

Appendix 2 – Revised Classification for Bony Fishes

The nomenclatural arrangement presented here builds on the existing classification by Wiley and Johnson [1] and intends to preserve names and taxonomic composition of groups whenever possible. However, adjustments are made to recognize new well-supported molecular clades, many of which also have been obtained by previous molecular studies (several examples discussed below). Order-level or supraordinal taxa are erected (new) or resurrected on the basis of well-supported clades only (>90% bootstrap values). Current taxon names supported by previous molecular or morphological studies are retained if congruent with our results, even if bootstrap support is low (e.g., *Osteoglossocephalai sensu* Arratia [2] with only 38% bootstrap). In some cases, ordinal or subordinal taxa that were not monophyletic in our analysis are also validated, as long as the incongruence is not supported by strong bootstrap values. Examples include the suborder Blennioidei (not monophyletic here but monophyletic in Wainwright et al. [3]) and the order Pleuronectiformes (not monophyletic here but monophyletic in Betancur-R. et al. [4]).

Family names for bony fishes are based on Eschmeyer and Fong [5] and van der Laan et al. [6], with minor modifications. Consult van der Laan et al. [6] for authorship of family names and Wiley and Johnson [10] for authorship of ordinal and subordinal names. Our list is not intended as a comprehensive revision of valid family names; instead, it is simply an adaptation of their list based on published studies that we know validate or synonymize family groups using explicit phylogenetic evidence. Unlike Eschmeyer and Fong [5] and van der Laan et al. [6], we do not recognize the family status of Anotopteridae, Omosudidae (synonyms of Alepisauridae [7]) or Latidae (synonym of Centropomidae [8,9]). Also, we recognize the following families, listed in Eschmeyer and Fong [5] and van der Laan et al. [6] as synonyms or subfamilies of other families: Botiidae (following [10]), Diplophidae (following Nelson [11]; apparently omitted by Eschmeyer and Fong [5]), Horabagridae (following Sullivan et al. [12]), Siniperidae (following Li et al. [13]), Steindachneriidae (following Roa-Varon and Orti [14]), Zanclorenchidae, the aulopiform Bathysauropsidae and Sudidae (following Davis [7]), and the pleuronectiform Paralichthodidae, Poecilopsettidae, and Rhombosoleidae (following Chapleau [15], Munroe [16]). A total of 502 families are recognized here, of which 369 (73.5%) were examined. Of these, 146 families included only one representative (39.6%) and 40 (17.9%) of the remaining 223 were rendered non-monophyletic in our analysis (non-monophyletic families are indicated below). For each order/suborder we list all families examined as well as the unexamined families whose taxonomic affinity is expected on the basis of traditional taxonomy or phylogenetic evidence. The list of unexamined families is also intended as a resource that may help fish systematists to direct future sequencing efforts.

A total of 66 orders are classified, three of which are new (Holocentriformes, Istiophoriformes, and Pempheriformes), and 15 are resurrected or validated under a new circumscription. Some ordinal or subordinal names may appear to be new,

but most can be found in the literature at various hierarchical levels. As examples, Spariformes is a Bleeker name and Centrarchiformes is a Webber and de Beaufort name. As priority is not applied to names above the family level, we have not made a thorough attempt to establish first use. Only those three for which no reference could be found are listed as “new.” New infraorders are named in Suborder Cottioidei to circumscribe well-corroborated clades and may conserve the rank of superfamily in subsequent revisions. The ordinal status of 50 percomorph families examined (as well as many others unexamined) belonging to Carangimorphariae, Ovalentariae, and Percomorpharia remains uncertain (i.e., *incertae sedis*) due to poor phylogenetic resolution. Percentages in parentheses following names indicate bootstrap support (no bootstrap values shown for redundant groups or monotypic taxa). The complete phylogenetic tree with annotated classification is illustrated in [Fig. S1](#) (see also [OneZoom](#)). The new classification scheme presented here should be considered a work in progress (version 1), as any other hypothesis. It is likely to include involuntary errors and omissions in addition to the many unexamined, *sedis mutabilis*, and *incertae sedis* taxa. Updates should be forthcoming as new evidence become available and feedback from experts help refine it. For the most updated version visit [DeepFin](#).

