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Phylogenetic classification of extant genera of fishes of the order Cypriniformes (Teleostei: Ostariophysi)

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Abstract

The order Cypriniformes is the most diverse order of freshwater fishes. Recent phylogenetic studies have approached a consensus on the phylogenetic relationships of Cypriniformes and proposed a new phylogenetic classification of family-level groupings in Cypriniformes. The lack of a reference for the placement of genera amongst families has hampered the adoption of this phylogenetic classification more widely. We herein provide an updated compilation of the membership of genera to suprageneric taxa based on the latest phylogenetic classifications. We propose a new taxon: subfamily Esominae within Danionidae, for the genus *Esomus*.

Key words: Cyprinidae, Cobitoidei, Cyprinoidei, carps, minnows

Introduction

The order Cypriniformes is the most diverse order of freshwater fishes, numbering over 4400 currently recognized species (Eschmeyer & Fong 2017), and the species are of great interest in biology, economy, and in culture. Occurring throughout North America, Africa, Europe, and Asia, cypriniforms are dominant members of a range of freshwater habitats (Nelson 2006), and some have even adapted to extreme habitats such as caves and acidic peat swamps (Romero & Paulson 2001; Kottelat *et al.* 2006). Many cypriniforms are important food and recreational fishes, and they are popular in the global ornamental pet trade. The zebrafish, *Danio rerio*, is a model organism of scientific importance, and has been heavily studied in its development and its genome (Howe *et al.* 2013). Advancement in sequencing technologies has also allowed the sequencing and publication of whole genome sequences of several cypriniforms (Burns *et al.* 2015; Wang *et al.* 2015; Xu *et al.* 2014; Yang *et al.* 2016).

Until recently, there was little consensus for the major groupings among families within the Cypriniformes (Conway *et al.* 2010). Siebert (1987) studied the osteology among all major groups of cypriniforms known at the time, and established the prevailing hypothesis for cypriniform relationships, which recognizes two major subgroupings (Conway *et al.* 2010). Firstly, the cobitoids have traditionally been classified in multiple families of loaches, alongside the algae eaters (Gyrinocheilidae) and suckers (Catostomidae). In stark contrast, the diverse cyprinoids, which include over 3,000 species and thus constitute the vast majority of cypriniform species, have traditionally been recognized to include two families, Cyprinidae sensu lato and potentially Psilorhynchidae (Conway et al. 2010). Although cyprinoids have long been thought of by many ichthyologists to be morphologically conserved, their morphological diversity rivals that of characiforms (Howes 1991), a clade of fishes currently divided into numerous families. Multiple subgroupings have been recognized within Cyprinidae *sensu lato* for some time (Howes 1991). More recently, multiple phylogenetic studies have consistently reconstructed major groupings within the cypriniforms, which have validated some of these traditional groupings, as well as rejected the monophyly of others, and demonstrated the non-monophyly of Cyprinidae *sensu lato* relative to Psilorhynchidae (Chen & Mayden 2009; Mayden & Chen 2010). Because of this, a new phylogenetic

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classification for the cypriniforms has been proposed, of which one of the largest changes is recognizing a Cyprinoidei that contains multiple families of fishes previously classified in Cyprinidae *sensu lato* and new limits of the Cyprinidae itself to a more restricted set of taxa (Cyprinidae *sensu stricto*). Unfortunately, the adoption of a phylogenetic classification for cypriniforms has been hampered by lack of a centralized reference for what genera belong to what particular family-level groups, but these classifications are distributed across numerous phylogenetic studies. Hence, most scientists continue to recognize Cyprinidae *sensu lato*, which is rendered non-monophyletic by Psilorhynchidae. Recognition of a broad Cyprinidae masks the morphological and phylogenetic diversity within this group and makes the Cyprinidae and the other families of the Cypriniformes (as well as the related Characiformes, Siluriformes, and Gymnotiformes) unequal taxonomic and phylogenetic units. Further, a broad Cyprinidae limits the use of the Linnean classification scheme to express phylogenetic relationships.

Our aim here is to provide a reference that can be used as a summary for the current understanding of cypriniform phylogeny and a working classification. Though this classification scheme may appear novel to those unfamiliar with cypriniform taxonomic literature, we make relatively few taxonomic changes. The family groups defined herein were defined by previous studies (Chen & Mayden 2009; Mayden & Chen 2010; Kottelat 2012), but the generic composition of the cyprinoid families is distributed among various publications. As in other lists extensively cataloguing and changing the classification of fishes (e.g. Kottelat 2012; Betancur-R *et al.* 2017), our classification represents a snapshot view of evolutionary relationships given recent analyses. We hope this reference will be useful in providing a foundation to understand the previously proposed phylogenetic classification of family-group names within the Cypriniformes.

Methods

Many of the phylogenetic studies on cypriniform relationships from Siebert (1987) onward refer to two major subdivisions of cypriniforms—cobitoids and cyprinoids—and recognize these taxa at the superfamily level (although see Kottelat [2012] for a recent example that recognizes a suborder for cobitoids). On the other hand, the most recent phylogenetic classification of fishes generally used the subordinal rank rather than the superfamilial rank to group families (Betancur-R *et al.* 2014), so a recent phylogenomic study on cypriniform fishes (Stout *et al.* 2016) also recognized these taxa at the suborder level (i.e. Cyprinoidei, Cobitoidei). This usage has been continued in the most recent phylogenetic classification of fishes (Betancur-R *et al.* 2017). We continue following the Fish Tree of Life convention of using the suborder for the main taxonomic level below the order and above the family here. We state this explicitly to clarify why we depart from the prevailing classification of dividing Cypriniformes into superfamilies (e.g. Siebert 1987; Chen & Mayden 2009; Mayden & Chen 2010; Conway 2011).

To compile a list of all cypriniform genera considered available, we downloaded a list of genera from Catalog of Fishes (Eschmeyer *et al.* 2017). At the time of this writing, the Catalog of Fishes grouped cypriniform genera into the following taxa: Gyrinocheilidae, Catostomidae, Cobitidae, Botiidae (divided into Botiinae and Leptobotiinae), Nemacheilidae, Balitoridae, Gastromyzontidae, Barbuccidae, Serpenticobitidae, Ellopostomatidae, Vaillantellidae, Psilorhynchidae, and Cyprinidae (divided into eleven subfamilies: Acheilognathinae, Barbinae, Cyprininae, Danioninae, Gobioninae, Leptobarbinae, Leuciscinae, Paedocypridinae, Sundadanioninae, Tincinae, and Xenocypridinae). We then assigned genera/subgenera to tribes, families, and suborders based on recent phylogenetic and taxonomic publications that use and revise family-group names within the Cypriniformes. Two recent molecular phylogenetic studies focus on broader cypriniform relationships: a phylogenomic study incorporating 219 loci and 172 cypriniform species (Stout *et al.* 2016), and a phylogenetic study based on six nuclear loci: EGR1, EGR2B, EGR3, IRBP, RAG1, and Rh (Hirt *et al.* 2017). The latter expands on earlier phylogenetic studies across Cyprinoidei, Cobitoidei, and Cypriniformes based on these same loci from the Cypriniformes Tree of Life project (e.g. Chen & Mayden 2009; Chen *et al.* 2009; Mayden & Chen 2010), and also explores the effect of gene choice on phylogenetic reconstruction; therefore, since it is not entirely independent from some of its previous studies, we focus primarily on the Hirt *et al.* (2017) latest study when discussing support and conflict for deeper cypriniform relationships from this marker set, but cite other relevant papers for specific taxonomic recommendations. Many other phylogenetic studies focus on particular clades of Cypriniformes, and they will be discussed in relevant sections. In general, we have opted to recognize some of the most recent taxonomic suggestions made by authors based on molecular phylogenetic evidence; however, some of these studies do not identify morphological synapomorphies or diagnostic characters corresponding to these clades. When such information is available, we cite morphological support corresponding to taxa we are recognizing from the literature, with some caveats, including that morphological support may not have been observed in all members of the taxon as listed here, and that morphological characters may not have been determined using phylogenetic inference but are simply autapomorphic and have diagnostic utility. We referenced van der Laan *et al.* (2014) for family name authorities. Some family-group names have been proposed or used within the Cypriniformes that are not valid under the code (van der Laan *et al.* 2014), or are unnamed. We list these names for these clades in quotes as placeholder names (e.g. 'Osteochilini', 'Semilabeonini', 'Poropuntiinae'). Additionally, the *Squalidus—Hemibarbus* clade of Tang *et al.* (2011), for which no name has been proposed, is listed.

A comprehensive evaluation of the validity of cypriniform genera is outside the scope of this list. We furthermore do not examine subgenera and make no comment on their validity. Our goal is to provide a listing of the placement of genera among family group taxa. Many cypriniform genera are not monophyletic and are in need of taxonomic revision, however, members of these genera usually still belong to a single family-group taxon (e.g. all *Schistura* belong to Nemacheilidae, all *Rasbora* belong to the Rasborini tribe), and hence their non-monophyly does not affect the placement of members of this genus in the classification. However, this is not always the case, such as with multiple *Puntius* species falling outside of the Smiliogastrinae where *Puntius* is assigned (Yang *et al.* 2015). We do not list species included in each genus, and because of this, species belonging to a different family, subfamily, or tribe than the genus they are currently assigned to are not explicitly noted.

We restrict our list to recent fishes. The morphological placement of fossil fishes among these clades will require further study given the knowledge of cypriniform relationships from molecular data. This reference is not meant to provide a complete review of cypriniform taxonomic history, which has been reviewed previously. See relevant sections for references reviewing the history of each taxon. The author(s) of all genus-level and species names can be found in Eschmeyer *et al*. (2017), and authors of all family-level names can be found in van der Laan *et al.* (2014).

Results and discussion

Gyrinocheilidae, Catostomidae, and Cobitoidei. Within the Cypriniformes are multiple families including benthic species, including the algae eaters of the family Gyrinocheilidae (represented by a single genus, *Gyrinocheilus*), the suckers of the family Catostomidae, and the diverse loaches, divided amongst numerous families now including Balitoridae, Barbuccidae, Botiidae, Cobitidae, Ellopostomatidae, Gastromyzontidae, Serpenticobitidae, Nemacheilidae, and Vaillantellidae (Kottelat 2012). The term *loach* has colloquially been used as a name to refer to members of these families, which together are also strongly supported as a clade (Šlechtová *et al.* 2007; Conway *et al.* 2010; Conway 2011; Stout *et al.* 2016). Previous publications refer to Cobitoidea or Cobitoidei (not always interchangeably), and the clade variably includes or excludes *Gyrinocheilus* and/or Catostomidae; for consistency, we will refer to the Cobitoidei as a clade exclusively uniting loach families.

Conventionally, Gyrinocheilidae, Catostomidae, and Cobitoidei have been thought to form a single clade, primarily deriving from Siebert's (1987) work (Conway *et al.* 2010). Support for the relationships between these taxa, however, has been weak, and various interrelationships have been supported between them (Sawada 1982; Harris *et al.* 2014). Conway (2011) performed the most comprehensive morphological phylogenetic study on Cypriniformes to date, and was not able to reconstruct strong support for the relationships between Gyrinocheilidae, Catostomidae, Cobitoidei, and Cyprinoidei. Reanalyses of these data have borne the same result (Britz *et al.* 2014; Liu *et al.* 2015; Stout *et al.* 2016), including a modified version of this dataset including the extinct fossil taxon *Jianghanichthys*, which has shared character states of both cyprinoids and catostomids. The unresolved relationships of *Jianghanichthys* among cypriniform fishes was used to support the recognition of the only family of Cypriniformes known only from fossils, Jianghanichthyidae (Liu *et al.* 2015). Furthermore, molecular phylogenetic support for the monophyly of these groups together also remains elusive (Chen *et al.* 2009), with phylogenetic analyses recovering results such as monophyly (Šlechtová *et al.* 2007; He *et al.* 2008; Stout *et al.* 2016; Hirt *et al.* 2017;), poorly supported relationships or a polytomy between these three clades and Cyprinoidei (He *et al.* 2008; Hirt *et al.* 2017; Mayden & Chen 2010; Saitoh *et al.* 2006), or with cyprinoids as the closest relative to one of these clades (He *et al.* 2008; Chen *et al.* 2009; Hirt *et al.* 2017; Stout *et al.* 2016). Given the uncertainty of the monophyly of a clade formed by these three taxa, we treat Gyrinocheilidae and Catostomidae within their own suborders respectively, Gyrinocheiloidei and Catostomoidei, separate from the Cobitoidei and Cyprinoidei, as previously proposed (Stout *et al.* 2016).

While the interrelationships of Gyrinocheilidae, Catostomidae, and Cobitoidei are uncertain, the membership of taxa to these groups have been stable. Gyrinocheilidae contains a single genus, *Gyrinocheilus*, including three species distributed in Southeast Asia. The distinctive nature of *Gyrinocheilus* has long been recognized. Species of *Gyrinocheilus* have a number of specializations for clinging to rocks in rapidly-flowing water, including lips modified into an oral sucker and the unique presence of spiracles above the gills through which water is inhaled (Roberts & Kottelat 1993). See Conway *et al.* (2010) and clade K in Conway (2011) for morphological synapomorphies for the family Gyrinocheilidae. The suckers of the family Catostomidae are primarily benthic fishes distributed mostly in North America, with a few Asian species (Smith 1992). Catostomid phylogenetics and classification have been reviewed by Harris *et al.* (2014), and their classification is reproduced here. The systematics of fossil and extant catostomids was first broadly studied by Smith (1992) incorporating both morphological and biomolecular data. See Smith (1992), Conway *et al.* (2010), and clade L in Conway (2011) for morphological synapomorphies for Catostomidae. The molecular phylogenetics within Catostomidae have also been explored in numerous studies, as reviewed by Harris *et al.* (2014). Within Catostomidae, the subfamilies Ictiobinae, Cycleptinae, Myxocyprininae, Catostominae are recognized, and the Catostominae including the tribes Catostomini, Erimyzonini, Moxostomatini, and Thoburniini are recognized, based largely on Smith's (1992) phylogenetic results, with subsequent modification from molecular studies. See Smith (1992) for synapomorphies diagnosing most of these groups, however the classification of Harris *et al.* (2014) recognizes *Myxocyprinus* as a separate subfamily (vs. sister to *Cycleptus* in Cycleptinae) and recognizes Erimyzonini and Thoburniini as distinct from other Moxostomatini (vs. all in a single tribe). Although apomorphies for clades corresponding to Myxocyprininae, Cycleptinae, Erimyzonini, and Thoburniini *sensu* Harris *et al.* (2014) are presented by Smith (1992), Smith (1992) does not reconstruct a monophyletic *Moxostoma* with respect to Thoburniini. The validity of the unique catostomin genera *Chasmistes*, *Deltistes*, and *Xyrauchen* have previously been questioned, as they are repeatedly reconstructed as nested within *Catostomus* (Chen & Mayden 2012); we tentatively follow Harris *et al.* (2014) in recognizing these genera as valid. Erimyzontini is occasionally spelled Erimyzonini (Harris *et al.* 2014), however Erimyzont— is the correct stem (van der Laan 2014).

Loaches, fishes of the suborder Cobitoidei, are benthic fishes distributed primarily in Europe and Asia, with a few species in Africa (Kottelat 2012). The monophyly of the loach clade Cobitoidei is consistently recovered in recent morphological and molecular phylogenetic studies. See clade M of Conway (2011) for morphological synapomorphies for the Cobitoidei (note his analysis does not include the more recently-described families Ellopostomatidae, Barbuccidae, or Serpenticibotidae). Kottelat (2012) provides the latest phylogenetic classification of Cobitoidei, based on recent molecular phylogenetic studies (Šlechtová *et al.* 2007; Bohlen & Šlechtová 2009). In general, molecular and morphological studies have converged on four deeply-branching groups of loaches: the Botiidae, the Vaillantellidae, the Cobitidae, and a clade formed by Balitoridae *sensu lato* (= Barbuccidae + Balitoridae + Serpenticobitidae + Gastromyzontidae), Nemacheilidae, and Ellopostomatidae (see further discussion below). See Conway *et al.* (2010) and clade O of Conway (2011) for morphological synapomorphies for Botiidae, and clade Q for synapomorphies for Cobitidae. See also Sawada (1982) for morphological synapomorphies for Botiidae and Cobitidae. *Vaillantella* (the sole genus of Vaillantellidae) has a unique morphology among Cypriniformes and is distinguished by an extremely long dorsal fin (Conway *et al.* 2010); members of this genus have various other characters similar to nemacheilids and botiids. Though morphological classification of this genus has had a tortured taxonomic and phylogenetic history (Saitoh *et al.* 2006; Šlechtová *et al.* 2006; 2007; Conway 2011), molecular phylogenetic analyses almost always place *Vaillantella* as the sister group to a clade formed by all loaches except for Botiidae, and thus it does not belong to any of the traditionally recognized families (Hirt *et al.* 2017; Šlechtová *et al.* 2007; Stout *et al.* 2016). Alternatively, Conway (2011) recovers *Vaillantella* as sister to Botiidae based on three characters, but two characters are not unique (also found in members of Nemacheilidae) and another character is found in many non-cypriniform otophysans (Conway 2011). See also Nalbant & Bănărescu (1977) and Conway *et al.* (2010) for description and diagnosis of Vaillantellidae.

With the exclusion of Botiidae, Cobitidae has been consistently recovered as monophyletic by morphological and molecular phylogenetic studies (Šlechtová *et al.* 2006; 2007; 2008; Chen *et al.* 2009; Mayden & Chen 2010; Conway 2011; Stout *et al.* 2016; Hirt *et al.* 2017). See Conway *et al.* (2010) and clade Q of Conway (2011) for morphological synapomorphies of Cobitidae. Cobitids and botiids both have an erectile suborbital spine which has traditionally been used to classify these taxa in a single family, but this character has been either independently gained between these two families and Serpenticobitidae, or independently lost from other cobitoids (Conway 2011). Šlechtová *et al.* (2008) studied the molecular phylogenetic relationships among members of the family Cobitidae.

Molecular and morphological phylogenetic analyses typically resolve a clade formed by Balitoridae *sensu lato* (= Barbuccidae + Balitoridae + Serpenticobitidae + Gastromyzontidae), Nemacheilidae, and *Ellopostoma*. In some older classification schemes, Nemacheilidae and *Ellopostoma* were considered together with Balitoridae *sensu lato* (e.g. Siebert 1987), but most recent classification schemes consider the nemacheilids and ellopostomatids as distinct families. Nemacheilidae has not been united by morphological synapomorphies in multiple studies (Sawada 1982; Siebert 1987; Conway 2011), though this family is consistently recovered as monophyletic by molecular phylogenetic studies (e.g. Tang *et al.* 2006; Šlechtová *et al.* 2007; Bohlen & Šlechtová 2009; Chen *et al.* 2009; Mayden & Chen 2010; Liu *et al.* 2012; Stout *et al.* 2016; Hirt *et al.* 2017). *Ellopostoma* is an unusual small-bodied loach that has been variably placed among Cobitidae, Balitoridae, and Nemacheilidae (Bohlen & Šlechtová 2009; Chen *et al.* 2009). Although it has not been studied in a morphological phylogenetic framework, multiple molecular phylogenetic studies support its placement in the clade formed by Nemacheilidae and Balitoridae *sensu lato* (Bohlen & Šlechtová 2009; Chen *et al.* 2009). Böhlen & Šlechtová (2009) recovered *Ellopstoma* in a polytomy with Nemacheilidae and Balitoridae *sensu lato*, while Chen *et al.* (2009) recover *Ellopostoma* as sister to Nemacheilidae. Schönhuth *et al.* (2018) recover Cobitidae as more closely related to Balitoridae, Gastromyzontidae, and Nemacheilidae than *Ellopostoma*, however this was not strongly supported. For a description and diagnosis for Ellopostomatidae, see Chen *et al.* (2009).

