

Identification of the Cichlid Fishes of Lake Malawi/Nyasa Part 2: Pseudotropheina (the 'mbuna' sub-radiation).

George F. Turner

School of Environmental and Natural Sciences, Bangor University, Gwynedd, LL 57 2UW, UK
& Life Sciences: Vertebrates Division, Natural History Museum, Cromwell Road, London
SW7, UK.

Email: bss608@bangor.ac.uk

ABSTRACT: With an estimated 900-1000 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 subtribe *Pseudotropheina* (or *Mbuna*), of which 350+ known species are considered: this will probably prove to be a considerable underestimate. Many taxa within this group are tightly bound to patchily-distributed rocky habitats, leading to substantial within-lake geographic isolation. This is associated with sharp discontinuities in patterns of male breeding dress, which may merit recognition as narrowly-distributed endemic species or geographic colour variants, according to the model of species definition being applied. But, some populations with very similar phenotype appear to have evolved independently and may show assortative mating in laboratory trials, suggesting that they too should be regarded as distinct species. It is intended that this work should be available as a free-standing pre-print which can be modified as further sequences are obtained, 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 2016a). 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; Svartal et al. 2019; Ronco et al. 2020a; Meier et al. 2023, Blumer et al. 2025 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 support recent and planned publications based on genomic data (Malinsky et al. 2018; Svartal et al. 2019; Turner et al. 2022; Sawasawa et al. 2024, Blumer et al 2025, Camacho Garcia et al. 2025), but it is hoped that it will assist in future field work and taxonomic studies and will eventually be expanded and revised into a form more suitable to act as a field identification guide.

Recently, a number of nomenclatural issues have been straightened out by Oliver (2024), although sometimes with inconvenient consequences. 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, splitting the endemic species into the Cyrtocarina, Pseudotropheina and Rhamphochromina.

It is intended that these documents remain as open access preprints which will be updated to reflect additional collections and nomenclatural changes. The present volume covers the Pseudotropheina, informally known as the 'mbuna'. These are mainly rocky shore fish, many of which show substantial geographic variation in colour, particularly of mature males (Ribbink et al. 1983, Konings 2016a).

Methods

The mbuna (Pseudotropheina) were defined by Oliver (2024) on the basis of molecular traits identified in previous studies, but among Malawian haplochromines they could be distinguished by a combination of (i) abrupt transition to very small scales on the chest (scales on the nape are also particularly small); (ii) anal fin of males bearing rounded yellow to orange spots bordered with a narrow transparent ring in the posterior half of the fin (form shared with *Astatotilapia*, but in that genus, they are generally not always restricted to the posterior half); (iii) left ovary atrophied (shared with Rhamphochromina). Informally, they tend to have relatively thick, rounded bodies with short pectoral fins. *Abactochromis labrosus* is a bit of an exception, with its laterally compressed body shape, but otherwise most people experienced with the group can generally distinguish an mbuna on sight, even if the particular specimen is of a species that is completely unfamiliar.

Most mbuna species are undescribed and most of the evidence for their identification comes from photographs, either of live fish underwater, recently collected specimens from food fisheries and experimental surveys or from illustrations of preserved specimens. Collecting locality, 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 occasionally pharyngeal dentition.

With experience of working on this group for over 35 years, I consider osteology (apart from pharyngeal bones), X-rays, fin ray and scale counts to be largely useless in species identification. These traits 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 that we cannot obtain from looking at external body shapes. 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 between 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 diagnostic traits can be seen by an experienced naturalist '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 often still doesn't show up in standard ratios. If a large number of images of accurately identified specimens were available, identification could probably often be accomplished by Artificial Intelligence. At present, this is not the case.

The authors of many taxonomic papers (including myself) often respond to these challenges 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 to the publication. It rarely adds much to species identification and is usually done *post-hoc* on specimens that have already been identified by other methods. I have yet to see a species 'discovered' by morphometrics. 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 little better 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. Most of the molecular work on the *Pseudotropheina* / mbuna remains unpublished at the time of writing. This particular group presents a specific problem in dealing with geographic colour variation, although this is also manifest in a few taxa within the *Cyrtocarina* which have secondarily invaded rocky habitats, such as the *Aulonocara stuartgranti* and *Protomelas taeniolatus* complexes or the *Copadichromis mbenjii* group (Konings 2016a; Turner 2025).

This naturally leads on to a consideration of **terminology**. Some of this is complicated by the fact that we are still in the process of discovering the nature of Malawi cichlid taxa and their phylogenetic relationships. Many publications, particularly older aquarium hobby ones, use the term '**morph**' rather loosely. Here, it is used only to refer to sympatrically co-occurring variants which represent discrete, distinguishable phenotypes within a single gene pool. Among mbuna, colour polymorphism within populations was first shown by Fryer (1959, also Fryer & Iles 1972) but there was some confusion between cases of polymorphism and the co-existence of sympatric species that differed in male and sometimes in female colour. This was clarified in the 1980s (Schröder 1980, Ribbink et al. 1983), when it was apparent that the BB/OB/O polymorphism was largely female-limited. The very rare males of the OB/O morphs are much sought after in the aquarium trade and in comparison to their frequencies in the field, are seriously over-represented (perhaps by a thousand-fold or more) in photographs on sites like cichlidae.com and Malawi.si. In general, the kind of discrete polymorphism manifest in the BB/OB/O system is due to a simple genetic basis, often a single gene of major effect. It is maintained as a polymorphism due to balancing selection, which is either due to heterozygote advantage (not likely in this case) or frequency-dependent selection. Under frequency-dependent selection, whenever the

frequency of a morph drops below a certain level, it becomes more advantageous and so it tends to 'bounce back'. We still have an incomplete understanding of this process in Malawi cichlids, but in other taxa, it is often due to 'search images' of predators that tend to focus on the more common morphs (apostatic selection), or due to differential fitnesses of morphs in different microhabitats, e.g. through camouflage. In the case of the BB/OB/O, it is slightly more complicated than a single gene: it seems to be the result of a chromosomal inversion- a genomic region which generally does not recombine with the equivalent non-inverted region and thereby behaves much like a single 'supergene' with potentially lots of different effects. In the OB/O morph individuals, there is a dominant female-determining gene linked to the colour gene (Behrens et al. 2025).

In Malawi cichlids, there is much less evidence for **trophic morphs**. Outside of Lake Malawi, there is a well-known case of the papilliform (fine-toothed) and molariform (broad-toothed) morphs of the Mexican cichlid *Herichthys minckleyi*, where variation in a simple genetic trait is maintained within a largely genetically mixed population (Hulsey et al. 2026). Populations of *Labidochromis caeruleus* at Nkhata Bay seem to include individuals with heavy mollusc-crushing pharyngeal bones and dentition and others with much more lightly built jaws (Lewis 1982), but this is poorly understood and may represent continuous variation or phenotypic plasticity rather than genetically based polymorphism.

The term 'morph' is not used here to represent **geographic variants**, irrespective of whether or not these are colour variants. This is because these variants can be explained by very different genetic bases and evolutionary forces in comparison to sympatric polymorphisms. Geographic variants generally result from the lack to genetic interchange between populations. This can allow populations to diverge gradually at many genetic loci, each perhaps of very minor effect. This can be due to local environmental differences (including the influence of co-existing species), variation in mate choice patterns and even random factors (genetic drift).

An additional complication comes from the use of the term **ecomorph** in evolutionary biology literature. In this terminology, the word is not used to designate a 'morph' within a polymorphic population at all, but rather a species with a distinct 'ecomorphology' irrespective of its phylogenetic relationships. This usage was adopted at first mainly in the many studies of Caribbean anoles, lizards which often undergo parallel evolution on different islands to fill equivalent niches with taxa with similar morphologies. Thus, the term 'crown giant ecomorph' refers to a group of allopatric species each of which has evolved a similar morphology and occupies a similar niche on different islands. The phylogenetic status of these populations is intended to be specified nor indeed consistent: taxa belonging to the same ecomorph may have evolved entirely independently to occupy the same niche. The term ecomorph has then been adopted in the fish literature, through studies of temperate postglacial species, such as sticklebacks, salmonids and coregonids, and subsequently into cichlid fish literature.

Earlier fish studies tended to use the term trophic morph or ecomorphs interchangeably to refer to distinct phenotypes that had evolved in isolated lakes, such benthic and limnetic sticklebacks or charr. In most cases, however, these forms appear to represent largely

reproductively isolated taxa generally showing strong microhabitat preferences, either throughout their lifecycle or sometimes in the breeding season. So, they are not really ‘morphs’ within a single mixed gene pool, maintained by frequency-dependent selection. And the term ‘ecomorphs’ was already taken by the anole usage to represent ecomorphological equivalents on different islands (or lakes). These sympatric partially reproductively isolated forms are now generally called ‘**ecotypes**’ (e.g. Lu et al. 2001, Keeley et al. 2007). However, the term is still not used consistently: e.g. Baran & Streelman (2020) refer to Lake Malawi ‘sand-dwellers’ and ‘rock-dwellers’ (mbuna) cichlids (hundreds of species each) as two ‘ecotypes’. Among cichlids of the Lake Malawi catchment, the best example of ecotypes as sympatric partly reproductively isolated ecomorphologically divergent taxa may be the littoral and benthic *Astatotilapia* within Lake Masoko (Malinsky et al. 2015). At present, there is no convincing evidence for the existence of ecotypes within Lake Malawi per se.

With the term ‘morph’ restricted to sympatric variants likely maintained by frequency-dependent selection, I will use the term ‘**geographic variant**’ to describe populations which show differences presently considered insufficient for them to be treated as species by previous workers such as Ribbink et al., Stauffer and his team or Konings. By most current practical definitions of species used for other taxa, populations with clear phenotypic divergences, such as differences in male colour indicative of genetic isolation would be considered distinct species (de Queiroz 1998), but generally Malawi cichlid taxonomists have been more conservative. Where a series of geographic variants have been considered by previous authorities to be sufficiently distinct to be regarded as species, but can still be matched with reasonable probability as closely related equivalent populations, I have referred to them as ‘**complementary species**’. For example, *Pseudotropheus lucerna* was described from the Chilumba areas and is regarded as confined to the northwestern coasts of Lake Malawi, a series of allopatric species can be matched up with it: MC746-751, MC915. These would probably have been considered subspecies when that term was regarded as acceptable among ichthyologists.

Table 1 Terms used to describe distinct cichlid varieties at species level or below.

Term	Definition	Examples of Cichlids
Colour morph	Intraspecific colour variant within a single gene pool	BB/OB/O morphs of <i>Maylandia zebra</i>
Trophic morph	Intraspecific morphological variant within a single gene pool	Papilliform/molariform <i>Herichthys minckleyi</i> (possibly <i>Labidochromis caeruleus</i> at Nkhata Bay)
Ecotype	Partly reproductively isolated ecologically divergent sympatric taxa	Littoral/benthic <i>Astatotilapia</i> in Lake Masoko
Ecomorph	A group of phenotypically similar taxa, often independently evolved, occupying a similar niche in different locations	Big-lipped species in Lakes Malawi, Tanganyika, Victoria etc.
Geographic variant	Allopatric populations differing in morphology and/or colour, proposed to be conspecific	<i>Cynotilapia zebroides</i> populations
Complementary species	Allopatric populations differing in morphology and/or colour, proposed to be heterospecific	<i>Pseudotropheus williamsi</i> or <i>Ps. lucerna</i> species complex taxa

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.

Species including all known undescribed taxa are listed alphabetically, although some species that were uncovered or rediscovered in the course of preparing this work have been added on at the end. Genera that are not monotypic are discussed briefly before listing the species.

In the title line for each species-level taxon is given a brief indication of its distribution (Table 2). These indications are intended to reflect geographic ‘facts on the ground’ as understood by local fishing communities, rather than sometimes contentious political boundaries. For example, under a treaty between the colonial powers Great Britain (then

controlling Malawi) and Germany (then controlling mainland Tanzania) in 1890, none of Lake Malawi belongs to the successor state of Tanzania (Mayall 1973). It appears that this treaty has never been formally renegotiated, but in practice the lake is used by the people who live along its shores and administered by their political representatives. A further treaty between Britain and Portugal in 1954 placed some of the lake under Portuguese control, inherited by Mozambique, but with enclaves around the inhabited Likoma and Chizumulu Islands remaining in the British 'Protectorate' of Nyasaland and inherited by Malawi. Some of the fishing grounds and submerged offshore reefs (e.g. Taiwanese Reef) around these islands may technically be in Mozambican waters but in practice are accessed from the Malawian islands. Notably, this treaty permitted fishers from both countries to fish in either country's waters, so long as they employed methods agreed by the two countries (Mayall 1973). There is no indication that this treaty has been superseded.

Table 2: Abbreviations used for taxon ranges. Note that mbuna are not recorded from any satellite lakes (e.g. Chilingali, Tanzanian crater lakes) nor upstream in any catchment rivers.

Abbreviation	Meaning
CHI	Chizumulu: waters off the shores of Chizumulu Island and associated smaller islands and reefs
LIK	Likoma: waters off the shores of Likoma Island and associated smaller islands and reefs
MLN	Malawi North: waters off the mainland shoreline and nearby islands within Malawi, North of 12°S (in practice, Kande Island)
MLS	Malawi South: waters off the mainland shoreline and nearby islands within Malawi, South of 12°S, including connected downstream water bodies, the Shire River and Lake Malombe.
MZ	Mozambique: waters off the mainland shoreline and nearby islands within Mozambique, but excluding the Malawian enclave islands
TZ	Tanzania: waters off the mainland shoreline of Tanzania, and any nearby islands
All regions	Found in at least part of all 6 regions above
Lakewide	Probably present in all suitable habitats within Lake Malawi and downstream water bodies.

Nomenclature and Taxonomic Decisions

This work is intended to remain as a permanent preprint. 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 formal taxonomic proposals but retain existing published names where possible. 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 many geographically restricted populations of rocky shore cichlids, many of which show clear differentiation in

male breeding colour (for example, see Pauers 2010). The number of species presented in the present work is likely to be a considerable underestimate.

I have tried to follow the standard source for fish nomenclature, Fricke et al. (2026), which is comprehensive, open access, online and frequently updated. However, this only covers formally described species and many Malawian cichlids remain undescribed. Konings (2016) covers undescribed species and is accepted as a relevant authority by Fricke et al., so the two sources are generally consistent. Konings (2016) is not comprehensive (Lake Malawi cichlids only), is paywalled, hard-copy only and is not being updated. Where they disagree, I have generally followed Fricke et al. For example, I follow Fricke et al. (2026) in considering *Metriaclima* to be a junior synonym of *Maylandia*. I have generally followed Fricke et al. (2026) in recognising Pauers' *Labeotropheus* species as valid, although Konings (2016, 2024) does not. Additionally, some formal taxonomic changes have implications for the classification of undescribed species. The genus *Chindongo* Li et al. 2016 postdates Konings 2016. Formally described *Chindongo* species are covered by Li et al. and accepted by Fricke et al., but undescribed species are omitted by both. I have followed the current classification of these species in the online archive Cichlidae.com, largely through articles by Konings, although these are paywalled and not permanent records.

Generally, I have tried to follow established species names and definitions, but in some cases, I have had to use my own initiative, and this raises the issue of species definitions: I have generally tried to be consistent with current practice, which I believe is rather conservative compared the practice in most other animal taxa. Ribbink et al. (1983) were explicit about basing their species definition on Paterson's Recognition Concept, which is not longer widely discussed, but in practice is not very different to Mayr's Biological Species Concept, with its emphasis on independent gene pools. They emphasised the importance of mating signal traits: by this time a number of studies had shown that male colour was often relevant to assortative mating among mbuna species. However, they recognised that 'morphologically similar allopatric populations which differ in coloration and perhaps also in aspects of ecology and behaviour may be demes, subspecies, semispecies, superspecies, sibling species or some other category'. They noted that in cases of doubt, Mayr (1969) recommended assigning taxa to subspecies, as this provides important information: allopatry and close relationship. This seems like a good argument to me, and I confess I don't really understand why ichthyologists generally seem to be so reluctant to use subspecies nowadays allopatric forms as distinct species throws away this information. Anyhow, Ribbink et al. raise the valid argument that it can be difficult to match allopatric equivalents across geographic ranges. For example, they identified seven forms of *Tropheops* at Nkhata Bay and four at Likoma Island: they felt that none could be matched in a way which establishes closest relationships. Thus, they chose to consider all to be different species. By contrast, of the three species at Chisumulu Island, two are so similar to the Likoma Island forms that they felt they could safely regard them as conspecific geographical variants. Overall, the great majority of species identified by Ribbink et al. have continued to be recognised irrespective of whether they have been formally described and continue to form the bedrock of our understanding of mbuna diversity.

Subsequent workers have generally been less explicit: Konings' (2016) chapter on Malawi cichlid taxonomy deals entirely with generic classification and says nothing at all about species definitions. In a discussion of a description of a new geographically variable species Stauffer & Konings (2023) state that 'Initially we anticipated to describe each of the three populations as different species as they had been treated as such for a long time (Konings 1995) based on the male breeding coloration. We failed to find any morphological features, however, that could distinguish the three populations (Fig. 6). Since these are neighboring populations, we believe we need an additional characteristic besides differing male coloration to accept them as separate species instead of geographical variants of *M. melissa*'. So, their operational species concept seems to require that populations differ in two sets of traits, morphological as well as signal traits. This practice is not referred to any particular theoretically- or empirically based concept. However, Stauffer et al. (2002) had previously discussed their process of species diagnosis. Fundamentally, they supported a lineage-based evolutionary species concept (e.g. Mayden 1997), but recognised that this would be difficult to render operational given evidence that species of Malawi cichlids cannot be consistently mapped on to mitochondrial DNA trees. They proposed that while phylogenetic information was lacking, reproductive isolation (inferred from signal traits) and morphological differentiation could be used as evidence for lineage distinctness. They suggested that signal traits could include bower structure as well as breeding dress. However, they also pointed to an example of clinal change in breeding dress e.g. in *Auloncara stuartgranti* as justification for recognising species with substantial geographic variation in signal traits. Finally, Pauers (2010) addressed the conceptual and practical bases explicitly, referring positively to Stauffer et al. (2002) and Mayden (1999), but pointing out inconsistencies in past practice, where clearly distinct geographic colour variants of species such as *Labeotropheus* have generally not been regarded as distinct species, apparently because they could more easily be matched up with allopatric equivalents.

Anyhow, techniques have advanced since 2002, and analysis of whole genome sequences has provided useful information about the relationships among Malawi cichlid taxa, although it is certainly not always straightforward (Scherz et al. 2022). Recent studies, often backed up by as yet unpublished molecular data have led me to recognise a number of populations as distinct species, most clearly when they do not show up as sister taxa to allopatric populations which had previously been regarded as conspecific. In some cases, consistent phenotypic differences have been felt sufficient to recognise new informal taxa, and I have coined informal names. In other cases, I have revisited names generally regarded as junior synonyms, such as *Pseudotropheus fuscoides* Fryer 1956 and *Maylandia melabanchion* (Stauffer et al. 1997). Although all are listed as valid by Fricke et al. (2026), I concur with Konings (2024) that a couple of the Pauers lab's *Labeotropheus* taxa appear to be difficult, if not impossible, to distinguish from other described taxa (Konings 2024): this becomes problematic when deciding which name to apply to allopatric populations not specifically covered in the original descriptions. Consequently, MC888 *Labeotropheus alticodia* Pauers & Phiri 2023 and MC894 *Labeotropheus obscurus* Pauers & Phiri 2023 are both considered junior synonyms of MC889 *Labeotropheus artatorostris* Pauers 2017.

However, they are still given MC codes and brief species entries to allow other workers to form their own opinions, perhaps in the light of additional information.

The recognition of the majority of the Pauers lab *Labeotropheus* species has considerable knock-on effects, because a great many phenotypically distinct populations that would merit recognition as species under the Pauers (2010) concept have not as yet been formally described. Furthermore, because this concept was not applied to *Labeotropheus* by previous workers (e.g. Ribbink et al. 1983, Spreinat 1995, Konings 1989 to 2024), they also lack informal names. To be consistent, I have developed a suite of novel informal names, partly informed by analogy with published information on the *Maylandia* complex (Allender et al. 2003), along with currently unpublished collaborative molecular studies, which it would be premature to discuss at the time of writing.

When the initial species list for this series of papers was drawn up in 2025, it was largely based on Konings (2016). The codes for the Rhamphochromina and various non-endemic Malawi cichlids were allocated numbers following those of the mbuna. Where I have subsequently recognised mbuna populations as additional distinct species, their MC codes are out of sequence with those of congeneric species. This will be a feature of future revisions which are intended to follow this work.

Photograph Credits

Photographs are credited to the photographer where known, with the following abbreviations: AK = Ad Konings; GFT = George Turner; HS= Hannes Svardal; MJG= Martin Genner. Abbreviations ending in 'lab' indicate images collected by the research group supervised by the individual team leader shown, but which may not necessarily have been physically taken by the team leader, e.g. HSlab= Lab of Hannes Svardal. Line drawings are mostly credited to the source publication: in earlier publications the artist was often uncredited. Other abbreviations: MCGDS = Malawi Cichlid Genomic Diversity Survey, a collaborative programme of UK-, Belgium-, Malawi- and Tanzania- based researchers operating since the 2010s.

Results

In the present work, mbuna are presently allocated to 14 genera and 349 species, of which 141 are formally described (Table 1). The most speciose genus is *Maylandia*, but it is clearly highly polyphyletic: the largest component group is probably the *M. zebra* complex of around 24 species - although the *M. zebra* species itself should probably be split into a number of allopatric taxa, as should *M. fainzilberi*. Overall, I would estimate that around 35 species seems a plausible number. However, it is possible that the genus might need to be merged with part of *Cynotilapia*. Likewise, *Pseudotropheus*, the 3rd largest genus, is likely to be broken down into numerous genera in future. Ultimately, *Tropheops* seems likely to be the largest genus, currently placed at 60 species: a small group including *P. microstoma* and ‘*gracilis* *nankumba*’ may need to be split off, along with the ‘*elongatus* group’ but the *P. lucerna* group should probably be included, and it seems likely that a number of species have still been overlooked. Notably, very few *Tropheops* species have actually been formally described. Other large genera are likely to be *Labidochromis*, *Labeotropheus* and *Melanochromis*.

Table 3: Estimated species numbers per genus. Total current species estimate is 349, but 352 taxa have been allocated MC codes to include disputed species.

Genus	Valid Species	Undescribed	Disputed	MC Codes	Total
<i>Abactochromis</i>	1	0	0	510	1
<i>Chindongo</i>	11	19	0	511-540	30
<i>Cyathochromis</i>	1	0	0	541	1
<i>Cynotilapia</i>	5	14	0	542-560	19
<i>Genyochromis</i>	1	0	0	561	1
<i>Gephyrochromis</i>	2	4	0	562-567	6
<i>Iodotropheus</i>	2	1	0	568-570	3
<i>Labeotropheus</i>	8	14	2	571-572, 888-908, 914	24
<i>Labidochromis</i>	18	23	1	573-614	42
<i>Maylandia</i>	38	37	0	615-685, 910, 916-918	75
<i>Melanochromis</i>	15	2	0	686-702	17
<i>Petrotilapia</i>	11	8	0	703-721	19
<i>Pseudotropheus</i>	19	35	0	722-773, 911, 915	54
<i>Tropheops</i>	9	51	0	774-830, 912, 913	60
Total	141	208	3		352

MC510. *Abactochromis labrosus* (Trewavas 1935), All regions

A single small (42mm SL) specimen from Deep Bay (Chilumba, in the far north of Lake Malawi) was used as the basis for the description of *Melanochromis labrosus* by Trewavas in 1935. It was assigned to *Melanochromis* on the basis of its relatively coarse pharyngeal dentition and the absence of the jaw and tooth specialisations then regarded as diagnostic of *Genyochromis* (broad transverse bands of teeth, strongly projecting chin) and *Labidochromis* (anterior teeth long, unicuspid, forward-pointing). It was distinguished from other *Melanochromis* species by its lobed lips. Ribbink et al. (1983) recorded the species at Mbenji, Likoma and Chizumulu Islands, but reported it as being rare. They cited D.S.C. Lewis as suggesting it ought to be placed in a genus of its own. This was duly implemented by Oliver & Arnegard (2010), who created the monotypic genus *Abactochromis* for this purpose. The species can be distinguished by its typically mbuna-like small chest scales and its ocellated anal fin eggspots (in males), coupled with its expanded lobed lips. Additionally, the species is generally dark brown, sometimes with faint vertical barring, and lacks the contrasting black and white vertical barring of *Placidochromis milomo* (MC375) or the horizontal stripes on a golden background of *Cheilochromis euchilus* (MC78). *Otopharynx pachycheilus* (MC311) has spots on its flanks. *Protomelas ornatus* (MC427) tends to have blotchy vertical bars and dark spots along the dorsum, and less well-developed lips for a given size. Male *A. labrosus* tend to have darker barring, and dark dorsal fin submarginal band below a white margin and prominent anal fin spots (Oliver & Arnegard 2010, Konings 2016a). Females/immatures are sometimes uniformly orange, although it is not clear if this is a discrete O-morph or a geographic variant (Oliver & Arnegard 2010). At the time of writing, an aquarium strain is available in which females and immatures are yellow-brown with faint brownish bars.

Oliver & Arnegard recorded *A. labrosus* from rocky habitats throughout the lake, apart from the southern arms and Nankumba Peninsula. The species is only known from rocky shores, where it is reported to press its lips into cracks and suck out prey (Ribbink et al. 1983). Oliver & Arnegard discuss possible alternative functions to the lips, including taste and prey detection, but studies on other cichlids with such lips tend to support the crack-feeding strategy. A single specimen from Chitande Island, Chilumba, near the type locality, was sequenced by Blumer et al. (2025). Phylogenetic analysis confirms that it is an mbuna, closely-related to species of *Labidochromis*, *Chindongo minutus* (MC519) and a species believed to be *Pseudotropheus* sp. 'variable eastern' (MC766), if this has been correctly identified.

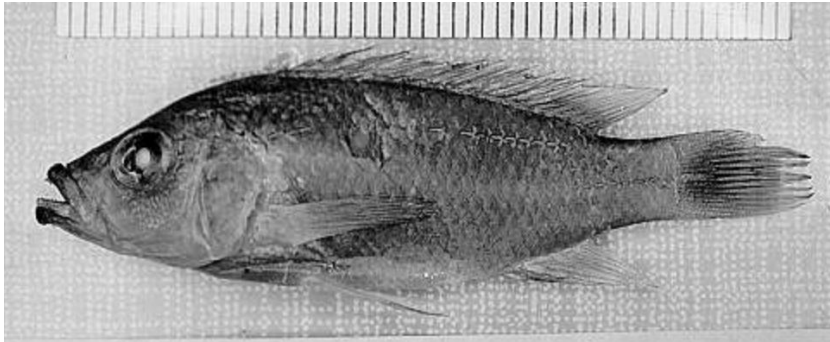


Fig. 510.1: *Abactochromis labrosus*: holotype of *Melanochromis labrosus* Trewavas, 42mm SL, BMNH 1935.6.14.321 [M.K.Oliver].

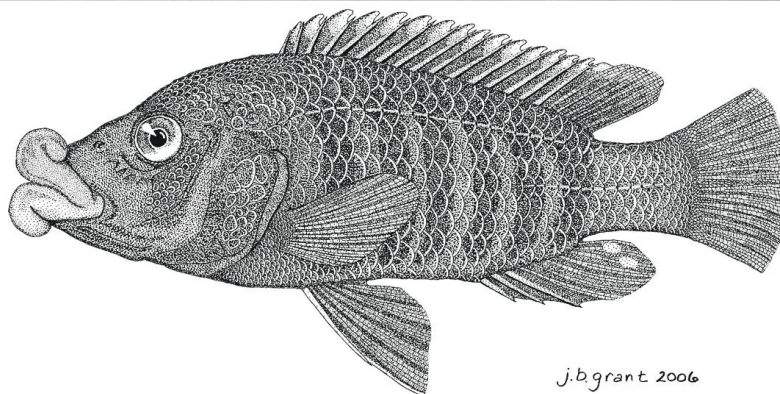


Fig. 510.2: *Abactochromis labrosus*, Drawing of 78mm SL male, from Oliver & Arnegard 2010.



Fig. 510.3: *Abactochromis labrosus* D07-F10, collected by SCUBA, Chitande Island, Chilumba, 25 Feb 2016, sequenced [HS].

***Chindongo* Li, Konings & Stauffer 2016: species MC511-540.**

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

Type species: *Chindongo bellicosus* Li, Konings & Stauffer 2016.

Contained valid species (11): *Chindongo ater*, *Chindongo bellicosus*, *Chindongo cyaneus*, *Chindongo demasoni*, *Chindongo elongatus*, *Chindongo flavus*, *Chindongo heteropictus*, *Chindongo longior*, *Chindongo minutus*, *Chindongo saulosi*, *Chindongo socolofi*.

Proposed undescribed taxa (19): *Chindongo* sp. 'aggressive brown', *Chindongo* sp. 'aggressive zebra likoma', *Chindongo* sp. 'aggressive zebra mbenji', *Chindongo* sp. 'burrower', *Chindongo* sp. 'elongatus brown', *Chindongo* sp. 'elongatus masimbwe', *Chindongo* sp. 'elongatus mbenji brown', *Chindongo* sp. 'elongatus mozambique brown', *Chindongo* sp. 'elongatus mphanga', *Chindongo* sp. 'elongatus nkhata blue', *Chindongo* sp. 'elongatus nkhata brown', *Chindongo* sp. 'elongatus ornatus', *Chindongo* sp. 'elongatus ornatus tanzania', *Chindongo* sp. 'elongatus ruarwe', *Chindongo* sp. 'elongatus spot', *Chindongo* sp. 'elongatus thumbi', *Chindongo* sp. 'fuscus dwarf', *Chindongo* sp. 'minutus mozambique', *Chindongo* sp. 'perspicax yellow breast'.

Generic reviews & diagnoses: Li et al. (2016), Konings (2016b). Earlier consideration of informal groups that were later partly incorporated into this genus was provided by Ribbink et al. (1983), mainly the *Pseudotropheus elongatus* species-group and *Pseudotropheus* 'aggressive' species-group, with some listed as *Pseudotropheus* 'miscellaneous'.

Generic diagnosis: mainly bicuspid outer oral teeth in a broad band (usually 5-6 rows), moderately- to steeply-sloped vomer (53-68°), small mouth, slightly retrognathous, vertical barred flank pattern (Li et al. 2016). In fact, some of the species included seem to largely lack flank bars, e.g. *C. socolofi*.

Field Diagnosis: Small blue or blue-black barred mbuna (males), with a small slightly underslung mouth and bicuspid teeth. Underwater, they are generally territorial and skulk near the bottom. Females have similar body shapes; some are similarly coloured to the males (*C. demasoni*, *C. socolofi*), others may be drab (e.g. *C. minutus*), or bright yellow (*C. heteropictus*, *C. saulosi*).

Phylogenetic comments: Analysis of sequences of 3 species indicated that genus is polyphyletic (MCGDS, unpublished): two of the slender species grouped with a slender *Maylandia* species, suggesting that perhaps the old 'elongatus complex' of Ribbink et al. might be better supported. The type species *C. bellicosus* has not been sequenced, but is one of the slender ones. The only one of the short-bodied species to be sequenced (*C.*

minutus) clustered with *Labidochromis* and *Abactochromis*. None of the intermediate-shaped ones like *C. socolofi* or *C. heteropictus* have been sequenced yet.

Ecomorphological notes: All species appear to be strictly confined to rocky habitats. Li et al. (2016) indicate that all species feed on loose biomaterial (mainly diatoms and cyanobacteria) combed from the algal filaments, which themselves are not removed. They feed at an angle of around 30–60° to the substrate. They generally exclude all other species from a small feeding territory, which then develops as an ‘algal garden’.

MC511. *Chindongo ater* (Stauffer, 1988) MLS

Originally described as *Pseudotropheus ater*, it was moved to *Chindongo* by Li et al. (2016). It was previously known as *P. elongatus* ‘black’ by Ribbink et al. (1983). This ‘elongatus’ ecomorph is reported only from Chinyankwazi and Chinyamwezi in the NE of the SE Arm. It is a small species (up to 94mmSL), preferring large rocks at depths of around 3–15m. Males are reported to show blue interorbital bars, not seen in the illustration here. Konings (2016) suggests affinities with *P. sp.* ‘elongatus aggressive’ from Zimbabwe Rock and *Pseudotropheus sp.* ‘elongatus slab’ from Maleri Island (both now *C. bellicosus* MC512). Photos A. Konings (adult male above).



MC512. *Chindongo bellicosus* Li, Konings & Stauffer 2016 MLS

Described as the type species of *Chindongo* by Li et al. (2016). It was previously known as *P. sp.* ‘elongatus aggressive’ and *Pseudotropheus sp.* ‘elongatus slab’ by Ribbink et al. (1983). It is reported from Nkhudzi, Kanchedza I., Monkey Bay, Nankumba Peninsula, Domwe I., Zimbabwe Rock (type locality), Thumbi West I., Mumbo I. and the Maleris and to attain 111mm SL (Ribbink et al. 1983). There is some variation in male colour. At some localities, both sexes are highly territorial. Konings (2016) suggests affinities with *C. ater* MC511), which is found nearby but allopatrically. Photos A. Konings (adult male above).



MC513. *Chindongo cyaneus* (Stauffer 1988) MLS

Originally described as *Pseudotropheus cyaneus*, it was moved to *Chindongo* by Li et al. (2016). It was previously known as *P. elongatus* 'chinyamwezi' by Ribbink et al. (1983). This 'elongatus' ecomorph is reported only from Chinyamwezi Island in the NE of the SE Arm. It is a small species (up to 78mmSL), found at depths of around 3 to at least 43m. Males are territorial but females and juveniles are reported to form schools of up to 70 individuals. Photos A. Konings (adult male above).



MC514. *Chindongo demasoni* (Konings 1994) TZ

This small species (mature at 4cm TL) was originally described as *Pseudotropheus demasoni*, but was moved to *Chindongo* by Li et al. (2016). It is endemic to Pombo and Ndumbi Rocks in Tanzania, just south of the Ruhuhu delta, where it lives in shallow water less than 4m deep. Males, females and juveniles are conspicuously coloured blue and black, making the species popular in the aquarium trade. Photo A. Konings (adult male).



MC515. *Chindongo elongatus* (Fryer 1956a) TZ

This small species (the largest type 82mm TL) was originally described as *Pseudotropheus elongatus*, based on three specimens collected at Mbamba Bay in Tanzania. Most of the information on the biology of the species was collected at Nkhata Bay (Fryer 1959; Ribbink et al. 1983) is now believed to refer to an undescribed species known as *C. sp. 'elongatus nkhata blue'* (MC531), but this is very similar and may be conspecific. The species was included in *Chindongo* by Li et al. (2016). Photo A. Konings (Hongi Island).



MC516. *Chindongo flavus* (Stauffer 1988) MLS

This species was first informally described as *Pseudotropheus elongatus* 'dinghani' by Ribbink et al. (1983). The name was not explained and was possibly already in use in the aquarium fish hobby at this time: at the time of writing the species was still widely available in the trade. The species was reported only from Chinyankwazi Island, where it was recorded at all depths from the surface to 35m, but being most abundant at 8-15m over a variety of sizes of rocks and slabs. Males were reported to hold territories with refuges in crevices, aggressively attacking all intruders, feeding both on biofilms and plankton. Non-territorial fish were reported to form large schools feeding almost exclusively on plankton. The maximum size was reported as 70mm SL.

The species was formally described as *Pseudotropheus flavus* by Stauffer (1988) from 10 specimens up to 76.1mm SL, collected at 7.5-18m depth on the shores of Chinyankwazi. They were noted as having 3-5 rows of oral teeth, the outer ones mostly bicuspid. One paratype had 5 anal spines; Malawian 'haplochromines' almost always have 3. The species was later reclassified as *Chindongo flavus* by Li et al. (2016).

Males have a strongly black and yellow male breeding dress, without blue forehead barring, a prominent dark dorsal submarginal band, largely dark pelvic and anal fins and a yellow caudal fin with dark upper and lower margins. Females are pale brownish, weakly barred, but show a dark dorsal submarginal band (fig. 516.1-2).

The species is identified on the basis of its colour pattern, slender body, bicuspid teeth and its occurrence at Chinyankwazi Island, where it appears to be endemic. The only other 'elongatus'-type at this location is the more slender cave-dwelling *Chindongo ater* MC511, in which adult males are uniformly black, and females lack a dorsal submarginal band (Konings 2016a).

Scherz et al. (2022) analysed a single whole genome sequence of a specimen collected from Chinyankwazi Island in 2010. It was found to have affinities with *Maylandia zebra*, *M. xanstomachus*, *Cynotilapia axelrodi* and *Genyochromis mento*. However, a limited number of taxa were investigated in that study: for example, no other *Chindongo* or 'elongatus complex' species were included.



Fig. 516.1: *Chindongo flavus*, male, Chinyankwazi Island [AK].



Fig. 516.2: *Chindongo flavus*, female, Chinyankwazi Island [AK].

MC517. *Chindongo heteropictus* (Staeck 1980) CHI

This small sexually dichromatic species was originally described as *Pseudotropheus heteropictus*, but was included in *Chindongo* by Li et al. (2016). It is endemic to Chizumulu Island. Specimens of both sexes from Membe Reef (not Membe Island) have a strong black band in the dorsal fin absent in other populations. Published information on the biology of *P. cf. heteropictus* at Thumbi West Island (e.g. Ribbink et al. 1983) refers to *Maylandia flavifemina* MC625. Photos by A. Konings (male above).



MC518. *Chindongo longior* (Seegers 1996) TZ

This small elongate species was originally described as *Pseudotropheus longior*, but was included in *Chindongo* by Li et al. (2016). The types were collected from Mbamba Bay, Tanzania and it has not been recorded outside that area. Photo A. Konings (male above).



MC519. *Chindongo minutus* (Fryer 1956a) MLN

Pseudotropheus minutus was described by Fryer (1956a) from 6 specimens collected at Nkhata Bay. The species was also studied by Fryer (1959), Ribbink et al. (1983) and Li et al. (2016, who moved it to *Chindongo*). It has been observed and illustrated by Konings (1989, 1990a, 1995, 2001, 2007a, 2016a: fig. 519.1). Superficially, it can be recognised by its relatively stocky, but otherwise typical mbuna body shape, small size and the strongly blue and black colour of the adult males, which have wide black flank bars on a pale blue background: the black bars extend into the dorsal fin and merge with a black submarginal band on a pale blue background. The dorsal has a white margin. The pelvic and anal fins also have a lot of black. The caudal is pale blue, with dark radial stripes, thicker near the top and bottom margins. The head is mainly black below but has transverse black and blue bars between the eyes and across the nape. There is generally one or two pale yellow eggspots on the posterior margin of the anal fin (fig. 519.1). Females are similar but duller and lacking anal fin spots. This is a very small species: Konings (2016a) gives 66mm TL (Ribbink et al. 1983 give 66mm SL). The species is very common at Nkhata Bay, and Ribbink et al. considered it to range as far north as Ruarwe and Chitande Island (Chilumba), but Konings (2016a) considered the populations north of Lion's Cove to be a different species (*Pseudotropheus perspicax*, MC736): Ribbink et al. noted the northern individuals as being generally drabber. Konings (2016a) distinguished allopatric populations as *P. sp. 'minutus Mozambique'* (MC539), *P. sp. 'minutus Tanzania'* (MC752) and *P. sp. 'tiny'* (Thumbi West, MC764)- these all look very similar from photographs, but only the first of these is listed under *Chindongo* in the online Cichlidae.com website entry for the genus (Konings 2016b), the others remaining in *Pseudotropheus*. It is not clear if this is simply due to lack of information: Li et al. (2016) do not discuss undescribed taxa directly, but suggest that other species currently in *Pseudotropheus* are likely to be transferred to *Chindongo*, pending observation of the angle that they feed at, or analysis of the vomerine angle. Like other *Chindongo*, *C. minutus* has a wide lower jaw with small, largely bicuspid oral teeth and a moderately sloping head profile (and ethmovomerine block on the skull). Males are reported to be strongly territorial and to maintain 'algal gardens', areas from which all other species are excluded, allowing the residents to harvest loose material from the growing filaments (Konings 2016a). Females are reported to be non-territorial and occur singly or in small groups. Ribbink et al. state that they occur from the shallow to 25m depth, but are most numerous at 4-15m.

Two specimens sequenced by MCGDS (unpublished) were collected from Nkhata Bay (the type locality) in 2016, one of which was a male in strong territorial colours (Fig. 519.2-3). Phylogenetic analysis places them in a clade including *Labidochromis* species and *Abactochromis labrosus*, but not closely related to the more elongated *Chindongo* species (MC531, 532). Although *C. bellicosus* has not yet been sequenced, it is also one of the elongated species and so if this genus is maintained in a revision, *C. minutus* could well be excluded from it. Interestingly, Lewis (1982) noted a similarity in the dentition of *P. minutus* and *Labidochromis* species, noting that the former had elongated central outer teeth visible when the mouth was closed (see also sketch in Fryer 1956a), although they did not decrease

markedly in size from the symphysis outward, nor were they strongly procumbent, and the dental arcade was more rounded than in *Labidochromis* species.



Fig. 519.1: *Chindongo minutus*, adult male, Nkhata Bay [AK].



Fig. 519.2: *Chindongo minutus*, D03-E08; adult male, collected by SCUBA, Nkhata Bay 21 Feb 2016. Sequenced. [HS].



Fig. 519.3: *Chindongo minutus*, D02-A06; collected by SCUBA, Nkhata Bay 20 Feb 2016. Sequenced. [HS].

MC520. *Chindongo saulosi* (Konings 1990b) CHI

This small (70mm SL) sexually dichromatic species was originally described as *Pseudotropheus saulosi* (formerly *Pseudotropheus* sp. taiwan: Konings 1989), but was included in *Chindongo* by Li et al. (2016). It is endemic to Taiwatee Reef, which is technically in Mozambican waters but is generally accessed from the Malawian Chizumulu Island. Males look very similar to those of *C. minutus* or both sexes of *C. demasoni*, but females and juveniles are bright yellow, making it a popular aquarium species., which has led to reductions in populations and attempts at restocking. Males are reputed to be highly territorial. Photos by A. Konings (male above).

**MC521. *Chindongo socolofi* (Johnson 1974) MZ**

This small (62mm SL) sexually monochromatic species was originally described as *Pseudotropheus socolofi* (popularly known as *Pseudotropheus* 'pindani'), but was included in *Chindongo* by Li et al. (2016). Endemic to the central Mozambican coast (Cobue to Tumbi Point), but in the original description erroneously reported from Likoma Island. Long established in the aquarium trade. Photos by A. Konings (male above).

**MC522. *Chindongo* sp. 'aggressive brown' MLS**

This secretive, drab species was first identified by Ribbink et al. (1983) as a member of the *Pseudotropheus* 'aggressive' complex. It is reported from very shallow waters at Thumbi West, Mumbo and Harbour Island (Monkey Bay). Photo by Konings.



MC523. *Chindongo* sp. 'aggressive zebra likoma' LIK

This secretive, drab species is reported from shallow waters in the northern half of Likoma Island. Ribbink et al. (1983) had included it as part of a widespread *Ps.* 'aggressive zebra' species. Females are dark brown (Konings 2016). Photo of male by Konings.

**MC524. *Chindongo* sp. 'aggressive zebra mbenji' MLS**

This secretive, drab species is reported from shallow waters at Mbenji and the Maleris. Ribbink et al. (1983) had included these populations as part of a widespread *Ps.* 'aggressive zebra' species. Konings (2016) further distinguished a *Metriaclima* (=Maylandia) sp. 'aggressive zebra maleri' MC648 which is partially sympatric. Photo of male at Mbenji by Konings.

**MC525. *Chindongo* sp. 'burrower' MLS**

This small (60mm SL) sexually dichromatic species was first reported by Ribbink et al. (1983) as *Pseudotropheus* 'burrower'. It is reported from the rock-sand interface at the Maleris and nearby Chidunga Rocks (Chipoka) at depths of 3-24m. Males dig under rocks and spoil heaps mark out their spawning burrows, which may be clustered close together. They are reported to feed from rocks and sediment. Photos by A. Konings (male above).

**MC526 *Chindongo* sp. 'elongatus brown' MLS**

This small slender species is reported from Luwala (= West) and Chimwalani (= Eccles) Reefs near Makanjila at the north end of the SE Arm in Malawi. It resembles *C. longior* from Tanzania. Photos by A. Konings (male above).



MC527. *Chindongo* sp. 'elongatus masimbwe' LIK

This small slender species is reported from Masimbwe and other locations on Likoma. They resemble many other elongatus populations. Photo by A. Konings (male).

**MC528. *Chindongo* sp. 'elongatus mbenji brown' MLS**

This species was first reported by Ribbink et al. (1983) from Mbenji Island, where it was seen to prefer the vertical faces of large rocks at depths of 5-18m. It was said to be largely solitary and to attain a maximum of 92mm SL (Ribbink et al. 1983). Photo by A. Konings (male).

**MC529. *Chindongo* sp. 'elongatus mozambique brown' MZ**

This population occurs between Londo and Tumbi Point in Mozambique. It resembles MC682 *Maylandia usisyae*, MC526 *C. sp. elongatus brown* and MC518 *C. longior*, all of which are allopatrically occurring. Photo by A. Konings (male).



MC530. *Chindongo* sp. 'elongatus mphanga' MLN

This species was formerly known as *Pseudotropheus elongatus* 'mpanga' by Ribbink et al. (1983), who stated that it was usually found over boulders at 3-5m depth, and attained a maximum size of 72mm SL. It has since been recorded from Mphanga Rocks to Maison Reef, including Katale Island, Luwino Reef and Chilumba Harbour (Konings 2016a). Four specimens were identified on the basis of male colour, body shape and location and sequenced. All were from Makankha Rocks, 180m south from the southern tip of Chirwa Island at a heading of 160° (D68-B07, C02, C04, C07: fig. 530.2). They clustered with other 'Elongatus'.



Fig. 530.1: *Chindongo* sp. 'elongatus mphanga', male, Katale Island [AK].



Fig. 530.2: *Chindongo* sp. 'elongatus mphanga', male, D68-C02, Makankha Rocks, Chilumba, 26 Sept 2023, sequenced [MCGDS].

MC531. *Chindongo* sp. 'elongatus nkhata blue' MLN

Ribbink et al. (1983) recognised two species of the '*Pseudotropheus elongatus* species-group' at Nkhata Bay, one of which was assigned to *P. elongatus* 'nkhata brown' (now *Chindongo* sp. 'elongatus nkhata brown', see MC532) and *P. elongatus* sensu stricto (Fig. 531.1). This followed Fryer (1956a, 1959), who originally described *P. elongatus* and mentioned its occurrence at Nkhata Bay. However, Ribbink et al. had a more fine-scaled species concept than Fryer, recognising 24 species of the '*P. elongatus* species-group' from the Malawi part of the lake alone. Fryer's types of *P. elongatus* were from Mbamba Bay in Tanzania (Fryer 1956a, Seegers 1996, Tawil 2018a), and these are now tentatively considered to be a different species from the Nkhata Bay population, which was renamed *P.* sp. 'elongatus nkhata blue' (Konings 1995; 2016a; fig. 531.2), later placed in *Chindongo* (Cichlidae.com, undated anonymous 'stub' article). It is not clear what features differentiate these populations, beyond geography. However, Nkhata Bay and Mbamba Bay, although currently a long distance apart for a shoreline-hugging species (around 500km) are directly opposite each other (~60km apart) and were probably quite closely-connected during past lower lake levels. It remains possible that they ought to be considered conspecific (Tawil 2018a). In addition, *C.* sp. 'elongatus ruarwe' found from Ruarwe north to Charo, is stated by Konings (2016a) to be very similar. Although illustrations show specimens with brighter more contrasting colour, this may be due to mood, and no distinguishing features are given. Consequently, it makes more sense to regard any individual from Nkhata Bay with the general *C. elongatus* phenotype with strong black and blue barring as *C.* sp. 'elongatus nkhata blue' on the basis of location, until the taxonomic status of these allopatric populations is resolved.

A specimen of blue-black *C.* sp. 'elongatus' was collected from Nkhata Bay in 2016 by MCGDS (unpublished) and presently allocated to *C.* sp. 'elongatus nkhata blue' (fig. 531.4). A live specimen photographed on the same survey may give a better indication of its usual appearance (fig. 531.3). Phylogenetic analysis indicated that this species is closely related to *C.* sp. 'elongatus nkhata brown'.

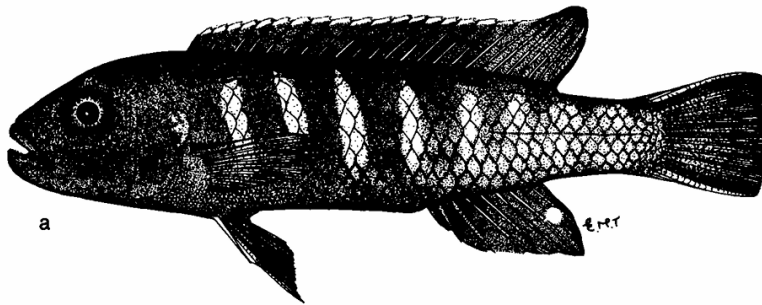


Fig. 531.1: Male *Chindongo* sp. 'elongatus nkhatta blue' from Nkhata Bay, illustrated as *Pseudotropheus elongatus*, from Ribbink et al. (1983).



Fig. 531.2: Male *Chindongo* sp. 'elongatus nkhatta blue' from Nkhata Bay. This is probably not the fully developed territorial/breeding colour [AK].



Fig. 531.3: Male *Chindongo* sp. 'elongatus nkhatta blue' from Nkhata Bay, 19 Feb 2016 [HS].



Fig. 531.4: *Chindongo* sp. 'elongatus nkhatta blue', male, D03-B07, SCUBA, Nkhata Bay, 21 Feb 2016. Sequenced [HS].

MC532. *Chindongo* sp. 'elongatus nkhata brown' MLN

Pseudotropheus 'elongatus Nkhata brown' was first mentioned, but not formally described by Ribbink et al. (1983) and later placed in *Chindongo* sp. 'Nkhata brown' by Tawil (2018c), but is listed as *Chindongo* sp. 'elongatus nkhata brown' on the Cichlid Room Companion website (as of 2025) in an anonymous 'stub' article. It remains undescribed. Ribbink et al. reported the species only from Nkhata Bay, where it was said to be uncommon. Males were described as having a brown body and head, with a reddish tinge. The dorsal fin was brown with a narrow, but marked black submarginal band running its full length, with yellow lappets and a reddish-orange trailing edge to the soft dorsal. The caudal fin was dark brown, orange-red distally and on the upper and lower borders. Anal fin black with a reddish-brown trailing portion and white leading edge; egg-spots yellow, usually 1 or 0. Pelvic fins orange-red posteriorly with black submarginal bands and white leading edges. Females were described as dark chocolate-brown tending to black, with orange-brown trailing edges to the fins. Konings (2016a; fig.532.1) illustrated a male conforming reasonably well to this description, but with faint bluish flank bars and a blue interorbital bar - neither mentioned by Ribbink et al. The illustration of a female shows a prominent eggspot and may be an immature male (fig. 532.2). The only co-occurring 'elongatus-type' known to Ribbink et al. was then regarded as the true *P. elongatus*, which differed in that males were described as being black with blue interorbital bars, having blue wedges along the upper part of the flanks and 2-6 anal fin eggspots; females generally dark grey to black. However, this does not fit well with the species now identified as *Chindongo* sp. 'elongatus nkhata blue' (MC531), formerly *Pseudotropheus* sp. 'elongatus nkhata blue' (Konings 2016a), as the type locality of *P. elongatus* is known to be Mbamba Bay in Tanzania and the distribution of the species now reckoned to be confined to the Eastern (Tanzanian) coast. However, the illustrations of the 'nkhat blue' show full blue barring rather than supralateral wedges (Konings 2016a), but actually the line drawing in Ribbink et al. 1983 figure 9 seems to also show full bars. Irrespective, it appears that any largely brownish mbuna of the elongatus phenotype can be referred to *C. sp. 'elongatus nkhata brown'*.

A single specimen collected from Nkhata Bay was sequenced by the MCGDS (unpublished). The elongate body, shallow-sloping head profile and retrognathous jaws are consistent with a *Chindongo* of the elongatus-morphotype (fig. 532.3). It is uniformly dark brown, but shows rather elongated fins indicating it is probably a male. The absence of eggspots is consistent with 'elongatus nkhat brown' males. Phylogenetically, this specimen clusters with *C. sp. 'elongatus nkhat blue'* but also *Maylandia* sp. 'elongatus chailosi', *Cynotilapia axelrodi* and *Genyochromis mento*, but not with *Chindongo minutus*.



Fig. 532.1: *Chindongo* sp.
'nkhata brown' male [AK].



Fig. 532.2: *Chindongo* sp.
'nkhata brown' female?
[AK].



Fig. 532.3: *Chindongo* sp.
'elongatus nkhata brown',
D01-D02, SCUBA, Nkhata
Bay, 20 Feb 2016 [HS].

MC533. *Chindongo* sp. 'elongatus ornatus' LIK

Pseudotropheus elongatus 'ornatus' was recorded by Ribbink et al. (1983) from Likoma Island, attaining 93mm SL. It was reported from Ndumbi Rocks and Makulawe Point, preferring upper surfaces of large rocks, often in large aggregations. Like many other species with colourful females and juveniles, this species is popular in the aquarium trade. It was reassigned to *Chindongo* by Konings & collaborators. Photos by A. Konings (male above).

**MC534. *Chindongo* sp. 'elongatus ornatus tanzania' TZ**

This population was reported by Konings (2016) from sediment-rich habitats south of Mbamba Bay in Tanzania. It differs from MC533 mainly in female colour, lacking the dark submarginal bands in the dorsal and anal fins. Females may also be whitish. Illustrations suggest males may have fewer flank bars. Photos by A. Konings (male above).



MC535. *Chindongo* sp. 'elongatus ruarwe' MLN

Chindongo sp. 'elongatus ruarwe' (fig. 535.1) was first mentioned, by Ribbink et al. (1983) as *Pseudotropheus elongatus* 'ruarwe', with the same name used by Konings (2007a to 2016a) in a slightly different format, as *Pseudotropheus* sp. 'elongatus ruarwe', later as *Chindongo* sp. 'elongatus ruarwe' (Tawil 2018b).

Ribbink et al. recorded the species as living among small to medium-sized rocks in sediment-free zones from the surface to 15 m. Males defend territories, usually among rocks but sometimes on the upper surfaces. Females and immature males are solitary or wander in small groups on the surface of rocks.

Konings (2016a) considered populations north to Charo to belong to the same species, although they generally showed more black and less blue.

No clear diagnostic features are known to distinguish this species from *C. elongatus*, *C. sp. elongatus nkhata blue* or *C. sp. 'elongatus spot'*, and further study may indicate that all four are best considered conspecific. This population has not yet been sequenced, and is included here because it was considered in the identification of the sequenced *C. sp. elongatus nkhata blue* (MC531).



Fig. 535.1: *Chindongo* sp. 'elongatus ruarwe' male [AK].

MC536. *Chindongo* sp. 'elongatus spot' TZ, MZ

This elongatus population is found at from Liuli in Tanzania to Cobue in Mozambique. The male coloration is similar to some populations of *C. sp. 'elongatus ruarwe'*. Photo of male by A. Konings.

**MC537. *Chindongo* sp. 'elongatus thumbi' MLS**

This elongatus population is known on from the NW coast of Thumbi West Island, at depths of 25m or more (Konings 2016). Females also have dark submarginal bands in the dorsal and anal fins. Photo of male by A. Konings.

**MC538. *Chindongo* sp. 'fuscus dwarf' MZ**

This small (6cm TL), drab, aggressive species is known only from shallow intermediate habitats at Londo in Mozambique. Photo of male by A. Konings.

**MC539. *Chindongo* sp. 'minutus mozambique' MZ**

This small, aggressive species is known only from sediment-free habitats from Undu in Tanzania to Chiloele in southern Mozambique. Photo of male by A. Konings.



MC540. *Chindongo* sp. 'perspicax yellow breast' TZ

This small, aggressive species is known only from Pombo Rocks in Tanzania. Photo of male by A. Konings.



MC541. *Cyathochromis obliquidens* Trewavas 1935, Lakewide

Cyathochromis obliquidens was described by Trewavas in 1935 from numerous specimens collected at both ends of the lake. Unusually, it has remained within the same genus throughout. The genus remains monotypic, and does not appear to have been revised or reconsidered since, and no lectotype has been designated for the species. No definition of the genus has ever been published, but Trewavas provided a key in which it was distinguished from most other mbuna genera entirely on the form of the oral teeth: 'with slender shafts and compressed, spoon-like crowns, those of outer series sloping towards symphysis, with obliquely rounded edge and with a minute lateral cusp ; inner teeth with a broad middle and a pair of minute lateral cusps'. In the key, three other mbuna genera (*Genyochromis*, *Labidochromis* & *Melanochromis*) were previously distinguished from the majority on the basis of their coarser pharyngeal dentition including *Cyathochromis*. No illustration of the whole fish was given, but the teeth were sketched (fig. 541.1). The anterior oral teeth are formed into a wide band (fig. 541.2).

Ribbink et al. (1983) included a detailed description of male and female coloration. Males are subtly coloured in shades of blue-grey, olive-green and yellow-brown, with a prominent dark dorsal fin submarginal band (mainly on the spiny dorsal) and largely black pelvics. The anterior 2/3 of the anal fin is largely black, the posterior region translucent or with a blue sheen, with a few prominent yellow-orange eggspots. Females are generally olive/sandy coloured, countershaded with a prominent dark midlateral band, and a thinner supralateral band on the flanks, both often broken into a series of squarish blotches, along with faint vertical barring, similar to many *Tropheops* and *Petrotilapia* species. Maximum size was given as 112mm SL (Ribbink et al. 1983) or 15cm TL (Trewavas 1935).

The species seems to be widely distributed in suitable habitat, although Ribbink et al. (1983) suggest some subtle variation in the colour of mature males. Fryer (1959) noted that the species is abundant in the 'intermediate habitat' where rocks give way to sand, feeding mainly by scraping biofilm ('aufwuchs') from the surface of the leaves of *Vallisneria* plants and occasionally rocks. However, I have also observed them in reedy areas far from rocks (e.g. fig. 541.7). Both Fryer and Ribbink et al. record gut contents including detritus, algal material and occasional small invertebrates and sand grains. Males are reported to be territorial, and to dig simple craters in the sand, often near rocks.

Three adult male specimens sequenced by MCGDS (unpublished) were collected in shallow water at Chiofu Bay (fig. 541.4) and Nkhata Bay (fig. 541.5). Identity was confirmed by examination of the teeth on preserved specimens. Phylogenetic analysis indicated that *Cyathochromis* is derived from *Petrotilapia*, with the sister taxon being a group of specimens provisionally identified as *P. genalutea* (MC705) from the southern part of the lake (Chiofu, Cape Maclear) but not putative conspecifics from the North (Chilumba, Nkhata Bay).



Fig. 541.1: *Cyathochromis obliquidens*, oral dentition (from Trewavas 1935). a & b: Outer teeth. c: Inner teeth.



Fig. 541.2: *Cyathochromis obliquidens*. lower jaw from Konings (2016a).



Fig. 541.3: *Cyathochromis obliquidens*, male, Cobwe [AK].



Fig. 541.4: *Cyathochromis obliquidens*, male, D10-E06 snorkelling, Chiofu, 29 Feb 2016. Sequenced [HS]



D01-H03



D01-H06

Fig. 541.5: *Cyathochromis obliquidens* males collected by SCUBA, Nkhata Bay, 20 Feb 2016. Sequenced. [HS].



Fig. 541.7: Four *C. obliquidens* with a *P. similis* (top left) among reeds at the mouth of the Ruhuhu, Tanzania, 2015 [GFT].



Fig. 541.6: *Cyathochromis* habitat. Left: *Vallisneria* bed near rocks, Otter Point; Right: individual *Vallisneria* plant showing runners used in vegetative propagation, SE Arm 18 Aug 2006 [GFT].

***Cynotilapia* Regan 1922: species MC542-560.**

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

Type species: *Cynotilapia afra* (Günther 1894)

Contained valid species (5): *Cynotilapia afra*, *Cynotilapia aurifrons*, *Cynotilapia axelrodi*, *Cynotilapia chilundu*, *Cynotilapia zebroides*.

Proposed undescribed taxa (14): *Cynotilapia* sp. 'blue black', *Cynotilapia* sp. 'chilumba deep', *Cynotilapia* sp. 'chinyankwazi', *Cynotilapia* sp. 'elongatus chitimba', *Cynotilapia* sp. 'elongatus mbenji blue', *Cynotilapia* sp. 'elongatus mdoka', *Cynotilapia* sp. 'elongatus ndumbi', *Cynotilapia* sp. 'flavus deep', *Cynotilapia* sp. 'hara', *Cynotilapia* sp. 'lion', *Cynotilapia* sp. 'lion chinyankwazi', *Cynotilapia* sp. 'lion ntekete', *Cynotilapia* sp. 'maleri', *Cynotilapia* sp. 'ndumbi'.

Generic reviews & diagnoses: Regan (1922), Trewavas 1935, Ribbink et al. (1983), Tawil (2011), Konings (2016a), Li et al. (2016).

Generic diagnosis: Li et al. (2016): '1) the teeth of the oral jaws are unicuspid and widely spaced; 2) the ethmo-vomerine block is moderately-sloped (26–41° to the parasphenoid); 3) the lower jaw is strong and usually a little longer than the upper jaw; 4) the cleft of upper and lower jaws forms a 30–42° angle with the body axis. *Cynotilapia* have a few (4–8) large conical teeth in the outer row of the upper and lower jaws.'

Field Diagnosis: Small barred mbuna (males), with unicuspid teeth, lacking the pointed jaws and elongated teeth seen in the *Labidochromis* sp with simple teeth. Females have similar body shapes, but are drabber. Underwater, most species tend to have bright territorial males that dig under stones, but females, immatures and some males float up off the bottom, feeding on plankton in loose groups.

Phylogenetic comments: Sequences indicate that they are close to the blue-black *Maylandia* species. *Cynotilapia axelrodi* appears to be distantly related to the other taxa investigated (*C. afra*, *C. aurifrons*, *C. zebroides*). The relationships of species such as *C. sp.* 'lion' and the *Elongatus* ecomorphs remains unclear.

Ecomorphological notes: All species appear to be strictly confined to rocky habitats, although *C. axelrodi* and *C. sp.* 'lion' tend to prefer areas where small rocks are scattered on a sand/mud bottom. *Cynotilapia zebroides* is often extremely numerous.

MC542. *Cynotilapia afra* (Günther 1894) MLN, MLS, TZ, MZ, LIK, CHI

Hemichromis afer was described by Günther in 1894 from two uniformly dark specimens collected in the southern part of the lake (fig. 542.1). The original illustration shows a paler dorsal fin margin, but there is no trace of anal fin eggspots. This species was identified in many studies with the slender, common mbuna species that generally has strongly vertically barred males (e.g. Fryer 1959; Ribbink et al. 1983; Konings 1989, 1990a, 1995a, 2001, 2007a). Tawil (2011) suggested that *C. afra* is in fact a dark, deep-bodied species (he wasn't clear what it was or where it came from) and that *Microchromis zebroides* Johnson 1975 was in fact a valid species. Konings (2016a) accepted this, although not accepting Tawil's proposal that *Microchromis* could be differentiated from *Cynotilapia*, and further identified *C. afra* with populations with deep-bodied, generally dark-coloured males from Mbenji, Likoma, Chizumulu and the central and southern parts of the East Coast (fig. 542.2-3). Konings proposed that the type locality was probably Chizumulu Island. This species is very similar in body shape to the allopatric, but more colourful *C. aurifrons* (MC543): the two are not known to co-occur, but either form seems to co-exist sympatrically with *C. zebroides* (MC560). The species seems to be largely a plankton-feeder, but is tightly associated with rocky habitats, where males defend territories and dig tunnels under rocks.

Initially identified as this species, a single male specimen of 69.7mm SL from Chiofu Bay was sequenced. A smaller individual of 65.4mm SL in the same collection looks very similar but has not yet been sequenced. The preserved specimens are almost uniformly black, but when pinned before preservation showed a broad orange margin to the soft dorsal and an irregular orange area on the caudal fin, but did not show the conspicuous white dorsal fin margin usually seen in male *C. afra* (fig. 542.2). Both specimens have relatively small numbers of wide, blunt, almost evenly bicuspid teeth in the outer rows of both upper and lower oral jaws and are now referred to a new taxon within the genus *Maylandia* (MC911). Thus, at present, it seems that no sequence is available for *C. afra*.

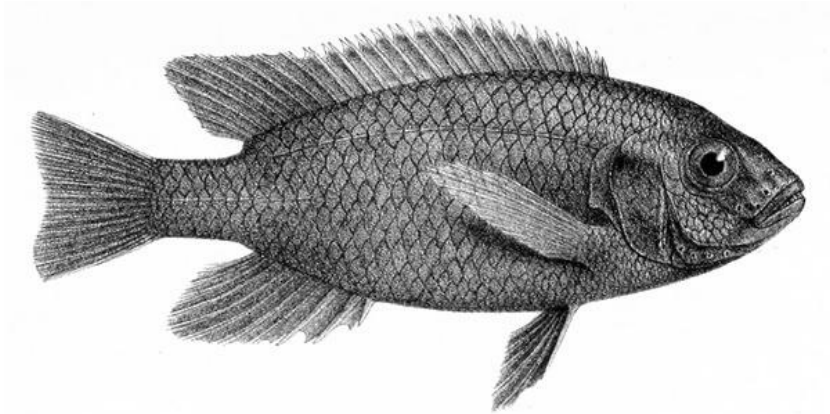


Fig. 542.1: *Cynotilapia afra* type from original description by Günther (1894).



Fig. 542.2: *Cynotilapia afra* male from Mbenji Island [AK].



Fig. 542.3: *Cynotilapia afra* female from Mbenji Island [AK].

MC543. *Cynotilapia aurifrons* (Tawil 2011) MLN

Microchromis aurifrons was described by Tawil in 2011 from specimens collected at Mphanga Rocks, Chilumba, in the north of the lake. Subsequent authors (Konings 2016a; Li et al. 2016) did not agree that *Microchromis* could be reliably distinguished from *Cynotilapia*. The species is generally larger, deeper bodied and lives in deeper water than *C. zebroides*, with which it normally co-occurs. Populations with darker males from Likoma, Chizumulu, Mbenji and the eastern coast are generally assigned to *C. afra*, although these may not really deserve specific status, but could be considered allopatric conspecific populations, in which case *C. aurifrons* would be a junior synonym. The two forms are not known to co-occur. Ribbink et al. (1983) generally assigned populations of this species to *Cynotilapia* 'mbamba'. Mature males around Chilumba generally have a bright yellow dorsal fin and forehead 'blaze' and have very wide black bars on the flanks (fig. 543.1). At Nkhata Bay, the blaze is pale blue-white but the dorsal fins are still largely yellow, and the body more obviously barred black on pale blue (fig. 543.2). Females generally have a yellowish dorsal fin, whereas those of *C. afra* have silvery-grey dorsal fins (Konings 2016a). Ribbink et al. (1983) report that the species most common at depths greater than 10m, and that it occurs down to at least 40m. Males defend territories among rocks, while females and juveniles mostly feed in loose groups about 1-5m above the bottom. They mostly feed on zooplankton and a little phytoplankton, but territorial males sometimes feed from the bottom, and gut contents included a little filamentous alga.