Megaclass Osteichthyes (=Euteleostomi, =Euosteichthyes)

Superclass Actinopterygii (100%)

Class Cladistia (100%)

Order Polypteriformes

Polypteridae

Class Actinopteri (100%)

Subclass Chondrostei (100%)

Order Acipenseriformes

Acipenseridae

Polyodontidae

Subclass Neopterygii (100%)

Infraclass Holostei (100%)

Order Amiiformes

Amiidae

Order Lepisosteiformes (100%)

Lepisosteidae

Infraclass Teleostei (100%)

Megacohort Elopocephalai *sensu* Arratia [2] (100%)

Supercohort Elopocephala (100%)

Cohort Elopomorpha (100%)

Order Elopiformes (100%)

Elopidae

Megalopidae

Order Albuliformes (100%)

Albulidae

Order Notacanthiformes (100%)

Halosauridae
Notacanthidae

Order Anguilliformes (100%)

Anguillidae
Congridae
Eurypharyngidae
Muraenesocidae
Muraenidae
Nemichthyidae
Ophichthidae
Saccopharyngidae
Serrivomeridae

Not examined: Chlopsidae, Colocongridae,
Cyematidae, Derichthyidae, Heterenchelyidae,
Monognathidae, Moringuidae, Myrocongridae,
Nettastomatidae, Protanguillidae,
Synaphobranchidae.

Comment: Suborders recognized in Wiley and Johnson [1] based on previous work cited therein are significantly incongruent with the clades obtained in this analysis; thus, no subordinal classification is proposed.

Megacohort Osteoglossocephalai *sensu* Arratia [2] (38%)

Supercohort Osteoglossocephala *sensu* Arratia [2] (99%)

Cohort Osteoglossomorpha

Order Hiodontiformes (100%)

Hiodontidae

Order Osteoglossiformes (100%)

Arapaimidae
Gymnarchidae
Mormyridae
Notopteridae
Osteoglossidae
Pantodontidae

Supercohort Clupeocephala *sensu* Arratia [17] (100%)

Cohort Otomorpha, new circumscription (=Otocephala,
Ostarioclupeomorpha) (100%)

Subcohort Clupei (87%)

Order Clupeiformes

Suborder Denticipitoidei

Denticipitidae

Suborder Clupeoidei (100%)

Chirocentridae

Clupeidae (not monophyletic)

Engraulidae
Pristigasteridae
Not examined: Dussumieriidae,
Sundasalangidae.
Subcohort Alepocephali (100%)
Order Alepocephaliformes
Alepocephalidae (not monophyletic)
Platytroctidae
Not examined: Leptochilichthyidae.
Subcohort Ostariophysii (100%)
Section Anotopterygia (97%)
Order Gonorynchiformes
Suborder Gonorynchoidei
Gonorynchidae
Not examined: Phractolaemidae.
Suborder Chanoidei
Chanidae
Suborder Knerioidei (100%)
Kneriidae
Section Otopterygia (100%)
Superorder Cyprinae (100%)
Order Cypriniformes
Botiidae
Catostomidae
Cobitidae
Cyprinidae
Gyrinocheilidae
Nemacheilidae
Not examined: Balitoridae,
Barbuccidae, Ellopostomatidae,
Psilorhynchidae, Serpenticobitidae,
Vaillantellidae.
Superorder Characiphysae (100%)
Order Gymnotiformes (100%)
Suborder Gymnotoidei (not monophyletic)
Gymnotidae (not monophyletic)
Suborder Sternopygoidei (not
monophyletic)
Aptereronotidae
Rhamphichthyidae
Sternopygidae (not monophyletic)
Not examined: Hypopomidae.

Comment: Although not monophyletic here, the monophyly gymnotiform suborders was corroborated by Albert and Crampton [18].

Order Characiformes (100%)

Suborder Citharinoidei (not monophyletic)

Citharinidae

Distichodontidae

Suborder Characoidei (not monophyletic)

Acestrorhynchidae

Alestidae

Bryconidae

Chalceidae

Characidae

Chilodontidae

Crenuchidae

Ctenoluciidae

Cynodontidae

Erythrinidae

Gasteropelecidae

Hemiodontidae

Hepsetidae

Lebiasinidae

Parodontidae

Prochilodontidae

Serrasalminidae

Triportheidae

Not examined: Anostomidae,

Curimatidae, Iguanodectidae.