Prevailing usage of Balitoridae *sensu lato* (= Barbuccidae + Balitoridae + Serpenticobitidae + Gastromyzontidae) has included a diversity of hillstream loaches and allies, and recent molecular phylogenetic evidence suggests that *Barbucca* and *Serpenticobitis* form a clade with these loaches (Šlechtová *et al.* 2007). Kottelat (2012) had two main arguments for describing and diagnosing two new families for *Barbucca* and *Serpenticobitis* respectively. Firstly, including *Barbucca* and *Serpenticobitis* in Balitoridae *sensu lato* would result in a Balitoridae that included "a number of very distinctive groups" (Kottelat 2012). Secondly, Kottelat (2012) argued the distinctive morphologies of *Barbucca* and *Serpenticobitis* have resulted in each of these two taxa being classified with multiple different families, and this uncertainty would remain with further research. Balitoridae *sensu stricto* and Gastromyzontidae correspond to different loach clades of the Balitoridae *sensu lato* that have been recognized for some time (Hensel 1970; Roberts 1989). Better sampling of balitorids, gastromyzontids, *Barbucca*, and *Serpenticobitis* in morphological and molecular systematic studies could clarify the synapomorphies that define these families and resolve relationships within Balitoridae and Gastromyzontidae. Roberts (1989) discusses the validity of previous characters used to diagnose Balitoridae and Gastromyzontidae relevant to Bornean balitorids and gastromyzontids. Balitoridae *sensu stricto* and Gastromyzontidae are also each supported as monophyletic by multiple molecular phylogenetic studies (Šlechtová *et al.* 2007; Bohlen & Šlechtová 2009; Randall & Page 2015). Randall & Page (2015), in contrast to Kottelat (2012), recognized the subfamily Gastromyzontinae within a broader Balitoridae (making no comment on *Serpenticobitis* and *Barbucca*, but the implication would be that their family-rank names would be considered subfamilies of Balitoridae). We tentatively retain Kottelat's (2012) classification of recognizing distinct families for these taxa.

Botiidae and Balitoridae are also divided into subfamilies. Based on molecular phylogenetic analysis (Šlechtová *et al.* 2006), Botiidae is classified into two subfamilies, Leptobotiinae (*Leptobotia*, *Parabotia*) and Botiinae (*Ambastaia*, *Botia*, *Chromobotia*, *Sinibotia*, *Syncrossus*, *Yasuhikotakia*). In Nalbant's (2002) original circumscription of these taxa (at the tribe level), *Sinibotia* was placed among Leptobotiinae instead of Botiinae, therefore his proposed morphological characters defining leptobotiines and botiines need to be re-evaluated; the most striking character that does differ between the two subfamilies is that botiines are tetraploid, a derived state among loaches (Šlechtová *et al.* 2006). For the Balitoridae *sensu stricto*, which is equivalent to Balitorinae *sensu* Randall & Page (2015), we also elevated the constituent tribes Balitorini and Homalopteroidini Randall & Page (2015) recognized to subfamily level. In their phylogenetic analysis of molecular data, Randall & Page (2015) were also missing several genera of Balitoridae: *Bhavania* Hora 1920, *Cryptotora* Kottelat 1998, *Ghatsa* Randall & Page 2015, *Neohomaloptera* Herre 1944, and *Travancoria* Hora 1941. These genera are listed as Balitoridae *incertae sedis*. Nemacheilidae and Gastromyzontidae have also been classified into subfamilies, but these groupings may not be natural, so are not followed here. Prokofiev (2010) presented a phylogenetic classification based on morphological characters for four tribes within Nemacheilidae (as Nemacheilinae), but the phylogenetic support for these taxa are poor. Prokofiev (2010) states that his Yunnanilini is not supported by synapomorphies and that a phylogenetic revision is needed. The Prokofiev (2010) tribes are also rejected as monophyletic in molecular phylogenetic studies thus far, despite relatively low taxon sampling across molecular studies for Nemacheilidae; some examples include recovery of *Micronemacheilus*, a member of Yunnanilini, nested within Lefuini (Liu et al. 2012), *Schistura dabryi*, a member of Nemacheilini, nested within Triplophysini (Liu et al. 2012), and *Tuberoschistura*, a member of Nemacheilini, potentially having a closer relationship to members of Triplophysini than other members of Nemacheilini such as *Acanthocobitis* (Chen et al. 2009). Given this conflict among phylogenetic studies, we tentatively do not recognize subfamilies within the Nemacheilidae. Gastromyzontidae has also been previously classified into subfamilies, however some of these groupings may not be natural, and it may be premature to recognize subfamilies (Kottelat 2012).

Cyprinoidei. Cyprinoidei includes all members of the Cyprinidae *sensu lato*, *Psilorhynchus*, and *Paedocypris*. The systematics and classification of Cyprinidae *sensu lato* have previously been reviewed (Hensel 1970; Howes 1991; Conway *et al.* 2010). We briefly summarize the history here to provide context for the classification presented here. Given the morphological diversity of cyprinoids, major groupings have previously been recognized based on characters such as the presence and innervation of barbels, the number of rows and shape of teeth on the pharyngeal jaws, the presence of a pre-anal keel formed by scales, and the number of rays and presence of spines in the dorsal and anal fins (Hensel 1970; Howes 1991). For convenience, we will refer to the subclades following the families suggested by recent molecular phylogenetic studies, and we tentatively retain the family level classification as proposed by some recent phylogenetic studies (Chen & Mayden 2009; Mayden & Chen 2010). Some of these major groups include the Cyprinidae *sensu stricto* (including carps, barbs, and allies), Leuciscidae (minnows of Europe, Asia, and North America), Danionidae (danios, rasboras, and allies), Acheilognathidae (bitterlings), Gobionidae (gudgeons), and Xenocyprididae (Asian carps, culters, and allies). Some minor groups have also been supported by molecular phylogenetic evidence each represented by one or two genera, including the Leptobarbidae (mad barb, sultan fish), Sundadanionidae, Tanichthyidae, and Tincidae (tench). Some other groups that have traditionally been recognized (e.g. cultrins, schizothoracins, squaliobarbins) are recovered within these major clades and will be commented on further in relevant sections addressing each taxon. Hence, the Cyprinoidei in this current scheme is divided into twelve families: Acheilognathidae, Cyprinidae *sensu stricto*, Danionidae, Gobionidae, Leptobarbidae, Leuciscidae, Paedocyprididae, Psilorhynchidae, Sundadanionidae, Tanichthyidae, Tincidae, and Xenocyprididae.

Possible alternative classification schemes with fewer families have previously been presented. Chen *et al.* (1984) and Cavender & Coburn (1992) both resolve two major groups of Cyprinidae *sensu lato*, although varied on the placement of *Tinca*. Subsequently, using RAG2 data, Wang *et al.* (2007b) did not recover the danionins with the Leuscinae and considered it a separate subfamily, and thus classified Cyprinidae *sensu lato* into three subfamilies. Three major clades corresponding to these groups have continued to generally be recovered by multiple molecular phylogenetic studies with the addition of *Sundadanio*, *Leptobarbus*, and *Tanichthys* to the clade corresponding to Leuciscinae *sensu* Wang *et al.* (Saitoh *et al.* 2006; Chen & Mayden 2009; Mayden & Chen 2010; Stout *et al.* 2016; Hirt *et al.* 2017). Conway (2011) recovered relationships consistent with Cavender & Coburn's two-subfamily scheme in the most comprehensive morphological study of the order to date, but bootstrap support was weak for the monophyly of Leuciscinae *sensu* Cavender & Coburn. Though these studies and others have classified Cyprinidae *s.l.* with two or three subfamilies, the prevailing classification for the last few decades has instead been to recognize many more subfamilies, up to a dozen (e.g. Howes 1991; Nelson 2006; Saitoh et al. 2006; Kottelat & Freyhof 2007; Rüber et al. 2007; Chen & Mayden 2009; Conway et al. 2010; Mayden & Chen 2010; Liao & Kullander 2012; Eschmeyer & Fong 2017; Schönhuth et al. 2018), which as noted are recognized at the family rank here.

The genus *Psilorhynchus*, including fishes referred to as torrent minnows or stone carps, has previously been classified as either a cobitoid or a cyprinoid, and has been recognized as a monogeneric family, Psilorhynchidae (Conway *et al.* 2010; Conway 2011). Psilorhynchids bear a coarse similarity to balitorid loaches due to their convergent ecological specialization to a benthic lifestyle in rapidly flowing waters (Conway 2011). While prior morphological studies have either suggested a closer affinity to cobitoids or cyprinoids, the most recent morphological investigation focusing on Psilorhynchidae and its placement among cypriniforms have demonstrated support for its relationship in a clade as sister to the remaining cyprinoids (Conway 2011). Molecular phylogenetic evidence consistently supports a close relationship of Psilorhynchidae to cyprinoids, with earlier studies either not having sufficient taxon sampling to address relative relationships between Psilorhynchidae to taxa across cyprinoid diversity (Šlechtová *et al.* 2007), or recovering uncertain relationships for Psilorhynchidae among cyprinoids (He *et al.* 2008). However, more recent molecular phylogenetic studies with increased taxon sampling have recovered a relationship where Psilorhynchidae is sister to Cyprinidae *sensu stricto* herein (Mayden & Chen 2010; Chen *et al.* 2013; Hirt *et al.* 2017; Schönhuth *et al.* 2018), which renders Cyprinidae *sensu lato* paraphyletic. One possible option to resolve this is to recognize *Psilorhynchus* within Cyprinidae *sensu lato* at the subfamily level (Chen 1980; He *et al.* 2008; Liao & Kullander 2012). Most recent classifications, including phylogenetic classifications, have recognized Psilorhynchidae as a distinct family, either co-equal with Cyprinidae *sensu lato* (Nelson 2006; Conway 2011), or as a member of a Cyprinoidei including multiple families (Chen & Mayden 2009; Mayden & Chen 2010). The clade including all members of the Psilorhynchidae is supported by numerous morphological synapomorphies (Conway 2011).

Paedocypris is a recently-discovered genus of miniature fishes that include some of the smallest vertebrates in the world (Kottelat *et al.* 2006). Morphological phylogenetic studies have suggested a clade of miniature, paedomorphic fishes including *Paedocypris*, *Sundadanio*, and *Danionella* aligned with cyprinoids (Britz & Conway 2009; Britz *et al.* 2014), though studying the phylogenetic placement of these taxa using morphology is challenging due to their developmental truncation (Hirt *et al.* 2017). Molecular phylogenetic studies of the placement of *Paedocypris* have led to multiple conflicting hypotheses including as members of the Danionidae (Rüber *et al.* 2007; Tang *et al.* 2010), as sister to the remainder of Cypriniformes (Mayden & Chen 2010; Hirt *et al.* 2017), or as sister to the Cyprinoidei (Stout *et al.* 2016; Hirt *et al.* 2017). The Cyprinoidei including *Paedocypris* and *Psilorhynchus* is diagnosed by the presence of the basioccipital masticatory plate, a keratin-covered process at the anterior end of the basioccipital, upon which the pharyngeal jaws work against to break down food (Britz *et al.* 2014). *Paedocypris*, and thus Paedocyprididae, is unique among cypriniforms and can be easily distinguished by numerous apomorphic characters (Kottelat *et al.* 2006).

Acheilognathidae, the bitterlings, are distinguished from other cyprinoids by sexually dimorphic characters such as the presence of an ovipositor in females used to deposit eggs within the gill chambers of mussels, and tubercle-bearing plates in males (Howes 1991; Kottelat & Freyhof 2007). The taxonomic history of Acheilognathidae was reviewed by Chang *et al.* (2014), and the membership of genera to this family are reproduced here. More recently, a new genus of acheilognathid, *Sinorhodeus*, was described and is additionally included here (Li *et al.* 2017). Li *et al.* (2017) also questioned the diagnoses of *Pararhodeus* and *Paratanakia*, but retained them as distinct genera.

The phylogenetic placement of the tench of the genus *Tinca* has long remained elusive due to its mosaic of characteristics that were used to assign it as either more closely related to leuciscids or to cyprinids, though its recognition as a unique lineage within cyprinoids has long been recognized (Howes 1991; Cavender & Coburn 1992). The genus *Tinca* has the unique autapomorphy among cyprinoids of possessing a forked pelvic bone with convergent tips (Cavender & Coburn 1992).

Leptobarbus, *Sundadanio*, and *Tanichthys* have all previously been considered members of the Danionidae (Kottelat & Witte 1999; Liao & Kullander 2012). These three genera all possess a *Y*-shaped ligament connecting the kinethmoid to the ethmoid, the ancestral state in cyprinoids, but this is absent in all danionids (Liao & Kullander 2012). Molecular phylogenetic studies recover these genera as branches within a clade formed by *Tinca*, Acheilognathidae, Gobionidae, Leuciscidae, and Xenocyprididae, but these genera were not reconstructed with any of these major groups (Chen & Mayden 2009; Mayden & Chen 2010; Stout *et al.* 2016; Hirt *et al.* 2017), leading to the recognition of the separate families Leptobarbidae, Sundadanionidae, and Tanichthyidae. *Leptobarbus* morphologically appears much like a large bodied *Rasbora* (Roberts 1989), and *Leptobarbus* was thought to be related to danionids (Liao & Kullander 2012). Although distinguished from danionids by the *Y*-shaped ligament, further morphological research is needed for this taxon to study its phylogenetic relationships among cyprinoids and determine other characters that may distinguish it from other cyprinoid families. The paedomorphic *Sundadanio* was also originally assigned to the danionids (Kottelat & Witte 1999). Morphological phylogenetic analysis support a membership of *Sundadanio* to cyprinoids, but resolution among cyprinoids is poor (Britz *et al.* 2014). Britz *et al.* (2011) described a new paedomorphic genus and species *Fangfangia spinicleithralis* as morphologically similar to *Sundadanio*, and we provisionally place it in Sundadanionidae; see Britz *et al.* (2011) for putative synapomorphies for a clade formed by *Fangfangia* and *Sundadanio*, two of which are based on anal-fin ray characteristics, and also the unique characteristic of the lateral processes of the first centrum being directed ventrally and connected to the pharyngeal process of the basioccipital (vs. directed laterally). See Mayden & Chen (2010) for a morphological diagnosis of the family Tanichthyidae.

The families Cyprinidae, Gobionidae, Leuciscidae, and Xenocyprididae are described in more detail below.

Cyprinidae *sensu stricto*. With the elevation of Cyprinidae *sensu lato* to Cyprinoidei, we recognize a narrower Cyprinidae including carps, barbs, and their allies. This group still includes a large diversity of cyprinoid fishes, from Africa and Eurasia (Yang *et al.* 2015). The cyprinids have previously been recognized as a distinct grouping within the cyprinoids (Cavender & Coburn 1992). See Cavender & Coburn (1992) and clade E of Conway (2011) for morphological synapomorphies diagnosing this group.

Within the Cyprinidae, multiple subgroups such as the cyprinins, barbins, labeonins, garrins, oreinins, and schizothoracins have previously been recognized, as reviewed by Yang *et al.* (2015). A phylogenetic classification of the Cyprinidae was recently presented by Yang *et al.* (2015), including listing genera considered *incertae sedis* within the Cyprinidae. The phylogenomic investigation by Stout *et al.* (2016) was congruent in the monophyly of clades corresponding to almost all of these taxa, although interrelationships between these clades differed some between studies. While the membership of clades is consistent across studies, we do note that the ancestral hybridization and the polyploidization of multiple clades within the Cyprinidae *s.s.* complicates reconstruction of relationships between clades, and this deserves further research.

We elevate the tribes of Yang *et al.* (2015) to the subfamily level. Hence, within Cyprinidae we recognize the subfamilies Labeoninae, Probarbinae, Torinae, Smiliogastrinae, Cyprininae, Acrossocheilinae, Spinibarbinae, Schizothoracinae, Schizopygopsinae, and Barbinae, as well as 'Poropuntiinae'. Yang *et al.*'s (2015) use of the 'Poropuntiini' (= 'Poropuntiinae') after Poropuntii Rainboth 1991, is a matter of convenience; they stated that the name was not available because no diagnosis was provided, Article 13.1.1 of the ICZN (see also van der Laan *et al.* 2014). So far, no family-group names exist for any members of this clade. Morphological diagnoses among cyprinid subfamilies previously presented by Yang *et al.* (2015) were based on characters including varying levels of ploidy, serration on fin rays, scale patterns, and morphology of the lips. See Yang *et al.* (2015) for morphological diagnoses of their new family group names Probarbinae, Acrossocheilinae, and Spinibarbinae. Yang *et al.* (2015) also discuss morphological diagnoses for the Schizothoracinae, Schizopygopsinae, and 'Poropuntiinae'. Yang *et al.* (2015) stated explicitly there is a lack of morphological synapomorphies for the Cyprininae.

Labeoninae is recovered as sister to the remainder of Cyprinidae in multiple phylogenetic studies (Conway 2011; Yang *et al.* 2015; Stout *et al.* 2016). Monophyly of this group has been previously supported by both morphological and molecular studies, as reviewed by Yang *et al.* (2012a). See Cavender & Coburn (1992), Stiassny & Getahun (2007), and Conway (2011) for morphological synapomorphies supporting this group. In recent classifications, there have been multiple schemes by which Labeoninae has been divided. Stiassny & Getahun (2007) split Labeoninae into two subgroups: Labeoina and Garraina. Yang *et al.* (2012a) divide the Labeoninae into four subgroups: Labeoina, Garraina, 'Semilabeoina', and 'Osteochilina'. The Labeoina and Garraina *sensu* Stiassny & Getahun (2007), based on morphological data, is significantly rejected by Yang *et al.*'s (2012a) molecular data, and Stiassny & Getahun's Labeoina was also not recovered as monophyletic in Stout *et al.* (2016). We opt to follow Yang *et al.*'s (2012a) classification, and raise their subtribes to tribe level, resulting in four tribes: Labeonini (using the stem *Labeon*-, given the genitive case of *Labeo* is *Labeonis*), Garrini (using the stem *Garr*-, pers. comm. van der Laan), 'Semilabeonini', and 'Osteochilini'. 'Semilabeonini' and 'Osteochilini' are names used here out of convenience in the sense that Yang *et al.* (2012a) used them, because family-group names for these clades have not been formally described and Yang *et al.*'s (2012a) names are not valid according to the code (van der Laan *et al.* 2014). We follow Yang *et al.* (2012a) in tentatively recognizing *Diplocheilichthys, Parapsilorhynchus*, and *Sinilabeo* as *incertae sedis* within Labeoninae. Yang *et al.* (2012a) also comment that the status of *Schismatorhynchos* requires further investigation, and we tentatively recognize *Schismatorhynchos* as *incertae sedis* within Labeoninae. Kottelat (2013) recognizes *Discolabeo* as a synonym of *Garra*, Zhang *et al.* (2016) recognize this genus as valid, as indicated by Eschmeyer *et al.* (2017). We were not able to obtain this text. Given Kottelat's (2013) recognition of *Discolabeo* as *Garra*, we recognize *Discolabeo* within Garrini.

Many species often classified as *Garra* are not within Garrini, but rather are placed in the 'Semilabeonini'.