A full genome sequence was obtained from a male specimen collected at Nkhata Bay in 2016 (fig. 543.4) and a further 23 specimens of both sexes collected in 2018 (fig. 543.5-9). These all cluster tightly as a single group, with their sister taxon resolved as an immature male conspecific from Maison Reef, Chilumba, collected in 2023 (fig. 543.10). The closest relative for the *C. aurifrons* group as a whole appears to be a cluster of *C. zebroides* (MC560) specimens also from Nkhata Bay or perhaps *Maylandia emmiltos* and *M. fainzilberi* from Chilumba.



Fig. 543.1: *Cynotilapia aurifrons* male from Luwino Reef, Chilumba, near to the type locality [AK].



Fig. 543.2: *Cynotilapia aurifrons* male from Nkhata Bay [AK].



Fig. 543.3: *Cynotilapia aurifrons* female from Chitande Island, Chilumba [AK].



Fig. 543.4: *Cynotilapia aurifrons*, D03-A08. SCUBA, Nkhata Bay, 21 Feb 2016 [HS].



Fig. 543.5: *Cynotilapia aurifrons*, D33-A01. male, Nkhata Bay, 18 April 2018 [MCGDS].



D33-A02



D33-A03



D33-A04



D33-A05



D33-A06



D33-A07

Fig. 543.6: *Cynotilapia aurifrons*, males, Nkhata Bay, 18 April 2018 [MCGDS].



Fig. 543.7: *Cynotilapia aurifrons*, D33-J10, female, Nkhata Bay, 20 April 2018 [MCGDS].



D34-A01



D34-A02



D34-A03



D34-A04



D34-A05



D34-A06

Fig. 543.8: *Cynotilapia aurifrons*, females, Nkhata Bay, 20 April 2018 [MCGDS].

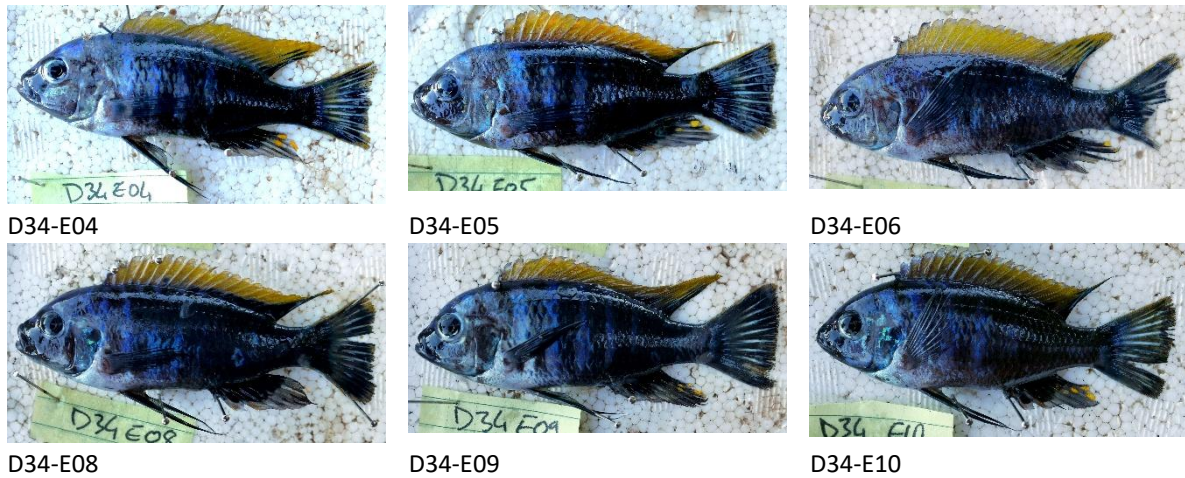


Fig. 543.9: *Cynotilapia aurifrons*, males, Nkhata Bay, 20 April 2018. NB: No photo was found for D34-E07, but it had been recorded as *C. aurifrons* in the field [MCGDS].



Fig. 543.10: *Cynotilapia aurifrons*, probably an immature male, Maison Reef, 15-16m depth, Chilumba, D65-D06, 24 Sept 2023. Examination of the preserved specimen indicates large unicuspid outer row teeth [MCGDS].

MC544. *Cynotilapia axelrodi* Burgess 1976 MLN

Cynotilapia axelrodi was described by Burgess (1976a) from specimens collected by aquarium fish exporters. Dominant males have pale blue bodies and black radial markings on the caudal fin, as well as mainly black pelvic and anal fins. Dark flank bars are sometimes exhibited (fig. 544.1). Females are broadly similar but drabber (fig. 544.2). Like other *Cynotilapia*, it has unicuspid teeth, but closely resembles species with bicuspid teeth, such as *Maylandia pulpican*.

The species was well-documented by Ribbink et al. (1983) and Konings (2016a). It is a popular aquarium fish. It is native to the area around Nkhata Bay to Lion's Cove, where it lives in shallow areas where small rocks are scattered among sand/mud bottoms, usually at depths of 4-10m (Ribbink et al. 1983). Males tunnel under rocks or dig small craters alongside them. Females and non-territorial males feed in the water column in loose schools. They are reported to feed mostly on plankton but occasionally feed on the bottom (Ribbink et al. 1983). It is reported to reach 77mm SL in the wild (Ribbink et al. 1983).

A single specimen was sequenced, collected by M. Genner in 2004 from Nkhata Bay (fig. 544.3). It indicates that the species is not closely related to other *Cynotilapia*, but rather to species of the 'elongatus' group and *Genyochromis*.



Fig. 544.1 *Cynotilapia axelrodi*, male, Nkhata Bay, Feb 2007 [GFT].



Fig. 544.2: *Cynotilapia axelrodi*, female, Nkhata Bay [AK].



Fig. 544.3: *Cynotilapia axelrodi*, 2004.159, Nkhata Bay, 29 October 2004 [MJG].

MC545. *Cynotilapia chilundu* (Li et al. 2016) CHI

This species was formerly known as *Pseudotropheus* sp. 'elongatus taiwan'. With its elongate body shape, yellow tailfin between black upper and lower margins, it looks like a typical 'elongatus' similar to *Chindongo* sp. 'elongatus mphanga' (MC530). However, it has simple teeth, leading to its present generic classification. It has only been recorded from Taiwan Reef, near Chizumulu Island, but in Mozambican waters. Not yet sequenced. Photos by A. Konings (male above).



MC546. *Cynotilapia* sp. 'blue black' MLS

This confusingly named species (most *Cynotilapia* are 'blue black'!) is described by Konings (2016a) as dominating the mbuna community at Three Peaks Reef, which lies deep down (shallowest point 40m depth) between Mumbo Island and Zimbabwe Rock. It is said to resemble a large black-dorsal *Cynotilapia zebroides*, but that species is reportedly introduced at the Cape Maclear area (Ribbink et al. 1983). Illustrations on the website Malawi.si report something fitting this description under the name *Cynotilapia* sp. 'zebra deep', while on the Malawicichlids.com site, a photo by Konings under *C. sp.* 'blue black' is captioned as being from Chinyamwezi Island, which probably means Konings (2016a) would consider this to be MC548 *C. sp.* 'chinyankwazi'.



Photo by Carsten Gissel (malawi.si), labelled as *C. sp.* 'zebra deep' from Three Peaks Reef.

MC547. *Cynotilapia* sp. 'chilumba deep' MLN

There is a single record of a rather battered deep-bodied blue and black male specimen from Chilumba Harbour. It looks a bit like *C. aurifrons*. Photo by M. Genner.

**MC548. *Cynotilapia* sp. 'chinyankwazi' MLS**

This is a large (95mm SL: Ribbink et al. 1983), deep-bodied, schooling, plankton-feeding *Cynotilapia zebroides* form (that species is not reported from this location) living at a wide depth range on both Chinyankwazi and Chinyamwezi Islands, and in a deepwater reef nearby (Konings 2016). Ribbink et al. (1983) report Chinyankwazi males have a dark submarginal band in the dorsal fin, merging with the flank bars extending to the dorsal. Konings (2016) shows a Chinyamwezi male with a completely blue dorsal fin (shown here). Neither mention geographic variation, indeed Konings specifically states that there is none. Ribbink's colour description may refer to MC652 *Maylandia* sp. 'chinyankwazi', which was not distinguished by them.

**MC549. *Cynotilapia* sp. 'elongatus chitimba' MLN**

This is a slender species with unicuspid teeth. It is known from a small patch of rocks isolated in a sandy bay, Chitimba Bay, between Chilumba and the mouth of the South Rukuru River (Konings 2016). The male colours with generally dark fins, contrasting dark submarginal bands on the caudal and flank bars fading to a yellowish underside are common in *elongatus* ecomorphs but not in other *Cynotilapia*. Photo of male by A. Konings.

**MC550. *Cynotilapia* sp. 'elongatus mbenji blue' MLS**

This is a slender species with unicuspid teeth. It is known only from Mbenji Island, where it is reported to feed on plankton as an adult. The male colours with generally dark fins and flank bars fading to a yellowish caudal peduncle and caudal fin are common in *elongatus* ecomorphs but not in other *Cynotilapia*. Photo of male by A. Konings.



***Cynotilapia* sp. 'elongatus mdoka' MLN**

This is a slender species with unicuspid teeth. It is known only from Mdoka (between Ngara and Chilumba), where it is reported to feed on plankton as an adult. Externally, it looks a lot like MC530 *Chindongo* sp. 'elongatus mphanga', which is geographically close, but presumably has bicuspid teeth. Photo of male by A. Konings.



MC552. *Cynotilapia* sp. 'elongatus ndumbi' LIK

This is a slender species with unicuspid teeth. It is known only from a few sites (including Ndumbi Rocks) at Likoma Island. It was originally identified as a member of the *P. elongatus* complex by Ribbink et al. (1983) who reported it attaining 111mmSL and living from the surface to at least 23m depth. They reported it being a benthic feeder, with both sexes defending 'algal gardens' on rock surfaces, but Konings reports it to live in caves and feed on largely on plankton as an adult. Photo of male by A. Konings.



MC553. *Cynotilapia* sp. 'flavus deep' MLS

This is a deepwater species known only from depths of 30-35m or deeper at Chinyamwazi Island and a nearby reef. It resembles species of the 'elongatus complex', such as the more brightly coloured sympatric *Chindongo flavus*. Male, by A. Konings.



MC554. *Cynotilapia* sp. 'hara' MLN

This striking species has appeared in the aquarium trade. It seems to be confined to Gallireya Reef, just south of Chilumba, off the village of Hara. It was originally discussed as *Pseudotropheus* sp. 'zebra hara' (Konings 2004) and as *Cynotilapia* sp. 'zebra hara' (Tawil 2005). Although it has unicuspid outer jaw teeth, it seems to live closer to the substrate than typical *Cynotilapia*. Photos by A. Konings (male above).



MC555. *Cynotilapia* sp. 'lion' MLN, TZ

This small (69mm SL, Ribbink et al. 1983) species has long been in the aquarium trade. Males show substantial geographic variation in background colour and in the extent of black in the dorsal fin (some have a continuous dark band). Females are drab brownish. It has been reported from Mara Rocks to Chadagha on the West coast. Its distribution on the east coast seems to be displaced to the north, straddling the mouth of the Ruhuhu, from Ngwazi to Lundu (Konings 2016). It has also been reported at Nkhata Bay since 1997, probably the result of introduction via the aquarium trade (Genner et al. 2006). However, since the southern end of the presumed natural range is only 9km north of Nkhata Bay along a largely rocky coastline, it may well be native. Although it has unicuspid teeth, it seems to live closer to the substrate than typical *Cynotilapia* and it generally prefers areas where a few small rocks are scattered on a mud/sand bottom at depths of 2-30m (Ribbink et al. 1986).



Photos by A. Konings (male. Lion's Cove, above, Sanga, below).

MC556. *Cynotilapia* sp. 'lion chinyankwazi' MLS

This is a small, dark squat species which Konings (2016) reports is similar to MC655 *Maylandia* sp. 'dumpy'. It seems to be confined to Chinyankwazi Island. *C.* sp 'deep skov' at Three Peaks Reef (malawi.si) might be a conspecific or a close relative. Photo A. Konings (male).



MC557. *Cynotilapia* sp. 'lion ntekete' MLS, MZ

This is another small, squat species which Konings (2016). Males from some populations are dark and resemble MC655 *Maylandia* sp. 'dumpy' (Maleris) or MC 556 *C.* sp. 'lion chinyankwazi' (male, above, from Malopa, A. Konings). However, populations from Meponda (Mozambique) to Makanjila Point (Malawi), vary in male breeding colour, with a bright yellow one at Liwani (below, photo A. Konings, male), formerly known as *Pseudotropheus* sp. 'dwarf gold' (Konings, 2001). Malopa and Liwani are only about 5km apart along a largely rocky coastline, so this is a surprising degree of geographic variation.



MC558. *Cynotilapia* sp. 'maleri' MLS

This is a large, dark, deep-bodied, deep-water species confined to the Maleri Islands (Ribbink et al. 1983; Konings 2016). It resembles *C. afra* & *C. aurifrons*, which are not reported from the Maleris (*C. zebroides* is also absent). It is found mainly at 20-40m depth. There would be good grounds to consider this a population of *C. afra* as currently defined by Konings (2016), see Louw (2025). Photo of male, A. Konings.



MC559. *Cynotilapia* sp. 'ndumbi', MLN, MLS, TZ, MZ, LIK, CHI

This large cave-dwelling species was originally reported by Ribbink et al. (1983) from Ndumbi Rocks, a reef off Likoma. However, Konings (2016) reports a very substantial range: as well as Likoma, Chizumulu (Linganjala Reef) and Taiwanee Reef, the Malawian coast at Mphanga Rocks (Chilumba in the far north), Narungu (near Chiofu), Makokola Reef (SE Arm), the Tanzanian coast at Lupingu, Magunga and Higga, and the Mozambican coast at Chilucha (near Metangula). If this is accurate, it must be one of the most widely distributed and least known mbuna species with the potential to be confused with other species at a range of sites.



Photo by A. Konings: adult male from Linganjala Reef.

MC560. *Cynotilapia zebroides* (Johnson 1975) Lakewide

Microchromis zebroides was described by Johnson in 1975 based on a male of 70mm SL and a female of 63mm SL from collected by an aquarium exporter, reportedly at Likoma Island. The species had long been thought to be *Cynotilapia afra* (e.g. Fryer 1959) and Johnson's name was regarded as a junior synonym (Ribbink et al. 1983; Lewis et al. 1986; Konings 1989, 1990a, 1995a, 2001, 2007a; Zidana et al. 2009), but Tawil (2011) proposed that both genus and species should be recognised as valid. Subsequent authors (e.g. Konings 2016a; Li et al. 2016) did not find the genera to be distinguishable but retained *C. zebroides* as the name for the common, widespread blue and black barred species with unicuspid teeth. Ribbink et al. (1983) give a maximum size of 101mm SL (at Likoma). The species can be identified from its unicuspid teeth, strongly barred males, small size and slender bodies. Dorsal fin colour is very variable, varying from blue-white to yellow with varying degrees of black markings (fig. 560.1). Post-mortem, individuals can become very dark, almost black. The species feeds mainly in midwater on plankton, but territorial males defend a territory among rocks. They dig tunnels under the rocks, which are used as refuges and spawning sites. Individuals occasionally feed on loose material at the bottom. The species is often extremely abundant, particularly at depths of 5-20m, although it can be found to at least 40m depth (Ribbink et al. 1983). The species is not native to most of the southern arms of the lake including the Cape Maclear area, but it has been introduced at Thumbi West Island (Ribbink et al. 1983), from which it is spreading. There has been some discussion of whether they have undergone hybridisation with native *M. zebra* and/or been founded by a variety of source populations (Stauffer & Bowers 1996, Streelman et al. 2004, Zidana et al. 2009). Males from the population from Cobue in Mozambique have a great deal of yellow on their head and nape, and are popular in the aquarium trade: they became established around Nkhata Bay in 2004 (Genner et al. 2006), although it is not clear whether they have persisted. Many individuals were sequenced from Nkhata Bay, Chiofu and Cape Maclear and found to be related to *M. zebra*. In fact, they seem to have evolved independently at least twice.



Fig. 560.1: Male *Cynotilapia zebroides* underwater at Nkhata Bay, 7 Feb 2007 [GFT].



Fig. 560.2: Female *Cynotilapia zebroides* underwater at Nkhata Bay, 2016 [HS].



D09-E09



D09-G08

Fig. 560.3: *Cynotilapia zebroides* at Chiofu are rather dark deep-bodied specimens, collected by SCUBA, 28 Feb 2016. They cluster with *C. zebroides* from Cape Maclear [HS].



D25-D10



D27-J06



D26-E02



D26-F03

Fig. 560.4: A total of 54 specimens of *Cynotilapia zebroides* were sequenced by the MCGDS (unpublished). Shown are representative males, Otter Point, Cape Maclear, Feb 2017 [HS].



2004.157A, 29 October 2004 [MJG].



D01-E05, 20 Feb 2016 [HS].



D01-E08, 20 Feb 2016 [HS].



D01-F04, 20 Feb 2016 [HS].

Fig. 560.5: Four specimens of *C. zebroides* from Nkhata Bay have been sequenced by MCGDS (unpublished), three from the 2016 collection and one from 2004.

MC561. *Genyochromis mento* Trewavas 1935, Lakewide

Described from three syntypes from the south of the lake, *Genyochromis mento* is a distinctive species placed in a monotypic genus. It was distinguished in Trewavas's key by its strongly projecting chin and wide mouth with numerous bands of teeth (fig. 561.1), as well as its enlarged pharyngeal dentition (in common with *Melanochromis* and *Labidochromis*). The scale-eating habits of the species were reported by Fryer et al. (1955), Fryer (1959) and Ribbink et al. (1983). Fryer et al. (1955) suggested that they mainly fed on the scales of cyprinids (*Labeo* spp.). Ribbink et al. (1983) observed that they generally bit pieces off the fins of other cichlids, occasionally rasping scales, but not observing attacks on *Labeo*. Ribbink et al. (1983) also described how the species is highly polymorphic in colour (fig. 561.2-5), describing nine colour forms, including OB and Orange morphs, as well as varieties of black, grey and olive-coloured fish. They described the species as most common over rocks at 3-12m, but occasionally as deep as 40m. They describe it as being solitary and non-territorial. The species can be recognised by its slender body, heavy lower jaw and broad bands of teeth. A single specimen from Chiofu has been sequenced (fig. 561.6), indicating affinities to the 'elongatus' group.

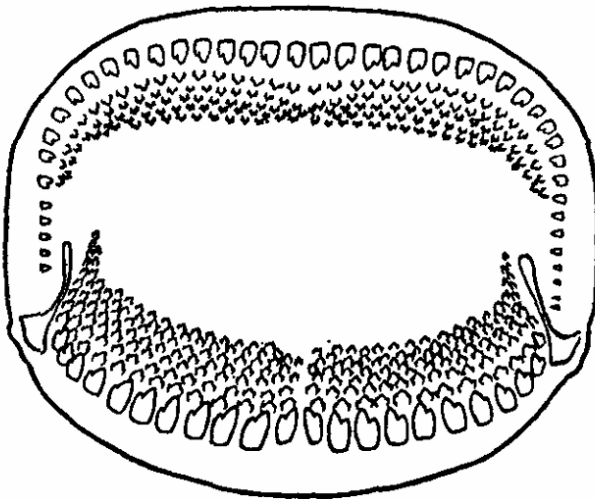


Fig. 561.1: Oral dentition of *Genyochromis mento* from Trewavas (1935).



Fig. 561.2: *Genyochromis mento*, blue-grey, from Higga Reef [AK].



Fig. 561.3: *Genyochromis mento*, orange form from Katala Island, showing heavy lower jaw [AK].



Fig. 561.4: *Genyochromis mento*, blue-finned yellow form from Katala Island, [AK].



Fig. 561.5: *Genyochromis mento*, OB morph from Thumbi West Island, [Mark Smith].



Fig. 561.6: *Genyochromis mento*, 2011.171, Chiofu, 17 Jan 2011 [MJG].

***Gephyrochromis* Boulenger 1901: species MC562-567.**

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

Type species: *Gephyrochromis moorii* Boulenger 1901.

Contained valid species (2): *Gephyrochromis moori*, *Gephyrochromis lawsi*.

Proposed undescribed taxa (4): *Gephyrochromis* sp. 'patricki minos', *Gephyrochromis* sp. 'sand blackfin', *Gephyrochromis* sp. 'sand', *Gephyrochromis* sp. 'zebroides'.

Generic reviews & diagnoses: Boulenger (1901), Trewavas (1935, as *Christyella*), Fryer (1957), Ribbink et al. (1983), Konings (2007b, 2016a). Boulenger erected the monotypic genus based on material collected by Moore, mistakenly attributed to Lake Tanganyika. It was redescribed as *Christyella nyasana* Trewavas 1935, but it was later realised that this was a junior synonym (Trewavas 1946).

Generic diagnosis: From the key in Trewavas (1935): Lower pharyngeal teeth fine, outer (oral) teeth slender, close-set, curved, subconical (this seems to mean strongly unequally bicuspid sometimes becoming conical); lower jaw shorter than upper anteriorly. Konings (2007b) notes that the inner teeth are tricuspid and that the outer teeth form a scoop used for feeding on loose sediment. He also notes that males are non-territorial.

Field Diagnosis: A rather subtly coloured mbuna often found over sand/mud habitats or areas of rock/sand/mud interface, with long slender outer jaw oral teeth forming a 'scoop'.

Phylogenetic comments: Sequences indicate that they are close to the *Maylandia aurora* species complex.

Ecomorphological notes: Generally seem to prefer areas where rocks are mixed with sediment or (particularly *G. moorii*) pure sandy habitats. Seem to be largely sediment feeders.

MC562. *Gephyrochromis lawsi* Fryer 1957, MLN.

Gephyrochromis lawsi was originally described by Fryer in 1957 from specimens collected at Florence Bay (now Chitimba Bay) and Nkhata Bay. He reported that it was generally found at the edges of the rocky habitat, over sand or shingle bottoms. Like other species of *Gephyrochromis*, it has long, slender weakly implanted teeth in the outer row of the lower jaw. These are generally unequally bicuspid, tending to conical. They seem to form a kind of scoop, perhaps used for collecting sediment (Konings 2016a). However, Fryer reports the species as scraping algae from rocks, albeit picking up a lot of sand grains and other material in the process, but he did not have access to SCUBA. The relatively deep body and male breeding dress are distinctive among congeneric species. A single sequenced specimen (fig. 562.3) from Nkhata Bay was related to other *Gephyrochromis* species and members of the *Maylandia aurora* group.



Fig. 562.1: *Gephyrochromis lawsi*, male at Nkhata Bay [AK].



Fig. 562.2: *Gephyrochromis lawsi*, female at Chiwindi, Mozambique [AK].



Fig. 562.3: *Gephyrochromis lawsi*, male, D01-B09, SCUBA, Nkhata Bay, 20 Feb 2016 [HS].

MC563 *Gephyrochromis moorii* Boulenger 1901 MLN (+?)

Gephyrochromis moorii was originally described by Boulenger (1901), but mistakenly attributed to Lake Tanganyika: Moore's collection included specimens from both lakes. Its teeth are similar to those of *G. lawsi*, but it has a more slender body and perhaps paler male breeding dress, although it seems to have the same overall pattern of blue flanks and an orange dorsum. It seems to be found over open sandy areas, and can be obtained from trawls and seine catches. The distinction among the two species is not well defined and probably needs further investigation. It has not yet been sequenced, but tissue samples are available from various collections, including the specimen from Bandawe in 2023 for which the teeth have been examined (fig. 563.2).

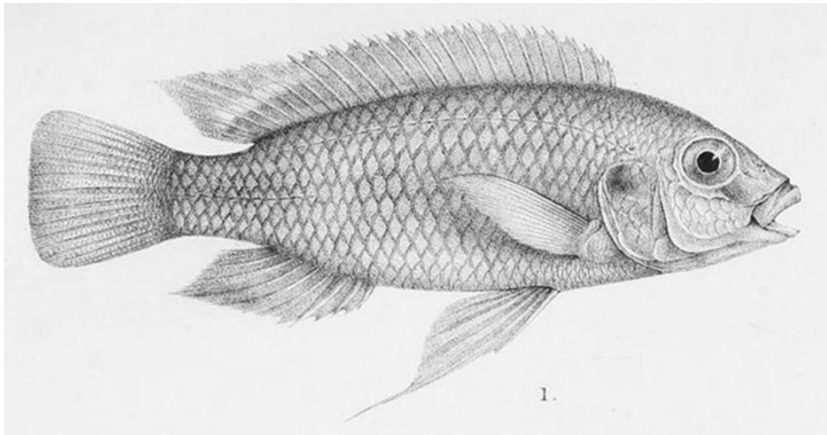


Fig. 563.1: *Gephyrochromis moorii*, type, from Boulenger 1901.



Fig. 563.2: *Gephyrochromis moorii*, male, trawled from Bandawe, 2023 [GFT].

MC564. *Gephyrochromis* sp. 'patricki minos' MZ

This species is known only from underwater photos. It is reported to feed by scooping up loose sediment, much like species of *Gephyrochromis*, so is placed in that genus by Konings (2007, 2016). It was formerly placed in *Metriaclima* (=Maylandia) by Konings (2001). It resembles MC678 *M. sp.* 'zebra patricki' which feeds on algae on rocks and is found in the south-west of the lake (Mbenji, Namalenji, Maleri Islands). 'Patricki minos' is reported only from Minos Reef in Mozambique. Photos by A. Konings (male above).

**MC565. *Gephyrochromis* sp. 'sand blackfin' TZ**

This species was originally regarded as a *Tropheops*, but was reassigned to *Gephyrochromis* based on its feeding behaviour and dentition. It is known only from Tanzania, north of Lundu, and frequents sandy areas (Konings 2016). Photos by A. Konings (male above).

**MC566. *Gephyrochromis* sp. 'sand' TZ, MZ, LIK**

This species was originally regarded as a *Tropheops*, but was reassigned to *Gephyrochromis* based on its feeding behaviour and dentition. It is known only from Liuli in Tanzania, from Londo in Mozambique. A population has also been reported from Membe Point in Likoma. It frequents sandy areas (Konings 2016). Photos by A. Konings (male above).



MC567. *Gephyrochromis* sp. 'zebroides' MLS

This species was first identified by Konings (1995a) from specimens observed in the Chiofu Bay area, in the southeastern part of Lake Malawi near the Malawi/Mozambique border. However, it appears to have a wider distribution, ranging north to Metangula but also being found on the NW coastline in areas such as Ruarwe (Konings 2007b). Females are pale with dark vertical bars and a prominent dark submarginal band trimmed with white in the dorsal fin (fig. 567.4). The anal fin has a broad dark margin. Males are dark brownish and apparently non-territorial (fig. 567.2-3). A very similar species is illustrated as *Labidochromis* sp. 'zebra eastern' (Konings 2016a, fig. 567.5). This is also known from Chiofu, but the two species are not directly compared, despite being discussed only 4 pages apart in the chapter on 'intermediate habitats' (*Gephyrochromis* sp. 'zebroides' on page 212, *Labidochromis* sp. 'zebra eastern' on page 216). If they are different, perhaps the *Labidochromis* sp. has a slightly larger number of vertical bars (7 v 5 under the dorsal fin) and that are less tapered, but this is based on relatively few photographs. Two apparent female specimens collected from Chiofu in 2016 were sequenced (fig. 567.6-7). They are placed in a clade including *G. lawsi*, but actually as sister to *Maylandia aurora* (MCGDS unpublished).



Fig. 567.1: *Gephyrochromis* sp. 'zebroides': oral teeth conform to the generic diagnosis [AK].



Fig. 567.2: *Gephyrochromis zebroides*: male from Ntekete, near Choifu [AK].



Fig. 567.3: *Gephyrochromis zebroides*: male from Choifu [HS].



Fig. 567.4: *Gephyrochromis zebroides*: female from Narungu, near Chiofu [AK].



Fig. 567.5: *Labidochromis* sp. 'zebra eastern' photographed at Chiofu by Konings [AK].



Fig. 567.6: *Gephyrochromis* sp. 'zebroides', D07-H01, SCUBA, Chiofu, 27 Feb 2016 [HS].



Fig. 567.7: *Gephyrochromis* sp. 'zebroides', D09-F01, SCUBA, Chiofu, 28 Feb 2016 [HS].



Fig. 567.8: *Gephyrochromis* sp. 'zebroides', male, D10-J03, not sequenced, SCUBA, Chiofu, 28 Feb 2016 [HS].

***Iodotropheus* Oliver & Loiselle 1972: species MC568-570.**

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

Type species: *Iodotropheus spregerae* Oliver & Loiselle 1972.

Contained valid species (2): *Iodotropheus spregerae*, *I. stuartgranti*.

Proposed undescribed taxa (1): *I.* sp. 'londo'.

Synonyms (1): *I. declivitas* (= *I. sprengerae*).

Generic reviews & diagnoses: Oliver & Loiselle (1972) described the genus, then monotypic. No diagnosis was given, although in the discussion of 'affinities' it was stated that possession of a frenum (fleshy skin fold) on the upper lip was unique among mbuna (=Pseudotropheina), although the authors admitted that this feature was often developed to a variable extent in specimens below 50mm SL. Lewis (1982), revising *Labidochromis*, considered *Iodotropheus* to share many traits with that genus, including a narrow dental arcade, elongate anterior teeth which decrease in size from the symphysis outwards and a short, downcurved, beaklike ethmovergine block. *Iodotropheus* has bicuspid outer teeth, as do a few *Labidochromis*, but the major cusp in *Iodotropheus* is formed into a squarish flange. The lower jaw of *Iodotropheus* is heavy and strongly prognathous, particularly in larger specimens, rather than isognathous or retrognathous. The occurrence of the frenum was also noted in some *Labidochromis*, so was no longer considered diagnostic for *Iodotropheus*. Konings (1990b) described *I. stuartgranti*, a species without the strongly prognathous jaws of the type species, but did not formally revise or diagnose the genus. Konings (1990b) mentioned that the jaws are narrow and rounded, and noted the presence of a frenum, although pointing out that it generally less well-developed in specimens he has examined, and tends to be shown more obviously in over-large specimens reared in captivity. Stauffer (1994) described *I. declivitas* (regarded as a junior synonym of *I. sprengerae* by Konings 2016a), again without revising the genus. He mentioned the brownish colour as distinctive, but this was shared with species of *Labidochromis* (Tawil 2013a).

Generic diagnosis: Essentially, there has never been a formal diagnosis.

Field Diagnosis: Rather subtly coloured, small mbuna, similar to *Labidochromis* but with less exaggerated teeth.

Phylogenetic comments: Sequences indicate that they are close to (or nested within) *Labidochromis*.

Ecomorphological notes: *Iodotropheus* are small, inconspicuous, non-territorial rocky shore cichlids tending to pick at rocky substrates.

MC568. *Iodotropheus* sp. 'londo' MZ

This little-known species from the northern Mozambique coast (Londo to Msuli*) has not been sequenced, or indeed even collected. It was first identified by Konings in 2007a. Tawil (2013a) has questioned its assignment to *Iodotropheus*, suggesting the head shape and colour may fit better with one of the 'elongatus' complex.

*In Konings (2016a), localities Msuli, Mesuli and Mesule may all be the same.



Male, Mesuli [AK].

MC569. *Iodotropheus sprengerae* Oliver & Loiselle 1972 MLS

This small, subtly-coloured fish has been a major aquarium species for decades, but has been little studied in the wild and actually has quite a small distribution in rather marginal habitat patches. It was first described by Oliver and Loiselle (1972) from 8 specimens up to 83mm SL obtained through the aquarium trade. Ribbink et al. (1983) reported a maximum size of 94mm SL. Females are brown, males orange-brown, sometimes with violet flanks, and a dark submarginal band in the dorsal fin and blue-white lappets (fig. 569.1, 2). Oliver & Loiselle (1972) reported the species only from Boadzulu Island (locality a personal communication from aquarium fish exporter Peter Davies). Ribbink et al. (1983) also observed it at Chinyamwezi and Chinyankwazi Islands, where they reported males to have more orange-red colour and less purple than at Boadzulu. Konings (2016a) illustrates a specimen from Makokola Reef, on the SW coast of the SE Arm. Stauffer (1994) described the Boadzulu population as *I. declivitas*, suggesting that Oliver & Loiselle's specimens may actually have been from the more northern islands. Konings (1995a, 2016a) regarded *I. declivitas* as a junior synonym. Like many *Labidochromis* species, *I. sprengerae* is a non-territorial, solitary species that picks a range of food items from among the biocover.

The species has not been sequenced. A sequence labelled as *I. sprengerae* was obtained by Malinsky et al. (2018) and used in the analyses of Scherz et al. (2022). The voucher specimen has subsequently been located and re-examined: it is now identified as MC766 *Pseudotropheus* sp. 'variable eastern'. That species is closely related to *Labidochromis*, and it seems likely that the same is true for *Iodotropheus*.



Fig. 569.1: *Iodotropheus sprengerae*, male, Boadzulu Island [AK]



Fig. 569.2: *Iodotropheus sprengerae*, male, Makokola Reef [AK]

MC570. *Iodotropheus stuartgranti* Konings 1990b. MLS, MZ

Iodotropheus stuartgranti is known from the coast between Makanjila and southern Mozambique, being recorded from Chiofu, Gome, Masinje (all MLW) and Meponda (MZ). It is very similar to the sympatric *Labidochromis vellicans*, but differs in having bicuspid dentition. Not yet sequenced.



Male (Chiofu), female (Meponda) [AK].

***Labeotropheus* Ahl 1926: species MC571-572; 888-909, 914.**

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

Type species: *Labeotropheus fuelleborni* Ahl 1926.

Contained valid species (8): *L. artatorostris*, *L. aurantinfra*, *L. chlorosiglos*, *L. chirangali*, *L. fuelleborni*, *L. rubidorsalis*, *L. simoneae*, *L. trewavasae*. In addition to the two long established species *L. fuelleborni* and *L. trewavasae*, I recognise as valid 6 of the taxa described by Pauers (2016, 2017) or Pauers and Phiri (2023). These are all recognised by Fricke et al. (2026), but not Konings (2024).

Junior synonyms (1): *Labeotropheus curvirostris* Ahl 1926 (see *L. fuelleborni* MC571).

Taxa of disputed status (2): *L. alticodia*, *L. obscurus*. These two species (Pauers & Phiri 2023) are regarded as junior synonyms of *L. artatorostris*. They are recognised as valid by Eschmeyer's Catalog (Fricke et al. 2026), but not by Konings (2024). They are both given MC numbers, illustrated and discussed below.

Undescribed species (14): *L. sp.* 'chirwa orange'; *L. sp.* 'fuelleborni Chinyankwazi'; *L. sp.* 'fuelleborni chinyamwezi'; *L. sp.* 'fuelleborni maison'; *L. sp.* 'fuelleborni nakantenga'; *L. sp.* 'fuelleborni red top eastern'; *L. sp.* 'fuelleborni red top chidunga'; *L. sp.* 'makanjila'; *L. sp.* 'trewavasae blackdorsal'; *L. sp.* 'trewavasae maingano'; *L. sp.* 'trewavasae maison'; *L. sp.* 'trewavasae mumbo blue dorsal'; *L. sp.* 'trewavasae nakantenga'; *L. sp.* 'trewavasae orange'. These common names are proposed *de novo* in the present document.

Generic reviews & diagnoses: Ahl (1926), Trewavas (1935), Fryer (1956b).

Generic diagnosis: Ahl (1926, translated): "Body oblong-oval, the upper head profile strongly convex; jaws with several rows of tricuspid teeth, the outer cusps of which are as long as the central cusp, forming a narrow band; the outermost row somewhat enlarged, but also consisting of tricuspid teeth; upper jaw with a row of conical teeth on each side, more or less differentiated, sometimes with a hint of lateral cusps, some or all larger than the last tricuspid teeth; lower jaw short and broad, the lateral margin of the narrow band of teeth not curved inwards; mouth entirely inferior, nose strongly projecting. Dorsal fin with 17-18 spines, Anal fin with III spines. Scales cycloid." Trewavas (1935) keys the genus out among the mbuna group (not yet called that) by having small pharyngeal teeth, tricuspid teeth and 'mouth inferior-subterminal; teeth fixed, slightly and gradually narrowing to base, in narrow bands; lower jaw without lateral series'.

Field Diagnosis: Mbuna with a prominent 'nose' and underslung mouth.

Phylogenetic comments: Sequences indicate that *Labeotropheus* is monophyletic and quite genetically distinct from other mbuna.

Ecomorphological notes: Species are confined to rocky shores: the deep-bodied 'fuelleborni-ecomorph' in shallower water than the slender 'trewavasae' ecomorph, allowing it to colonise areas with a shallow rock-sand interface.

MC571. *Labeotropheus fuelleborni* Ahl 1926

MLN, MLS, TZ, MZ, LIK

The species was described twice by Ahl in a 1926 paper (sometimes listed as 1927), as *L. fuelleborni* and *L. curvirostris*. The latter was considered a junior synonym by Trewavas (1935). The type material for both proposed species was collected from the same location: Langenberg (modern Lumbila), Tanzania (fig. 571.3). The genus was considered monotypic until Fryer (1956b) described a more slender species as *L. trewavasae* (MC572). Ribbink et al. (1983) documented extensive geographic colour variation but refrained from giving common names to the different populations. More recently, four additional species of the *L. fuelleborni* ecomorph have been named, with geographically restricted distributions. To be consistent, I have given common names to other geographic variants, and attempted to identify the geographic range of *L. fuelleborni* (fig. 571.1-2). Males on the Tanzanian shores all seem to have a similar colour pattern, of pale blue with darker blue vertical flank barring and stronger dark bars across the snout (fig. 571.4, 571.5), so this could be assumed to be the 'true' *Labeotropheus fuelleborni* phenotype. The male phenotype from Nkhata Bay is essentially identical and could provisionally be regarded as conspecific with the Tanzanian form (fig. 571.6). Specimens sequenced by the MCGDS (unpublished) conform to this phenotype (fig. 571.7). Sequenced male specimens from Chiofu Bay were very deep-bodied and had orange pelvic fins (fig. 571.8-9), much like those from Maingano Island on Likoma (fig. 571.10). For now, these too are provisionally regarded as *L. fuelleborni*. Females are generally brownish-grey with faint dark flank bars, although OB and O morph females are known at some localities (e.g. fig. 571.11). Like other LF ecomorph populations, they tend to inhabit shallow, often high-energy habitats, scraping biofilms from rock surfaces. Males tend to hold territories at the deeper end of the species range, which is often around 5m, but sometimes as deep as 10m or occasionally more. Females and juveniles tend to live in shallower water, often in groups.

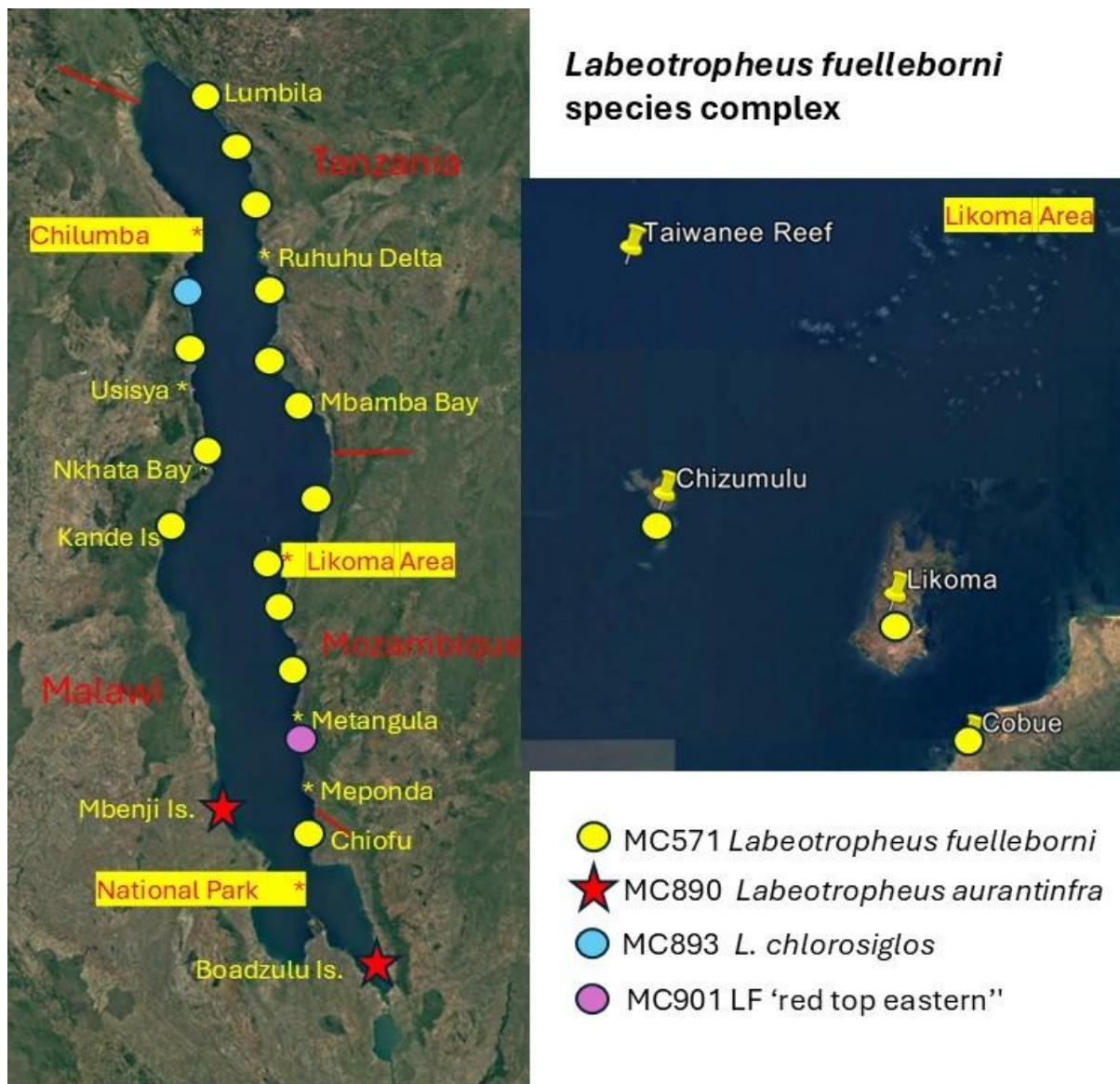


Fig. 571.1: As presently understood, *Labeotropheus fuelleborni* sensu stricto has a wide distribution along the northern and central shores of the lake but is replaced by ecophenotypically equivalent taxa (LF ecomorphs) in the south and the far north-west, as well as a region of the Mozambican shore around Minos Reef.

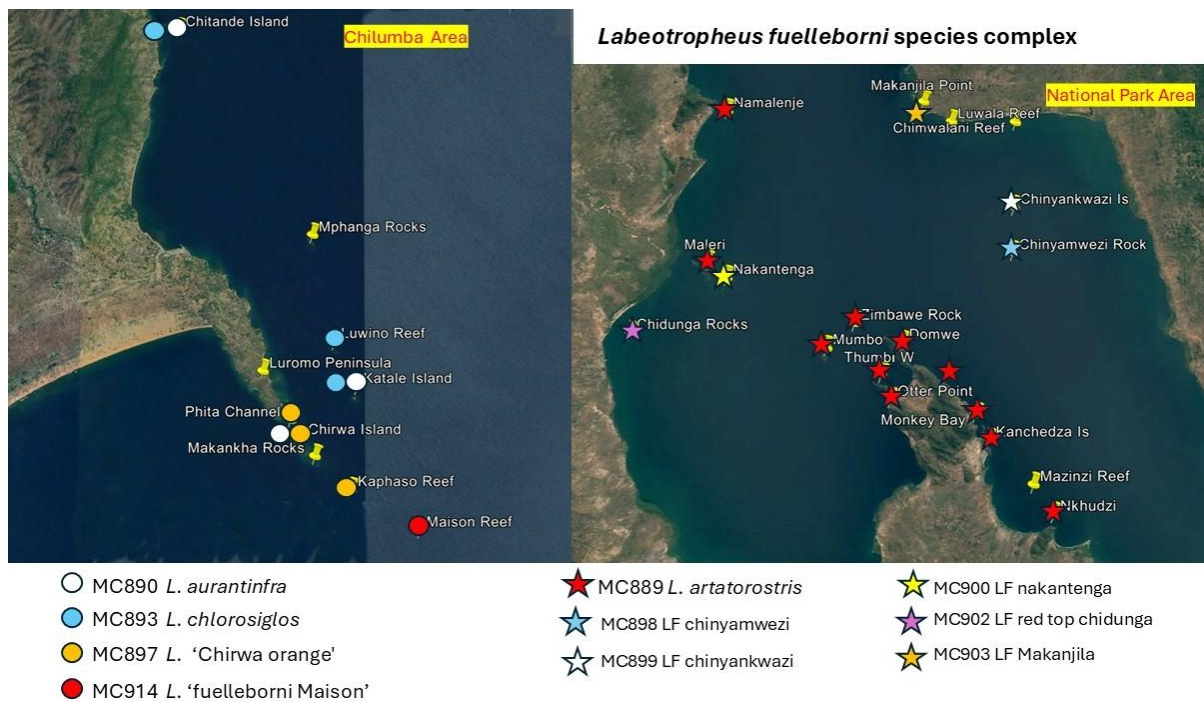


Fig. 571.2: Numerous *Labeotropheus* 'fueleborni ecomorphs' are found at Chilumba and in the south of the lake. In the south, a single taxon (*L. artatorostris*) appears to dominate with 5 other phenotypes found in small isolated habitat patches. At Chilumba, the situation is more complicated, with a mosaic of species, sometimes with two co-existing at the same site.



Fig. 571.3: Lectotype of *Labeotropheus fueleborni* from Lumbila, Tanzania [AK].



Fig. 571.4 : Adult male *Labeotropheus fueleborni* from Ikombe, Tanzania [AK].



Fig. 571.5 : Adult male *Labeotropheus fueelleborni* from Manda, Tanzania, 6 Apr. 2003 [Josh Hellon, GFTLab].



Fig. 571.6: Adult male *Labeotropheus fueelleborni* from Nkhata Bay, Malawi [AK].



Fig. 571.7: *Labeotropheus fueelleborni*, D72-E08, Nkhata Bay, 5 Oct 2023. The broad dark flank stripes are probably a response to capture [MCGDS].



Fig. 571.8: *Labeotropheus fueelleborni*, D10-C03, male, SCUBA, Chiofu, 29 Feb 2016 [HS].



Fig. 571.9: *Labeotropheus fuelleborni*, freshly collected, Chiofu Bay, 29 Feb 2016 [HS].



Fig. 571.10: *Labeotropheus fuelleborni*, MWA2131, male, SCUBA, Maingano Island, Likoma, 2023 [HS lab].



Fig. 571.11: *Labeotropheus fuelleborni*, D09-A02, female OB morph, SCUBA, Chiofu, 28 Feb 2016 [HS].

MC572. *Labeotropheus trewavasae* Fryer 1956b MLN, MLS, TZ, MZ

Labeotropheus trewavasae was described by Fryer (1956b) from specimens collected at Nkhata Bay. It was distinguished from *L. fuelleborni* primarily on the basis of its relatively shallower body. Males of this population are vivid powder blue with a slightly darker snout and a dark bar between the eyes, with some orange spots in the dorsal fin, as well the usual vivid yellow anal fin eggspots (fig. 572.3). Females are brown, although OB morph individuals are known (fig. 572.4). Studies by Ribbink et al. (1983) identified equivalent populations often with different male breeding colours, from a number of sites around the Malawian part of the lake and noted their distribution was rather disjunct, whereas that of *L. fuelleborni* was more continuous. Pauers (2016, 2017) and Pauers & Phiri (2023) published names for local colour forms of slender bodied *Labeotropheus* now regarded as valid species by Fricke et al. (2026). Molecular studies in progress generally support a model of local diversification of southern and northern populations, which often results in similar colour forms evolving independently in different parts of the lake, as previously shown for *Maylandia* species by Allender et al. (2003). Thus, I propose to restrict *L. trewavasae* to populations phenotypically similar to the Nkhata Bay fish in northern and central/eastern parts of the lake, apart from Chilumba where there appears to be a high level of local endemism in a number of mbuna groups (fig. 572.1-2) Thus, populations provisionally assigned to *L. trewavasae* include those at Mara Rocks, Kande Island, Lupingu (TZ), Kirondo (TZ), Chiloele (MZ) and Ntekete (MLW) (Konings 2016a, 2024).

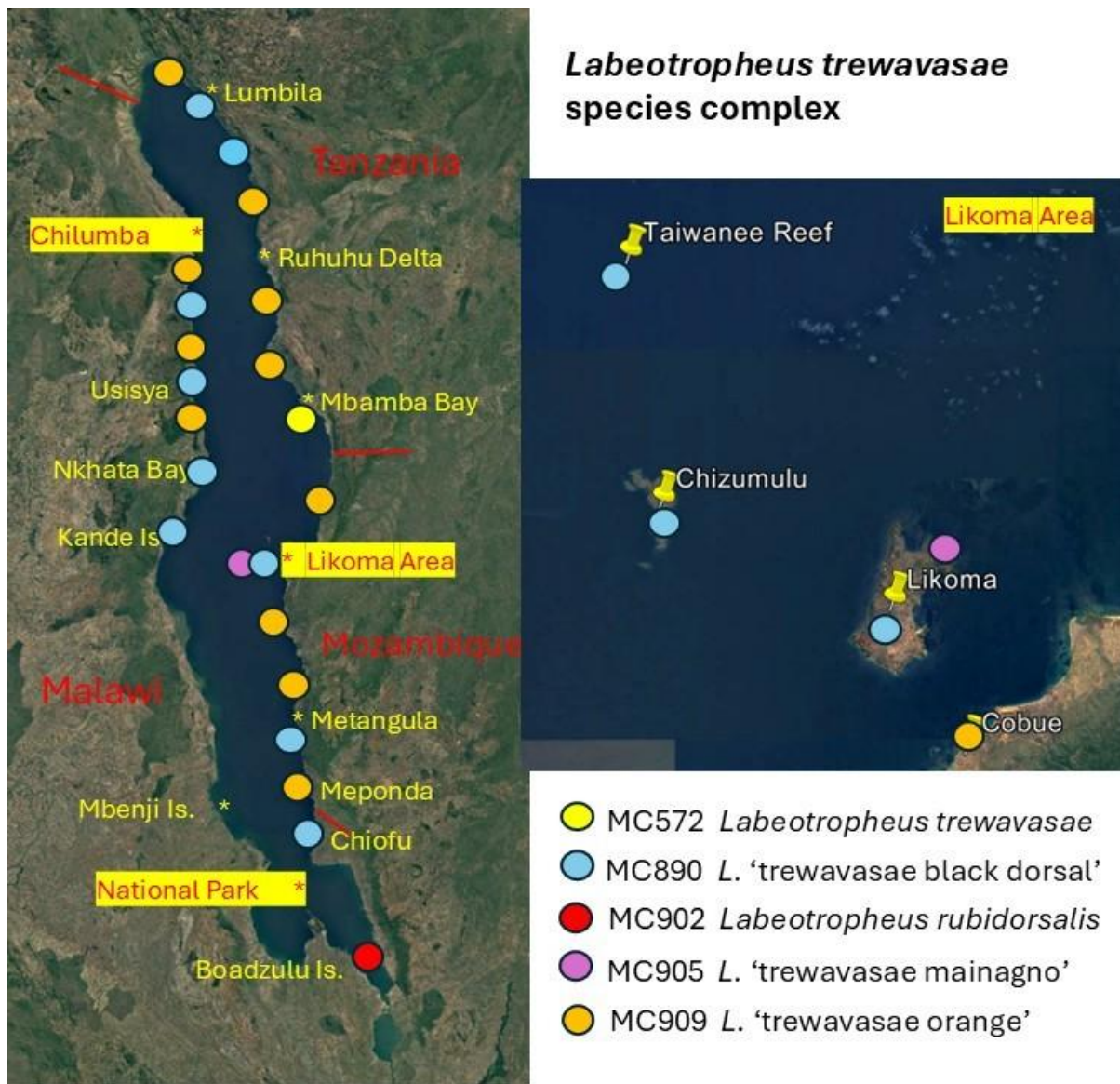


Fig. 572.1: *Labeotropheus trewavasae sensu stricto* has a patchy distribution interspersed with populations of an orange-sided phenotype (mainly MC909), and in the south is largely replaced by the red-dorsal MC902.

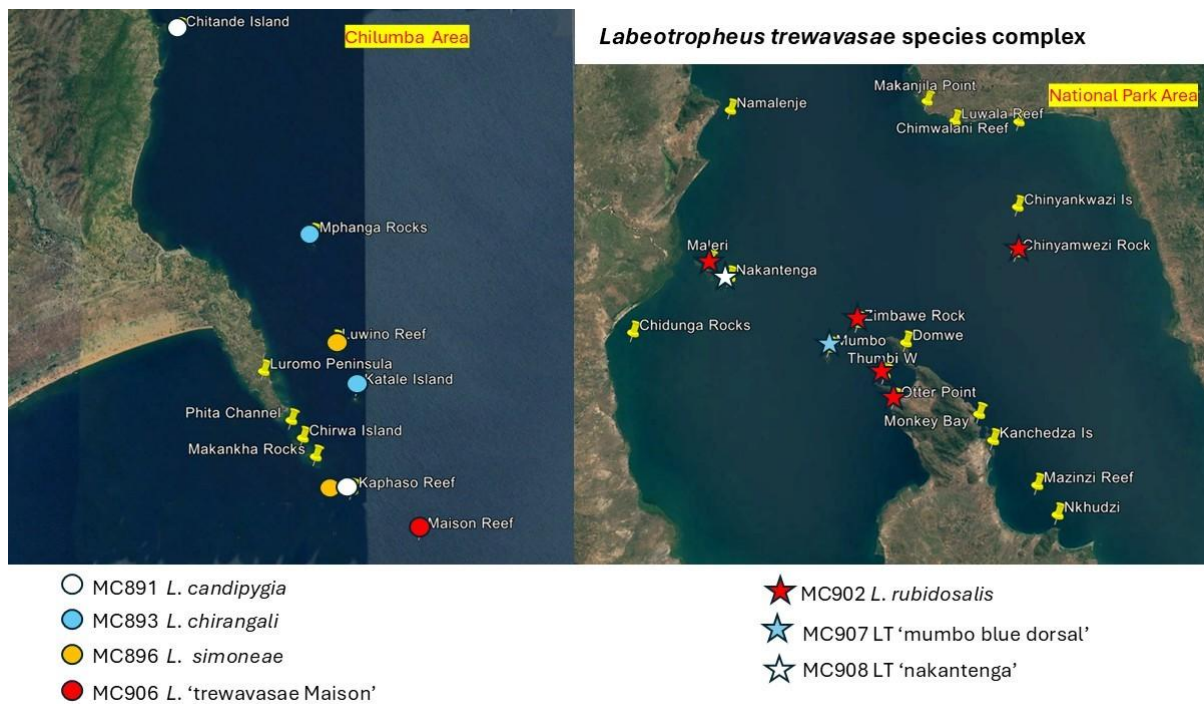


Fig. 572.2: Populations of the *Labeotropheus trewavasae* ecomorph at Chilumba show a lot of diversity in colour and shape. In the south, they are mostly the red-dorsal *L. rubidorsalis*: the isolated blue dorsal populations on Mumbo and Nakantenga seem to be derived from *L. rubidorsalis* and are not genetically close to the northern blue-dorsal *L. trewavasae sensu stricto*.



Fig. 572.3: *Labeotropheus trewavasae*, male, Nkhata Bay, 19 Feb 2016 [HS].

Fig. 572.4: *Labeotropheus trewavasae*, OB female, Nkhata Bay, 19 Feb 2016 [HS].



Fig. 572.5: *Labeotropheus trewavasae*, male, Nkhata Bay, D72-D03 [MCGDS].



Fig. 572.6: *Labeotropheus trewavasae*, female, plain morph Nkhata Bay, D72-C06 [MCGDS].



Fig. 572.7: Male *Labeotropheus trewavasae* underwater at Kande Island 19 Apr 2018 (screenshot from video clip) [GFT].

***Labidochromis* Trewavas 1935: species MC573-614.**

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

Type species: *Labidochromis vellicans* Trewavas 1935.

Contained valid species (18): *Labidochromis caeruleus*, *L. chisumulae*, *L. flavigulis*, *L. freibergeri*, *L. gigas*, *L. ianthinus*, *L. joanjohnsonae*, *L. lividus*, *L. maculicauda*, *L. mathotho*, *L. mbenjii*, *L. mylodon*, *L. pallidus*, *L. shiranus*, *L. strigatus*, *L. textilis*, *L. vellicans*, *L. zebroides*.

Junior synonyms (1): *Melanochromis exasperatus* Burgess 1976b = *Labidochromis joanjohnsonae*.

Taxa of disputed status (1): *L. heterodon* Lewis 1982 may be a junior synonym of *Labidochromis mathotho* Burgess & Axelrod 1976.

Proposed undescribed species (23): *L. sp* 'blue bar', *L. sp* 'caeruleus brown', *L. sp* 'caeruleus chilucha', *L. sp* 'caeruleus jalo', *L. sp* 'chisumulae mbweca', *L. sp* 'gigas chidunga', *L. sp* 'gigas chilumba', *L. sp* 'gigas cobwe', *L. sp* 'gigas lupingu', *L. sp* 'gigas mara', *L. sp* 'gigas pombo', *L. sp* 'hong'i', *L. sp* 'hora', *L. sp* 'likomae', *L. sp* 'lividus mozambique', *L. sp* 'lividus nkhungu', *L. sp* 'lundu blue', *L. sp* 'mara', *L. sp* 'mbamba', *L. sp* 'perlmutt', *L. sp* 'textilis blue', *L. sp* 'textilis cobalt', *L. sp* 'zebra eastern'.

Generic reviews & diagnoses: Trewavas (1935), Lewis (1982).

Generic diagnosis: Originally based on having enlarged, simple, forward-pointing teeth (Trewavas 1935), later refined by Lewis (1982): 'Small lithophilous fishes rarely exceeding 100mm in total length which inhabit the rocky littoral zone of Lake Malawi's shore and islands. Snout narrow and more or less acutely pointed in a horizontal plane. Mouth pointed with acute or subacute upper and lower outer tooth bands. Anterior outer teeth in both jaws elongate with a strong tendency to be procumbent, usually visible when mouth is closed and often touching at their tips to form a forceps-like apparatus. A sharp to moderate gradation in size of outer teeth from the symphysis outwards. Anterior outer teeth in both jaws unicuspid, bicuspid with one cusp much reduced, or mixed unicuspid and bicuspid. Premaxillary pedicel long relative to dentigerous arm of premaxilla (1.1-1.5 times length of dentigerous arm, cf. 0.7-0.9 in all other mbuna examined and 0.9 in *Astatotilapia calliptera*). Neurocranium with a short downcurved beak-like ethmovomerine process.'

Field Diagnosis: Mbuna with a very small, pointed mouth and a few forward-projecting, enlarged teeth.

Phylogenetic comments: Sequences indicate that *Labidochromis* is quite closely related to *Abactochromis*, *Chindongo minutus* and then to *Melanochromis*.

Ecomorphological notes: Most species are confined to rocky shores, where most of them exist at low densities, inconspicuously foraging singly, picking small items from among the rock surfaces. *Labidochromis shiranus* has been found in the Upper Shire River, near the

concrete supports of a bridge, suggesting it lives on rocks scattered in soft-bottomed habitats (Lewis 1982).

MC573. *Labidochromis caeruleus* Fryer 1956 MLN, TZ, MZ

Fryer (1956a) described this species from 7 specimens collected at Nkhata Bay. He described it as light cobalt blue, tending to white in some specimens, and showed an illustration of a specimen with a thick dark submarginal band in both the dorsal and a similar marginal band in the anal and pelvic fins. Faint vertical barring was noticed in the whitish specimen and males were reported to have a single bright orange anal fin spot. The pharyngeal bone was noted to have heavier dentition than that of *L. vellicans*, then the only known species in the genus. The largest measured specimen was 61mm SL, 75mm TL. Ribbink et al. (1983) and Lewis (1982) noted that only courting male showed a hint of blue iridescence and in fact the normal colour of both sexes was white. Lewis also noted that some individuals had extremely robust pharyngeal jaws and that their gut contents were almost exclusively small gastropods (*Gabbiella stanleyi*) that are found among *Vallisneria* beds. Those with less robust pharyngeal jaws fed mainly on arthropods. Very similar white species were described from the south of the lake by Lewis (1982): *L. mylodon* from Mumbo Island has unequally bicuspid teeth and heavy pharyngeal dentition and lacks black markings in the fins; *L. pallidus* from the Maleris and Thumbi West has bicuspid outer teeth, lightweight pharyngeal dentition, is more buff/olive than pure white and has a black submarginal band in the anal fin. These appear to be geographical sister species. Both sexes of the population of *L. caeruleus* from around Lion's Cove to Mbowe are bright yellow with black dorsal and anal fin bands, as well as largely black pelvics (Konings 2016a). This population has become widely established as the 'yellow lab', probably the most commonly kept domestic strain of any Lake Malawi cichlid. Konings (2016a) also assigns a number of populations from the east coast to this species, including some where individuals are heavily barred, even on a blue blue background colour – they look a lot like *L. chisumulae*. The single sequenced specimen was collected from the type locality, Nkhata Bay, and seems unambiguously to be *L. caeruleus* (fig. 573.2).



Fig. 573.1: *Labidochromis caeruleus* from Nkhata Bay, the type locality [AK].



Fig. 573.2: *Labidochromis caeruleus*, D03-A07, SCUBA, Nkhata Bay 21 Feb 2016, sequenced [HS].

MC574. *Labidochromis chisumulae* Lewis 1982 CHI

The species is endemic to Chizumulu Island. Females and immatures are white, like those of many populations of *L. caeruleus*, and it appears to be a geographic complementary species. Photos by A. Konings (male above).



MC575. *Labidochromis flavigulis* Lewis 1982 LIK, CHI

The species is endemic to Likoma and Chizumulu Islands. Both sexes have numerous horizontal orange lines on the flanks and spots on the fins. Males are a bit brighter, with more blue and black. It is reported to be an algal feeder. Photos by A. Konings (male above).



MC576. *Labidochromis freibergi* Johnson 1974 LIK, MLS

The small shallow-water species is endemic to Likoma. It is very similar to *L. zebroides* which is also endemic to Likoma, but confined to Masimbe Island. *L. freibergi* has bicuspid outer teeth, contrasting with the simple teeth of *L. zebroides*. Introduced to Thumbi West Island. Photos by A. Konings (male above).



MC577. *Labidochromis gigas* Lewis 1982 MLS, LIK, CHI

This species was described from nine males collected at Likoma Island (Lewis 1982). Ribbink et al. (1983) reported a maximum size of 100mm SL, the largest of the *Labidochromis* they recorded. They recorded the species from Likoma and Chisumulu Islands, with introduced populations at Thumbi West I. and Otter Point. It has recently also been reported at Mumbo Island, probably translocated from Thumbi West. Ribbink et al. reported a preference for medium-sized rocks at 6-12m, but with a maximum depth of at least 30m. It was reported to be herbivorous with unicuspid outer teeth (Lewis 1982, Ribbink et al. 1983). Mature males are pale blue and females/immatures brown (fig. 577.1-2): males often show stronger barring and dark bars between the eyes. A single specimen from Thumbi West Island was sequenced by Scherz et al. (2022). A single specimen from the same location is available in the MCGDS collection, but has not yet been sequenced (fig. 577.3).



Fig. 577.1: *Labidochromis gigas*, male, Machili Island, Chizumulu [AK].



Fig. 577.2: *Labidochromis gigas*, female, Thumbi West Island, [AK].



Fig. 577.3: *Labidochromis gigas*, male, D74-C05, Mitande Reef, Thumbi West Island, 8 Oct 2023 [MCGDS].

MC578. *Labidochromis heterodon* Lewis 1982 MLS

This rusty/ purplish species is confined to Boadzulu Island in the far south of the lake, it has large simple teeth, flanked by smaller bicuspid teeth. It may be a junior synonym of *L. mathotho*.



Not yet sequenced

MC579. *Labidochromis ianthinus* Lewis 1982 MLS

The subtly coloured *Labidochromis ianthinus* was described by Lewis (1982) from 18 specimens from around Mbenji Island. Konings (2016a) reports the species also from Nkhomo and Jalo reefs. Ribbink et al. (1983) report a maximum size of 71mm SL, Lewis (1982) gives 76mm SL. It is an insectivore, mainly found in shallow water. It has unicuspid outer teeth, and a more rounded dental arcade than some related species. A single specimen from Mbenji was sequenced by Scherz et al. (2022). Phylogenetic analysis suggested it was closer to *Pseudotropheus* sp 'variable eastern' (mislabelled as *Iodotropheus sprengerae*) than to *Labidochromis gigas*.



Fig. 579.1: *Labidochromis ianthinus*, male, Mbenji Island [AK].



Fig. 579.2: *Labidochromis ianthinus*, female, Mbenji Island [AK].

MC580. *Labidochromis joanjohnsonae* Johnson 1974 MLS, LIK

This sexually dimorphic species is originally from Likoma, but has been introduced to Thumbi West Island (Ribbink et al. 1983) and Nkhata Bay (Genner et al. 2006). Photos by A.Konings (male above).

**M581. *Labidochromis lividus* Lewis 1982, LIK**

Yet another blue and black barred species from Likoma (North and West shores), like *L. freibergi* and *L. zebroides*. This one is reported to be largely herbivorous, favouring small caves in the rock-sand interface. The larger teeth in the outer oral jaw series are unicuspid. Photos by A.Konings (male above).



MC582. *Labidochromis maculicauda* Lewis 1982 MLN

Labidochromis maculicauda is a small, slender mbuna, described by Lewis (1982) from specimens collected at Nkhata Bay by Fryer, along with specimens originally included in the type series of *L. vellicans* Trewavas 1935 (labelled as 'Monkey Bay?', but thought not to be from there as the species is not recorded from that locality) and some from the type series of *L. textilis* Oliver 1975 (aquarium specimens from unknown locality in Lake Malawi). Lewis recorded the species from Nkhata Bay and Chilumba. Konings (2016a) reports the species from the northwestern shores north of Kande Island on the west coast, and at all rocky shores north of Undu Point on the eastern shore.

Lewis reports that the species has horizontal orange stripes but differs from other such species in the markings on the dorsal and caudal fins (described as having an irregular submarginal band on the spinous dorsal, and irregular dark blotches on the soft dorsal and caudal fins). Males described as being very dark brown, sometime with darker vertical bars. Dorsal fin lappets white, tipped with orange; caudal with a white posterior margin tipped with orange. The oral teeth are conical, including the inner rows (in contrast to other species such as *L. vellicans* which have tricuspid inner teeth). The snout is short for a *Labidochromis*. Lewis gives a maximum total length of 75mm, 62.3mm SL. Lewis (1982) suggests that observations by Fryer (1959) on *L. vellicans* actually refer to *L. maculicauda*. Konings reports that the species favours the shallow 'surf zone'. Lewis reports it to feed mostly on chironomids and other arthropods, and to be found from the surface to 12m depth.

