508.3: *Tyrannochromis nigriventer*: large individual D06-J01 seems clear-cut, and D02-D03, D07-G08 show strong vertical barring which is characteristic of this species. D03-A02 looks a bit harder to identify. A sequence is available for a specimen from Minos Reef, Mozambique, but no photograph of voucher specimen can be located [HS].

MC509. *Tyrannochromis* sp. ‘macrostoma short pedicel’

A single specimen was regarded by Snoeks & Hanssen (2004) as possibly a new species. No details of its diagnostic features were given, except that it was said to have a relatively short premaxillary pedicel. Superficially, it looks like a young *T. macrostoma*.



MC509.1: Recorded only by Snoeks & Hanssens (2004) from one specimen. Not sequenced

MC888. *Placidochromis* sp. 'retrognathous' First identified in 2023; Not sequenced.

Discussion

Here, I have dealt with 509 'taxa', of which 256 are presently regarded as valid described species, leaving 253 undescribed. This is not intended to be a final list of all taxa, in the manner attempted by Ronco et al. (2020a), although perhaps this might develop through revisions of this preprint.

A few of these taxa are merely 'markers' for taxa which had previously been named but may have subsequently been identified as something else, perhaps 4 *Mchenga* and *Lethrinops* sp. 'altus deep'. This is likely to be substantially outweighed by the number of taxa not yet distinguished: for example on the 2023 trawl survey (yet to be thoroughly assessed), numerous small deepwater species that might be assigned to *Aulonocara, Lethrinops* or *Placidochromis* were distinguished, largely on male breeding dress. Distinctive male breeding dress may not always be apparent due to seasonality or patchy distribution of breeding aggregations. A number of the described species have not yet been confidently identified in the field since their original description: for example, *Aulonocara auditor, Buccochromis atritaeniatus, Copadichromis flavimanus, Mchenga eucinostomus, Stigmatochromis pleurospilus*. Some of this might be due to the poor quality of the type material: small numbers of small, presumably immature specimens with no information on male breeding dress or collecting locality. Quite a few of the *Placidochromis* described by Hanssen in 2004 also lack photos of fresh specimens or male breeding colours, although locality information is generally excellent. However, many of these have not been correlated with subsequent field collections, although in the present work this has been achieved for the first time in a few species.

Another issue might be changes in species composition within the lake: some species are represented in old museum collections by huge numbers of individuals, but have rarely been seen in recent surveys, such as *Dimidiochromis dimidiatus* and *Otopharynx tetraspilus*. A possible explanation for this is anthropogenic change: heavy fishing, particularly with small-meshed beach seines is more or less universal away from rocky shores in the Malawian part of the lake (Turner 1995). Species which complete their entire life cycle in this habitat are likely to be particularly vulnerable, especially if they are large and slow-maturing. An additional effect of beach seining is the removal of macrophyte beds, by the physical action of the nets in the case of submerged plants, and also by deliberate removal of emergent plants such as reeds and papyrus to make areas of shoreline accessible to seining. Reedbeds are also removed to open up areas for tourism: swimming, watersports etc. Unfortunately, macrophyte beds are also likely to represent key nursery areas for many fish species.

For deeper-water fish communities, the main culprit is likely to be small-meshed bottom trawling, particularly by pair trawlers. Again, these vessels typically use undersized meshes and are likely to physically alter the bottom habitats, churning up sediments and reducing water clarity, which probably limits the depth of photosynthetic activity. Additional factors might be increased sediment loading from rivers due to agricultural activities leading to erosion and to eutrophication through increased nutrient loads from fertiliser and sewage (Hecky et al. 2003). These activities are most likely to affect large maturing species that spend most of their life-cycle in 'trawlable' areas: relatively flat sediment plains in the southern arms at depths of 20-100m. Many species formerly abundant there have declined drastically: some such as *Lethrinops microdon, L. stridei*, and *L. mylodon* seem to be persisting in the far north of the lake, while others such as *Oreochromis lidole* have not been recorded in recent decades. Some communities have been less impacted. Many rocky shores are within National Park boundaries and species living close to the rocks have only been accessible by small-meshed gillnets: unfortunately the recent upsurge in sales of small-meshed monofilament nets threatens even these areas.