Comment: Although not monophyletic in this analysis, the monophyly of characiform suborders has been corroborated by other molecular studies (e.g., [19]).

Order Siluriformes (100%)

Suborder Loricarioidei (93%)

Astroblepidae

Callichthyidae

Loricariidae

Nematogenyidae

Trichomycteridae

Suborder Diplomystoidei

Diplomystidae

Suborder Siluroidei (100%)

Akysidae

Amblycipitidae

Amphiliidae
Anchariidae
Ariidae
Auchenipteridae
Bagridae
Cetopsidae
Chacidae
Clariidae
Claroteidae
Cranoglanididae
Doradidae
Heptapteridae
Heteropneustidae
Horabagridae
Ictaluridae
Malapteruridae
Mochokidae
Pangasiidae
Pimelodidae
Plotosidae
Pseudopimelodidae
Schilbeidae
Siluridae
Sisoridae
Not examined: Aspredinidae,
Austroglanididae, Erethistidae,
Lacantuniidae, Olyridae,
Scoloplacidae.

Supercohort Clupecocephala (cont.)

Cohort Euteleostomorpha (100%)

Subcohort Lepidogalaxii

Order Lepidogalaxiiformes

Lepidogalaxiidae

Subcohort Protacanthopterygii *sedis mutabilis* (37%)

Order Galaxiiformes, new circumscription (100%)

Galaxiidae

Order Argentiniformes, new circumscription (100%)

Argentinidae

Bathylagidae

Microstomatidae

Opisthoproctidae

Order Salmoniformes (100%)

Salmonidae

Order Esociformes (100%)

Esocidae
Umbridae
Subcohort Stomiatii, new circumscription (73%)
Order Stomiatiformes (=Stomiiformes) (100%)
Diplophidae
Gonostomatidae
Phosichthyidae (not monophyletic)
Sternoptychidae
Stomiidae (not monophyletic)
Order Osmeriformes, new circumscription (100%)
Osmeridae
Plecoglossidae
Retropinnidae
Salangidae
Subcohort Neoteleostei, new circumscription (100%)
Infracohort Ateleopodia (100%)
Order Ateleopodiformes
Ateleopodidae
Infracohort Eurypterygia (96%)
Section Aulopa (100%)
Order Aulopiformes
Suborder Aulopoidei (not monophyletic)
Aulopidae
Pseudotriconotidae
Synodontidae (not monophyletic)
Suborder Paraulopoidei
Paraulopidae
Suborder Alepisauroidi (not monophyletic)
Alepisauridae
Bathysauridae
Chlorophthalmidae (not monophyletic)
Evermannellidae
Giganturidae
Ipnopidae
Notosudidae
Paralepididae (not monophyletic)
Scopelarchidae (not monophyletic)
Sudidae
Not examined: Bathysauroididae,
Bathysauropsidae.

Comment: Suborders and families listed are as in Davis [7]. Although not monophyletic herein, the monophyly aulopiform suborders was supported by Davis [7].
Section Ctenosquamata (97%)

Subsection Myctophata (100%)

Order Myctophiformes

Myctophidae

Neoscopelidae

Subsection Acanthomorphata (97%)

Division Lampridacea (100%)

Order Lampridiformes, new circumscription

Lamprididae

Lophotidae

Regalecidae

Trachipteridae

Not examined: Radiicephalidae,

Veliferidae.

Division Paracanthomorphacea *sensu* Grande et al.

[20] (93%)

Series Percopsaria (100%)

Order Percopsiformes

Amblyopsidae

Aphredoderidae

Percopsidae

Series Zeiogadaria (=Zeioigadiformes *sensu* Li et al. [21]) (98%)

Subseries Zeariae (100%)

Order Zeiformes

Parazenidae

Zeidae

Not examined: Cyttidae,

Grammicolepididae,

Oreosomatidae, Zenionidae.