The single sequenced specimen (fig. 582.3) conforms well to the description and published illustrations of a male of this species, and it is from the type locality (Nkhata Bay), where the only other known *Labidochromis* is *L. caeruleus*, which is white. There are also reports of *L. flavigulis*, supposed to be endemic to Likoma/Chizumulu, but this species does not have dark males (see Konings 2016a).



Fig. 582.1: *Labidochromis maculicauda*, female, Nkhata Bay [AK].



Fig. 582.2: *Labidochromis maculicauda*, male, Nkhata Bay [AK].



Fig. 582.3: *Labidochromis maculicauda*, male, D03-E04, Nkhata Bay, 21 Feb 2016 [HS].

MC583. *Labidochromis mathotho* Burgess & Axelrod 1976, MLS

This small drab species was described from two specimens collected from an unknown locality within the Malawian part of the lake, probably in the south. It is possibly a senior synonym of MC578 *L. heterodon*, which has similar dentition. Photo of holotype from original description.



MC584. *Labidochromis mbenjii* Lewis 1982, MLS

This species is endemic to Mbenji Island and associated reefs. It resembles *L. heterodon* but lacks the strong black dorsal fin band shown by males of that species. It also resembles *L. vellicans*. The three species have parapatric distributions. Photos by A. Konings (male above).



MC585. *Labidochromis mylodon* Lewis 1982, MLS

This species is endemic to Mumbo Island. It is very similar to *L. pallidus* and *L. caeruleus*. It has molariform pharyngeal dentition and bicuspid outer jaw teeth. The three species have allopatric distributions. Photo by A. Konings.

**MC586. *Labidochromis pallidus* Lewis 1982, MLS**

This species is found at the Maleri Islands and Thumbi West. It has non-molariform pharyngeal dentition and bicuspid outer jaw teeth. It is very similar to *L. mylodon* and *L. caeruleus*. The three species have allopatric distributions. Photo by A. Konings, male.

**MC587. *Labidochromis shiranus* Lewis 1982, MLS**

This is a large (90mm TL) species that seems to be found in turbid sediment-rich habitats in the south-east arm of Lake Malawi, from Makanjila point even into the Shire river, where it was collected from the concrete bridge supports at Mangochi. It resembles *L. vellicans*, but is larger with a longer snout. Photos by A. Konings, male above.

**MC588. *Labidochromis* sp. 'blue bar', MLS**

This species resembles *L. vellicans*, and occurs at Namalenje Island. It may also have been introduced at Mitande Rocks, Thumbi West (Konings 2016a). Photo by A. Konings, male.



MC589. *Labidochromis* sp. 'caeruleus brown', TZ

A rare cryptic species from Lupingu, Tanzania: the mature male seemed to be brown with an orange dorsal fin margin. Photo by A. Konings, male.

**MC590. *Labidochromis* sp. 'caeruleus chilucha', MZ**

Konings (2016a) reports this species from a number of sites near Metangula in Mozambique. It is thought to be related to *L. caeruleus* but shows hints of the narrow horizontal striping seen in other *Labidochromis* species. Photo by A. Konings, male.

**MC591. *Labidochromis* sp. 'caeruleus jalo', MLS**

A rare barred species from Jalo Reef near Nkhatakota. Photo by A. Konings.

**MC592. *Labidochromis* sp. 'chisumulae mbweca', MZ**

A population very similar to *L. chisumulae* has been reported from Mbweca to Tumbi Point in Mozambique. Photo of male by A. Konings.



MC593. *Labidochromis* sp. 'gigas chidunga', MLS – Chidunda Rocks, SW Arm

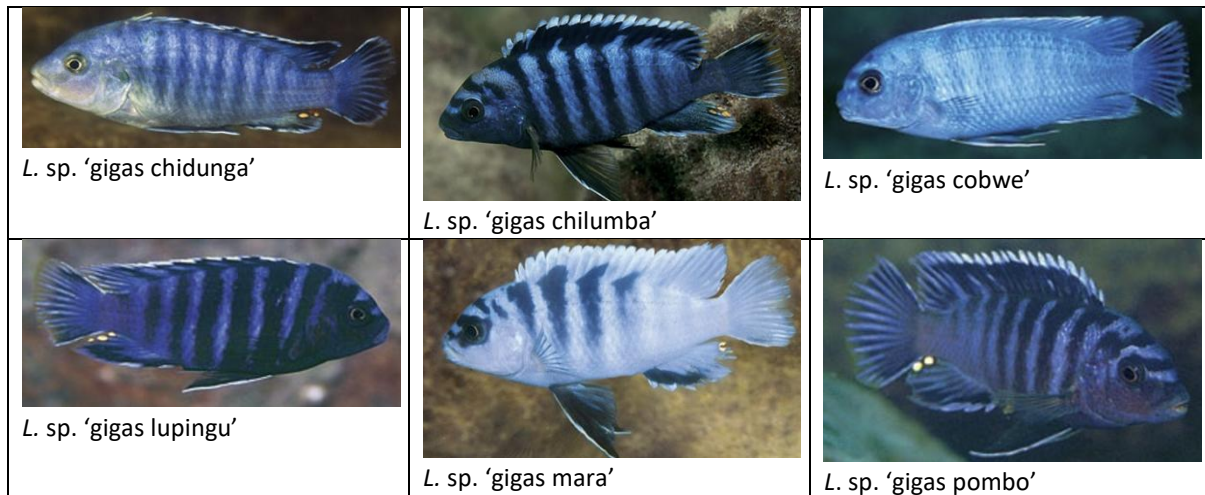
MC594 *Labidochromis* sp. 'gigas chilumba', MLN – Katale, Chilumba

MC595. *Labidochromis* sp. 'gigas cobwe', MZ – Cobue, MZ

MC596. *Labidochromis* sp. 'gigas lupingu', TZ – Lupingu, TZ

MC597. *Labidochromis* sp. 'gigas mara', MLN – Mara Rocks, MLW

MC598. *Labidochromis* sp. 'gigas pombo', TZ – Pombo Rocks, TZ



These 6 allopatric variants of the *L. gigas* (MC577) complex are regarded as distinct species by Konings (2016a). There is some variation in male breeding dress: *L. sp. 'gigas cobwe'* looks a lot like *L. gigas* from the type locality (Likoma, also Chisumulu). The Chilumba, Lupingu and Pombo males all look much the same: these are the most northerly sites, which often share taxa, so perhaps the complex might be reduced from 7 to 4 species. Photos by A. Konings, males.

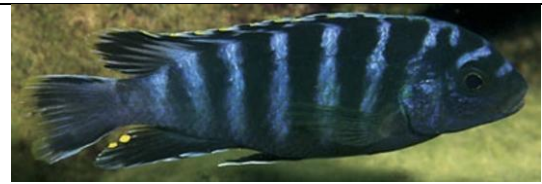
MC599. *Labidochromis* sp. 'hongi', TZ

This popular aquarium species is known from Hongi Island, Lundo Island, Liuli, Ngkuyo Island and Undu Point on the southern Tanzanian coast. It is reported to be herbivorous (Konings 2016a). Photos by A. Konings (male above).



MC600. *Labidochromis* sp. 'hora', MLN

This species is found from Hora Mhango to Mbowe Island, Usisya Bay (Konings 2016a). It resembles *L. lividus* and *L. zebroides* from Likoma. Photo by A. Konings (male).

**MC601. *Labidochromis* sp. 'likomae', LIK**

This species with blue-grey males and barred females is found at Maingano, Membe Point, Mbamba Island, and the islet of Masimbwe on Likoma, generally in deeper water (> 20 m). Its behaviour suggests that it has affinities with the white species, such as *L. caeruleus* and *L. chisumulae* (Konings 2016a). Photo by A. Konings (male above).

**MC602. *Labidochromis* sp. 'lividus mozambique', MZ****MC603. *Labidochromis* sp. 'lividus nkhungu', MZ**

These populations are found on the Mozambique coast: 'lividus mozambique' is strongly barred and is reported from Londo, Cobwe, Metangula and Chilucha Reef; 'lividus nkhungu' is unbarred and occurs South of Metangula, at N'kolongwe and Nkhungu Point. Females are brown. Both are herbivores. (Konings 2016a). Photos by A. Konings (male MC602 above, male MC603 below).



MC604. *Labidochromis* sp. 'lundu blue', TZ

A small shallow water species from Lundu in Tanzania resembles *L. lividus*. Konings (2016a) suggests this population might actually be related to *Chindongo minutus*: it suggests the dentition has not been examined. Photos by A. Konings (male).

**MC605. *Labidochromis* sp. 'mara' MZ**

Undescribed population found from Mala Point to Mbweka, Mozambique. Similar to *L. maculicauda* (Konings 2016a). Photos by A. Konings (male above)

**MC606. *Labidochromis* sp. 'mbamba', TZ**

Undescribed population of secretive cave-dwelling fish found in deep water (>15m) around Ngkuyo Island and along the rocky coast south of Mbamba Bay, Tanzania (Konings 2016a). Photo by A. Konings (male).

**MC607. *Labidochromis* sp. 'perlmutter', TZ**

A popular aquarium fish from Higga Reef, Tanzania maybe an allopatric replacement for *L. caeruleus* (Konings 2016a). Females are more strongly barred. Photo by A. Konings (male).



MC608. *Labidochromis* sp. 'textilis blue', MZ**MC609. *Labidochromis* sp. 'textilis cobalt', MZ**

These two Mozambican species look rather more like *Iodotropheus stuartgranti* than the orange-banded *L. textilis*. Females are rather brownish. They have essentially contiguous distributions: blue from Metangula to Thundu and 'cobalt' from Lumessi to Meponda (Konings 2016a).



Labidochromis sp. 'textilis blue' (left) and *L. sp.* 'textilis cobalt' males (photos by Konings).

MC610. *Labidochromis* sp. 'zebra eastern', MLS, MZ

Reported from Lumessi, Mozambique to Masinje, Malawi (including Chiofu Bay) (Konings 2016a). Their markings are very different from any other *Labidochromis* species and the range of this species overlaps with the very similar-looking MC567 *Gephyrochromis* sp. 'zebroides'. It is not clear if they really are different. Photo by A. Konings (male).

**MC611. *Labidochromis strigatus* Lewis 1982, CHI**

This is a small shallow-water species from Chisumulu Island. Photo by A. Konings (male above).



MC612. *Labidochromis textilis* Oliver 1975, TZ, MZ

Another small orange-banded species, this one is known from Undu Reef in Tanzania to Metangula in Mozambique. It is similar to *L. flavigulis* but it has a longer jaw and less conspicuous teeth (Konings 2016a). Photo by A. Konings (male).



MC613. *Labidochromis vellicans* Trewavas 1935.

The species was originally described by Trewavas (1935), but at the time the genus was considered monotypic, so the description did not serve to distinguish the species from other *Labidochromis*. Lewis (1982) clarified its distinctive traits, as well as removing some of the type material to other species, providing a diagnosis, here paraphrased. A rock-dwelling species, adults attaining ~75mm TL. Mouth small and set low on head profile. Anterior teeth in both jaws conical, forward-projecting, considerably elongated, with tips bent back and touching to form a forceps-like structure. Inner teeth in both jaws well-spaced, tricuspid. Snout fairly pointed. Body compressed, medium depth. Colour dull greenish grey in females and juvenile, rich purple and orange-brown in males. Distribution restricted to southern and eastern Lake Malawi (Senga Point, Mumbo, Thumbi West, Domwe to Nkhudzi, Chinyamwezi, Makanjila area). Ribbink et al. (1983) expanded the distribution records to include the Maleri Islands, Otter Point, Zimbabwe Rock and Namalenje, but reported it from Chinyankwazi Island and not from the nearby Chinyamwezi Island. Konings (2016a) reports that the species ranges as far north as Minos Reef on the east coast, and so it is likely to be present at Chiofu Bay. Ribbink et al. (1983) notes that the specimens from Thumbi West Island (figs. 613.1-2) are generally paler than elsewhere, and males are usually dark greyish purple, with an olive or rusty cast and orange margins to the fins (fig. 613.3). Lewis (1982) records the species as largely herbivorous, with gut contents dominated by cyanobacteria (*Calothrix*) although occasional small invertebrates were also taken. Ribbink et al. (1983) report that the species prefers large, sediment-free rocks in exposed areas shallower than 7m, although it is occasionally seen deeper.

It appears that this species has not been sequenced: a single specimen from Chiofu Bay was identified with this species in the field, but closer examination of the preserved specimen indicates that it has dentition appropriate to *Pseudotropheus* and it is regarded as *P. sp.* 'variable eastern' (MC766).



Fig. 613.1: *Labidochromis vellicans*, female, Thumbi West Island [AK].



Fig. 613.2: *Labidochromis vellicans*, adult male, Thumbi West Island [AK].



Fig. 613.3: Probable *Labidochromis vellicans*, immature male, Chiofu, 28 Feb 2016 [HS].



Fig. 613.4: *Labidochromis vellicans*, male, D09-C02, SCUBA, Chiofu, 28 Feb 2016 [HS].

MC614. *Labidochromis zebroides* Lewis 1982, LIK

This species is endemic to Likoma Island, recorded only from Masimbwe Island. It has closely-packed unicuspid teeth in the outer rows and resembles a number of other allopatric blue-black barred species, such as *L. lividus* (Konings 2016a). Females are brownish with darker bars. Photo by A. Konings (male).



***Maylandia* Meyer & Förster 1984: species MC615-685; 910, 916-918.**

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

Type species: *Pseudotropheus (Maylandia) greshakei* Meyer & Förster 1984.

Contained valid species (38): *M. aurora*; *M. barlowi*; *M. benetos*; *M. callainos*; *M. chrysomallos*; *M. cyneusmarginata*; *M. emmiltos*; *M. estherae*; *M. fainzilberi*; *M. flavicauda*; *M. flavifemina*; *M. gallireyae*; *M. glaucos*; *M. greshakei*; *M. hajomaylandi*; *M. koningsi*; *M. lanisticola*; *M. lombardoi*; *M. lundoense*; *M. mbenjii*; *M. melabbranchion*, *M. melissa*; *M. midomo*; *M. mossambica*; *M. ngarae*; *M. nigrodorsalis*; *M. nkhunguense*; *M. pambazuko*; *M. phaeos*; *M. pulpican*; *M. pyrrsonotos*; *M. sciasma*; *M. staufferi*, *M. tarakiki*; *M. usisyae*; *M. xanxomachus*; *M. xanthos*; *M. zebra*.

Junior synonyms (3): *Pseudotropheus pursus* Stauffer 1991 (amended to *P. purum* and sometimes included in *Maylandia/Metriaclima*) = *P. livingstonii*. *Metriaclima sandaracinos* Stauffer, Bowers, Kellogg & McKaye 1997 = *M. pyrrsonotus*; *Metriaclima thapsinogen* Stauffer, Bowers, Kellogg & McKaye 1997 = *M. pyrrsonotus*.

Proposed undescribed species (37): *M. sp.* 'aggressive bars'; *M. sp.* 'aggressive greyhead'; *M. sp.* 'aggressive zebra maleri'; *M. sp.* 'aurora bevous'; *M. sp.* 'black dorsal mbenji'; *M. sp.* 'black eastern'; *M. sp.* 'cave manda'; *M. sp.* 'chinyankwazi'; *M. sp.* 'daktari'; *M. sp.* 'dolphin'; *M. sp.* 'dumpy'; *M. sp.* 'dumpy chitimba'; *M. sp.* 'dumpy tanzania'; *M. sp.* 'elongatus chidunga'; *M. sp.* 'elongatus goldbar'; *M. sp.* 'elongatus linganjala'; *M. sp.* 'elongatus ngkuyo'; *M. sp.* 'estherae blueface'; *M. sp.* 'hajomaylandi pombo'; *M. sp.* 'kingsizei lupingu'; *M. sp.* 'kingsizei masimbwe'; *M. sp.* 'lime'; *M. sp.* 'lime jalo'; *M. sp.* 'lime nkhome'; *M. sp.* 'maleri blue zebra'; *M. sp.* 'mbweca'; *M. sp.* 'msobo heteropictus'; *M. sp.* 'mumbo blue zebra'; *M. sp.* 'red top gallireya'; *M. sp.* 'taiwan'; *M. sp.* 'taiwan masimbwe'; *M. sp.* 'zebra gold'; *M. sp.* 'zebra long pelvic'; *M. sp.* 'zebra mbowe'; *M. sp.* 'zebra patricki'; *M. sp.* 'zebra ruarwe'; *M. sp.* 'zebra yellow tail'.

Generic reviews & diagnoses: Originally described as a subgenus of *Pseudotropheus*, the original diagnosis was rather vague. The genus was redescribed as *Metriaclima* (Stauffer et al. 1997). Although widely used in scientific and aquaristic publications, this is generally considered a junior synonym (Condé & Géry 1999; Scharpf 2025), but the generic diagnosis can be used for *Maylandia*.

Generic diagnosis: Stauffer et al. (1997); Konings & Stauffer (2006). The main diagnostic features are the presence of bicuspid outer oral teeth, the moderately-sloped ethmovomerine process of 31-48° (which translates into a similarly sloped head profile) with swollen tip, and lower jaw angled at around 45° to the main body axis. It is also noted that many of the upper jaw teeth are exposed when the mouth is closed and the tips of the outer upper and lower jaw teeth are far apart. When feeding the main body axis is held

perpendicular to the substrate and the mouth opened to around 180° and then closed again, with the teeth combing through any attached algal strands. This feeding action is shared with species of the genus *Petrotilapia*, but these have wider bands of tricuspid teeth.

Field Diagnosis: Mbuna with general *M. zebra* head shape: head profile less steep than *Tropheops* species, a wide terminal mouth, but narrower bands of teeth than a *Petrotilapia*, and teeth generally bicuspid.

Phylogenetic comments: Sequences indicate *Maylandia* is polyphyletic.

The main ***M. zebra* group** is mixed in with some *Cynotilapia* species (including *C. afra*, *C. aurifrons*, *C. zebroides*) and appears to include Konings' groups of the 'large zebras' (*M. fainzilberi*, possibly *M. xanstomachus*, *M. cyneusmarginata*), the cobalt zebras (*M. callainos*, *M. estherae*, possibly *M. sp. 'estherae blueface'*) and the gold zebra (*M. sp. zebra gold*, possibly *M. sp. 'zebra yellowtail'*). Additionally, as currently recognised, *M. zebra* itself is also polyphyletic. The 'large zebras' are undersampled in current analyses, with only the populations in the area around Chilumba investigated.

Konings (2016a, 2020) recognised further informal groups which probably deserve recognition at generic level. "The members of the **Aurora group** are characterized by their habitat preference (sand-rock interface), the absence of a black submarginal band in the dorsal fin, and by a light brown coloration of most females exhibiting no (or only faintly present) vertical bars and a yellow margin in the dorsal, anal, and caudal fins". The three species of this group sequenced to data, *M. aurora*, *M. barlowi*, *M. chrysomallos*, for a tight group genetically, and are not closely related to the *M. zebra* group.

Konings (2016a, 2020) also recognises the 'black dorsal' or '**flavifemina' group**, as species with strong sexual dichromatism, males being blue-black with a black bar in the dorsal fin, and females generally yellowish or yellow-brown. They are also restricted to the rock-sand interface habitat. None of these have been sequenced as yet.

Additionally, three more groups can be recognised. A number of taxa formerly included in Ribbink et al.'s (1983) '***Pseudotropheus elongatus* group**' have been included in *Maylandia* by Konings and collaborators, largely based on skull shape and perpendicular feeding angle (which are probably non-independent traits). The only one of these sequenced so far (*Maylandia melissa*) is not closely related to other *Maylandia*, but groups with other 'elongatus'.

Other species seem to be members of a '**sand mbuna' group**, including *M. lanisticola* and *M. ngarae* (probably also *M. gallireya*) which are not closely related to the Zebra or Aurora groups but form a group with *Pseudotropheus* sp. 'acei' (and probably *P. livingstonii*, *P. likomae* and *P. elegans*).

Finally, there are the various small mbuna, which might comprise a '**kingsizei' group**. These have not really been investigated, and should be compared with superficially similar taxa currently placed in *Chindongo*, as well *Cynotilapia axelrodi*.

Ecomorphological notes: Most species are confined to rocky shores, where many species, especially of the *M. zebra* group, exist at high densities. Males are conspicuous, aggressive and territorial. Females tend to be more cryptic (although sometimes they can be quite bright, especially the W and O morphs) and forage in groups, sometimes high in the water column. Members of the *M. aurora* group tend to prefer areas where large rocks lie over sand/mud bottoms, while members of the *M. lanisticola* group are found on open soft bottom areas where empty *Lanistes* snail shells are found.

Summary of possible *Maylandia* subgroup membership

Aggressive group: *M. sp.* 'aggressive greyhead'; *M. sp.* 'aggressive zebra maleri'. **Compare with** *P. fuscus* and other members of Ribbink et al.'s 'aggressive' group.

Aurora group: *M. aurora*; *M. barlowi*; *M. benetos*; *M. chrysomallos*; *M. glaucos*; *M. hajomaylandi*; *M. mossambica*; *M. nkhunguense*; *M. sciasma*; *M. xanthos*; *M. sp.* 'aurora bevous'; *M. sp.* 'hajomaylandi pombo'. Possibly also *M. lombardoi* and *M. sp.* 'maleri blue zebra'.

Elongatus group: *M. flavicauda*; *M. melissa*; *M. usisyae*; *M. sp.* 'cave manda'; *M. sp.* 'elongatus chidunga'; *M. sp.* 'elongatus goldbar'; *M. sp.* 'elongatus linganjala'; *M. sp.* 'elongatus ngkuyo'; *M. sp.* 'zebra ruarwe' (?). **Compare with:** elongatus in other genera (*Chindongo*, *Cynotilapia*, *Pseudotropheus*, *Tropheops*).

Flavifemina Group: *M. flavifemina*; *M. nigrodorsalis*; *M. phaeos*; *M. lundoense*; *M. sp.* 'msobo'; *M. sp.* 'msobo heteropictus'. Possibly *M. sp.* 'black dorsal mbenji' (may be an 'aggressive').

Miscellaneous: *M. koningsi*; *M. sp.* 'dumpy'; *M. sp.* 'dumpy chitimba'; *M. sp.* 'dumpy tanzania'; *M. sp.* 'kingsizei lupingu'; *M. sp.* 'kingsizei masimbwe'; *M. sp.* 'mbweca' (v *Cynotilapia* sp 'lion'?); *M. sp.* 'patricki' (v sand tropheops?); *M. sp.* 'taiwan'; *M. sp.* 'taiwan masimbwe'.

Pulpican/Lime Group: *M. pulpican*; *M. sp.* 'daktari'; *M. sp.* 'lime'; *M. sp.* 'lime jalo'; *M. sp.* 'lime nkomo'; *M. sp.* 'lime'; *M. sp.* 'lime jalo'; *M. sp.* 'lime nkomo'; **Compare with** *Cynotilapia axelrodi*, *C. sp.* 'lion'.

Sand mbuna group: *M. gallireya*; *M. lanisticola*; *M. ngarae*. **Compare with:** *Pseudotropheus elegans*, *P. livingstonii*, *P. sp.* 'acei'.

Zebra Group: *M. callainos*; *M. cyneusmarginata*; *M. emmiltos*; *M. estherae*; *M. fainzilberi*; *M. greshakei*; *M. mbenji*; *M. melabanchion*; *M. midomo*; *M. pambazuko*; *M. pyrrsonotos*; *M. tarakiki*; *M. xanstomachus*; *M. zebra*; *M. sp.* 'aggressive bars'; *M. sp.* 'chinyankwazi'; *M. sp.* 'dolphin'; *M. sp.* 'estherae blueface'; *M. sp.* 'mumbo blue zebra'; *M. sp.* 'red top gallireya'; *M. sp.* 'zebra gold'; *M. sp.* 'zebra long pelvic'; *M. sp.* 'zebra mbowe'; *M. sp.* 'zebra yellow tail'. **Compare with:** *Cynotilapia afra*, *C. aurifrons*, *C. zebroides* etc.

MC615. *Maylandia aurora* (Burgess 1976), MLN, MLS, LIK

Pseudropheus aurora was described by Burgess (1976c) from a large number of specimens presumed to be from Likoma Island. Males are purplish blue, with yellowish fins, and a yellow breast that extends to the lower part of the head, including the jaws and belly. They sometimes show faint broad vertical flank bars, and the background colour can be pale blue on occasion (fig. 615.1, 3). Females and juveniles are generally pale, sandy-coloured fish (fig. 615.2). Their body shape is slightly stockier than a typical *M. zebra*. No OB or O morph individuals are known. Ribbink et al. (1983) record a maximum size of 87mm SL.

It was believed to be endemic to Likoma Island (Ribbink et al. 1983), but similar-looking fish have been found along the Mozambican coast, in some populations, with stronger vertical barring (Ciccotto et al. 2011; Konings 2016a). The Likoma form was introduced to Thumbi West Island and Otter Point in the 1970s (Ribbink et al. 1983). It has become established and spread to neighbouring areas. It was later introduced to Nkhata Bay (Genner et al. 2006) and we collected it there again in 2016, suggesting it has become established there too. The species is a popular aquarium fish.

The species prefers areas where large rocks lie on sand at depths of 2-5m. They generally feed on rock surfaces or on the sand, but sometimes join mixed species schools feeding on plankton in the water column (Ribbink et al. 1983).

The first specimen sequenced was from Nkhata Bay (fig. 615.4), but numerous additional specimens were sequenced from collections from Thumbi West, Mumbo, Domwe and Tsano Rock. Phylogenetic analysis of sequences indicates that this species is not closely related to the *M. zebra* group, but rather to *Gephyrochromis* and more generally to the *Tropheops*/*Petrotilapia* group. Konings (2016a) distinguished this species as a member of an informal '*M. aurora* group': both of the other species in this group that have been investigated (*M. barlowi* MC616, *M. chrysomallos* MC619) do indeed seem to be related to *M. aurora*.



Fig. 615.1: *Maylandia aurora*, adult male, Thumbi West Island [AK].



Fig. 615.2: *Maylandia aurora*, mouthbrooding female, Likoma Island [AK].



Fig. 615.3: *Maylandia aurora*, adult male, Thumbi West Island, 2016 [GFT].



Fig. 615.4: *Maylandia aurora*, male, D02-E07 collected by SCUBA from Nkhata Bay, 21 Feb 2016, sequenced [HS].

MC616. *Maylandia barlowi* (McKaye & Stauffer 1986), MLS

Pseudotropheus barlowi was described by McKaye & Stauffer (1986) from specimens collected at Nakantenga Island. It was previously known as *Pseudotropheus zebra* 'fusco' by Ribbink et al. (1983). It has turned out to have quite a wide distribution in the south of the lake, being abundant at Mbenji and the Maleri Islands but also seen at Chidunga Rocks (SW Arm), Thumbi West, Mazinzi Reef, Nkhudzi headland, Chimwalani and Luwala Reefs in the SE Arm (Konings 2016a). Males are bright yellow with largely pale blue fins dorsal and anal fins, and usually a single bright yellow eggspot. Females are brownish with a pale dorsal fin margin. No OB or O-morph individuals have been reported. The body shape is similar to *M. aurora*: generally a bit deeper-bodied than *M. zebra*. The largest of the types was 81.1mm SL, Ribbink et al. (1983) give 82mm SL. Like *M. aurora*, it favours areas of large rocks on sand, or slabs covered in sediment. Ribbink et al. (1983) recorded a depth preference of 2-27m. The species was recorded scraping rocks or feeding on plankton, and gut contents sometimes contained a lot of invertebrate remains (Ribbink et al. 1983).

Ten specimens were sequenced by the MCGDS (unpublished), all adult males from Nakantenga Island. Identification was straightforward, based on location, overall body shape and colour. They were resolved as the sister group (among those taxa sampled) to *Maylandia aurora* plus *M. chrysomallos*, and this group collectively placed within the *Tropheops/Petrotilapia* group, not close to the *M. zebra*/*C. zebroides* group.



Fig. 616.1: *Maylandia barlowi*, male, Mbenji Island, [AK].



Fig. 616.2: *Maylandia barlowi*, mouthbrooding female, Chimwalani Reef [AK].



Fig. 616.3: *Maylandia barlowi*, male, D41-I04, Nakantenga Island, sequenced [MCGDS].

MC617. *Maylandia benetos* (Stauffer et al. 1997), MLS

M. aurora group, preferring shallow areas with rocks on sand/mud. Pale blue males (above, AK), sometimes with dark bars on forehead or anterior of flanks. Female beige with slightly orange fins. NW end of SE Arm. Mazinzi Reef, Kanchedza Island and rocky headland between.



Not sequenced. Male [AK].

MC618. *Maylandia callainos* (Stauffer & Hert 1992), MLN, MLS, TZ

Pseudotropheus callainos was described by Stauffer & Hert (1992) from specimens collected at Nkhata Bay. The species was first studied by Fryer (1959, see also Fryer & Iles 1972), who reported unbarred blue (B) and largely female white (W) 'morphs' of *Pseudotropheus* (later *Maylandia*) *zebra* (MC685). Field studies by Holzberg (1978), lab behavioural studies by Schröder (1980) and allozyme studies by McKaye et al. (1984) suggested the B/W were a distinct species, co-existing sympatrically with *P. zebra*. Ribbink et al. (1983) also treated the B/W morphs as a distinct species, *Pseudotropheus zebra* 'cobalt', but also recognised the all-white populations from Ruarwe and Mphanga Rocks as *Pseudotropheus zebra* 'pearly'. White-morph individuals from polymorphic populations generally show some irregular dark spots, sometimes streaks in the fins, but individuals of the pearly populations are generally pure white. Ribbink et al. (1983) described the Mphanga Rocks population as being more off-white with a violent tinge and faint barring, and called them *P. zebra* 'ianth'. They also recorded a population from Chitande Island with blue males, faintly barred with black pelvic fins and pale off-white or pinkish females with dark blotches as *Pseudotropheus zebra* 'Chitande'. There are also greyish (B) females in this population, although these are not mentioned by Ribbink et al. (1983) nor Konings (2016a). Both 'pearly' and 'Chitande' populations are considered to be *M. callainos* by Konings (2016a). Genner & Turner (2005) also noted that recorded that at Katala and Chirwa Islands all males are blue, but females are white or OB, while at Luwino Reef, all females are white, but males split roughly evenly between W and B morphs (see also photographs in <https://malawi.sj>, accessed 28 March 2026).

Further field studies, laboratory trials and molecular analyses with microsatellite DNA (van Oppen et al. 1997; Knight et al. 1997) confirmed the distinctness of *M. callainos* with respect to *M. zebra* and *M. sp.* 'zebra gold' (MC675), a third sympatric species at Nkhata Bay. Although Stauffer & Hert's description was based only on B and W morph individuals from Nkhata Bay (and a comparison with introduced populations at Thumbi West), the species is now considered to range over most of rocky habitats in the northern half of the lake (Konings 2016a). The Nkhata Bay population has mainly blue males, with high frequencies of both blue and white females, and lesser numbers of white males and blue-blotched females. This phenotypic mix extends from Kande Island in the south to Cape Manulo just to the south of Usisya Bay. Populations at Mara Rocks and Mbowe Island are mostly blue. North of the Usisya Bay, at Ruarwe, the population is 100% white morph and monomorphic white populations extend to Ngara and are also found along the northeast coast as far south as Puulu, near Liuli in Tanzania although blue males are noted from some of the sites around Chilumba, such as Katala and Chirwa, and also at Makonde in Tanzania (Konings 2016a). At Luwino Reef, pearly white and blue males seem to be about equally numerous, but females are mostly pearly (W) or greyish (B). The species has been introduced from Nkhata Bay to the south of the lake, with high densities at Thumbi West (Ribbink et al. 1983) and more recently also at the Maleri Islands and Mumbo, as well as from Domwe and southwards

towards Monkey Bay. In the south, both blue and white morphs are found, but the blue-blotched form has not been reported.

Holzberg reported *M. callainos* from 0-10m at Nkhata Bay; Ribbink et al. reported 0-25m, but most common at 3-10m and a preference for sediment-free habitats; van Oppen et al. reported a range of 0-20m, but an average maximum depth of 14m across a range of transects. Ribbink et al. (1983) reported the Chitande form mainly living among small- to medium-sized rocks from 5-15m, but being reported from the extreme shallows to around 30m. The Pearly form was reported to be most numerous at 4-18m, but to range from the surface to at least 35m depth (Ribbink et al. 1983). The species was reported to mainly feed from scraping rock surfaces, or from collecting plankton in the water column.

Numerous individuals have been sequenced: 'cobalt zebra' from Nkhata Bay, Thumbi West and elsewhere in the Cape Maclear area (Mumbo, Nakantenga, Domwe, Thumbi East), 'pearly zebra' from Luwino Reef and Mphanga Rocks, 'Chitande zebra' from Chitande Island. These all form a single grouping, with considerable geographic structure, with *M. estherae* as the sister taxon. Collectively, they are embedded with the barred *M. zebra/fainzilberi* etc grouping (MCGDS, unpublished).



Fig. 618.1: *Maylandia callainos*, B-morph male, Nkhata Bay, 2016, [HS]



Fig. 618.2: *Maylandia callainos*, WB-morph female, Nkhata Bay [AK]



Fig. 618.3: *Maylandia callainos*, B-morph male, D02-A02, Nkhata Bay, SCUBA, 20 Feb 2016, sequenced [HS]



Fig. 618.4: *Maylandia callainos*, B-morph female, D02-E10, Nkhata Bay, SCUBA, 21 Feb 2016, sequenced [HS]



Fig. 618.5: *Maylandia callainos*, W-morph male, D02-E06, Nkhata Bay, SCUBA, 21 Feb 2016, sequenced [HS]



Fig. 618.6: *Maylandia callainos*, W Female, D01-B07, Nkhata Bay, SCUBA, 20 Feb 2016, sequenced [HS].



Fig. 618.7: *Maylandia callainos*, B-morph male, showing characteristic faint barring and dark pelvic fins of the Chitande Island variety, 25 Feb 2016, [HS].



Fig. 618.8: *Maylandia callainos*, B-morph female, showing characteristic grey body colour of the Chitande Island variety, 25 Feb 2016 [HS].



Fig. 618.9: *Maylandia callainos*, WB-morph female, Chitande Island, 25 Feb 2016 [HS].



D06-E02. B-morph male



D06-I06. B-morph female



D06-B08, OB-morph female



D06-F06, OB-morph female

Fig. 618.10: *Maylandia callainos*, Chitande Island, SCUBA, 24 Feb 2016. B-morph individuals show a substantial loss of colour post-mortem, but live colours would correspond to those seen in figs. 618.7-8. A large number of individuals of this population were sequenced [HS].



D05-I08, W-male, Luwino Reef.



D05-J02, W-female, Luwino Reef.



D04-B09, W-male, Mphanga Rocks



D04-C02, W-female, Mphanga Rocks

Fig. 618.11: Representative specimens of *Maylandia callainos* 'pearly' (W-morph) from Luwino Reef (24 Feb 2016) and Mphanga Rocks (23 Feb 2016) [HS].

MC619. *Maylandia chrysomallos* (Stauffer et al. 1997), MLS, MZ.

Metriaclima chrysomallos was described from Mumbo Island (Stauffer et al. 1997) but is now considered a *Maylandia*. In the original description, the male holotype was shown with strong vertical barring (fig. 619.1), with the bars extending into the dorsal fin. Stauffer et al. report that males have 7-9 vertical bars, but the illustration of the type shows around 6 relatively wide bars under the dorsal fin, with other bars crossing the nape or (scarcely visible) caudal peduncle. The species was said to be distinguished from the sympatric *M. melabranchion* (later synonymised with *M. zebra*) by having gold highlights on the flanks. No mention is made of a yellow chin or throat.

Ciccotto et al. (2011) sort of redescribed the species from material collected at Nametumbwe and Gome, but not the type locality of Mumbo (they do not mention examination of any material from the type locality in their description). They show males from Mumbo as pale blue with a yellow area on the lower half of the head, including the jaws, as well as the chest and pelvic fins (fig. 619.2). The dorsal, caudal and anal fins are blue, not yellow as they are in *M. aurora*, but this is not given as a diagnostic feature, but rather they are stated to have 7-9 faint vertical bars under the dorsal (which is not apparently what was meant in the original description) compared to 6 for *M. aurora*. Konings (2016a) also reports that the species can be found at Nakantenga Island, but no photographs could be found. Ciccotto et al. (2011) and Konings (2016a) also assign to this species a series of populations ranging from Meponda in Mozambique to Makanjila Point in Malawi. These vary considerably in male colour, with males at the SW end of the distribution showing more yellow, those in the middle of the range around Chiofu and Gome being pure blue (fig. 619.3) and those to the north being blue with faint dark vertical flank bars and largely black pelvic fins and black radial stripes and margins to the caudal fin (fig. 619.4). Konings (2016a) reports that females of the Mumbo population are generally beige-grey, but those of the Makanjila-Meponda region have slightly yellowish-edged fins (fig. 619.5). At Chiofu and Gome, males co-occur with the all-blue males of *M. estherae* (MC622), but these have prominent yellow spots in the soft dorsal fin, which are not seen in *M. chrysomallos* at these sites (fig. 619.3, 8; also Konings 2011). Konings (2016a) regards *M. chrysomallos* as a member of the *M. aurora* group, with a preference for areas where rocks meet sand ('intermediate habitat' in Malawi cichlid jargon). The largest specimen examined by Ciccotto et al. (2011) was 79.6mm SL.

Eight individuals collected from Chiofu Bay in 2016 were sequenced, and these clustered in a distinct grouping with *M. aurora* and *M. barlowi*, supporting Konings' '*M. aurora* group'. However, this group is not closely-related to the main *Maylandia zebra* group, but rather belongs with *Tropheops* and *Petrotilapia* (MCGDS unpublished).

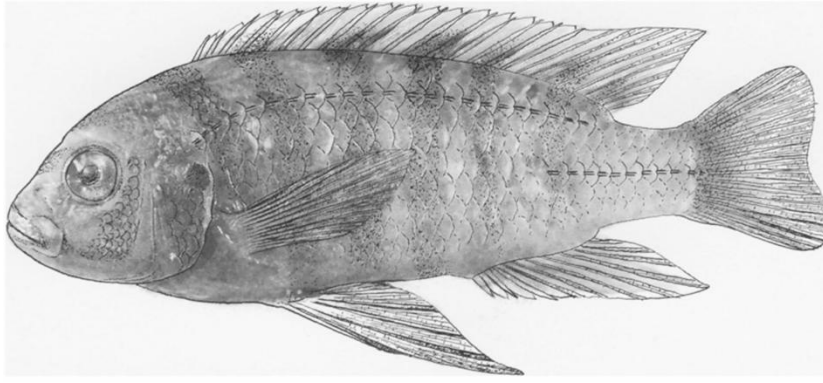


Fig. 619.1: *Maylandia chrysomallos*, holotype, male, Mumbo Island [from Stauffer et al. 1997].



Fig. 619.2: *Maylandia chrysomallos*, male, Mumbo Island [AK].



Fig. 619.3: *Maylandia chrysomallos*, male, Gome [AK].



Fig. 619.4: *Maylandia chrysomallos*, male, Mozambique/Malawi border [AK].



Fig. 619.5: *Maylandia chrysomallos*, female, Ntekete [AK].



Fig. 619.6: *Maylandia chrysomallos*, female, D09-H09, Chiofu Bay, 28 Feb 2016, sequenced [HS].



Fig. 619.7: *Maylandia chrysomallos*, male, D09-H02, Chiofu Bay, 28 Feb 2016, sequenced [HS].



Fig. 619.8: *Maylandia chrysomallos*, male, Chiofu Bay, 28 Feb 2016 [HS].

MC620. *Maylandia cyneusmarginata* (Stauffer et al. 1997), MLS

The specific name is adjectival, and so has to agree with the gender of the generic name. *Maylandia* is feminine, therefore it is *M. cyneusmarginata* in Eschmeyer's catalog (Fricke et al. 2025). *Metriaclima* is neuter, so it is *M. cyneusmarginatum* in Konings (2016a). It was, however, originally described by Stauffer et al. (1997) as *Metriaclima cyneusmarginatus*, which is incorrect. It was described from specimens collected near Nkhotakota, but populations from Chidunga Rocks (SW Arm) were also assigned to this species by Konings (2016a).



It appears to be very similar to the allopatric, widely distributed and geographically variable *M. fainzilberi*. Not yet sequenced. Photo AK.

MC621. *Maylandia emmiltos* (Stauffer et al. 1997), MLN

Metriaclima emmiltos was first described by Stauffer et al. (1997) from specimens collected at Mphanga Rocks, Chilumba, but it is now considered a member of genus *Maylandia*. It is also found at nearby Luwino Reef. Males resemble those of 'classic' *M. zebra* (e.g. Nkhata Bay, Cape Maclear area, Chiofu) in having a blue background colour with strong dark vertical barring on the flanks and a largely black head, with prominent barring across the forehead. However, the dorsal fin is bright orange-red. Similar-looking 'red-dorsal' populations in the south of the lake appear to have evolved independently (Allender et al. 2003). These are presently referred to *M. pyrrhonotus* by Konings (2016a), but in the past subpopulations were split off as *M. sandaracinos* and *M. thapsinogen* (Stauffer et al. 1997). Female *M. emmiltos* are coloured similarly to males, but are much drabber: however, the orange dorsal fin is clearly apparent. OB- and O-morph individuals are not known. Ecologically and morphologically, they resemble 'classic' zebras from locations such as Nkhata Bay and Cape Maclear, with relatively narrow bands of teeth and a wide depth range: Ribbink et al. (1983) report the species as common from 2-25m at Mphanga Rocks, but occurring from the shallows to at least 31m. They co-occur with the larger *M. fainzilberi* form, which has wider tooth bands and preference for shallow waters. Like other 'zebras', they feed on rock surfaces or on plankton in the water column.

A number of individuals have been sequenced from both Mphanga Rocks and Luwino Reef. The two populations are genetically distinct, but closely related. Their closest relatives are *M. fainzilberi* also from the Chilumba area, suggesting local divergence (MCGDS, unpublished). Surprisingly, the more narrowly-distributed *M. emmiltos* seems to be ancestral to the *M. fainzilberi* populations in the area, with the basal split being between *M. emmiltos* Mphanga v *M. emmiltos* Luwino + *M. fainzilberi* (Luwino + Mphanga + Katale + Chirwa + Chitande).



Fig. 621.1: *Maylandia emmiltos*, male, from Mphanga Rocks, Bangor University Aquarium [GFT lab].



Fig. 621.2: *Maylandia emmiltos*, female, Mphanga Rocks [AK].



Fig. 621.3: *Maylandia emmiltos*, male, D04-C05, SCUBA, Mphanga Rocks, 23 Feb 2016, sequenced [HS].

MC622. *Maylandia estherae* (Konings 1995b) MZ, MLS.

Pseudotropheus (later *Metriaclima*, now *Maylandia*) *estherae* was described by Konings (1995b) from specimens collected at Minos Reef, Mozambique. The species generally resembles *M. zebra* in overall body shape, but, in common with *M. callainos* lacks prominent vertical barring in any of its colour morphs. The original description mentions blue males and orange, orange-blotched (OB), brown or (occasionally) blue females. The conspicuous orange morph females were reported to comprise about 80% of females seen. The type is a female and the 5 paratypes all males, but their colour morph is not stated. It is reported that the species the teeth of *M. estherae* are always visible when the mouth is closed, in contrast to *M. callainos*. However, teeth being visible when the mouth is closed was later stated to be a diagnostic feature of the genus *Metriaclima* (now *Maylandia*) by Konings & Stauffer (2006). *Maylandia estherae* is also stated to have thicker jaws than *M. callainos*, and to be less laterally compressed than *M. callainos*, this best captured by the ratio of interorbital width to caudal peduncle length. Konings (1995b) initially reported that male *M. estherae* had distinctive ocellated spots on the trailing edge of the dorsal fin, but later stated that this was true only in the north of its range, mainly where it overlapped with *M. nkhunguensis*. OB female *M. estherae* were reported to be less deep-bodied than those of *M. zebra*. At the time of the original description, the species was known only from Chilucha Reef (off Metangula 85km from Malawian border,) and Minos Reef (off Meluluca, ca 70km to border) in Mozambique. Later work showed that *M. estherae* co-occurred with another species (later *Maylandia nkhunguensis* MC640). That species also has blue males which lack the yellow dorsal fin spots, and has blue females: see Konings (2016a). *M. nkhunguensis* is also reported to have a narrower mouth than *M. estherae*. In Konings' 2016a book, blue *M. estherae* females are not mentioned, so perhaps these were *M. nkhunguensis* females. Konings (2016a) reports further populations of *M. estherae* near Meponda in Mozambique and in Malawi between the border and the Nsinje River, including Chiofu Bay. There is a substantial gap in this range, which seems to be filled with a population considered by Konings (2016a) to possibly represent a different species, *M. sp.* 'estherae blueface' (MC662), which has barred brown, OB and orange females. Male 'estherae blueface' have slightly more obvious barring and a dark blue lower half to the head. *Maylandia estherae* is reported to prefer sediment-free rocky habitats (Konings 2016a). The largest paratype of *M. estherae* is 79.2mm SL (Konings 1995b). This species was formerly available in the aquarium trade with blue males and orange females: young could be distinguished by sex and colour immediately after release by their mothers. *Maylandia estherae* has now effectively been domesticated as the 'red zebra', by line breeding orange females with orange males, which are very rare in the wild, to produce a monomorphic orange strain. These orange males turn paler when sexually mature and dominant. OB morph individuals of both sexes are also sometimes available.

Twenty individuals were sequenced from Chiofu Bay. These comprised 10 blue males and 10 orange females. All OB and plain females in the sample were clustered with BB zebra males. Surprisingly, the *M. estherae* individuals formed a single cluster as sister group to a cluster

of *M. zebra* from Chiofu, and these were collectively resolved as sister group to group comprised of a number of populations of *M. callainos* (MCGDS unpublished).



Fig. 622.1: *Maylandia estherae*, adult male B-morph, Chiloelo, Mozambique [AK].



Fig. 622.2: *Maylandia estherae*, adult female O-morph, Gome, Malawi [AK].



Fig. 622.3: *Maylandia estherae*, adult female OB-morph, Minos Reef, Mozambique [AK].



Fig. 622.4: *Maylandia estherae*, adult female B-morph, Chiloelo, Mozambique [AK].



Fig. 622.5: *Maylandia estherae*, B-morph male, D08-I10, SCUBA, Chiofu, 28 Feb 2016, sequenced [HS].



Fig. 622.6: *Maylandia estherae*, O-morph female, D08-E02, SCUBA, Chiofu, 28 Feb 2016, sequenced [HS].



Fig. 622.7: *Maylandia estherae*, plan and O-morph mouthbrooding females, Chiofu, Feb 2016 [HS].

MC623. *Maylandia fainzilberi* (Staeck 1976), TZ, MLN.

Pseudotropheus (now *Maylandia*) *fainzilberi* was described from Makonde in Tanzania by Staeck (1976). It is generally larger and with wider tooth bands than 'classic' *M. zebra*. Males of the typical population were strongly blue and black barred, with blue dorsal fins, and a patch of yellowish-orange colour on the lower part of the head and chest, up to the base of the pectoral fin (fig. 623.1). Although not reported in the original description, Konings (2016a) states that OB morph females are found in all populations in Tanzania and the northern Mozambican shore (the most southerly known population on the eastern shore is at Lumabaulo, well to the North of Cobue). He also notes that the presence of an orange area at the base of the pectoral fins is distinctive, although this is not present in all Malawian populations that have been assigned to this species. In Malawi, populations along the north-western shores were formerly assigned to *Pseudotropheus zebra* 'chilumba' and *Pseudotropheus zebra* 'Ruarwe' (Ribbink et al. 1983). These have similar body shape and dentition to the Tanzanian populations but lack the orange area at the base of the pectoral fins. In both areas, males have a largely black dorsal fin, black upper part of the head and blue lower part. In some locations (e.g. Ruarwe, Luwino Reef) the throat is bright yellow. However, this is not a continuously distributed population phenotype, as males at intermediate locations such as Hora Mhango have a blue dorsal fin and dark chin (Konings 2016a, p.64). Males from the population at Mara Rocks have faint barring and a yellow throat and look very similar to *M. xanstromachus* from the Maleri Islands (Konings 2016a): however, molecular studies by Allender et al. (2003) suggest they are not closely related. The inter-relationships of these various populations remain unresolved.

Numerous specimens have been sequenced from Chitande Island, Katala Island, Chirwa Island and its surroundings (Phita Channel, Makankha Rocks), Luwino Reef, Mphanga Rocks (figs. 623.4-8). All formed a single grouping with strong geographical structure (Katala, Chirwa area were intermingled), and closely related to *M. emmiltos*.



Fig. 623.1: *Maylandia fainzilberi*, adult male, Matema, Tanzania [AK].



Fig. 623.2: *Maylandia fainzilberi*, adult male, Mphanga Rocks, in aquarium [GFT Lab].



Fig. 623.3: *Maylandia fainzilberi*, adult male, Chitande Island, Feb 2016 [HS].



Fig. 623.4: *Maylandia fainzilberi*, adult male, D06-C05, Chitande Island, Feb 2016, sequenced [HS].



Fig. 623.5: *Maylandia fainzilberi*, adult male, D06-D01, Chitande Island, Feb 2016, sequenced [HS].



Fig. 623.6: *Maylandia fainzilberi*, adult male, D61-E02, Katale Island, sequenced [MCGDS].



Fig. 623.7: *Maylandia fainzilberi*, adult male, D68-F02, Phita Channel, Chirwa Island, sequenced [MCGDS].



Fig. 623.8: *Maylandia fainzilberi*, adult female, D68-F03, Phita Channel, Chirwa Island, sequenced [MCGDS].

MC624. *Maylandia flavicauda* (Li et al. 2016) MLS

An 'elongatus', formerly part of *Ps. elongatus* 'yellow tail' (Ribbink et al. 1983). Zimbabwe Rock and Chimney Rock near Mumbo. Very similar species at Thumbi West and elsewhere are regarded as a range of species (*Chindongo* sp. 'elongatus thumbi', *Tropheops biritwira*, *Tropheops kumwera*). Photo by Konings (male)



MC625. *Maylandia flavifemina* (Konings & Stauffer 2006) MLS

This is essentially the 'type species' of the informal 'flavifemina' or 'black dorsal' group of Konings (2016). The species of this group are mainly found on the east coast and the south, and are apparently entirely absent from the NW coast as well as Likoma and Chizumulu. Ribbink et al. (1983) recorded *Maylandia flavifemina* was recorded as *Pseudotropheus zebra* 'black dorsal' on the Maleri Isles, but as *Pseudotropheus heteropictus* (a different species) at Thumbi West. Both males and females differ markedly in colour between these localities. The type locality is Maleri, but the species is also known from Nakantenga, Nankhoma, Namalenje, Thumbi West, and possibly Chidunga Rocks. Males from Maleri have numerous thin dark stripes on a blue background, with a largely black dorsal fin (fig. 625.2). The background colour is often very dark and the cheeks and chest yellow. At Thumbi West, males lack the yellow cheek and chest, and have variable amounts of black in the dorsal fin (fig. 623-4). Females are yellow on the Maleris (fig. 625.5) but more beige on Thumbi West (fig. 625.6). The species prefers sediment-rich areas at the rock-sand interface, generally deeper than 5m. It has not yet been sequenced, but specimens were collected at the Maleris in 2026.

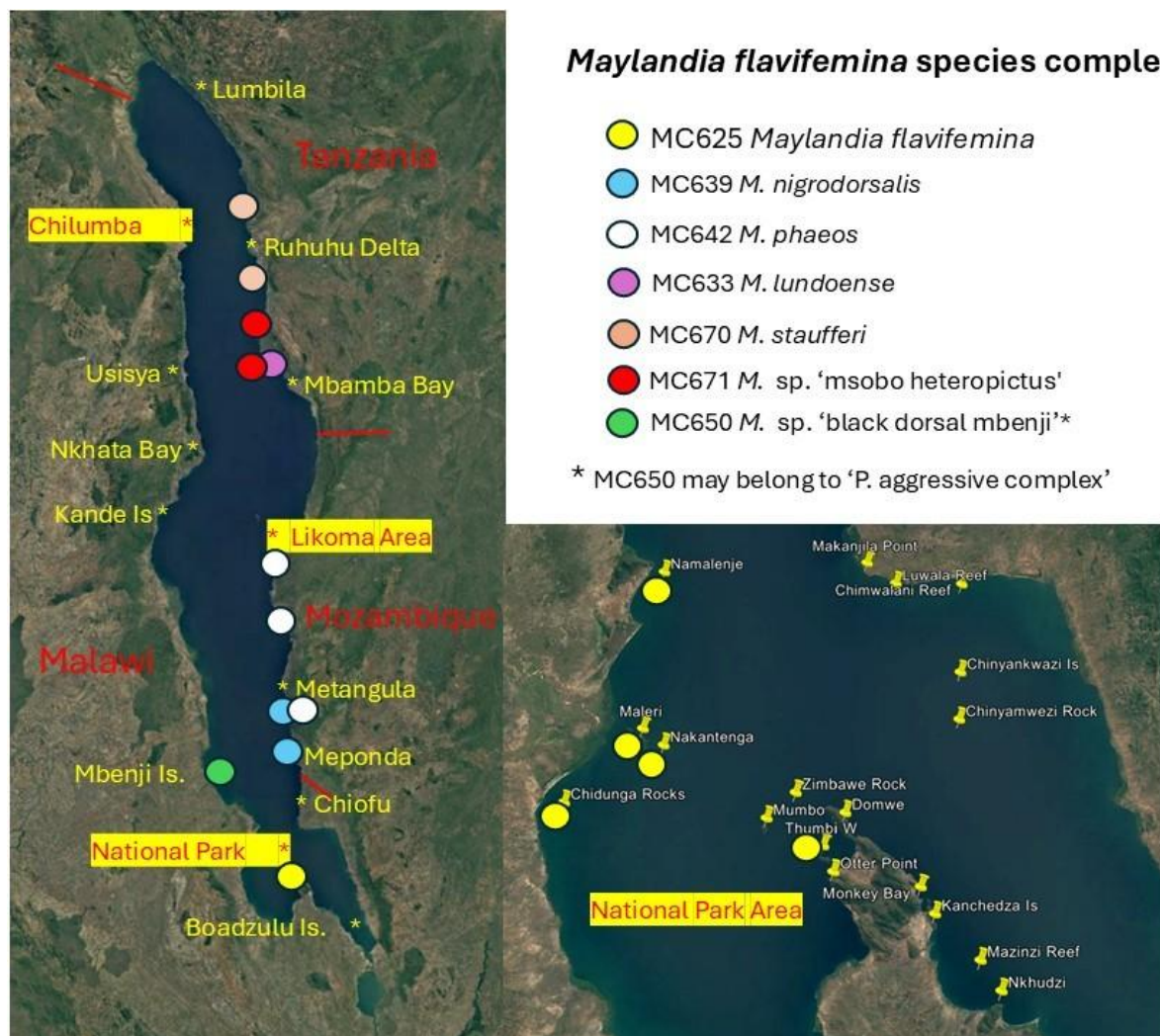


Fig. 625.1: Known distribution of species of the informal *Maylandia flavifemina* species group.



Fig. 625.2: *Maylandia flavifemina*, male, Maleri Island [AK].



Fig. 625.3: *Maylandia flavifemina*, male, Thumbi West Island. Note lack of yellow colour on the chest and cheeks and heavier dark bars than the Maleri specimen [AK].



Fig. 625.4: *Maylandia flavifemina*, male, Thumbi West Island. Note thinner occipital barring, less black on dorsal fin and large number of eggspots, as well as lack of yellow on chest and cheeks [AK].



Fig. 625.5: *Maylandia flavifemina*, female, Maleri Island [AK].



Fig. 625.6: *Maylandia flavifemina*, female, Thumbi West Island. Note overall beige colour rather than bright yellow [AK].

MC626. *Maylandia gallireyae* (Miller et al. 2021), MLN

A snail-dwelling sand mbuna similar to *M. lanisticola* but with a black submarginal band in the dorsal fin. Head less pug-like than *M. ngarae*. Males bluish without obvious barring. Known only (so far) from Gallireya Reef just south of Chilumba. Lives between ranges of *M. ngarae* and *M. lanisticola*. Photo by Konings (Male).



MC627. *Maylandia glaucos* (Ciccotto et al. 2011), MZ

An 'aurora-group' species. Males blue with faint vertical bars, females beige. Males vary in the amount of orange, with sometimes distributed on upper surface of head and body. Found at a reef or two near Cobue between ranges of *M. xanthos* (to north) and *M. aurora* (to south). Photo by Konings (male)

**MC628. *Maylandia greshakei* (Meyer & Foerster 1984), MLS**

A zebra. Males pale blue with orange dorsal and caudal fins. Sometimes faintly barred. Females beige with slightly orange dorsal. Confined to Makokola Reef in SE Arm. Very similar to *M. mbenjii*. Type species of *Maylandia*. Photo A. Konings (male).

**MC629. *Maylandia hajomaylandi* (Meyer & Scharf 1984), CHI**

An aurora-group species from rock-sand interface habitats. Males pale blue with thin faint barring and orange heads and chests. Females beige with slightly orange fins. Endemic to Chizumulu Island. Has been a popular aquarium species. Photo A. Konings (male).

**MC630. *Maylandia koningsi* (Stauffer 2018), LIK**

Small aggressive species generally in deeper water (>15m). Males unbarred, pale blue with black fins, head and belly; strongly striped forehead. Female yellowish. Known only from Maingano Island and Membe Point in Likoma. Used to be called *Pseudotropheus 'membe deep'* (Ribbink et al. 1983). A popular aquarium species. Photos by A. Konings (male above).



MC631. *Maylandia lanisticola* (Burgess 1976), MLS, MLN.

Pseudotropheus lanisticola was described by Burgess (1976d) (fig. 631.1). Ribbink et al. (1983) considered the species to be a junior synonym of *P. livingstonii*. Stauffer (1991) regarded them as distinct, but redescribed *P. lanisticola* as *P. pursus* (later changing the name- an 'inadvertant error' to *P. purus*, or *Metriaclima purum* (which would be *Maylandia purus*). Konings (2016a) considered this a junior synonym of *P. lanisticola*, which he placed in *Metriaclima*, so now *Maylandia lanisticola* should be considered valid (Fricke et al. 2026). It belongs to a group of mbuna which are found on sandy habitats and are distinguished by their sandy body colour and few wide brownish flank bars. These have been split between *Metriaclima*/*Maylandia* and *Pseudotropheus* on the basis of the head profile angle (usually measured on the skull as the angle of the ethmovomerine process versus the parasphenoid). This does not seem to be supported by molecular study. In practice, *P. lanisticola* is distinguished from *P. livingstonii* and *P. likomae* mainly by the brightly-coloured orange and blue-white anastomosing stripes in its caudal fin, and from *M. gallireya* and *M. ngarae* by the lack of a black submarginal band in the dorsal fin. *M. lanisticola* shows geographic variation in fin colour, most obviously in the anal fin which can be striking yellow or black or pale whitish blue. Males often lose the vertical bars and can be blue-grey.

The species is one of the smallest mbuna, with the largest type 54.1mm SL, 60.6mm SL for the largest of the *pursus* types. The species lives in snail shells throughout its life, using the large *Janistes* shells when they attain adult sizes. Konings (2016a) reports that the largest adults in some locations are unable to hide in shells and forage in the open. They are reported to feed by scraping hard surfaces such as snails shells, and small pebbles, as well as feeding on plankton.

Konings reports the species from shallow sandy areas from Kande Island southwards, but does not record it north of Makanjila Point on the eastern shore (Konings 2016a). It is also common in Lake Malombe. A total of 27 specimens were sequenced (631.2-5), from the southern arms and Lake Malombe, forming a single grouping, but with considerable geographic structuring. With its terminal mouth, bicuspid outer teeth and moderately sloping head profile, it has long been placed in the *M. zebra* group (Ribbink et al. 1983), but molecular studies do not support this, but instead indicate relationships with other 'sand mbuna' including *M. ngarae*, *P. livingstonii* and *P. sp. 'acei'* (MCGDS unpublished).



Fig. 631.1: *Maylandia lanisticola*, holotype.



Fig. 631.2: *Maylandia lanisticola*, D12-G09: trawled from 20m depth off Makanjila, SE Arm, 2 March 2016, sequenced [HS].



Fig. 631.3: *Maylandia lanisticola* D18-C03, seined at Palm Beach, SE Arm, 23 Jan 2017, sequenced [HS].



Fig. 631.4: *Maylandia lanisticola*, male, D13-E05, trawled from 45-50m, SE Arm, 3 March 2016, sequenced [HS].



Fig. 631.5: *Maylandia lanisticola*, male, D21-H02, bought from Nkatcha Fisherman, Lake Malombe, 24 Jan 2017, sequenced [HS].

MC632. *Maylandia lombardoi* (Burgess 1977), MLS

A popular aquarium species, probably of the 'aurora-group', females are bright blue with broad dark bars, males bright yellow. Confined to Mbenji Island and nearby reefs. Photos by Konings: male on right, female below.

**MC633. *Maylandia lundoense* (Stauffer et al. 2013), TZ**

A member of the 'flavifemina group', males are blue and black with narrow vertical bars and a black submarginal band in the dorsal fin, females pale brownish. The species has been reported as *Pseudotropheus* 'Black Dorsal Tanzania' (Spreinat 1994); *Pseudotropheus* sp. 'black dorsal shauri' (Konings 1995); *Maylandia phaeos* (Schraml 1998); *Metriaclima* sp. 'black dorsal cobalt' (Konings 2001); *Metriaclima* sp. 'black dorsal lundo' (Konings 2007). Endemic to Lundo Island on the southern Tanzanian coast, where it co-occurs with *M.* sp. 'msobo heteropictus' Photo A. Konings (male).

**MC634. *Maylandia mbenjii* (Stauffer et al. 1997), MLS**

A zebra with pale blue (unbarred) males which have bright orange dorsal fins (much like *M. greshakei*), as well as orange in the caudal and pectoral fins. Females are pale brownish or OB/O. Confined to Mbenji Island. Photo by Mark Smith (male).



MC635. *Maylandia melissa* (Stauffer & Konings 2023), MLN

Metriaclima (now *Maylandia*) *melissa* was described in 2023 by Stauffer and Konings. The type locality was Chitande Island, Chilumba, but the species was taken to incorporate three geographically separate but nearby populations showing consistent differences in male colour and formerly allocated to different putative species with distinct common names: *Maylandia* sp. 'elongatus bee' (Chilumba to Chirwa Island), *Maylandia* sp. 'elongatus chailosi' (Chitande Island) and *Maylandia* sp. 'elongatus chewere' (Chewere Reef). These populations were all previously discussed under *Metriaclima* and *Pseudotropheus*.

Pseudotropheus elongatus 'bee' was first identified by Ribbink et al. (1983) from Chitande Island and Mara Rocks, noting that the Chitande Island form was strongly barred black and yellow, but the Mara Rocks form was more bluish. Mara Rocks is a long way to the south of Chilumba, and their illustration was labelled as Ruarwe! But still the 'bee' was at Chitande! However, the names seemed to have switched around in the meantime, taking 'bee' away from Chitande to Chirwa, but then naming the species after a bee, but from Chitande as the type locality! Ribbink et al. (1983) reported the species preferring the rock-sand interface at depths of 3-40m at Chitande (narrower depth range at Mara Rocks), with males digging spawning craters alongside or under rocks and females being non-territorial, sometimes in loose groups. Stauffer & Konings (2023) report the species feeding on plankton or by combing rock surfaces. Konings (2016a) notes the Chewere population being particularly dense. The largest type was 72.9mm SL.

One specimen of the Chitande population has been sequenced (fig. 636.2). It is related to other 'elongatus' populations and to *Cynotilapia axelrodi*, not to the other main *Maylandia* groups: zebra, aurora, sand mbuna (MCGDS, unpublished).



Fig. 636.1: *Maylandia melissa*, male, Chitande Island. This population was formerly known as 'elongatus chailosi' by Konings and elongatus 'bee' by Ribbink et al. 1983 [AK].



Fig. 636.2: *Maylandia melissa*, D06-B05, SCUBA, Chitande Island, Chilumba, 24 Feb 2016 [HS].



Fig. 636.3: *Maylandia melissa*, male, Katale Island. This population was formerly known as 'elongatus bee' by Konings (2016a) [AK].



Fig. 636.4: *Maylandia melissa*, male, Chewere Reef. This population was formerly known as 'elongatus chewere' by Konings (2016a) [AK].



Fig. 636.5: *Maylandia melissa*, mouthbrooding female, Chitande Island. [AK].

MC636. *Maylandia midomo* (Stauffer, Black & Konings 2013), TZ

A deep-bodied 'zebra' with wide bands of teeth, males are blue-black barred with a blue dorsal fin and forehead blaze,. Apparently endemic to Londo Island in Tanzania. Photo by A. Konings (male)

**MC637. *Maylandia mossambica* (Ciccotto, Konings & Stauffer, 2011), MZ**

An 'aurora-group' species from southern Mozambique (Chiloelo River to Chinuni) with pale blue faintly-barred males and sandy-coloured females. There is some geographic variation in the extent of yellow on the head, trunk and fins, the presence of dark radial markings in the anal, caudal and soft dorsal fins, a thin dark submarginal band on the anal fin and black pelvic fin markings. It looks very similar to populations of *M. chrysomallos* just across the border in Malawi. It has gone under various names including 'aurora yellow', 'aurora chinuni', 'aurora blacktail' and 'Masinje'. The original name was given as *Metriaclima mossambicus* but that ending is masculine and *Metriaclima* is neuter, so it should be *M. mossambicum*. However, *Maylandia* is feminine (despite being named after the male aquarium author, Hans Mayland), so it should be *M. mossambica* (see Fricke et al. 2026). Photos by A. Konings (female below)



MC638. *Maylandia ngarae* (Miller et al. 2021), MLN

Maylandia ngarae was described as *Metriaclima ngarae* by Miller et al. (2021). It is a essentially a northern equivalent of *M. lanisticola* (MC631), but distinguished by the presence of a conspicuous black band in the dorsal fin (lacking in *M. lanisticola*) and a generally more squashed-looking pug-like head, associated with the short snout and upwardly-angled mouth (fig. 638.1). This species is named after Ngara, a major collecting locality. The reported range of the species is between the Malawi/Tanzania border to north of Chilumba at Chese. To the south of Chilumba in Chitimba Bay, it is replaced by *Maylandia gallireyae* (MC626, not yet sequenced), collected from the vicinity of Gallireya Reef. All of these species are associated with empty *Lanistes* snail shells which appear to be used as refuges. They feed on biofilm on hard substrates or on plankton. The largest type was 62.4mm SL.

Seven specimens bought together from fishers at Ngara were sequenced (fig. 638.3-4). They were closely related to *M. lanisticola* and *P. acei*.



Fig. 638.1: *Maylandia ngarae*, holotype from original description.



Fig. 638.2: *Maylandia ngarae*, with *Lanistes* shell, from original description.



Fig. 638.3: *Maylandia ngarae*, freshly bought from seine fisherman at Ngara, Chilumba, 25 Feb 2016 [GFT].



Fig. 638.4: *Maylandia ngarae*, D07-B07, bought from seine fisherman at Ngara, Chilumba, 25 Feb 2016 [HS].