Yang *et al.* (2012a) recovered multiple species of *Garra* within 'Semilabeonini', and recognize *Ageneiogarra* Garman 1912 for *Garra imberba* (the type species of *Ageneiogarra*) and *Garra micropulvinus*, as well as *Placocheilus* Wu 1977 given the separation of *P. cryptonemus*. Wang *et al.* (2007b) also recovers another species of *Garra*, *G. pingi*, as related to members of 'Semilabeonini'. Lothongkham *et al.* (2014) consider *Placocheilus* as a synonym of *Garra*. Wang *et al.* (2014) studied the relationships of *Garra imberba*. Although they included *Garra imberba*, the type species of *Ageneiogarra*, and *Placocheilus caudofasciatus*, the type species of *Placocheilus*, they recognized both genera within *Garra*. They recover two major clades of *Garra* corresponding to species that belong to Garrini and species that belong to 'Semilabeonini', the latter including *Placocheilus* and *Ageneiogarra*. Wang *et al.* (2014) also recovered '*Placocheilus*' *dulongensis* as clearly more closely related to true *Garra* than it is to *Placocheilus caudofasciatus*; hence, some species of *Placocheilus* should be considered *Garra*. In summary, multiple studies have demonstrated that *Placocheilus* and *Ageneiogarra* are distinct from *Garra. Vinagarra* has also been recently described based on distinctive mouth characteristics, and includes the species *Vinagarra findolabium* (Endruweit 2014). *Vinagarra* has morphological similarities to *Placocheilus* and *Discogobio*, *Ageneiogarra*, and *Sinigarra* (Endruweit 2014), all previously recovered as part of 'Semilabeonini'. Molecular data support the placement of *Garra findolabium* in a clade with *Ageneiogarra* and *Placocheilus*, although the interrelationships of the clade are not well resolved (Wang *et al.* 2014). We tentatively place *Vinagarra* within 'Semilabeonini'. *Sinigarra napoensis* is nested within a clade formed by *Ageneiogarra* species based on an analysis including three mitochondrial genes and four nuclear genes (Zheng *et al.* 2016). Therefore, *Sinigarra* could be a synonym of *Ageneiogarra*, given that *Ageneiogarra* has priority over *Sinigarra*. Zheng *et al.* (2016) also reconstructed relationships among Chinese karst labeonines, recovering *Prolixicheilus, Paraqianlabeo*, and *Cophecheilus* as closely-related to other members of 'Semilabeonini'. Hence, they are listed under 'Semilabeonini' here.

The relationships of *Chagunius* within Cyprinidae have been uncertain. Rainboth (1986; 1989) recognized a similarity between *Chagunius, Hypselobarbus*, and *Discherodontus* and hypothesized they formed a clade, but Yang *et al.* (2012b; 2015) demonstrated that these genera are not each other's closest relatives. *Hypselobarbus* is part of Torinae, while *Discherodontus* is part of the 'Poropuntiinae'. Yang *et al.* (2015) classified *Chagunius* in Smiliogastrinae, however they recovered it in variable places including grouped with the Smiliogastrinae from mitogenome data (80% bootstrap support), sister to 'Poropuntiinae' by RAG1 (although with less than 50% support), and sister to *Aaptosyax* from multiple mitochondrial genes (although with less than 50% support). In Stout *et al.* (2016), *C. chagunio* was placed in different parts of Cyprinidae in concatenation and coalescent-based analysis; concatenation placed it as sister to a group formed by Spinibarbinae, Acrossocheilinae, Schizopygopsinae, Torinae, and Barbinae, while coalescent-based analysis placed it more closely-related to the clade formed by Smiliogastrinae + 'Poropuntiinae', although with poor support (below 50% bootstrap). Given this conflict and uncertainty for the placement of *Chagunius*, rather than listing *Chagunius* as a smiliogastrine, we consider *Chagunius* as *incertae sedis* within the Cyprinidae.

Barbus was viewed by Myers (1960) as a "monstrous aggregation". Through a series of taxonomic works, *Barbus* was whittled to just some species of Eurasian tetraploids and the diploid '*Barbus*' of Africa (reviewed by Hayes & Armbruster 2017). Yang *et al.* (2015) demonstrated that members of *Barbus sensu lato* were divided among multiple groups (subfamilies here), including the Barbinae, Torinae, and the Smiliogastrinae. Yang *et al.* (2015) do not present explicit morphological diagnoses for these barb groups. As part of recognizing a monophyletic *Barbus* and Smiliogastrinae, Yang *et al.* (2015) recognized a diploid genus of small African barbs, *Enteromius*, which is now largely recognized as valid, though the genus may require further revision (Skelton 2016; Hayes & Armbruster 2017). Borkenhagen (2017) reconstructed the molecular phylogeny of Torinae, and considered *Pterocapoeta*, *Arabibarbus*, *Carasobarbus*, and *Mesopotamichthys* as valid. Vreven *et al.* (2016) review the history of hexaploid members of Torinae, primarily of the genus *Labeobarbus*, including species formerly classified in *Varicorhinus*, and the closely-related genera *Acapoeta* and *Sanagia*. *Eechathalakenda* was described by Menon (1999) for a single species of *Hypselobarbus*-like fish. Pethiyagoda *et al.* (2012) tentatively treat this genus as valid. The phylogenetic placement of this taxon has not yet been studied. We tentatively place it as *incertae sedis* at the level of Cyprinidae. *Puntius* is here listed as part of Smiliogastrinae, but some species currently recognized as *Puntius* are clearly not members of this group (Yang *et al.* 2015), hence a revision of this genus is needed.

Within the Schizothoracinae, Yang *et al.* (2015) recovered the genus *Schizothorax* as non-monophyletic with respect to *Aspiorhynchus* and *Schizopyge*, which were nested within this diverse genus. Yang *et al.* (2015) argue it is premature to revise the genus *Schizothorax*, and retained these genera as valid. They did not comment on Kottelat's (2013) usage of *Oreinus* for a few species of *Schizothorax*. In Yang *et al.*'s (2015) analysis, the circumscription of *Oreinus* as defined by Kottelat (2013) is not monophyletic. We thus list *Oreinus* within Schizothoracinae, which is consistent with Yang *et al.*'s (2015) call that a revision of *Schizothorax* is needed.

We tentatively place *Spinibarbichthys* along with *Spinibarbus* in Spinibarbinae. This taxon has not been studied in a phylogenetic framework but it is described as similar to *Spinibarbus*, and has previously been considered a subgenus of *Spinibarbus* (Duong *et al.* 2007).

Prolabeo and *Prolabeops* from West Africa are treated as *incertae sedis* in the Cyprinidae. The genera share a keratinized lower jaw with Labeoninae and some members of Torinae. Authors have suggested an affinity of *Prolabeo* to *Labeo* and *Labeobarbus* (Norman 1932; Daget 1984; Lévêque *et al.* 1994) and an affinity of *Prolabeops* to *Enteromius* and *Garra* (Thys van den Audenaerde 1965, 1974). Reid (1982) suggested that both genera lack synapomorphies of the Labeoninae, but they were not treated in the recent review of the African Torinae by Vreven *et al.* (2016). The species additionally share some resemblance to African Smiliogastrinae, making placement of the genera within the Cyprinidae uncertain at this time. Yang *et al.* (2012a) considered *Prolabeo* and *Prolabeops* as members of Labeoninae *incertae sedis*, though did not include them in their molecular phylogenetic analysis.

Caecocypris basimi, a cave species from Iraq, was recognized as *incertae sedis* within Cyprinidae by Bannister & Bunni (1980) because of the lack of a putative surface ancestor. They also noted similarities to the cave barb of Somalia, *Barbopsis*, which they suggested was parallelism. Despite the absence of barbels, a maxillary foramen is present; this foramen allows the innervation of the rostral barbel as found in other cyprinoids (Banister & Bunni 1980). In size and form, the species resembles that of the African small barbs (*Enteromius* and related taxa); however, no similar surface species occur in the Middle East and *Caecocypris* has not been analyzed phylogenetically. It seems most likely that *Caecocypris* belongs to Cyprinidae, but we are unsure of which subfamily it would belong to, so we recognize it as *incertae sedis* in Cyprinidae.

Gobionidae. The family Gobionidae, the gudgeons, is one of the most long-recognized subfamilies among the cyprinoids, with most species distributed in East Asia and the remaining in Europe (Tang *et al.* 2011). The gudgeons are distinctive among cyprinoids and it has been previously suggested that a separate family should be recognized (Kottelat & Freyhof 2007). See Tang *et al.* (2011) for a review and for the taxonomy reproduced here, with modification as described below. See Bănărescu & Nalbant (1973) for a morphological diagnosis for the Gobionidae.

Molecular phylogenetic studies strongly recover a monophyletic clade of Gobionidae including three or four clades. Tang *et al.*'s (2011) recent phylogenetic analysis of the Gobionidae recovered three major clades: Gobioninae, Sarcocheilichthyinae, and a *Hemibarbus—Squalidus* clade. Gobioninae includes *Gobiobotia*, the type genus of a group recognized by previous workers called the Gobiobotiinae, but Tang *et al.* (2011) chose to synonymize the group with Gobioninae. Though Jiang & Zhang (2013) recognized three tribes within the Gobioninae, they use these names for convenience as not all three groups were monophyletic, and thus we do not recognize these tribes here in this phylogenetic classification. The placement of *Coreius* was reconstructed with poor support in a polytomy with Sarcocheilichthyinae and Gobioninae in Tang *et al.* (2011), thus its placement among those three clades was uncertain. Stout *et al.* (2016) also recovered three major clades corresponding to the clades identified in Tang *et al.* (2011), but *Coreius* was not included in their study. Zhao *et al.* (2016) studied phylogenetic relationships of the Gobionidae using mitogenomes. These authors recovered three clades corresponding to those recovered in Tang *et al.* (2011), and they recovered strong bootstrap support for *Coreius* forming the sister clade to the clade formed by Sarcocheilichthyinae + Gobioninae; hence, *Coreius* should not be considered part of a monophyletic Sarcocheilichthyini, and we consider it *incertae sedis*.

Morphological synapomorphies for the subfamilies of Gobionidae were not presented (Tang *et al.* 2011). Although gudegons are primarily benthic, the Sarcocheilichthyinae, unlike most gudgeons, include mostly species that have terminal (vs. inferior) mouths (Tang *et al.* 2011).

The placement of one *Belligobio* species in Tang *et al.*'s (2011) phylogeny within *Hemibarbus* prompted them to transfer this species to *Hemibarbus*; however, since they did not study the type species, they could not determine the validity of *Belligobio*, and so they retained it as valid. *Placogobio* Nguyen 2001 was described from Vietnam (Kottelat 2013; Eschmeyer *et al.* 2017). Eschmeyer *et al.* (2017) provisionally placed this genus within

Gobionidae. We were unable to obtain the description of *Placogobio*, and also tentatively recognize *Placogobio* as Gobionidae *incertae sedis*. Tang *et al.* (2011) recovered a clade where the species from the genera *Biwia*, *Microphysogobio*, *Platysmacheilus*, and *Huigobio* did not form monophyletic clades, though retained these genera as valid and argued for a need to revise these taxa. Jiang & Zhang (2013) evaluated the validity of species of these genera and maintained these genera as valid, including *Huigobio*. With additional taxon sampling, Huang *et al.* (2016) recovered *Huigobio* nested among species of *Microphysogobio*, and thus considers *Huigobio* as a synonym of *Microphysogobio*. We follow Huang *et al.* (2016) in recognizing *Huigobio* as a synonym of *Microphysogobio*, though a comprehensive taxonomy and phylogeny of *Microphysogobio* remains unresolved (Jiang & Zhang 2013).

Xenocyprididae. Xenocyprididae is a morphologically diverse clade of fishes including species that have been previously grouped as various subfamilies, such as Cultrinae, Hypophthalmichthyinae, Squaliobarbinae, and others, as reviewed in Tang *et al.* (2013a). Although morphological definitions have identified many of the subclades of the Xenocyprididae, the Xenocyprididae has not generally been recognized as a single group. These groups were more recently identified as a clade in a molecular phylogenetic study, and given the name Oxygastrinae (Tang *et al.* 2013a; b); however, Kottelat (2013) determined that this name was unavailable because it was not based on the genus *Oxygaster* van Hasselt 1823, and that Xenocypridinae is an available name for this group and has precedence. See Tang *et al.* (2013a) for a review of morphological support for a clade corresponding to the Xenocyprididae.

The opsariichthyines have been recognized for some time to represent a natural group (Chen 1982; Wang *et al.* 2007a), and several studies have demonstrated that they are sister to the remaining species of xenocypridids (Tang *et al.* 2013a; Huang *et al.* 2017). These species have an external morphological similarity to danionids, and were previously considered among them (Tang *et al.* 2010), but can be morphologically distinguished from danionids by the presence of a *Y*-shaped ligament connecting the kinethmoid and the ethmoid, which is found in many cyprinoids but not in any danionids (Liao *et al.* 2011; Liao & Kullander 2012). Opsariichthyinae includes the genera *Candidia*, *Nipponocypris*, *Opsariichthys*, *Parazacco*, and *Zacco* (Tang *et al.* 2013a; Huang *et al.* 2017; Ito *et al.* 2017). They are distinguished among cyprinoids by a long anal fin and the separation of the left and right supratemporal canals of the cephalic lateral line system (Ito *et al.* 2017). A subfamily Xenocypridinae, including all remaining genera of Xenocyprididae exclusive of Ospariichthyinae, is also recognized herein. In non-opsariichthyine xenocypridids, leuciscids, and gobionids, the left and right supratemporal canals are connected, while it is independently separated in the acheilognathids and opsariichthyines (Ito *et al.* 2017).

Multiple unstudied genera are here placed provisionally within Xenocyprididae as *incertae sedis*, though we note that given the absence of a long anal fin in these genera, they are likely not members of the Opsariichthyinae as currently diagnosed. We follow Tang *et al.* (2013a) in provisionally placing *Anabarilius*, *Longiculter*, *Pogobrama*, and *Rasborichthys* within Xenocyprididae, but these genera have not been studied in a molecular phylogenetic framework. Tang *et al.* (2013a) mention that the classification of *Atrilinea* is uncertain, however they mention that Chen's (1987) phylogenetic analysis suggests *Atrilinea* may possibly belong to Xenocyprididae. We provisionally place this genus within Xenocyprididae, but echo Tang *et al.*'s (2013a) call that further study is warranted. Eschmeyer *et al.* (2017) list *Araiocypris* and *Gymnodanio* within Xenocypridinae (= Xenocyprididae) but this appears to be without precedence. We continue this recognition here, but note there is also uncertainty with the respect to their membership here. *Araiocypris batodes* is a small cyprinoid described from two specimens from northern Vietnam with reduced cephalic sensory system and presence of a soft ventral keel, but no more specific determination of its relationships was possible (Conway & Kottelat 2008). Tang *et al.* (2010) comment that the placement of *Gymnodanio* to Danionidae could not be confirmed. The only character suggested for its relationship to other fishes is a similar fin ray count to *Barilius* (Chen & He 1992), a genus of Chedrinae within Danionidae. *Gymnodanio* has some unique characters, including a naked body except for lateral line scales, a decurved lateral line, and a soft keel between the pelvic fins and anus. In addition, we recognize *Oxygaster* as a member of Xenocyprididae and Xenocypridinae. Although multiple studies have been congruent in recognizing *Oxygaster* within this group (Tang et al. 2013a; b), a recent study has placed this genus as outside of the Xenocyprididae and sister to Leuciscidae (Schönhuth et al. 2018). We tentatively follow Tang et al. (2013a; b), but the phylogenetic relationships of *Oxygaster* warrant further study.

Danionidae. The classification of Danionidae has been in recent flux with regards to the inclusion of

Paedocypris and *Sundadanio*, but we exclude them here based on the results of multiple molecular phylogenetic studies (Mayden & Chen 2010; Stout *et al.* 2016; Hirt *et al.* 2017). The grouping equivalent to Danionidae has previously been referred to as 'rasborins' in much of the phylogenetic literature (e.g. Howes 1991; Cavender & Coburn 1992), though more recently it was shown the family group name Danionidae has priority (Tang *et al.* 2010). See Cavender & Coburn (1992) for morphological synapomorphies of danionids excluding *Opsariichthys* and *Zacco* (which as noted above are xenocypridids). Also, danionids share the absence of the *Y*-shaped ligament connecting the kinethmoid and the ethmoid, although this absence is also found in some members of other cyprinoid families (Liao & Kullander 2012).

We recognize three major clades in Danionidae that have been previously recovered (Liao *et al.* 2011; Tang *et al.* 2010), herein recognized as subfamilies of the same rank: Danioninae, Rasborinae, and Chedrinae. Liao *et al.* (2011) suggested that the Danioninae and Chedrinae are sister clades and united them under a single taxon of the same rank as Rasborinae. While this conflicted with earlier molecular phylogenetic analyses (Rüber *et al.* 2007; Mayden & Chen 2010; Tang *et al.* 2010), a sister-group relationship between Chedrinae and Danioninae was strongly supported by phylogenomic analyses (Stout *et al.* 2016). See Liao *et al.* (2011) for morphological synapomorphies supporting each of these three clades.

There has been some conflict on the placement of the genus *Esomus* among danionid groups. In a phylogenomic analysis, *Esomus* was recovered as a lineage sister to the remaining subfamilies of Danionidae (Stout *et al.* 2016). This differs from previous morphological and molecular studies, which have variably suggested *Esomus* may be a danionine, rasborine, or chedrine (see Stout *et al.* 2016 for more details). Liao *et al.* (2011) recovers two non-homoplasious morphological synapomorphies that are exclusive to Chedrinae and *Esomus* that support their close relationship: a reduced or absent postcleithrum and the orientation of the postcleithrum relative to the ribs (Liao *et al.* 2011); however, given that *Esomus* does not possess a postcleithrum, it does not actually share the latter character state with other chedrines. Also, there is homoplasy among cyprinoids for the presence of the postcleithrum (Liao *et al.* 2011), so the morphological support for a close relationship of *Esomus* to Chedrinae may be inflated by this absence and the inapplicability of the postcleithrum orientation. Without these postcleithrum characters, Chedrinae and Esominae are not diagnosed by any non-homoplasious synapomorphies in Liao *et al.*'s (2011) study.

Based on morphological phylogenetic evidence, *Bengala elanga* (monotypic) is supported as closely related to *Luciosoma* (Liao *et al.* 2011; 2012), and we recognize it among the Chedrinae. The placement of *Thryssocypris* among the cyprinoids is unclear but members of this genus have some potential similarities with danionids (Howes 1991; Tang *et al.* 2010), so we tentatively place it *incertae sedis* in Danionidae. We recognize members of *Danio*, *Celestichthys*, and *Brachydanio* as a single genus (*Danio*) following Kullander (2015). Importantly, this continues recognition (and thus provides taxonomic stability) to the species *Danio rerio* within *Danio*, which would be moved to *Brachydanio* if *Danio* is split. We feel that recognizing *Danio rerio* in a different genus would be problematic for what has become an important model organism in biology (McCluskey & Postlethwait 2015), and suggest the use of subgenera within *Danio* to recognize these clades.

Kottelat (2013) suggested that *Opsaridium* Peters, 1854 and *Sagittabarilius* Fowler, 1936 are available names for African *Raiamas*, which are not closely related to the Asian *Raiamas bola* and *R. guttatus* according to molecular analyses (Liao *et al.* 2012). Since then, a molecular phylogenetic analysis demonstrated that *Opsaridium zambezense* (the type species of *Opsaridium*) and *Raiamas salmolucius* (the type species of *Sagittabarilius*) are relatively closely related (Sungani *et al.* 2017). Hence, we recognize *Sagittabarilius* as a synonym of *Opsaridium*.