Very deep-water taxa may be less affected so far. The anoxic boundary in the lake is at a depth of ~250m (Eccles 1974). Experimental midwater trawling and gillnetting was reported by Allison et al. (1996) but no experimental bottom trawls have gone much below about 130m, so actually almost nothing is known of the benthic fish communities over half of the habitable depth of the lake. Commercial trawls rarely go as deep as 100m. The research vessel Ndunduma operating from Monkey Bay generally fishes as a commercial trawler operating at around 70-100m just off its home port, and the large species found at this depth such as *Alticorpus mentale* and *Lethrinops gossei* seem to be thriving. It may be that this is because their populations extend to much greater depth. Equally, fully pelagic species, such as *Rhamphochromis* and *Diplotaxodon* might have large offshore population reserves.

Phylogeny and Genera

Past researchers on Malawi cichlids made considerable efforts to identify characters that could be used to define genera and higher-order classifications, ranging from the haplochromine-type v tilapia-type pharyngeal apophysis, through to the attempted use of the form of 3rd vertebral apophyses in the definition of *Diplotaxodon* (Trewavas 1935; Eccles & Trewavas 1989). None of these survived much scrutiny. Molecular studies indicate that other traits such as the 'Lethrinops-style' dental arcade (Trewavas 1931; Hanssens 2004) or the expansion of cephalic lateral line canals are not much better (Regan 1922, Trewavas 1935; Eccles & Trewavas 1989; Snoeks & Walapa 2004) and are clearly prone to parallel evolution (Blumer et al. 2025).

The revision by Eccles & Trewavas (1989) largely used flank melanin patterns (although in some genera such as *Copadichromis* and *Corematodus*, this was jettisoned in favour of other traits). However, some genera were defined on a combination of melanin patterns and morphological features, such as dentition, cephalic lateral line canal expansion, and jaw structure. In many cases, this resulted in the creation of 'dustbin' genera defined by the presence of a specific melanin pattern, but this pattern was shared with many other genera which additionally possessed other defining candidate synapomorphies. Not surprisingly, these dustbin genera, such as *Protomelas*, *Placidochromis*, *Mylochromis* and *Otopharynx* are not monophyletic. However, inspecting the results of whole-genome sequence (WGS) based phylogenetics (Blumer et al. 2025), these genera are turning to be very polyphyletic indeed. The resulting 'fragments' of these larger genera don't seem to have very much in common or exhibit any obvious diagnostic features that could allow for the creation of smaller generic units.

Therefore, it makes little sense to propose splitting these genera up into units based on molecular phylogeny, not least because the coverage of WGS is still very small. The clear mismatch between mitochondrial and whole genome trees means that simple methods like mtDNA are clearly no substitute for WGS. We are not at a stage where it would make much sense to come up with a full revised generic classification. The current genera are largely 'operational' in the sense that a newly described species can be put into an existing genus. Admittedly, it will probably be a polyphyletic genus, but that is where we are at present.

Perhaps a few tweaks could be made. *Buccochromis* could accommodate *Otopharynx speciosus*. *Nimbochromis fuscotaeniatus* could be moved into *Tyrannochromis*. *Hemitaeniochromis urotaenia* could join *Dimidiochromis*, while *Naevochromis* might take in a bunch of thick-jawed paedophages with a variety of melanin patterns. Perhaps, *Placidochromis* and *Lethrinops* could be split between deep-water and shallow-water sections. All this would take a lot of work and to be honest, it would seem that a higher priority would be to expand coverage of WGS and to increase the rate of species descriptions.

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