MC639. *Maylandia nigrodorsalis* (Stauffer et al. 2013), MZ

A member of the 'flavifemina (=black dorsal) group', usually strongly colour-dimorphic species living where rocks meet sand. This one is from southern Mozambique. It shows considerable geographic variation and went under a range of names including 'black dorsal chiloelo', 'black dorsal nkhungu', 'black dorsal nkolongwe', 'black dorsal thundu', as well as the usual generic confusion of *Pseudotropheus* and *Metriaclima*. Photo by Konings (Thundu male).

**MC640. *Maylandia nkhunguensis* (Ciccotto et al. 2011), MZ**

An aurora group species (Konings 2016a), but unusual in that females, as well as males, are pale blue. It has a narrow distribution, confined to a couple of reefs in Mozambique (Minos and Nkhungu) where it is abundant and may be confused with MC622 *M. estherae*. Formerly known as 'blue reef'. Photo by Konings (male, above, and female).

**MC641. *Maylandia pambazuko* (Stauffer et al. 2013), TZ, MZ**

Superficially looks like a yellow dorsal *Cynotilapia zebroides*, but has bicuspid teeth and the two are reported to co-occur. It also looks a bit like the 'red top' zebras *M. emmiltos* and *M. pyrrhonotus*. This species is found in southern Tanzania and northern Mozambique. Photo by Konings (male).



MC642. *Maylandia phaeos* (Stauffer et al. 1997), TZ, MZ

A large member of the 'flavifemina group', a strongly colour-dimorphic species living where rocks meet sand. Males are strongly blue and black with lots of thin vertical bars, females yellow. This one is from southern Tanzania and northern Mozambique. Photo by Konings (male above).

**MC643. *Maylandia pulpican* (Tawil 2002a) MZ, LIK**

This is a small, aggressive species of the 'kingsizei'-type, but placed in *Maylandia* because of the skull shape and bicuspid teeth. It looks a lot like *Cynotilapia axelrodi* (indeed was originally placed in *Cynotilapia*). Some individuals have a broad dark band in the dorsal fin. It is found in northern Mozambique as well as some locations on Likoma, including Maingano Island. Photo by Konings (male).



MC644. *Maylandia pyrrsonotos* (Stauffer et al. 1997), MLS

Maylandia pyrrsonotos is the southern 'red-top' zebra, originally described by Stauffer et al. (1997) as *Metriaclima pyrrsonotos*, *M. sandaracinos* and *M. thapsinogen*: all three being considered conspecific by Konings (2016a). *Maylandia sandaracinos* was collected from Mpandi Island in Nkhudzi Bay and Kanchedza Island in Chirombo Bay, north of Mazinzi Bay, both small habitat patches in the NW of the SE Arm. *M. thapsinogen* was collected from Chimwalani Reef (then known as Eccles Reef) in the NE of the SE Arm, and has a yellow throat membrane. *Maylandia pyrrsonotos* itself was originally described from Nakantenga Island but a small (possibly introduced) population was also recorded from nearby Maleri Island in the north of the SW Arm and was stated to be the only one of three southern red-top zebras which had black bars extending into the dorsal fin, but this trait seems to be variable (fig. 644.1). Orange-morph females (fig. 644.2) and occasional males are known from Nakantenga.

Thirty-one individuals have been sequenced, all from Nakantenga Island, and all of the barred morph (fig. 644.3-4). These form a single cluster, most closely related to *M. zebra* from nearby Mumbo Island (other Maleri Islands have not been sampled, nor have other southern red-top zebras), and appear to have evolved the red dorsal fin independently from *M. emmiltos* in the north (MCGDS, unpublished), as suggested by earlier studies by Allender et al. (2003).



Fig. 644.1: *Maylandia pyrrsonotos*, male, Nakantenga Island [AK].



Fig. 644.2: *Maylandia pyrrsonotos*, O-morph female, Nakantenga Island [AK].



Fig. 644.3: *Maylandia pyrrsonotus*, male, D41-F09, Nakantenga Island, 26 Sept 2019, sequenced [MCGDS].



Fig. 644.4: *Maylandia pyrrsonotus*, female, D41-E07, Nakantenga Island, 26 Sept 2019, sequenced [MCGDS].

MC645. *Maylandia sciasma* (Ciccotto et al. 2011), TZ

'Aurora-group' (?), formerly 'aurora north'. Males strongly barred black and blue with dark pelvic fins and weak forehead bars. Females pale beige with dark pelvics. Confined to the Tanzanian shore north of the Ruhuhu River. Photo by Konings (male).

**MC646. *Maylandia* sp. 'aggressive bars', MLN, MZ, TZ, LIK, CHI**

This undescribed form was originally identified by Ribbink et al. as *Ps. 'aggressive zebra'*. Konings (2016a) reports it to be very widespread noting it at Thumbi Point & Puulu in Tanzania, Tumbi Point, Mbweca, Taiwanese Reef, Minos Reef, Nkhungu Reef & Chiloele in Mozambique, and Hora Mhango, Charo, Kakusa, Likoma & Chizumulu in Malawi. He also reports it as having very large bicuspid teeth, similar to those of MC910 *M. sp. 'black eastern'*. 'Black eastern' is known from Chiofu, which lies between the known range of 'aggressive bars' and that of the similar MC652 *M. sp. 'chinyankwazi'*.



Male from Chiloele (A. Konings). Females are dark brown.

MC647. *Maylandia* sp. 'aggressive greyhead', MLS

Ribbink et al. (1983) identified this small (76mm SL) species from the Maleris, where it is common in shallow water (generally 3-8m). Both sexes are territorial. Females were reported to be brown, but Konings (2016a) says they look like the males. Photo (male) by Konings.

**MC648. *Maylandia* sp. 'aggressive zebra maleri', MLS**

This form was originally identified by Ribbink et al. (1983) as a population of 'aggressive zebra' (see also MC524, MC646). It lives in very shallow water where rocks meet sand. Both sexes are territorial and look rather similar. Photo (male) by Konings.



MC649. *Maylandia* sp. 'aurora bevous', CHI

Endemic to Chizumulu Island, mostly found deeper than 10m in areas where rocks meet sand. Females are blue-grey with faint bars. The name seems to have come from the species originally being thought of as a geographic variant of 'zebra bevous' - now renamed (MC760) *Ps. sp. 'sand cobalt'* by Konings (2016a), a species from Likoma. The name 'bevous' was first used by Ribbink et al. (1983). I have no idea what it means: it seems to be absent from the internet except in this context! Photo (male) by Konings.

**MC650. *Maylandia* sp. 'black dorsal mbenji', MLS**

Endemic to Mbenji, living at the rock-sand interface, this was originally mistaken for a *Cynotilapia* by Ribbink et al. (1983). Konings (2016a) was unclear whether this belongs with the black dorsal (flavifemina) group or is closer to MC646 (aggressive bars). Females are drabber versions of the males. Photo (male) by Konings.

**MC651. *Maylandia* sp. 'cave manda', TZ**

A little-known, cryptic cave-dwelling species reported from Manda and Pombo Rocks in Tanzania, it looks very similar to MC 646 (aggressive bars). Females assigned to this species are blue-grey with faint barring (Konings 2016a). Photo (male) by Konings.

**MC652. *Maylandia* sp. 'chinyankwazi', MLS**

Found in the SE Arm at Chinyankwazi, Chinyamwezi, and Boadzulu islands, and Makokola Reef, this appears to be the geographic equivalent of MC646 *M. sp. 'aggressive bars'* and possibly MC 651 *M. sp. 'cave manda'*. Males are virtually identical and all three are allopatric with complementary distributions. Females are brown. Photo (male) by Konings.



MC653. *Maylandia* sp. 'daktari', TZ, MZ

At Undu & Hai Reefs in Tanzania, males are bright yellow and females beige. At Chiwindi & Liutche in Mozambique, males have a bluish sheen on a yellow background and females are yellowish. Resemble *M. sp. 'lime'* and its relatives (MC666-668). They live at 5-15m at the rock-sand interface, and behave rather like *Cynotilapia axelrodi* or sp. 'lion' (Konings 2016a), but have bicuspid teeth. Photo (male, TZ) by Konings.

**MC654. *Maylandia* sp. 'dolphin', TZ**

This species is reported from Ndonga to Puulu at depths of 5-7 m. Females look much like males and juveniles are bright blue with dark bars. Despite its name, Konings (2016a) does not treat it among the 'dolphin mbuna', such as MC772 *Ps. tursiops*, but with the 'aggressive' group. Photo (male) by Konings.

**MC655. *Maylandia* sp. 'dumpy', MLS.**

This small species, first reported by Ribbink et al. (1983) is common in sediment-rich rocky areas at depths of 13-28m at the Maleri Islands. Konings (2016a) notes a resemblance to *Cynotilapia* sp. 'lion' although it has bicuspid teeth. Photo (male) by Konings.

**MC656. *Maylandia* sp. 'dumpy chitimba', MLN.**

This small species is found where rocks lie on sand in Chitimba Bay, south of Chilumba. Photo (male) by Konings.

**MC657. *Maylandia* sp. 'dumpy tanzania', TZ.**

This small species is found where clumps of small rocks lie on sand at depths of 25m or more at Lupingu, Manda and Puulu Island, where it had been recorded as *Pseudotropheus* 'Zebra Dwarf Tanzania' by Spreinat (1994). Photo (male) by Konings.



MC658. *Maylandia* sp. 'elongatus chidunga', MLS.

A slender species found in sediment-rich areas at Chidunga Rocks, near Chipoka. Photo (male) by Konings.

**MC659. *Maylandia* sp. 'elongatus goldbar', LIK, CHI.**

A slender species found in sediment-rich areas at Likoma and Chizumulu. Females are also strongly barred. Photo (male) by Konings.

**MC660. *Maylandia* sp. 'elongatus linganjala', CHI.**

A slender species rather similar to *M. flavicauda*, but found in sediment-free rocky areas at Chizumulu Island and associated Linganjala Reef. Photo (male) by Konings.

**MC661. *Maylandia* sp. 'elongatus ngkuyo', TZ.**

A slender species rather similar to *M. flavicauda*, but found on sediment-free rocky areas at Ngkuyo (Mbamba) Island and along the coast from Njambe to Undu Point, southern Tanzania. Photo (male) by Konings.

**MC662. *Maylandia* sp. 'estherae blueface', MZ.**

A zebra from Mozambique, around Lumessi in between ranges occupied by *M. estherae*, but it is reported to occur in more sediment-rich areas. Females are barred-brownish, OB or O morph. Photo (BB male) by Konings.



MC663. *Maylandia* sp. 'hajomaylandi pombo', TZ

A zebra from Tanzania, on the deeper part of shallow reefs between Lundu and the Ruhuhu delta. Females are barred. Photo (male) by Konings.



MC664, *Maylandia* sp. 'kingsizei lupingu', TZ.

This small species is reported to exhibit male colour polymorphism. It lives at the rock sand interface between Lupingu and Cape Kaiser in Tanzania. Konings (2016a) suggests it may be related to *Cynotilapia* sp. 'lion' as well as other 'kingsizei' (some of which are presently placed in *Pseudotropheus*). Photos by Konings (2016a).



MC665. *Maylandia* sp. 'kingsizei masimbwe', LIK.

This small species is found at Masimbwe Island, off Likoma. It seems to be an allopatric cognate of MC643, *Maylandia pulpican*, which is found around the rest of Likoma. Photo by Konings (male).



MC666. *Maylandia* sp. 'lime', LIK.

This small species resembles MC653 *M. sp.* 'daktari' but males have more black in the pelvic and anal fins. It is found at Likoma. Males at Mbamba Island are more bluish. Females are silvery beige. Ribbink et al. (1983) reported the species to prefer sediment rich areas at 15-30m depth. The species was named by Ribbink et al., who consistently used the word 'lime' for bright 'lemon' yellow, when everyone else uses it for lurid pale yellow-green. Photo by Konings (males, Mbamba Island form below).

**MC667. *Maylandia* sp. 'lime jalo', MLS.****MC668. *Maylandia* sp. 'lime nkomo', MLS.**

These small species are thought to resemble MC666, but are found at Jalo Reef, North of Nkhotakota and at Nkhomo Reef (-13.3267, 34.3574) near Benga, and the nearby Mbenji Island, both preferring the rock-sand interface in fairly deep water. Photos by Konings (males, Jalo above, Nkhomo below).

**MC669. *Maylandia* sp. 'mbweca', MZ.**

This resembles a dark version of *C. sp.* 'lion' but has bicuspid teeth. It is found on the Mozambican coast just south of Likoma Island. Photo by Konings (male).

**MC670. *Maylandia staufferi* Konings 2026, TZ.**

This 'flavifemina' group species has bright yellow females and blue and black males. It is found along the central part of the Tanzanian coast from Cape Kaiser southwards. It is a popular aquarium species, formerly known as *M. sp.* 'msobo'. Photo by Konings (male).



MC671. *Maylandia* sp. 'msobo heteropictus', TZ.

Tanzania: Njambe to Lundo Island. Males of some populations have a strong dark band in the dorsal fin. Females are beige with dark orange fins. 'Flavifemina' group species. Photo by Konings (male).

**MC672. *Maylandia* sp. 'red top gallireya', MLN.**

A striking zebra species from the isolated Gallireya Reef (-10.4997,34.2355) in Young's Bay, just South of Chilumba. Females are dark barred. It may be related to MC676 M. 'zebra long pelvic' which is found north of Chilumba. Photo by Konings (male).

**MC673. *Maylandia* sp. 'taiwan', CHI.**

A rather elongate uncommon, deep-water zebra from Taiwanese Reef off Chizumulu Island. Females are brown. Photo by Konings (male).

**MC674. *Maylandia* sp. 'taiwan masimbwe', LIK.**

A dark elongate deepwater species from Masimbwe Island off Likoma. The inclusion of 'taiwan' in the name has nothing to do with its distribution, but rather to similarity to MC673. Photo by Konings (male).



MC675. *Maylandia* sp. 'zebra gold', MLN

Maylandia sp. 'zebra gold' is a common aquarium fish and has been the subject of a lot of research, but it remains undescribed. Fryer (1959) made a few brief notes on a fish having bright yellow males and living further offshore at Nkhata Bay, but otherwise being very similar to *M. zebra*. He mistakenly called it *Pseudotropheus livingstonii* (MC732), which is a very different species (sandy coloured with broad bars and living over sand bottoms). Holzberg (1978) called them Y-BB, and noted a depth distribution of 7.5-25m, generally deeper than what we now know as the *M. zebra* and *M. callainos* at Nkhata Bay. He also noted that there were both BB (plain/brown-barred) and OB (blotched) females, but not O-morph females (which he called 'gold') at the depth preferred by these males. He was uncertain whether they represented a distinct species. Ribbink et al. (1983) were more confident of its distinctness, naming the Y-BB species *Pseudotropheus zebra* 'gold', and recording it from the northern coastlines, noting absences from Mara Rocks, Mphanga Rocks and Chitande, and recording some geographic variation in male colour. They gave a depth range of 5 to at least 40m, with a preference for sediment covered rocks. Konings (2016a) placed the range of the species on the western shore from Chirombo Point in the south to Charo, but also noted its absence from the east coast, where it may be replaced by *M. sp.* 'zebra yellowtail'. Konings also notes the occurrence of OB females (and occasional males), missed by Ribbink et al. Further field studies, laboratory trials and molecular analyses with microsatellite DNA (van Oppen et al. 1997; Knight et al. 1997) confirmed the distinctness of *M. sp.* 'zebra gold' with respect to both sympatric *M. zebra* and *M. callainos* at Nkhata Bay. Laboratory breeding trials confirmed that *M. zebra* and *M. sp.* 'zebra gold' were genetically compatible and could be hybridised under conditions where females of one species were kept with only males of the other, producing intermediate-looking but viable and fertile hybrids, with male colour differences controlled by relatively few genes (Barson et al. 2007). Genner et al. (1999) found that the diet of the species differed significantly from that of *Cynotilapia zebroides* or *Maylandia callainos*, but not *M. zebra*, and was dominated by zooplankton and sediment, with relatively little phytoplankton or epilithic algae. Adult males are easily distinguished by their colour (fig 675.1). Females tend to be more slender with a smaller head and jaws than those of the sympatric *M. zebra*, and the BB (plain) morph tend to be more uniformly brown rather than barred, while the blotched morph generally has a paler background colour and lacks the orange leading edge to flank scales often seen in *M. zebra* (fig. 675.2, 4).

At the time of writing, eight specimens have been sequenced, all from Nkhata Bay: 5 males - D01-C03 (fig 675.3), D01-D06, D01-D08, D01-F09 (fig. 675.4), D01-H10; 1 OB female D03-A09 (fig. 675.4) and 2 BB females- D03-B04 (fig. 675.5) and D33-B03. These all cluster together and lie within the main zebra/*Cynotilapia* group, in a rather basal position.



Fig 675.1: *Maylandia* sp 'zebra gold', male, Nkhata Bay, 2016 [HS].



Fig 675.2: *Maylandia* sp 'zebra gold', OB-morph female, Nkhata Bay, 2016 [HS].



Fig 675.3: *Maylandia* sp 'zebra gold', male, D01-C03, Nkhata Bay, 2016, sequenced [HS].



Fig 675.4: *Maylandia* sp 'zebra gold', male, D01-F09, Nkhata Bay, 2016, sequenced [HS].



Fig 675.5: *Maylandia* sp 'zebra gold', OB-morph female, D03-A09, Nkhata Bay, 2016, sequenced [HS].



Fig 675.6: *Maylandia* sp 'zebra gold', BB-morph female, D03-B04, Nkhata Bay, 2016, sequenced [HS].

MC676. *Maylandia* sp. 'zebra long pelvic', MLN.

A slender zebra species from the far North at Ngara, Mdoka, Mdowa and Chese. There is some geographic variation in male colour with some having orange throats and chests and some with a yellowish dorsal fin. Females are dark barred. It may be related to MC672 *M. 'red top gallireya'* which is found south of Chilumba. Photo by Konings (male).

**MC677. *Maylandia* sp. 'zebra mbowe', MLN.**

This small 'kingsizei' species from Mbowe Island in Usisya Bay was initially confused with 'zebra ruarwe' (MC679). Females are bluish with dark bars. Photo by Konings (male).

**MC678. *Maylandia* sp. 'zebra patricki', MLS.**

This small species occurs at Chidunga Rocks (Chipoka), the Maleris, Namalenje, Mbenji, Nkhomo Reef and Jalo Reef (near Nkhotakota), generally at the shallow rock-sand interface, which probably facilitates dispersal. There is some geographic variation, with some strongly barred. Females are brown. Photo by Konings (male, Chidunga Rocks).

**MC679. *Maylandia* sp. 'zebra ruarwe', MLN.**

This small slender species occurs from Mphanga Rocks (Chilumba) to Ruarwe. Ribbink et al. (1983) listed it as a zebra, but Konings (2016a) considers it to be a 'kingsizei'. Females and juveniles are bright blue, but unbarred. Photo by Konings (male).



MC680. *Maylandia* sp. 'zebra yellow tail', TZ.

This slender species is found in deep sediment-rich rocky habitats from Lupingu to Manda, where it appears to replace MC675 'zebra gold'. Females are brown. Photo by Konings (male).

**MC681. *Maylandia tarakiki* (Stauffer et al. 2013), TZ**

This is a fairly standard blue-black zebra, barred with a blue dorsal fin, rather more slender than most (used to be known as 'zebra slim'). OB females and occasional males are known. It is confined to a few locations in Tanzania around Higga Reef, Mbamba Bay. It is not known to co-occur with any other 'classic zebra' (Knings 2016a). At the time of writing, it seemed to be common in the aquarium trade. Photo by Konings (male).

**MC682. *Maylandia usisyae* (Li et al. 2016), MLN**

An elongatus. Males are rather yellow-brown, although partial dark bars sometimes appear, with bluish areas between. The forehead has blue cross-bars. The dorsal, anal and pelvic fins are largely black with some orange. Females are brown. It is confined to Mara Rocks and a nearby small reef. Ribbink et al. (1983) seem to have got this form mixed up with what is now known as *Maylandia melissa*, under 'elongatus bee'. Photo by Konings (male).



MC683. *Maylandia xanstomachus* (Stauffer & Boltz 1989), MLS.

A big, blue zebra with a yellow throat and wide tooth bands. Dominant males are largely pale blue and only weakly barred, but subordinates show more dark blue barring. Pelvic fins are generally dark (fig. 683.1). Females are beige (fig. 683.2). OB females and males are shown on the malawi.si and cichlidae.com websites. Originally reported from the Maleri Islands preferring depths of 2-8m, by Ribbink et al. (1983) as *Pseudotropheus zebra* 'yellow throat', it was recorded as attaining 102mm SL. Konings (2016a) later reported small populations at Kanchedza Island in Chirombo Bay and Chidongo Rocks in the SW Arm. Specimens are available to sequence from the 2026 dive survey and a full sequence of a specimen from Maleri Island has also been reported by Scherz et al. (2022).



Fig. 683.1: *Maylandia xanstomachus*, male, Nakantenga Island [AK].



Fig. 683.2: *Maylandia xanstomachus*, female, Nakantenga Island [AK].

MC684. *Maylandia xanthos* (Ciccotto et al. 2011), MZ.

An aurora-group species. Appears drab blue with brownish bars and a yellowish belly and dorsal fin. Females are yellowish-beige. Has a very restricted distribution in Mozambique around Lumbaulo, where it lives in deep water. Photo by Konings (male).



MC685. *Maylandia zebra* (Boulenger 1899), all regions.

Tilapia (now *Maylandia*) *zebra* was described by Boulenger (1899) from a single specimen: a large prominently barred male (fig. 685.1). It was described as grey with brown bars, so live colour was already lost and not noted by the collector (fig. 685.2). It is clear from the description and illustration that it has a dark head, strong barring on the forehead and a pale dorsal fin, with perhaps a little darkening at the base. Konings (2009) suggests the type locality might be Likoma, but no justification is given. However, it seems likely: Boulenger notes the specimen was collected by Miss M. Woodward, presented by Miss S.C. McLaughlin, and women of those names worked as Missionaries at Likoma in this period (Barnes 1933). A suitable-looking form can indeed be found at Likoma (fig. 685.3). This looks like the 'classic BB zebra'. For convenience, I will use this term for the phenotype which is also found at locations such as Nkhata Bay, Chiofu Bay, Thumbi West, Domwe, Monkey Bay and Boadzulu Islands: a blue and black barred fish (dark barring fading posteriorly) with a dark head, strong blue and black cross stripes on the forehead, pale blue dorsal and caudal fins and dark pelvics. However, molecular analysis carried out over 20 years ago (with admittedly old-fashioned methods) indicates that this phenotype may have evolved multiple times in different parts of the lake (Allender et al. 2003), which suggests that ultimately, we might be faced with the option of either recognizing essentially indistinguishable forms that live in different places as different species or else having to collapse multiple very distinct forms down into a single widespread species. This is complicated by the fact that in several locations, multiple different forms co-exist without interbreeding, and show divergent microhabitat preferences and adult colour patterns. These sympatric species are often more genetically similar than apparently identical things living in different locations. The current definition of *M. zebra* lies somewhere between these two extremes, essentially awaiting further genetic information and formal revision. For now, the practice of Konings (2016a) is largely adopted, which precludes allowing plausibly reproductively isolated sympatric taxa from being treated as conspecific, while attempting to match up allopatric forms based on estimated recent common ancestry. In the absence of thorough molecular phylogenetic analysis, there is a lot of educated guessing going on, but it provides a useful baseline. Currently, *M. zebra* is taken (e.g. Konings 2016) to include forms with a generally similar overall morphology but with a range of colour patterns: for example, the virtually plain blue population at the Maleris has been included in *M. zebra* (I have removed this to MC 917), while a classic BB-zebra that is slightly more slender is regarded as the heterospecific *M. tarakiki* (MC681). I will focus below on populations that have been sampled for sequencing by the MCGDS and then discuss a few other unsampled populations.

Konings (2016a, fig 65.3) shows a photo of a classic BB male from **Likoma Island** (the probable type locality: this photo is from Ndumbi Rocks). Another photo from Ndumbi Rocks appears on the Malawi.si website, which shows a specimen with a darker head and black bars extending into the dorsal fin (fig 685.4). Both of these seem to have a heavy lower jaw and wide tooth bands (fig. 685.3-4). The redescription by Stauffer et al. (1997) does indeed show the holotype having 5 lower jaw tooth rows, whereas populations from the Cape

Maclear area have 2-3 and those from Nkhata Bay area have 2-4. No morphological studies appear to have been carried out on specimens collected from the Likoma population since the original description. A single sequence is available for a specimen collected at Maingano Island in 2023 (fig. 685.4). This specimen also shows a 'classic BB' male phenotype and heavy lower jaw. It does not appear to be closely related to the *M. zebra* from Nkhata Bay or the southern arms, but lies basal to a cluster containing *M. callainos* and its sister group comprised of *M. estherae* and 'classic BB' *M. zebra* from Chiofu Bay.

The **Chiofu Bay** population was sampled in 2016. Underwater photographs show a classic BB zebra, with perhaps a slightly heavy lower jaw (fig. 685.6), and a similar phenotype is apparent from the post-mortem sample photographs, which generally show heavily darkened fish (fig. 685.7). OB-morph females showed a striking orange background colour with large contrasting dark blotches (fig. 685.8).

The **Nkhata Bay** population is again a classic zebra more or less indistinguishable from the type (fig. 685.9, 10) and was extensively sampled by Stauffer et al. (1997) for morphological redescription of the species. Both OB (fig. 685.11) and O females (fig. 685.12) are also found (and occasional males): both have bright orange anterior regions on each flank scale, making the OB forms clearly distinct from those of the sympatric *M. sp. 'zebra gold'*. This population has been extensively sampled for sequencing by the MCGDS (unpublished), with all 41 individuals forming a clear genetic cluster (including OB and O females), with no indications of overlap with sympatric species such as *M. callainos*, *M. sp. 'zebra gold'* or *Cynotilapia sp.*, consistent with its reproductive isolation, already indicated (for the *Maylandia* species) by van Oppen et al. (1998) using microsatellite allele frequency analysis. Phylogenetic reconstruction suggests that it is the sister group to a cluster formed of classic *M. zebra* from Likoma and Chiofu, but also *M. callainos* and *M. estherae*, so the classic *M. zebra* do not form a clade.

The classic zebra phenotype is found from Nkhata Bay as far north as Cape Manulo at the southern tip of Usisya Bay (north of this, at Usisya, Mara Rocks, Mbowe Island and Ruarwe, it is replaced by populations identified as *M. fainzilberi*). To the South, it reappears at **Kande Island**, looking phenotypically indistinguishable (fig 685.13). Three specimens from Kande sequenced by MCGDS (fig. 685.14) surprisingly were not closely related to the Nkhata Bay populations (44km to the north), but came out basally to a large grouping including Chiofu, Likoma and Nkhata Bay classic zebras but also *M. pyrronotus* from Nakantenga Island, *M. estherae* and *M. callainos*.

The classic zebra reappears again in the south of the lake. The **Thumbi West** population is well-known and phenotypically indistinguishable from the other classic zebra (fig. 685.15). It too was included in Stauffer et al.'s (1997) morphological analysis. A large number (ca 58) of specimens from this locality have been sequenced (fig. 685.16), all apparently BB-morph, although OB and O morph females are numerous at this site. Sequences indicated that the population is closely related to that at **Domwe Island** (n=17), which has dark bars extending into the dorsal fin (see MC916 for a discussion) and those at **Thumbi East Island** (n=7), which look phenotypically indistinguishable from the Thumbi West specimens (figs. 685.17-19). BB and OB females were included in the Domwe sample. Male BB zebra at **Otter Point**

have paler head markings and flank bars than those of classic zebras (fig. 685.19): a total of 67 specimens have been sequenced (fig. 685.20), and they are resolved as the sister group to the Thumbi West specimens, as you might expect from their location.

Specimens at **Mumbo Island, Zimbabwe Rock** and the pale blue form at **Maleri** and **Chidunga Rocks** have been included in *M. zebra* by Konings (2024), but are here removed to other taxa (see MC 916-918). These taxa were all excluded from *M. zebra* sensu stricto by either Ribbink et al. (1983) or Stauffer et al. (1997).

Further populations currently regarded as members of *M. zebra* include classic zebra phenotypes at **Boadzulu Island** and a 'blue blaze' form (lacking dark forehead stripes) at **Chizumulu Island** (fig. 685.29). Similar phenotypes reappear in locations in Mozambique and/or Tanzania (see Konings 2016a).

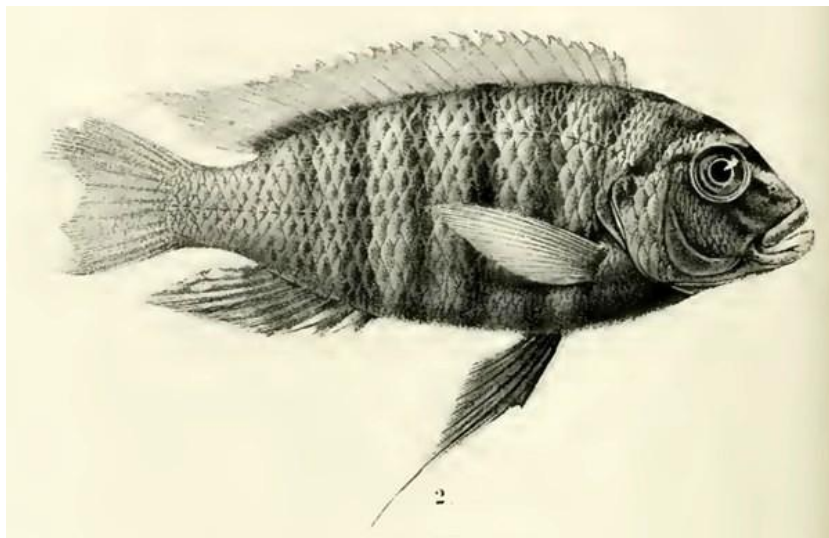


Fig. 685.1: *Maylandia zebra*, Type, illustrated in Boulenger 1899.



Fig. 685.2: *Maylandia zebra*, Type, 2017 [GFT].



Fig. 685.3: *Maylandia zebra*, Ndumbi Rocks, Likoma [AK].



Fig. 685.4: *Maylandia zebra*, Ndumbi Rocks, Likoma [AK].



Fig. 685.5: *Maylandia zebra* BB male, MWA2327, Maingano Island, Likoma, MWA [HS lab].



Fig. 685.6: *Maylandia zebra* BB male, Chiofu Bay, 2016 [HS].



Fig. 685.7: *Maylandia zebra*
BB male, D06-J03, Chiofu
Bay, 28 Feb 2016 [GFT].



Fig. 685.8: *Maylandia zebra*
OB female, D09-A07, Chiofu
Bay, 28 Feb 2016 [HS].



Fig. 685.9: *Maylandia zebra*
BB male, Nkhata Bay, Feb
2016 [HS].



Fig. 685.10: *Maylandia zebra* BB male, D03-A04,
Nkhata Bay, Feb 2016 [HS].



Fig. 685.11: *Maylandia zebra* OB-morph female, D32-E05, Nkhata Bay, Feb 2016, sequenced [HS].



Fig. 685.12: *Maylandia zebra* O-morph female, Nkhata Bay, Feb 2016 [HS].



Fig. 685.13: *Maylandia zebra*, Kande Island [AK].



Fig. 685.14: *Maylandia zebra* BB male, D33-F02, Kande Island, 19 Apr 2018 [MCGDS].



Fig. 685.15: *Maylandia zebra* BB male, Thumbi West 2016 [HS].



Fig. 685.16: *Maylandia zebra* BB male, D55-C06, Thumbi West Island, 2 Sept 2023 [MCGDS].



Fig. 685.17: *Maylandia zebra* OB female, D55-D06, Thumbi West Island, 2 Sept 2023 [MCGDS].



Fig. 685.18: *Maylandia zebra* BB female, D55-E08, Thumbi West Island, 2 Sept 2023 [MCGDS].



Fig. 685.19: *Maylandia zebra*, BB male, Otter Point [AK].



Fig. 685.20: *Maylandia zebra*, BB male, D25-F09, Otter Point, 3 Feb 207, sequenced [AK].



Fig. 685.21: *Maylandia zebra*, male, Makokola Reef, SE Arm. This may be a 'classic' zebra just not exhibiting full territorial colours [AK].



Fig. 685.22: *Maylandia zebra*, male, Boadzulu Island, SE Arm [AK]



Fig. 685.23: *Maylandia zebra*, male, Chizumulu Island, 'blue blaze' form lacking bars between the eyes [AK].

***Melanochromis* Trewavas 1935: species MC686-702.**

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

Type species: *Melanochromis melanopterus* Trewavas 1935.

Contained valid species (15): *M. auratus*; *M. baliodigma*; *M. chipokae*; *M. dialeptos*; *M. heterochromis*; *M. kaskazini*; *M. lepidiadaptus*; *M. lorae*; *M. melanopterus*; *M. mossambiquensis*; *M. mpoto*; *M. robustus*; *M. simulans*; *M. vermivorus*; *M. wochepa*

Proposed undescribed taxa (2): *M. sp. 'parallelus mbweca'*; *M. sp. 'robustus mbenji'*

Generic reviews & diagnoses: Trewavas (1935), Johnson (1975), Ribbink et al. (1983), Trewavas (1984), Bowers & Stauffer (1997), Tawil (2002b), Konings & Stauffer (2012).

Generic diagnosis: Trewavas (1935) originally diagnosed the genus on the basis of its coarser pharyngeal dentition, coupled with the lack of the oral specialisation seen in *Genyochromis* and *Labidochromis*. After several rounds of redefinition, Konings & Stauffer (2012) operated a diagnosis based on (i) the presence of two horizontal stripes in females and immatures, the midline one solid, the upper generally broken and (ii) the reversal or obscuring of this colour pattern in mature males. This definition led to the removal of the *Pseudotropheus johannii* group from the genus (Tawil 2002b).

Field Diagnosis: Strongly horizontally striped mbuna (or all-blue males of similar morphology). Most species have elongate bodies and quite a few have rather long snouts and a predatory look.

Phylogenetic comments: Sequences indicate that *Melanochromis* species are all closely related. A group including *Pseudotropheus* sp. 'williamsi north', *Pseudotropheus fuscus* and *P. fuscoides* seem to be closely related. More widely, this group appears to have affinities with a group including *Labidochromis* species, *Abactochromis* and *Chindongo minutus*. The *Pseudotropheus johannii* group does indeed seem unrelated.

Ecomorphological notes: All species appear to be strictly confined to rocky habitats. They are generally weakly territorial and include algal-feeders, micropredators and a scale-eater.

MC686. *Melanochromis auratus* (Boulenger 1897), MLS.

Chromis auratus was described by Boulenger (1897) from a single specimen collected in Monkey Bay. It was evidently sufficiently fresh that he was able to provide an accurate description of the colour of a female/juvenile specimen, mentioning the bright yellow body colour and dark horizontal stripes. Placed in *Pseudotropheus* by Regan (1922), the species was moved to *Melanochromis* by Johnson (1975), and this has been accepted by later workers. The species is widespread in the southern part of the lake being recorded from Mbenji, Namalenje, the Maleris, Chidunga Rocks (SW Arm), Mumbo, the Cape Maclear-Monkey Bay-Nkhudzi area and Chinyamwezi Island. It is a popular aquarium fish, although it has a reputation for being highly aggressive (even for an mbuna). In nature, it is a largely non-territorial species, often foraging in loose groups, mainly on benthic algae, although plankton, invertebrates and fish fry are opportunistically taken (Ribbink et al. 1983). Mature males show a reversed colour pattern (fig. 686.3). The accurate location and fresh colour information in the initial species description make diagnosis straightforward (fig. 686.1). Nineteen specimens were sequenced (MCGDS) from aquarium-held specimens at SM Grant's export facility in Senga Bay, Malawi (fig. 686.2-3). Their exact collection site is unknown. All specimens clustered together and were related closely to *M. dialeptos*, *M. loriae* and *M. simulans*. A single specimen from Thumbi West Island was sequenced by Scherz et al. (2022).



Fig. 686.1: *Melanochromis auratus* juvenile, Thumbi West Island, 2016 [HS].



Fig. 686.2: *Melanochromis auratus* apparent female, D10-J06, SM Grant aquarium facility, Lake Malawi, 2016 [HS].



Fig. 686.3: *Melanochromis auratus* apparent male, D11-A10, SM Grant aquarium facility, Lake Malawi, 2016 [HS].

MC687. *Melanochromis baliodigma* Bowers & Stauffer 1997, MZ, MLS, CHI.

The species was originally identified by Ribbink et al. (1983) as *Melanochromis* 'blotch', from Chizumulu Island and Masinje Rocks near Makanjila. It was later described by Bower & Stauffer (1997) from specimens collected at Membe Island, Chizumulu, but also in the same paper as *Melanochromis xanthodigma* Bowers & Stauffer 1997, with type locality at Makanjila Reef. The latter is now considered a junior synonym (Tawil 2002b, Konings & Stauffer 2012, Konings 2016a). The species is now known to be distributed all along the Mozambique and Malawian coastlines between these two localities. Male breeding dress is fairly typical for *Melanochromis* (fig. 687.1), but females and juveniles have dark brown vertical as well as horizontal bars on a yellow background, remarkably like the pattern shown by *Pseudotropheus crabro* (fig. 687.1). Konings (2016a) reports that the species is often associated with the nests of *Bagrus* catfish, where it preys on juveniles. Otherwise, it seems to be an opportunistic micropredator. The maximum size recorded is around 98mm SL (Ribbink et al. 1983); 85.5mm SL (Bowers & Stauffer 1997, types of *M. xanthodigma*).

A single specimen sequenced for MCGDS was collected at Chiofu. Although postmortem, the specimen appears a uniform dark brown with hints of orange in the fins, the elongated body, long snout and relatively large jaws do not really fit with any other species recorded from this area (fig. 687.3). Analysis of sequences suggests that the species is related to *Melanochromis robustus* and these are a sister group to the short-snouted *Melanochromis* species.



Fig. 687.1: *Melanochromis baliodigma*, male, Lumessi [AK]



Fig. 687.2: *Melanochromis baliodigma*, juvenile, Gome [AK]



Fig. 687.3: *Melanochromis baliodigma*, D09-B07, SCUBA, Chiofu, 28 Feb 2016 [HS].

MC688. *Melanochromis chipokae* Johnson 1975, MLS.

Melanochromis chipokae is regarded as endemic to Chidunga Rocks in the SW Arm, off Chipoka, a very small habitat patch. It is a long-snouted species very similar to the widely-distributed *M. melanopterus*, but more colourful. Not sequenced. Photos by AK, male above.



MC689. *Melanochromis dialeptos* Bowers & Stauffer 1997, MLS, MZ.

This species is essentially an allopatric replacement for *M. auratus*, and was treated as a colour variant of this species by Ribbink et al. (1983). It is only found along a short stretch of the East coast from Makanjila point northwards to the Lumessi River in Mozambique.

Further north it is replaced by *M. wochepa*, then *M. mossambiquensis* and finally the widely distributed *M. loriae*. Easily identifiable from the colour pattern and location (fig 689.1-2), a single specimen from Chiofu Bay was sequenced by MCGDS (fig. 689.3). It is closely-related to *M. auratus*, *M. loriae* and *M. simulans*.



Fig. 689.1: *Melanochromis dialeptos*, male, Gome [AK].



Fig. 689.2: *Melanochromis dialeptos*, female, Gome [AK].



Fig. 689.3: *Melanochromis dialeptos*, female, D07-I01, SCUBA, Chiofu 21 Feb 2016 [HS].

MC690. *Melanochromis heterochromis* Bowers & Stauffer 1993, MLS.

This species is widespread and common in the south of the lake. It was identified as *M. vermivorus* (MC701) by Ribbink et al. (1983) and shown to be geographically variable, particularly in colour. Bowers & Stauffer (1993) described it (again from a wide range of localities) as *M. heterochromis*, based on supposed morphological differences from the types of *M. vermivorus*, which they did not identify in the field. Konings (2008) has subsequently collected *M. vermivorus* (but has not reported the location). In 2008, he reported that *M. heterochromis* has a shorter lower jaw and premaxillary pedicel length, although strangely just a single figure is given for each species, no range. Konings-Dudin et al. 2009) directly compared populations from Monkey Bay (*M. heterochromis*) with Nkhudzi and Boadzulu (*M. vermivorus*) finding them to be distinguishable on multivariate plots. Detailed counts and measurements were given for *M. vermivorus*, but not *M. heterochromis*. It is mentioned that relative lower jaw length was the best diagnostic feature, but ranges overlapped considerably and in the diagnosis for *M. vermivorus*, the key distinguishing feature is given as the colour of the female/non-breeding male. In the subsequent paper by Konings & Stauffer (2012), the two species are again separated in the key to the genus on the basis of female colour: brown for *M. vermivorus*, cream to grey for *M. heterochromis*, with no mention of morphological differences. Male colours seem to be identical and the geographic ranges of the species appear to be strictly allopatric but closely-adjacent along the NW part of the SE Arm, with *M. heterochromis* found at Monkey Bay and *M. vermivorus* at Nkhudzi headland, less than 13km to the south. The current range of *M. heterochromis* includes Jalo Reef (Nkhotakota), Mbenji, the Maleris, Mumbo, Thumbi West, Domwe, Monkey Bay, Chinyankwazi and Chinyamwezi (type locality). At present, their status as distinct species seems dubious.

A specimen sequenced by Scherz et al. (2022) listed as *M. vermivorus* was collected from Harbour Island, Monkey Bay, and so based on current understanding of these taxa, should be *M. heterochromis*.



Fig. 690.1: *Melanochromis heterochromis*, male, Mumbo Island [AK].



Fig. 690.2: *Melanochromis heterochromis*, female, Mumbo Island [AK].

MC691. *Melanochromis kaskazini* Konings-Dudin et al. 2009, TZ.

This large, long-snouted, colourful species is an allopatric replacement for *M. melanopterus* in the far NE (Tanzanian) part of the lake. Not yet sequenced. Photos by A. Konings, male (above) and female both from Manda, TZ.



MC692. *Melanochromis lepidiadaptus* Bowers & Stauffer 1997, MLS.

First reported by Ribbink et al. (1983), as *Melanochromis* 'lepidophage', this species appears to be confined to a shallow reef at Makanjila Point. Konings reports that it has a broader diet than fish scales, also eating *Bagrus* juveniles, for example. Photos by Konings: male (above) and female. Not yet sequenced.



MC693. *Melanochromis loriae* Johnson 1975, MLN, MLS, TZ.

This species was long known as *Melanochromis parallelus* Burgess & Axelrod 1976 (e.g. Ribbink et al. 1983, Lewis et al., 1986, Spreinat 1995, Konings 2007). It was later discovered by Konings & Stauffer (2012) that it had previously been described as *Melanochromis loriae* by Johnson in 1975, validly, albeit in a fairly obscure self-published magazine. Konings and Stauffer chose not to preserve the then universally used name, so *M. loriae* is now accepted and has been used subsequently (e.g. Konings 2016a). The species is widely distributed across the northern part of the lake, including areas such as Nkhata Bay, Chilumba, Likoma and Chizumulu, as well as much of the Tanzanian coastline. It would seem to occupy position as the northern equivalent of *M. auratus* with *M. dialeptos*, *M. wochepa*, and *M. mossambiquensis* filling in along the eastern coast. Konings also suggests it might be the northern sister species of *M. heterochromis*. Either way, this does not mean it is useful to regard them as conspecific varieties: *M. loriae* was introduced to Thumbi West Island, within the range of both *M. auratus* and *M. heterochromis*, and the three species have continued to co-exist subsequently, with no obvious sign of introgression or competitive exclusion. It is a short-snouted species with prominent black stripes on a white background (fig. 693.1), with the usual reverse-coloured male, in this case with blue stripes on a black background (fig. 693.2). The species is reported to be weakly territorial and to feed largely on benthic algae, but opportunistically takes invertebrates, plankton, catfish eggs or even acts as a cleaner fish (Ribbink et al. 1983; Konings 2016a). A single apparent female from Nkhata Bay has been sequenced (fig. 693.3), and is closely related to *M. auratus*, *M. dialeptos* and *M. simulans*.



Fig. 693.1: *Melanochromis loriae*, female/immature, Nkhata Bay 2016 [HS].



Fig. 693.2: *Melanochromis loriae*, male, Thumbi West [AK].



Fig. 694.3: *Melanochromis loriae* D02-E01, female, SCUBA, Nkhata Bay 21 Feb 2016, sequenced [HS].

MC694. *Melanochromis melanopterus* Trewavas 1935, MLS, MZ, TZ, LIK, CHI.

Melanochromis melanopterus is a relatively large species with a wide distribution (Monkey Bay, Cape Maclear, the Maleris, Mbenji, Likoma, Chizumulu, the southern part of the Tanzanian coast and most of the Mozambican coast). It shows a lot of colour variation. It has a long snout and large jaws and is generally quite predatory, sometimes hunting in packs. Not yet sequenced. Photos by A. Konings: male (above) Nakantenga, female Mbenji.



MC694. *Melanochromis mossambiquensis* Konings-Dudin et al. 2009, MZ.

Melanochromis mossambiquensis is a small, short-snouted species found in the central Mozambican coast, between the ranges of *M. loriae* to the north and *M. wochepea* to the south. Some geographic variation in male colour and snout length is reported. Not yet sequenced. Photos by A. Konings: male (above) and female.



MC696. *Melanochromis mpoto* Konings & Stauffer 2012, MLN, TZ.

Known as *Melanochromis* 'blue' by Ribbink et al. (1983), this large, long-snouted species is known from the north of the lake, including Nkhata Bay and Chilumba area, but is also widely distributed in the northern and central part of the Tanzanian coast (Matema to Hongi Island). It does not seem to co-occur with *M. melanopterus*. Max size 91.1mm (Konings & Stauffer 2012), 101mm SL (Ribbink et al. 1983). Most common at 20-40m, they often form hunting packs. Males are blue (fig. 696.1), females dark brown, but sometimes showing horizontal stripes, with orange fin margins and sometimes hints of blue on the head (fig. 696.2). A single sequenced specimen from Nkhata Bay, where it is the only known long-snouted *Melanochromis* (fig. 696.3), was closely related to *M. baliodigma*.



Fig. 696.1: *Melanochromis mpoto*, male, Chitande Island [AK].



Fig. 696.2: *Melanochromis mpoto*, female, Chitande Island [AK].



Fig. 696.3: *Melanochromis mpoto*, D03-B06, SCUBA, Nkhata Bay 21 Feb 2016 [HS].

MC697. *Melanochromis robustus* Johnson 1985, MLS.

This large (125.8mm SL), heavily built species was described from a single aquarium specimen, purportedly from Chizumulu Island. It has never been seen at that site since, but is known from Chinyankwazi and Mumbo. Redescribed by Konings & Stauffer 2012, was formerly known as *M. cf. brevis* (Ribbink et al. 1983), *M. brevis* (Konings 1995). Opportunistic feeder in very shallow turbulent waters (<3m).



MC698. *Melanochromis simulans* Eccles 1973, MLS, MZ.

Described by Eccles in 1973 from a single specimen collected for the aquarium trade, this species looks like a drab, longer-snouted version of *M. auratus*. It is found from Makanjila point (Masinje Rocks) northwards along the southern Mozambique coast to Nkhungu Point (more or less opposite Nkhotakota on the Malawian shore). It is reported to prefer shallow turbulent waters (<6m deep) and to be an opportunistic feeder or micropredator (Ribbink et al. 1983; Konings 2016a). Minimum length reported to be 81.5mm SL (type). On the basis of sequencing, a single specimen from Chiofu Bay (fig. 698.3) appeared to be most closely related to *M. auratus*, rather than other long-snouted species, such as *M. mpoto* and *M. baliodigma* (MCGDS unpubl.).



Fig. 698.1: *Melanochromis simulans*, male, Ntekete [AK].



Fig. 698.2: *Melanochromis simulans*, apparent female, Masinje [AK].



Fig. 698.3: *Melanochromis simulans*, apparent female, D07-H04, SCUBA, Chiofu 21 Feb 2016 [HS].

MC699. *Melanochromis* sp. 'parallelus mbweca', MZ.

This undescribed species looks a lot like *M. loriae*, but is smaller, more slender, slightly longer snouted and confined to a few sites on the central Mozambican coast. Reported by Konings (2007, 2012). Photos AK, from Mbweca.

**MC700. *Melanochromis* sp. 'robustus mbenji', MLS.**

A large, long-snouted species. Females resemble drab *M. baliodigma*. Males look a bit like *M. melanopterus*. Known only from Mbenji Island (Konings 1995, 2012). Photos AK. .

**MC701. *Melanochromis vermivorus* Trewavas 1935, MLS.**

M. vermivorus is somewhat intermediate between *M. heterochromis* and *M. melanopterus/chipokae*, but occurs allopatrically. It is found from Nkhudzi headland to Boadzulu Island in the SE Arm.

Not sequenced. Photos by AK: male (above) Nkhudzi, female (below) Boadzulu.



MC702. *Melanochromis wochepea* Konings-Dudin et al. 2009, MZ.

Melanochromis wochepea is a small, short-snouted species found along part of the southern Mozambican coast, between the ranges of *M. mossambiquensis* to the north and *M. dialeptos* to the south. Males are blue and seem to violate the generic definition by not reversing the female colour pattern. Not yet sequenced. Photos by A. Konings: male (above) and female.



***Petrotilapia* Trewavas 1935: species MC703-721.**

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

Type species: *Petrotilapia tridentiger* Trewavas 1935

Contained valid species (11): *P. chrysos*; *P. flaviventris*; *P. genalutea*; *P. kitrinos*, *P. microgalana*; *P. mumboensis*; *P. nigra*; *P. palingnathos*; *P. pyroscelos*; *P. tridentiger*; *P. xanthos*

Undescribed species (8): *P. sp.* 'black flank'; *P. sp.* 'chitimba'; *P. sp.* 'fuscous'; *P. sp.* 'likoma barred'; *P. sp.* 'likoma variable'; *P. sp.* 'nigra tanzania'; *P. sp.* 'nigra tumbi'; *P. sp.* 'yellow chin'

Generic reviews & diagnoses: Trewavas (1935), Marsh (1983).

Generic diagnosis: Trewavas (1935), from key (within mbuna): all teeth tricuspid; mouth terminal; teeth movable, with expanded, recurved crowns and slender shafts; a single or double lateral series at each side of lower jaw posterior to the broad band. Marsh (1983) pointed out that the posterior lateral teeth are often unicuspid.

Field Diagnosis: Mbuna with wide 'lips' with broad bands of long tricuspid teeth.

Phylogenetic comments: Sequences indicate that *Petrotilapia* is derived from *Tropheops* and is ancestral to *Cyathochromis*.

Ecomorphological notes: Species are confined to rocky shores, feeding with the body held perpendicular to the substrate, the mouth is opened widely and pressed against the substrate, with the jaws closed together, the teeth comb through filamentous algae extracting material from between the strands. Plankton is also taken at times. This feeding strategy is essentially the same as *Maylandia*. Males generally defend very large territories, although those of different species often partially overlap. Territories include a refuge among rocks, where spawning takes place. Females and immature males often forage in groups, sometimes mobbing highly territorial species. It is usual for 3 or occasionally 4 species to co-exist on any particular rocky shore: basically there are three main 'ecomorphs': big shallow water (Tridentiger-group), small-medium shallow water (Genalutea-group) and medium deeper water (Nigra-group). *P. palingnathus* (Likoma) is rather unique with its retrognathous mouth. Of the other 18 proposed species, 4 are regarded as members of the Tridentiger group (*P. tridentiger*, *P. mumboensis*, *P. sp.* 'likoma barred' and *P. sp.* 'yellow chin') and 2 of the Genalutea group (*P. genalutea* and *P. pyroscelos* from Likoma). The other 12 are regarded as members of the Nigra group and are largely allopatric, some with very restricted distributions.

MC703. *Petrotilapia chrysos* Stauffer & Van Snik 1996, MLS.

This species (known as *P. 'gold'* by Ribbink et al. 1983) replaces *P. nigra* at Chinyamwezi and Chinyankwazi Islands (where it is the only species of the genus), and along the coast north from Makanjila point as far as Metangula. Males of some populations are a lot drabber: in many places the males are dark blue and lack the yellow chest, while females in the north of their range look like those of *P. nigra* (tan with horizontal rows of square spots). Max. size 131mm SL. Not sequenced. Photos by AK, male above.

**MC704. *Petrotilapia flaviventris* Lundeba et al. 2011, TZ, MZ, CHI.**

Known as *P. 'yellow ventral'* by Ribbink et al. (1983), this species is the *P. nigra* (deeper-water) equivalent from Chizumulu and the east coast from Mbweca (MZ) to Undu Reef (TZ). At some localities males are largely yellow. At some sites, the females show faint vertical bars. Max. size 125mm SL. Not yet sequenced. Photos by AK.



MC705. *Petrotilapia genalutea* Marsh 1983, MLN, MLS, TZ, MZ.

This species was described by Marsh (from Ribbink's team) in 1983, based on specimens collected at Monkey Bay. Male breeding colour is distinctive, generally blue-grey with yellow-orange cheeks and chest, and strong dark submarginal bands in the dorsal and anal fins. Females have the usual *Petrotilapia* pattern of longitudinal rows of dark blotches on a light tan background. Marsh (1983) states that they can be distinguished from sympatric *P. nigra* females by their lack of dark submarginal stripes present in the fins of the latter. *Petrotilapia genalutea* tends to prefer shallow water, being most abundant at about 3m deep, but extending to about 8m, although as deep as 18m at Boadzulu Is (Marsh 1983). Females may form foraging schools of several hundred. The species is held to have a huge distribution: although records seem to be lacking for some areas, Konings states that there are only a few places where the species is absent, such as Likoma, Chizumulu, Chinyamwezi and Chinyankwazi Islands. It seems to be able to cross sandy shores and establish itself in areas where rocks give way to sand at shallow depths (Konings 2016a). Maximum size 126mm SL (Marsh 1983).

Six specimens from Chiofu (fig. 705.3) and one from Cape Maclear (collected by M.J. Genner 13 August 2004, coded B17, no photo available) were sequenced and clustered together. A second group comprised seven males from a number of locations in the Chilumba area (Chitande Island, Luwino Reef, Makhanka Reef, Mphanga Rocks: fig. 705.4), a female from Makankha Rocks (fig. 705.5), as well as a single male from Nkhata Bay (fig. 705.4). Although the Chitande Population had previously been regarded as a distinct species, *P. 'Chitande'* by Ribbink et al. (1983), there was no indication of this from the data, although the photo seems to show a paler blue and yellow male, as described by Ribbink et al.

Surprisingly, their closest relatives were specimens of *Cyathochromis obliquidens* MC451 from Chiofu and Nkhata Bay. It is not clear whether *C. obliquidens* is the sister group to *P. genalutea* as a whole or are more closely aligned to the southern group.



Fig. 705.1: *Petrotilapia genalutea*, male, Boadzulu Island [AK].



Fig. 705.2: *Petrotilapia genalutea*, female, Thumbi West Island [AK].



D09-G03



D09-J09



D09-I08



D09-I10

Fig. 705.3: *Petrotilapia genalutea*, males, collected by SCUBA, Chiofu 28 Feb 2016 [HS]. Six specimens were collected from this locations: additional specimens sequenced were D09-I09, D09-J10, and these clustered with them on the tree. D09-G03 was placed basally, and is unusually dark, but no other species with an orange chest and dark submarginal dorsal fin band is known from the area.



D02-G02, Nkhata Bay, 21 Feb 2016



D05-F10, Luwino Reef, Chilumba, 24 Feb 2016



D06-I01, Chitande Island, Chilumba, 24 Feb 2016



D03-I02, Mphanga Rocks, Chilumba, 23 Feb 2016

Fig. 703.4: *Petrotilapia genalutea*, males, collected by SCUBA from Chilumba and Nkhata Bay. Additional specimens sampled were D03-I03 (Mphanga Rocks), D05-G01, G02, I03 (all Luwino Reef).



Fig. 703.5: *Petrotilapia genalutea*, immature, D68-C01, Makankha Rocks, Chilumba, 26 Sept 2023. The dark submarginal band in the dorsal fin is well shown here [MCGDS].

MC706. *Petrotilapia microgalana* Ruffing et al. 2006, MLN.

Petrotilapia microgalana is a member of the *P. nigra* group found on the northwestern shore from Kande Island in the south to Mdoko Reef north of Chilumba. It shows considerable variation in male and female coloration, and was regarded by Ribbink et al. as two provisional species, *P. 'ruarwe'* from Chilumba south to Ruarwe and *P. 'small blue'* from Cape Manulo (Usisya Bay) to Nkhata Bay. At Nkhata Bay, males are pale blue with yellow undersides and dark submarginal band in the dorsal fin (fig. 706.1). Females are beige, but the young are bright yellow (fig. 706.2-3). At the northern end of their range, the females and young tend to be drabber and the females may have dark vertical bars (Ruarwe) or are dark brown (near Chilumba), but the males are often more intensely blue and orange (fig. 706.5). Like other Nigras, this species has a large depth range, from the surface down to 35-40m in places. This is one of the smaller *Petrotilapia*, with a maximum size of 115mm SL (Ribbink et al. 1983).

Thirteen specimens were sequenced from Nkhata Bay, and all clustered together (fig. 706.4). A single specimen from Mphanga Rocks was resolved as their sister group (fig. 706.6). This is consistent with the 'Ruarwe' form either being a sister species or a geographic variant. *Petrotilapia* sp 'black flank' MC711, also from Mphanga Rocks, was resolved as their sister taxon, from among the species sequenced.



Fig. 706.1: *Petrotilapia microgalana*, male, Nkhata Bay 2016 [HS].



Fig. 706.2: *Petrotilapia microgalana*, female, Nkhata Bay 2016 [HS].



Fig. 706.3: *Petrotilapia microgalana*, juvenile, Nkhata Bay 2016 [HS].



D01-B10, male.



D01-C02, female.



D01-H07, maturing male.



D01-C10, male.

Fig. 706.4: *Petrotilapia microgalana*, Nkhata Bay 20 Feb 2016. Additional specimens sequenced were D01-C04, -D09, -H04, -H09, -I05; D02-E04, -E05, -J03; D03-C08.



Fig. 706.5: *Petrotilapia microgalana*, Mbowe Island (Usisya), male. [AK].



Fig. 706.6: *Petrotilapia microgalana* male, D03-I06, SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS].

MC707. *Petrotilapia mumboensis* Lundeba et al. 2011, MLS.

This species was first reported by Ribbink et al. (1983) as *P. 'mumbo blue'*. This large species is found at Thumbi West, Mumbo and Mbenji: at the former it is reported to co-exist with *P. tridentiger*, *P. nigra* and *P. genalutea* and if so could not be considered as an allopatric equivalent of any of them. It is big (up to 135mm SL) and lives in shallow water, which sounds a lot like *P. tridentiger*, and it may have evolved to fill that niche at Mumbo where *P. tridentiger* has not been recorded. It is differentiated by the prominent black submarginal band of males.



Male, A. Konings.



Territorial males, Thumbi West, GFT.

MC708. *Petrotilapia nigra* Marsh 1983, MLS.

While members of the *P. tridentiger* and *P. genalutea* groups tend to be confined to relatively shallow water, *P. nigra* penetrates deeper, to at least 35m (Ribbink et al. 1983). Although it is confined to the southern part of the lake around Monkey Bay and the Cape Maclear area (Domwe I., Thumbi West, Otter Point), equivalent species fill its niche throughout suitable habitats in the rest of the lake. Males are generally dark, strongly barred and lack the yellow chest of *P. genalutea*. Females are sandy-coloured, with rows of dark blotches on their flanks. Konings (2016a) states that females lack dark submarginal bands in the dorsal fin, in contrast to *P. genalutea*. However, Marsh (1983), in the original description, states that females do have a dark dorsal submarginal band, but are generally darker and have more separate blotches on the posterior flanks, while those of *P. genalutea* often run into stripes. Ribbink et al. (1983) report a maximum size of 122mm SL.

A single specimen from Thumbi West Island was sequenced by Scherz et al. (2022), and consistently resolved as the sister taxon to a *P. genalutea* specimen sequenced by Malinsky et al. (2018), and more widely, grouped with *Tropheops* species.



Fig. 708.1: *Petrotilapia nigra*, male, Thumbi West [AK].



Fig. 708.2: *Petrotilapia nigra*?, female, Domwe Island [AK].

MC709. *Petrotilapia palingnathos* Lundeba et al. 2011, CHI.

First reported by Ribbink et al. (1983) as *P.* 'retrognathous', this large (125mm SL) species is confined to Chizumulu Island and Taiwanee Reef. Mostly found in shallow water, but sometimes to 10m. Not yet sequenced. Male [AK].

**MC710. *Petrotilapia pyroscelos* Lundeba et al. 2011, CHI.**

P. 'orange pelvic' was first reported by Ribbink et al. (1983). A member of a Genalutea group (Konings 2016a), it is common in shallow turbulent areas around Chizumulu Island. Females drab greyish. 132mm SL. Not sequenced. Male [AK].



MC711. *Petrotilapia* sp. 'black flank', MLN.

First recorded by Ribbink et al. (1983) from Mphanga Rocks, it was reported to prefer large rocks at 2-8 depth. Konings (2016a) also reports it from Katale Island, where it is rare and outnumbered by *P. microgalana*, another member of the *P. nigra* group. Females are drab with horizontal and vertical dark markings (fig. 711.1), males are dark grey or purplish (fig. 711.2). A single male from Mphanga Rocks was sequenced and resolved as sister to *P. microgalana* (fig. 711.3).



Fig. 711.1: *Petrotilapia* sp. 'black flank' female [AK].



Fig. 711.2: *Petrotilapia* sp. 'black flank' male [AK].



Fig. 711.3: *Petrotilapia* sp. 'black flank' male D03-I04, SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS].

MC712. *Petrotilapia* sp. 'chitimba', MLN.

This striking species has a narrow distribution at Chitimba Bay, near Chilumba, on an area of scattered stones at 22m (Konings 2016a). It may have affinities with *P. microgalana*. It is one of the few *Petrotilapia* species regularly available in the aquarium trade. Not yet sequenced. Male (above) & female [AK]

**MC713. *Petrotilapia* sp. 'fuscous', MLS.**

This very dark species was first recognised by Ribbink et al. (1983) from all three Maleri Isles and Mbenji. It is believed to belong to the *P. nigra* group, although Mbenji males look a lot like *P. genalutea* (orange cheek and chest). Not sequenced. [photos AK].



Female, Mbenji



Male, Nakantenga



Male, Mbenji

MC714. *Petrotilapia* sp. 'likoma barred', LIK, CHI.

First recorded by Ribbink et al. (1983), this may be the largest mbuna (165mm SL). A shallow water species, it is probably a replacement for *P. tridentiger* at Likoma and Taiwanese Reef. Not sequenced [Photo AK, Male].



MC715. *Petrotilapia* sp. 'likoma variable', LIK.

Another Ribbink et al. (1983) species apparently endemic to Likoma, where it is regarded as the *P. nigra* equivalent. Up 145mm SL. The male's blue varies from pale to dark. Not sequenced. [AK].

**MC716. *Petrotilapia* ri Sabo et al. 2026, MLS.**

First reported by Ribbink et al (1983). Endemic to Mumbo, where it is common and takes the place of *P. nigra*. Formerly *P. sp.* 'mumbo yellow'. Up to 128mm SL. Not yet sequenced. [AK]

**MC717. *Petrotilapia* sp. 'nigra tanzania', TZ.**

Widespread male form, AK

Replaces *P. nigra* on the Tanzanian coast north of Mbamba Bay. Geographically variable.



Higga Reef & vicinity, male, AK

Not yet sequenced.

MC718. *Petrotilapia* sp. 'nigra tumbi', MZ.

Endemic to Tumbi Point in Mozambique and very similar to *P. nigra*, but their distributions separated by *P. chrysos*. Male, AK.



MC719. *Petrotilapia* sp. 'yellow chin', MLS, MZ.

This species was first reported by Ribbink et al. (1983) from Makanjila, the Maleri Islands and Namalenje. Konings (2016a) reports that it also ranges from Makanjila northwards as far as Metangula on the Mozambique shore. It is a large (135mm SL) shallow water species that appears to replace *P. tridentiger* in these locations (figs. 719.1-2). A single sequenced male (fig. 719.3) from Chiofu was resolved as basal within the *Petrotilapia*/*Cyathochromis* group.



Fig. 719.1: *Petrotilapia* sp. 'yellow chin', male, Nakantenga Island [AK].



Fig. 719.2: *Petrotilapia* sp. 'yellow chin', female, Chiofu [AK].



Fig. 719.3: *Petrotilapia* sp. 'yellowchin', male, D09-B03, SCUBA, from Chiofu, 28 Feb 2016 [HS].

MC720. *Petrotilapia tridentiger* Trewavas 1935, MLS, MLN, TZ, MZ.

The type species of what was then a monotypic genus was described by Trewavas in 1935. Marsh (1983) designated a lectotype collected at Monkey Bay: other specimens (syntypes) could not be adequately identified to species level. On Marsh's definition, the species is a large (to 137mm SL) inhabitant of shallow turbulent waters, in which males are bright, metallic blue, largely unbarred and lacking a dorsal fin submarginal band or contrasting lappets. Females are tan to dark brown with darker vertical barring (not showing the rows of square, dark blotches of many *Petrotilapia* species). Ribbink et al. (1983) report the species in the SE Arm at Chemwezi, Boadzulu I., Mpandi I., Kanchedza I, Nkhudzi and Monkey Bay. Also at Domwe Island and Otter Point at Cape Maclear, but not at the more offshore islands, nor at the Maleris. It reappears at Nkhata Bay and the coast north to Lion's Cove and thence to Cape Manulo, Mara Rocks, Ruarwe and to Chilumba including Chitande Island and Mpanga Rocks. Konings notes its absence between Cobue and Makanjila Point (where it replaced by *P. sp.* 'yellow chin'). It is also reported from Thumbi West, Zimbawe Rocks and Thumbi East Islands. At Thumbi West, it is said to co-occur with *P. mumboensis* which looks very similar but has a black submarginal band in the dorsal fin. Not yet sequenced.



Fig. 720.1: *Petrotilapia tridentiger*, male, Mara Rocks [AK].



Fig. 720.2: *Petrotilapia tridentiger*, female, Thumbi West Island [AK].

MC721. *Petrotilapia xanthos* Lundeba et al. 2011, MLN.

A striking species, endemic to Gallireya Reef. It is a reasonably large (130mm SL) member of the *P. nigra* group, with bright yellow males (above) and contrastingly barred females (below). Not yet sequenced. Photos by AK.