Leuciscidae. The minnows of Leuciscidae are found primarily in Europe, Asia, and North America, and are dominant members of the European and North American cypriniform assemblages (Cavender & Coburn 1992; Kottelat & Freyhof 2007). See "Monophyly of Phoxinins & Leuciscins" in Cavender & Coburn (1992) and Bogutskaya (1992) for morphological synapomorphies for Leuciscidae. The Leuciscidae has previously been divided into two major clades: Leuciscinae and Phoxininae (Cavender & Coburn 1992). The Leuciscinae includes primarily Eurasian genera, and are highly diverse in Europe, and also includes the North American species *Notemigonus crysoleucas* (Cavender & Coburn 1992; Kottelat & Freyhof 2007; Schönhuth *et al.* 2018). The Phoxininae *sensu* Cavender & Coburn includes all North American native cyprinoids (except for *N. crysoleucas*), and some Eurasian genera (Imoto et al. 2013). See Cavender & Coburn (1992) for morphological synapomorphies supporting each of these clades.

Recently, the Phoxininae *sensu* Cavender & Coburn were divided into multiple subfamilies corresponding to major clades that have been supported across multiple phylogenetic studies (Bufalino & Mayden 2010; Schönhuth *et al.* 2012; Imoto et al. 2013; Schönhuth *et al.* 2018). These studies identified within the North American Phoxininae a 'western clade,' a 'creek chub-plagopterin clade,' and an 'open posterior myodome (OPM) clade' including the shiners. Though morphological studies are consistent in recovering three major groups (Mayden 1989; Cavender & Coburn 1992), morphological and molecular phylogenies differ in the placement of some genera among these clades (Bufalino & Mayden 2010; Gidmark & Simons 2014). Additionally, these three North American clades group together with a clade of Eurasian phoxinines and *Phoxinus* (Bufalino & Mayden 2010; Stout et al. 2016; Schönhuth *et al.* 2018). Most recently, Schönhuth *et al.* (2018) opted to recognize subfamily-level groupings for species that were previously recognized among Phoxininae, due to their distinctiveness and the fact that Leuciscinae renders Phoxininae *sensu lato* as paraphyletic (although the relationships between Leuciscinae and some of the other subfamilies were not well-resolved by maximum likelihood). This restricts Phoxininae to only the Eurasian species of *Phoxinus*, and recognizes the subfamilies Pseudaspininae for the Far East species previously classified among Phoxininae (including *Oreoleuciscus*, *Pseudaspius*, *Rhynchocypris*, and *Tribolodon*), the Laviniinae for the Western clade, the Plagopterinae for the Creek Chub-Plagopterin clade, and the Pogonichthyinae for the OPM clade. For a review on the history of these groupings and their corresponding genera, see Schönhuth *et al.* (2018). All three species of the Mexican genus *Evarra* and the monotypic *Stypodon* are extinct and have not been studied phylogenetically (Gidmark & Simons 2014). Coburn & Cavender (1992) comment that *Evarra* is likely to be a western clade member; we tentatively place that genus within the Laviniinae. *Stypodon* signifer, the only member of the genus *Stypodon*, had molariform pharyngeal teeth and likely ate snails (Miller 2006). The species appears similar to OPM members in external morphology. Its pharyngeal tooth count is unusual 0,3-3,0, however several members of the OPM group lack teeth in the outer row as well (Boschung & Mayden 2004). Although *Notemigonus* (the only member of the Leuciscinae in North America) also lacks teeth in the outer row, the overall morphology of *Stypodon* is much more similar to the Pogonichthyinae. We tentatively place it as Pogonichthyinae.

There have been many recent changes in the recognition of genera within the Leuciscidae. For a recent classification of North American genera, which we follow here, refer to Gidmark & Simons (2014). Among their decisions was recognizing the splitting of the genus *Notropis* based on mitochondrial phylogenetic data, with the following additional genera recognized as valid: *Alburnops*, *Aztecula*, *Ericymba*, *Graodus*, *Hudsonius*, and *Miniellus* (Mayden *et al.* 2006; Gidmark & Simons 2014). A subsequent study has questioned the monophyly of *Alburnops* and *Hudsonius*, but makes no taxonomic acts to synonymize these genera with others (Schönhuth *et al.* 2018). More work is forthcoming that is expected to further resolve the taxonomy of the group, and we tentatively retain the taxonomy recognized in Gidmark & Simons (2014). We follow Gidmark & Simons (2014) in synonymizing *Moapa* within *Gila*, and recognizing *Acrocheilus* (for *Acrocheilus alutaceus*) and *Klamathella* (for *Klamathella coerulea*, previously placed in *Gila*) and *Tiaroga* for *Tiaroga cobitis* (previously placed in *Rhinichthys*). We do not recognize *Pararhinichthys* as a valid genus following studies that argue *Pararhinichthys bowersi* is an F_1 hybrid between *Rhinichthys cataractae* and *Nocomis micropogon* (Poly & Sabaj 1998); however, if *Pararhinichthys* is determined to be distinct genus, it is an available name. Among East Asian phoxinin genera, Imoto *et al.* (2013) recovered *Pseudaspius* within a clade of *Tribolodon*, rendering *Tribolodon* paraphyletic based on mitogenomic data; given that *Pseudaspius* is the older name, *Tribolodon* could be a synonym of *Pseudaspius*.
This result was also found by Kartavtsev et al. (2016) using mitochondrial sequences and Schönhuth et al. (2018) with both mitochondrial and nuclear sequences. None of these studies have made any taxonomic actions regarding *Tribolodon.*

Esominae Tan & Armbruster new subfamily

Type genus: *Esomus* Swainson 1839

Diagnosis. Esominae can be distinguished from all cypriniforms by the combined presence of long maxillary barbels extending past the pectoral-fin origin (vs. maxillary barbels, when present, not extending past the pectoral-fin origin) and possessing only a single row of teeth on the pharyngeal jaw (vs. multiple rows of teeth on the pharyngeal jaw). In many Esominae, extremely long maxillary barbels are present that extend past the pelvic-fin origin.

Composition. *Esomus ahli* Hora & Mukerji 1928, *Esomus altus* (Blyth 1860), *Esomus barbatus* (Jerdon

1849), *Esomus caudiocellatus* Ahl 1924, *Esomus danrica* (Hamilton 1822), *Esomus longimanus* (Lunel 1881), *Esomus malayensis* (Matte & Reichelt 1908), *Esomus metallicus* Ahl 1924, *Esomus thermoicos* (Valenciennes 1842) and the possibly valid species *Esomus lineatus* Ahl 1923, *Esomus malabaricus* Day 1867 and *Esomus manipurensis* Tilak & Jain 1990.

Remarks. We derived the diagnosis for *Esomus* based on information from Hora & Mukerji (1928) and Pasco-Viel *et al.* (2010). Additionally, morphological descriptions by Talwar & Jhingran (1991) and discussion by Liao *et al.* (2011) indicate Esominae members possess the following characters: mouth small and superior, lower jaw without symphyseal knob, eyes visible from ventral view, dorsal-fin insertion posterior to pelvic-fin insertion, dorsal fin with six or seven branched rays, anal fin with five branched rays, postcleithrum greatly reduced or absent, lateral line (when present) abruptly descending for first few scales anteriorly.

Classification of Genera of Cypriniformes

Gyrinocheiloidei
Gyrinocheilidae Gill 1905 (Type genus: *Gyrinocheilus* Vaillant 1902)
Gyrinocheilus Vaillant 1902 (syn. *Gyrinocheilops* Fowler 1937)
Catostomoidei
Catostomidae Agassiz 1850 (Type genus: *Catostomus* Lesueur 1817)
Catostominae Agassiz 1850 (Type genus: *Catostomus* Lesueur 1817)
Catostomini Agassiz 1850 (Type genus: *Catostomus* Lesueur 1817)
Catostomus Lesueur 1817 (syn. *Acomus* Girard 1856, *Decactylus* Rafinesque 1820, *Minomus* Girard 1856, *Notolepidomyzon* Fowler 1913, *Pantosteus* Cope in Cope & Yarrow 1875, *Stomocatus* Bonaparte 1839)
Chasmistes Jordan 1878 (syn. *Lipomyzon* Cope 1881, *Pithecomyzon* Fowler 1913)
Deltistes Seale 1896
Xyrauchen Eigenmann & Kirsch 1899
Erimyzontini Hubbs 1930
Erimyzon Jordan 1876
Minytrema Jordan 1878
Moxostomatini Bleeker 1863 (Type genus: *Moxostoma* Rafinesque 1820)
Moxostoma Rafinesque 1820 (syn. *Lagochila* Jordan & Brayton 1877, *Megapharynx* Legendre 1942, *Placopharynx* Cope 1870, *Ptychostomus* Agassiz 1855, *Quassilabia* Jordan & Brayton in Jordan 1878, *Scartomyzon* Fowler 1913, *Teretulus* Rafinesque 1820)
Thoburniini Hubbs 1930 (Type genus: *Thoburnia* Jordan & Snyder 1917)
Hypentelium Rafinesque 1818 (syn. *Hylomyzon* Agassiz 1855)
Thoburnia Jordan & Snyder in Jordan 1917
Cycleptinae Gill 1861 (Type genus: *Cycleptus* Rafinesque 1819)
Cycleptus Rafinesque 1819 (syn. *Rhytidostomus* Heckel 1843)
Ictiobinae Bleeker 1863 (Type genus: *Ictiobus* Rafinesque 1820)
Carpiodes Rafinesque 1820 (syn. *Sclerognathus* Valenciennes in Cuvier & Valenciennes 1844)
Ictiobus Rafinesque 1820 (syn. *Amblodon* Rafinesque 1819, *Bubalichthys* Agassiz 1855, *Megastomatobus* Fowler 1913)
Myxocyprininae Fowler 1958 (Type genus: *Myxocyprinus* Gill 1877).
Myxocyprinus Gill 1877
Cobitoidei
Balitoridae Swainson 1839 (Type genus: *Balitora* Gray 1830)
Balitorinae Swainson 1839 (Type genus: *Balitora* Gray 1830)

        - *Balitora* Gray 1830 (syn. *Sinohomaloptera* Fang 1930)
        - *Balitoropsis* Smith 1945
        - *Hemimyzon* Regan 1911 (syn. *Dienbienia* Nguyen & Nguyen 2002)
        - *Homaloptera* van Hasselt 1823 (syn. *Helgia* Vinciguerra 1890)
        - *Jinshaia* Kottelat & Chu 1988
        - *Lepturichthys* Regan 1911
        - *Metahomaloptera* Chang 1944
        - *Pseudohomaloptera* Silas 1953
        - *Sinogastromyzon* Fang 1930
    - Homalopteroidinae Randall & Page 2015 (Type genus: *Homalopteroides* Fowler 1905)
        - *Homalopteroides* Fowler 1905 (syn. *Chopraia* Prashad & Mukerji 1929)
        - *Homalopterula* Fowler 1940
    - Balitoridae *incertae sedis*
        - *Bhavania* Hora 1920
        - *Cryptotora* Kottelat 1998
        - *Ghatsa* Randall & Page 2015
        - *Neohomaloptera* Herre 1944
        - *Travancoria* Hora 1941
- Barbuccidae Kottelat 2012 (Type genus: *Barbucca* Roberts 1989)
    - *Barbucca* Roberts 1989
- Botiidae Berg 1940 (Type genus: *Botia* Gray 1831)
    - Botiinae Berg 1940 (Type genus: *Botia* Gray 1831)
        - *Ambastaia* Kottelat 2012
        - *Botia* Gray 1831 (syn. *Diacantha* Swainson 1839, *Hymenphysa* McClelland 1839, often misspelled *Hymenophysa*)
        - *Chromobotia* Kottelat 2004
        - *Sinibotia* Fang 1936
        - *Syncrossus* Blyth 1860
        - *Yasuhikotakia* Nalbant 2002
    - Leptobotiinae Nalbant 2002 (Type genus: *Leptobotia* Bleeker 1870)
        - *Leptobotia* Bleeker 1870
        - *Parabotia* Dabry de Thiersant 1872
- Cobitidae Swainson 1838 (Type genus: *Cobitis* Linnaeus 1758)
    - *Acantopsis* van Hasselt 1823 (syn. *Prostheacanthus* Blyth 1860)
    - *Aperioptus* Richardson 1848 (syn. *Acanthopsoides* Fowler 1934, *Neacanthopsis* Smith 1945)
    - *Bibarba* Chen & Chen 2007
    - *Canthophrys* Swainson 1838 (syn. *Somileptus* Swainson 1839)
    - *Cobitis* Linnaeus 1758 (syn. *Acanestrinia* Băcescu 1962, *Acanthopsis* Agassiz 1832, *Acantophthalmus* van Hasselt 1823, *Beyshehiria* Erk'akan, Atalay-Ekmekçi & Nalbant 1999, *Bicanestrinia* Băcescu 1962, *Choia* Kim, Park & Nalbant 1997, *Cobitinula* Hankó 1924, *Iberocobitis* Băcescu 1962, *Iksookimia* Nalbant 1993, *Kichulchoia* Kim, Park & Nalbant 1999, *Niwaella* Nalbant 1963)
    - *Koreocobitis* Kim, Park & Nalbant 1997
    - *Kottelatlimia* Nalbant 1994
    - *Lepidocephalichthys* Bleeker 1863 (syn. *Cobitichthys* Bleeker 1858, *Enobarbichthys* Whitley 1931, *Enobarbus* Whitley 1928, *Jerdonia* Day 1871, *Madrasia* Nalbant 1963, *Platacanthus* Day 1865)
    - *Lepidocephalus* Bleeker 1858

Microcobitis Bohlen & Harant 2011
Misgurnus Lacepède 1803 (syn. *Mesomisgurnus* Fang 1935, *Ussuria* Nikolskii 1903)
Neoeucirrhichthys Bănărescu & Nalbant 1968
Pangio Blyth 1860 (syn. *Apua* Blyth 1860, *Cobitophis* Myers 1927, *Eucirrhichthys* Perugia 1892)
Paralepidocephalus Tchang 1935
Paramisgurnus Dabry de Thiersant 1872 (syn. *Paramisgurnus* Sauvage 1878)
Protocobitis Yang & Chen 1993
Sabanejewia Vladykov 1929
Theriodes Kottelat 2012

Ellopostomatidae Bohlen & Šlechtová 2009 (Type genus: *Ellopostoma* Vaillant 1902)
Ellopostoma Vaillant 1902

Gastromyzontidae Fowler 1905 (Type genus: *Gastromyzon* Günther 1874)
Annamia Hora 1932
Beaufortia Hora 1932
Erromyzon Kottelat 2004
Formosania Oshima 1919 (syn. *Crossostoma* Sauvage 1878)
Gastromyzon Günther 1874 (syn. *Lepidoglanis* Vaillant 1889)
Glaniopsis Boulenger 1899
Hypergastromyzon Roberts 1989
Katibasia Kottelat 2004
Liniparhomaloptera Fang 1935
Neogastromyzon Popta 1905
Paraprotomyzon Pellegrin & Fang 1935
Parhomaloptera Vaillant 1902
Plesiomyzon Zheng & Chen 1980
Protomyzon Hora 1932 (syn. *Progastromyzon* Hora & Jayaram 1952)
Pseudogastromyzon Nichols 1925 (syn. *Labigastromyzon* Tang & Chen 1996)
Sewellia Hora 1932 (syn. *Diardichthys* Roberts 1998, *Parasewellia* Nguyen & Nguyen in Nguyen 2005)
Vanmanenia Hora 1932 (syn. *Homalosoma* Boulenger 1901, *Praeformosania* Fang 1935)
Yaoshania Yang, Kottelat, Yang & Chen 2012

Nemacheilidae Regan 1911 (Type genus: *Nemacheilus* Bleeker 1863)
Aborichthys Chaudhuri 1913
Acanthocobitis Peters 1861
Afronemacheilus Golubtsov & Prokofiev in Prokofiev 2009
Barbatula Linck 1790 (syn. *Cobites* Swainson 1839, *Orthrias* Jordan & Fowler 1903)
Claea Kottelat 2011 (syn. *Oreias* Sauvage 1874)
Draconectes Kottelat 2012
Dzihunia Prokofiev 2001
Eidinemacheilus Segherloo, Ghaedrahmati & Freyhof 2016
Eonemachilus Berg 1938
Hedinichthys Rendahl 1933 (syn. *Minihedinichthys* Prokofiev 2017)
Heminoemacheilus Zhu & Cao 1987
Homatula Nichols 1925
Indoreonectes Rita & Bănărescu in Rita, Bănărescu & Nalbant 1978
Iskandaria Prokofiev 2009

Lefua Herzenstein 1888 (syn. *Elxis* Jordan & Fowler 1903, *Octonema* Herzenstein in Herzenstein & Warpachowski 1888)
Malihkaia Kottelat 2017
Mesonoemacheilus Bănărescu & Nalbant 1982
Micronemacheilus Rendahl 1944
Nemacheilus Bleeker 1863 (syn. *Modigliania* Perugia 1893, *Pogononemacheilus* Fowler 1937)
Nemachilichthys Day 1878
Neonoemacheilus Zhu & Guo 1985 (syn. *Infundibulatus* Menon 1987)
Oreonectes Günther 1868 (syn. *Octonema* Martens 1868)
Oxynoemacheilus Bănărescu & Nalbant 1966 (syn. *Ilamnemacheilus* Coad & Nalbant 2005, *Nun* Bănărescu & Nalbant in Bănărescu, Nalbant & Goren 1982)
Paracanthocobitis Grant 2007
Paracobitis Bleeker 1863 (syn. *Adiposia* Annandale & Hora 1920, *Pseudodon* Kessler 1874)
Paranemachilus Zhu 1983
Paraschistura Prokofiev 2009 (syn. *Metaschistura* Prokofiev 2009)
Petruichthys Menon 1987
Physoschistura Bănărescu & Nalbant 1982
Protonemacheilus Yang & Chu 1990
Pteronemacheilus Bohlen & Ŝlechtová 2011
Sasanidus Freyhof, Geiger, Golzarianpour & Patimar 2016
Schistura McClelland 1838 (syn. *Acoura* Swainson 1839, *Longischistura* Bănărescu & Nalbant 1995)
Sectoria Kottelat 1990
Seminemacheilus Bănărescu & Nalbant 1995
Speonectes Kottelat 2012
Sphaerophysa Cao & Zhu 1988
Sundoreonectes Kottelat 1990
Traccatichthys Freyhof & Serov 2001
Triplophysa Rendahl 1933 (syn. *Deuterophysa* Rendahl 1933, *Didymophysa* Whitley 1950, *Diplophysa* Kessler 1874, *Diplophysoides* Fowler 1958, *Indotriplophysa* Prokofiev 2010, *Labiatophysa* Prokofiev 2010, *Paradidymophysa* Prokofiev 2017, *Qinghaichthys* Zhu 1981, *Tarimichthys* Prokofiev 2010, *Tauphysa* Rendahl 1933)
Troglocobitis Parin 1983
Troglonectes Zhang, Zhao & Tang 2016
Tuberoschistura Kottelat 1990
Turcinoemacheilus Bănărescu & Nalbant 1964
Yunnanilus Nichols 1925
Serpenticobitidae Kottelat 2012 (Type genus: *Serpenticobitis* Roberts 1997)
Serpenticobitis Roberts 1997
Vaillantellidae Nalbant & Bănărescu 1977 (Type genus: *Vaillantella* Fowler 1905)
Vaillantella Fowler 1905
Cyprinoidei
Acheilognathidae Bleeker 1863 (Type genus: *Acheilognathus* Bleeker 1859)
Acheilognathus Bleeker 1859 (syn. *Acanthorhodeus* Bleeker 1871, *Paracheilognathus* Bleeker 1863, *Rhodeops* Fowler 1910)
Paratanakia Chang, Chen & Mayden 2014
Pseudorhodeus Chang, Chen & Mayden 2014