***Pseudotropheus* Regan 1922: species MC722-773, 911, 915.**

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

Type species: *Chromis williamsi* Günther 1894

Contained valid species (19): *P. benetos*, *P. brevis*, *P. crabro*, *P. cyaneorhabdos*, *P. elegans*, *P. fuscus*, *P. fuscoides*, *P. galanos*, *P. interruptus*, *P. johannii*, *P. likomae*, *P. livingstonii*, *P. lucerna*, *P. novemfasciatus*, *P. perileucos*, *P. perspicax*, *P. purpuratus*, *P. tursiops*, *P. williamsi*. (MC722-737, MC772-3, MC911)

Proposed undescribed species (35): *P. sp. 'acei'*, *P. sp. 'aggressive grey'*, *P. sp. 'aggressive yellow fin'*, *P. sp. 'crabro blue'*, *P. sp. 'dwarf nkhatta'*, *P. sp. 'elongatus kironde'*, *P. sp. 'elongatus makonde'*, *P. sp. 'kingsizei tumbi'*, *P. sp. 'lucerna blue cobalt'*, *P. sp. 'lucerna blue mozambique'*, *P. sp. 'lucerna blue tanzania'*, *P. sp. 'lucerna brown'*, *P. sp. 'lucerna fin spot'*, *P. sp. 'lucerna north'*, *P. sp. 'lucerna thumbi blue'*, *P. sp. 'minutus tanzania'*, *P. sp. 'ndumbi gold'*, *P. sp. 'perspicax hara'*, *P. sp. 'perspicax likoma'*, *P. sp. 'perspicax orange cap'*, *P. sp. 'perspicax tanzania'*, *P. sp. 'polit'*, *P. sp. 'polit tumbi'*, *P. sp. 'sand cobalt'*, *P. sp. 'socolofi nkolongwe'*, *P. sp. 'thin stripe'*, *P. sp. 'three peaks'*, *P. sp. 'tiny'*, *P. sp. 'tursiops mbenji'*, *P. sp. 'variable eastern'*, *P. sp. 'variable kande'*, *P. sp. 'variable mozambique'*, *P. sp. 'williamsi makanjila'*, *P. sp. 'williamsi maleri'*, *P. sp. 'williamsi north'*. (MC738-771, MC915).

Generic reviews & diagnoses: Regan (1922), Trewavas (1935), Ribbink et al. (1983), Li et al. (2016).

Generic diagnosis: Regan (1922) originally defined the genus from basic mbuna features, plus the presence of bicuspid teeth in the oral jaws. Trewavas (1935) modified the definition to consider the presence of small, crowded teeth on the lower pharyngeal bone, as opposed to the coarser dentition in *Melanochromis*. Later, the distinction between these genera was revised to focus mainly on melanic markings, with *Melanochromis* used for those with primarily horizontal stripes and *Pseudotropheus* for vertically-barred forms. Subsequently, *Tropheops*, *Maylandia* (= *Metriaclima*) and *Chindongo* were defined to accommodate former *Pseudotropheus* species, more latterly defining *Pseudotropheus* on the basis of features of the type species (*P. williamsi*) and similar taxa (e.g. Li et al. 2016), but in fact still retaining numerous additional species in this genus which either clearly do not fit the restricted definition or were not considered. It presently remains as a 'waste-basket' genus for Lake Malawi Pseudotropheina (Mbuna) which are not accommodated in other genera.

Field Diagnosis: Mbuna which cannot be classified in other genera.

Phylogenetic comments: Many *Pseudotropheus* species are uncommon and hard to identify, and they are generally not well represented in sequencing programmes (about 8 out of 53 possible species). At present, it looks like there are at least 6 different groups within the genus, but it is probable that several more remain unsampled.

MC722. *Pseudotropheus benetos* (Bowers & Stauffer 1997) MLN, TZ.

Resembling *P. tursiops* (MC772). Found in the far north (Chilumba, N. Tanzanian coast). Was described as *Melanochromis*. Not sequenced. [AK].

**MC723. *Pseudotropheus brevis* (Trewavas 1935), MLS.**

A large deep-bodied, shallow water species from the SE Arm (Monkey Bay, Nkhudzi, Boadzulu), aka *Melanochromis brevis* (Trewavas 1935), *P. 'williamsi nkudzi'* (Ribbink et al. 1983). Not sequenced.



MC724. *Pseudotropheus crabro* (Ribbink & Lewis 1982), all regions.

Originally described as *Melanochromis crabro*, this is an unusual species in appearance and behaviour. Females and immature males have broad dark brown bands on a yellow background, with horizontal dark stripes underlying (fig. 724.1). In adult males the dark bands get wider and darker, the unpaired and pelvic fins also become darker and the background fades to rows of pale spots (fig. 724.2). They feed on the external parasites (especially *Argulus*) and the eggs of *Bagrus* catfish. They are a popular aquarium fish and do not need a specialised diet. They are probably opportunistic in the wild too. They tend to be associated with caves where the catfish lurk. The species is widely distributed, although it has not yet been reported north of Mara Rocks on the western shore or Hongi on the east. Two adult males were sequenced from Chiofu (fig. 724.3-4). They did not seem closely related to anything else.



Fig. 724: *Pseudotropheus crabro*, juvenile, underwater at Choifu, 28 Feb 2016 [HS].



Fig. 724: *Pseudotropheus crabro*, young male, Lion's cover [AK].



D07-G09.
Pseudotropheus crabro.
SCUBA, Chiofu, 27 Feb 2016



D10-I09.
Pseudotropheus crabro.
 Snorkelling, Chiofu, 29
 Feb 2016

**MC725. *Pseudotropheus cyaneorhabdos* (Bowers & Stauffer 1997),
 LIK.**

A small blue and black striped member of the johannii group, endemic to NE Likoma, especially at Maingano Is. The sexes have similar colour patterns, but males are a bit more contrasting. Originally described as *Melanochromis*. [AK].



MC726. *Pseudotropheus elegans* Trewavas 1935, MLN, TZ.

For many years, the name was attached to what is now known as *P. livingstonii*. *P. elegans* is now considered to be the correct name for the former 'white-tail acei' (which sometimes has a yellow tail), a sand-dwelling mbuna with a particular fondness for sunken logs and branches. It has a rather a dark unbarred body, a forked tail, and strong black bands especially visible in the soft dorsal and anal fins. It is mainly found in the far north-west, including Itungi Port, Ngara and Chitande Is. [AK].



Not yet sequenced. [AK].

MC727. *Pseudotropheus fuscus* Trewavas 1935, MLN.

Described from a single specimen in 1935, Trewavas commented on its narrow interorbital distance. It has quite a long snout, a wide terminal mouth and equally bicuspid teeth. It was first studied in the field by Fryer (1959), who recorded it feeding on loose biocover at Nkhata Bay. He also described *P. fuscoides* Fryer 1956a, noting that it had sharper teeth and a larger eye and feeding more on invertebrates than algae. Ribbink et al. (1983) were not confident of the ID, suggesting maybe *P. fuscoides* lived a bit deeper down. Konings (2016a) has treated them as conspecific (but see MC911). *Pseudotropheus fuscus* is a highly aggressive territorial species, with both sexes defending feeding territories which are defended against all other species allowing 'algal gardens' of filamentous algae to grow. It is reported to live in shallow water, generally among small rocks, often lying on sand, from Kande to Chilumba. Maximum size 77mm SL (Ribbink et al. 1983). Males are blue with lots of thin dark bands (fig. 727.1), females brownish. A single specimen was sequenced from Nkhata Bay, showing the post-mortem melanisation seen in many darker mbuna (fig. 727.2). It was closely related to *P. williamsi* and to *Melanochromis*.



Fig. 727.1: *Pseudotropheus fuscus*, male, Nkhata Bay [AK].



Fig. 727.2: *Pseudotropheus fuscus*, D03-F03, SCUBA, Nkhata Bay, 21 Feb 2016a [HS].



Fig. 727.3: *Pseudotropheus fuscus*, D03-F03: dentition is relatively blunt, with lower jaw teeth roughly equally bicuspid [GFT].

MC728. *Pseudotropheus galanos* Stauffer & Kellogg 2002, MLS.

This is a williamsi-type from Mbenji Island, frequenting shallow turbulent areas. Males have a red dorsal fin and the species was called *Pseudotropheus* 'red dorsal' by Ribbink et al. (1983). Male [AK].



MC729. *Pseudotropheus interruptus* (Johnson 1975), MLN, MLS, CHI

This small, colourful member of the *johannii* group was described by Johnson (1975) in a self-published aquarium newsletter, and it long went unnoticed by the research community. The species was known as *Melanochromis* 'red' by Ribbink et al. (1983) and described as *Melanochromis elastodema* by Bowers & Stauffer (1997). Konings (1998) brought the Johnson name to the wider community. Tawil (2002b) moved it to *Pseudotropheus* in the course of tightening up the definition of *Melanochromis* and this has been accepted since (e.g. Konings 2016a). The species seems to have originally been endemic to Chizumulu Island, but the small size and vivid colours of the species has made it a popular aquarium species, and this has led a number of translocations: first to Likoma (which seems to have been the source of the aquarium specimens used in Johnson's description), then Thumbi West (Ribbink et al. 1983) and most recently to Nkhata Bay (Genner et al. 2006). The species can be recognised from known location plus colour: females are bright yellow (fig. 729.1), males are black with a row of bright blue blotches between the midlateral and supralateral horizontal stripes and blue markings elsewhere on the upper part of the body, forehead and fins (fig. 729.2). Male *P. johannii* (MC730) have continuous horizontal stripes, and live in other locations; females look identical. They are reported to be weakly territorial and feed from the biocover (Konings 2016a). Ribbink et al. (1983) report that they tend to congregate (sometimes in large numbers) on the surfaces of large slabs at depths of 4-12m, although they can be found as deep as 23m. Maximum size 71mm (Ribbink et al. 1983).

A single male from Nkhata Bay was sequenced for MCGDS (fig. 729.3) and proved to be closely related to *P. johannii*. These were not particularly closely related to any other group in the analysis.



Fig.729.1: *Pseudotropheus interruptus*, female, Chizumulu Is. [AK].



Fig.729.2: *Pseudotropheus interruptus*, male, Chizumulu Is. [AK].



Fig. 729.3: *Pseudotropheus interruptus*, male, D02-A08, SCUBA, Nkhata Bay, 20 Feb 2016 [HS].

MC730. *Pseudotropheus johannii* Eccles 1973, MLS, MZ.

The first of the johannii group to be described, the nomenclature has been stable apart from some flitting between *Pseudotropheus* and *Melanochromis* and back again. Although described from specimens collected for the aquarium trade, the collecting locality seems to have been accurately recorded as Cape Ngombo (Makanjila point). The range is now known to extend from there well into Mozambique as far north as Chuanga, just north of Metangula (Konings 2016a). The largest recorded wild specimen is 70mm SL (Eccles 1973). Ribbink et al. (1983) record the species frequenting the rock-sand interface at 0-6m and to feed over sandy as well as rocky substrate or in midwater, but this may be a reflection of the shallow habitat patch they surveyed (Masinje Rocks). Generally, its biology is probably much like that of *P. interruptus* (MC729), which essentially can probably be considered an allopatric sister species. A single specimen sequenced for the MCGDS was collected from Chiofu Bay within the known range of the species. It was closely related to *P. interruptus*, and the pair rather distantly related to anything else in the survey to date.



Fig. 730.1:
Pseudotropheus johannii,
mouthbrooding female
(longitudinal stripe are not
always so obvious), Gome,
Makanjila-Mozambique
coast [AK].



Fig. 730.2:
Pseudotropheus johannii,
male, Gome, Makanjila-
Mozambique coast [AK].



Fig. 730.3:
Pseudotropheus johannii,
male, SCUBA, D08-H02,
Chiofu, 28 Feb 2016 [HS].

MC731. *Pseudotropheus likomae* Konings et al. 2024, LIK.

This is a small shell-dwelling 'sand mbuna' similar to *P. livingstonii*, but with a tendency towards horizontal as well as vertical dark markings. It was called *P. livingstonii* 'likoma' by Ribbink et al. (1983), who reported it as endemic to Likoma, but introduced to Thumbi West. Juveniles (which don't show the horizontal markings) live in snail shells. Adult males defend sand-scrape bowers. Maximum reported size 76.5mm SL (Konings et al. 2024).



Not sequenced. Female [AK]

MC732. *Pseudotropheus livingstonii* (Boulenger 1899), MLN, MLS, MZ, TZ, LIK.

Ribbink et al. (1983) discussed this species under the name of *P. elegans*. Their *P. livingstonii* is actually *M. lanisticola*. This was not fully sorted out until Stauffer et al. (2016). This species is larger, more slender and has longer soft dorsal and anal fins. It also has a more gently sloping head profile. Notably, it lacks the bright blue-white and orange stripe markings in the caudal characteristic of *M. lanisticola*. It lives in shells as a juvenile, but tends to shoal over sandy bottoms when larger. Adult males often have elongated dark anal fins. It is often caught by bottom trawlers in large numbers.



Female [AK]



Male [MJG]

MC733. *Pseudotropheus lucerna* Trewavas 1935, MLN.

Described by Trewavas from specimens in the Christy collection in 1935, accounts of this species can be found under both *Pseudotropheus* and *Tropheops*, as it has been shuffled between these genera over the years (Konings 2016c). This is due to its mouth and head morphology which have a lot of affinities with species in *Tropheops* (generally underslung mouth with teeth arranged to form a cutting blade) but it seems slightly less specialised with a less steeply-sloping head profile, perhaps associated with its feeding behaviour, which is less focussed on tearing off algal filaments and perhaps more generalised. The species is associated with shallow areas where rocks lie on sand, generally in less wave exposed habitats, allowing sediment to build up. They can often be seen by snorkelling and looking in areas where little patches of reeds grow among rocks. The species is pretty easily recognised by the large dark ocellated blotch in the soft dorsal fin, along with the head/mouth shape: for example, *Pseudotropheus* sp. 'aggressive grey' has a soft-dorsal similar blotch, but a narrow terminal mouth instead of a broad underslung one. Konings (2016a) has split the species up geographically with informally proposed named for different geographic variants, some of which were already differentiated by Ribbink et al. (1983)

At present, seven species are informally recognised): see MC746-751 (fig. 733.1). The types of *P. lucerna* were collected at 'Deep Bay' (=Chilumba), and so under this arrangement, the species is regarded as being confined to the NW (Malawian coast from Chewere (near Chilumba) south to Nkhata Bay. Presumably, any populations found at other areas in the region, such as Ngara or Kande Island would also fall into this taxon, unless they had a dramatically different male breeding dress. Populations of the 'lucerna phenotype' are abundant in suitable habitats in the Cape Maclear area, for example, on Thumbi West and around Otter Point but these don't seem to be mentioned in any publication, so, if we accept Konings' arrangement, they should probably be referred to the nearest informally named variant, *P. sp.* 'lucerna brown' (MC749) from the SE Arm. Uncertainty over how to deal with geographic variants of this species group has led to unstable informal nomenclature, most notably in the various editions of Konings' *Malawi Cichlids in their Natural Habitat* where *P. lucerna* in some or all of its presently understood geographic range is referred to as *Pseudotropheus* sp. 'tropheops aggressive' (Konings 1995), *Tropheops* sp. 'lucerna blue aggressive' (Konings 2001), *Tropheops* sp. 'lucerna nkhata' and *Tropheops lucerna* (Konings 2007), before returning to the original Trewavas (1935) name in the 5th edition in 2016 (see Konings 2016b). Ribbink et al. (1983) give a detailed colour description of the species from the Nkhata Bay and Lion's Cove area, reporting that it is confined to water shallower than 7m, describing territorial males defending pits dug in the same or among *Vallisneria* beds, and females living in small groups, up to 10 individuals. Fryer (1959) reported a diet of filamentous and loose algae. Males have a relatively dull blue and orange breeding dress, like many other mbuna that live away from strictly rocky habitats, with the dark dorsal fin spot still visible, along with a broad dark submarginal band in the pelvic and anal fins and the upper and lower margins on the caudal fin, and a broad blue-white margin to the dorsal fin. There is a large single eggspot (fig. 733.2). Females are pale sandy coloured

with a flexible arrangement of dark flank markings but with the dark dorsal spot always apparent (fig. 733.3).

Three specimens were sequenced by MCGDS, all from Nkhata Bay (figs. 733.4-5). They appear to be the sister group to the main *Tropheops* radiation and not closely related to *Pseudotropheus williamsi* (the type species of *Pseudotropheus*). So, on a revised generic classification, they should either be placed in a specific 'lucerna' genus or go back into a less rigidly delimited *Tropheops*. None of the other 'lucerna-group' populations have been sequenced to date.

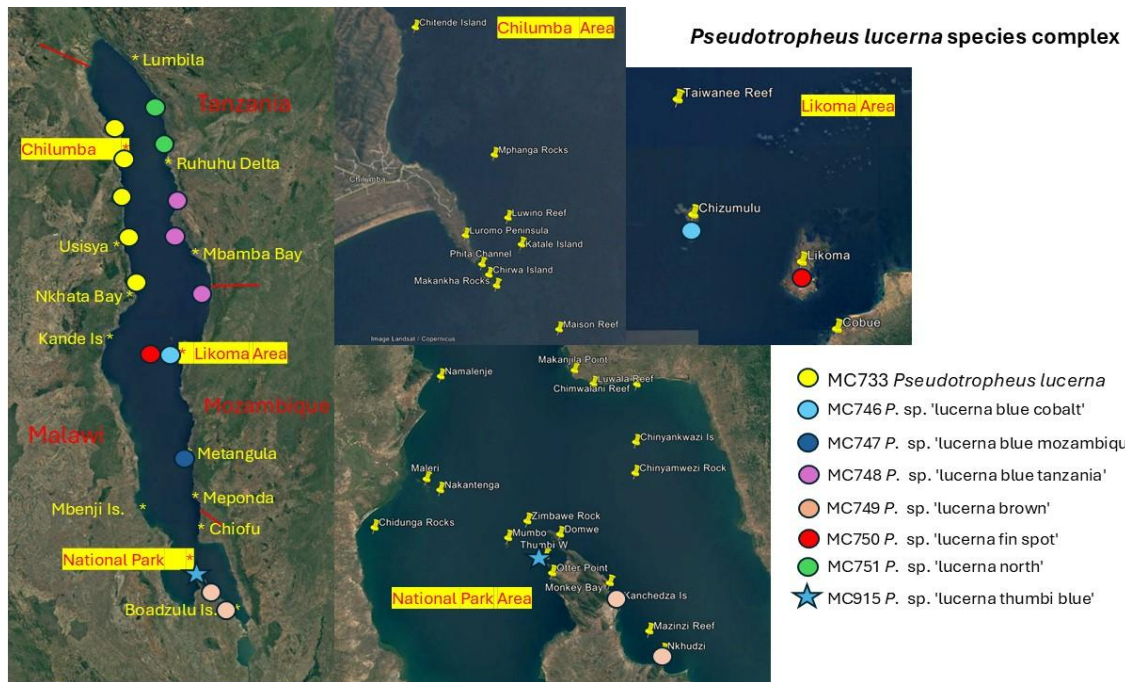


Fig. 733.1: Known distributions of species of the *Pseudotropheus lucerna* complex.



Fig. 733.2:
Pseudotropheus lucerna, male, Nkhata Bay [AK].



Fig. 733.3:
Pseudotropheus lucerna, female, Nkhata Bay [AK].



Fig. 733.4:
Pseudotropheus
lucerna, apparent
female, SCUBA, D01-
B02, Nkhata Bay 20 Feb
2016 [HS].



D01-B01



D01-H01

Fig. 733.5: *Pseudotropheus lucerna*, males, SCUBA, Nkhata Bay 20 Feb 2016 [HS].

MC734. *Pseudotropheus novemfasciatus* Regan 1922, MLS.

This species was described by Regan from a single specimen., The location within the lake was not specified in the paper or the museum collection records, but it was collected by Wood, who reported that most of his specimens were from Domira Bay (Happold 2011, cited by Konings). The species has proved difficult to identify since. It has generally been considered to be a *Tropheops*, but recently Konings has put it back into *Pseudotropheus*.

The type specimen is small (65mmTL), and not in great condition and not much is left of the colour pattern (fig. 734.1). However Regan (1922) reported “body crossed by 9 dark vertical bars, the first 6 corresponding to the 6 of *P. zebra*, the last 2 on caudal peduncle; end of snout and lower jaw blackish; an opercular spot and a spot on base of caudal; a faint dark band on lateral line and another on middle of side; spinous dorsal with a dusky intramarginal band; soft dorsal and caudal with a series of spots.” This sounds a lot like a standard female *Tropheops* pattern (apart from the dark snout and jaw) shared by a lot of species (as well as things like *Cyathochromis* and many *Petrotilapia*). Konings (2022) has provisionally identified this species with a couple of photos of specimens from the areas between Domira Bay and Nkhotakota (figs. 734.2-3). Neither specimen shows the markings mentioned by Regan. The male illustrated shows a very steep head profile, also shown by some *Tropheops*, but not so much by the type of *P. novemfasciatus* (fig. 734.4). The view of the female in the Konings image does not permit assessment of this feature, but tends to indicate a small, rather rounded mouth. At present, the identification and generic classification of the species seem rather dubious. It does not seem likely that this species as been sequenced to date, although some specimens were initially identified with this taxon (see MC811).



Fig. 734.1: *Pseudotropheus novemfasciatus*, type, London Natural History Museum [GFT].



Fig. 734.2: *Pseudotropheus* cf. *novemfasciatus* female, sensu Konings, Chingole, 36km North of Domira Bay [AK].



Fig. 734.3: *Pseudotropheus* cf. *novemfasciatus* male, sensu Konings, near Chia Lagoon, Nkhotakota [AK].



Fig. 734.4: *Pseudotropheus novemfasciatus*, type, close-up of head and jaws [GFT].

MC735. *Pseudotropheus perileucos* (Bowers & Stauffer 1997), MLS, LIK.

For years, this species was known as *Melanochromis* 'black-white johanni' following Ribbink *et al.* (1983). It was familiar as one of the many translocated species at Thumbi West Island and Otter Point in the south of the lake, although it originally inhabited Likoma Island, as do many of the other introduced species. It was originally described as a *Melanochromis* by Bowers & Stauffer (1997), but like others of the johanni group was transferred to *Pseudotropheus* (see MC729). It is a small, weakly territorial species often feeding in loose groups of up to 60 individuals around the rock-sand interface from the surface to 10m, occasionally to 30m. It has been observed to feed on rock and sand surfaces as well as on plankton (Ribbink *et al.* 1983). It is a popular aquarium species. The species is strongly sexually dimorphic and easily identifiable by its distinctive colour.

The species has been collected both by the Svardal lab at Likoma (fig. 735.3) and the MCGDS at Thumbi West (fig. 735.4), but sequence information has not yet been reported.



Fig. 735.1: *Pseudotropheus perileucos*, male, Masimbwe, Likoma [AK].



Fig. 735.2: *Pseudotropheus perileucos*, female, Masimbwe, Likoma [AK].



Fig. 735.3: *Pseudotropheus perileucos*, apparent female, MWA1935, Likoma, 2023 [HS lab].



Fig. 735.4: *Pseudotropheus perileucos*, maturing male, D74-B08, Mitande Rocks, Thumbi West Island, 2023 [MCGDS].

MC736. *Pseudotropheus perspicax* (Trewavas 1935), MLN.

Originally described as *Melanochromis perspicax*, this small, aggressive species was moved into *Pseudotropheus* as the generic distinction became based more on colour than pharyngeal dentition. The collection locality was Chilumba, but male breeding colours are variable within that area (as they are in many other taxa). Konings includes a large number of populations with differing male breeding dress in this species (e.g. stronger barring, yellow on upper surfaces, brownish face etc), and in cognate species (see MC754-7). Konings considers the species to range from Chilumba to Mbowe Island (Usisya Bay) on the NW Coast.



Male from Katale Island, Chilumba [AK]



Male from Mbowe Island, Chilumba [AK]

MC737. *Pseudotropheus purpuratus* Johnson 1976, MLS, MZ?.

This highly aggressive little mbuna (max 74mm SL), formerly *P. 'aggressive blue'* (Ribbink et al. 1983) lives among small rocks at 3-6m (max 9m). Both sexes hold territories with 'algal gardens', feeding mainly on loose plant material and invertebrates. Known from Monkey Bay to the Maleris, possibly also southern Mozambique along the coast towards Makanjila (Gome). It is probably related to *P. benetos*, *fuscus*, *tursiops* and a number of undescribed species (with 'aggressive' or 'tursiops' in their name).



Not sequenced. [AK].

MC738. *Pseudotropheus* sp. 'acei', MLS.

This slender species is well known from the aquarium trade and common in commercial seine and trawl catches, but remains undescribed. It has been confused in the past with *P. elegans*, which went under common names such as 'white-tail acei' in the aquarium trade. This one is the 'yellow-tail acei'. Both sexes have pale blue unbarred bodies and blue-white spinous dorsal and anal fins, yellow soft dorsal and pectoral fins, and a strongly forked yellow-orange caudal fin, with blue-white leading margins (fig. 738.1). Mature males tend to be brighter, with longer fins, darker pelvics and show obvious eggspots (fig. 738.2-3). The slender body, elongated soft dorsal and anal fins and the forked tail lead to an elegant overall appearance. This is a sand-associated mbuna, rarely encountered over rocks and tending to live in schools. Superficially, it resembles *Gephyrochromis moorii* (confused by Turner 1996), but that species generally has a strong yellow-orange colour on the upperside of the body and flanks and has different dentition: closely-packed, elongated outer lower jaw teeth (see MC563). *P.* sp. 'acei' has stout, flattened, bicuspid outer lower jaw teeth (fig. 738.4). A single male trawled from Makanjila was sequenced by MCGDS (fig. 738.5), and found to be closely related to other sand mbuna, such as *M. lanisticola* and *M. ngarae*.



Fig. 738.1: *Pseudotropheus* sp. 'acei', female, Chimwalani Reef [AK].



Fig. 738.2: *Pseudotropheus* sp. 'acei', male, aquarium specimen [GFT].



Fig. 738.3: *Pseudotropheus acei* trawled from ~20m depth off Makanjila, 2nd March 2016, the same trawl haul as the sequenced specimen in fig. 738.5 [HS].

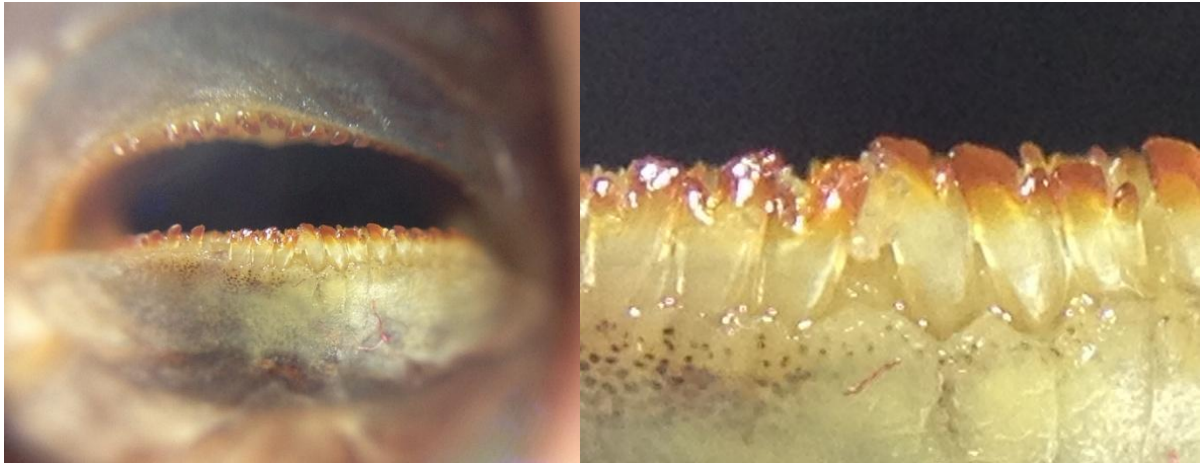


Fig. 738.4: *Pseudotropheus* sp. 'acei': outer lower jaw oral teeth are stout, closely-packed, unequally bicuspid and medially angled [GFT].



Fig. 738.5: *Pseudotropheus* sp. 'acei', male, D12-D06, trawled from 20m depth off Makanjila, SE Arm, 2 March 2016, sequenced [HS].



Fig. 738.6: *Pseudotropheus* sp. 'acei', male, 2011.402, North Dwangwa, 24 July 2011 [MJG].

MC739. *Pseudotropheus* sp. 'aggressive grey', LIK.

Not to be confused with MC647 *Maylandia* sp. 'aggressive grey head', this is a 'tursiops-group' species from Likoma. Ribbink et al. recorded it from depth of 4-10, occasionally 13m, among small rocks. Both sexes are territorial and females less bluish with less conspicuous eggspots. Photo (male) AK.

**MC740. *Pseudotropheus* sp. 'aggressive yellow fin', CHI.**

Endemic to Chizumulu Island, where it lives among small- to medium-sized rocks are depths of 6m or less. Females are dark brown. Photo (male) AK.

**MC741. *Pseudotropheus* sp. 'crabro blue', MLN, TZ.**

Males look like those of *Maylandia* sp. 'aggressive bars' (or a BB-zebra with a dark dorsal fin band), but females are unusually marked with a central row of brown blotches and irregular flank bars on a beige background. They have been observed cohabiting large caves along with *Bagrus* catfish (hence the 'crabro' nickname) in the north of the lake at Chewere, Chitande Island (MLW), Nkanda & Magunga Reef (TZ). Konings (2016a) reports that Spreinat (1994) recorded it as *Ps.* 'Broad Bar', but the illustrations don't look very similar at all (male has wide, tapering bars, no dorsal fin band, female is blue with vertical barring). Photos (male, above) by Konings.



MC742. *Pseudotropheus* sp. 'dwarf nkhata', MLN.

This small, subtly coloured species is reported from deep water (>20m) at Nkhata Bay. It has not been collected or examined closely. Photos by A. Konings, male above.

**MC743. *Pseudotropheus* sp. 'elongatus kirondo', TZ.****MC744. *Pseudotropheus* sp. 'elongatus makonde', TZ.**

These two small subtly-coloured elongate forms are each known from single sites on the northern part of the Tanzanian coast. Photos by A. Konings (males: Kirondo above, Makonde below).

**MC745. *Pseudotropheus* sp. 'kingsizei tumbi', MZ.**

This tiny species is known from deep sediment-free areas where rocks meet sand at a single site (Tumbi Point) in Mozambique. Females are beige with prominent wide brown bars. Photo by A. Konings (male).



MC746. *Pseudotropheus* sp. 'lucerna blue cobalt', CHI.

MC747. *Pseudotropheus* sp. 'lucerna blue mozambique', MZ.

MC748. *Pseudotropheus* sp. 'lucerna blue tanzania', TZ, MZ.

MC749. *Pseudotropheus* sp. 'lucerna brown', MLS.

MC750. *Pseudotropheus* sp. 'lucerna fin spot', LIK.

MC751. *Pseudotropheus* sp. 'lucerna north', TZ.

Under present classification schemes, eight allopatric populations are assigned as different species within the *Pseudotropheus lucerna* complex (see fig. 733.1). *Pseudotropheus lucerna* (MC733) was described from specimens collected at 'Deep Bay' (Chilumba). The phenotype does not vary much along the NW coast, and so specimens from Chewere to Nkhata Bay are currently identified with the formally described species (Konings 2016a). Ribbink et al. (1983) distinguished *Ps.* 'lucerna brown' in the SE Arm of the lake. Females of all populations look very similar: brown-beige with rows of dark blotches on the flanks, a dark blotch on the soft dorsal and dark radial markings on the caudal. The exception is the deeper-bodied 'lucerna north' which lacks the soft dorsal markings. An additional taxon in the complex, MC915 *Pseudotropheus* sp. 'lucerna thumbi blue', has been provisionally identified from Thumbi West Island, and discussed below. These fishes are rarely seen by SCUBA divers, but are more readily observed by snorkelling in very shallow areas where small patches of reeds intervene among rocky habitats, probably accounting for the large gaps in the known distribution. All taxa are allopatric, but it is not yet known whether or not they are closely related. In particular, MC751 seems quite distinct.



L to R: Male *Ps.* sp. 'lucerna blue cobalt'; *Ps.* sp. 'lucerna blue mozambique'; *Ps.* sp. 'lucerna blue tanzania'



Left to Right: Males of *Pseudotropheus* sp. 'lucerna brown'; *Ps.* sp. 'lucerna fin spot'; *Ps.* sp. 'lucerna north'

MC752. *Pseudotropheus* sp. 'minutus tanzania', TZ.

This small species is found over most of the Tanzanian coast, as far south as Ndonga. Males of most populations look very similar to the *Chindongo minutus* from the Malawian coast, but in the far north they are generally a drab olive brownish colour. Photo by Konings (male, Manda).

**MC753. *Pseudotropheus* sp. 'ndumbi gold', LIK.**

This small sexually dimorphic species is found in a few small habitat patches around Likoma Island (Maingano Island, Ndumbi Rocks, Makulawe Point). Photo by Konings (male, above).



MC754. *Pseudotropheus* sp. 'perspicax hara', MLN.

MC755. *Pseudotropheus* sp. 'perspicax likoma', LIK.

MC756. *Pseudotropheus* sp. 'perspicax orange cap', TZ.

MC757. *Pseudotropheus* sp. 'perspicax tanzania', TZ.

A number of allopatric small cichlids thought to be similar to MC736 *Pseudotropheus perspicax* (from the north western coast) are regarded as distinct species. *Pseudotropheus* sp. 'perspicax hara' is from Gallireya Reef, Ps.sp. 'perspicax likoma' (which is rather similar to MC742 *P. sp. 'dwarf nkhata'*) is only known from Masimbwe (Likoma), Ps. sp. 'perspicax orange cap' is found at Ndumbi Point, Tanzania, Ps. sp. 'perspicax tanzania' has a wide range along the southern Tanzanian coast: males vary in dorsal fin colour, including white, orange and plain blue. Females of all forms are fairly drab brownish. Photos by A. Konings.



Males of *Ps. sp. 'perspicax hara'* (left) and *Ps. sp. 'perspicax likoma'* (right)



Males of *Ps. sp. 'perspicax orange cap'* (left) and *Ps. sp. 'perspicax tanzania'* (right)

MC758. *Pseudotropheus* sp. 'polit', MLN.

MC759. *Pseudotropheus* sp. 'polit tumbi', MZ.

Pseudotropheus sp. 'polit' is a small species, like *P. sp. 'perspicax'* and *Chindongo minutus*, and occurs allopatrically to both, only at Lion's cove. *Ps. sp 'polit tumbi'* is known only from Tumbi Point in Mozambique. It is unclear whether they are closely related. Females of both are drab, light brown.



Males of *P. sp. 'polit'* (left) and *P. sp. 'polit tumbi'*

MC760. *Pseudotropheus* sp. 'sand cobalt', LIK.

This name is used by Konings (2007, 2016a) for population of fish at Likoma Island observed to feed by scooping sediment in a manner similar to *Gephyrochromis*. It had formerly been known as *Pseudotropheus* sp. 'cobalt' (Konings 1989), *Metriaclima* sp. 'zebra mbamba' (Konings, 2001), *Metriaclima* sp. 'black dorsal cobalt' (Konings 2001: included MC633 *M. lundoense* aka *M.* sp. 'black dorsal lundo') and was part of Ribbink et al.'s (1983) *Ps. zebra* 'bevous' (which also included MC649). Photo AK (male).

**MC761. *Pseudotropheus* sp. 'socolofi nkolongwe', MZ.**

A small species found in shallow areas of rock-sand interface, known from a single site in Mozambique. Females are also blue, but duller than males. Photo AK (male).

**MC762. *Pseudotropheus* sp. 'thin stripe', LIK.**

A small cryptic species preferring caves at 10-30m depth around Likoma Island. Photo AK (male).

**MC763. *Pseudotropheus* sp. 'three peaks', MLS.**

A small dull species seen to feed on plankton on Three Peaks Reef, lying between Mumbo Island and Zimbabwe Rocks, at a depth of 30-40m. Photo AK (male).



MC764. *Pseudotropheus* sp. 'tiny', MLS.

A small species common at Thumbi West Island, it resembles *Ch. minutus*. Reported by Ribbink et al. (1983) to reach a maximum size of 62mm SL, mainly living at 3-15m, occasionally to 25m, preferring areas of sand among rocks. Females are brown. Photo AK (male).

**MC765. *Pseudotropheus* sp. 'tursiops mbenji', MLS.**

A member of the tursiops group, this species lives in shallow areas where rocks lie on sand at Mbenji Island. It is strongly territorial, and females are similar to males but drabber. Photo AK (male).



MC766. *Pseudotropheus* sp. 'variable eastern', MLS, MZ.

Not much is known of this species, first identified by Konings (1990b), which is reported to be a small aggressive species found on the Makanjila-Southern Mozambique coast including Meponda and Gome (fig. 766.1-2). A specimen collected by Genner from Chiofu Bay in 2011 has been provisionally assigned to this species (fig. 766.3). No fresh photo has been located, but as it was initially identified as an *Iodotropheus sprengerae*, it suggests it had subtle purplish and brown colours. However, that species is not known from this area. The specimen has been preserved and the short bicuspid teeth are consistent with *Pseudotropheus* and 'variable eastern' seems the best fit for the locality. A second specimen collected from the same location in 2016 (fig. 766.4) was initially identified in the field as *Labidochromis vellicans*, but examination of the specimen in 2026 revealed *Pseudotropheus*-type dentition (fig. 766.5), and sequence analysis showed these to be closely-related. Overall, it is close to *Labidochromis* spp.



Fig. 766.1: *Pseudotropheus* sp. 'variable eastern', male, Gome [AK].



Fig. 766.2: *Pseudotropheus* sp. 'variable eastern', female, Masinje [AK].



Fig. 766.3: *Pseudotropheus* 'variable eastern', preserved specimen, 2011.174, Chiofu 17 Jan 2011 [MJG].



Fig. 766.4: *Pseudotropheus* sp. 'variable eastern', male, D09-C02, SCUBA, Chiofu, 28 Feb 2016 [HS].



Fig. 766.5: *Pseudotropheus* sp. 'variable eastern', male, D09-C02, oral dentition: teeth are relatively small, closely-packed and bicuspid, indicating that it would be classed as *Pseudotropheus* rather than *Labidochromis* under current generic definitions [GFT].

MC767. *Pseudotropheus* sp. 'variable kande', MLN.

A small subtly-marked species, this is known only from Kande Island. It is more elongate than *Chindongo minutus*. Male photographed by A. Konings.



MC768. *Pseudotropheus* sp. 'variable mozambique', MZ.

Distinguished from MC766 'variable eastern' by the male's prominent dark dorsal fin band (the width of which appear to be geographically variable), this species is known from Minos Reef to Chiloele. Male photographed by A. Konings.



MC769. *Pseudotropheus* sp. 'williamsi makanjila', MLS.

A large species with blue males is found along most of the Mozambican coast and along the Malawian coast as far as Makanjila Point. A similar phenotype from Mbenji Island was included by Konings (2016a), although it was treated as distinct by Ribbink et al. (1983). Male photographed by A. Konings.

**MC770. *Pseudotropheus* sp. 'williamsi maleri', MLS.**

The male williamsi at the three Maleri Islands are largely blue but have orange-brown undersides and red & black in the dorsal fin, and are treated as distinct by Ribbink et al. (1983) and Konings (2016a). Male photographed by A. Konings.



MC771. *Pseudotropheus* sp. 'williamsi north'.

It is thought that the type of *Pseudotropheus williamsi* (MC773) was collected at Chizumulu Island, and geographic variants considered sufficiently distinct to be regarded as allopatric sister species are given appropriate geographically-indicative common names (see fig. 773.1 for names and ranges). Ribbink et al. (1983) recognised 8 geographic species, but were not aware of the type locality. Most of these were in the south or at Likoma/Chizumulu. A population at Nkhata Bay was actually regarded as conspecific with one in the south. On the other hand, Konings (2016a) recognised the Nkhata Bay population as part of 'williamsi north', which has mainly been reported from the northern part of the Tanzanian coast. Females of all williamsi species look much alike: tan coloured fish with big mouths and rows of dark blotches forming stripes along the flanks (fig. 771.1), but male williamsi north are yellow with bright blue lips. Despite their large size and aggressiveness, they have become popular aquarium fish, particularly the Tanzanian population which has much more extensive yellow colour on the males (fig. 771.2), compared to the drabber Nkhata Bay males (fig. 771.3). Williamsi species all seem to like very shallow, turbulent areas with large rocks, where they shoot around quickly between hiding places and are very hard to get a look at. They have been observed feeding on terrestrial prey, such as winged insects resting on rocks.

A single specimen was collected in 2018 by SCUBA at Nkhata Bay (fig. 771.4). It is resolved as related to *P. fuscus* and *Melanochromis* species, suggesting that a cladistically defined *Pseudotropheus* genus would probably contain relatively few species.



Fig. 771.1: *Pseudotropheus* sp. 'williamsi north', female, Nkhata Bay [AK].



Fig. 771.2: *Pseudotropheus* sp. 'williamsi north', male, Manda, Tanzania [AK].



Fig. 771.3: *Pseudotropheus* sp. 'williamsi north', male, Nkhata Bay [AK].



Fig. 771.4: *Pseudotropheus* sp. 'williamsi north', male, D33-E01, Nkhata Bay, 18 April 2018 [MCGDS].

MC772. *Pseudotropheus tursiops* Burgess & Axelrod 1975

The 'dolphin mbuna' species have a concave head profile and long snout with large bicuspid outer teeth used to extract algae from clefts in rock surfaces. They live in shallow areas (<8m) where rocks lie on sand, and males and some females aggressively defend a large 'algal garden'. Max size 94mm SL (Ribbink et al. 1983). Endemic to Chizumulu Island, but '*tursiops mbenji*' and *P. benetos* (Chilumba, NE coast) are cognate species with similar morphology, and *P. fuscus*, *P. purpuratus* and *P. 'aggressive grey'* are ecologically similar allopatric forms, but less morphologically specialised. Not yet sequenced.



Male (above) and female [AK].

MC773. *Pseudotropheus williamsi* (Günther 1894)

The type species of the genus *Pseudotropheus* was originally described in the genus *Chromis* (now used only for marine Pomacentrids). The original description (Günther 1894) mentioned the dark submarginal band in the dorsal, but described the body as uniformly dark, despite the illustration showing two rows of spots (fig. 773.2). It is mentioned that it was collected by Rev. J. A. Williams in 1891, but the collection locality is not given. Konings (2007) suggests that historical records indicate that Williams spent that time in Chizumulu (although also visiting Likoma). Ribbink et al. (1983) were unaware of this, and identified 8 different allopatric forms of the *P. williamsi* species group, including one on Chizumulu and two on Likoma. Konings (2016a) considers these three to be conspecific and to represent the described species. Cognate species include *P. brevis* (MC723) in the SE Arm, *P. galanos* (MC728) at Mbenji, *P. sp. 'williamsi makanjila'* (MC769) Mozambique-Makanjila coast (+Mbenji?), *P. sp. 'williamsi maleri'* (MC770) Maleris & Namalenje and possibly *Melanochromis robustus* (Mumbo, Chinyankwazi): see fig. 773.1 for distributions. It was chosen as the type species of the genus *Pseudotropheus* by Regan (1922), although the generic definition and name were based around the similarity of one of the other species then included in the genus, *Pseudotropheus tropheops*, to *Tropheus* species in Lake Tanganyika. *Pseudotropheus williamsi* is a relatively large (max 110mm SL: Ribbink et al. 1983), robust species with a large terminal mouth and bicuspid outer teeth. Members of the *P. williamsi* species group inhabit shallow, turbulent areas with large rocks, and tends to move rapidly between hiding places, perhaps reflecting the high predation pressure from birds etc. in such shallow waters, making them hard to collect or even observe underwater. Females are tan-coloured with 2 rows of dark spots on their flanks, and another at the base of the dorsal fin (fig. 773.3). Males are bright blue with a black submarginal band in the spinous dorsal, being replaced by a series of black radial markings in the soft dorsal, anal and caudal fins. The spinous anal has a wide black margin (fig. 773.4). Stomach contents suggest a varied diet including adult and immature insects, plankton, algae and detritus (Ribbink et al. 1983). Members of this species group have been observed jumping out of the water to catch insects, such as chaoborid adults (Konings 2016a).

A single individual from Likoma Island has been collected by the Svoldal lab, but sequence information is not yet available (fig. 773.5).

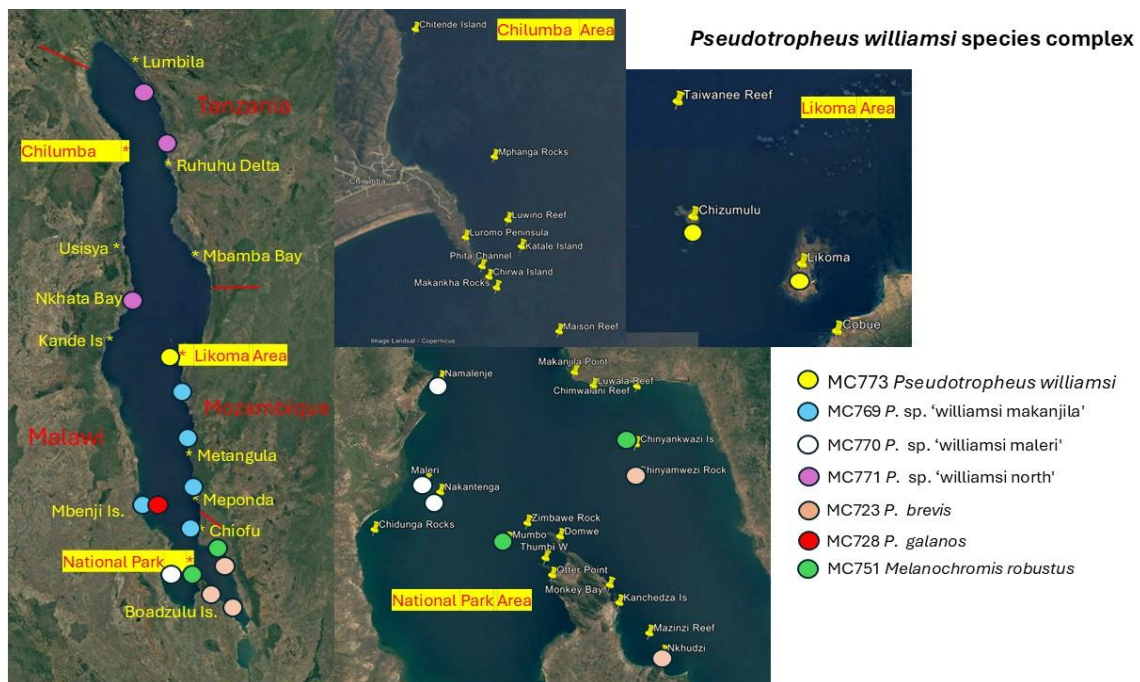


Fig. 773.1: Known distribution of species of the *P. williamsi* complex and similar species. The substantial gaps in the north western and central eastern coasts may represent missing data, as these are skittish, cryptic species found in shallow turbulent areas.

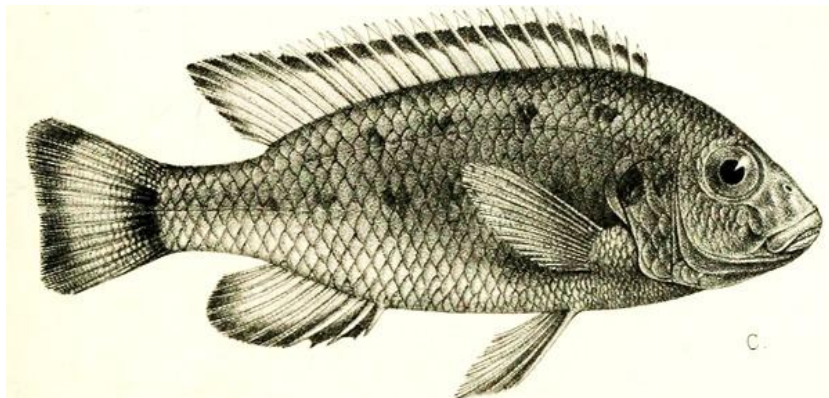


Fig. 773.2: *Pseudotropheus williamsi*, type, from original description.



Fig. 773.3: *Pseudotropheus williamsi*, female?, Maingano Island, Likoma [AK].



Fig. 773.4: *Pseudotropheus williamsi*, male, Maingano Island, Likoma [AK].



Fig. 773.5: *Pseudotropheus williamsi*, apparent female, MWA1928, Maingano Island, Likoma, 15 Oct 2023 [HS lab].

***Tropheops* Trewavas 1984: species MC774-830, MC912-913.**

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

Type species: *Pseudotropheus tropheops* Regan 1922.

Contained valid species (9): *Tropheops biritwira*; *Tropheops gracilior*; *Tropheops kamtambo*; *Tropheops kumwera*; *Tropheops macrophthalmus*; *Tropheops microstoma*; *Tropheops modestus*; *Tropheops romandi*, *Tropheops tropheops*.

Proposed undescribed species (50): *T. sp.* 'aurora'; *T. sp.* 'band'; *T. sp.* 'black dorsal'; *T. sp.* 'black hara'; *T. sp.* 'boadzulu'; *T. sp.* 'chilumba'; *T. sp.* 'chilumba type'; *T. sp.* 'chinyamwezi'; *T. sp.* 'chinyankwazi'; *T. sp.* 'chiofu widemouth'; *T. sp.* 'chitimba'; *T. sp.* 'dark'; *T. sp.* 'deep'; *T. sp.* 'elongatus chizumulu'; *T. sp.* 'elongatus mbako'; *T. sp.* 'elongatus metangula'; *T. sp.* 'elongatus namalenje'; *T. sp.* 'elongatus reef east'; *T. sp.* 'gold otter'; *T. sp.* 'goldbreast'; *T. sp.* 'gome yellow'; *T. sp.* 'gracilior nankumba'; *T. sp.* 'higga'; *T. sp.* 'kande'; *T. sp.* 'lilac'; *T. sp.* 'lumessi blue'; *T. sp.* 'macrophthalmus chitimba'; *T. sp.* 'macrophthalmus chitimba blue'; *T. sp.* 'macrophthalmus gallireya'; *T. sp.* 'maleri blue'; *T. sp.* 'maleri yellow'; *T. sp.* 'masimbwe'; *T. sp.* 'mauve'; *T. sp.* 'mauve yellow'; *T. sp.* 'mbenji blue'; *T. sp.* 'mbenji yellow'; *T. sp.* 'membe'; *T. sp.* 'mphanga'; *T. sp.* 'mumbo'; *T. sp.* 'olive'; *T. sp.* 'orange chest'; *T. sp.* 'orange head'; *T. sp.* 'red cheek'; *T. sp.* 'red cheek north'; *T. sp.* 'red fin'; *T. sp.* 'rust'; *T. sp.* 'taiwan'; *T. sp.* 'weed'; *T. sp.* 'yellow chin'; *T. sp.* 'yellow gular'.

Generic reviews & diagnoses: Ribbink et al. (1983, as *P. tropheops* species complex), Trewavas (1984, as a subgenus), Li et al. (2016, incorporating 'elongatus' species). Following the recognition of the group as a 'species complex' by Ribbink et al. (1983) and the more or less simultaneous proposal of the subgenus by Trewavas (1984), *Tropheops* gradually became used as a genus in parallel with the adoption of *Metriaclima*/*Maylandia* for the zebra group. The membership of the group seemed relatively straightforward, with species generally fairly deep-bodied and with some flexibility over the use of the head profile as a defining feature, allowing generally similar taxa such as the *P. lucerna* group to be included. More recently, Li et al. (2016) and works by Konings (e.g. 2007a, 2016a) have emphasized the head profile (usually measured as the vomer angle) and feeding behaviour, resulting in exclusion of some species (e.g. *P. lucerna* group, *P. novemfasciatus*) and inclusion of slender-bodied species previously included in the '*P. elongatus* species complex'.

Generic diagnosis: Ribbink et al. (1983): 'Members of this group are recognized by the profile of the snout which descends steeply. The angle at which the snout descends varies slightly from one species to the next but is nonetheless a clear distinguishing feature of the group. The mouth in most species is slightly subterminal and feeding is usually effected at an angle of about 45° to the rock surface. Algae are nipped from the rocks with a sideways and upward jerk of the head. A superficial examination of the dentition of members of this species-complex indicates that all species are similar, each having an outer series of bicuspid teeth, several inner rows of tricuspid teeth and a series of large conical teeth on the lateral

edges of the upper jaws.’ Li et al. (2016): “*Tropheops* is diagnosed by the following morphological characteristics: 1) the presence of bicuspid teeth in outer rows and enlarged conical teeth on the posterior ends of the dentigerous arms of the premaxilla; 2) a steeply sloped (71– 96° to the parasphenoid) ethmo-vomerine block; 3) narrow ventral mouth with lower jaw shorter than the upper; 4) the cleft of the upper and lower jaws forms a 15–35° angle with the body axis.”

Field Diagnosis: Mbuna with steep head profiles and underslung mouth, but lacking the soft bulbous ‘nose’ of *Labeotropheus*.

Phylogenetic comments: The incorporation of ‘*elongatus*’ species into *Tropheops* remains to be tested with molecular methods.

MC774. *Tropheops biriwira* Li et al. 2016

This is one of the 'elongatus' species added to *Tropheops* since Konings (2007a) decided to adopt the policy of prioritising the vomer / feeding angle over other traits. It was formerly treated as part of *Pseudotropheus elongatus* 'yellow tail' by Ribbink et al. (1983) and then distinguished as *Pseudotropheus* sp. 'elongatus green-back' by Reinthal (1990) and as *Tropheops* sp. 'elongatus greenback' by Konings (2007a). This is a small slender species, not reported to exceed 69mm SL (paratype). Like many other elongatus species, mature males have strong vertical flank barring and black upper and lower margins to the caudal fin. Otherwise, males have a greenish-yellow cast, black pelvic and anal fins, and a wide black dorsal submarginal band under a yellow margin. In contrast to typical deep-bodied *Tropheops* species that rarely have more than 1 or two eggspots, photos show the species often has 3 or more. The species is reported only from Mumbo and Otter Islands, where it prefers caves among medium-large rocks at depths of 7 to at least 40m. Like other elongatus species, it is often found swimming close to rock surfaces, orienting its belly to the rock, even if this means swimming upside-down.

A specimen from Otter Point has been sequenced (fig. 775.2). It is closely related to *T.* sp. 'elongatus namalenje'. These are not part of the main *Tropheops* group. They may lie basally within a cluster containing species of the *Maylandia aurora* group and *Tropheops* sp. 'gracilior nankumba' (MC802).



Fig. 775.1: *Tropheops biriwira*, male, Otter Island [AK].



Fig. 775.2: *Tropheops biriwira*, male, D25-J06, Otter Island [HS].

MC775. *Tropheops gracilior* (Trewavas 1935)

Tropheops gracilior was originally described by Trewavas (1935) as a subspecies of *Pseudotropheus tropheops*. Identification of this taxon as a field species has proven problematic. Ribbink et al. (1983) provisionally appended the name (cf. *gracilior*) to a population preferring shallow sheltered areas in the south of the lake and this name remained in use for that form for some time: e.g. Konings (2001) was using *Tropheops gracilior* for the same population. Konings (2007a) then reidentified *T. gracilior* as the taxon formerly known as *Tropheops* sp. 'black', on the basis of communication from J. Snoeks that the types of *P. gracilior* came from Vua/Deep Bay (=Chilumba) in the far north of the lake, and that they exhibited a dark submarginal band and both sexes were dark overall, although I find this difficult to confirm from my observation of the type material (fig. 775.1). The southern form was reassigned to *T. sp. 'gracilior nankhumba'* (MC802). Trewavas's original description is very brief with no illustrations (fig. 775.1 here may be the first ever illustration of one of the types!). The key 'distinguishes' them from the nominal subspecies using two highly overlapping ratios and they are characterized as more slender and darker in colour than typical *T. tropheops*. However, there is no particularly good reason to imagine they are all conspecific, as multiple *Tropheops* species are generally found together on any rocky habitat patch. However, in the absence of any more definitive investigation, *T. gracilior* remains identified with the former *Tropheops* 'black', following Konings (2007a, 2016a).

Ribbink et al. (1983) report the species from through the NW of the lake, and report males as purple-blue, tending to black dorsally, with an orange chest and belly, and a strong dark submarginal band in the dorsal fin: the form illustrated by Konings (2016a) from the Tanzanian coast is bluer (fig. 775.2). The former species name of *Tropheops* 'black' came from the females, which are very dark overall (fig. 775.3), and generally show a dark submarginal band in the dorsal. Ribbink et al. also report OB females, which, among the *Tropheops*, are otherwise only known in *Tropheops* sp. 'orange chest' and *T. sp. 'chinyamwezi'*: these three are suggested to be allopatric sister species, along with *T. sp. 'black hara'* (Gallireya Reef), *T. sp. 'dark'* (Likoma) by Konings (2016a). *Tropheops gracilior* is reported to prefer medium to large rocks at depths of 3-15m, although being found from the surface to at least 24m. van Oppen et al. (1998) recorded them from 0-15m at Nkhata Bay.

Several specimens from Nkhata Bay have been sequenced (figs. 775.4-5). Specimen D33-D02 shows the male phenotype reasonably well, and two of the others show a dark body colour and prominent submarginal band. They other two cluster with them. They do not confirm previous theories about relationships, but instead suggest they are most closely related to sympatric species such as *Tropheops* sp. 'band' (MC783) and *T. sp. 'rust'* (MC824).



Fig. 775.1: Syntype of *Tropheops gracilior*, apparent male, showing hints of dark markings on dorsal and anal fins [GFT].



Fig. 775.2: *Tropheops gracilior*, male, Lupingu, Tanzania [AK].



Fig. 775.3: *Tropheops gracilior*, female, Chitande Island, Malawi [AK].



Fig. 775.4: *Tropheops gracilior*, male, D34-D02, Nkhata Bay, 20 April 2018 [MCGDS].



D03-B08



D02-F09



D02-F10



D03-F09.

Fig. 775.5: *Tropheops gracilior*, collected by SCUBA, Nkhata Bay, 21 Feb 2016. Specimens D02-F09 and D03-B08 show the black submarginal band reasonably well. The other two specimens are harder to identify, but cluster closely with those and with the specimen illustrated in fig, 775.4.

MC776. *Tropheops kamtambo* Li et al. 2016.

This is a narrowly distributed elongatus (although there are many allopatric cognate species), formerly *Pseudotropheus elongatus* 'reef' (Ribbink et al. 1983), then *Tropheops* sp. 'elongatus reef' (Konings 2007a), found at Chimwalani and Luwala Reef (northern SE Arm) and possibly near the Malawi/Mozambique border. It has not yet been sequenced.



Male from Chimwalani [AK].

MC777. *Tropheops kumwera* Li et al. 2016.

This is a narrowly distributed elongatus (although there are many allopatric cognate species), formerly *Pseudotropheus elongatus* 'boadzulu' (Ribbink et al. 1983), then *Tropheops* sp. 'elongatus boadzulu' (Konings 2007a), found along the western side of the SE Arm from Domwe Island to Boadzulu and Chemwezi Rocks. Konings (2016) photo from Mazinzi Reef is unusual: most photographs show far more barring on anterior half of flanks (as the Tsano Rock image here). It has not yet been sequenced.



Male Mazinzi Reef [AK].



Male, Tsano Rock [AK].

MC778. *Tropheops macrophthalmus* (Ahl 1927).

The species was described by Ahl from 2 specimens, with the colour description (translated from German) given as “coloration (in alcohol) brownish, with 8-9 dark crossbands; one dark opercular spot; fins solid-coloured.” Konings (1995) associated this with a species with bright yellow males found along the NE (Tanzanian) coast from Matema to Kirondo, on the basis of its steep head profile (fig. 778.1) and plain coloured fins. More tentatively, he also regards as conspecific a form from the NW (Malawian) coast around Chilumba (Ribbink et al.'s (1983) *Pseudotropheus tropheops* 'Chitande yellow') and even more provisionally Ribbink et al.'s *Pseudotropheus tropheops* 'gold' from Chizumulu Island. Konings reports the species having a preference for shallow rocky habitats. Ribbink et al. (1983) report (for *Pseudotropheus tropheops* 'Chitande yellow'), a preference for the rock-sand interface, and sheltered sediment covered rocks down to 12m depth. Males (but not females) are territorial, and sometimes dig into sand, and reach a maximum size of 99mm SL. Ribbink et al. (1983) reported *Pseudotropheus tropheops* 'gold' from the northern and NE shores of Chizumulu, with a preference for small-medium sized rocks in pure rocky habitats, although sometimes occurring near sand, at 3-25m. Males were said to prefer the upper surfaces of prominent rocks and females to be non-territorial. Maximum size recorded was 89mm SL. Not yet sampled for sequencing.



Fig. 778.1: *Tropheops macrophthalmus*, syntype, Berlin Natural History Museum, on loan at London NHM [GFT].



Fig. 778.2: *Tropheops macrophthalmus*, male, Matema, Tanzania [AK].



Fig. 778.3: *Tropheops macrophthalmus*, female, Matema, Tanzania [AK].

MC779. *Tropheops microstoma* (Trewavas 1935).

Described by Trewavas (1935) from two specimens collected at Monkey Bay in the 1920s (only one of which I have been able to locate), it was distinguished in her key from *T. tropheops* and *T. gracilior* by it having a relatively narrower, more rounded tooth band. Collectively, the three species (as we now understand them) were 'distinguished' from *T. macrophthalmus* only by overlapping counts and the four of them from *T. novemfasciatus* by their steeper snout angle. The actual description simply says 'these fishes resemble *P. tropheops* in every way except in the very narrow mouth and curved tooth-band'. Relatively wide dark bars are still visible in one of the types, although this was not mentioned in the description (fig. 779.1). Ribbink et al. (1983) provisionally identified it (cf. *microstoma*) with a small species from Monkey Bay to Otter Point (including Domwe, but not Thumbi West), in areas where rocks lie on sand, often in small patches of rocks, but also following the rock margins as deep as 40m or more. Males are strongly marked with wide blue and black barring and yellowish soft dorsal and caudal fins (fig. 779.2). Females are grey-brown, but also strongly barred (fig. 779.3). Males were reported to be strongly territorial, particularly in the mornings, and to sometimes dig spawning craters in the sand. Females were reportedly non-territorial. Diets consisted of algal material, invertebrates and plankton. Konings (2016a) also reports the species extending slightly further into the SE Arm to Masasa Reef. The identification of this taxon with *T. microstoma* has remained consistent since 1983 and it is pretty easily identified in the field from its wide bars.

Five specimens collected from Otter Point, Otter Island and Domwe were sequenced (fig. 779.4-5). All cluster together. They do not seem to be members of the main *Tropheops* cluster, but lie somewhere more basally with the *Tropheops/Petrotilapia* group.



Fig. 779.1: *Tropheops microstoma*, syntype, London Natural History Museum [GFT].



Fig. 779.2: *Tropheops microstoma*, male, Masasa Reef [AK].



Fig. 779.3: *Tropheops microstoma*, female, Masasa Reef [AK].



Fig. 779.4: *Tropheops microstoma*, male, D25-D05, SCUBA, Otter Point, Cape Maclear, 3 Feb 2017 [HS].



D25-D06, Otter Point, Cape Maclear, 3 Feb 2017



D74-D04, Otter Island, 7 Oct 2023



D56-B04, Domwe, 3 Sept 2023



D56-B06, Domwe, 3 Sept 2023

Fig. 779.5: *Tropheops microstoma*, males from Domwe and Otter Point [HS, MCGDS].



Fig. 779.6: *Tropheops microstoma*, male, D25-D05. Oral teeth. (left) and underside (right) This is a narrow-mouthed species: dental arcade 21.3-22.5% of Head Length (N=2). Outer series are closely packed, equally bicuspid in both upper and lower jaws. The mouth is often more or less terminal, rather than strongly underslung as in most other *Tropheops* species [GFT].

MC780. *Tropheops modestus* (Johnson 1974).

This small slender species was described as a *Pseudotropheus* by Johnson in a fairly obscure self-published aquarium hobby newsletter. The type was a single female of 63.5mm SL (fig. 780.1). Johnson noted that it was slightly deeper bodied, with a relatively larger eye, smaller mouth and more equal jaws than *P. elongatus*. It was reported to have been collected ‘off Makanjila Island’. There is no known Makanjila Island, although there is a Makanjila Point and Rocks. Johnson did not seem to visit the field, but described species from aquarium specimens and may not always have been in possession of accurate collection locations. According to Konings (2016a and earlier works), the species was later known as *P. sp. ‘elongatus bar’* and this term (in the format *P. elongatus ‘bar’*) was used by Ribbink et al. (1983). Johnson’s description was cited by Ribbink et al. (1983), but perhaps understandably, they were not able to match the description of *P. modestus* with a ‘field species’. Subsequent records (mainly by Ribbink et al. and Konings) are from Maleri, Nankoma and Nakantenga Islands and Chidunga Rocks (off Chipoka in the SW Arm), but none from the vicinity of Makanjila. Underwater photographs show a strongly barred blue and black male with orange flecks on the blue areas, and the classic ‘elongatus’ broad dark margins to the caudal fin. The dorsal and anal fins have broad black submarginal bands, tipped with white. The spinous dorsal is generally dark orange basally, with a narrow white trim underlying the dark submarginal band (fig. 780.2). The (rarely photographed) female is shown as dark brown, unbarred, with a dorsal fin rather like the male’s (fig. 780.3).

Ribbink’s team reported this species to be aggressive, with males and occasionally females seen defending clefts in the rock, but although heterospecifics were aggressively chased as well as conspecifics, algal gardens were not recorded. It was reported to favour large rocks and slabs from the surface to 28m depth, but to be most abundant at 5-15m. Maximum size was reported as 66mm SL, which is one of the smaller mbuna.

A single female sequenced from Nakantenga by MCGDS was recognised from its size and colour, particularly the dorsal fin markings (fig. 780.4). The only other elongatus known from this location is *Chindongo bellicosus*, which has a more terminal mouth, strong lower jaw and more slender body. Also, female *C. bellicosus* do not seem to show a dark submarginal band in the dorsal fin. *Tropheops modestus* is closely related to *Tropheops biriwira*, but not to the main body of *Tropheops* species.



Fig. 780.1: *Tropheops modestus*, type, [London Natural History Museum, on loan from USNM].



Fig. 780.2: *Tropheops modestus*, male, Maleri Island [AK].



Fig. 780.3: *Tropheops modestus*, female, Maleri Island [AK].



Fig. 780.4: *Tropheops modestus*, female, D42-E04, Nakantenga Island, 26 Nov 2019 [MCGDS].

MC781. *Tropheops romandi* (Colombé 1979).

Originally described as a subspecies of *Pseudotropheus tropheops* (as it was then), the types very small (fig. 781.1). Males were described as dark overall, with a dark submarginal band in the dorsal fin, and seven tapering dark bars on a dark blue background under the dorsal fin. A key to the (sub-)species mentioned the same overlapping ratios used by Trewavas in 1935 for *P. tropheops tropheops* v *P. tropheops gracilior*, and these also overlapped between *T. romandi* and the other subspecies, despite the very small number of specimens on which the ratios were determined. So these remain pretty useless for identification of specimens. A distinctive feature was said to be the rounded tooth band on the lower jaw, but there is no indication that later identifications paid any attention to this feature. Ribbink et al. (1983) tentatively identified the females from the *T. romandi* description with those of their *P. tropheops* 'intermediate' (bright yellow with a dark submarginal band in the dorsal fin), but were not confident about the males, so did not use the name. This seems strange, as Colombé says that there was no sexual dimorphism colour in *T. romandi* ('aucun dimorphisme sexuel n'apparaît dans la livrée'), but the blue and black fish described fit well with Ribbink et al.'s description of the male 'intermediate' and nothing in the Colombé text remotely resembles the bright yellow 'intermediate' females. However, there is a photo in the original description labelled 'yellow variety' (fig. 781.2 below, originally Colombé, fig. 2, credited to Axelrod, see also Axelrod & Burgess 1986, p. 244). This image does in fact fit the 'intermediate' female quite well. Colombé plays down the importance of colour, suggesting that these species are often polymorphic and that his colour description is not 'exhaustive' and only applies to this particular variety. Unfortunately, all the types I inspected in the Natural History Museum in Paris are bleached pale yellow: they appear to have been fixed directly in alcohol, not formaldehyde, judging by their white eyeballs (fig. 781.1). This means they might be quite promising for DNA extractions! Ribbink et al. reported a maximum size of 89mm SL for 'intermediate', compared to 51.9-62.8mm SL for the types of *romandi*, allegedly mature adults. This suggests that Colombé's description was probably based on aquarium-bred specimens, as these often mature at smaller sizes (assuming these are conspecific). Colombé (1979) gives Likoma as the original collecting location, but Ribbink et al. (1983) claimed that no similar species was found there, and their 'intermediate' was reported from Thumbi West Island in the south. Konings (2016a) has maintained this identification (with confidence not shown by Ribbink et al.!) and increased the range to include the NW of the SE Arm from Domwe to Nkhudzi: some of these populations seem to have generally very dark males and females lacking the black dorsal submarginal band (if they are correctly identified). A female was collected from Mumbo Island in 2026 (fig. 781.6). Ribbink et al. (1983) described the males as mainly occurring over patches of sand among rocks or over sediment-covered slabs (fig. 781.4). Females (fig. 781.3) and juveniles were reported to range more widely across habitats, including *Vallisneria* beds. They are found from the surface to at least 25 m depth, males being generally deeper than 5m. Males were reported to dig pits in the sand, sometimes under rocks. They seem quite opportunistic, feeding on rocks, sand, weeds and in the water column.

A single male from Thumbi West, corresponding well to Ribbink's intermediate/Konings' *T. romandi* was sequenced for the MCGDS (fig. 781.5). It was found to be closely related to *T.* sp. 'gracilior nankhumba' and not to the main *Tropheops* group.



Fig. 781.1: *Tropheops romandi*, holotype, Paris Natural History Museum. Note the mouth is not very underslung [GFT].



Fig. 781.2: *Tropheops romandi*, photo from original description, labelled as 'variété jaune' by Colombé [H. Axelrod].



Fig. 781.3: *Tropheops romandi*, female, Thumbi West [AK].



Fig. 781.4: *Tropheops romandi*, male, Thumbi West [AK].



Fig. 781.5: *Tropheops romandi*, male, D74-C01, Mitande Reef, Thumbi West Island, 18 Oct 2023 [MCGDS].



Fig. 781.6: *Tropheops romandi*, female, Mumbo Island, 22 July 2026 [GFT].

MC782. *Tropheops* sp. 'aurora'

This abundant, steep-snouted rocky shore species is found along the central part of the Tanzanian coast between Lundu and Mbamba Bay. Konings (2016a) considers it to be a member of the 'mauve' group. Both sexes are more strongly barred than usual for this group. Not yet sequenced. Photos by Konings (male above).



MC783. *Tropheops* sp. 'band'

This undescribed species was first reported by Ribbink et al. (1983) exclusively from Nkhata Bay, and was later studied by van Oppen et al. (1998). At 102mm SL, it is one of the larger *Tropheops* species recorded by Ribbink et al. No illustration was provided but a very detailed description of male and female colour was given. Broadly, males are bright blue and yellow with little or no flank barring and a strong dark submarginal band in the dorsal fin (fig. 783.1). They are confined to shallow areas of the rock-sand interface, mainly 1-3m, being absent below 6m. Females are a sandy to grey colour with rows of squarish black blotches (fig. 783.2). They are not easy to distinguish from females of the sympatric *T. sp. 'rust'*: an opinion seemingly shared by males of the two species, as van Oppen et al. (1998) observed a couple of occasions where a single female was courted by males of both species. However, although their depth ranges often overlapped, Band was not found deeper than 3m, while Rust penetrated to at least 22m, and the species showed significant differences in microsatellite allele frequencies, suggesting they represented independent gene pools consistent with them being different species. Things got slightly confused by Ribbink et al., who also reported what they called 'no band' which was essentially identical in appearance and habitat preference, but with males being slightly smaller and brighter and lacking the dark dorsal fin band. Subsequently, 'no band' has never been found and is generally considered to likely represent young specimens of 'band' (van Oppen et al. 1998; Konings 2016a). However, it might be worth keeping an eye out for something akin to the species *T. sp. 'weed'* in case it occurs at Nkhata Bay (MC826). Male Band are reported to dig pits near rocks (Ribbink et al. 1983) and both sexes feed over rocks and sand. During the collections for the van Oppen paper, we found this species very difficult to catch in reasonable numbers by day and ended up collecting most individuals at night by snorkelling. The geographic range of the species is not known: previously, specimens have only been collected at Nkhata Bay.

Specimens for sequencing were collected at Nkhata Bay, 8 males in 2016 (fig. 783.3) and 4 more in 2018 (fig. 783.4). They appear to be members of the main *Tropheops* group, and related to other northern species, in particular to specimens identified with *T. sp. 'weed'* (MC826) at Kande and *T. sp. 'chitimba'* (MC791) to the north. A specimen from Chiweta Beach (fig. 783.5) lies outside the reported geographic range for 'band' but shows a very similar male phenotype. The sequence suggests this is a member of the group containing 'band', 'weed' and 'chitimba' but is not unambiguously resolved in the 'band' group.



Fig. 783.1: *Tropheops* sp. 'band', male, Nkhata Bay [AK].



Fig. 783.2: *Tropheops* sp. 'band', female, Nkhata Bay [AK].



D03-F04



D03-F05



D03-F06



D03-F07



D03-F08



D03-F10

Fig.783.3: *Tropheops* 'band', males, snorkelling, Nkhata Bay 22 Feb 2016 [HS]



D32-G01



D32-G06



D33-E10



D33-F01

Fig.783.4: *Tropheops* 'band', males, SCUBA, Nkhata Bay, 17-18 April 2018 [MCGDS]



Fig. 783.5: *Tropheops* cf. 'band', D06-B01, Beach Seine, Chiweta 24 Feb 2016 [HS].

MC784. *Tropheops* sp. 'black dorsal'

This species was first noted by Ribbink et al. (1983) and is known from a few reefs and patches of rocks in the Makanjila area. Females are bright yellow. Konings suggests it might be related to *T. sp. 'chilumba'* and *T. sp. 'chinyankwazi'*. Not sequenced. Male [AK].

**MC785. *Tropheops* sp. 'black hara'**

First reported by Konings (2004), this species appears to be endemic to Gallireya Reef, just south of Chilumba, where it prefers the pure rocky areas. Females are dark, and Konings proposes affinity with *Tropheops gracilior*, formerly known as *T. sp. 'black'*, hence the name of this species with conspicuous yellow males! Not sequenced. Male [AK].



MC786. *Tropheops* sp. 'boadzulu'

Another Ribbink et al. (1983) species, this was thought to be endemic to Boadzulu Island in the SE Arm, where it is reported to prefer water deeper than 10m. Males are rather subtly coloured and females strongly barred. Konings (2016a) reported it also from Makokola Reef and suggests an affinity with *T. microstoma*, on the basis of the wide flank bars and dark dorsal submarginal band, but this has yet to be tested. The only other *Tropheops* species at Boadzulu seems to be *T.* sp. 'orange chest' which differs in both male and female coloration (Ribbink et al. 1983).

A single specimen was sequenced by Scherz et al. (2022) from Boadzulu Island, under the name *Tropheops* sp. aff. *tropheops* "Boadzulu". It generally clustered with a specimen of *Tropheops* sp. 'orange chest' (MC819, reported under the name *T. tropheops*) or sometimes with *Petrotilapia* spp.



Fig. 786.1: *Tropheops* sp. 'boadzulu', male, Boadzulu Island [AK].



Fig. 786.2: *Tropheops* sp. 'boadzulu', female, Boadzulu Island [AK].

MC787. *Tropheops* sp. 'chilumba'

Tropheops sp. 'chilumba' was first named by Konings (1990). Ribbink et al. (1983) described the males under *Pseudotropheus tropheops* 'redfin' but somehow that name got transferred to a very different-looking species that doesn't have red fins. The problem seemed to be that Ribbink et al.'s 'redfin' description consisted of the males of Chilumba and the females of what is still now called 'redfin' (MC823), but the name came from the males that are now called Chilumba! *Tropheops* sp. 'chilumba' is a deep-bodied species with blue-grey males (fig. 787.1) with a red dorsal fin with a prominent dark submarginal band, and bright yellow females (fig. 787.2). Konings' illustration does not show a dark submarginal band in the dorsal fin of the females, but this was clearly apparent in most of the specimens we collected. The vivid colours of the females and juveniles probably help make it a popular aquarium fish. In the Chilumba area, the male's red dorsal fin and dark submarginal band are distinctive. Similar forms, *T.* sp. 'chilumba-type' (MC788) and *T.* sp. 'higga' (MC803) are found on the East coast: generally males are more strongly barred and lack the red in the dorsal fin. In the southern part of the eastern coast, *T.* sp. 'black dorsal' (MC784) and *T.* sp. 'chinyankwazi' (MC790) are also similar, but again lack the red dorsal fin and have drabber females. These are most easily told apart by location.

Sixteen specimens from Mphanga Rocks were sequenced from the MCGDS 2016 collection and all clustered together (fig. 787.3). Six more specimens, all apparent females, were collected in 2023 at Luwino Reef, Makankha Rocks and the Phita Channel, Chirwa Island (figs. 787.4-6). These formed a sister group to the Mphanga specimens. Collectively, their closest relative was the sympatric *Tropheops* 'orange head', and the group nestled with a wider northern *Tropheops* group in the main *Tropheops* cluster.



Fig. 787.1: *Tropheops* sp. 'chilumba' male, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS].



Fig. 787.2: *Tropheops* sp. 'chilumba' male, Mphanga Rocks, Chilumba [AK].



D03-J01



D03-J02



D03-A01



D03-A02

Fig. 787.3: *Tropheops* 'chilumba', males: D03-J01, J02; apparent females: D03-A01, A02, SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS]. Others sequenced from the same collection were D03-J03-J06, D03-J09-J10, D03-A03-A08.



D58-C07



D58-D03

Fig. 787.4: *Tropheops* sp. 'chilumba' female, Luwino Reef, SCUBA at 3-9m, 19 Sept 2023 [MCDS].



D59-B01



D59-B05

Fig. 787.5: *Tropheops* sp. 'chilumba' female, Katale Island, SCUBA at 0-3m, 20 Sept 2023 [MCDS].



D68-B08



D68-C03

Fig. 787.6: *Tropheops* sp. 'chilumba' female, Makankha Rocks, SCUBA at 3-6m, 26 Sept 2023 [MCDS].

MC788. *Tropheops* sp. 'chilumba type'

This is a horribly-named species - it doesn't even live at Chilumba! It has a very restricted range, being found only at Chiwindi in Mozambique near the Tanzanian border. It has strongly barred males (similar to those of MC803) and yellow females. Photo, male [AK].

**MC789. *Tropheops* sp. 'chinyamwezi'**

Originally distinguished by Ribbink et al. (1983), this population seems very similar to *T. sp.* 'orange chest' (really only distinguishable by location). Both are unusual in having OB females. Other females are drab grey-brown with vertical barring and dark submarginal bands. It appears to be endemic to Chinyamwezi Island, where it is the only *Tropheops* present.



Pic, male [AK].

MC790. *Tropheops* sp. 'chinyankwazi'

Another Ribbink et al. (1983) species, this seems to be endemic to Chinyankwazi Island, where it seems to be the only species of the genus present. Konings (2016a) sees affinities with the Chilumba group, but it seems more slender, males lack the red dorsal fin, have a dark belly and yellowish cheeks and chest; females are drab brownish grey. Reported by Ribbink et al. to have a narrow mouth and to be mainly found at 3-14m.



Male [AK].

MC791. *Tropheops* sp. 'chitimba'

First identified by Konings (1995), this seems to be a geographic analogue of *Tropheops* sp. 'band' which has so far only been reported from Nkhata Bay. It was recorded from Chitimba Bay to the south of Chilumba, where Konings reports males defending holes in the large sandstone slabs in the area, and being smaller than *T.* sp. 'band'. There is no information on equivalent taxa from the ~125 km of coastline in between, probably because shallow rock-sand interfaces are not appealing places for SCUBA divers and serious enthusiasts tend not to spend much time snorkelling! Females are sandy-coloured with yellowish pelvic and anal fins. Males are similar to *T.* sp. 'band' but have less blue on the top of the head and don't show a strong dark submarginal band in the dorsal fin (fig. 791.1). Their size and colour actually conform quite well to Ribbink et al.'s description of *Tropheops* sp. 'no band' but that species was only recorded at Nkhata Bay (see *T.* sp. 'band', MC783). A single specimen (fig. 791.3) sequenced from the channel between Chirwa Island and the mainland was found to be related to *T.* sp. 'band' and *T.* sp. 'weed', which inhabit similar shallow rock/sand interface habitats along the NW coast of the lake.



Fig. 791.1: *Tropheops* sp. 'chitimba', male, Chitimba [AK].



Fig. 791.2: *Tropheops* sp. 'chitimba', juvenile, Chitimba [AK].



Fig. 791.3: *Tropheops* sp. 'chitimba', male, D70-D03, 3-6m depth, Phita Channel (Chirwa Island), 28 Sept 2023 [MCGDS].

MC792. *Tropheops* sp. 'dark'

A little known fairly drab species from Likoma, first identified by Ribbink et al. (1983). Females are dark brown with a dark submarginal dorsal fin band. Reported to have a wide depth preference, to at least 33m. Not sequenced. Male [AK].



MC793. *Tropheops* sp. 'deep'

Tropheops sp. 'deep' was first identified by Ribbink et al. (1983), from Nkhata Bay. It was reported as preferring deeper water, rarely seen shallower than 10m, and extending to at least 30m. Van Oppen et al. (1998) reported the species from 5 to 24m depth at Nkhata Bay. Males are blue with a yellow chin and chest, females reddish brown, yellowish ventrally, with orange pelvic and anal fins. The female illustrated by Konings as *T. sp. 'deep'* (2016a, p.206) doesn't really fit Ribbink et al.'s description, nor my personal experience of the species, and may be *T. sp. 'black'* (now identified as *T. gracilior*). Both sexes have very steep head profiles. Males have very dark orange eggspots.

A single male from Nkhata Bay was sequenced in 2016 (fig. 793.2), clustering with other northern species such as *T. gracilior* and *T. sp. 'rust'*, which both penetrate into relatively deep waters. An additional 14 specimens from 2018 (figs. 793.3-5), representing both sexes, were also sequenced and all clustered together.



Fig. 793.1: *Tropheops* sp. 'deep', male, Nkhata Bay [AK].



Fig. 793.2: *Tropheops* sp. 'deep', D01-I01 SCUBA, Nkhata Bay 20 Feb 2016 [HS].



D33-A08 Female



D33-B01 Female



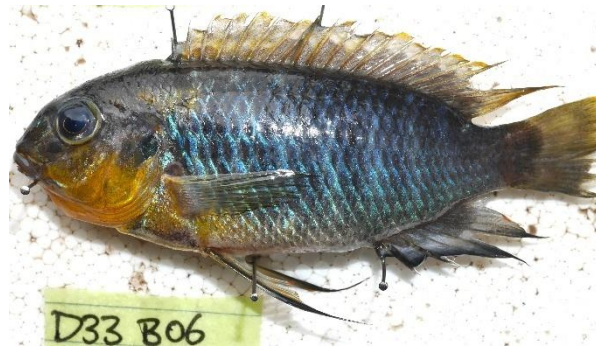
D33-B02 Female



D33-B04, Male



D33-B05, Male



D33-B06, Male



D33-B07, male



D33-B08, male

Fig. 793.3: *Tropheops* sp. 'deep' from Nkhata Bay, 18 April 2018 [MCGDS]. Specimen D33-A10 was sequenced, but not photographed.



Fig. 793.4: *Tropheops* sp. 'deep', D33-E07, from Nkhata Bay, 18 April 2018 [MCGDS].



D34-D03, male



D34-D04, male



D34-D05, female



D34-D06, female

Fig. 793.5: *Tropheops* sp. 'deep' from Nkhata Bay, 20 April 2018 [MCGDS].

MC794. *Tropheops* sp. 'elongatus chizumulu', CHI.

MC795. *Tropheops* sp. 'elongatus mbako', TZ, LIK.

MC796. *Tropheops* sp. 'elongatus metangula', MZ.

MC797. *Tropheops* sp. 'elongatus namalenje', MLS.

MC798. *Tropheops* sp. 'elongatus reef east', MLS.

These are all slender species that would previously have been placed in the *Pseudotropheus elongatus* species complex, but under the generic reorganisation of Konings (2007 onwards) are assigned to *Tropheops*, based on their ethmoverine angle or steep head profile and feeding angle - which are all likely to be effectively the same character. All are distinguished with geographically-based common names: some are obvious (Chizumulu, Namalenje). 'Mbako' is found on Likoma and also reported from Undu Reef on the southern part of the Tanzanian coast. 'Metangula' is a Mozambican endemic whose range includes Minos Reef. 'Reef East' is reported from Ntekete, which might suggest a wider range along the Makanjila-Mozambique coast. Like other elongatus species, females are generally drabber versions of the males, or brown with indistinct barring. Males of the mbako, metangula and namalenje forms essentially have the same body shape and colour phenotype (see below). Photos by Konings.



Males of *Tropheops* sp. 'elongatus chizumulu' (left) and *T. sp.* 'elongatus reef east'



L to R: Male *Tropheops* sp. 'elongatus metangula', *T. sp.* 'elongatus namalenje', *T. sp.* 'elongatus mbako',

MC799. *Tropheops* sp. 'gold otter', MLS.

This species was first identified by Ribbink et al. (1983), who reported it as living shallow turbulent areas defending territories on large rocks. Both sexes are bright yellow. It appears to be endemic to Otter Point in the south of the lake. *Tropheops* sp. 'gracilior nankhumba' (MC802) lives in the same microhabitat in the same place and also has bright yellow females. They may be the same. Male [AK].

**MC800. *Tropheops* sp. 'goldbreast', MZ.**

This is a large species of shallow turbulent areas, males defending territories on large rocks. Females are dark. It is endemic to a stretch of Mozambican coastline (Liutche, Londo, Tumbi Point). Male [AK].



MC801. *Tropheops* sp. 'gome yellow', MLS.

This species was first identified by Konings, from the area from Gome (near Makanjila) to southern Mozambique. There seems to be some confusion with *Tropheops* sp. 'yellow gular' (MC829) which occurs sympatrically and is reported to have very similar looking males, but differently coloured females: in the case of Gome Yellow, females are yellow with a dark submarginal band in the dorsal fin. The males also have a black submarginal band in the dorsal, which seems to be absent in photos of Yellow Gular. They are reported to prefer sediment-free rocky areas.

Three specimens clustered closely as a subgroup within the tree, including a clearly yellow female with a dark submarginal band (fig. 801.6) and a male photographed fresh as well as after euthanasia and tissue sampling (fig. 801.4-6). This clusters closely with another group of seven specimens, 6 phenotypically similar males (fig. 801.7) and another yellow female (fig. 801.8). The females show subtle differences, with the one from the first subcluster showing a strong dorsal fin submarginal band and a black anal fin margin (fig. 801.6), while the one from the second subcluster has a fainter submarginal band and a yellow anal fin margin (fig. 801.8). In general males have a dark margin to a pale anal fin and are pale blue overall in life (fig. 801.9).



Fig. 801.1: *Tropheops* sp. 'gome yellow', male, Chiofu [AK].



Fig. 801.2: *Tropheops* sp. 'gome yellow', female, Gome [AK].



Fig. 801.3: *Tropheops* sp. 'gome yellow', female, Chiofu [AK].



Fig. 801.4: *Tropheops* sp. 'gome yellow', male (probably D09-I06), Chiofu, 28 Feb 2016 [HS].



Fig. 801.5: *Tropheops* sp. 'gome yellow', male, D09-I06, Chiofu, 28 Feb 2016 [HS].



D10-B07, female



D10-B09, male

Fig. 801.6: *Tropheops* sp. 'gome yellow', SCUBA, Chiofu, 29 Feb 2016. These two specimens clustered closely with D09-I06, fig. 801.5 [HS].



D10-D07



D10-D09



D10-E03



D10-E07



D10-E08



D10-E09

Fig. 801.7: *Tropheops* sp. 'gome yellow', males, SCUBA, Chiofu, 29 Feb 2016 [HS].



Fig. 801.8: *Tropheops* 'gome yellow', female, D10-E10, SCUBA, Chiofu, 29 Feb 2016 [HS].



Fig. 801.9: Presumed *Tropheops* sp. 'gome yellow' males photographed in 2016 were generally pale blue in life, with extensive areas of yellow on the snout, cheeks and chest, with a prominent dark margin to the anal fin. [HS].

MC802. *Tropheops* sp. ‘gracilior nankumba’, MLS.

This species which frequents sheltered or deep-water sediment covered rocks in the south of the lake was originally identified as *Pseudotropheus* cf. *gracilior* by Ribbink et al. (1983), and continued to be so (under other names such as *Tropheops gracilior*) up until Konings (2007) revised his views and associated that name with the former *Tropheops* sp. ‘black’, a deep-bodied species of pure rocky habitats in the north of the lake. As a result, the southern species was renamed ‘gracilior nankumba’ reflecting both the former identification and its distribution. Males have a distinctive orange-bronze head and back, with dark barring on the anterior flanks and a black and yellow dorsal fin, and bluish forehead bars, flanks and caudal (fig. 802.1). Other illustrations show males with bluish dorsal fins and white lappets, and much stronger dark barring. Ribbink et al. reported the species from Nkhudzi headland, Kanchedza Island, Monkey Bay, Mvunguti, Domwe Island, Thumbi West Island and Otter Point. They described it as a broadmouthed species, with a maximum size of 91mm SL. They also reported that females came in two colour forms: body and head either yellow or grey-white, with a black submarginal band running length of the dorsal fin, and the soft-rayed part of dorsal fin and the entire caudal fin covered by faint white dots. Konings (2016a) only recognised the greyish females are being this species (fig. 802.2), seeing the yellow females as *T. romandi* or *T. sp* ‘gold otter’. Ribbink et al. (1983) reported that some specimens had stomach contents dominated by benthic invertebrates such as copepods and insect larvae, while others had the more expected algal material, as well as a little plankton. Males were reported as digging craters under rocks.

Five specimens from Otter Point were sequenced: 2 males showing characteristic adult coloration (fig. 802.3-4) and three uniformly orange-yellow females, which clustered with the males, tending to confirm Ribbink et al.’s ideas that females are polymorphic, although there is currently no genetic support for the identification of the grey females with *gracilior nankumba*. Overall, the species was estimated to be closely related to *Tropheops romandi* (MC781), but not to other *Tropheops* species, and collectively their affinities might lie with the *elongatus* group and the *Maylandia aurora* complex.



Fig. 802.1. *Tropheops* sp. ‘gracilior nankumba’, male, Domwe Island [AK].



Fig. 802.2. *Tropheops* sp. 'gracilior nankumba', female, Nkhudzi [AK].



Fig. 802.3: *Tropheops* 'gracilior nankumba', male, D25-D03 SCUBA, Otter Point, Cape Maclear, 3 Feb 2017 [HS].



D25-D02 male



D25-D04 female



D26-B06 female



D26-B07 female

Fig. 802.4: *Tropheops* sp. 'gracilior nankumba', SCUBA, Otter Point, Cape Maclear, 3 Feb 2017 [HS].



Fig. 802.5: *Tropheops* sp. 'gracilior nankumba', male, D25-D02, oral dentition (left), ventral surface of head (right). The species has a fairly wide mouth: 23.7-27.2% Head Length (n=3). The mouth is almost terminal, in contrast to the markedly subterminal mouths of most *Tropheops* sp. (GFT).

MC803. *Tropheops* sp. 'higga', TZ.

A large deep-bodied, strongly blue-black barred male *Tropheops* is reported from Higga Reef and Ngkuyo Island in Mbamba Bay, Tanzania. It seems identical to male MC788 *Tropheops* sp. 'chilumba type' from about 35km to the south near the Mozambique/ Tanzanian border, but female MC803 are reported to be 'greyish yellow' with greyish midlateral blotches, whereas MC788 females are said to be bright yellow MC788 (Konings 2016a). Other photos of non-mouthbrooding females show strongly barred females lacking the midlateral blotches. Not sequenced. Photos, male (above) & female [AK].



MC804. *Tropheops* sp. 'lilac', MLS.

Ribbink et al. (1983) originally informally described *Pseudotropheus tropheops* 'lilac' from Thumbi West Island, where it was said to be common among small sediment-free rocks at depths of 1-3m, maximally 5m. Detailed colour descriptions of both sexes were provided, but the blue, yellow-chested males, pale brownish females with dark midlateral blotches are almost default *Tropheops* colours (Tawil 2013b). Young et al. (2009) also reported the species from Thumbi West, but otherwise there appears to be no records of the species at this location in subsequent works. Ribbink et al. (1983) also informally described 'lilac maleri' and 'lilac mumbo' as distinct species, but Konings (2016a and earlier works) has treated them all as *Tropheops* sp. 'lilac'. However, photographs seem to show very distinct-looking populations. Ribbink et al.'s description of 'lilac mumbo' mentions a dark submarginal band in the dorsal fin and a separate blotch of rusty colour on the shoulder, with generally only 1-2 anal fin eggspots. This corresponds reasonably well to Konings' photo of an adult male from Mumbo (fig. 804.1). The brown-coloured female also fits well with the largely black anal fin visible, although midlateral dark blotches are not shown (fig. 804.2). Konings' illustration of a male from Nakantenga Island (fig. 804.3) shows an individual with a blue dorsal fin, no submarginal band and black radial markings in the soft dorsal, forming a dark blotch distally. This corresponds fairly closely to Ribbink et al.'s description of 'lilac maleri'. They also note 2-5 anal fin eggspots, which is unusually high for *Tropheops* species and three are shown in the Konings photo. In contrast to the very restricted habitat preference reported for the Thumbi West population, Ribbink et al. (1983) report 'lilac mumbo' as the only *Tropheops* species on that island, occurring from the surface to at least 25m depth, preferring 3-15m over medium to large rocks, slabs and boulders. However, 'lilac maleri' is reported as mainly a shallow-water species, rarely seen below 10m and mostly recorded over small to medium-size rocks at 0-4m. Ribbink et al. give maximum sizes of 104mm SL (Thumbi West), 106mm SL (Mumbo) and 88mm (Maleris). At present, the status of the Thumbi West population is unclear, as is the distinctiveness of the Mumbo and Maleris forms.

Two male specimens were collected from Nakantenga Island and sequenced. Although dried out and darkened before photography, they show a bluish fish with an orange (could be yellow in life) chest and a distinctive dark blotch in the soft dorsal fin, conforming to the 'lilac maleri' form (fig. 804.4-5). They appear to be related to *Tropheops* sp. 'mauve', 'red-cheek', 'gome yellow' and 'yellow gular'.



Fig. 804.1: *Tropheops* sp.
'lilac', male, Mumbo Island
[AK].



Fig. 804.2: *Tropheops* sp.
'lilac', female, Mumbo Island
[AK].



Fig. 804.3: *Tropheops* sp.
'lilac', male, Nakantenga
Island [AK].



Fig. 804.4: *Tropheops* sp.
'lilac', male, D42-B06,
Nakantenga Island, 26 Sept
2019 [MCGDS].



Fig. 804.5: *Tropheops* sp.
'lilac', male, D42-B04,
Nakantenga Island, 26 Sept
2019 [MCGDS].

MC805. *Tropheops* sp. 'lumessi blue', MZ.

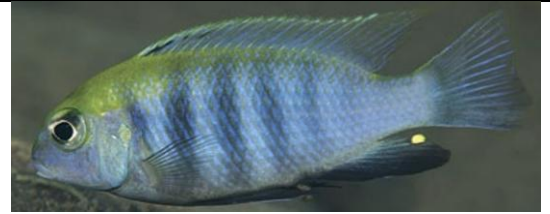
This species, distinguished from *T. sp.* 'red cheek' (MC823) by Konings (1995, 2016a) is known only from the southern Mozambican coast near the Malawi border. It is a large species inhabiting shallow turbulent areas. Females are yellow. Not yet sequenced. Male [AK].

**MC806. *Tropheops* sp. 'macrophthalmus chitimba', MLN.**

This species is reported by Konings to inhabit Gallireya and Chitimba Reefs on the NW coastline just south of Chilumba. Females are also yellow. Confusingly, two similar species co-occur, one at each site. Although they look similar to *T. macrophthalmus* which lives nearby and indeed are named after them, Konings (2016a) thinks they are not closely related. They have not yet been sequenced. Male [AK].

**MC807. *Tropheops* sp. 'macrophthalmus chitimba blue', MLN.**

This species is reported by Konings (2016a) to inhabit Chitimba Reef on the NW coastline just south of Chilumba, where it co-occurs with MC806. Females of both species are yellow and indistinguishable, but males of this one are blue and yellow. They have not yet been sequenced. Male [AK].

**MC808. *Tropheops* sp. 'macrophthalmus gallireya', MLN.**

This species is reported by Konings (2016a) to inhabit Gallireya Reef on the NW coastline just south of Chilumba, where it co-occurs with MC806. Males of the two species are yellow and indistinguishable, but females of this one are greyish. A similar situation exists in MC802, but that is thought to be polymorphism. They have not yet been sequenced. Female [AK].



MC809. *Tropheops* sp. 'maleri blue', MLS.

This species was informally described by Ribbink et al. (1983), who noted it was uncommon, but found on all three Maleri Isles, preferring large rocks in shallow water. Males were reported to be blue overall, with greyish barring and to have a narrow dark submarginal band in the dorsal fin, with white lappets. The photo by Konings (2016a, fig 809.1) corresponds well to this description. Ribbink et al. did not identify females, but Konings shows a very dark brown fish (fig. 809.2). Ribbink et al. report a maximum size of 101mm SL.

A single specimen collected for the MCGDS in 2019 suffered from the usual malaise of that expedition, with the photo showing a dried out dark specimen with almost no colour showing beyond the overall melanisation (and horribly pinned protruded but closed jaws creating an unnatural 'sausage-lipped' appearance), but the deep body shape, steep head profile, dark colour which might have been blue in life, and narrow dorsal submarginal band are all consistent with the identification. Surprisingly, it seems to be related to *Tropheops* sp. 'orange chest'.



Fig. 809.1: *Tropheops* sp. 'maleri blue', male, Nakantenga Island [AK].



Fig. 809.2: *Tropheops* sp. 'maleri blue', female, Nakantenga Island [AK].



Fig. 809.3: *Tropheops* sp. 'maleri blue', male, D42-B01, Nakantenga, 26 Sept 2019 [MCGDS]. [AK].

MC810. *Tropheops* sp. 'maleri yellow', MLS.

Originally identified by Ribbink et al. (1983) from the Maleri Isles and Namalenje, Konings' photo of a male (2016a: 204) looks suspiciously like *T. sp.* 'lilac' (also known to occur in the Maleris) in its largely blue body and distinctive dark blotch in the soft dorsal. Other photos show a largely yellow fish lacking these markings, with a dark submarginal band fitting better with Ribbink et al.'s description (shown here Konings' photo of a male from Namalenje). Females are brownish with rows of dark spots. Prefers shallow water, where males defend the tops of prominent rocks. Not sequenced. Photo male A. Konings.



MC811. *Tropheops* sp. 'masimbwe', MLS.

This is a relatively new name coined by Konings (2022) for what Ribbink et al. (1983) identified as *Pseudotropheus* cf. *novemfasciatus* and which was previously discussed by Konings variously as *Pseudotropheus* or *Tropheops novemfasciatus* (Konings 2016a: 203). The species is reported as preferring areas with beds of *Vallisneria* near rocks or shallow areas of rocks among sand. Males are reported to dig craters. Ribbink et al. reported the species at Monkey Bay, Kanchedza Island, Chigubi, Nkhudzi, Mpandi Island and Nkopola. Konings & Kavembe (2018) extended the range north to Mvunguti as well as on the eastern shore of the SE Arm from Kadango to Chemwezi Rocks.

A single specimen provisionally identified with this species has been sequenced, from a batch collected south of Palm Beach from a seine net haul (figs. 811.4-8). These male specimens were rather slender and lacked and sign of the prominent vertical barring seen in live underwater photos (e.g. fig. 811.2-3). Their colours were deeper and richer and the head profile seemed less steep and the mouth less underslung than typical for a *Tropheops*. However, the anterior submarginal dorsal fin band was strongly developed, as was the black anal fin marginal band. Males also showed a single eggspot, which is not unusual among *Tropheops* species. Identification seems provisional at best. However, the oral tooth band seems somewhat rounded (fig. 811.7-8). Phylogenetic analysis places the specimen within the main *Tropheops* group, and although rather basally, less so than *T.* sp. 'redfin' (MC823) or *Pseudotropheus lucerna* (MC733).



Fig. 811.1: *Tropheops* sp. 'masimbwe', female/juvenile, Kanchedza Island, SE Arm [AK]



Fig. 811.2.2: *Tropheops* sp. 'masimbwe', male, Mvunguti, SE Arm [AK]



Fig. 811.2.3: *Tropheops* sp. 'masimbwe', male, Kanchedza Island, SE Arm [AK]



Fig. 811.4: *Tropheops* cf. 'masimbwe', male, D20-C07 bought from seine fishers, Malo, S. of Palm Beach SE Arm, 24 Jan 2017 [GFT].



Fig. 811.5: *Tropheops* cf. 'masimbwe', male, D20-C10 bought from seine fishers, Malo, S. of Palm Beach SE Arm, 24 Jan 2017. Not sequenced [GFT].



Fig. 811.6: *Tropheops* cf. 'masimbwe', male, freshly collected from seine fishers, Malo, S. of Palm Beach SE Arm, 24 Jan 2017 [GFT].

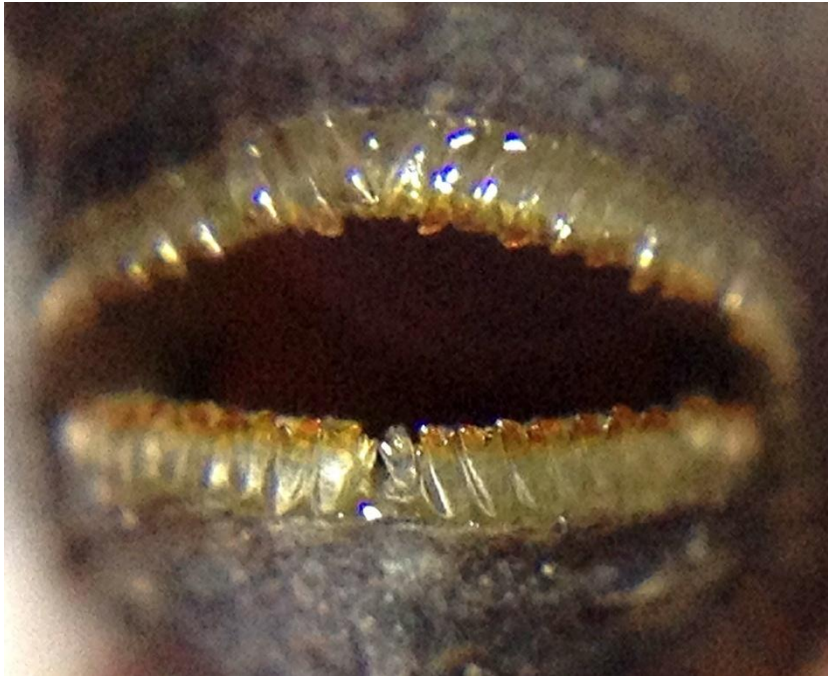


Fig. 811.7: *Tropheops* cf. 'masimbwe', oral dentition, male, Malo, S. of Palm Beach SE Arm, 24 Jan 2017. The outer series teeth in both jaws are strongly medially angled, while in most *Tropheops* species that are more erect [GFT].



Fig. 811.8: *Tropheops* cf. 'masimbwe', head and jaws, male, Malo, S. of Palm Beach SE Arm, 24 Jan 2017. The mouth is terminal, rather than markedly subterminal shown by most *Tropheops* species [GFT].

MC812. *Tropheops* sp. 'mauve', MLN.

This species has a very confusing history. It has blue males, (sort of) yellow females and lives in shallow waters in the north of the lake. After that it all gets a lot more complex. Ribbink et al. (1983) initially identified *Pseudotropheus tropheops* 'mauve' occurring from Nkhata Bay to Chilumba. They provided a detailed description of the colour, behaviour and ecology of the species from Nkhata Bay (the 'informal type locality'). Males were largely blue, females bright yellow. Males defend the tops of medium-sized rocks in largely sediment-free areas. They noticed that at Usisya and Mara Rocks males had yellow chests, but females were said to be similar throughout their range. Unfortunately, none of this applies to the taxon currently regarded as *Tropheops* sp. 'mauve' anymore. Those observations, along with all the ecological and molecular studies of van Oppen et al. (1997, 1988), Genner et al. (1999a,b), Rico et al. (2003) all now apply to *Tropheops* sp 'mauve yellow' (MC813), sensu Konings (2016a and earlier).

Rico et al. (2003) first reported the occurrence of a cryptic species pair of this taxon at Ruarwe, but did not publish temporary names for the two forms. Allender et al. (2003) referred to them as *Tropheops* "mauve" yc (yellowchest) and *Tropheops* "mauve" b (all blue). Genner et al. (2004) settled on *Pseudotropheus (Tropheops)* "mauve" and *P. (T.)* "mauve white dorsal". However, a different parallel nomenclature was developing in the more widely-read works of Konings. Initially, 'mauve yellow' was established for Tanzanian populations where both sexes were sometimes all-yellow (Konings 2001), while 'mauve' was used for all the Malawian populations. Eventually, Konings (2016a) accepted that there were two taxa in Malawi, but recognised that the Tanzanian 'mauve yellow' matched up with the form at Nkhata Bay with all-blue males and bright yellow females, leaving the name 'mauve' to be used for the Genner et al. 'white dorsal' species which is found between Ruarwe and Chilumba. The use of *Tropheops* sp. 'mauve' has also been adopted in recent developmental studies, working with a long-established lab strain originally from Ruarwe (e.g. Marconi et al. 2023).

Consequently, the situation following Konings (2016a) is that *Tropheops* sp. 'mauve' is not actually found at Nkhata Bay, Ribbink et al.'s 'type locality', but the range of the species extends from Ruarwe north to Chilumba. Konings also has a photograph of a male from Ndumbi Point, Tanzania (<https://malawi.si>). Males are uniformly pale blue with faint dark barring, a blue-white dorsal fin and long pelvic fins (fig. 812.1). Females are greyish, brownish dorsally with orange pelvic and anal fins, as well as orange on the lower half of the caudal (fig. 812.2). They live in shallow often sediment-rich habitats, including areas where rocks are scattered on sand. They have an average mouth width (18-23.7% Head length, N=10 from Chitande Island).

Seven specimens sequenced from the Chilumba area (fig. 812.3-6) were all closely related to each other. Phylogenetically, they were not close to 'mauve yellow', but rather to other northern species such as 'olive', 'chilumba', 'orange head', 'kande', 'deep', *gracilior* and 'rust'.



Fig. 812.1: *Tropheops* sp. 'mauve', male, Chitande Island [AK].



Fig. 812.2: *Tropheops* sp. 'mauve', female, Chitande Island [AK].



D06-H05, male



D06-I03, female',



D06-I04, male



D06-I05, female

Fig. 812.3: *Tropheops* sp. 'mauve' Chitande Island, Chilumba, 24 Feb 2016 [HS].



Fig. 812.4: *Tropheops* sp. 'mauve', female, D68-B06, Makankha Rocks, Chilumba, 26 Sept 2023 [MCGDS].



Fig. 812.5: *Tropheops* sp. 'mauve', male, D64-C06, Chirwa Island, Chilumba, 23 Sept 2023 [MCGDS].



Fig. 812.6: *Tropheops* sp. 'mauve', female, D68-D03, Makankha Rocks, Chilumba, 26 Sept 2023 [MCGDS].

MC813. *Tropheops* sp. 'mauve yellow', MLN.

As stated under MC812, most previously published academic work on *Tropheops* sp. 'mauve' refers to what is now known as 'mauve yellow'. This species was originally identified (as 'mauve') from Nkhata Bay by Ribbink et al. (1983) who provided a detailed description of the colour and behaviour of that population. Males are uniformly blue, faintly barred with dark pelvic and anal fins and some yellow touches in the dorsal and caudal fins. Females are described as 'apricot yellow', which seems to be more a subtle orange colour. Males defend the tops of medium-sized rocks in largely sediment-free areas. Ribbink et al. noticed that at Usisya and Mara Rocks males have yellow chests, but females were said to be similar throughout their range. Further behavioural, ecological and molecular studies were carried out under the name of 'mauve' by van Oppen et al. (1997, 1988), Genner et al. (1999a,b) and Rico et al. (2003). These studies all refer to *Tropheops* sp 'mauve yellow' sensu Konings: *Tropheops* sp. 'mauve' sensu Konings does not occur on the coast from Nkhata Bay to Cape Manulo. Allender et al. (2003) distinguished 'mauve yellow chest' (called 'mauve aurora' in the table 1 of the supporting material) from 'mauve blue', using samples of both taxa from an area of sympatry at Ruarwe, estimating them to be sister taxa, albeit based on a limited number of *Tropheops* taxa. Genner et al.'s biogeographic study (2004) referred to them as *Pseudotropheus* (*Tropheops*) "mauve" (Konings' 'mauve yellow') and *P. (T.)* "mauve white dorsal" (= Konings' 'mauve'). For the present study, I adopt Konings' terms, as they are more widely used.

Konings also noted that males of some of the northern populations of 'mauve yellow' had yellow chests (fig. 813.3), but some Tanzanian populations had entirely yellow males, with the characteristic black band on the anal fin and dark pelvics (fig. 813.4) distinguishing them from *Tropheops macrophthalmus* MC778. *Tropheops* sp. 'mauve yellow' has a small to medium sized mouth width.

Twelve specimens were sequenced from Nkhata Bay: some of the smaller males showed considerable amounts of yellow in their fins (fig. 813.5-9). All clustered together within the main *Tropheops* group, close to *T. sp.* 'red cheek', and specimens of several species from Chiofu (MCGDS, unpubl.).

In addition, seven specimens were sequenced from Kande Island. No information on the phenotype of this population was found in previously-published literature, but the males we observed underwater were blue with a large patch of yellow-orange on the lips, cheeks, shoulder and chest, with the typical dark markings on the anal fin, dark pelvics, and a pale dorsal fin margin (fig. 813.10). A female photographed underwater appears to be paler, more lemon yellow with an orange anal fin, and rows of faint dark blotches on the flanks (fig. 813.10).

The sequenced specimens from Kande Island comprised 5 males and 2 females (fig. 813.11-14); females showed notable variation in background colour, being both apricot orange and silver-grey. Males were all bright blue, orange-chested with whitish dorsal fin margins and largely dark anal and pelvic fins. Notably, the males in particular seemed to have a less steep

head profile than the specimens from Nkhata Bay. All Kande specimens clustered together, and appeared as the sister group to the Nkhata Bay specimens (MCGDS, unpubl.).



Fig. 813.1: *Tropheops* sp. 'mauve yellow', male, Nkhata Bay [AK].



Fig. 813.2: *Tropheops* sp. 'mauve yellow', female, Mbowe Island [AK].



Fig. 813.3: *Tropheops* sp. 'mauve yellow', male, Mara Rocks [AK].



Fig. 813.4: *Tropheops* sp. 'mauve yellow', male, Ngwazi, Tanzania [AK].



Fig. 813.5: *Tropheops* sp. 'mauve yellow' male, D03-A05, caught by SCUBA, Nkhata Bay, 21 Feb 2016 [HS].



Fig. 813.6: *Tropheops* sp. 'mauve yellow', female, D33-E10, Nkhata Bay, SCUBA, 18 April 2018 [MCGDS].



D32-G09



D32-G10

Fig. 813.7: *Tropheops* sp. 'mauve yellow', males, Nkhata Bay, SCUBA, 17 April 2018 [MCGDS].



D33-E02, male



D33-E03, male



D33-E04, male



D33-E05, male



D33-E06, male



D33-E08, female

Fig. 813.8: *Tropheops* sp. 'mauve yellow', Nkhata Bay, SCUBA, 18 April 2018 [MCGDS].



D34-C09



D34-C10

Fig. 813.9: *Tropheops* sp. 'mauve yellow', Nkhata Bay, SCUBA, 20th April 2018 [MCGDS].



Fig. 813.10: *Tropheops* sp. 'mauve yellow', Kande Island, screen grabs from underwater videos, adjusted with 'white balance' function of GIMP software, 19th April 2018 [GFT].

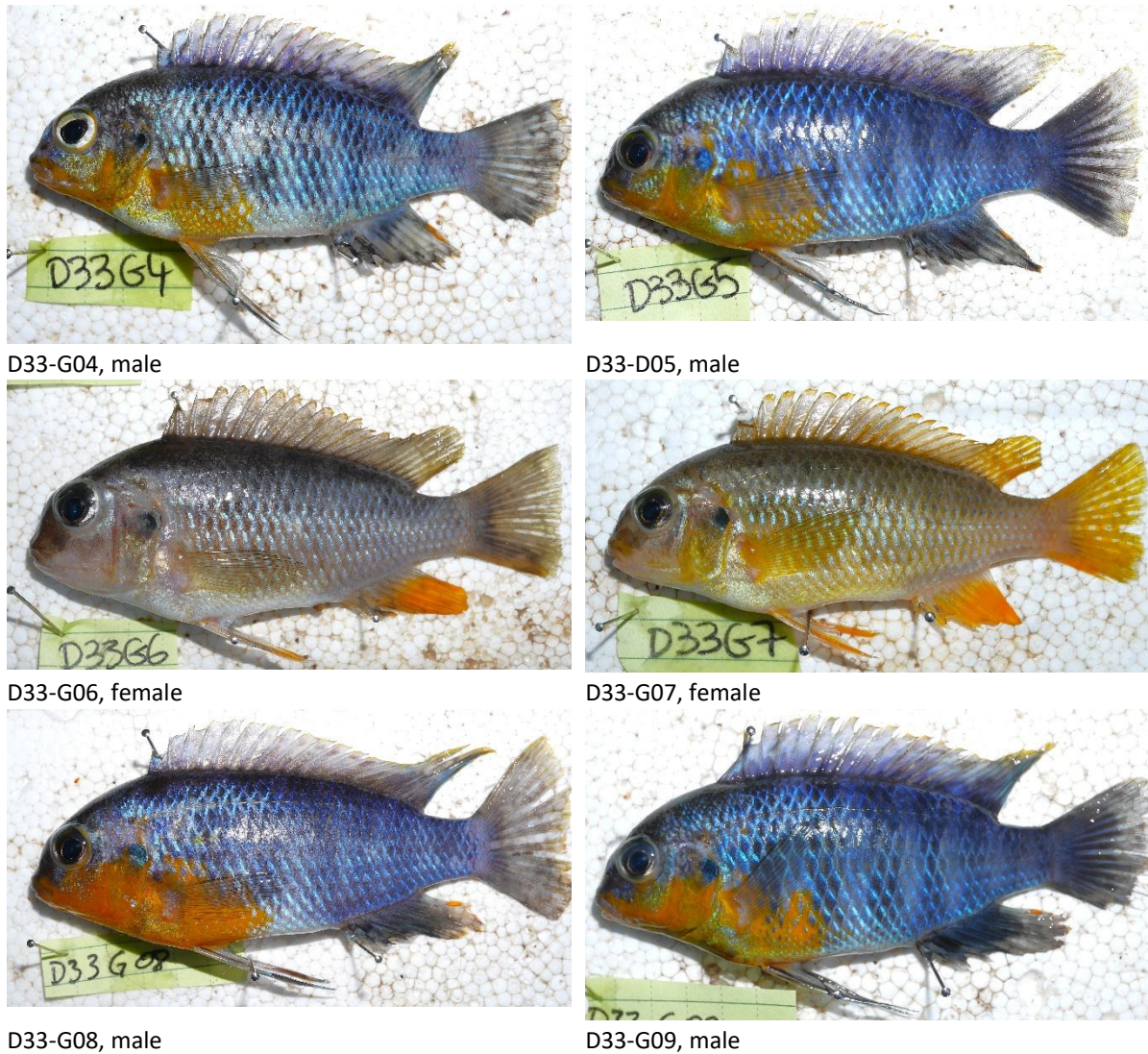


Fig. 813.11: *Tropheops* sp. 'mauve yellow', Kande Island, 19th April 2018 [MCGDS].



Fig. 813.12: *Tropheops* sp. 'mauve yellow', D33-G10, male, Kande Island, 19th April 2018 [MCGDS].



Fig. 813.13: *Tropheops* sp. 'mauve yellow', Kande Island, oral dentition, adult male (D33). This is a narrow-mouthed species, with columnar upper outer teeth and short embedded equally bicuspid lower teeth [GFT].

MC814. *Tropheops* sp. 'mbenji blue', MLS.

First identified by Ribbink et al. (1983), this species is believed to be endemic to Mbenji Island. Males, which attain 92mm SL, defend the tops of medium to large rocks in sediment-free habitats at 3-12m (occasionally to 25m). Females reported to be brown (Konings shows dark anal and pelvic fins). Not sequenced. Male [AK].

**MC815. *Tropheops* sp. 'mbenji yellow', MLS.**

First identified by Ribbink et al. (1983), this species is believed to be endemic to Mbenji Island, where it is found at 2-15m (occasionally to 25m) in sheltered, sediment-rich area. Females reported to be grey with rows of dark blotches and a dark submarginal band in the dorsal. Not sequenced. Male [AK].

**MC816. *Tropheops* sp. 'membe', MLS, MZ, LIK.**

First identified by Ribbink et al. (1983), it occurs mainly among medium-sized rocks, but also among small rocks and at the rock-sand interface, generally at 10 to 30 m (range from 3-40m). Females are pale grey with a bright orange anal fin. Originally identified from Likoma but also found on the Mozambique coast. Konings (2016a) reports a small introduced population on Thumbi W. Not sequenced. Male [AK].



MC817. *Tropheops* sp. 'mumbo', MLS.

The strongly barred females of this slender species were originally identified as *P. zebra* 'mumbo' by Ribbink et al. (1983). This was re-identified as a *Tropheops* by Konings (1990a), who also showed rather pale strongly barred males with a bluish sheen on the snout (also 1995, 2001). The dark orange male phenotype shown here was not illustrated until the Konings 2007 book. Ribbink et al. 1983) state that it prefers sediment-rich habitats at the rock-sand interface from 3-25m, but quantitative transects showed the species absent at their southern site and only found deeper than 20m at the eastern site). The species has a small, almost terminal mouth, with a rounded dental arcade and seems less specialised in morphology than many other *tropheops* species. The male breeding dress and mouth form are reminiscent of *T. sp. 'gracilior nankhumba'*, MC805, although female colour is quite distinct. MC805 is not closely related to other sequenced *Tropheops* taxa, apart from *T. romandi* (MC781).



Fig. 817.1: *Tropheops* sp. 'mumbo' male [A.Konings]



Fig. 817.2: *Tropheops* sp. 'mumbo' female [A.Konings]



Fig. 817.3: *Tropheops* sp. 'mumbo' male, Mumbo Island 22 July 2026 [GFT]



Fig. 817.4: *Tropheops* sp. 'mumbo' female, Mumbo Island 24 July 2026 [GFT]



Fig. 817.5: *Tropheops* sp. 'mumbo' female, Mumbo Island 24 July 2026, same individual as fig. 817.4, showing mouth almost terminal [GFT]



Fig. 817.6: *Tropheops* sp. 'mumbo' female, Mumbo Island 24 July 2026 (see fig 817.4 for lateral view). Views of oral jaws from front and underneath show it has a narrow almost terminal mouth with a rounded dental arcade [GFT]

MC818. *Tropheops* sp. 'olive', MLN, TZ.

This species was first identified by Ribbink et al. (1983). It is abundant, widely distributed in the northern half of the lake and easily identified, yet it remains undescribed. Males at Nkhata Bay are brownish-yellow, although they are brighter at some other locations, such as Chilumba and Ruarwe (Ribbink et al. 1983). Males become quite deep bodied as they grow, and generally have long, dark-margined pelvics, a broad dark band on the anal and a dark chest and chin (figs. 818.1-2). The slender females are very distinctive: silvery-white with strong dark vertical bars and horizontal stripes, making a distinct checkered appearance (figs. 818.3-4). Ribbink et al. (1983) reported that females in northern location have a more yellowish background colour, although we could not confirm that, and Konings (2016a) reports females as being similar at all sites. The snout profile is less steep than that of many other *Tropheops* species, and the mouth is of intermediate width (18.6-24.7% Head Length, n=7). Konings (2016a) reported the species occurring from Kande Island north to Mdoka, and on the northeastern coast between Manda and Kironondo. He stated that males at Kande are less bright. I did not find the species at Kande when I visited that site in 2018 with the MCGDS: yellow-brown males similar to *T. sp. 'olive'* were not accompanied by the characteristic black and white checkered females, and their sequences clustered more closely with *T. sp. 'deep'*. These are considered to represent a distinct species, *T. sp. 'kande'* (MC910, below).

Tropheops sp. 'olive' prefers turbulent, sediment-free habitats in very shallow waters, seldom deeper than 5m (Ribbink et al. 1983); van Oppen et al. (1998) indicated occasionally to 12m. Males defend the tops of medium to large rocks, usually at 2m depth or less, with females also feeding from the tops and sides of large rocks in small groups. Males do not seem to dig, and spawning often seems to occur in the open on sides of rocks. Population genetic studies using microsatellite loci (van Oppen et al. 1997) showed strong genetic structuring around headlands in the Nkhata Bay area, but that populations across the larger habitat barriers around Usisya Bay were still best regarded as conspecific (Rico et al. 2003).

Eleven specimens from Nkhata Bay and one from Chitande Island, Chilumba, were sequenced (figs. 818.5-8). They were resolved as related to other *Tropheops* species from the area, most closely to 'orange head' (MC820) and 'mphanga' (MC914).



Fig. 818.1: *Tropheops* sp.
'olive' male, Ngwazi,
Tanzania [AK].



Fig. 818.2: *Tropheops* sp.
'olive' male, Chitande Island,
Chilumba, 2016 [HS].



Fig. 818.3: *Tropheops* sp.
'olive' male, Mphanga
Rocks, Chilumba [AK].



Fig. 818.3: *Tropheops* sp.
'olive' female, Magunga,
Tanzania [AK].



Fig. 818.4: *Tropheops* sp. 'olive' female, Chitande Island, Chilumba, 2016 [HS].



D01-J09



D01-J10



D02-J07



D03-C03

Fig. 818.5: *Tropheops* sp. 'olive', males, SCUBA, Nkhata Bay, 20-21 Feb 2016 [HS].



Fig. 818.6: *Tropheops* sp. 'olive', male, D06-H04, SCUBA, Chitande Island, Chilumba 26 Feb 2016 [HS].



D32-G07, male



D32-H01, female



D32-H02, female



D33-D06, male



D33-D07, male



D33-D08, male

Fig. 818.7: *Tropheops* sp. 'olive', Nkhata Bay, 17-18 April 2018 [MCGDS].



Fig. 818.8: *Tropheops* sp. 'olive', female, D33-J09, Nkhata Bay, 20 April 2018 [MCGDS].

MC819. *Tropheops* sp. 'orange chest', MLS.

This species was first identified as an undescribed species by Ribbink et al. (1983), who did not identify any of their 34 putative species in their *Pseudotropheus tropheops* complex as the actual *P. tropheops sensu stricto*. Konings provisionally identified 'orange chest' as *P. tropheops*, (later *Tropheops tropheops*) in 1989, later treating it as a positive identification in his books from 1995 to 2016a. However, he changed his mind in 2022, identifying *T. tropheops* as likely to be the former *Tropheops* sp. 'broadmouth' (MC830). Thus, *Tropheops* sp. 'orange chest' has reappeared as a temporary (43 years old and counting!) name for an undescribed species. This is confirmed by examination of specimens, which indicate that *T. sp. 'orange chest'* has a much narrower mouth (16.1-18.3% Head Length) than the types of *T. tropheops*.

Ribbink et al. (1983) reported the species as common and widespread in the south of the lake, including Monkey Bay, the Nankumba Peninsula, Domwe I., Zimbabwe Rock, Kanchedza I., Chigubi, Nkudzi, Mpandi I., Crocodile Rocks, Boadzulu I., Chemwezi I., Thumbi West I., Otter Point and the Maleri Islands. It was reported as preferring medium to large rocks in sediment-free areas from the shallows to at least 33m deep, with adults, mainly males, aggressively defending territories to the extent that algal gardens were sometimes seen. A maximum size of 118mm SL was reported, the largest of the *Tropheops* varieties. Some variation in colour was reported, generally in that one or both of the sexes could be paler or darker in particular locations. An uncommon OB morph, mainly in females, was noted at Monkey Bay. Konings (2016a) gave a roughly similar distribution, noting its absence from Mumbo Island, and stating that OB individuals were found at most locations. He suggested affinities with *T. sp. 'chinyamwezi'* (MC789) and *T. gracilior* (MC775, formerly 'black'), both of which also show OB morph individuals. The three taxa have similar body shapes, habitat preferences and markings in both sexes, but can be distinguished by location.

Sequenced specimen 2004.B16 was collected on 13 August 2004 by Genner from Cape Maclear as *Tropheops tropheops* (Orange Chest). There is no photo, but the sequence fits with other specimens of this ID. Three specimens were collected at Thumbi West in 2017: 1 male and 2 OB females (fig. 819.3-4). A further OB female collected in 2023 from Thumbi West was also sequenced (fig. 819.5). All 5 of these specimens clustered closely together. A further three specimens (2 males, 1 OB female) collected from Zimbabwe Rock in 2022 clustered with each other and as a sister group to the Thumbi specimens (fig. 819.6-8). Notably, the males were relatively slender with rounded heads. They were also dark coloured, with little evidence of an orange chest and a wider submarginal band than the Thumbi West males. Ribbink et al. (1983) had noted that males from Zimbabwe Rock were a very dark purple brown. However, published photographs by Konings (fig. 819.8) show males at this location with orange flanks, a dark belly and dark pelvic and anal fins. However, they also have a rather slender, round-headed look and a wide, dark dorsal submarginal band. This population seems both genetically and phenotypically distinct from that at Thumbi West.

The species is resolved as closest to *T. sp. 'maleri blue'* (MC809) from Nakantenga, which seems rather counterintuitive.



Fig. 819.1: *Tropheops* sp. 'orange chest', male, Thumbi West Island [AK].



Fig. 819.2: *Tropheops* sp. 'orange chest', female, Thumbi West Island [AK].



Fig. 819.3: *Tropheops* sp. 'orange chest', male, D23-C02, SCUBA, Thumbi West, Cape Maclear 28 Jan 2017 [HS].



D27-C06



D27-C07

Fig. 819.4: *Tropheops* sp. 'orange chest', OB female, SCUBA, Thumbi West, Cape Maclear 4 Feb 2017 [HS].



Fig. 819.5: *Tropheops* sp. 'orange chest', OB female, D74-B07, SCUBA, Thumbi West, Cape Maclear 10 August 2023 [MCGDS].



Fig. 819.6: *Tropheops* sp. 'orange chest', OB female, D50-I06, SCUBA, Zimbabwe Rock, Cape Maclear, 11 May 2022 [MCGDS].



Fig. 819.7: *Tropheops* sp. 'orange chest', male, D50-I07, SCUBA, Zimbabwe Rock, Cape Maclear, 11 May 2022 [MCGDS].





Fig. 819.8: *Tropheops* sp. 'orange chest', male, D50-I08, SCUBA, Zimbabwe Rock, Cape Maclear, 11 May 2022 [MCGDS].



Fig. 819.9: *Tropheops* sp. 'orange chest', male, Zimbabwe Rock [AK].



Fig. 819.10: *Tropheops* sp. 'orange chest', male, D23-C02, oral dentition.

MC820. *Tropheops* sp. 'orange head', MLN.

This species was first reported by Genner et al. (2004), who gave a brief colour description and stated that it was only found at Mphanga Rocks. Freshly-collected specimens were photographed in 2004 (figs. 820.1-2). Konings (2016a) also illustrated it (fig. 820.3-4), reporting it from Luwino and Maison Reefs as well as Katale Island- all localities around Chilumba (fig. 820.5). Of these, only Katale had been visited in the Genner survey. Konings reported it preferred the intermediate habitat (rock-sand interface), generally at 25m or deeper, although it also occurred in shallower areas at Luwino and Katale. Konings reported that females often fed over sand, although territorial males mostly fed on rocks.

Five males from Mphanga Rocks were sequenced (fig. 820.6), and all formed a tight genetic group, sister to *T. sp. 'chilumba'* (MC787), a sympatric, but very different-looking species. In addition, 4 individuals were collected from the vicinity of Chirwa Island, at Makhanka Rocks and the Phita Channel (fig. 820.7-10). Females and maturing males were very dark, but a single colourful male looked quite close to *T. sp. 'orange head'*. Provisionally, these seem to be placed basally within the 'orange head'/'chilumba' group, which might suggest they ought to be treated as a distinct species, at least following cladistic practices. At present, they are retained in 'orange head' for now as there is no clear phenotypic distinction between them and so it would be difficult to allocate populations not yet sampled genetically, such as those at Katale, Luwino and Maison.



Fig. 820.1: *Tropheops* sp. 'orange head', male, Mphanga Rocks, 17 April 2004 [MJG].



Fig. 820.2: *Tropheops* sp. 'orange head', female, Mphanga Rocks, 17 April 2004 [MJG].



Fig. 820.3: *Tropheops* sp.
'orange head', male,
Mphanga Rocks [AK].



Fig. 820.4: *Tropheops* sp.
'orange head', female,
Maison Reef [AK].

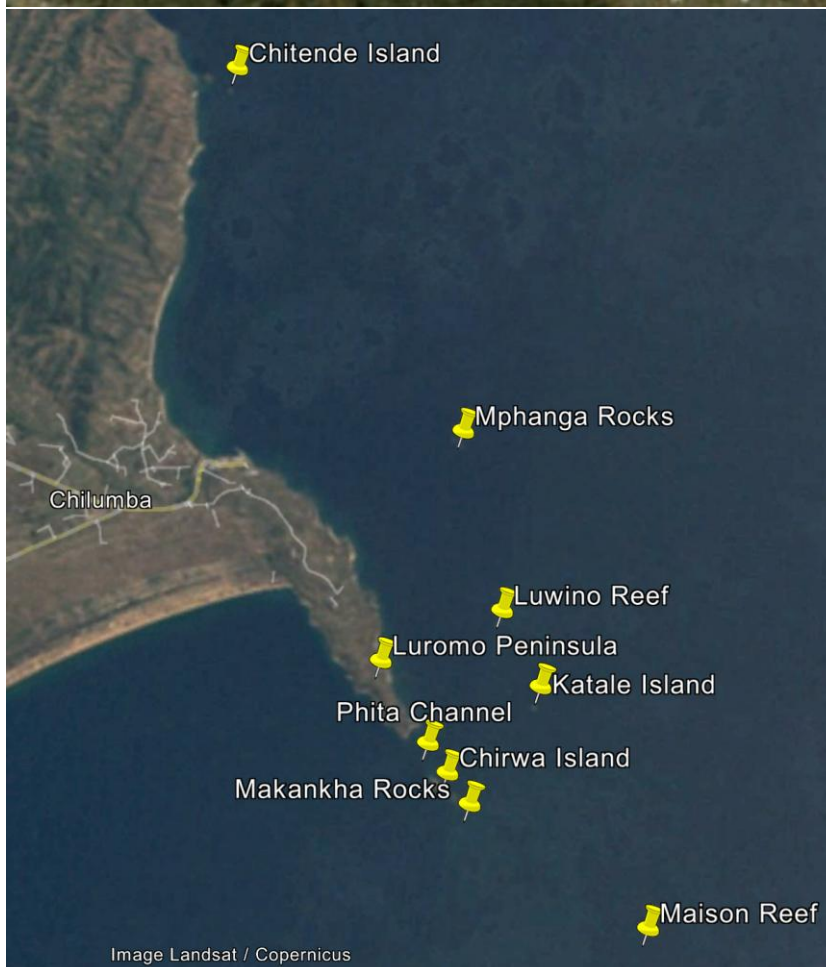


Fig. 820.5: Sampled locations around Chilumba: Genner et al. (2004) found *T. sp.* 'orange head' at Mphanga Rocks, Konings (2016a) added Luwino and Maison Reefs and Katale Island. The present study reports a similar form around Chirwa Island at Makankha Rocks and the Phita Channel.



D03-I08



D03-I09



D03-I10



D03-J07



Fig. 820.6: *Tropheops* sp. 'orange head', males, SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016. Left: D03-I08 [HS].



Fig. 820.7: *Tropheops* sp. 'orange head', male, D66-F04, SCUBA, Makhanka Rocks, Chilumba, 26 Sept 2023 [MCGDS].



Fig. 820.8: *Tropheops* sp. 'orange head', female, D68-D01, SCUBA, Makhanka Rocks, Chilumba, 26 Sept 2023 [MCGDS].



Fig. 820.9: *Tropheops* sp. 'orange head', maturing male, D68-D02, SCUBA, Makhanka Rocks, Chilumba, 26 Sept 2023 [MCGDS].



Fig. 820.10: *Tropheops* sp. 'orange head', female/immature male, D68-E04, SCUBA, Phita Channel, Chilumba, 28 Sept 2023 [MCGDS].

MC821. *Tropheops* sp. 'red cheek', MLS, LIK, CHI.

This species was first identified by Ribbink et al. (1983) who found it at Likoma and Chizumulu, as well as Thumbi West Island and between Tsano Rock and Zambo Point in the SE Arm. They considered the Thumbi West population to have been introduced, but not the SE Arm one. If this really is native, it is quite an extraordinarily disjunct distribution. Konings recorded populations on the NE coast between Ikombe and Cape Kaiser in Tanzania, but later considered them to be an additional species, *Tropheops* sp. 'red cheek north' (MC822). There are no records of either species from the east coast south of Likoma, so this then leaves the two supposedly native ranges over 210 km apart, 'as the crow flies'. It would seem possible that the SE Arm population might also have been introduced. Ribbink et al report a preference for medium-sized, rounded rocks in sediment-free areas, mainly from the surface to about 6m (occasionally 19m). Males defend the upper surfaces of rocks, females are solitary and non-territorial. Ribbink et al. (1983) recorded the Thumbi West population as 'uncommon' but Young et al. (2009) reported it among the 6 most numerous species in their transects at the same location, suggesting it had been establishing itself in the interim. However, there are no positive records of the species having dispersed to other localities. The species is distinguished by its deep body and small mouth (Ribbink et al. 1983), and distinctive male colours: bright orange anteriorly, blue posteriorly, with dark vertical barring and a strong dark dorsal submarginal band, with blue-white dorsal margin, tipped with yellow lappets (fig. 821.1). Females are generally yellow with rows of dark square spots (fig. 821.2).

A single sequenced male was collected from the introduced population at Thumbi West Island in 2017 (fig. 821.3). It seems to be the sister species to *Tropheops* sp. 'mauve yellow' (MC813).



Fig. 821.1: *Tropheops* sp. 'red cheek', male, Maingano Island, Likoma [AK].