  - *Rhodeus* Agassiz 1832 (syn. *Pseudoperilampus* Bleeker 1863)
  - *Sinorhodeus* Li, Liao & Arai 2017
  - *Tanakia* Jordan & Thompson 1914
- Cyprinidae Rafinesque 1815 (Type genus: *Cyprinus* Linnaeus 1758)
  - Acrossocheilinae Yang *et al.* 2015 (Type genus: *Acrossocheilus* Oshima 1919)
    - *Acrossocheilus* Oshima 1919 (syn. *Lissochilichthys* Oshima 1920, *Masticbarbus* Tang 1942, *Sinibarbus* Sauvage 1874)
    - *Folifer* Wu 1977
    - *Onychostoma* Günther 1896 (syn. *Scaphesthes* Oshima 1919, *Scaphiodontella* Oshima 1920)
  - Barbinae Bleeker 1859 (Type genus: *Barbus* Daudin 1805)
    - *Aulopyge* Heckel 1841
    - *Barbus* Daudin 1805 (syn. *Pseudobarbus* Bielz 1853)
    - *Capoeta* Valenciennes 1842 (syn. *Scaphiodon* Heckel 1843)
    - *Cyprinion* Heckel 1843
    - *Luciobarbus* Heckel 1843 (syn. *Aspiobarbus* Berg 1933, *Bertinichthys* Whitley 1953, *Bertinius* Fang 1943, *Messinobarbus* Bianco 1998)
    - *Scaphiodonichthys* Vinciguerra 1890 (syn. *Scaphiodontopsis* Fowler 1934)
    - *Semiplotus* Bleeker 1860
  - Cyprininae Rafinesque 1815 (Type genus: *Cyprinus* Linnaeus 1758)
    - *Aaptosyax* Rainboth 1991
    - *Carassioides* Oshima 1926
    - *Carassius* Jarocki 1822 (syn. *Cyprinopsis* Fitzinger 1832, *Neocarassius* Castelnau 1872)
    - *Cyprinus* Linnaeus 1758 (syn. *Carpio* Heckel 1843, *Laichowcypris* Nguyen & Doan 1969, *Laichowcypris* Mai (ex Hoa & Hoa) 1978, *Mesocyprinus* Fang 1936, *Mesocyprinus* Cheng 1950)
    - *Luciocyprinus* Vaillant 1904 (syn. *Fustis* Lin 1932)
    - *Procypris* Lin 1933 (syn. *Paraprocypris* Fang 1936)
    - *Sinocyclocheilus* Fang 1936 (syn. *Anchicyclocheilus* Li & Lan 1992, *Gibbibarbus* Dai 1988)
  - Labeoninae Bleeker 1859 (Type genus: *Labeo* Cuvier 1816)
    - Garrini Bleeker 1863 (Type genus: *Garra* Hamilton 1822)
      - *Discolabeo* Fowler 1937
      - *Garra* Hamilton 1822 (syn. *Discognathichthys* Bleeker 1860, *Discognathus* Heckel 1843, *Hemigarra* Karaman 1971, *Hemigrammocapoeta* Pellegrin 1927, *Horalabiosa* Silas 1954, *Iranocypris* Bruun & Kaiser 1944, *Lissorhynchus* Bleeker 1860, *Mayoa* Day 1870, *Neotylognathus* Kosswig 1950, *Phreatichthys* Vinciguerra 1924, *Platycara* McClelland 1838, *Tylognathoides* Tortonese 1938, *Typhlogarra* Trewavas 1955)
      - *Paracrossochilus* Popta 1904
      - *Tariqilabeo* Mirza & Saboohi 1990 (syn. *Akrokolioplax* Zhang & Kottelat 2006, *Gonorhynchus* McClelland 1838)
    - Labeonini Bleeker 1859 (Type genus: *Labeo* Cuvier 1816)
      - *Altigena* Burton (ex Lin) 1934 (syn. *Vinalabeo* Nguyen, Nguyen & Nguyen 2016)
      - *Bangana* Hamilton 1822 (syn. *Mirolabeo* Chu & Wang 1963, *Rohitodes* Bleeker 1860, *Tylognathus* Heckel 1843)
      - *Cirrhinus* Oken 1817 (syn. *Isocephalus* Heckel 1843)
      - *Gymnostomus* Heckel 1843 (syn. *Cirrhinichthys* Bleeker 1863, *Mrigala* Bleeker 1860)
      - *Incisilabeo* Fowler 1937
      - *Labeo* Cuvier 1816 (syn. *Abrostomus* Smith 1841, *Acra* Bleeker 1860, *Catla* Valenciennes in Cuvier & Valenciennes 1844, *Chrysophekadion* Bleeker 1860, *Gibelion* Heckel 1843,

Morulius Hamilton 1822, *Nandina* Gray 1831, *Rohita* Valenciennes in Cuvier & Valenciennes 1842, *Rohitichthys* Bleeker 1860, *Tambra* Bleeker 1860)

Nukta Hora 1942

Speolabeo Kottelat 2017

'Osteochilini' (From genus *Osteochilus* Günther 1868)

Barbichthys Bleeker 1860

Crossocheilus Kuhl & van Hasselt 1823 (syn. *Crossocheilichthys* Bleeker 1860, *Holotylognathus* Fowler 1934)

Epalzeorhynchos Bleeker 1855

Henicorhynchus Smith 1945

Labiobarbus van Hasselt 1823 (syn. *Cyrene* Heckel 1843, *Dangila* Valenciennes in Cuvier & Valenciennes 1842)

Lobocheilos Bleeker 1853 (syn. *Gobionichthys* Bleeker 1859)

Osteochilus Günther 1868 (syn. *Diplocheilos* Bleeker 1860, *Kantaka* Hora 1942, *Neorohita* Fowler 1937)

Thynnichthys Bleeker 1859 (syn. *Thynnichthyina* Fowler 1937)

'Semilabeonini' (From genus *Semilabeo* Peters 1881)

Ageneiogarra Garman 1912

Cophecheilus Zhu, Zhang, Zhang & Han 2011

Discocheilus Zhang 1997 (syn. *Discolabeo* Chen in Chen & Lan 1992)

Discogobio Lin 1931

Fivepearlus Li, Yang, Li & Chen 2017

Hongshuia Zhang, Qiang & Lan 2008

Linichthys Zhang & Fang 2005

Mekongina Fowler 1937

Paraqianlabeo Zhao, Sullivan, Zhang & Peng 2014

Parasinilabeo Wu 1939 (syn. *Pararectoris* Su, Yang & Cui 2001)

Placocheilus Wu in Wu, Lin, Chen, Chen & He 1977

Prolixicheilus Zheng, Chen & Yang 2016

Pseudocrossocheilus Zhang & Chen 1997

Pseudogyrinocheilus Fang 1933

Ptychidio Myers 1930 (syn. *Varicogobio* Lin 1931)

Qianlabeo Zhang & Chen 2004

Rectoris Lin 1935

Semilabeo Peters 1881 (syn. *Amplolabrius* Lin 1933)

Sinigarra Zhang & Zhou 2012

Sinocrossocheilus Wu 1977

Stenorynchoacrum Huang, Yang & Chen 2014

Vinagarra Nguyen & Bui 2009

Labeoninae *incertae sedis*

Diplocheilichthys Bleeker 1860

Longanalus Li 2006

Parapsilorhynchus Hora 1921

Protolabeo Zhang, Zhao & An 2010

Schismatorhynchos Bleeker 1855

Sinilabeo Rendahl 1933

'Poropuntiinae' (From genus *Poropuntius* Smith 1931)

- *Albulichthys* Bleeker 1860
- *Amblyrhynchichthys* Bleeker 1860
- *Balantiocheilos* Bleeker 1860
- *Barbonymus* Kottelat 1999
- *Cosmochilus* Sauvage 1878 (syn. *Papillocheilus* Smith 1945)
- *Cyclocheilichthys* Bleeker 1859 (syn. *Anematichthys* Bleeker 1859, *Oxybarbus* Vaillant 1893, *Siaja* Bleeker 1859)
- *Cyclocheilos* Bleeker 1859
- *Discherodontus* Rainboth 1989
- *Eirmotus* Schultz 1959
- *Hypsibarbus* Rainboth 1996
- *Mystacoleucus* Günther 1868 (syn. *Acanthonotus* Tickell in Day 1888, *Matsya* Day 1889)
- *Poropuntius* Smith 1931
- *Puntioplites* Smith 1929 (syn. *Adamacypris* Fowler 1934)
- *Sawbwa* Annandale 1918
- *Scaphognathops* Smith 1945 (syn. *Scaphognathus* Smith 1931)
- *Sikukia* Smith 1931 (syn. *Xenocheilichthys* Smith 1934)

Probarbinae Yang *et al.* 2015 (Type genus: *Probarbus* Sauvage 1880)

- *Catlocarpio* Boulenger 1898
- *Probarbus* Sauvage 1880

Schizothoracinae McClelland 1842 (Type genus: *Schizothorax* Heckel 1838)

- *Aspiorhynchus* Kessler 1879
- *Oreinus* McClelland 1838 (syn. *Englottogaster* Gistel 1848, *Opistocheilos* Bleeker 1860)
- *Percocypris* Chu 1935
- *Schizopyge* Heckel 1848 (syn. *Paraschizothorax* Tsao 1964)
- *Schizothorax* Heckel 1838 (syn. *Aspiostoma* Nikolskii 1897, *Paraschizothorax* Bleeker 1863, *Paratylognathus* Sauvage 1880, *Racoma* McClelland & Griffith in McClelland 1842, *Schizothoraichthys* Misra 1962, *Tetrostichodon* Tchang, Yueh & Hwang 1964)

Schizopygopsinae Mirza 1991 (Type genus: *Schizopygopsis* Steindachner 1866)

- *Chuanchia* Herzenstein 1891
- *Diptychus* Steindachner 1866
- *Gymnocypris* Günther 1868 (syn. *Rugogymnocypris* Yueh & Hwang 1964)
- *Gymnodiptychus* Herzenstein 1892
- *Herzensteinia* Chu 1935
- *Oxygymnocypris* Tsao 1964
- *Platypharodon* Herzenstein 1891
- *Ptychobarbus* Steindachner 1866
- *Schizopygopsis* Steindachner 1866

Smiliogastrinae Bleeker 1863 (Type genus: *Smiliogaster* Bleeker 1860)

- *Barbodes* Bleeker 1859 (syn. *Cephalakompsus* Herre 1924, *Mandibularca* Herre 1924, *Ospatulus* Herre 1924, *Spratellicypris* Herre & Myers 1931)
- *Barboides* Brüning 1929 (syn. *Raddabarbus* Thys van den Audenaerde 1971)
- *Clypeobarbus* Fowler 1936
- *Dawkinsia* Pethiyagoda, Meegaskumbura & Maduwage 2012
- *Desmopuntius* Kottelat 2013

  - *Enteromius* Cope 1867 (syn. *Afropuntio* Karaman 1971, *Agrammobarbus* Pellegrin 1935, *Beirabarbus* Herre 1936, *Estevea* Whitley 1953, *Hemigrammocapoeta* Estève 1952, *Hemigrammopuntius* Pellegrin 1923, *Mannichthys* Schultz 1942, *Nicholsopuntius* Pellegrin 1933, *Parapuntius* Karaman 1971, *Vanderbiltella* Fowler 1936)
  - *Haludaria* Pethiyagoda 2013 (syn. *Dravidia* Pethiyagoda, Meegaskumbura & Maduwage 2012)
  - *Hampala* Kuhl & van Hasselt 1823 (syn. *Hampala* Bleeker 1860, *Heteroleuciscus* Sauvage 1874)
  - *Oliotius* Kottelat 2013
  - *Oreichthys* Smith 1933
  - *Osteobrama* Heckel 1843 (syn. *Smiliogaster* Bleeker 1860)
  - *Pethia* Pethiyagoda, Meegaskumbura & Maduwage 2012
  - *Pseudobarbus* Smith 1841 (syn. *Cheilobarbus* Smith 1841, *Gnathendalia* Castelnau 1861, *Oreodaimon* Greenwood & Jubb 1967)
  - *Puntigrus* Kottelat 2013
  - *Puntius* Hamilton 1822
  - *Rohtee* Sykes 1839
  - *Sahyadria* Raghavan, Philip, Ali & Dahanukar 2013
  - *Striuntius* Kottelat 2013
  - *Systomus* McClelland 1838
- Spinibarbinae Yang *et al.* 2015 (Type genus: *Spinibarbus* Oshima 1919)
  - *Spinibarbichthys* Oshima 1926
  - *Spinibarbus* Oshima 1919
- Torinae Karaman 1971 (Type genus: *Tor* Gray 1834)
  - *Acapoeta* Cockerell 1910
  - *Arabibarbus* Borkenhagen 2014
  - *Carasobarbus* Karaman 1971 (syn. *Kosswigobarbus* Karaman 1971, *Pseudotor* Karaman 1971)
  - *Hypselobarbus* Bleeker 1860 (syn. *Gonoproktopterus* Bleeker 1860)
  - *Labeobarbus* Rüppell 1835 (syn. *Barbellion* Whitley 1931, *Barynotus* Günther 1868, *Dillonia* Heckel 1847, *Lanceabarbus* Fowler 1936, *Varicorhinus* Rüppell 1835)
  - *Lepidopygopsis* Raj 1941
  - *Mesopotamichthys* Karaman 1971
  - *Naziritor* Mirza & Javed 1985
  - *Neolissochilus* Rainboth 1985 (syn. *Lissochilus* Weber & de Beaufort 1916)
  - *Osteochilichthys* Hora 1942
  - *Pterocapoeta* Günther 1902
  - *Sanagia* Holly 1926
  - *Tor* Gray 1834
- Cyprinidae *incertae sedis*
  - *Barbopsis* Di Caporiacco 1926 (syn. *Eilichthys* Pellegrin 1929, *Zaccarinia* Gianferrari 1934)
  - *Caecobarbus* Boulenger 1921
  - *Caecocypris* Banister & Bunni 1980
  - *Chagunius* Smith 1938
  - *Coptostomabarbus* David & Poll 1937
  - *Eechathalakenda* Menon 1999
  - *Kalimantania* Bănărescu 1980
  - *Laocypris* Kottelat 2000
  - *Neobarynotus* Bănărescu 1980

- *Parasikukia* Doi 2000
- *Paraspinibarbus* Chu & Kottelat 1989
- *Parator* Wu, Yang, Yue & Huang 1963
- *Prolabeo* Norman 1932
- *Prolabeops* Schultz 1941
- *Pseudosinocyclocheilus* Zhang & Zhao 2016
- *Rohteichthys* Bleeker 1860
- *Schizocypris* Regan 1914
- *Troglocyclocheilus* Kottelat & Bréhier 1999
- *Typhlobarbus* Chu & Chen 1982
- *Xenobarbus* Norman 1923

- Danionidae Bleeker 1863 (Type genus: *Danio* Hamilton 1822)
  - Chedrinae Bleeker 1863 (Type genus: *Chedrus* Swainson 1839)
    - *Barilius* Hamilton 1822 (syn. *Pteropsarion* Günther 1868)
    - *Bengala* Gray 1834 (syn. *Megarasbora* Günther 1868)
    - *Cabdio* Hamilton 1822 (syn. *Aspidoparia* Heckel 1847, *Morara* Bleeker 1860)
    - *Chelaethiops* Boulenger 1899 (syn. *Anchovicypris* Fowler 1936)
    - *Engraulicypris* Günther 1894 (syn. *Mesobola* Howes 1984)
    - *Leptocypris* Boulenger 1900
    - *Luciosoma* Bleeker 1855 (syn. *Trinematichthys* Bleeker 1860)
    - *Malayochela* Bănărescu 1968
    - *Nematabramis* Boulenger 1894 (syn. *Mearnsella* Seale & Bean 1907)
    - *Neobola* Vinciguerra 1895
    - *Opsaridium* Peters 1854 (syn. *Pelotrophus* Günther 1864, *Sagittabarilius* Fowler 1936)
    - *Opsarius* McClelland 1838 (syn. *Allodanio* Smith 1945, *Bendilisis* Bleeker 1860, *Chedrus* Swainson 1839, *Pachystomus* Heckel 1843, *Paradaniops* Nguyen & Doan 1969, *Perilampus* McClelland 1838, *Shacra* Bleeker 1860, *Schacra* Günther 1868)
    - *Raiamas* Jordan 1919 (syn. *Bola* Günther 1868)
    - *Rastrineobola* Fowler 1936
    - *Salmostoma* Swainson 1839 (syn. *Salmophasia* Swainson 1839)
    - *Securicula* Günther 1868 (syn. *Pseudoxygaster* Bănărescu 1967)
  - Danioninae Bleeker 1863 (Type genus: *Danio* Hamilton 1822)
    - *Betadevario* Pramod, Fang, Rema Devi, Liao, Indra, Jameela Beevi & Kullander 2010
    - *Chela* Hamilton 1822 (syn. *Cachius* Günther 1868)
    - *Danio* Hamilton 1822 (syn. *Brachydanio* Weber & de Beaufort 1916, *Celestichthys* Roberts 2007)
    - *Danionella* Roberts 1986
    - *Devario* Heckel 1843 (syn. *Danioides* Chu 1935, *Daniops* Smith 1945, *Eustira* Günther 1868, *Parabarilius* Pellegrin & Fang 1940, *Paradanio* Day 1865, *Rambaibarnia* Fowler 1934)
    - *Inlecypris* Howes 1980
    - *Laubuka* Bleeker 1859 (syn. *Allochela* Silas 1958)
    - *Microdevario* Fang, Norén, Liao, Källersjö & Kullander 2009
    - *Microrasbora* Annandale 1918
    - *Neochela* Silas 1958
  - Esominae *new subfamily* (Type genus: *Esomus* Swainson 1839)
    - *Esomus* Swainson 1839 (syn. *Nuria* Valenciennes in Cuvier & Valenciennes 1842, *Pogonocharax* Regan 1907)

    - Rasborinae Günther 1868 (Type genus: *Rasbora* Bleeker 1859)
        - *Amblypharyngodon* Bleeker 1860 (syn. *Brachygramma* Day 1865, *Mola* Heckel 1848, *Mola* Blyth 1860)
        - *Boraras* Kottelat & Vidthayanon 1993
        - *Brevibora* Liao, Kullander & Fang 2010
        - *Horadandia* Deraniyagala 1943
        - *Kottelatia* Liao, Kullander & Fang 2010
        - *Pectenocypris* Kottelat 1982
        - *Rasbora* Bleeker 1859 (syn. *Parluciosoma* Howes 1980)
        - *Rasboroides* Brittan 1954
        - *Rasbosoma* Liao, Kullander & Fang 2010
        - *Trigonopoma* Liao, Kullander & Fang 2010
        - *Trigonostigma* Kottelat & Witte 1999
    - Danionidae *incertae sedis*
        - *Thryssocypris* Roberts & Kottelat 1984
- Gobionidae Bleeker 1863 (Type genus: *Gobio* Cuvier 1816)
    - Gobioninae Bleeker 1863 (Type genus: *Gobio* Cuvier 1816)
        - *Abbottina* Jordan & Fowler 1903 (syn. *Pseudogobiops* Berg 1914)
        - *Acanthogobio* Herzenstein 1892
        - *Biwia* Jordan & Fowler 1903
        - *Gobio* Cuvier 1816 (syn. *Bungia* Keyserling 1861)
        - *Gobiobotia* Kreyenberg 1911 (syn. *Progobiobotia* Chen & Cao 1982)
        - *Mesogobio* Bănărescu & Nalbant 1973
        - *Microphysogobio* Mori 1934 (syn. *Huigobio* Fang 1938, *Rostrogobio* Taranetz 1937)
        - *Platysmacheilus* Lu, Luo & Chen 1977
        - *Pseudogobio* Bleeker 1860
        - *Romanogobio* Bănărescu 1961 (syn. *Rheogobio* Bănărescu 1961)
        - *Saurogobio* Bleeker 1870 (syn. *Armatogobio* Taranetz 1937, *Gobiosoma* Dybowski 1872, *Longurio* Jordan & Starks 1905)
        - *Xenophysogobio* Chen & Cao 1977
    - Sarcocheilichthyinae Kryzanowsky 1947 (Type genus *Sarcocheilichthys* Bleeker 1860)
        - *Coreoleuciscus* Mori 1935
        - *Gnathopogon* Bleeker 1860 (syn. *Leucogobio* Günther 1896, *Otakia* Jordan & Snyder 1900)
        - *Gobiocypris* Ye & Fu 1983
        - *Ladislavia* Dybowski 1869
        - *Paracanthobrama* Bleeker 1864 (syn. *Glabrobarbus* Fowler 1930)
        - *Pseudopungtungia* Mori 1935
        - *Pseudorasbora* Bleeker 1860 (syn. *Fundulichthys* Bleeker 1860, *Micraspius* Dybowski 1869)
        - *Pungtungia* Herzenstein 1892 (syn. *Zezera* Jordan & Fowler (ex Ishikawa) 1903)
        - *Rhinogobio* Bleeker 1870 (syn. *Megagobio* Kessler 1876, *Rhinogobioides* Rendahl 1928)
        - *Sarcocheilichthys* Bleeker 1860 (syn. *Barbodon* Dybowski 1872, *Chilogobio* Berg 1914, *Exoglossops* Fowler & Bean 1920, *Georgichthys* Nichols 1918)
    - *Hemibarbus–Squalidus* clade *sensu* Tang *et al.* 2011
        - *Belligobio* Jordan & Hubbs 1925 (syn. *Hemibarboides* Wang 1935)
        - *Hemibarbus* Bleeker 1860 (syn. *Gobiobarbus* Dybowski 1869)
        - *Squalidus* Dybowski 1872 (syn. *Parasqualidus* Doi 2000, *Sinigobio* Chu 1935)

  - Gobionidae *incertae sedis*
    - *Coreius* Jordan & Starks 1905 (syn. *Coripareius* Garman 1912)
    - *Paraleucogobio* Berg 1907
    - *Placogobio* Nguyen 2001
- Leptobarbidae Bleeker 1864 (Type genus: *Leptobarbus* Bleeker 1859)
  - *Leptobarbus* Bleeker 1859 (syn. *Filirasbora* Fowler 1937)
- Leuciscidae Bonaparte 1835 (Type genus: *Leuciscus* Cuvier 1816)
  - Laviniinae Bleeker 1863 (Type genus: *Lavinia* Girard 1854)
    - *Acrocheilus* Agassiz 1855
    - *Chrosomus* Rafinesque 1820 (syn. *Parchrosomus* Gasowska 1979, *Pfrille* Jordan 1924)
    - *Eremichthys* Hubbs & Miller 1948
    - *Evarra* Woolman 1894
    - *Gila* Baird & Girard 1853 (syn. *Moapa* Hubbs & Miller 1948, *Myloleucus* Cope 1872, *Protoporus* Cope 1872, *Siboma* Girard 1856, *Temeculina* Cockerell 1909, *Tigoma* Girard 1856)
    - *Hesperoleucus* Snyder 1913 (syn. *Endemichthys* Hopkirk 1974)
    - *Klamathella* Miller 1945
    - *Lavinia* Girard 1854 (syn. *Luxilinus* Jordan 1885)
    - *Mylopharodon* Ayres 1855
    - *Orthodon* Girard 1856
    - *Ptychocheilus* Agassiz 1855
    - *Relictus* Hubbs & Miller 1972
    - *Siphateles* Cope 1883 (syn. *Leucidius* Snyder 1917)
  - Leuciscinae Bonaparte 1835 (Type genus: *Leuciscus* Cuvier 1816)
    - *Abramis* Cuvier 1816 (syn. *Brama* Bleeker (ex Klein) 1863, *Sapa* Kazanskii 1928, *Zopa* Fitzinger 1873)
    - *Acanthobrama* Heckel 1843 (syn. *Acanthalburnus* Berg 1916, *Culticula* Abbott 1901)
    - *Achondrostoma* Robalo, Almada, Levy & Doadrio 2007
    - *Alburnoides* Jeitteles 1861 (syn. *Spirlinus* Fatio 1882, *Squalalburnus* Berg 1932)
    - *Alburnus* Rafinesque 1820 (syn. *Chalcalburnus* Berg 1933)
    - *Anaecypris* Collares-Pereira 1983
    - *Aspiolucius* Berg 1907
    - *Ballerus* Heckel 1843
    - *Blicca* Heckel 1843
    - *Capoetobrama* Berg 1916
    - *Chondrostoma* Agassiz 1832 (syn. *Chondrochilus* Heckel 1843, *Chondrorhynchus* Heckel 1843, *Machaerochilus* Fitzinger 1873, *Nasus* Basilewsky (ex Cuvier) 1855)
    - *Delminichthys* Freyhof, Lieckfeldt, Bogutskaya, Pitra & Ludwig 2006
    - *Iberochondrostoma* Robalo, Almada, Levy & Doadrio 2007
    - *Ladigesocypris* Karaman 1972
    - *Leucalburnus* Berg 1916
    - *Leucaspius* Heckel & Kner 1857 (syn. *Owsianka* Dybowski 1862)
    - *Leuciscus* Cuvier 1816 (syn. *Aspiopsis* Zugmayer 1912, *Aspius* Agassiz 1832, *Aturius* Dubalen 1878, *Bathystoma* Fitzinger 1873, *Dobula* Rafinesque 1820, *Genghis* Howes 1984, *Idus* Heckel 1843)
    - *Leucos* Heckel 1843
    - *Mirogrex* Goren, Fishelson & Trewavas 1973

Notemigonus Rafinesque 1819 (syn. *Hemiplus* Rafinesque 1820, *Leucosomus* Heckel 1843, *Stilbe* DeKay 1842, *Stilbius* Gill 1865)
Pachychilon Steindachner 1882
Parachondrostoma Robalo, Almada, Levy & Doadrio 2007
Pelasgus Kottelat & Freyhof 2007
Pelecus Agassiz 1835
Petroleuciscus Bogutskaya 2002
Phoxinellus Heckel 1843 (syn. *Paraphoxinus* Bleeker 1863)
Protochondrostoma Robalo, Almada, Levy & Doadrio 2007
Pseudochondrostoma Robalo, Almada, Levy & Doadrio 2007
Pseudophoxinus Bleeker 1860 (syn. *Pararhodeus* Berg 1907, *Spinophoxinellus* Karaman 1972)
Rutilus Rafinesque 1820 (syn. *Cenisophius* Bonaparte 1846, *Gardonus* Bonaparte 1846, *Liparus* Schulze 1892, *Metallites* Schulze 1890, *Orfus* Fitzinger 1873, *Orthroleucos* Derjavin 1937, *Pararutilus* Berg 1912, *Pigus* Bonaparte 1846, *Rubellus* Fitzinger 1873)
Sarmarutilus Bianco & Ketmaier 2014
Scardinius Bonaparte 1837 (syn. *Heegerius* Bonaparte 1845)
Squalius Bonaparte 1837 (syn. *Cephalopsis* Fitzinger 1873, *Cephalus* Bonaparte 1846, *Iberocypris* Doadrio 1980, *Microlepis* Bonaparte 1846)
Telestes Bonaparte 1840 (syn. *Habrolepis* Fitzinger 1873)
Tropidophoxinellus Stephanidis 1974
Vimba Fitzinger 1873 (syn. *Leucabramis* Smitt 1895)

Phoxininae Bleeker 1863 (Type genus: *Phoxinus* Rafinesque 1820)
Phoxinus Rafinesque 1820 (syn. *Acahara* Jordan & Hubbs 1925, *Eulinneela* Dybowski 1916, *Phoxinus* Agassiz 1835)

Plagopterinae Cope 1874 (Type genus: *Plagopterus* Cope 1874)
Couesius Jordan 1878
Hemitremia Cope 1870
Lepidomeda Cope 1874 (syn. *Snyderichthys* Miller 1945)
Margariscus Cockerell 1909
Meda Girard 1856
Plagopterus Cope 1874
Semotilus Rafinesque 1820 (syn. *Cheilonemus* Storer (ex Baird) 1855, *Chilonemus* Baird 1851)

Pogonichthyinae Girard 1858 (Type genus: *Pogonichthys* Girard 1854)
Agosia Girard 1856 (syn. *Zophendum* Jordan 1878)
Alburnops Girard 1856
Algansea Girard 1856 (syn. *Xystrosus* Jordan & Snyder 1899)
Aztecula Jordan & Evermann 1898
Campostoma Agassiz 1855
Clinostomus Girard 1856 (syn. *Rhodopleuriscus* Fowler 1944)
Codoma Girard 1856
Cyprinella Girard 1856 (syn. *Erogala* Jordan in Jordan & Brayton 1878, *Moniana* Girard 1856)
Dionda Girard 1856
Ericymba Cope 1865
Erimonax Jordan 1924
Erimystax Jordan 1882
Exoglossum Rafinesque 1818 (syn. *Maxillingua* Rafinesque 1818, *Parexoglossum* Hubbs 1931)

    - *Graodus* Günther 1868
    - *Hudsonius* Girard 1856
    - *Hybognathus* Agassiz 1855 (syn. *Algoma* Girard 1856, *Tirodon* Hay 1882)
    - *Hybopsis* Agassiz 1854
    - *Iotichthys* Jordan & Evermann 1896
    - *Luxilus* Rafinesque 1820 (syn. *Coccogenia* Cockerell & Callaway 1909, *Coccotis* Jordan 1882, *Hypsolepis* Agassiz (ex Baird) 1854, *Plargyrus* Rafinesque 1820)
    - *Lythrurus* Jordan 1876
    - *Macrhybopsis* Cockerell & Allison 1909 (syn. *Extrarius* Jordan 1919)
    - *Miniellus* Jordan 1888
    - *Mylocheilus* Agassiz 1855 (syn. *Clarkina* Jordan & Evermann 1927)
    - *Nocomis* Girard 1856 (syn. *Ceratichthys* Baird in Girard 1856)
    - *Notropis* Rafinesque 1818 (syn. *Alburnellus* Girard 1856, *Azteca* Jordan & Evermann 1896, *Chriope* Jordan 1878, *Episema* Cope & Jordan in Jordan 1877, *Erinemus* Jordan 1876, *Hydrophlox* Jordan in Jordan & Brayton 1878, *Minnilus* Rafinesque 1820, *Nazatexico* Whitley 1931, *Nototropis* Jordan 1877, *Opsopoea* Jordan & Evermann 1896, *Orcella* Jordan & Evermann 1896, *Orcula* Jordan & Evermann 1900, *Paranotropis* Fowler 1904, *Photogenis* Cope 1867)
    - *Opsopoeodus* Hay 1881 (syn. *Trycherodon* Forbes in Jordan & Gilbert 1883)
    - *Oregonichthys* Hubbs 1929
    - *Phenacobius* Cope 1867 (syn. *Sarcidium* Cope 1871)
    - *Pimephales* Rafinesque 1820 (syn. *Ceraticthys* Baird & Girard 1853, *Cliola* Girard 1856, *Cochlognathus* Baird & Girard 1854, *Coliscus* Cope 1871, *Hyborhynchus* Agassiz 1855, *Hypargyrus* Forbes in Gilbert 1884, *Spinicephalus* Lesueur in Vaillant 1896)
    - *Platygobio* Gill 1863
    - *Pogonichthys* Girard 1854 (syn. *Symmetrurus* Jordan 1878)
    - *Pteronotropis* Fowler 1935
    - *Rhinichthys* Agassiz 1849 (syn. *Apocope* Cope 1872, *Argyreus* Heckel 1843, *Eritrema* Cope & Yarrow 1875)
    - *Richardsonius* Girard 1856
    - *Stypodon* Garman 1881
    - *Tampichthys* Schönhuth, Doadrio, Dominguez-Dominguez, Hillis & Mayden 2008
    - *Tiaroga* Girard 1856
    - *Yuriria* Jordan & Evermann 1896 (syn. *Falcula* Jordan & Snyder 1899, *Falcularius* Jordan & Snyder in Jordan 1903)
  - Pseudaspininae Bogutskaya 1990 (Type genus: *Pseudaspius* Dybowski 1869)
    - *Oreoleuciscus* Warpachowski 1889 (syn. *Acanthorutilus* Berg 1912)
    - *Pseudaspius* Dybowski 1869
    - *Rhynchocypris* Günther 1889 (syn. *Czekanowskiella* Dybowski 1916, *Eupallasella* Dybowski 1916, *Lagowskiella* Dybowski 1916, *Moroco* Jordan & Hubbs 1925)
    - *Tribolodon* Sauvage 1883
- Paedocyprididae Mayden & Chen 2010 (Type genus: *Paedocypris* Kottelat, Britz, Tan & Witte 2006)
  - *Paedocypris* Kottelat, Britz, Tan & Witte 2006
- Psilorhynchidae Hora 1926 (Type genus: *Psilorhynchus* McClelland 1838)
  - *Psilorhynchus* McClelland 1838 (syn. *Psilorhynchoides* Yazdani, Singh & Rao 1993)
- Sundadanionidae Mayden & Chen 2010 (Type genus: *Sundadanio* Kottelat & Witte 1999)
  - *Fangfangia* Britz, Kottelat & Tan 2012

    - *Sundadanio* Kottelat & Witte 1999
- Tanichthyidae Mayden & Chen 2010 (Type genus: *Tanichthys* Lin 1932)
    - *Tanichthys* Lin 1932
- Tincidae Jordan 1878 (Type genus: *Tinca* Garsault 1764)
    - *Tinca* Garsault 1764
- Xenocyprididae Günther 1868 (Type genus: *Xenocypris* Günther 1868)
    - Opsariichthyinae Rendahl 1928 (Type genus: *Opsariichthys* Bleeker 1863)
        - *Candidia* Jordan & Richardson 1909
        - *Nipponocypris* Chen, Wu & Hsu 2008
        - *Opsariichthys* Bleeker 1863
        - *Parazacco* Chen 1982 (syn. *Carinozacco* Zhu, Wang & Ni 1982)
        - *Zacco* Jordan & Evermann 1902
    - Xenocypridinae Günther 1868 (Type genus: *Xenocypris* Günther 1868)
        - *Ancherythroculter* Yih & Wu 1964
        - *Aphyocypris* Günther 1868 (syn. *Aphyocyprioides* Tang 1942, *Caraspius* Nichols 1925, *Fusania* Jordan & Starks 1905, *Nicholsicypris* Chu 1935, *Pararasbora* Regan 1908, *Phoxiscus* Oshima 1919, *Yaoshanicus* Lin 1931)
        - *Chanodichthys* Bleeker 1860 (syn. *Erythroculter* Berg 1909, *Leptocephalus* Basilewsky 1855, *Pseudoculter* Bleeker 1860)
        - *Ctenopharyngodon* Steindachner 1866 (syn. *Pristiodon* Dybowski 1877)
        - *Culter* Basilewsky 1855 (syn. *Cultrichthys* Smith 1938)
        - *Distoechodon* Peters 1881
        - *Elopichthys* Bleeker 1860 (syn. *Gymnognathus* Sauvage 1884, *Scombrocypris* Günther 1889)
        - *Hainania* Koller 1927
        - *Hemiculter* Bleeker 1860 (syn. *Cultriculus* Oshima 1919, *Kendallia* Evermann & Shaw 1927, *Siniichthys* Bănărescu 1970)
        - *Hemiculterella* Warpachowski 1888 (syn. *Semiculter* Chu 1935)
        - *Hemigrammocypris* Fowler 1910 (syn. *Brevigobio* Tanaka 1916)
        - *Hypophthalmichthys* Bleeker 1860 (syn. *Abramocephalus* Steindachner 1869, *Aristichthys* Oshima 1919, *Cephalus* Basilewsky 1855, *Onychodon* Dybowski 1872)
        - *Ischikauia* Jordan & Snyder 1900
        - *Luciobrama* Bleeker 1870
        - *Macrochirichthys* Bleeker 1859
        - *Megalobrama* Dybowski 1872 (syn. *Parosteobrama* Tchang 1930)
        - *Metzia* Jordan & Thompson 1914 (syn. *Rasborinus* Oshima 1920)
        - *Mylopharyngodon* Peters 1881 (syn. *Leucisculus* Oshima 1920, *Myloleuciscus* Garman 1912, *Myloleucops* Cockerell 1913, *Myloleucus* Günther 1873)
        - *Ochetobius* Günther 1868 (syn. *Agenigobio* Sauvage 1878)
        - *Oxygaster* van Hasselt 1823
        - *Parabramis* Bleeker 1864
        - *Parachela* Steindachner 1881 (syn. *Grandisquamachela* Fowler 1934)
        - *Paralaubuca* Bleeker 1864 (syn. *Cultrops* Smith 1938)
        - *Plagiognathops* Berg 1907 (syn. *Plagiognathus* Dybowski 1872)
        - *Pseudobrama* Bleeker 1870
        - *Pseudohemiculter* Nichols & Pope 1927
        - *Pseudolaubuca* Bleeker 1864 (syn. *Parapelecus* Günther 1889)

Sinibrama Wu 1939
Squaliobarbus Günther 1868
Toxabramis Günther 1873
Xenocyprioides Chen 1982
Xenocypris Günther 1868

Xenocyprididae *incertae sedis*

Anabarilius Cockerell 1923 (syn. *Nicholsiculter* Rendahl 1928, *Rohanus* Chu 1935)
Araiocypris Conway & Kottelat 2008
Atrilinea Chu 1935
Gymnodanio Chen & He 1992
Longiculter Fowler 1937
Pogobrama Luo 1995
Rasborichthys Bleeker 1859

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References

Banister, K.E. & Bunni, M.K. (1980) A new blind cyprinid from Iraq. *Bulletin of the British Museum of Natural History*, Zoology, 38, 151–158.

Bănărescu, P.M. & Nalbant, T.T. (1973) Pisces, Teleostei. Cyprinidae (Gobioninae). *Das Tierreich*, 93, 1–304.

Betancur-R, R., Wiley, E.O., Arratia, G., Acero, P.A., Bailly, N., Miya, M., Lecointre, G. & Ortí, G. (2017) Phylogenetic classification of bony fishes. *BMC Evolutionary Biology*, 17, 162. https://doi.org/10.1186/s12862-017-0958-3

Betancur-R, R., Wiley, E.O., Bailly, N., Miya, M., Lecointre, G. & Ortí, G. (2014) Phylogenetic Classification of Bony Fishes. Version 3. *DeepFin.Org*, 1–37. Available from: http://www.deepfin.org/Classification_v3.htm (accessed 13 December 2016)

Bogutskaya, N.G. (1990) The morphological basis for the classification of cyprinid fishes (Leuciscinae, Cyprinidae). Communication 2. *Voprosy Ikhtiologii*, 30, 920–933.