Fig. 821.2: *Tropheops* sp. 'red cheek', female, Likoma [AK].



Fig. 821.3: *Tropheops* sp. 'red cheek', male, D23-B03, SCUBA Thumbi West, Cape Maclear 28 Jan 2017 [HS].



Fig. 821.3: *Tropheops* sp. 'red cheek', male, D23-B03. Oral dentition. This is a narrow-mouthed species: toothed area width 19.5% Head Length. It has short, deeply embedded, subequally bicuspid teeth in both upper and lower outer series [GFT].

MC822. *Tropheops* sp. 'red cheek north', TZ.

Konings (1995) recorded populations on the NE coast between Ikombe (or Matema?) and Cape Kaiser in Tanzania, initially as *T. sp.* 'red cheek' (MC821) but later considered them to be an additional species (Konings 2007, 2016a). No rationale for this is given but photos indicate that both sexes may be drabber than the 'red cheek' populations at Likoma, Chizumulu and the south of the lake. It has not yet been sequenced. Above: male (Matema), female (Lupingu) [AK].



MC823. *Tropheops* sp. 'red fin', MLN, TZ, MZ.

Another species originally identified by Ribbink et al. (1983), this one has had a bit of a checkered history, because the original colour description seems to have been based on males and females of two different species: the males are now known as *T. sp. 'chilumba'* (MC787), while the females have remained as *T. sp. 'red fin'*. These were matched up with the correct males by Konings (1989, 1990b). It is a slender species. Males are generally yellow, with dark undersides and numerous thin dark vertical bars (fig. 823.1), although these can be faint in some populations. Konings reports the species from the western shore from Hora Mhango (north of Ruarwe) to Mara Rocks, and on the eastern coast from the Ruhuhu River in Tanzania to Lumbaulo in Mozambique. However, Ribbink et al. reported the species from Chitande Island and Mphanga Rocks and I have seen and collected the species from Nkhata Bay (fig. 823.3). Konings reports the species as mainly from deeper water, generally greater than 10m. Males are reported to dig in the sand among rocks.

A single specimen from Nkhata Bay has been sequenced (fig. 823.4). It lies within the main *Tropheops* group, but is the most basal species sequenced so far, apart from *P. lucerna* (MC733). A male from the same locality has been collected but not sequenced (fig. 823.5).



Fig. 823.1: *Tropheops* sp. 'red fin', male, Hora Mhango, NW Coast [AK].



Fig. 823.2: *Tropheops* sp. 'red fin', juvenile, Londo, TZ [AK].



Fig. 823.3: *Tropheops* sp. 'red fin', female, Nkhata Bay, 2016 [HS].



Fig. 823.4: *Tropheops* sp. 'red fin', female, D03-B05. SCUBA, Nkhata Bay, 21 Feb 2016 [HS].



Fig. 823.5: *Tropheops* sp. 'red fin', male, D02-J10. SCUBA, Nkhata Bay, 21 Feb 2016 [HS].

MC824. *Tropheops* sp. 'rust', MLN.

This is another species first identified by Ribbink et al. (1983), from Chirombo Point, Nkhata Bay and Lion's Cove. Konings (2016a) extended the range northwards to Cape Manulo, at the southern end of Usisya Bay. Both sexes are superficially rather similar to *T. sp. 'band'* but males have stronger melanic flank and head markings. This is not always obvious post-mortem, but a clear difference is that males lack the strong dark submarginal band seen in *T. sp. 'band'*. Females though are hard to distinguish, but both sexes have narrower mouths than those of *T. sp. 'band'*. Ribbink et al. report 'rust' is most common on sediment-rich rocky habitats between 6 and 15 m, but that it can also be found from the shallows down to depths of at least 23 m. Van Oppen et al. (1998) reported a range of 0-22m at Nkhata Bay, and also noted that two females were observed being courted by males of both *T. sp. 'rust'* and *T. sp. 'band'*, although microsatellite analysis suggested negligible gene flow between the populations, suggesting female choice might be responsible.

18 specimens were sequenced (fig. 824.3-8), all from Nkhata Bay, forming a single cluster, most closely related to *T. gracilior* (= 'black'), and then to *T. sp. 'deep'* and *T. sp. 'kande'*.



Fig. 824.1: *Tropheops* sp. 'rust', male, Lion's Cove [AK].



Fig. 824.2: *Tropheops* sp. 'rust', female, Lion's Cove [AK].



Fig. 824.3: *Tropheops* sp. 'rust', male, D01-J05, SCUBA, Nkhata Bay 20 Feb 2016 [HS].



D01-B03



D01-E04



D03-C04.



D02-J06.

Fig. 842.4: *Tropheops* sp. 'rust', SCUBA, Nkhata Bay, 20-21 Feb 2016 [HS].



D32-G02



D32-G03



D32-G04



D32-G08

Fig. 842.5: *Tropheops* sp. 'rust', males, SCUBA, Nkhata Bay, 17 April 2018 [MCGDS]



D33-B10



D33-C01



D33-C02



D33-C04



D33-C05



D33-C06

Fig. 842.6: *Tropheops* sp. 'rust', males, SCUBA, Nkhata Bay, 18 April 2018 [MCGDS].



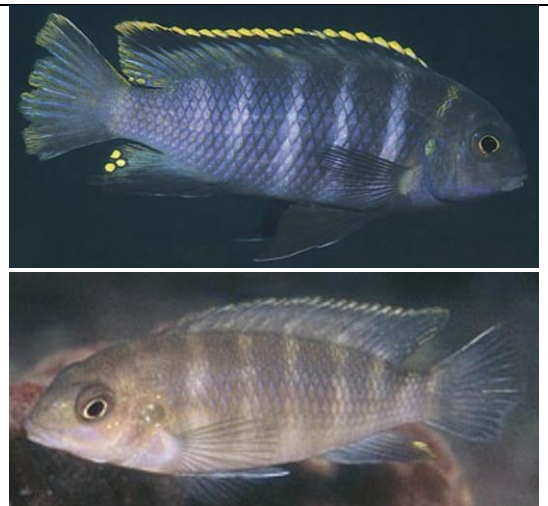
Fig. 842.7: *Tropheops* sp. 'rust', male, D33-C07, SCUBA, Nkhata Bay, 18 April 2018 [MCGDS].



Fig. 842.8: *Tropheops* sp. 'rust', D34-D01, immature male?, SCUBA, Nkhata Bay, 20 April 2018 [MCGDS].

MC825. *Tropheops* sp. 'taiwan', CHI.

First mentioned as *Pseudotropheus* sp. 'tropheops taiwan' by Konings (1990), this is a large elongate species confined to Taiwan Reef in Mozambican waters off Chizumulu Island. Both sexes are broadly-barred. Male (above), female [AK].



MC826. *Tropheops* sp. 'weed', MLN, TZ, MZ.

This species was first noted by Ribbink et al. (1983), who recorded it from Dankanya Bay (south of Usisya), Usisya and Chitande Island (Chilumba): all these locations are far to the north of Nkhata Bay. Konings (2016a) records occurrences from Usisya to Ngara on the NW coast, and from the Ruhuhu River in Tanzania to Mbweka in Mozambique (fig. 826.1-3). However, he also has a photograph (fig. 826.2) of a male from Kande Island, on the NW coast, ca 40km South of Nkhata Bay. In the late 1990s, I collected what appeared to be 'weed' at the Chintheche Inn (about 30km South of Nkhata Bay), where a few rocks were scattered on a shallow sandy beach. However, it has not been reported from Nkhata Bay itself, which is a well-studied site in the middle of the range of the species, although Ribbink et al. reported a population similar to *T. sp. 'band'* but lacking a dark submarginal dorsal fin band under the name *T. sp. 'no band'*, but this has not been found by subsequent workers.

Ribbink et al. (1983) report *T. sp. 'weed'* as living among scattered rocks in shallow (<6m) weedy areas. Many such areas are probably seldom visited by divers, as they are too shallow for SCUBA and tend to have low species diversity and skittish fish, often in areas of high turbulence and poor visibility. The species is similar to *T. sp. 'band'* (MC783) and *T. sp. 'chitimba'* (MC791), but males tend to have more subtle colours, stronger vertical barring and lack a continuous dark submarginal band in the dorsal fin, although this trait seems to be variable. *Tropheops sp. 'weed'* has a relatively wide mouth (26.3-29% Head Length, n=4), in common with other rock-sand interface *Tropheops*, such as 'band' and *P. lucerna*.

Four males from Kande were sequenced (fig. 826.4) and they were not clearly distinguished from specimens of *T. sp. 'band'* and *T. sp. 'chitimba'*. A single male from the Phita Channel between the Luromo Peninsula and Chirwa Island was also sequenced, and it seemed closest to the apparent *T. sp. 'band'* from Chiweta beach (MC783).

It is possible that 'band', 'chitimba' and 'weed' might be geographical variants, perhaps with an element of parallelism in colour evolution, as seen on a larger scale with more obvious colour elements in taxa such as *Maylandia zebra* and its relatives, or *Labeotropheus* spp. However, it is likely that there are many under-studied areas (like the beach off the Chintheche Inn or Chiweta) where a few rocks lie on shallow sandy or weedy areas, and it is possible that these might allow this species to traverse extensive sandy beaches and other areas unsuitable for most mbuna, allowing for greater gene flow over extensive areas. It may be that some differences in colour elements, such as the degree of barring or the intensity of the blue and yellow areas might be due to plasticity, depending on their environment.



Fig. 826.1: *Tropheops* sp 'weed', male, Mbweca [AK].



Fig. 826.2: *Tropheops* sp 'weed' Kande Island [AK].



Fig. 826.3: *Tropheops* sp 'weed', female, Mbweca [AK].



D33-I02



D33-I03



D33-I04



D33-I05

Fig. 826.4: *Tropheops* sp. 'weed', males, SCUBA, Kande Island, 19 April 2018 [MCGDS].

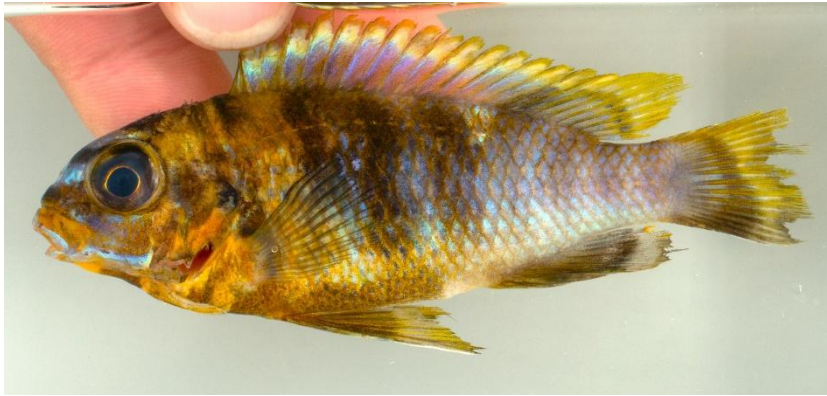


Fig. 826.5: *Tropheops* sp. 'weed', male, D68-D08, SCUBA, Phita Channel, Chilumba, 28 Sept 2023 [MCGDS].

MC827. *Tropheops* sp. 'yellow chin', TZ, MZ, LIK, CHI.

Ribbink et al. (1983) described this as a wide-mouthed species attaining 115mm SL, of the intermediate habitat (rock-sand interface), found at Likoma and Chizumulu Islands. Konings (2016a) reported it more widely from the southern Tanzanian and northern Mozambican coasts. Male colour varies from almost pure yellow to purplish blue with a yellow chin and chest. The dorsal fin sometimes has a thin dark submarginal band. Females are grey-brown with rows of dark blotches. It is reported as abundant in shallow areas, but reported as deep as 23m. Males from Linganjala Reef, off Chizumulu Island (above) and Londo, MZ (below) [AK].



MC828. *Tropheops* sp. 'yellow gular', MLS.

First identified by Ribbink et al. (1983) from Masinje, Makanjila, Eccles (Chimwalani) Reef and West (Luwala) Reef. It was described as a small-mouthed species growing to 103mm SL, and preferring purely rocky habitats in shallow water (<7m deep) although occupying the rock-sand interface in some areas. Geographic variation in male colour (extent of orange and shade of blue) as well as female colour (darkness of grey) was noted. Subsequently, Konings (2016a) reported the range of the species extending over 150km to the north to Tumbi Point in Mozambique, and including the Chiofu Bay area. However, online images of males by Konings and others (malawi.si, cichlidae.com) show tremendous variation in the extent of yellow colour, strength of dark vertical barring, presence of a dark submarginal band in the dorsal (not mentioned by Ribbink et al.) and overall body proportions. It is unclear how reliably the species has been distinguished from the sympatric 'gome yellow' (MC801) and 'chiofu widemouth' (MC913) and perhaps other taxa to the north.

Pinned male specimens collected for sequencing in 2016 were generally darker than 'gome yellow' with a yellow to orange chest and dark dorsal fin submarginal band, white lappets with orange tips and a dark anal fin (fig. 828.3). u



Fig. 828.1: *Tropheops* sp. 'yellow gular', male, Chimwalani Reef [AK].



Fig. 828.2: *Tropheops* sp. 'yellow gular', female, Chimwalani Reef [AK].



D09-G05



D10-A03



D10-B02



D10-F06



D09-I07



D09-J07



D10-A04



D09-J05

Fig. 828.3: *Tropheops* 'yellow gular' Apparent males, collected by SCUBA, Chiofu, 28-29 Feb 2016 [HS].

MC829. *Tropheops* sp. 'kande', MLN.

Tropheops sp. 'kande' is a previously unreported taxon first collected on a MCGDS sampling trip on 19 April 2018. Males are largely yellow-olive overall, with bluish highlights on the flanks and blue-white radial markings on the caudal and soft dorsal fins, and a pale blue anal fin. They show no sign of a dark submarginal band in the dorsal fin (fig. 829.1). Males were seen holding territories on top of large rocks, in the manner of *Tropheops* sp. 'olive' (MC818). 'Olive' is a common species all over the northwestern coast, including Nkhata Bay, which lies within the nearest substantial region of rocky coastline to Kande Island. They were originally confused. However, none of the black and white checked females characteristic of 'olive' were seen. Dark grey females were observed underwater, but not collected for tissue sampling (fig. 829.2). They seemed to be darker on the lower part of the flanks and were superficially reminiscent of *T. gracilior*. However, they showed an orange area on the distal part of the soft-rayed anal fin, as well as orange in the pelvics behind the dark submarginal band, more like those of female *T. sp. 'deep'*. These dark females were clearly distinct from the paler females of the other sampled *Tropheops* species, *T. sp. 'mauve'* and *T. sp. 'weed'*. But, in addition, males with dark submarginal bands were seen in deeper water, and it is possible that *T. gracilior* occurs at Kande too.

Five males were sequenced for the MCGDS study (fig. 829.3-4), and all clustered together, clearly separately from the co-occurring *T. sp. 'mauve'* and *T. sp. 'weed'*, confirming that at least three *Tropheops* species are established at Kande Island. Phylogenetically, their closest affinities seem to lie with *Tropheops* sp. 'deep' at Nkhata Bay, but the colours of both sexes and their preference for shallow habitats are clearly divergent, suggesting that this population represents a unique, previously unreported species.



Fig. 829.1: *Tropheops* sp. 'kande', male, Kande Island, screen grab from video, using 'white balance' setting of GIMP software, 19 April 2018 [GFT].



Fig. 829.2: *Tropheops* sp. 'kande', female?, Kande Island, screen grab from video, using 'white balance' setting of GIMP, 19 April 2018 [GFT].



Fig. 829.3: *Tropheops* sp. 'kande', male, D33-H07, Kande Island, 19 April 2018 [MCGDS].



D33-H08



D33-H09



D33-H10



D33-I01

Fig. 829.4: *Tropheops* sp. 'kande', males, Kande Island, 19 April 2018 [MCGDS].

MC830. *Tropheops tropheops* (Regan 1922), MLS.

Pseudotropheus tropheops was first described by Regan in 1922 (figs. 830.1-3), but later transferred to the genus *Tropheops* following its designation as a subgenus by Trewavas (1984) and later upgrading to generic level. The 'field identity' of the species was for a long time confused. Initially, the name was applied to Ribbink et al.'s (1983) *Tropheops* sp. 'orange chest' in many publications (e.g. Konings 1989 to 2016a). However, Konings (2022) has revised this and now considers *P. tropheops* to be the taxon formerly known as *Tropheops* sp. 'broadmouth'. The main rationale for this is (i) the type specimens are large; (ii) they have a prominent dark submarginal band; (iii) the specimens were collected by Wood, who mentions in a letter that his collection came from Domira Bay. Neither 'orange chest' nor 'broad mouth' are known from Domira Bay. Ribbink et al. (1983) reported the species as *Pseudotropheus tropheops* 'broad mouth' and reported it as confined to the southern areas of the lake: Nkopola, Nkudzi, Mpandi I, Chigubi, Kanchedza I., Monkey Bay, Nankumba, Domwe I., Chemwezi I., Makanjila, Masinje, Thumbi West I., Otter Point, Maleri I., Nankoma I., Senga Point and Rifu (fig. 830.5). The latter two sites are quite close to Domira Bay and 'broad mouth' has a preference for shallow, sediment rich rocky zones and intermediate habitats. The latter term signifies areas where rocks meet sand. It seems possible that 'broad mouth' might inhabit shallow patches of rocks on an otherwise sandy coast, and this habitat is likely to have been under-surveyed by SCUBA-based researchers, so its occurrence in Domira Bay seems plausible. My recent investigation of the types of *T. tropheops* has confirmed that the species does indeed have a wide mouth (fig. 830.4): in the lectotype, the lower jaw tooth band is 23.8% Head Length, compared to 16.1-18.3% in three specimens of *Tropheops* sp. 'orange chest', 74.3-81.7mm SL in the Cambridge Zoology collection (D23-C02, D27-C06, D27-C07). This seems to rule out 'orange chest' as *T. tropheops*. Ribbink et al. give the maximum size of 'broad mouth' as 100mm SL, which fits, as the largest type is 99mm SL. Underwater photographs of *T. sp.* 'broad mouth' are a reasonable match for the types of *T. tropheops* (fig. 830.6-7). The species has not yet been sequenced.

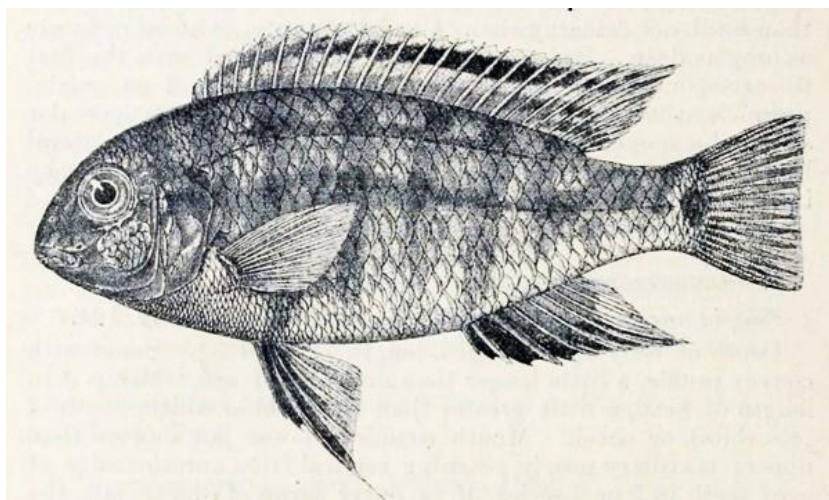


Fig. 830.1: *Tropheops tropheops*, text figure from original description.



Fig. 830.2: *Tropheops tropheops*, male, lectotype, 96.9mm SL, London 2026 [GFT].



Fig. 830.3: *Tropheops tropheops*, male, paralectotype, 99mm SL, London 2026 [GFT].



Fig. 830.4: *Tropheops tropheops* paralectotype, oral dentition, illustrating wide, underslung mouth, columnar teeth forming a cutting blade and large unicuspid 'fangs' on posterior-lateral region of upper jaw.



Fig. 830.5: Distribution of *Tropheops* sp. 'broad mouth' from Ribbink et al. (1983) ★ in comparison to type locality of *T. tropheops*, at Domira Bay.



Fig. 830.6: *Tropheops tropheops* (= 'broad mouth'), male, Makanjila Point [AK].



Fig. 830.7: *Tropheops tropheops* (= 'broad mouth'), female, Harbour Island, Monkey Bay [AK].



Fig. 830.8: *Tropheops tropheops* (= 'broad mouth'), mature male, Cape Maclear, Domwe, 23 July 2026 [GFT].



Fig. 830.9: *Tropheops tropheops* (= 'broad mouth'), subordinate male, Cape Maclear, Domwe, 23 July 2026 [GFT].



Fig. 830.10: *Tropheops tropheops*, male (see fig. 830.8 for lateral view), Cape Maclear, Domwe, 23 July 2026, oral jaws [GFT].

MC888. *Labeotropheus alticodia* Pauers & Phiri 2023, MLS.**(= junior synonym of *L. artatorostris*?)**

The species was described by Pauers & Phiri in 2023 from specimens collected at Maleri and Nankoma Islands. It is a deep-bodied blue species with orange pelvic and anal fins, and orange on the margins of the dorsal and caudal fins (fig 888.1-2). Underwater photos indicate that these fishes are bright powder-blue with faint vertical bars when alive (fig. 888.3). Populations assigned to *L. artatorostris* (Mumbo Island, Thumbi West Island) have a bit more orange on their soft dorsal and anal fins (MC889). Although there might be subtle morphological differences (Pauers & Phiri 2023), it is not clear that these two forms are sufficiently distinct to represent allopatric species and if they were to be recognised as distinct, it would be difficult to classify other allopatric populations with similar male breeding dress, so for now, pending genomic analysis the species is considered a junior synonym of *L. artatorostris*.



Fig. 888.1: *Labeotropheus alticodia*, freshly collected male holotype specimen, Maleri Island. The specimen appears to have a deformed body, shortened between the soft rayed areas of the dorsal and anal fins. Presently considered a junior synonym of *L. artatorostris*. [Photo M. Pauers].



Fig. 888.2: *Labeotropheus alticodia*, freshly collected female paratype specimen, Maleri Island [M. Pauers].



Figure 888.3: *Labeotropheus alticodia*, male, Maleri Island. [AK].

MC889. *Labeotropheus artatorostris* Pauers 2017, MLS.

Labeotropheus artatorostris was described by Pauers in 2017, from Mumbo Island and Thumbi West Island. It is a deep-bodied 'fuelleborni-ecomorph', generally occupying the shallower, more turbulent waters. Mature males are bright powder blue with variably expressed dark vertical flank bars and crosswise bars on the snout and between the eyes, much like those of *L. fuelleborni* sensu stricto. However, their pelvic fins are orange with a dark leading edge, anal fins generally orange, and the soft dorsal and caudal margins also exhibit some orange. Very similar phenotypes are found throughout the southern part of the lake, and provisionally its range can be proposed to encompass: Mbenji, Namalenje (*L. obscurus*), Maleri (*L. alticodia*), Nankoma (*L. alticodia*), Mumbo (type locality), Otter Point, Thumbi West Island & Mitande Rocks, Zimbabwe Rock, Domwe Island, Ilala Gap South to Tsano Rock, Thumbi East & Harbour Island and Boadzulu Island. It probably occurs at smaller habitat patches in between, such as Nkhudzi Headland and Kanchedza Island. The *Labeotropheus* fuelleborni-ecomorphs found at Nakantenga, Chinyamwazi and Chinyankwezi Islands are very different in terms of male breeding colour and are considered to be different species (MC898-900). Specimens from the Tanzanian coast (the type locality of *L. fuelleborni*) are often similar-looking, and all individual morphometric and meristic features overlapped in Pauers' original description (Pauers 2017). Sequenced specimens with a similar male breeding dress collected from the Malawian east coast at Chiofu Bay appear to be genetically distinct from the southern form, so these and other similar-looking eastern populations are presently regarded as *L. fuelleborni*, and distinct from *L. artatorostris*. The affinities of the similar-looking population at Chimwalani Reef are uncertain, and this locality lies between the ranges of *L. fuelleborni* and *L. artatorostris*. Female *L. artatorostris* are generally brownish, with faint darker bars. Ribbink et al. (1983) recorded OB females at Monkey Bay, Mbenji and Mumbo and O-morph females at Mbenji. The largest of the types is 114.9mm SL. Like other populations of the *Labeotropheus* fuelleborni ecomorph, they inhabit shallow waters: Ribbink et al. (1983) rarely report the species below 5m depth, except at Mbenji, where it is reasonably abundant at 10m. Females and juveniles are reported to be most abundant in the extreme shallows. The species scrapes biofilm from rock surfaces.



Fig. 889.2: *Labeotropheus artatorostris*, male, Thumbi West Island [AK].



Fig. 889.2: *Labeotropheus artatorostris*, male, Mumbo Island [AK].

MC890. *Labeotropheus aurantinfra* Pauers & Phiri 2023, MLN.

Labeotropheus aurantinfra was described by Pauers and Phiri (2023) from Chirwa Island. It is a relatively deep-bodied species, characterised by its overall blue body and fins, with yellow-orange flanks and underside, and in particular, by the orange colour extending onto the head, most consistently to the throat and branchiostegal (gular) membrane (fig. 890.1-2), in contrast to *L. chlorosiglos* and *L. sp. 'fuelleborni nakantenga'*, where the yellow does not extend to head. Pauers & Phiri recorded the species only from Chirwa Island and the nearby Ndomo Gap (=Phita Channel) separating the island from the Luromo (=Lulomo) Peninsula. However, later surveys have shown that it co-occurs with *L. chlorosiglos* at both Chitande Island (as well as with *L. candipygia*) and Katale (where there is a slender blue LT ecomorph with orange in the soft dorsal and caudal). At these two sites, there appear to be three separate genetic groups of *Labeotropheus*. *Labeotropheus aurantinfra* also co-occurs with the deep-bodied *Labeotropheus* sp. 'chirwa orange' around Chirwa Island and Phita Channel: again these appear to be genetically distinct. At Chitande Island, individuals often seem to show rather little orange, in comparison to those at Chirwa and Katale, although this may be mood-related, as some of the Chirwa ones showed little orange on the head (fig. 890.2). The largest type is 114.8mm SL. As with other deep-bodied *Labeotropheus*, it tends to be confined to shallow waters. Most females are grey-brown with faint darker bars, but OB morph females are reported (and included in the type series), although these were collected from a site where more than one species is now believed to occur (fig. 890.3). Sequenced specimens have been obtained from Chirwa/Phita (fig. 890.4), Katale Island (fig. 890.5-6) and Chitande Island (fig. 890.7-9).



Fig. 890.1: *Labeotropheus aurantinfra*, Holotype, adult male, Chirwa Island {M. Pauers}.



Fig. 890.2: *Labeotropheus aurantinfra*, paratype, adult male, Chirwa Island [M. Pauers].



Fig. 890.3: *Labeotropheus aurantinfra*, paratype, adult female, OB morph, Chirwa Island [M. Pauers].



Fig. 890.4: *Labeotropheus aurantinfra*, adult male, D65-E05, Phita Channel, sequenced [MCGDS].



Fig. 890.5: *Labeotropheus aurantinfra*, adult male, D61-C01, Katale Island, sequenced [MCGDS].



Fig. 890.6: *Labeotropheus aurantinfra*, adult male, Katale Island. D61-C03, [MCGDS]



Fig. 890.7: *Labeotropheus aurantinfra*, adult male, Chitande Island, D66-A03, [MCGDS]



Fig. 890.8: *Labeotropheus aurantinfra*, adult male, Chitande Island, D66-C03 [MCGDS].



Fig. 890.9: *Labeotropheus aurantinfra*, adult male, D66-A06, Chitande Is., [MCGDS].

MC891. *Labeotropheus candipygia* Pauers & Phiri 2023, MLN.

This species was first described by Pauers and Phiri (2023) from specimens collected from Chitande (=Chitende) Island, Chilumba. Its body shape is rather intermediate between the usual LF and LT ecomorphs, but it co-occurs with two deeper bodied species, *L. aurantinfra* and *L. chlorosiglos*. Its male breeding dress is primarily a dark orange, with a pale blue-white lower surface and distal part of the dorsal fin (fig. 891.1-3). Other populations with a similar male breeding dress are generally more slender (e.g. Ruarwe, Gome, see Konings 2024) and thus this species has previously been assigned to *L. trewavasae* (e.g. Konings 2016a). Genetic information is lacking on those allopatric populations, but specimens from the type locality have been collected. Females are generally plain grey-brown with faint darker vertical flank bars, but OB females are known (fig. 891.4). A single sequenced specimen has been recorded from Kaphaso Reef (fig. 891.5), which fits with the Chitande specimens both phenotypically and genetically. This reef is near to Chirwa Island, with which it shares other taxa. The largest type specimen was 97.2mm SL.



Fig. 891.1: *Labeotropheus candipygia*. Chitande Island, male, paratype [M. Pauers].



Fig. 891.2: *Labeotropheus candipygia*, male, Chitande Island, D66-A07, sequenced [MCGDS].



Fig. 891.3: *Labeotropheus candipygia*, underwater at Chitande Is [HS]



Fig. 891.4: *Labeotropheus candipygia*, OB female, D65-F08, Chitande Is, sequenced [MCGDS].



Fig. 891.5: *Labeotropheus candipygia*, male, D1-E02, Kaphaso Reef [MCGDS].

MC892. *Labeotropheus chirangali* Pauers & Phiri 2023, MLN.

Labeotropheus chirangali is a relatively slender species described by Pauers & Phiri (2023) from Mphanga Rocks, Chilumba (fig. 892.1-3). Males are pale blue with orange pigment on the soft dorsal and caudal fins (fig. 892.4). Scales can be highlighted in orange, especially posteriorly. Females tend to be pale with dark vertical bars (fig. 892.3). No other *Labeotropheus* species is known from this location. A similar phenotype is also reported from Katale (fig. 829.7), where it co-occurs with deeper bodied species, such as *L. auratinfra* and *L. chlorosiglos*. Blotched or O-morph females are not recorded from either location. The largest known type is 111.8mm SL. Specimens have been sequenced from Mphanga Rocks, which conform well to the phenotype of the type specimens, except that the blue colour was darker and more saturated, but this was probably a preservation artifact (fig. 829.-6).



Fig. 892.1: *Labeotropheus chirangali*, adult male, holotype, Mphanga Rocks [M.Pauers]



Fig. 892.2: *Labeotropheus chirangali*, adult male, paratype, Mphanga Rocks [M.Pauers].



Fig. 892.3: *Labeotropheus chirangali*, adult female, paratype, Mphanga Rocks [M.Pauers]



Fig. 892.4 *Labeotropheus chirangali*, adult male, Mphanga Rocks, 23 Feb 2016 [HS].



Fig. 892.5: *Labeotropheus chirangali*, adult male, D60-B03, Mphanga Rocks, sequenced [MCGDS].



Fig. 892.6: *Labeotropheus chirangali*, adult male, D60-E01, Mphanga Rocks, sequenced [MCGDS].



Fig. 892.7: *Labeotropheus cf. chirangali*, adult male, Katale [Mark Thomas].

MC893. *Labeotropheus chlorosiglos* Pauers 2016, MLN.

Labeotropheus chlorosiglos was described by Pauers in 2016 from specimens collected by the aquarium fish export team of Stuart M. Grant Ltd, reportedly from Katale Island, Chilumba, between 2001 and 2011. It was initially described as being of intermediate body shape between *Labeotropheus fuelleborni* and *L. trewavasae*, and being endemic to Katale. Additional specimens were collected from the same location in a later expedition, in addition to specimens collected from Makankha Reef (Pauers & Phiri 2023). There is some confusion over the location of this site (see under MC896), but a reef of that name is recorded to the SE of Chirwa Island (Malawi.si., 2025). Konings (2024) has proposed that actually the specimens were collected from Luwino Reef. Subsequently the species has been collected by the MCGDS for sequencing from Katale Island (fig. 893.3), Chitande Island (fig. 893.4), Luwino Reef (fig. 893.5-6) and Maison Reef (fig. 893.7), but not around Chirwa and associated areas such as the Phiti Channel and Kaphaso Reef, so the record for Makankha has not been supported. The colour of the Luwino Reef specimens was obscured by post-mortem darkening (fig. 893.5), but their identity was confirmed by unpublished analysis of sequences, and photographs of live specimens from the location were consistent with *L. chlorosiglos* (fig 893.6). The species may range further south, as illustrations of a similar phenotype are reported from Hora Mhango (Konings 2016a), on the NW Coast, but around 40km South of Chilumba.

Adult males are generally pale blue (although sometimes turning much darker post-mortem) with a variable amount of orange colour on the flanks, always below the upper lateral line. There is no orange on the head or chest. There can be substantial amounts of orange on the pelvics, soft dorsal and caudal fins, and sometimes a little bit at the base of the anal fin. Females are generally drab brownish colour. OB or O morph individuals are not known. Similar phenotypes are recorded from other parts of the lake, for example, around Nakantenga Island, but these are thought to be independently evolved. The largest type specimen was 114.3mm SL.



Fig. 893.1: *Labeotropheus chlorosiglos*, adult male, non-type, aquarium specimen [Mike Pauers].



Fig. 893.2: *Labeotropheus chlorosiglos*, adult male, Katale Island [Mike Pauers, reprinted in Pauers & Phiri 2023].



Fig. 893.3: *Labeotropheus chlorosiglos*, adult male, Katale Island, D61-D08 [MCGDS].



Fig. 893.4: *Labeotropheus chlorosiglos*, adult male, D69-A08, Chitande Is. [MCGDS].



Fig. 893.5: *Labeotropheus chlorosiglos*, adult male, Luwino, D05-C10, sequenced, but colour faded [HS].



Fig. 893.6: *Labeotropheus chlorosiglos*, adult male underwater, Luwino Reef [AK].



Fig. 893.7: *Labeotropheus chlorosiglos*, adult male, D65-D05, Maison Reef [MCGDS].

MC894. *Labeotropheus obscurus* Pauers & Phiri 2023, MLS.

(= junior synonym of *L. atratorostris*)

Labeotropheus obscurus was described by Pauers and Phiri (2023) from specimens collected at Namalenje Island, near Senga Bay. This is a small (200m max) island where large rocks drop to sand at around 6-11m depth (Ribbink et al. 1983). Apart from small, shallow areas of rocks near Senga Point and Rifu, the island is far from other rocky areas. Ribbink et al. (1983) reckon that the fauna has relatively low diversity (15 native species) and low endemism: populations of the *Pseudotropheus williamsi* and *P. elongatus* complex possibly being endemic to the island. Konings (2016a) holds that the former is conspecific with *P. sp.* 'williamsi maleri', but while recognising *Tropheops sp.* 'elongatus namalenje' as distinct, regards it as closely related to *Tropheops modestus* from the Maleris. The general impression therefore is that the fauna of Namalenje and Maleris are closely related. Notably, Ribbink et al. (1983) report that *L. fuelleborni* (sic) is one of only two of the 15 mbuna species found Namalenje to also occur at both Senga Point and Rifu, suggesting it is an excellent disperser and unlikely to be strongly genetically isolated between the Maleris and Namalenje. The main trait proposed to differentiate *L. obscurus* from *L. alticodia* (which itself is here considered another junior synonym of *L. atratorostris*) is the less conspicuous male breeding dress of the former. This might be a reflection of sampling the population during the peak rainy season, when water visibility at Namalenje is likely to be low and fish tend to lose their conspicuous colours (Konings 2024). Photographs of males of this population from other times of the year illustrate bright individuals essentially indistinguishable from those at the Maleri Islands (e.g. fig. 894.3). The holotype is only 78.2mm SL, and the largest paratype 78.3mm SL (Pauers & Phiri 2023), which are both quite small, suggesting they might not be fully mature. Although Pauers and Phiri (2023) discuss some statistical morphological differences between *L. obscurus* and *L. alticodia*/*L. atratorostris*, these could be consistent with smaller size, state of maturity of the typical plastic or minor genetic variations expected of largely allopatric conspecific populations. There are no clearly diagnostic character states or meristics. Pending genetic investigations, it is proposed that *L. obscurus* be regarded as a junior synonym of *L. atratorostris*.



Fig. 894.1: *Labeotropheus obscurus* from Namalenje Island, holotype [M. Pauers].



Fig. 894.2: *Labeotropheus obscurus* from Namalenje Island, paratype [M. Pauers].



Fig. 894.3: *Labeotropheus obscurus* from Namalenje Island, showing well-developed male colours [J.M. Artigas]

MC895. *Labeotropheus rubidorsalis* Pauers & Phiri 2023, MLS.

Labeotropheus rubidorsalis was described by Pauers & Phiri (2023) from 11 specimens collected at Maleri Island, although they reported similar-looking specimens from Nankoma and Namalenje Islands. Males are pale blue with faint vertical barring and largely blue-white fins, except for the dorsal and posterior margin of the caudal which are brilliant orange-red (fig. 895.1). It seems that only OB-morph females were included in the description (fig. 895.2) and indeed Ribbink et al. (1983) report only this form of female at Maleri and Nankoma. They report Namalenje males as having more intense orange dorsal fins, and that there are both plain and OB females at this location. Other locations reported to have yellow-orange to orange-red dorsal fins were: Boadzulu Island, Thumbi West Island and Zimbabwe Rocks. Konings (2016a) also illustrates an orange dorsal form from Chinyamwezi Island. The online archive Malawi.si (2025) shows photographs of a similar phenotype labelled as occurring at Makanjila Point (Malawi.si: Ad Konings, Özgür Jacqueline Demir, Elton Panagi) and Otter Island (Malawi.si Ad Konings). Orange dorsal males have recently been recorded as Domwe (previously lacking *Labeotropheus* of the *trewavasae* ecomorph) and Mumbo Island (endemic blue-dorsal populations MC907), perhaps as a result of translocations from other sites such as Thumbi West Island. All of these localities are in the southern part of Lake Malawi. The orange dorsal form referable to *L. rubidorsalis* has not been recorded North of Namalenje Island on the Western shore of the lake, nor north of Makanjila point on the Eastern shore.

The species is a typical *Labeotropheus trewavasae* ecomorph, with slender bodies and a preference for deeper water.

The largest type specimen was 91.3mm SL. Ribbink et al. (1983) list their largest as a 121mm SL individual from Zimbabwe Rock.



Fig. 895.1: *Labeotropheus rubidorsalis*, male, type, Maleri Island [M. Pauers]

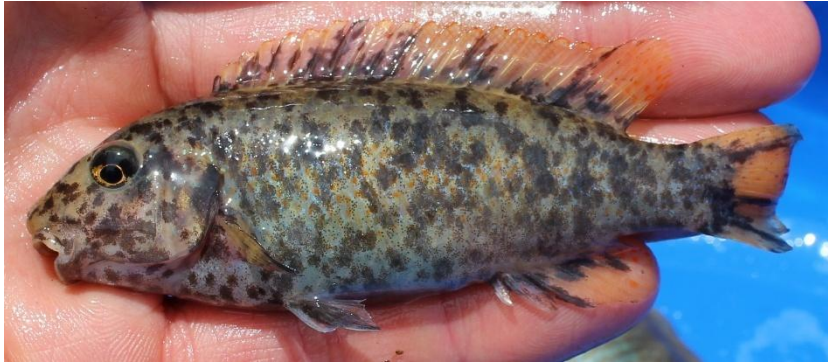


Fig. 895.2: *Labeotropheus rubidorsalis*, OB female, paratype, Maleri Island [M. Pauers]



Fig. 895.2: *Labeotropheus rubidorsalis*, male, Thumbi West Island, 6 March 2016 [HS]



Fig. 895.3: *Labeotropheus rubidorsalis*, male, D75-A05, Zimbabwe Rock [MCGDS]

MC896. *Labeotropheus simoneae* Pauers 2016, MLN.

Labeotropheus simoneae, a slender yellow-sided LT ecomorph (fig. 896.1-2) was described by Pauers (2016) from 5 specimens collected by S.M. Grant's dive team in 2009, from 'a reef near Katale Island': the original co-ordinates (-10.4542, 34.285) seem to be somewhere between Katale and Luwino Reef. Pauers and Phiri (2023) reported collecting additional specimens from reportedly the same locality, now given as Makankha Reef (-10.4564, 34.287). Those co-ordinates are only 170m from Katale Island (Google Earth), but to the southeast, rather than the northwest. The co-ordinates are also given as -10.4667, 34.2874 in the same publication. This is about 1km ESE (107 degrees) from the southern tip of Chirwa Island. However, the website Malawi.si (2025) places the location of this reef to the SE of Chirwa Island, possibly the rocks visible on Google Earth some 540m SE of the island at -10.4683, 34.2813). This is very close to the location reported as Kaphaso Reef in the MCGDS (1 Oct 2023), given as -10.47087, 34.28507, which lies 760m from Chirwa on the same heading. Konings (2024) suggests the specimens were actually collected from Luwino Reef, as this was a popular catching site for Grant's catching team at the time and is reported to be inhabited by specimens that resemble the illustrations of *L. simoneae* (fig. 896.5). The species is slender, males having a dark orange cast on the opercula and flanks, with the head, chest, dorsum and fins blue (fig 896.1-3). There are usually darker bars across the snout, and sometimes dark flank bars. Females are dull brown with dark bars (fig. 896.4). OB and O-morph females are not known. Specimens collected from Luwino Reef in 2016 and later sequenced were photographed a long time post-mortem and do not really show colours clearly (fig. 896.6-7), but are assumed to represent this species. Largest type was 110.4mm SL.



Fig.896.1: *Labeotropheus simoneae*, adult male, holotype from 'reef near Katale Is.' The rather purple colour here might be a photographic artifact [Mike Pauers].



Fig.896.2: *Labeotropheus simoneae*, adult male, from 'Makhanka Reef' [Mike Pauers, reprinted in Pauers & Phiri 2023].



Fig.896.3: *Labeotropheus simoneae*, adult male, from 'Makhanka Reef' [Mike Pauers].



Fig.896.4: *Labeotropheus simoneae*, female, from 'Makhanka Reef' [Mike Pauers].



Fig.896.5: *Labeotropheus simoneae*, adult male, from Luwino Reef [Patrick Tawil reprinted in Konings 2024]



Fig.896.6: *Labeotropheus simoneae*, adult male, from Luwino Reef, D05-D05, with major post-mortem colour-changes, sequenced [HS].



Fig.896.7: *Labeotropheus simoneae*, adult male, from Luwino Reef, D05-E07, with major post-mortem colour-changes, sequenced [HS].

MC897. *Labeotropheus* sp. 'chirwa orange', MLN.

This *Labeotropheus* population has a relatively deep body, but co-occurs with *L. aurantinfra*, another deep-bodied species which is blue with orange sides and throat. Both are found in the area around Chirwa Island, including the Phita Channel and Kaphaso Reef. Fully coloured males are spectacular orange with a wide pale blue margin to the dorsal fin. The anal fin is translucent to pale blue, with an orange base. Varying amounts of blue can sometimes be seen on the head and dorsum. It is difficult to know whether this form should be referred to the LF or LT ecomorph. The deep-body and occurrence in shallow water would suggest LF. The orange male breeding dress and its co-occurrence with another deep-bodied species might suggest an LT, as Konings (2016a) proposed for the population now known as *L. candipygia*. It is distinguished from that species by the lack of a pale blue-white underside. Pauers & Phiri (2023) noted that some *L. aurantinfra* seem to be almost entirely yellow and some of these were apparently included in the type series (fig 897.4). Konings (2024) has also illustrated this form as *L. auratinfra* (fig. 897. 5). However, recent collections indicate it has a distinctive morphotype. Females and immature males are brownish; OB- and O-morph individuals are unknown.



Fig. 897.1: *Labeotropheus* sp. 'chirwa orange', fully coloured male?, D68-E02, Phita Channel, [MCGDS].



Fig. 897.2: *Labeotropheus* sp. 'chirwa orange', male, D71-C01, Kaphaso Reef [MCGDS].



Fig. 897.3: *Labeotropheus* sp. 'chirwa orange', male, D70-E02, Chirwa Island, badly preserved specimen but still referable to this phenotype [MCGDS].



Fig. 897.4: Probable *Labeotropheus* sp. 'chirwa orange', male, with partially developed breeding dress, Chirwa Island or Ndomo Gap (=Phita Channel), specimen from the type series of *L. aurantinfra* [Mike Pauers].



Fig. 897.5: *Labeotropheus* sp. 'chirwa orange', male, Chirwa Island [AK].



Fig. 897.6: *Labeotropheus* sp. 'chirwa orange', female/juvenile, D69-F04, Phita Channel, 28 Sept 2023, [MCGDS].

MC898. *Labeotropheus* sp. ‘fuelleborni Chinyamwezi’, MLS.

Labeotropheus sp ‘fuelleborni Chinyamwezi’ is a typical blue-barred, deep-bodied LF ecomorph. Because of the location, it would be difficult to determine whether it should be classed with *L. fuelleborni* -which is believed to extend to the area around Chiofu, or *L. artratorostris* - which extends to Domwe Island. Males are clearly different from nearby populations of both, in that they show a lot of black in the fins: black pelvics with a pale leading edge, black radial stripes along the fin rays in the soft dorsal and caudal and a broad black lower margin in the anal. Resolving its affinities would probably require genomic analysis. At Chiofu, *L. fuelleborni* males have largely orange pelvics, and pale blue dorsal, anal and caudal fins. At Domwe, *L. artratorostris* also have largely orange pelvics and blue spinous dorsals, but have orange-suffused soft dorsal, anal and caudal fins, with faint dark radial markings in the caudal and soft dorsal. In any case, a number of other taxa on Chinyamwezi and the neighbouring Chinyankwazi Islands are presently treated as locally endemic species, including members of the genera *Chindongo*, *Cynotilapia*, *Maylandia* and *Tropheops*. OB and O morph females are known.



Fig. 898.1: *Labeotropheus* sp. ‘fuelleborni Chinyamwezi’, male [AK].

MC899. *Labeotropheus* sp. ‘fuelleborni Chinyankwazi’, MLS.

At Chinyankwazi Island, there is a population of *Labeotropheus* of the ‘fuelleborni-ecomorph’ which shows a distinctive colour pattern, of relatively thin dark vertical barring, and a dorsal fin which is pinkish-orange basally with a broad black submarginal band, and white lappets. The pelvics are largely orange (fig. 899.1). OB/O morph individuals have been recorded (Malawi.si, 2025). On the basis of its distinctive phenotype and presence on an isolated habitat patch with high local endemism, it is provisionally regarded as a unique species. It is not known to have been collected for morphological or molecular analysis.



Fig. 899.1: *Labeotropheus* sp ‘fuelleborni Chinyankwazi’ male [AK].

MC900. *Labeotropheus* sp. 'fuelleborni Nakantenga', MLS.

Labeotropheus sp. 'fuelleborni Nakantenga' has previously been regarded as a population of *L. fuelleborni* (MC571), but would be classed as a distinct species under the operational species concept of Pauers (2010). It is a typical deep-bodied, shallow-water LF ecomorph. Ribbink et al. (1983) provided a detailed colour description: 'Body and head pale blue, but with a golden-yellow flush on the flanks, extending onto the head in some individuals. This is the only population with yellowish flanks [GFT: not any more!]. Dorsal fin blue with a faint golden hue, orange trailing edges and yellow ocelli. Caudal fin blue with an orange trailing edge. Anal fin blue with yellow egg dummies. Pelvic fins blue with orange trailing portions.' They also reported that a population of this form had been introduced to Thumbi West Island, but further information on this is lacking, and it may have gone extinct. At Nakantenga Island, the species was reported from a depth of 0-5m. One individual has been sequenced by MCGDS (fig. 900.2).



Fig. 900.1: *Labeotropheus* cf. 'fuelleborni Nakantenga', adult male, Nakantenga Is. [AK].



Fig. 900.2: *Labeotropheus* sp. 'fuelleborni Nakantenga', adult male, D42-A07, Nakantenga Is. [MCGDS].

MC901. *Labeotropheus* sp. ‘fuelleborni red top eastern’, CHI, MZ.

Males of a few isolated populations of the *Labeotropheus* ‘fuelleborni ecomorph’ show a largely red-orange dorsal fin, including both spinous and soft-rayed areas. These are regarded as sufficiently different from the typical blue-dorsal *L. fuelleborni* (MC571) to be worth provisionally assigning to a separate species, herein *L. sp. ‘fuelleborni red top eastern’*. This follows current practice with *Maylandia zebra* and related species (red dorsal *M. emmiltos*, *M. pyrrhonotus* etc) and currently with the *Labeotropheus* ‘trewavasae ecomorph’. Known ‘red top eastern’ populations can be found at Chiwi Rocks and Membe Island off Chizumulu Island and at Minos Reef in Mozambique (see Konings 2016a, Malawi.si, 2025). Photographs indicate that the dorsal fin colour of males at Chiwi Rocks is quite variable ranging from entirely blue to almost entirely orange (Malawi.si, 2025). OB/O forms are known from Minos Reef, Chiwi Rocks and O-morph from Membe Island (Malawi.si, 2025). Another population at Chidunga Rocks is regarded as likely representing a different species (or a geographical variant of *L. artatorostris*), given molecular evidence that *Labeotropheus* populations in the southern arms appear to be distinct from those found further north (MCGDS, unpublished). None of these populations have been sequenced to date.



Fig. 901.1: *L. sp. ‘fuelleborni red top eastern’* male, Minos Reef [AK].

MC902. *Labeotropheus* sp. ‘fuelleborni red top Chidunga’, MLS.

A small population of the *Labeotropheus* ‘fuelleborni ecomorph’ has been reported from Chidunga Rocks in the SW Arm of the lake. Photographs show that males have an entirely orange-red dorsal fin (fig. 902.1), in contrast to neighbouring populations of *L. atratorostris* which have largely blue-dorsal fins, often with some orange in the soft dorsal, anal and caudal fins. This is felt to be sufficient to warrant provisionally allocating the Chidunga population to its own species. It is provisionally distinguished from the small isolated populations on the central eastern coast on the basis of geography. The co-occurring *L. trawavasae* ecomorph is largely blue. This population has yet to be sequenced.



Fig. 902.1: *Labeotropheus* sp. ‘fuelleborni red top Chidunga’, male, Chidunga Rocks [AK].

MC903. *Labeotropheus* sp. 'makanjila', MLS.

Makanjila Rocks is a small habitat patch just south of Makanjila Point, which marks the northern end of the SE Arm of Lake Malawi. There are a few photographs of male *Labeotropheus* from this area, showing a barred blue fish with a largely orange dorsal fin. Konings (2016a) regards it as a 'fuelleborni' which probably makes sense as the rocks appear to be scattered among sand areas and may not extend very deeply. In any case, it is not clear whether it belongs to the genetic group of southern populations or that of the northern and eastern areas, lying near to both Chiofu (NE group) and the Nankhumba Peninsula and its islands and reefs (southern group). It has not been sequenced nor studied morphologically.



Fig. 903: *Labeotropheus* sp. 'makanjila' male [AK].

MC904. *Labeotropheus* sp. 'trewavasae black dorsal', TZ.

A distinctive slender-bodied population has been reported from the vicinity of Higga Reef and nearby Ngkuyo Island in Tanzania (Konings 2016a). Males have blue bodies with darker vertical flank bars, and broad dark submarginal bands on the dorsal and anal fins, largely black pelvics and black radial markings on the caudal (fig. 904.1). OB females are reported in aquarium hobby publications. There are no reported genetic or morphological studies of this population. It is provisionally regarded as a distinct species based on its distinctive coloration.



Fig. 904.1: *Labeotropheus* sp. 'trewavasae black dorsal', male, Higga Reef [AK].

MC905. *Labeotropheus* sp. 'trewavasae Maingano', LIK.

Labeotropheus sp. 'trewavasae Maingano' is known only from Maingano Island on Likoma. It resembles *L. simoneae*, which is found much further to the North West, in the Chilumba area, but there seems to be no reason to propose close relationships among such widely separated populations. Males are slender, largely orange, with dark radial markings on the soft dorsal, caudal, anal and pelvic fins, while the distal 2/3 to 3/4 of the spinous dorsal is pale blue (fig. 906.1-3). Females are dull grey-brown, and OB/O females not reported. Similar-looking populations are found at various localities along the eastern coast. These are presently allocated to *Labeotropheus* sp. 'trewavasae orange' (MC909). Elsewhere on Likoma Island, the LT ecomorph is represented by a form with all-blue males, which is provisionally allocated to *Labeotropheus trewavasae sensu stricto* (MC572).



Fig. 905.1:
Labeotropheus sp.
'trewavasae
Maingano', male,
MWA2132, 2023
[HS lab].



Fig. 905.2:
Labeotropheus sp.
'trewavasae
Maingano', male,
MWA2279, 2023
[HS lab].



Fig. 905.3:
Labeotropheus sp.
'trewavasae',
male, MWA2306,
2023 [HS lab].

MC906. *Labeotropheus* sp. 'trewavasae Maison', MLN.

Labeotropheus sp. 'trewavasae Maison' is known only from Maison Reef, near Chilumba. In contrast to most LT populations in this area, most males are pale blue. They resemble the blue individuals from the *Labeotropheus trewavasae* type locality at Nkhata Bay, but their distributions are widely separated and there is no particular reason to propose that they are closely related. A few individuals show some more orange particularly on the caudal peduncle flank scales, the caudal fin and in a series of spots in the soft dorsal (fig. 906.3). This is reminiscent of *Labeotropheus chirangali* from Mphanga Rocks. Most females are drab grey-brown, but OB and O-morph females are quite common. All specimens were collected from 12m or deeper.



Fig. 906.1: *Labeotropheus* sp. 'trewavasae Maison', D68-A01, blue male, Maison Reef, Chilumba [MCGDS].



Fig. 906.2: *Labeotropheus* sp. 'trewavasae Maison', D67-F05, blue male, Maison Reef, Chilumba [MCGDS].



Fig. 906.3: *Labeotropheus* sp. 'trewavasae Maison', D64-D03, orange-flank male, Maison Reef, Chilumba [MCGDS].



Fig. 906.4: *Labeotropheus* sp. 'trewavasae Maison', D64-D08, OB-female, Maison Reef, Chilumba, 2023 [MCGDS].



Fig. 906.5: *Labeotropheus* sp. 'trewavasae Maison', D68-A02, O-morph female, Maison Reef, Chilumba, 2023 [MCGDS].

MC907. *Labeotropheus* sp. 'trewavasae Mumbo blue dorsal', MLS.

At Mumbo Island, male *Labeotropheus* of the trewavasae ecomorph have blue dorsal fins (Ribbink et al. 1983), in contrast to the orange dorsal *L. rubidorsalis* found in neighbouring locations such as Thumbi West Island (fig. 907.1). An orange v blue dorsal fin has been used to differentiate species of the *Maylandia zebra* complex, with orange dorsal forms classed as *Maylandia emmiltos* in the north and *M. pyrrhonotus* in the south of the lake, so the Mumbo blue dorsal form is here provisionally granted species status. Otherwise, the population seems to be a typical *L. trewavasae* form. OB females as well as BB females are known (Ribbink et al. 1983). It was recorded as most abundant at 5-10m, but its depth range extended to more than 25m (Ribbink et al. 1983).



Fig. 907.1: *Labeotropheus* sp. 'trewavasae mumbo blue dorsal', Mumbo Island, 25 July 2026 [GFT]

MC908. *Labeotropheus* sp. 'trewavasae Nakantenga', MLS.

Nakantenga Island is home to unusual phenotypes of both *Labeotropheus* ecomorphs. The deep-bodied fuelleborni-form has yellow flanks (MC900), while the slender-bodied trewavasae form is all-blue, including the dorsal fin. Superficially, it seems identical to the phenotype seen in many northern locations, including the type locality for *L. trewavasae* at Nkhata Bay (MC572). Given the discontinuous distribution, geographic distance and occurrence of independently evolved populations with similar colour form in the northern and southern parts of the lake (Allender et al. 2003), it is provisionally regarded as a distinct taxon, which is supported by preliminary molecular analysis. A similar phenotype illustrated from the nearby Chidunga Rocks (Malawi.si, 2025) is provisionally assigned to this taxon, pending genetic investigation.

Only 3 sequenced specimens were available for *Labeotropheus* at Nakantenga. D42-A07 is clearly of the fuelleborni-ecomorph (MC900). The specimens D42-B02 and D42-C02 are small and dark, showing little indication of male breeding dress. They are provisionally assigned to *Labeotropheus* sp. 'trewavasae Nakantenga'.



Fig. 908.1: *Labeotropheus* sp. 'trewavasae Nakantenga', D42-B02 [MCGDS].



Fig. 908.2 *Labeotropheus* sp. 'trewavasae Nakantenga', D42-C02 [MCGDS].

MC909. *Labeotropheus* sp. ‘trewavasae orange’, MLN, MLS, TZ, MZ.

Currently, there are no reported molecular or morphological studies of the slender-bodied *Labeotropheus* populations from the east coast north of Chiofu Bay, nor the West Coast between Chilumba and Nkhata Bay. In this area, populations with males that are largely blue are here assigned to *L. trewavasae* (MC572), or *Labeotropheus* sp. ‘trewavasae black dorsal’ (MC905), while these with largely orange/ochre-bodied males, including the population at Chiofu, are included in *Labeotropheus* sp. ‘trewavasae orange’. Populations with a similar orange phenotype at Chilumba and Likoma are excluded.

Labeotropheus sp. ‘trewavasae orange’ has been recorded in the area around Lion’s Cove, along the coast from Ruarwe to Charo, on the north-east coast around Lundu, Tanzania, on the central eastern coast including Metangula, and from Chiofu north into Mozambique (Konings 2016a). There is some variation among populations in the brightness and extent of the orange colour. Further clarification of the relationships of the populations presently included in ‘trewavasae orange’ is likely to require genomic study. At present, only the Chiofu population has been sequenced.

At Chiofu, the fish have the typical ‘trewavasae-ecomorph’ slender body and preference for deeper water. Males generally resemble those of *L. candipygia* from Chitande Island, in being generally orange-brown or ochre with a blue-white underside and dorsal fin and black pelvic fins (fig. 909.1-3). However, they are not closely related (MCGDS, unpublished). By the time they were photographed, specimens collected for sequencing from Chiofu in 2016 had lost some of their natural colour post-mortem (fig. 909.4-5), but could still be matched to this species. Sixteen specimens were sequenced, including OB morph females (fig. 909.6).



Fig. 909.1: *Labeotropheus* sp. ‘trewavasae orange’, male, Chiofu Bay [AK].



Fig. 909.2: *Labeotropheus* sp. ‘trewavasae orange’, male, Gome [AK].



Fig. 909.3 *Labeotropheus* sp. 'trewavasae orange', male, Chiofu Bay [HS].



Fig. 909.4: *Labeotropheus* sp. 'trewavasae orange', male, D10-C01, SCUBA, Chiofu, 29 Feb 2016 [HS].



Fig. 909.5 *Labeotropheus* sp. 'trewavasae orange', male, D09-H02, SCUBA, Chiofu, 28 Feb 2016 [HS].



Fig. 909.6 *Labeotropheus* sp. 'trewavasae orange', OB female, D09-C10, SCUBA, Chiofu, 28 Feb 2016 [HS].

MC910. *Maylandia* sp. 'black eastern', MLS.

This new taxon was discovered following examination of specimens collected at Chiofu Bay in 2016, initially identified as *Cynotilapia afra*. A single male specimen of 69.7mm SL from Chiofu Bay was sequenced (fig. 910.1). A smaller individual of 65.4mm SL looks very similar but has not yet been sequenced. The preserved specimens are almost uniformly black, but when pinned before preservation showed a broad orange margin to the soft dorsal and an irregular orange area on the caudal fin, but did not show the conspicuous white dorsal fin margin usually seen in male *C. afra* (see fig. 542.2). Both specimens have relatively small numbers of wide, blunt, almost evenly bicuspid teeth in the outer rows of both upper and lower oral jaws and are now referred to a new taxon within the genus *Maylandia* (MC910).

Sequence analysis suggests the specimen lies rather basally with the main *Maylandia*/*Cynotilapia* group or perhaps has affinities with the *P. johannii* group. The dentition strongly resembles that of MC646 *Maylandia* sp. 'aggressive bars' and MC652 *M. sp.* 'chinyankwazi' (A.Konings pers. comm.).



Fig. 910.1: *Maylandia* sp. 'black eastern', male, D10-I02, SCUBA, Chiofu 29 Feb 2016 [HS].



Fig. 910.2: *Maylandia* sp. 'black eastern', male, D10-I03, SCUBA, Chiofu 29 Feb 2016 [HS].



Fig. 910.3: *Maylandia* sp.
'black eastern', male, D10-
I02, SCUBA, Chiofu 29 Feb
2016 [GFT].

MC911. *Pseudotropheus fuscoides* Fryer 1956, MLN.

Since Fryer's (1956a) description of *P. fuscoides*, most publications (e.g. Konings 2016a; Fricke et al. 2026) that mention the species regard it as indistinguishable from and presumed conspecific with *Pseudotropheus fuscus* Trewavas 1935 (MC727), and as such it was not included in the list original list of candidate species here. It was originally described from specimens collected at Nkhata Bay, where *P. fuscus* was reportedly abundant in shallow waters, so it would be logical to suppose that Fryer, who was based there for two years, would be familiar with both species. He reported that *P. fuscoides* had sharply-pointed oral outer teeth and fed largely on insect larvae, while *P. fuscus* had more rounded teeth and mainly fed on algae. Ribbink et al. (1983) tentatively distinguished them, suggesting that *P. fuscoides* lived in shallower water (on average), was smaller and had paler males, although females were reportedly indistinguishable. *Pseudotropheus fuscoides* was reported from depths of 3-8m, occasionally to 12m, and both sexes were said to be highly aggressive and territorial, often defending algal gardens in their territories. The species was reported only from Nkhata Bay and Lion's Cove but Ribbink et al. did not sample Kande Island. They suggested it was possibly an immature form of *P. fuscus*, which was later stated with a degree of confidence by Konings (2016a: 274). The single specimen presumed to be *P. fuscus* sequenced from Nkhata Bay as MC727 has not been closely examined since initial collection. Specimen D33-F05 from Kande Island (fig. 911.1-2), was sequenced, mislabelled as *M. zebra*, but appearing out of place in the phylogeny. Re-examination of illustrations suggested it might be *P. fuscus*, and the preserved specimen (72mm SL) was located and examined in February 2026 (figs. 911.3-4). The longer snout and orange throat distinguish it from *P. sp.* 'variable kande' (MC767), a species which has not been collected or examined in detail. The outer oral teeth are sharply pointed (fig. 911.4), and the sequence is provisionally resolved as basal in relation to a group of *Melanochromis* species, suggesting that *P. fuscoides* is closely related to *P. fuscus*, but they are not estimated to be sister taxa (MCGDS, unpubl.).



Fig. 911.1: Freshly collected specimen from Kande Island, believed to be the sequenced specimen of *Pseudotropheus fuscoides*, D33-F05, 19 April 2018 [GFT].



Fig. 911.2: *Pseudotropheus fuscoides*, D33-F05, pinned after collection, Kande Island, 19 April 2018 [MCGDS].



Fig. 911.3: *Pseudotropheus fuscoides*, D33-F05, preserved specimen photographed on 6 Feb 2026 at Cambridge University [GFT].



Fig. 911.4: *Pseudotropheus fuscoides*, D33-F05, showing relatively prominent pointed teeth in both upper and lower rows. Preserved specimen photographed 6 Feb 2026 at Cambridge University, dentition [GFT].

MC912. *Tropheops* sp. 'chiofu widemouth', MLS.

This species was not distinguished during the field collections in 2016, but emerged as a separate genetic cluster following whole genome sequencing. Three specimens fell outside the clusters represented by apparent sister taxa *Tropheops* sp. 'gome yellow' (MC801) and *Tropheops* sp. 'yellow gular' (MC829) and their collective sister group of *Tropheops* sp. 'mauve yellow' (MC813) and *T. sp.* 'red cheek' (MC823). No clear phenotypic difference could be seen in the field photographs, which were taken post-mortem on rather dried out pinned specimens (figs 912.1-3). However, examination of the specimens showed that they had distinctly wider mouths (fig. 912.4): 26-27.1% Head length (n=3) v 19.7-22.7% for Gome Yellow (n=5) and 16.7-20.4% for Yellow Gular (n=5). Among *Tropheops* and related species, wide-mouthed species tend to be associated with the rock-sand interface: *Tropheops tropheops* MC830, *T. sp.* 'band' MC783 and *T. sp.* 'weed' MC826, as well as the related *Pseudotropheus lucerna* MC733. It seems possible that *T. sp.* 'chiofu widemouth' might share this habitat preference, but this would require further fieldwork. Recent re-examination of the Ribbink et al. (1983) records of *Pseudotropheus tropheops* 'broadmouth', now considered to represent *T. tropheops*, indicate populations at Makanjila and Masinje. These localities are fairly close to Chiofu and often share species, so it might be that these are in fact *T. sp.* 'chiofu widemouth', or even that *T. sp.* 'chiofu widemouth' is best considered a population of *T. tropheops*. However, there are no sequences available for *T. tropheops*.



Fig. 912.1: *Tropheops* sp. 'chiofu widemouth' male, D09-I01, SCUBA, Chiofu, 28 Feb 2016 [HS].



Fig. 912.2: *Tropheops* sp.
'chiofu widemouth' male,
D10-F05, SCUBA, Chiofu, 29
Feb 2016 [HS].



Fig. 912.3: *Tropheops* sp.
'chiofu widemouth' male,
D10-F07, SCUBA, Chiofu, 29
Feb 2016 [HS].



Fig. 912.4: Comparison of
mouth widths of *Tropheops*
sp. at Chiofu: left to right:
'yellow gular', 'gome
yellow', 'chiofu widemouth';
preserved sequenced
specimens at Cambridge
Zoology Museum [GFT].

MC913. *Tropheops* sp. 'mphanga', MLN.

Two adult male specimens collected seven years apart at Mphanga Rocks, Chilumba, cluster together, close to the main *Tropheops* sp. 'olive' cluster. They have some similarities in overall body shape to *T.* sp. 'olive', with a relatively small head, deep body and long soft dorsal, anal and pelvic fins. When the rather dried out 2016 specimen was first investigated it was suspected to be a dark individual *T.* sp. 'olive' (fig. 913.1), but the 2023 specimen was photographed in a fresher conditions in a photo tank, showing that the majority of the body and upper part of the head are dark blue, which is not consistent with 'olive' (fig. 913.2). The male's eggspots are also quite a dark orange colour, compared to the pale yellow typical of 'olive' males. This then appears to be a further undescribed species, so far recorded only from Mphanga Rocks. The female phenotype is not known. An underwater photo from Chitande Island appear to show a male of this species, so perhaps it ranges more widely than Mphanga Rocks (fig. 913.3).



Fig. 913.1: *Tropheops* sp. 'mphanga', D03-I07 SCUBA, Mphanga Rocks, Chilumba, 23 Feb 2016 [HS].



Fig. 913.2: *Tropheops* sp. 'mphanga', D68-A07, SCUBA at 0-3m depth, Mphanga Rocks, Chilumba, 26 Sept 2023 [MCGDS].



Fig. 913.3: *Tropheops* sp. 'mphanga', male, Chitande Island, 25 Feb 2016 [HS].