Bogutskaya, N.G. (1992) Limits and morphological features of the cyprinid subfamily Leuciscinae (Cyprinidae). *Journal of Ichthyology*, 31, 1–16.

Bohlen, J. & Šlechtová, V. (2009) Phylogenetic position of the fish genus *Ellopostoma* (Teleostei: Cypriniformes) using molecular genetic data. *Ichthyological Exploration of Freshwaters*, 20, 157.

Borkenhagen, K. (2017) Molecular phylogeny of the tribe Torini Karaman, 1971 (Actinopterygii: Cypriniformes) from the Middle East and North Africa. *Zootaxa*, 4236 (2), 291–301. https://doi.org/10.11646/zootaxa.4236.2.4

Boschung, H.T. & Mayden, R.L. (2004) *Fishes of Alabama*. Smithsonian Institution, Press, Washington, D.C., 736 pp.

Britz, R. & Conway, K.W. (2009) Osteology of *Paedocypris*, a miniature and highly developmentally truncated fish (Teleostei: Ostariophysi: Cyprinidae). *Journal of Morphology*, 270, 389–412. https://doi.org/10.1002/jmor.10698

Britz, R., Conway, K.W. & Rüber, L. (2014) Miniatures, morphology and molecules: *Paedocypris* and its phylogenetic position (Teleostei, Cypriniformes). *Zoological Journal of the Linnean Society*, 172, 556–615. https://doi.org/10.1111/zoj.12184

Britz, R., Kottelat, M. & Tan, H.H. (2011) *Fangfangia spinicleithralis*, a new genus and species of miniature cyprinid fish from the peat swamp forests of Borneo (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters*, 22, 327–335.

Bufalino, A.P. & Mayden, R.L. (2010) Molecular phylogenetics of North American phoxinins (Actinopterygii: Cypriniformes: Leuciscidae) based on RAG1 and S7 nuclear DNA sequence data. *Molecular Phylogenetics and Evolution*, 55, 274–283. https://doi.org/10.1016/j.ympev.2009.12.017

Burns, F.R., Cogburn, A.L., Ankley, G.T., Villeneuve, D.L., Waits, E., Chang, Y.-J., Llaca, V., Deschamps, S.D., Jackson, R.E. & Hoke, R.A. (2015) Sequencing and de novo draft assemblies of a fathead minnow (*Pimephales promelas*) reference genome. *Environmental toxicology and chemistry/SETAC*, 35, 212–217.
https://doi.org/10.1002/etc.3186

Cavender, T.M. & Coburn, M.M. (1992) Phylogenetic relationships of North American Cyprinidae. *In*: Mayden, R.L. (Ed.), *Systematics, Historical Ecology, and North American Freshwater Fishes*. Stanford University Press, Stanford, California, pp. 293–327.

Chang, C.H., Li, F., Shao, K.T., Lin, Y.-S., Morosawa, T., Kim, S., Koo, H., Kim, W., Lee, J.-S., He, S., Smith, C., Reichard, M., Miya, M., Sado, T., Uehara, K., Lavoué, S., Chen, W.J. & Mayden, R.L. (2014) Phylogenetic relationships of Acheilognathidae (Cypriniformes: Cyprinoidea) as revealed from evidence of both nuclear and mitochondrial gene sequence variation: Evidence for necessary taxonomic revision in the family and the identification of cryptic species. *Molecular Phylogenetics and Evolution*, 81, 182–194.
https://doi.org/10.1016/j.ympev.2014.08.026

Chen, W.J. & Mayden, R.L. (2009) Molecular systematics of the Cyprinoidea (Teleostei: Cypriniformes), the world's largest clade of freshwater fishes: further evidence from six nuclear genes. *Molecular Phylogenetics and Evolution*, 52, 544–549.
https://doi.org/10.1016/j.ympev.2009.01.006

Chen, W.J. & Mayden, R.L. (2012) Phylogeny of suckers (Teleostei: Cypriniformes: Catostomidae): further evidence of relationships provided by the single-copy nuclear gene IRBP2. *Zootaxa*, 3586, 195–210.

Chen, W.J., Lavoué, S. & Mayden, R.L. (2013) Evolutionary origin and early biogeography of otophysan fishes (Ostariophysi: Teleostei). *Evolution*, 67, 2218–2239.
https://doi.org/10.1111/evo.12104

Chen, W.J., Lheknim, V. & Mayden, R.L. (2009) Molecular phylogeny of the Cobitoidea (Teleostei: Cypriniformes) revisited: position of enigmatic loach *Ellopostoma* resolved with six nuclear genes. *Journal of Fish Biology*, 75, 2197–2208.
https://doi.org/10.1111/j.1095-8649.2009.02398.x

Chen, X.-Y. (1987) Studies on the phylogenetic relationships of Chinese leuciscine fishes (Pisces: Cypriniformes). *Acta Zootaxonomica Sinica*, 12, 427–439.

Chen, X.L., Yue, P.Q. & Lin, R.-D. (1984) Major groups within the family Cyprinidae and their phylogenetic relationships. *Acta Zootaxonomica Sinica*, 9, 424–440.

Chen, Y. (1980) Investigation of the systematic position of *Psilorhynchus* (Cyprinoidei, Pisces). *Acta Hydrobiologica Sinica*, 7, 371–376.

Chen, Y. (1982) A revision of opsariichthine cyprinid fishes. *Oceanologia Et Limnologia Sinica*, 13, 293–299.

Chen, Y.-F. & He, S. (1992) A new genus and a new species of cyprinid fishes from Yunnan, China (Cypriniformes: Cyprinidae: Danioninae). *Acta Zootaxonomica Sinica*, 17, 238–240.

Coburn, M.M. & Cavender, T.M. (1992) Interrelationships of North American Cyprinid Fishes. *In*: Mayden, R.L. (Ed.), *Systematics, Historical Ecology, and North American Freshwater Fishes*. Stanford University Press, Stanford, California, pp. 328–373.

Conway, K.W. (2011) Osteology of the South Asian Genus *Psilorhynchus* McClelland, 1839 (Teleostei: Ostariophysi: Psilorhynchidae), with investigation of its phylogenetic relationships within the order Cypriniformes. *Zoological Journal of the Linnean Society*, 163 (1), 50–154.
https://doi.org/10.1111/j.1096-3642.2011.00698.x

Conway, K.W. & Kottelat, M. (2008) *Araiocypris batodes*, a new genus and species of cyprinid fish from Northern Vietnam (Ostariophysi: Cyprinidae). *Raffles Bulletin of Zoology*, 56, 101–105.

Conway, K.W., Hirt, M.V., Yang, L., Mayden, R.L. & Simons, A.M. (2010) Cypriniformes: systematics and paleontology. *In*: Nelson, J.S. & Wilson, M.V.H. (Eds.), *Origin and Phylogenetic Interrelationships of Teleosts*. Verlag Dr. Friedrich Pfeil, Munchen, pp. 295–316.

Daget, J. (1984) Contribution à la faune du Cameroun Piossons des fleuves côtiers. *Bulletin du Museum National d'Histoire Naturelle*, 4ème Série, Section A, 6, 177–202.

Duong, Q.N., Nguyen, H.D. & Tran, D.H. (2007) A new species of fish belonging to the subgenus *Spinibarbichthys* (*Spinibarbus*: Cyprinidae: Cypriniformes) in Vietnam. *Tap Chí Sinh Hoc*, 29, 22–25.

Endruweit, M. (2014) Taxonomical notes on selected freshwater fish species described from northern and central Vietnam (Cypriniformes: Balitoridae, Cobitidae, Cyprinidae, Nemacheilidae; Perciformes: Channidae, Osphronemidae; Synbranchiformes: Mastacembelidae). 动物学研究 *Zoological Research*, 35, 142–159.

Eschmeyer, W.N. & Fong, J.D. (2017) Species by Family/Subfamily in the Catalog of Fishes. *Catalog of Fishes*. Available from: http://researcharchive.calacademy.org/research/ichthyology/catalog/SpeciesByFamily.asp (accessed 16 May 2017)

Eschmeyer, W.N., Fricke, R. & van der Laan, R. (2017) Catalog of Fishes: Genera, Species, References. Available from: http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp (accessed 20 March 2017)

Gidmark, N.J. & Simons, A.M. (2014) Cyprinidae: Carps and Minnows. In: Warren, M.L., Jr. & Burr, B.M. (Eds.), *Freshwater Fishes of North America*. Johns Hopkins University Press, Baltimore, MD, pp. 354–450.

Harris, P.M., Hubbard, G. & Sandel, M. (2014) Catostomidae: Suckers. *In*: Warren, M.L., Jr. & Burr, B.M. (Eds.), *Freshwater Fishes of North America*. Johns Hopkins University Press, Baltimore, MD, pp. 451–502.

Hayes, M.M. & Armbruster, J.W. (2017) The taxonomy and relationships of the African small barbs (Cypriniformes:

Cyprinidae). *Copeia*, 105, 348–362.
https://doi.org/10.1643/CI-15-348

He, S., Gu, X., Mayden, R.L., Chen, W.J., Conway, K.W. & Chen, Y. (2008) Phylogenetic position of the enigmatic genus *Psilorhynchus* (Ostariophysi: Cypriniformes): Evidence from the mitochondrial genome. *Molecular Phylogenetics and Evolution*, 47, 419–425.
https://doi.org/10.1016/j.ympev.2007.10.012

Hensel, K. (1970) Review of the classification and of the opinions on the evolution of Cyprinoidei (Eventognathi) with an annotated list of genera and subgenera described since 1921. *Annotationes Zoologicae et Botanicae*, 57, 1–45.

Hirt, M.V., Arratia, G., Chen, W.J. & Mayden, R.L. (2017) Effects of gene choice, base composition and rate heterogeneity on inference and estimates of divergence times in cypriniform fishes. *Biological Journal of the Linnean Society*, 121, 319–339.
https://doi.org/10.1093/biolinnean/blw045

Hora, S.L. & Mukerji, D.D. (1928) Notes on fishes in the Indian Museum. XVI. On fishes of the genus *Esomus* Swainson. *Records of the Indian Museum*, 30, 41–56.

Howe, K., Clark, M.D., Torroja, C.F., Torrance, J., Berthelot, C., Muffato, M., Collins, J.E., Humphray, S., McLaren, K., Matthews, L., McLaren, S., Sealy, I., Caccamo, M., Churcher, C., Scott, C., Barrett, J.C., Koch, R., Rauch, G.-J., White, S., Chow, W., Kilian, B., Quintais, L.T., Guerra-Assunção, J.A., Zhou, Y., Gu, Y., Yen, J., Vogel, J.-H., Eyre, T., Redmond, S., Banerjee, R., Chi, J., Fu, B., Langley, E., Maguire, S.F., Laird, G.K., Lloyd, D., Kenyon, E., Donaldson, S., Sehra, H., Almeida-King, J., Loveland, J., Trevanion, S., Jones, M., Quail, M., Willey, D., Hunt, A., Burton, J., Sims, S., McLay, K., Plumb, B., Davis, J., Clee, C., Oliver, K., Clark, R., Riddle, C., Eliott, D., Threadgold, G., Harden, G., Ware, D., Mortimer, B., Kerry, G., Heath, P., Phillimore, B., Tracey, A., Corby, N., Dunn, M., Johnson, C., Wood, J., Clark, S., Pelan, S., Griffiths, G., Smith, M., Glithero, R., Howden, P., Barker, N., Stevens, C., Harley, J., Holt, K., Panagiotidis, G., Lovell, J., Beasley, H., Henderson, C., Gordon, D., Auger, K., Wright, D., Collins, J., Raisen, C., Dyer, L., Leung, K., Robertson, L., Ambridge, K., Leongamornlert, D., McGuire, S., Gilderthorp, R., Griffiths, C., Manthravadi, D., Nichol, S., Barker, G., Whitehead, S., Kay, M., Brown, J., Murnane, C., Gray, E., Humphries, M., Sycamore, N., Barker, D., Saunders, D., Wallis, J., Babbage, A., Hammond, S., Mashreghi-Mohammadi, M., Barr, L., Martin, S., Wray, P., Ellington, A., Matthews, N., Ellwood, M., Woodmansey, R., Clark, G., Cooper, J., Tromans, A., Grafham, D., Skuce, C., Pandian, R., Andrews, R., Harrison, E., Kimberley, A., Garnett, J., Fosker, N., Hall, R., Garner, P., Kelly, D., Bird, C., Palmer, S., Gehring, I., Berger, A., Dooley, C.M., Ersan-Ürün, Z., Eser, C., Geiger, H., Geisler, M., Karotki, L., Kirn, A., Konantz, J., Konantz, M., Oberländer, M., Rudolph-Geiger, S., Teucke, M., Osoegawa, K., Zhu, B., Rapp, A., Widaa, S., Langford, C., Yang, F., Carter, N.P., Harrow, J., Ning, Z., Herrero, J., Searle, S.M.J., Enright, A., Geisler, R., Plasterk, R.H.A., Lee, C., Westerfield, M., de Jong, P.J., Zon, L.I., Postlethwait, J.H., Nüsslein-Volhard, C., Hubbard, T.J.P., Roest Crollius, H., Rogers, J. & Stemple, D.L. (2013) The zebrafish reference genome sequence and its relationship to the human genome. *Nature*, 496, 498–503.
https://doi.org/10.1038/nature12111

Howes, G.J. (1991) Systematics and biogeography: an overview. *In*: Winfield, I.J. & Nelson, J.S. (Eds.), *Cyprinid Fishes: Systematics, Biology and Exploitation*. Chapman & Hall London, London, pp. 1–33.
https://doi.org/10.1007/978-94-011-3092-9_1

Huang, S.P., Chen, I.S. & Shao, K.T. (2016) A new species of *Microphysogobio* (Cypriniformes: Cyprinidae) from Fujian Province, China, and a molecular phylogenetic analysis of *Microphysogobio* species from southeastern China and Taiwan. *Proceedings of the Biological Society of Washington*, 129, 195-211.
https://doi.org/10.2988/0006-324X-129.Q3.195

Huang, S.P., Wang, F.Y. & Wang, T.Y. (2017) Molecular phylogeny of the *Opsariichthys* group (Teleostei: Cypriniformes) based on complete mitochondrial genomes. *Zoological Studies*, 56, 1–13.

Imoto, J.M., Saitoh, K., Sasaki, T., Yonezawa, T., Adachi, J., Kartavtsev, Y.P., Miya, M., Nishida, M. & Hanzawa, N. (2013) Phylogeny and biogeography of highly diverged freshwater fish species (Leuciscinae, Cyprinidae, Teleostei) inferred from mitochondrial genome analysis. *Gene*, 514, 112–124.
https://doi.org/10.1016/j.gene.2012.10.019

Ito, T., Fukuda, T., Morimune, T., Hosoya, K., Ito, T., Fukuda, T., Morimune, T., Ito, T., Fukuda, T., Morimune, T., Ito, T., Fukuda, T. & Morimune, T. (2017) Evolution of the connection patterns of the cephalic lateral line canal system and its use to diagnose opsariichthyin cyprinid fishes (Teleostei, Cyprinidae). *ZooKeys*, 718, 115–131.
https://doi.org/10.3897/zookeys.718.13574

Jiang, Z.-G. & Zhang, E. (2013) Molecular evidence for taxonomic status of the gudgeon genus *Huigobio* Fang, 1938 (Teleostei: Cypriniformes), with a description of a new species from Guangdong Province, South China. *Zootaxa*, 3731 (1), 171–182.
https://doi.org/10.11646/zootaxa.3731.1.8

Kartavtsev, Y.P., Batischeva, N.M., Bogutskaya, N.G., Katugina, A.O. & Hanzawa, N. (2016) Molecular systematics and DNA barcoding of Altai osmans, *Oreoleuciscus* (pisces, cyprinidae, and leuciscinae), and their nearest relatives, inferred from sequences of cytochrome b (Cyt-b), cytochrome oxidase c (Co-1), and complete mitochondrial genome. *Mitochondrial DNA Part A*, 28, 502–517.
https://doi.org/10.3109/24701394.2016.1149822

Kottelat, M. (2012) Conspectus Cobitidum: An Inventory of the Loaches of the World (Teleostei: Cypriniformes: Cobitoidei). *Raffles Bulletin of Zoology*, 26, 1–199.

Kottelat, M. (2013) The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology*, 27, 1–663.

Kottelat, M. & Freyhof, J. (2007) *Handbook of European freshwater fishes*. Publications Kottelat, Cornol, & Freyhof, Berlin, 646 pp.

Kottelat, M. & Witte, K.-E. (1999) Two new species of *Microrasbora* from Thailand and Myanmar, with two new generic names for small Southeast Asian cyprinid fishes (Teleostei: Cyprinidae). *Journal of South Asian Natural History*, 4, 49–56.

Kottelat, M., Britz, R., Tan, H.H. & Witte, K.-E. (2006) *Paedocypris*, a new genus of Southeast Asian cyprinid fish with a remarkable sexual dimorphism, comprises the world's smallest vertebrate. *Proceedings of the Royal Society B: Biological Sciences*, 273, 895–899.
https://doi.org/10.1098/rspb.2005.3419

Kullander, S.O. (2015) Taxonomy of chain *Danio*, an Indo-Myanmar species assemblage, with descriptions of four new species (Teleostei: Cyprinidae). *Ichthyological Exploration of Freshwaters*, 25, 357–380.

Lévêque, C., Paugy, D. & Teugels, G.G. (1990) *Faune des poissons d'eaux douces et saumâtres d'Afrique de l'Ouest. Tome 1*. Ostrom, Paris, 329 pp.

Li, F., Liao, T.Y., Arai, R. & Zhao, L.J. (2017) *Sinorhodeus microlepis*, a new genus and species of bitterling from China (Teleostei: Cyprinidae: Acheilognathinae). *Zootaxa*, 4353 (1), 69–88.
https://doi.org/10.11646/zootaxa.4353.1.4

Liao, T.Y. & Kullander, S.O. (2012) Phylogenetic significance of the kinethmoid-associated Y-shaped ligament and long intercostal ligaments in the Cypriniformes (Actinopterygii: Ostariophysi). *Zoologica Scripta*, 42, 71–87.
https://doi.org/10.1111/j.1463-6409.2012.00565.x

Liao, T.Y., Arroyave, J. & Stiassny, M.L.J. (2012) Diagnosis of Asian *Raiamas* (Teleostei: Cyprinidae: Chedrina) with comments on chedrin relationships and previously proposed diagnostic characters for *Opsaridium* and *Raiamas*. *Ichthyological Research*, 59, 328–341.
https://doi.org/10.1007/s10228-012-0296-9

Liao, T.Y., Kullander, S.O. & Fang, F. (2011) Phylogenetic position of rasborin cyprinids and monophyly of major lineages among the Danioninae, based on morphological characters (Cypriniformes: Cyprinidae). *Journal of Zoological Systematics and Evolutionary Research*, 49, 224–232.
https://doi.org/10.1111/j.1439-0469.2011.00621.x

Liu, J., Chang, M.M., Wilson, M.V.H. & Murray, A.M. (2015) A new family of Cypriniformes (Teleostei, Ostariophysi) based on a redescription of †*Jianghanichthys hubeiensis* (Lei, 1977) from the Eocene Yangxi Formation of China. *Journal of Vertebrate Paleontology*, 35, e1004073.
https://doi.org/10.1080/02724634.2015.1004073

Liu, S.-Q., Mayden, R.L., Zhang, J.-B., Yu, D., Tang, Q., Deng, X. & Liu, H.-Z. (2012) Phylogenetic relationships of the Cobitoidea (Teleostei: Cypriniformes) inferred from mitochondrial and nuclear genes with analyses of gene evolution. *Gene*, 508, 60–72.
https://doi.org/10.1016/j.gene.2012.07.040

Lothongkham, A., Arbsuwan, S. & Musikasinthorn, P. (2014) *Garra waensis*, a new cyprinid fish (Actinopterygii: Cypriniformes) from the Nan River basin of the Chao Phraya River system, northern Thailand. *Zootaxa*, 3790 (4), 543–554.
https://doi.org/10.11646/zootaxa.3790.4.3

Mayden, R.L. (1989) Phylogenetic studies of North American minnows, with emphasis on the genus *Cyprinella* (Teleostei, Cypriniformes). *The University of Kansas Museum of Natural History Miscellaneous Publication*, 80, 1–189.
https://doi.org/10.5962/bhl.title.5480

Mayden, R.L. & Chen, W.J. (2010) The world's smallest vertebrate species of the genus *Paedocypris*: A new family of freshwater fishes and the sister group to the world's most diverse clade of freshwater fishes (Teleostei: Cypriniformes). *Molecular Phylogenetics and Evolution*, 57, 152–175.
https://doi.org/10.1016/j.ympev.2010.04.008

Mayden, R.L., Simons, A.M., Wood, R.M., Harris, P.M. & Kuhajda, B.R. (2006) Molecular systematics and classification of North American notropin shiners and minnows (Cypriniformes: Cyprinidae). *In*: Lozano-Vilano, M. & Contreras-Balderas, A.J. (Eds.), *Studies of North American Desert Fishes in Honor of EP (Phil) Pister*. Conservationist Universidad Autónoma de Nuevo León, Monterrey, pp. 72–101.

McCluskey, B.M. & Postlethwait, J.H. (2015) Phylogeny of zebrafish, a "model species," within *Danio*, a "model genus". *Molecular Biology and Evolution*, 32, 635–652.
https://doi.org/10.1093/molbev/msu325

Menon, A.G.K. (1999) Check list — Fresh water fishes of India. *Records of the Zoological Survey of India, Occasional Papers*, 175, 1–366.

Miller, R.R. (2006) *Freshwater Fishes of México*. University of Chicago Press, Chicago, 490 pp.

Myers, G.S. (1960) Preface to any future classification of the cyprinid fishes of the genus *Barbus*. *Stanford Ichthyological Bulletin*, 7, 212–215.

Nalbant, T.T. (2002) Sixty million years of evolution. Part one: family Botiidae (Pisces: Ostariophysi: Cobitoidea). *Travaux du Muséum National d'Histoire Naturelle "Grigore Antipa"*, 44, 309–333.

Nalbant, T.T. & Bănărescu, P.M. (1977) Vaillantellinae, a new subfamily of Cobitidae (Pisces, Cypriniformes). *Zoologische Mededelingen*, 52, 99–105.

Nelson, J.S. (2006) *Fishes of the World. 4th Edition*. John Wiley & Sons, New York, 624 pp.

Norman, J.R. (1932) XX.—A collection of fishes from Sierra Leone. *Annals and Magazine of Natural History*, 10, 180–185. https://doi.org/10.1080/00222933208673560

Pasco-Viel, E., Charles, C., Chevret, P., Semon, M., Tafforeau, P., Viriot, L. & Laudet, V. (2010) Evolutionary trends of the pharyngeal dentition in Cypriniformes (Actinopterygii: Ostariophysi). *PLoS ONE*, 5, e11293. https://doi.org/10.1371/journal.pone.0011293

Pethiyagoda, R., Meegaskumbura, M. & Maduwage, K. (2012) A synopsis of the South Asian fishes referred to *Puntius* (Pisces: Cyprinidae). *Ichthyological Exploration of Freshwaters*, 23, 69.

Poly, W.J. & Sabaj, M.H. (1998) Lack of evidence for the validity of *Rhinichthys bowersi* (Cyprinidae). *Copeia*, 1998, 1081–1085. https://doi.org/10.2307/1447363

Prokofiev, A.M. (2010) Morphological classification of loaches (Nemacheilinae). *Journal of Ichthyology*, 50, 827–913. https://doi.org/10.1134/S0032945210100012

Rainboth, W.J. (1986) Fishes of the Asian cyprinid genus *Chagunius*. *Occasional Papers of the Museum of Zoology University of Michigan*, 712, 1–17.

Rainboth, W.J. (1989) *Discherodontus*, a new genus of cyprinid fishes from southeastern Asia. *Occasional Papers of the Museum of Zoology University of Michigan*, 718, 1–31.

Randall, Z.S. & Page, L.M. (2015) On the paraphyly of *Homaloptera* (Teleostei: Balitoridae) and description of a new genus of hillstream loaches from the Western Ghats of India. *Zootaxa*, 3926 (1), 57–86. https://doi.org/10.11646/zootaxa.3926.1.2

Reid, G.M. (1982) The form, function and phylogenetic significance of the vomero-palatine organ in cyprind fishes. *Journal of Natural History*, 16, 497–510. https://doi.org/10.1080/00222938200770401

Roberts, T.R. (1989) The freshwater fishes of Western Borneo (Kalimantan Barat, Indonesia). *Memoirs of the California Academy of Science s*, 14, 1–210.

Roberts, T.R. & Kottelat, M. (1993) Revision of the Southeast Asian freshwater fish family Gyrinocheilidae. *Ichthyological Exploration of Freshwaters*, 4, 375–383.

Romero, A. & Paulson, K.M. (2001) It's a wonderful hypogean life: a guide to the troglomorphic fishes of the world. *Environmental Biology of Fishes*, 62, 13–41. https://doi.org/10.1023/A:1011844404235

Rüber, L., Kottelat, M., Tan, H.H., Ng, P.K.L. & Britz, R. (2007) Evolution of miniaturization and the phylogenetic position of *Paedocypris*, comprising the world's smallest vertebrate. *BMC Evolutionary Biology*, 7, 38. https://doi.org/10.1186/1471-2148-7-38

Saitoh, K., Sado, T., Mayden, R.L., Hanzawa, N., Nakamura, K., Nishida, M. & Miya, M. (2006) Mitogenomic evolution and interrelationships of the Cypriniformes (Actinopterygii: Ostariophysi): the first evidence toward resolution of higher-level relationships of the world's largest freshwater fish clade based on 59 whole mitogenome sequences. *Journal of Molecular Evolution*, 63, 826–841. https://doi.org/10.1007/s00239-005-0293-y

Sawada, Y. (1982) Phylogeny and Zoogeography of the Superfamily Cobitoidea (Cyprinoidei, Cypriniformes). *Memoirs of the Faculty of Fisheries, Hokkaido University*, 28, 65–223.

Schönhuth, S., Shiozawa, D.K., Dowling, T.E. & Mayden, R.L. (2012) Molecular systematics of western North American cyprinids (Cypriniformes: Cyprinidae). *Zootaxa*, 3586, 281–303.

Schönhuth, S., Vukić, Šandac, R., Yang, L. & Mayden, R.L. (*In press*). Phylogenetic relationships and classification of the Holarctic family Leuciscidae (Cypriniformes: Cyprinoidei). *Molecular Phylogenetics and Evolution.* https://doi.org/10.1016/j.ympev.2018.06.026

Siebert, D.J. (1987) *Interrelationships among families of the order Cypriniformes (Teleostei)*. Unpublished Dissertation, The City University of New York, New York, 354 pp.

Skelton, P.H. (2016) Name changes and additions to the southern African freshwater fish fauna. *African Journal of Aquatic Science*, 41, 345–351. https://doi.org/10.2989/16085914.2016.1186004

Smith, G.R. (1992) Phylogeny and biogeography of the Catostomidae, freshwater fishes of North America and Asia. *In*: Mayden, R.L. (Ed.), *Systematics, Historical Ecology, and North American Freshwater Fishes*. Stanford University Press, Stanford, pp. 778–826.

Stiassny, M.L.J. & Getahun, A. (2007) An overview of labeonin relationships and the phylogenetic placement of the Afro?Asian genus *Garra* Hamilton, 1922 (Teleostei: Cyprinidae), with the description of five new species of *Garra* from Ethiopia, and a key to all African species. *Journal of the Linnean Society of London, Zoology*, 150, 41–83. https://doi.org/10.1111/j.1096-3642.2007.00281.x

Stout, C.C., Tan, M., Lemmon, A.R., Lemmon, E.M. & Armbruster, J.W. (2016) Resolving Cypriniformes relationships using an anchored enrichment approach. *BMC Evolutionary Biology*, 16, 1–13.
https://doi.org/10.1186/s12862-016-0819-5

Sungani, H., Ngatunga, B.P., Koblmüller, S., Mäkinen, T., Skelton, P.H. & Genner, M.J. (2017) Multiple colonisations of the Lake Malawi catchment by the genus *Opsaridium* (Teleostei: Cyprinidae). *Molecular Phylogenetics and Evolution*, 107, 256–265.
https://doi.org/10.1016/j.ympev.2016.09.027

Šlechtová, V., Bohlen, J. & Perdices, A. (2008) Molecular phylogeny of the freshwater fish family Cobitidae (Cypriniformes: Teleostei): Delimitation of genera, mitochondrial introgression and evolution of sexual dimorphism. *Molecular Phylogenetics and Evolution*, 47, 812–831.
https://doi.org/10.1016/j.ympev.2007.12.018

Šlechtová, V., Bohlen, J. & Tan, H.H. (2007) Families of Cobitoidea (Teleostei; Cypriniformes) as revealed from nuclear genetic data and the position of the mysterious genera *Barbucca*, *Psilorhynchus*, *Serpenticobitis* and *Vaillantella*. *Molecular Phylogenetics and Evolution*, 44, 1358–1365.
https://doi.org/10.1016/j.ympev.2007.02.019

Šlechtová, V., Bohlen, J., Freyhof, J. & Ráb, P. (2006) Molecular phylogeny of the Southeast Asian freshwater fish family Botiidae (Teleostei: Cobitoidea) and the origin of polyploidy in their evolution. *Molecular Phylogenetics and Evolution*, 39, 529–541.
https://doi.org/10.1016/j.ympev.2005.09.018

Talwar, P.K. & Jhingran, A.G. (1991) *Inland Fishes of India and Adjacent Countries*. *Vols. 1 & 2*. Oxford & IBH Publishing Co., New Delhi, Bombay, Calcutta, 1097 pp.

Tang, K.L., Agnew, M.K., Chen, W.J., Hirt, M.V., Raley, M.E., Sado, T., Schneider, L.M., Yang, L., Bart, H.L., Jr, He, S., Liu, H.-Z., Miya, M., Saitoh, K., Simons, A.M., Wood, R.M. & Mayden, R.L. (2011) Phylogeny of the gudgeons (Teleostei: Cyprinidae: Gobioninae). *Molecular Phylogenetics and Evolution*, 61, 103–124.
https://doi.org/10.1016/j.ympev.2011.05.022

Tang, K.L., Agnew, M.K., Hirt, M.V., Lumbantobing, D.N., Raley, M.E., Sado, T., Teoh, V.-H., Yang, L., Bart, H.L., Jr, Harris, P.M., He, S., Miya, M., Saitoh, K., Simons, A.M., Wood, R.M. & Mayden, R.L. (2013a) Limits and phylogenetic relationships of East Asian fishes in the subfamily Oxygastrinae (Teleostei: Cypriniformes: Cyprinidae). *Zootaxa*, 3681 (2), 101–135.
https://doi.org/10.11646/zootaxa.3681.2.1

Tang, K.L., Agnew, M.K., Hirt, M.V., Sado, T., Schneider, L.M., Freyhof, J., Sulaiman, Z., Swartz, E., Vidthayanon, C., Miya, M., Saitoh, K., Simons, A.M., Wood, R.M. & Mayden, R.L. (2010) Systematics of the subfamily Danioninae (Teleostei: Cypriniformes: Cyprinidae). *Molecular Phylogenetics and Evolution*, 57, 189–214.
https://doi.org/10.1016/j.ympev.2010.05.021

Tang, K.L., Lumbantobing, D.N. & Mayden, R.L. (2013b) The phylogenetic placement of *Oxygaster* van Hasselt, 1823 (Teleostei: Cypriniformes: Cyprinidae) and the taxonomic status of the family-group name Oxygastrinae Bleeker, 1860. *Copeia*, 2013, 13–22.
https://doi.org/10.1643/CG-10-121

Tang, Q., Liu, H.-Z., Mayden, R.L. & Xiong, B. (2006) Comparison of evolutionary rates in the mitochondrial DNA cytochrome b gene and control region and their implications for phylogeny of the Cobitoidea (Teleostei: Cypriniformes). *Molecular Phylogenetics and Evolution*, 39, 347–357.
https://doi.org/10.1016/j.ympev.2005.08.007

Thys van den Audenaerde, D.F.E. (1965) La découverte de *Prolabeops cameroonensis* Schultz, 1941 (Pisces, Cyprinidae). *Revue de Zoologie et de Botanique Africaines*, 72, 161–167.

Thys van den Audenaerde, D.F.E. (1974) Quelques observations sur *Prolabeops melanhypopterus* du Cameroun (Pisces, Cyprinidae). *Revue de Zoologie et de Botanique Africaines*, 88, 778–783.

van der Laan, R., Eschmeyer, W.N. & Fricke, R. (2014) Family-group names of Recent fishes. *Zootaxa*, 3882 (1), 1–230.
https://doi.org/10.11646/zootaxa.3882.1.1

Vreven, E.J.W.M.N., Musschoot, T., Snoeks, J. & Schliewen, U.K. (2016) The African hexaploid Torini (Cypriniformes: Cyprinidae): review of a tumultuous history. *Zoological Journal of the Linnean Society*, 177, 231–305.
https://doi.org/10.1111/zoj.12366

Wang, H.Y., Wang, C.F., Du, S.Y. & Lee, S.C. (2007a) New insights on molecular systematics of opsariichthines based on cytochrome b sequencing. *Journal of Fish Biology*, 71, 18–32.
https://doi.org/10.1111/j.1095-8649.2007.01515.x

Wang, W.-Y., Zhou, W., Yang, J.X. & Chen, X.Y. (2014) Morphological and molecular studies on *Garra imberba* and its related species in China. 动物学研究 *Zoological Research*, 35, 20–32.

Wang, X., Li, J. & He, S. (2007b) Molecular evidence for the monophyly of East Asian groups of Cyprinidae (Teleostei: Cypriniformes) derived from the nuclear recombination activating gene 2 sequences. *Molecular Phylogenetics and Evolution*, 42, 157–170.
https://doi.org/10.1016/j.ympev.2006.06.014

Wang, Y., Lu, Y., Zhang, Y., Ning, Z., Li, Y., Zhao, Q., Lu, H., Huang, R., Xia, X., Feng, Q., Liang, X., Liu, K., Zhang, L., Lu, T., Huang, T., Fan, D., Weng, Q., Zhu, C., Lu, Y., Li, W., Wen, Z., Zhou, C., Tian, Q., Kang, X., Shi, M., Zhang, W., Jang, S., Du, F., He, S., Liao, L., Li, Y., Gui, B., He, H., Ning, Z., Yang, C., He, L., Luo, L., Yang, R., Luo, Q., Liu, X., Li, S., Huang, W., Xiao, L., Lin, H., Han, B. & Zhu, Z. (2015) The draft genome of the grass carp (*Ctenopharyngodon idellus*) provides insights into its evolution and vegetarian adaptation. *Nature Genetics*, 47, 625–631. https://doi.org/10.1038/ng.3280

Xu, P., Zhang, X., Wang, X., Li, J.-T., Liu, G., Kuang, Y., Xu, J., Zheng, X., Ren, L., Wang, G., Zhang, Y., Huo, L., Zhao, Z., Cao, D., Lu, C., Li, C., Zhou, Y., Liu, Z., Fan, Z., Shan, G., Li, X., Wu, S., Song, L., Hou, G., Jiang, Y., Jeney, Z., Yu, D., Wang, L., Shao, C., Song, L., Sun, J., Ji, P., Wang, J., Li, Q., Xu, L., Sun, F., Feng, J., Wang, C., Wang, S., Wang, B., Li, Y., Zhu, Y., Xue, W., Zhao, L., Wang, J.-T., Gu, Y., Lv, W., Wu, K., Xiao, J., Wu, J., Zhang, Z., Yu, J. & Sun, X. (2014) Genome sequence and genetic diversity of the common carp, *Cyprinus carpio*. *Nature Genetics*, 46, 1212–1219. https://doi.org/10.1038/ng.3098

Yang, J., Chen, X., Bai, J., Fang, D., Qiu, Y., Jiang, W., Yuan, H., Bian, C., Lu, J., He, S., Pan, X., Zhang, Y., Wang, X., You, X., Wang, Y., Sun, Y., Mao, D., Liu, Y., Fan, G., Zhang, H., Chen, X.Y., Zhang, X., Zheng, L., Wang, J.-T., Le Cheng, Chen, J., Ruan, Z., Li, J., Yu, H., Peng, C., Ma, X., Xu, J., He, Y., Xu, Z., Xu, P., Wang, J., Yang, H., Wang, J., Whitten, T., Xu, X. & Shi, Q. (2016) The *Sinocyclocheilus* cavefish genome provides insights into cave adaptation. *BMC Biology*, 14, 1–13. https://doi.org/10.1186/s12915-015-0223-4

Yang, L., Arunachalam, M., Sado, T., Levin, B.A., Golubtsov, A.S., Freyhof, J., Friel, J.P., Chen, W.J., Hirt, M.V., Manickam, R., Agnew, M.K., Simons, A.M., Saitoh, K., Miya, M., Mayden, R.L. & He, S. (2012a) Molecular phylogeny of the cyprinid tribe Labeonini (Teleostei: Cypriniformes). *Molecular Phylogenetics and Evolution*, 65, 362–379. https://doi.org/10.1016/j.ympev.2012.06.007

Yang, L., Hirt, M.V., Sado, T., Arunachalam, M., Manickam, R., Tang, K.L., Simons, A.M., Wu, H.-H., Mayden, R.L. & Miya, M. (2012b) Phylogenetic placements of the barbin genera *Discherodontus*, *Chagunius*, and *Hypselobarbus* in the subfamily Cyprininae (Teleostei: Cypriniformes) and their relationships with other barbins. *Zootaxa*, 3586, 26–40.

Yang, L., Sado, T., Hirt, M.V., Pasco-Viel, E., Arunachalam, M., Li, J., Wang, X., Freyhof, J., Saitoh, K., Simons, A.M., Miya, M., He, S. & Mayden, R.L. (2015) Phylogeny and polyploidy: Resolving the classification of cyprinine fishes (Teleostei: Cypriniformes). *Molecular Phylogenetics and Evolution*, 85, 97–116. https://doi.org/10.1016/j.ympev.2015.01.014

Zhang, C.-G. & Zhao, Y.-H. (2016) *Species Diversity and Distribution of Inland Fishes in China*. Science Press, Beijing, 284 pp.

Zhao, J., Xu, D., Zhao, K., Diogo, R., Yang, J. & Peng, Z. (2016) The origin and divergence of Gobioninae fishes (Teleostei: Cyprinidae) based on complete mitochondrial genome sequences. *Journal of Applied Ichthyology*, 32, 32–39. https://doi.org/10.1111/jai.12920

Zheng, L.-P., Chen, X.Y. & Yang, J.X. (2016) Molecular systematics of the Labeonini inhabiting the karst regions in southwest China (Teleostei, Cypriniformes). *ZooKeys*, 612, 133–148. https://doi.org/10.3897/zookeys.612.9085