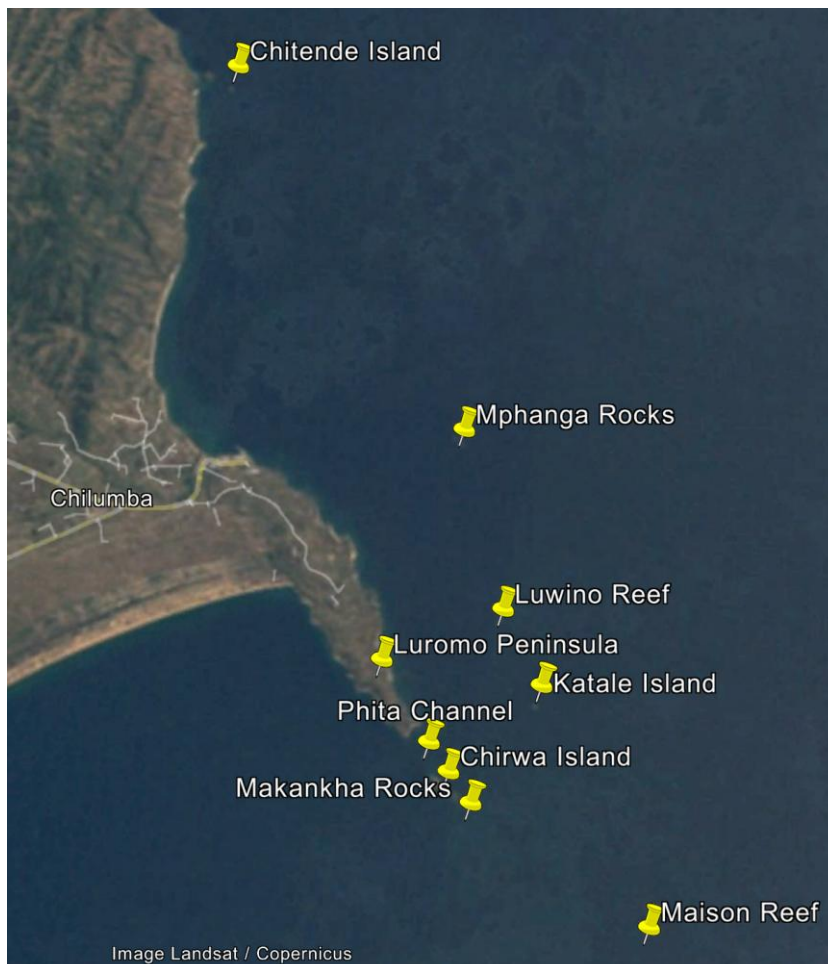


Fig. 913.4: Main sampling sites in the Chilumba area. *Tropheops* sp. 'mphanga' has been sampled from Mphanga Rocks, but probably also photographed at Chitande Island. It may occur at other sites in the area.

MC914. *Labeotropheus* sp. ‘fuelleborni maison’, MLN.

This taxon is very tentatively recognised based on very preliminary unpublished molecular work. Maison reef is the most southerly part of the Chilumba archipelago and is rather isolated from other sites (fig. 913.4). It has only a single LF form, in which males are bright blue with orange sides (well-developed in our photos: fig. 914.1-3), with considerable orange in the soft dorsal and caudal fins. Females are pale brownish (fig. 914.4); no OB or O morph females are known. There is no indication that males ever develop an orange throat: throat and the chest seem grey-white in our records, so it seems phenotypically indistinguishable from *L. chlorosiglos* MC893. That species is reported from Katale Island, Chitande Island and Luwino Reef- all sites to the north of Maison Reef, but neither form is known from the Chirwa/Luloma Peninsula area or Mphanga Rocks. Genetically, it may be closer to *L. aurantinfra* MC890, a species in which males typically do have an orange throat membrane. That species is known from the nearest sites to Maison Reef, namely the Chirwa Island/ Luromo (=Lulomo) Peninsula area, but it also occurs at Chitande and Katale Islands. Given that the Maison Reef population might be genetically distinct from phenotypically indistinguishable populations but genetically closer to phenotypically distinct populations, using cladistic principles, it seems unfortunately unavoidable to have to class it as a distinct taxon, *L. sp. ‘fuelleborni maison’*.

A few individuals from Luwino Reef (otherwise known to be home only to *L. chlorosiglos* among LF ecomorphs) seemed to be genetically admixed and to cluster with the Maison specimens. These were collected in 2016 and photographed a long time post mortem, so little can be said of their colour phenotypes (fig.914.5-7), but *L. chlorosiglos* and *L. sp. ‘fuelleborni maison’* appear to be indistinguishable anyway.



Fig. 914.1: *Labeotropheus* sp. ‘fuelleborni maison’, adult male, D65-D05, Maison Reef [MCGDS].



Fig. 914.2: *Labeotropheus* sp. 'fuelleborni maison', adult male, D67-B01, Maison Reef [MCGDS].



Fig. 914.3: *Labeotropheus* sp. 'fuelleborni maison', adult male, D67-D06, Maison Reef [MCGDS].



Fig. 914.4: *Labeotropheus* sp. 'fuelleborni maison', apparent female, D65-D03, Maison Reef [MCGDS].



Fig. 914.5: *Labeotropheus* sp. 'fuelleborni maison' admixed individual, apparent male, D05-C01, Luwino Reef [MCGDS].



Fig. 914.6: *Labeotropheus* sp. 'fuelleborni maison' admixed individual, apparent male, D05-D02, Luwino Reef [MCGDS].



Fig. 914.7: *Labeotropheus* sp. 'fuelleborni maison' admixed individual, apparent female, D05-F05, Luwino Reef [MCGDS].

MC915. *Pseudotropheus* sp. ‘*lucerna thumbi blue*’, MLS.

This taxon was discovered during the course of searching archived photographs while preparing the present document. There are no published records of any member of the *P. lucerna* complex from the Cape Maclear area, including Domwe, Thumbi West, Otter Point, Mumbo Islands, nor from the Maleris, Chidunga Rocks, Namalenje, Mbenji, Nkhotakota area or Kande Island (see Ribbink et al. 1983, Konings 2016a, c). Likewise, there are no records for the area from the Malawi/Mozambique border through to Makanjila point. However, there are many suitable habitats in these areas, and it seems likely that members of the species complex are present but remain uncharacterised. Certainly, female and immature fishes are commonly seen when snorkelling in suitable areas of small patches of reeds among rocks in very shallow waters, including at Otter Point and Thumbi West, but adult males are less often seen and tend to be very skittish. From Nkhata Bay northwards, ‘*lucerna*’ are identified with the formally described species (Konings 2016a), *P. lucerna* (MC733), while Ribbink et al. (1983) distinguished *Ps. ‘lucerna brown’* (MC749) in the SE Arm of the lake, south of Monkey Bay, so either of these forms might be candidates for populations in the extensive areas in between. However, in 2010, I photographed an adult male at Thumbi West Island which showed the characteristic elongate body shape and dark dorsal fin blotch of a member of the *P. lucerna* complex, in a microhabitat typical for the taxon, of a shallow patch of reeds among rocks (fig. 915.1). While the images are blurry, it can be seen that the male’s colour is very different to males of either *P. lucerna sensu stricto* or *P. sp. ‘lucerna brown’*, with an overall blue colour with white dorsal fin and dark anal and caudal fin markings, more reminiscent of *P. sp. ‘lucerna mozambique’* (MC747) or ‘*lucerna fin spot*’ from Likoma (MC750). Many species from Likoma have been introduced to Thumbi West Island (Ribbink et al. 1983), so this is one possibility. However, *P. sp. ‘lucerna fin spot’* is not known from the aquarium fish trade, and *lucerna*-complex species in general are rarely exported. Another possibility is that this represents the native *P. lucerna* complex for the area. It is provisionally recognised as a distinct taxon, *P. sp. ‘lucerna thumbi blue’*.

In July 2026, an adult male specimen was collected from a shallow reedy area at the same location as the 2010 photos (fig. 915.2). It is available for sequencing. Its body shape and dentition are a good fit for a member of the *P. lucerna* complex (fig. 915.3)

Fig. 915.1: Adult male of *P. sp.* 'lucerna thumbi blue' from Thumbi West Island, showing the typical shallow reedy habitat among rocks (below), July 2010 [GFT]



Fig. 915.2: *Pseudotropheus* sp. 'lucerna thumbi blue' from Thumbi West Island, 3 August 2026 [GFT].



Fig. 915.3: *Pseudotropheus* sp. 'lucerna thumbi blue' from Thumbi West Island (see fig. 915.2), showing bicuspid dentition, with closely-packed columnar bicuspid teeth and slightly retrognathous jaws [GFT].

MC916. *Maylandia melabbranchion* (Stauffer et al. 1997), MLS.

Metriaclima melabbranchion by was described by Stauffer and collaborators in 1997 from Domwe Island, Mitande Rocks (Thumbi West Island), Mumbo Island, Namalenje Island and Zimbabwe Rocks- all locations in the southern part of the lake. The type was from Mumbo and the populations showed considerable geographic variation in principal component plots, with the Mumbo population being both the most distinctive and the most divergent from the type of *M. zebra*. Specimens of this species were distinguished by having dark flank bars that extended into the dorsal fin, while those which did not were assigned to *M. zebra*. Although *M. zebra* and *M. melabbranchion* were reported to co-occur at Mitande Rocks, the multivariate plots did not compare these with each other, but showed each population in comparison to those with the same dorsal fin pattern, assumed to be conspecific. However, 37 morphometric ratio and counts are presented in summary tables, broken down by population, revealing that *M. zebra* and *M. melabbranchion* overlap in 36 of them, the exception being horizontal eye diameter as a percentage of head length, where data error is likely, since the range of values given for *M. melabbranchion* are all greater than the values given for the mean (and the holotype). Thus, it is possible that the extension of bars into the dorsal fin is a polymorphic trait at this location and thus not indicative of species differences. Konings & Geerts (1999) certainly thought so, and synonymised *M. melabbranchion* with *M. zebra*: this has been maintained subsequent Konings works up to and including his 2016 book. Stauffer's description was illustrated with a monochromatic drawing (fig. 916.1), but subsequent photographs (fig. 916.2-3) show rather slender-looking specimens with a relatively small head and jaws, thick dark anterior flank bars, very little pale blue on the upper part of the operculum and a prominent black mark on the spinous anal fin. Examination of the dentition shows the outer rows of adult males at least have relatively large, blunt teeth, often widely-spaced, in a long dental arcade (fig. 916.5).

Recent underwater studies have shown that specimens resembling *M. zebra* from Thumbi West appear to have been translocated to Mumbo Island, and they are readily distinguished from *M. melabbranchion* in the field. It would be useful to have different names for the two taxa in future studies of the development of this secondary contact. Furthermore, it has also become apparent that a third species of the *Maylandia zebra* complex is present on the island. This taxon (MC918, *Maylandia* sp. 'mumbo blue zebra') may also be native, indeed endemic to Mumbo. The two forms have partially overlapping depth preferences, with *M. melabbranchion* preferring deeper water than mumbo blue. Crucially, if there are two sympatric ecomorphologically divergent native species at Mumbo, they can't both be *M. zebra*, but there seems no way to decide among them which fits best with that species. For these reasons, I propose the *M. melabbranchion* be resurrected from synonymy. This would leave the status of the populations at Domwe, Namalenje, Mitande Rocks (Thumbi West)

and Zimbabwe unresolved. At present, it is suggested that the population at Thumbi West might be polymorphic, with a few specimens showing weakly developed extensions of the black barring into the dorsal fin, but otherwise looking much like typical blue-dorsal *M. zebra*. The population at Domwe seems to be more consistent, but again males have less pronounced extensions of the bars than seen in the Mumbo fishes: superficially they seem intermediate in body proportions too. Ribbink et al. (1983) report that the Namalenje population looks the same as the blue dorsal fish from Monkey Bay. A photograph on Cichlidae.com shows a typical Thumbi West-type zebra with a heavy head, deep body, thin anterior flank stripe and a large area of pale blue on the upper part of the operculum. It has relatively weakly developed projections of the flank bars into the lower part of the dorsal fin. For now, I suggest that the populations at Domwe and Namalenje should be retained in *M. zebra* pending further study.

Photographs of specimens from Zimbabwe Rock (Konings 2016) show males with an almost completely black dorsal fin (fig. 916.4). Ribbink et al. (1983) also commented on this (and showed a photograph of a similar-looking male), and mentioned that they are generally very dark overall. However, other photographs on the website Malawi.si (by Mark Thomas and Magnus Sandberg) show heavily-built males that look much like Thumbi West *M. zebra*, with thinner dark anterior flank bars, patches of pale blue on the upper part of the operculum and blue dorsal fins. Perhaps two distinct species co-occur? I suggest that the darker form shown by Konings might be considered an allopatric population of *M. melabbranchion* pending further study.

There is no record of OB/O morph individuals at Mumbo or Zimbabwe Rock.

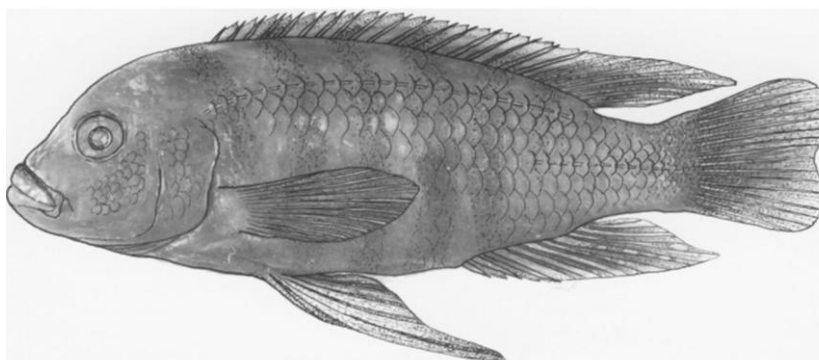


Fig. 916.1: *Maylandia melabbranchion*, male holotype, 84.8mm SL, drawing from original description. .



Fig. 916.2: *Maylandia melabbranchion*, male Mumbo Island [AK].



Fig. 916.3: *Maylandia melabbranchion* male, freshly collected from Mumbo Island, 24th July 2026 [GFT].



Fig. 916.4: *Maylandia melabbranchion*, male, Zimbabwe Rock [AK].



Fig. 916.5: *Maylandia melabbranchion*, males, D88-A03 (left) and D87-C03 (right), collected at Mumbo Island, July 2026. They show widely-spaced, stout, mostly unequally bicuspid teeth, with some simple, in lower jaw, and widely spaced upper jaw teeth. The lips are notably more thickened than those of species such as MC918 [GFT].

MC917. *Maylandia* sp. ‘maleri blue zebra’, MLS.

Ribbink et al. (1983: pp. 161-162 & p. 213, plate 1i) identified an informally described species at the Maleri Islands as *Pseudotropheus zebra* ‘blue’. They were reported from Maleri and Nankoma Islands, but not Nakantenga. Males were stated to be ‘pale powder blue usually without a trace of barring. Dorsal, caudal and anal in pale blue, almost white; 1-5 yellow egg-dummies. Pelvic fins pale blue with black submarginal band’. Females were reported ‘Body and head light brown, fins yellow’. The species was said to favour small-medium rocks at 5-15m but extending from the surface to depths of at least 25m. Males were reported to be aggressive mainly to conspecifics. Females, juveniles and non-territorial adults were reported to form large schools. Diet included plankton and benthos. Occasional OB females were reported (2-5%). At depths of 5-10m, this species was the most numerous mbuna on their transects at Maleri Island.

The combination of pale brownish females with yellow fins and largely unbarred males suggests affinities with the *M. aurora* complex rather than *M. zebra* sensu stricto: plausible relatives in the region include *Maylandia benetos* (MC617) at Mazinzi Reef and Kanchedza Island and *Maylandia chrysomallos* sensu Konings (MC619) at Mumbo Island and the coast from Makanjila north-eastwards. None of the putative aurora group are known to have OB females, but OB females at the Maleri Islands have been widely reported in recent surveys as *M. xanstromachus* (MC683, see Malawi.si, cichlidae.com). Ribbink et al. (1983) reported *M. xanstromachus* (which was then undescribed) as *Pseudotropheus zebra* ‘yellow throat’ (p. 162, plate 2a) but did not mention OB females. It is possible that this may be a case of mistaken identity on their part and that the OB females were not actually zebra ‘blue’ but zebra ‘yellow throat’.

Subsequent to Ribbink’s study, this population was initially regarded as a distinct species (Konings 2001), but Konings & Stauffer (2006) decided to incorporate it into *M. zebra* based on a lack of difference in multivariate shape when compared with a strongly barred population at Namalenje. Thus, it has been pooled into *M. zebra* sensu stricto (Konings 2016), which would obviously be inappropriate if it is indeed a member of the *M. aurora* complex. That, of course, remains to be tested using molecular methods. Overall, given the known high degree of morphological parallelism in Malawi cichlids, similarity in body shape does not seem a particularly convincing reason to regard allopatric populations as conspecific when they show striking differences in colour. For now, I propose the taxon is provisionally identified as a distinct species under the name *Maylandia* sp. ‘maleri blue zebra’. Recent dives at Maleri and Nakantenga indicated that the species is still common at around 5m or deeper in relatively flat areas with small rocks. They did not dominate the community as reported by Ribbink et al., perhaps due to the high abundance of the non-native *Maylandia callainos* which has become established since the time of Ribbink et al.

Four male specimens were collected at Maleri Island for sequencing in 2026, coded as D91-B02-05 (Fig. 917.4).



Fig. 917.1: *Maylandia* sp. 'maleri blue zebra', male, Maleri Island [AK].



Fig. 917.2: *Maylandia* sp. 'maleri blue zebra', male, Chidunga Rocks [AK]



Fig. 917.3: *Maylandia* sp. 'maleri blue zebra', male, Nakantenga Island [GFT]



Fig. 917.4: *Maylandia* sp.
'maleri blue zebra', male,
Maleri Island D91-B03 (also
B2-B5) August 2026
[MCGDS]

MC918. *Maylandia* sp. ‘mumbo blue zebra’, MLS.

This form of the *M. zebra* complex is known from Mumbo Island. It is characterised by faint vertical bars and head markings, uniformly pale blue dorsal and anal fins and a relatively heavy build (fig. 918.1-3). Females are brownish sometimes with faint vertical barring (fig 918.3). Blotched and orange females are not known. Lips are relatively thin and tooth bands are wide, particularly near the symphysis, with relatively large widely-spaced lower jaw teeth and closely-packed columnar outer upper jaw teeth: the teeth are generally conspicuous when the mouth is closed, in contrast to *M. melanochromis* in which they are less obvious (fig. 918.4). The species is most numerous at 0-5m, which is shallower than the sympatric *M. melanochromis*, although there is an area of overlap at around 5-10m. This species seems to be equivalent to *Maylandia fainzilberi*/ *M. xanostomachus*, both in terms of dentition and depth preference. The species was first reported (by myself, fig. 918.5) at Mumbo in 2005, but in recent years, it seems to have been heavily introgressed with genes from *Maylandia callainos* which has been translocated to Mumbo Island, probably from Thumbi West. However, males of the two species could be distinguished with reasonable certainty in the field in surveys in 2026, and the females are clearly different colours (brown v blue/white). A similar phenotype to mumbo blue zebra is found at Otter Point, but they do not seem to be genetically close. The Otter Point form was included in *M. zebra* sensu stricto by Ribbink et al. (1983) and Konings (2016) and this has been followed here (see MC685).



Fig. 918.1: *Maylandia* sp. ‘mumbo blue zebra’ male, Mumbo, July 2026 [GFT].



Fig. 918.2: *Maylandia* sp. ‘mumbo blue zebra’ male, Mumbo, deeper-bodied individual collected by SCUBA., July 2026. The melanistic markings are darker than shown by live individuals under water [GFT].



Fig. 918.3:(above) *Maylandia* sp. 'mumbo blue zebra' male, Mumbo Island, July 2026, showing pale dorsal fin and high eggspot number. [GFT]; below female, Mumbo Island, 2019 [MCGDS].

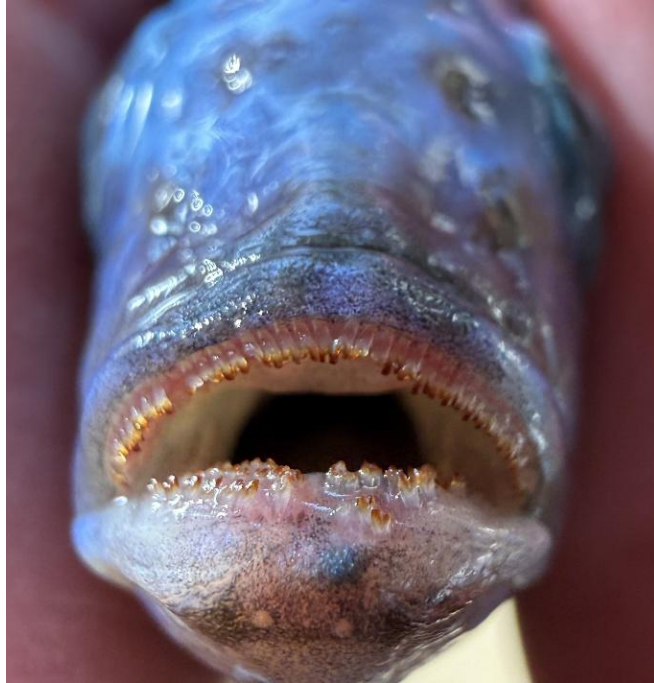


Fig. 918.4: *Maylandia* sp. 'mumbo blue zebra' male, Mumbo Island, July 2026, showing thinner lips than *M. melanbranchion*, and oral dentition with stout well-spaced bicuspid teeth in lower jaw and columnar closely-packed bicuspid teeth in outer series of upper jaw [GFT].



Fig. 918.5: *Maylandia* sp. 'mumbo blue zebra' male, Mumbo Island, 2005 [GFT].

Discussion

The mbuna or Pseudotropheina are a difficult group taxonomically. Reflecting this, when I compiled the initial list of Malawi cichlid taxa in late 2025, I had allocated 321 numbers for the group, but by the time this document was compiled in mid-2026, I needed 352.

An obvious issue with mbuna is local endemism. Most adult mbuna species are strongly associated with rocky shores, and they lack a juvenile dispersal phase, so they are sedentary throughout their life cycle (Ribbink et al. 1983; Genner & Turner 2005). Within the lake, rocky shores comprise a relatively small proportion of the coastline and are patchily distributed, with extensive sandy beaches, swampy reedbeds or river mouths separating rocky headlands and areas of sand/mud plains and open water separating islands. Rock-associated mbuna can show strongly significant genetic differentiation across quite narrow habitat barriers, of 10s to 100s of metres (van Oppen et al. 1997; Rico & Turner 2002). Such populations showed negligible phenotypic differentiation, but clear differences can be seen on a slightly larger scale. For example, *Maylandia zebra* males have much stronger barring at Thumbi West than at Otter Point (Ribbink et al. 1983), although the two sites are only around 1.6km apart at the closest point. Moreover, a good number of species are not shared between the sites, and quite a few species that were introduced to Thumbi West in the 1970s (Ribbink et al. 1983) have still not been detected at Otter Point more than 50 years later. Mumbo Island, which is about 5.5 km from Thumbi West has a number of populations considered to be endemic species (Ribbink et al. 1983). Similarly, different mbuna species are found at Chizumulu and Likoma Islands which are about 10km apart. Distinct species are found at Likoma and the rocky headland at Cobue in Mozambique, about 4km away (Konings 2016a). Sometimes, distinct ecomorphs appear to have failed to colonise particular regions of the lake: for example, the highly distinctive *Abactochromis labrosus* (MC510), with its laterally compressed body and expanded fleshy lips, appears to be entirely absent from the southern arms of the lake, including all the rocky islands and headlands around the Nankumba Peninsula (Oliver & Arnegard 2010). The zooplanktivorous mbuna with unicuspid teeth of genus *Cynotilapia* also appear to have been completely missing from the same area, but *C. zebroides* was among the species introduced at Thumbi West Island in the 1970s (Ribbink et al. 1983). It is now one of the most abundant and conspicuous mbuna in the community (Young et al. 2009; Konings 2016a). Other highly successful introduced species in the area include *Maylandia aurora* and *M. callainos*, although their ecomorphological distinctness is less obvious.

Although there is evidence that ecomorphologically divergent taxa may be geographically restricted, a far more obvious source of geographic (beta) diversity (Genner et al. 2004) comes from differentiation in colour, particularly (but not only) in the colour of territorial males (Ribbink et al. 1983; Genner & Turner 2005; Konings 2016a). Territorial male colour is believed to be under strong sexual selection, both as a signal between rival males and as a

mating signal towards females (Cooke & Turner 2018). There is evidence that male colour in haplochromine cichlids can be influenced by environmental factors: for example: rock-associated *Pundamilia* species in Lake Victoria show a tendency to divergence in male colour, female preference and visual systems across a depth gradient, resulting in largely blue-grey males in shallower water and red-yellow males in deeper water (Seehausen et al. 2008), with evidence of parallel divergence in different localities resulting in effectively the same species pair arising independently (Meier et al. 2018). A similar process seems to be operating in the Tanzanian crater lake *Astatotilapia*, where riverine yellow males are replaced by blue males in the deeper waters of Lake Masoko and by dark grey to black males in several other lakes (Turner et al. 2019). However, Deutsch (1997) did not find any significant association between male colour and microhabitat among Malawi rocky shore species. This may be a consequence of the relative clarity of the water on many rock coasts, permitting a broad light spectrum to penetrate to depths that can be surveyed by conventional SCUBA divers. The factors responsible for driving divergence in mbuna colour in allopatry remain obscure. Environmental factors may play a role, but it is possible that community interactions among species may favour divergence to increase discrimination between heterospecifics which may compete to a varying extent for space and food, along with conspecifics that are also rivals for mating opportunities. Female preference may also play a role: mating trials have indicated strong preference for conspecifics in comparisons of sympatric species (Knight et al. 1998; Plenderleith et al. 2005) and weaker preferences among allopatric populations (Knight & Turner 2004; Pauers et al. 2010). Males may also recognise conspecific females (Knight & Turner 1999; Pauers et al. 2010), although not always (van Oppen et al. 1998; Knight & Turner 1999). Irrespective of the reasons, there are many allopatric mbuna populations which differ markedly in colour and there are good reasons to suspect that this often reflects both ancestry and functional significance. Most currently active taxonomists reject the use of subspecies to delineate geographic variants differing in features such as colour, and follow variants of the evolutionary species concept which allows essentially any geographically isolated population to be designated as a distinct species (Wiley 1978; de Queiroz 1998), even if it lacks any obvious phenotypic traits that permit it to be diagnosed. Indeed, outside of the Lake Malawi cichlid radiation, many species across a range of taxa are presently diagnosed simply on the basis that they are resolved as a clade on a mitochondrial DNA-based phylogeny (see Turner 2024; Wüster 2025 for critiques). This approach does not really function well in Malawi cichlids, because even sympatric fully reproductively isolated species, often differing sufficiently to be placed in different genera do not show clear differentiation in mitochondrial DNA sequences. Informal species delimitation used in the present work, is largely dependent on the publications of Konings (mainly the illustrated books of 2016a and earlier editions), building on the earlier work of Ribbink et al. (1983). Many taxa treated as a single species in fact comprise a number of geographically isolated populations that differ unambiguously in features such as male breeding colour: these would almost certainly be regarded as a complex of different species in many other taxa, as has been argued by Pauers (2010),

specifically in the case of *Labeotropheus* species. A further complexity arises from the observation that some colour forms of species show a strongly disjunct distribution: for example the 'classic' *Maylandia zebra* is blue & black barred, including dark forehead stripes, dark cheeks and chin and a blue dorsal fin. This colour form occurs in several localities throughout the lake, but often with other colour forms in between. The orange dorsal forms *M. emmiltos* and *M. pyrrhonotus* are essentially indistinguishable from one another but occur at opposite ends of the lake. Molecular studies even with relatively primitive techniques showed that these geographically distant but phenotypically similar populations were often not closely related (Allender et al. 2003), a pattern which continues to be supported by whole-genome based analyses in progress. Currently, while the orange dorsal forms are regarded as heterospecific, many blue-dorsal forms which are just as divergent genetically are regarded as conspecific *M. zebra* populations. This seems inconsistent. Similar patterns seem to be emerging with other taxa, including *Tropheus*, *Labeotropheus* and *Petrotilapia*. Although there have been few investigations to date, laboratory trials by Blais et al. (2009) indicated strong assortative mating among similarly coloured allopatric *Maylandia* populations, with indications that it could be based on non-visual signals. Thus, I believe that so far I have been rather conservative in designation of species among the mbuna, as has Konings (2016a). Consequently, it seems likely that the number of recognised mbuna species is likely to rise as further investigations are undertaken.

Acknowledgements

I am grateful to all my collaborators over the many years I have been working on Malawi cichlid taxonomy. Specifically, in the current programme of studies (since around 2012), many of the specimens were collected for genome sequencing projects funded through Cambridge University and later also the University of Antwerp, led by Richard Durbin, Eric Miska, Emilia Santos and Hannes Svandal, with major contributions in terms of unpublished data analysis and interpretation from Moritz Blumer, Bettina Fischer and Sing Wei Lim. I am grateful to Juan Artigas, Martin Genner, Ad Konings, Mike Oliver, Mike Pauers, Mark Smith and Jay Stauffer for helpful comments, unpublished information and permission to use images. Access to collections has been particularly important and I am grateful to Mathew Lowe and Natalie Jones at Cambridge and to Rupert Collins, Oliver Crimmen and James Maclaine in London.

References

Ahl, E. 1926. Einige neue Fische der Familie Cichlidae aus dem Nyassa-See. *Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin* 1926, 51-62.

Allender, C.J., Seehausen, O., Knight, M.E., Turner, G.F. & Maclean, N. 2003. Divergent selection during speciation of Lake Malawi cichlid fish inferred from parallel radiations in nuptial coloration. *Proceeding of the National Academy of Sciences, USA* 100, 14074-14079.

Axelrod, H.R. & Burgess, W.E. 1986. *African Cichlids of Lakes Malawi and Tanganyika*, 11th Edition, TFH Publications, Neptune City, NJ, USA.

Baran, N.M. & Streelman, J.T. 2020. Ecotype differences in aggression, neural activity and behaviorally relevant gene expression in cichlid fish. *Genes, Brain and Behavior* 19, e12657

Barnes, B.H. 1933. *Johnson of Nyasaland. A Study of the Life and Work of William Percival Johnson, D.D. Archdeacon of Nyasa, Missionary Pioneer*. Universities Mission to Central Africa, Westminster, UK. 258pp.

Barson, N.J., Knight, M.E. & Turner, G.F. 2007. The genetic architecture of male colour differences between a sympatric Lake Malawi cichlid species pair. *Journal of Evolutionary Biology* 20, 45-53.

Behrens, K.A., Jailwala, S., Clark, F.E, Meyer, A.C., Kumar, N.M., Konings, A.F., Roberts, R.B., Conte, M.A., Streelman, J.T., McGrath, P.T. & Kocher, T.D. 2025. A chromosome inversion creates a supergene for sex and colour in Lake Malawi cichlids. *Molecular Ecology* 34, e17821.

Blais, J., Plenderleith, M., Rico, C., Taylor, M.I., Seehausen, O., van Oosterhout, C. & Turner, G.F. 2009. Assortative mating among Lake Malawi cichlid fish populations is not simply predictable from male nuptial colour. *BMC Evolutionary Biology* 9: 53.

Blumer, M., Burskaia, V., Artiushin, I., Saha, J., Camacho García, J., Campuzano Jimenez, F., Hooft van Huysdynen, A., Elkin, J., Fischer, B., van Houtte, N., Zhou, C., Gresham, S., Malinsky, M., Linderoth, T., Sawasawa, W., Vernaz, G., Bista, I. Hickey, A., Kucka, M., Louzada, S., Zatha, R., Yang, F., Rusuwa, B., Santos, M.E., Chan, Y.F., Joyce, D.A., Böhne, A., Miska, E.A., Ngochera, M., Turner, G.F., Durbin, R., Svoldal, H. 2025. Introgression dynamics of sex-linked chromosomal inversions shape the Malawi cichlid adaptive radiation. *Science* 388, 6752.

Bouchet, P., Decock, W., Lonneville, B., Vanhoorne, B. & Vandepitte, L. 2023. Marine biodiversity discovery: the metrics of new species descriptions. *Frontiers in Marine Science* 10, 929989.

Boulenger, G.A. 1897. Descriptions of new fishes from the Upper Shiré River, British Central Africa, collected by Dr. Percy Rendall, and presented to the British Museum by Sir Harry H. Johnston, K. C. B. *Proceedings of the Zoological Society of London* 1896 (4), 915-920, Pl. 47

Boulenger, G.A. 1899. A revision of the African and Syrian fishes of the family Cichlidae. Part II. *Proceedings of the Zoological Society of London* 1899 (1), 98-143 [1-47], Pls. 11-12.

- Boulenger, G.A. 1901. Diagnoses of new fishes discovered by Mr. J. E. S. Moore in lakes Tanganyika and Kivu. II. Cichlidae, Mastacembelidae. *Annals and Magazine of Natural History* (Series 7) v. 7, 1-6.
- Bowers, N. J. & Stauffer, J.R, Jnr. 1993. New species of rock-dwelling cichlid (Pisces: Cichlidae) from Lake Malawi, Africa, with comments on *Melanochromis vermivorus* Trewavas. *Copeia* 1993(3), 715-722.
- Bowers, N. J. & Stauffer, J.R, Jnr. 1997. Eight new species of rock-dwelling cichlids of the genus *Melanochromis* (Teleostei: Cichlidae) from Lake Malawi, Africa. *Ichthyological Explorations of Freshwaters* 8, 49-70.
- Burgess, W.E. 1976a. Studies on the family Cichlidae: 7. *Cynotilapia axelrodi*, a new species of mbuna from Lake Malawi (Pisces: Cichlidae). *Tropical Fish Hobbyist* 25 (2), 37-44.
- Burgess, W.E. 1976b. Studies on the family Cichlidae: 3. A new *Melanochromis* from Lake Malawi, with comments on the genus. *Tropical Fish Hobbyist* 24 (6), 61-65
- Burgess, W.E. 1976c. Studies on the family Cichlidae: 5. *Pseudotropheus aurora*, a new species of cichlid fish from Lake Malawi. *Tropical Fish Hobbyist* 24 (9), 52-56.
- Burgess, W.E. 1976d. Studies on the family Cichlidae: 6. A new shell-dwelling cichlid from Lake Malawi and its inquiline catfish. *Tropical Fish Hobbyist* 25 (1), 39-48.
- Burgess, W.E. 1977. Studies on the family Cichlidae: 8. *Pseudotropheus lombardoi*, a new species of Lake Malawi Mbuna with reversed sexual coloration (Pisces: Cichlidae). *Tropical Fish Hobbyist* 26 (2), 63-67.
- Burgess, W. E. & Axelrod, H.R. 1975. *Pseudotropheus tursiops*, a new species of cichlid fish from Lake Malawi. *Tropical Fish Hobbyist* 24 (3), 86-90.
- Burgess, W. E. & Axelrod, H.R. 1976. Studies on the family Cichlidae: 4. Two new species of mbuna (rock-dwelling cichlids) from Lake Malawi. *Tropical Fish Hobbyist* 24 (7), 44-49, 52.
- Camacho García, J.I., Vernaz, G., Malinsky M., Ngochera, M.J., Joyce, D.A. & Svardal, H. 2025. Widespread genetic signals of visual system adaptation in deepwater cichlid fishes. *Molecular Biology and Evolution* 42, 1–19
- Ciccotto, P.J., Konings, A.F. & Stauffer, J.R. Jr. 2011. Descriptions of five new species in the genus *Metriaclima* (Teleostei: Cichlidae) from Lake Malaŵi, Africa. *Zootaxa* 2738, 1-25.
- Colombé, J. 1979. *Pseudotropheus tropheops romandi*, sous-espèce nouvelle du lac Malawi (Pisces, Teleostei, Cichlidae). *Revue française d'Aquariologie et Herpetologie* 6 (2), 33-39.
- Condé, B. & Géry, J. 1999. *Maylandia* Meyer et Foerster, 1984, un nom générique disponible (Teleostei, Perciformes, Cichlidae). *Revue française d'Aquariologie Herpétologie* 26, 21-22.

Cooke, G.M. & Turner, G.F. 2018. Team colours matter when playing away from home: aggression biases in geographically isolated mbuna cichlid populations. *Hydrobiologia* 809, 31-40.

de Queiroz, K. 1998. The general lineage concept of species, species criteria, and the process of speciation: a conceptual unification and terminological recommendations. In: Howard, D.J., & Berlocher, S.H. (eds) *Endless forms: species and speciation*. Oxford University Press, Oxford, pp 57–75

Deutsch, J.C. 1997. Colour diversification in Malawi cichlids: evidence for adaptation, reinforcement or sexual selection? *Biological Journal of the Linnean Society* 62, 1–14.

Eccles, D. H. 1973. Two new species of cichlid fishes from Lake Malawi (formerly known as Lake Nyasa). *Arnoldia (Rhodesia)* 6 (16): 1-7.

Fricke, R., Eschmeyer, W. N. & van der Laan, R. (eds) 2026. Eschmeyer's Catalog of Fishes: Genera, Species, References. <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. Electronic version accessed up to 2 April 2026.

Fryer, G. 1956a. New species of cichlid fishes from Lake Nyasa. *Revue de Zoologie et de Botanique Africaines* 53, 81-91.

Fryer, G. 1956b. A new species of *Labeotropheus* from Lake Nyasa, with a redescription of *Labeotropheus fuelleborni* Ahl, and some notes on the genus *Labeotropheus* (Pisces: Cichlidae). *Revue de Zoologie et de Botanique Africaines* 54, 280-289.

Fryer, G. 1957. A new species of *Gephyrochromis* (Pisces: Cichlidae) from Lake Nyasa, with notes on its ecology and affinities. *Revue de Zoologie et de Botanique Africaines* 55, 347-352.

Fryer, G. 1959. The trophic interrelationships and ecology of some littoral communities in Lake Nyasa with especial reference to the fishes, and a discussion of the evolution of a group of rock-frequenting Cichlidae. *Proceedings of the Zoological Society of London* 132, 153-281.

Fryer, G. & Iles, T.D. 1972. *The Cichlid Fishes of the Great Lakes of Africa. Their Biology and Evolution*. Oliver & Boyd, Edinburgh. 641pp.

Fryer, G., Greenwood, P. H. & Trewavas, E. 1955. Scale-eating habits of African cichlid fishes. *Nature* 175, 1089-1090.

Genner, M.J. & Turner, G.F. 2005. The Mbuna cichlids of Lake Malawi: a model for rapid speciation and adaptive radiation. *Fish & Fisheries* 6, 1-34.

Genner, M.J., Turner, G.F., Barker, S. & Hawkins, S.J. 1999a. Niche segregation among Lake Malawi fishes? Evidence from stable isotope signatures. *Ecology Letters* 2, 185-190.

Genner, M.J., Turner, G.F. & Hawkins, S.J. 1999b. Resource control by territorial male cichlids in Lake Malawi. *J. Anim. Ecology* 68, 522-529.

Genner, M.J., Taylor, M.I., Cleary, D.F.R., Hawkins, S.J., Knight, M.E. & Turner, G.F. 2004. Beta diversity of rock-restricted cichlid fishes from Lake Malawi: importance of environmental and spatial factors. *Ecography* 27, 601-610.

Genner, M.J., Botha, A. & Turner, G.F. 2006. Translocations of rocky habitat cichlid fishes to Nkhata Bay, Lake Malawi. *Journal of Fish Biology* 69, 622-628.

Günther, A. 1894. Second report on the reptiles, batrachians, and fishes transmitted by Mr. H. H. Johnston, C. B., from British Central Africa. *Proceedings of the Zoological Society of London* 1893 (pt 4), 616-628, Pls. 53-57.

Happold, D. 2011. *African Naturalist*. Book Guild Publishing, Sussex, England. 290pp.

Holzberg, S. 1978. A field and laboratory study of the behaviour and ecology of *Pseudotropheus zebra* (Boulenger) an endemic cichlid of Lake Malawi (Pisces, Cichlidae). *Zeitschrift für zoologische Systematik und Evolutionsforschung* 16, 171-187.

Hulsey, C.D., Franchini, P., Masonick, P., Kautt, A., Machado-Schiaffino, G., Pippel, M., García-de León, F.J., Myers, E. & Meyer, A. 2026. Divergence at the IRX gene cluster underlies extreme trophic polymorphism in a cichlid fish (*Herichthys minckleyi*). *Communications Biology* 9, 508.

Johnson, D. S. 1974. Three new cichlids from Lake Malawi. *Today's Aquarist* 1(3), 38-42.

Johnson, D. S. 1975. More new Malawi cichlids. A proposed method of classifying species of the genera *Melanochromis* and *Pseudotropheus* by color pattern. *Today's Aquarist* 2 (1), 15-25.

Johnson, D. S. 1976. Two new cichlids of the Mbuna group from Malawi with a discussion of several bicuspid toothed *Labidochromis* sp. *Today's Aquarist* 2(3):17-24.

Johnson, D.S. 1985. Lake Malawi's monster *Melanochromis*. *Melanochromis robustus* sp. n. *Today's Aquarist* [new series] 1 (1).

Keeley, E.R., Parkinson, E.A. & Taylor, E.B. 2007. The origins of ecotypic variation of rainbow trout: A test of environmental vs. genetically based differences in morphology. *Journal of Evolutionary Biology* 20, 725-736.

Knight, M.E. & Turner, G.F. 1999. Reproductive isolation among closely related Lake Malawi cichlids: can males recognise conspecific females by visual cues? *Animal Behaviour* 58, 761-768

Knight, M.E. & Turner, G.F. 2004. Laboratory mating trials indicate incipient speciation by sexual selection among populations of the cichlid fish *Pseudotropheus zebra* from Lake Malawi. *Proceedings of the Royal Society of London B* 271, 675-680.

Knight, M.E., Turner, G.F. Rico, C., van Oppen, M.J.H. & Hewitt, G.M. 1998. Microsatellite paternity analysis on captive Lake Malawi cichlids supports reproductive isolation by direct mate choice. *Molecular Ecology* 7, 1605-1610.

Konings, A. 1989. *Malawi cichlids in their natural habitat*. Verduijn Cichlids, Rotterdam, Netherlands.

Konings, A. 1990a. *Ad Konings's Book of Cichlids and All the Other Fishes of Lake Malawi*. TFH Publications. 496 pp.

Konings, A. F. 1990b. Descriptions of six new Malawi cichlids. *Tropical Fish Hobbyist* 38 (no. 11), 110-129.

Konings, A. F. 1994. *Pseudotropheus demasoni* sp. nov.: a sexually monomorphic cichlid from the Tanzanian coast of Lake Malawi. *The Cichlids Yearbook* 4, 24-27.

Konings, A. 1995a. *Malawi cichlids in their natural habitat*. 2nd Ed. Cichlid Press, Germany.

Konings, A.F. 1995b. Description of *Pseudotropheus estherae* sp. nov., the well-known red zebra cichlid from Lake Malawi. *Tropical Fish Hobbyist* 43 (9), 206-210.

Konings, A. 1998. Comments on the classification of species of the genus *Melanochromis*. *Cichlid News Magazine* 7(4), 6-16

Konings, A. 2001. *Malawi cichlids in their natural habitat*. 3rd edition. Cichlid Press, El Paso, Texas; 352 pp.

Konings, A. 2004. More discoveries from Lake Malawi. *Cichlid News Magazine* 13(2), 6–13.

Konings, A. 2007a. *Malawi cichlids in their natural habitat*. 4th edition. Cichlid Press, El Paso, Texas; 424 pp.

Konings, A. 2007b. *Gephyrochromis*, there is "moore" to it than you think. *Cichlid News Magazine* 16(2), 16-21.

Konings, A. 2008. *Melanochromis heterochromis* Bowers & Stauffer, 1993. *Cichlid Room Companion*. Retrieved on Mar 08, 2026, from: <https://cichlidae.com/species.php?id=908>.

Konings, A. 2009. *Metriaclima zebra* (Boulenger, 1899). *Cichlid Room Companion*. Retrieved on Jan 02, 2026, from: <https://cichlidae.com/species.php?id=81>.

Konings, A. 2011. *Metriaclima estherae* (Konings, 1995). *Cichlid Room Companion*. Retrieved on Dec 31, 2025, from: <https://cichlidae.com/species.php?id=78>.

Konings, A. 2016a. *Malawi cichlids in their natural habitat*. 5th Edn. Cichlid Press, El Paso, TX. 432pp.

- Konings, A. 2016b. *Chindongo* Li, Konings & Stauffer, 2016. Cichlid Room Companion. Retrieved on Apr 03, 2026, from: <https://cichlidae.com/genus.php?id=296>
- Konings, A. 2016c. *Pseudotropheus lucerna* Trewavas, 1935. Cichlid Room Companion. Retrieved on Jan 11, 2026, from: <https://cichlidae.com/species.php?id=535>
- Konings, A. 2020. *Metriaclima* Stauffer, 1997. Cichlid Room Companion. Retrieved on Jan 05, 2026, from: <https://cichlidae.com/genus.php?id=31>.
- Konings, A. 2022. The importance of record keeping: the case of *Tropheops*. *Cichlid News Magazine* 31(3), 32-36
- Konings, A. 2024. *Labeotropheus* —A taxonomic nightmare. *Cichlid News Magazine* 33(1), 6-15.
- Konings, A. & Kazembe, J. 2018. *Tropheops novemfasciatus*. *The IUCN Red List of Threatened Species*. e.T61159A148675214. DOI: 10.2305/IUCN.UK.2018-2.RLTS.T61159A148675214.en
- Konings, A. & Stauffer, J.R. Jr. 2006. Revised diagnosis of *Metriaclima* (Teleostei: Cichlidae) with description of a new species from Lake Malawi National Park, Africa. *Ichthyological Explorations of Freshwaters*.17, 233-246.
- Konings, A. F. & Stauffer, J. R., Jr. 2012. Review of the Lake Malawi genus *Melanochromis* (Teleostei: Cichlidae) with a description of a new species. *Zootaxa* 3258, 1-27
- Konings, A., Miller, T.A. & Stauffer, J.R., Jr. 2024. Description of a rock-dwelling cichlid that re-invaded the sand substrate in Lake Malaŵi, Africa. *Zootaxa* 5399, 181–189.
- Konings-Dudin, G., Konings, A. & Stauffer, J.R., Jr. 2009. Descriptions of three new species of *Melanochromis* (Teleostei: Cichlidae) and a redescription of *M. vermivorus*. *Zootaxa*, 2076, 37–59
- Lewis, D.S.C. 1982. A revision of the genus *Labidochromis* (Teleostei: Cichlidae) from Lake Malawi. *Zoological Journal of the Linnean Society* 75, 189-265.
- Lewis, D.S.C., Reinthal, P. & Trendall, J. 1986. *A guide to the fishes of Lake Malawi National Park*. World Wildlife Fund.
- Li, S., Konings, A.F. & Stauffer, J.R. 2016. A revision of the *Pseudotropheus elongatus* species group (Teleostei: Cichlidae) with description of a new genus and seven new species. *Zootaxa*. 4168 1-29.
- Louw, I. 2025. The pulchritude of *Cynotilapia* sp. ‘maleri’. A true “Afra.” *Cichlid News* 34(2) 34-37.

Lu, G., Basley, D.J. & Bernatchez, L. 2001. Contrasting patterns of mitochondrial DNA and microsatellite introgressive hybridization between lineages of lake whitefish (*Coregonus clupeaformis*); relevance for speciation. *Molecular Ecology* 10, 965-985.

Lundeba, M., Stauffer, J.R., Jr. & Konings, A. 2011. Five new species of the genus *Petrotilapia* (Teleostei: Cichlidae), from Lake Malawi, Africa. *Ichthyological Explorations of Freshwater* 22, 149-168.

Malinsky M., Challis, R., Tyers, A.M., Schiffels, S., Terai, Y., Ngatunga, B.P., Miska, E.A., Durbin, R., Genner, M.J. & Turner, G.F. 2015. Genomic islands of speciation separate cichlid ecomorphs in an East African crater lake. *Science* 350, 1493-1498.

Malinsky, M., Svardal, H., Tyers, A.M., Miska, E.A., Genner, M.J., Turner, G.F. & Durbin, R. 2018. Whole-genome sequences of Malawi cichlids reveal multiple radiations interconnected by gene flow. *Nature Ecology & Evolution* 2, 1940-1955.

Marconi, A., Yang, C. Z., McKay, S. & Santos, M.E. 2023. Morphological and temporal variation in early embryogenesis contributes to species divergence in Malawi cichlid fishes. *Evolution & Development* 25, 170–193.

Marsh, A. C. 1983. A taxonomic study of the fish genus *Petrotilapia* (Pisces: Cichlidae) from Lake Malawi. *Ichthyological Bulletin of the J. L. B. Smith Institute of Ichthyology* 48, 1-14.

Mayall, J. 1973. The Malawi-Tanzania boundary dispute. *The Journal of Modern African Studies*, 11, 611-628.

Mayden, R.L. 1997. A hierarchy of species concepts: the denouement of the species problem. In: *The Units of Biodiversity - Species in Practice*, Special Vol.54 (eds. M.F. Claridge, H.A. Dawah & M.R. Wilson). Chapman and Hall Ltd, London, pp. 381-424.

Mayden, R.L. 1999. Consilience and a hierarchy of species concepts: advances toward closure on the species puzzle. *Journal of Nematology* 31, 95–116.

Mayr, E. 1969. *Principles of Systematic Zoology*. McGraw Hill, New York.

McKaye, K. R. & Stauffer, J.R., Jr. 1986. Description of a gold cichlid (Teleostei: Cichlidae) from Lake Malawi, Africa. *Copeia* 1986(4), 870-875.

McKaye, K.R., Kocher, T., Reinthal, P., Harrison, R. & Kornfield, I. 1984. Genetic evidence for allopatric and sympatric differentiation among morphs of a Lake Malawi cichlid fish. *Evolution* 38, 215-219.

Meier, J.I., Marques, D.A., Wagner, C.E., Excoffier, L. & Seehausen, O. 2018. Genomics of parallel ecological speciation in Lake Victoria Cichlids. *Molecular Biology and Evolution* 35, 1489–1506.

Meier, J.I., McGee, M.D., Marques, D.A., Mwaiko, S., Kishe, M., Wandera, S., Neumann, D., Mrosso, H., Chapman, L.J., Chapman, C.A., Kaufman, L., Taabu-Munyaho, A., Wagner, C.E., Bruggmann, R., Excoffier, L. & Seehausen, O. 2023. Cycles of fusion and fission enabled rapid parallel adaptive radiations in African cichlids. *Science* 381, eade2833.

Meyer, M.K. & Förster, W. 1984. Un nouveau *Pseudotropheus* du lac Malawi avec des remarques sur le complexe *Pseudotropheus-Melanochromis* (Pisces, Perciformes, Cichlidae). *Revue Française d'Aquariologie Herpétologie* 10, 107-112.

Meyer, M.K. & Scharl, M. 1984. *Pseudotropheus (Maylandia) hajomaylandi* n. sp., a new taxon from Lake Malawi. *Revue française d'Aquariologie Herpétologie* 11, 51-56.

Miller, T.A., Konings, A.F. & Stauffer, J.R., Jr. 2021. Descriptions of two new shell-dwelling species of *Metriaclima* (Cichlidae) from Lake Malawi, Africa. *Zootaxa* 5052, 419-432.

Oliver, M.K. 1975. *Labidochromis textilis*, a new cichlid fish (Teleostei: Cichlidae) from Lake Malawi. *Proceedings of the Biological Society of Washington* 88, 319-330.

Oliver, M.K. 2024. African cichlid fishes: morphological data and taxonomic insights from a genus-level survey of supraneurals, pterygiophores, and vertebral counts (Ovalentaria, Blenniiformes, Cichlidae, Pseudocrenilabrinae). *Biodiversity Data Journal* 12 :e130707.

Oliver, M. K. & Arnegard, M.E. 2010. A new genus for *Melanochromis labrosus*, a problematic Lake Malawi cichlid with hypertrophied lips (Teleostei: Cichlidae). *Ichthyological Exploration of Freshwaters* 21, 209-232.

Oliver, M. & Loiselle, P.V. 1972. A new genus and species of cichlid of the mbuna group (Pisces: Cichlidae) from Lake Malawi. *Revue de Zoologie et de Botanique Africaines* 85, 309-320.

Pauers, M.J. 2010. Species concepts, speciation, and taxonomic change in the Lake Malawi mbuna, with special reference to the genus *Labeotropheus* Ahl 1927 (Perciformes: Cichlidae). *Reviews in Fish Biology and Fisheries* 20, 187-202.

Pauers, M.J. 2016. Two new and remarkably similarly colored species of *Labeotropheus* (Perciformes: Cichlidae) from Lake Malaŵi, Africa. *Copeia* 104, 628-638.

Pauers, M.J. 2017. A new species of *Labeotropheus* (Perciformes: Cichlidae) from southern Lake Malaŵi, Africa. *Copeia* 105, 399-414.

Pauers, M.J. & Phiri, T.B. 2023. Six new species of *Labeotropheus* (Cichliformes: Cichlidae) from the Malaŵian Shore of Lake Malaŵi, Africa. *Ichthyology & Herpetology* 112, 264-292.

Pauers M.J., Ehlinger, T.J. & McKinnon, J.S. 2010. Female and male visually-based mate preferences are consistent with reproductive isolation between populations of the Lake Malawi endemic *Labeotropheus fuelleborni*. *Current Zoology* 56, 65-72.

Plenderleith, M., van Oosterhout, C., Robinson, R.L. & Turner, G.F. (2005) Female preference for conspecific males based on olfactory cues in a Lake Malawi cichlid fish. *Biology Letters* 1, 411-414.

Regan, C. T. 1922. The cichlid fishes of Lake Nyassa. *Proceedings of the Zoological Society of London* 1921 (4), 675-727, Pls. 1-6.

Reinthal, P.N. 1990. The feeding habits of a group of herbivorous rock-dwelling cichlid fishes (Cichlidae: Perciformes) from Lake Malaŵi, Africa. *Environmental Biology of Fishes*, 27, 215–233.

Ribbink, A.J. & Lewis, D.S.C. 1982. *Melanochromis crabro* sp. nov.: a cichlid fish from Lake Malawi which feeds on ectoparasites and catfish eggs. *Netherlands Journal of Zoology* 32, 72-87.

Ribbink, A. J., B.A. Marsh, A.C. Marsh, A.C. Ribbink, B.J. Sharp. 1983. A preliminary survey of the cichlid fishes of rocky habitats in Lake Malawi. *South African Journal of Zoology* 18, 149–310

Rico, C. & Turner, G.F. 2002. Extreme microallopatric divergence in a cichlid fish from Lake Malawi. *Molecular Ecology* 11, 1585-1590.

Rico, C., Bouteillon, P., van Oppen, M.J.H., Knight, M.E., Hewitt, G.M. & Turner, G.F. 2003. No evidence for parallel sympatric speciation in cichlid species of the genus *Pseudotropheus* from north western Lake Malawi. *Journal of Evolutionary Biology* 16, 37-46.

Ronco, F., Matschiner, M., Böhne, A., Boila, A., Büscher, H.H., El Taher, A., Indermaur, A., Malinsky, M, Ricci, V. Kahmen, A., Jentoft, S. & Salzburger, W. 2020a. Drivers and dynamics of a massive adaptive radiation in cichlid fishes. *Nature* 589, 76-81.

Ronco, F., Büscher, H.H., Indermaur, A. & Salzburger, W. 2020b. The taxonomic diversity of the cichlid fish fauna of ancient Lake Tanganyika, East Africa. *Journal of Great Lakes Research* 46, 1067–1078

Ruffing, R.A., Lambert, A. & Stauffer, J.R., Jr. 2006. Description of a new species of *Petrotilapia* (Teleostei: Cichlidae), from Lake Malaŵi, Africa. *Proceedings of the Biological Society of Washington* 119, 534-539.

Sawasawa, W., Hooft van Huysduynen, A., Gresham, S., Sungani, H., Rusuwa, B., De Boeck, G., Turner, G.F., Ngochera, M. & Svardal, H. 2024. Population genomic analysis reveals cryptic population structure in the commercially important Lake Malawi cichlid *Copadichromis mloto* (Iles, 1960). *Hydrobiologia* 852, 3801-3817.

Scharpf, C. 2025. Scantly clad but not naked: an analysis of the *Metriaclima* vs. *Maylandia* (Teleostei: Cichlidae) debate. *Zootaxa* 5620, 461-469.

- Scherz, M.D., Masonick, P., Meyer, A. & Hulsey, C.D. 2022. Between a rock and a hard polytomy: phylogenomics of the rock-dwelling Mbuna cichlids of Lake Malawi. *Systematic Biology* 71, 741–757.
- Schröder, J. H. 1980. Morphological and behavioural differences between BB/OB and B/W colour morphs of *Pseudotropheus zebra* Boulenger (Pisces: Cichlidae). *Zeitschrift für zoologische Systematik und Evolutionsforschung* 18, 69–76.
- Seegers, L. 1996. The identity of *Pseudotropheus elongatus*, with the description of *P. longior* from Mbamba Bay, Tanzania, and notes on *Genyochromis mento* (Teleostei: Cichlidae). *Ichthyological Explorations of Freshwaters* 7, 97-110.
- Seehausen, O., Terai, Y., Magalhaes, I.S., Carleton, K.L., Mrosso, H.D.J., Miyagi, R., van der Sluijs, I., Schneider, M.V., Maan, M.E., Tachida, H., Imai, H. & Okada, N. 2008. Speciation through sensory drive in cichlid fish. *Nature* 455, 620–626.
- Sherman, K., Dahlgren, C., Dunn, C., Claridge, D. & Higgs, N. 2025. Implementation of access and benefit sharing in the Bahamas: a precautionary tale. *Conservation* 5, 3.
- Snoeks, J. 2004. Introduction. Chapter 1. Pp. 9-11. In: J. Snoeks (ed.). *The cichlid diversity of Lake Malawi/Nyasa/Niassa: identification, distribution and taxonomy*. Cichlid Press, El Paso, Texas. 1-360.
- Spreinat, A. 1995. *Lake Malawi Cichlids from Tanzania*. Unterm Hagen 4, D-37079, Göttingen, Germany: 316pp.
- Staeck, W. 1976. Ergebnisse einer ichthyologischen Sammelreise zum Nordende des Nyassasees (II). *Das Aquarium mit Aqua Terra* 10 (no. 89), 486-492.
- Staeck, W. 1980. *Pseudotropheus heteropictus* n. sp. aus dem Malawi-See (Pisces: Cichlidae). *Senckenbergiana Biologica* 60, 159-162.
- Stauffer, J.R., Jr. 1988. Three new, rock-dwelling cichlids (Teleostei: Cichlidae) from Lake Malawi, Africa. *Copeia* 1988 (3), 663-668.
- Stauffer, J.R., Jr. 1991. Description of a facultative cleanerfish (Teleostei: Cichlidae) from Lake Malawi, Africa. *Copeia* 1991 (1), 141-147.
- Stauffer, J.R., Jr. 1994. A new species of *Iodotropheus* (Teleostei: Cichlidae) from Lake Malawi, Africa. *Ichthyological Exploration of Freshwaters* 5, 331-344.
- Stauffer, J.R., Jr. 2018. Description of *Metriaclima koningsi*, a new species (Teleostei: Cichlidae) from Lake Malaŵi, Malaŵi, Africa. *Zootaxa* 4370, 95-100.
- Stauffer, J.R., Jr. & Boltz, J.M. 1989. Description of a rock-dwelling cichlid (Teleostei: Cichlidae) from Lake Malawi, Africa. *Proceedings of the Biological Society of Washington* 102, 8-13.

Stauffer, J. Jr & Bowers, N.J. 1996. Evidence of hybridization between *Cynotilapia afra* and *Pseudotropheus zebra* (Teleostei: Cichlidae) following an intralacustrine translocation in Lake Malawi. *Copeia* 1996, 203–208.

Stauffer, J. R., Jr. & Hert, E. 1992. *Pseudotropheus callainos*, a new species of mbuna (Cichlidae), with analyses of changes associated with two intra-lacustrine transplantations in Lake Malawi, Africa. *Ichthyological Exploration of Freshwaters* 3, 253-264.

Stauffer, J. R., Jr. & Kellogg, K.A. 2002. Description of a new species in the *Pseudotropheus williamsi* complex (Teleostei: Cichlidae), from Lake Malawi, Africa. *Copeia* 2002 (1), 146-151.

Stauffer, J.R., Jr. & Konings, A.F. 2023. Description of a geographically variable elongate rock-dwelling cichlid (Cichliformes: Cichlidae) from Lake Malaŵi, Africa. *Zootaxa* 5296, 265-274.

Stauffer, J.R., Jr. & van Snik, E.S. 1996. New species of *Petrotilapia* (Teleostei: Cichlidae) from Lake Malawi, Africa. *Copeia* 1996 (3), 695-702.

Stauffer, J.R., Jr., Bowers, N.J., Kellogg, K.A. & McKaye, K.R. 1997. A revision of the blue-black *Pseudotropheus zebra* (Teleostei: Cichlidae) complex from Lake Malaŵi, Africa, with a description of a new genus and ten new species. *Proceedings of the Academy of Natural Sciences of Philadelphia* 148, 189-230.

Stauffer, J.R., Jr., McKaye, K.R. & Konings, A.F. 2002. Behaviour: an important diagnostic tool for Lake Malawi cichlids. *Fish and Fisheries* 3, 213–224.

Stauffer, J.R., Jr., Black, K. & Konings, A.F. 2013. Descriptions of five *Metriaclima* (Teleostei: Cichlidae) from Lake Malawi, Africa. *Zootaxa* 3647, 101-136.

Stauffer, J.R., Jr., Konings, A.F. & Ryan, T.M. 2016. Redescription of *Pseudotropheus livingstonii* and *Pseudotropheus elegans* from Lake Malaŵi, Africa. *Zootaxa* 4154 , 169-178.

Streelman, J.T., Gmyrek, S.L., Kidd, M.R., Kidd, C., Robinson, R.L., Hert, E., Ambali, A.J. & Kocher, T.D. 2004. Hybridization and contemporary evolution in an introduced cichlid fish from Lake Malawi National Park. *Molecular Ecology*, 13, 2471–2479.

Svardal, H., Quah, F.X., Malinsky, M., Ngatunga, B.P., Miska, E.A., Salzburger, W., Genner, M.J., Turner, G.F., Durbin, R. 2019. Ancestral hybridisation facilitated species diversification in the Lake Malawi cichlid fish adaptive radiation. *Molecular Biology & Evolution* 37, 1100-1113.

Tawil, P. 2002a. Description de *Cynotilapia pulpican* n. sp. (Pisces, Teleostei, Cichlidae), nouvelle espèce du lac Malawi, avec remarques sur les genres *Cynotilapia*, *Microchromis*, *Maylandia* et *Metriaclima*. *L'an Cichlidé* 2, 72-82.

Tawil, P. 2002b. Notes sur le genre *Melanochromis* et l'appartenance générique de *Pseudotropheus johannii* Eccles, 1973, et espèces apparentées. *L'an Cichlidé* 2, 61–68.

Tawil, P. 2005. *Cynotilapia* sp. *L'an Cichlidé*. 5, 73-74

Tawil, P. 2011. Description of a new cichlid species from Lake Malawi, with reexamination of *Cynotilapia afra* (Günther, 1893) and *Microchromis zebroides* Johnson, 1975. *Cybiu* 35, 201-211.

Tawil, P. 2013a. *Iodotropheus* Oliver & Loiselle, 1972. *Cichlid Room Companion*. Retrieved on Dec 10, 2025, from: <https://cichlidae.com/genus.php?id=23>.

Tawil, P. 2013b. *Tropheops* sp. 'lilac'. *Cichlid Room Companion*. Retrieved on Feb 01, 2026, from: <https://cichlidae.com/species.php?id=140>.

Tawil, P. 2018a. *Chindongo elongatus* (Fryer, 1956). *Cichlid Room Companion*. Retrieved on Nov 29, 2025, from: <https://cichlidae.com/species.php?id=137>

Tawil, P. 2018b. *Chindongo* sp. 'elongatus Ruarwe'. *Revue Française des Cichlidophiles*. 379 7-22.

Tawil, P. 2018c. The hooded mbuna. *Cichlid News Magazine*. 27(3):11-16.

Trewavas, E. 1935. A synopsis of the cichlid fishes of Lake Nyasa. *Annals and Magazine of Natural History* (Series 10) v. 16, 65-118.

Trewavas, E. 1946. The types of African cichlid fishes described by Borodin in 1931 and 1936, and of two species described by Boulenger in 1901. *Proceedings of the Zoological Society of London* 116, 240-246.

Trewavas, E. 1984. Nouvel examen des genres et sous-genres du complexe *Pseudotropheus-Melanochromis* du lac Malawi (Pisces, Perciformes, Cichlidae). *Revue française d'Aquariologie Herpétologie* 10, 97-106.

Turner, G. F. 1996. *Offshore Cichlids of Lake Malawi*. Cichlid Press, Lauenau. 240 pp.

Turner, G.F. 2024. Cladistic species definitions can lead to under-representation of biodiversity from adaptive radiations. *Evolutionary Journal of the Linnean Society* 3, kzae009.

Turner, G.F. 2025. Identification of the Cichlid Fishes of Lake Malawi/Nyasa Part 1: Cyrtocarina (the 'benthic' or 'hap' sub-radiation). *EcoEvoRxiv* 355pp. <https://ecoevorxiv.org/repository/view/10901/>

Turner, G.F., Ngatunga, B.P. & Genner, M.J. 2019. The natural history of the satellite lakes of Lake Malawi. *EcoEvoRxiv*. <https://ecoevorxiv.org/sehdq/> 131pp.

Turner, G.F., Crampton, D.A., Rusuwa, B., Hooft van Huysduynen, A. & Svardal, H. 2022. Taxonomic investigation of the zooplanktivorous Lake Malawi cichlids *Copadichromis mloto* (Iles) and *C. virginalis* (Iles). *Hydrobiologia* 850, 2165–2175.

van Oppen, M.J.H., Turner, G.F., Rico, C., Deutsch, J.C., Ibrahim, K.M., Robinson, R.L. & Hewitt, G.M. 1997. Unusually fine-scale genetic structuring found in rapidly speciating Malawi cichlid fishes. *Proceedings of the Royal Society of London, Series B* 264, 1803–1812.

van Oppen, M.J.H., Turner, G.F., Rico, C., Robinson, R.L., Deutsch, J.C., Genner, M.J. & Hewitt, G.M. 1998. Assortative mating among rock-dwelling cichlid fishes supports high estimates of species richness from Lake Malawi. *Molecular Ecology* 7, 991–1001

Wiley, E.O. 1978. The evolutionary species concept reconsidered. *Systematic Zoology* 27, 17–26.

Wüster, W. 2025. Shedding the mitochondrial blinkers: A long-overdue challenge for species delimitation in herpetology. *Vertebrate Zoology*, 75, 259–275.

Young, K.A., Whitman, J.M. & Turner, G.F. 2009. Secondary contact during adaptive radiation: a community matrix for Lake Malawi cichlids. *Journal of Evolutionary Biology* 22, 882–889.

Zidana, H., Turner, G.F., van Oosterhout, C. & Hanfling, B. 2009. Elevated mtDNA diversity in introduced populations of *Cynotilapia afra* (Gunther 1894) in Lake Malawi National Park is evidence for multiple source populations and hybridization. *Molecular Ecology* 18, 4380–4389.