Subseries Gadariae (100%)

Order Stylephoriformes (*sensu*

Miya et al. [22])

Stylephoridae

Order Gadiformes (100%)

Suborder Macrouroidei

Macrouridae (not
monophyletic)

Steindachneriidae

Suborder Gadoidei (not
monophyletic)

Gadidae

Lotidae

Merlucciidae

Moridae

Phycidae

Not examined:
Bregmacerotidae,
Eulichthyidae,
Melanonidae.

Suborder Muraenolepidoidei

Not examined:
Muraenolepididae.

Comment: The subordinal
classification follows Roa-Varon
and Orti [14: fig. 6].

Division Polymixiacea (100%)

Order Polymixiiformes

Polymixiidae

Division Euacanthomorphaea *sensu* [23] (99%)

Subdivision Berycimorphaceae (87%)

Order Beryciformes, new circumscription
(circumscription similar to Trachichthyiformes
sensu Moore [24])

Anoplogastridae

Barbourisiidae

Berycidae

Cetomimidae

Diretmidae

Melamphaidae

Monocentridae

Rondeletiidae

Trachichthyidae

Not examined: Anomalopidae,
Gibberichthyidae, Hispidoberycidae,
Stephanoberycidae (placement expected
following Moore [24]).

Subdivision Holocentrimorphaceae (100%)

Order Holocentriformes, new

Holocentridae

Comment: Moore [24], and Stiassny and
Moore [25] provide morphological evidence
supporting a sister-group relationship
between holocentrids and percomorphs,
which further guarantees placement of this
family in its own order.

Subdivision Percomorphaceae

Subdivision Percomorphaceae (cont.)

Not examined (9 families traditionally placed in “Perciformes”): Banjosidae, Bathyclupeidae, Dichistiidae, Hapalogenyidae, Lactariidae, Parascorpididae, Perciliidae, Symphysanodontidae, Trichonotidae.

Comment: These “perciform” families are provisionally placed here given the long history of phylogenetic indistinctiveness between Percoidei, Perciformes, and Percomorpha (e.g., [26]).

Series Ophidiomorpha (100%)

Order Ophidiiformes

Suborder Ophidioidei

Ophidiidae

Not examined: Carapidae

Suborder Bythitoidei

Bythitidae

Not examined: Aphyonidae, Parabrotulidae

Series Batrachoidomorpha (100%)

Order Batrachoidiformes

Batrachoididae

Series Gobiomorpha (see also [27,28]) (100%)

Comment: In addition to the well-supported molecular circumscription of this group, kurtids, apogonids and gobioids are characterized by the presence of sensory papillae rows on the head and body [27].

Order Kurtiformes, new circumscription (98%)

Suborder Kurtoidei

Kurtidae

Suborder Apogonoidei

Apogonidae

Comment: Johnson [29] noted that the configuration of the dorsal gill-arch elements may be homologous in Kurtus and apogonids.

Order Gobiiformes (100%)

Suborder Odontobutoidei (100%)

Odontobutidae

Suborder Eleotroidei (97%)

Eleotridae

Suborder Gobioidae (100%)

Gobiidae (not monophyletic)

Microdesmidae

Not examined: Kraemeriidae, Rhyacichthyidae, Schindleriidae, Thalasseleotrididae, Xenisthmidae.

Series Scombrimorpha (97%)

Order Syngnathiformes, new circumscription (97%)

Incertae sedis: Aulostomidae, Centriscidae.

Suborder Syngnathoidae, new circumscription (92%)

Syngnathidae

Possibly included (examined): Fistulariidae

Suborder Dactylopteroidei (100%)

Dactylopteridae

Suborder Callionymoidei (100%)

Callionymidae

Not examined: Draconettidae, Pegasidae, Solenostomidae,
(assumed affinity with Callionymidae).

Suborder Mulloidei, new circumscription (92%)

Creediidae

Mullidae

Not examined: Leptoscopidae (assumed affinity with
Creediidae [30]).

Order Scombriformes, new circumscription (=Stromateoidei *sensu* Li et al.
[21]) (100%)

Ariommatidae

Bramidae

Caristiidae

Centrolophidae

Chiasmodontidae

Gempylidae

Icosteidae

Nomeidae

Pomatomidae

Scombridae (not monophyletic)

Scombrolabracidae

Stromateidae

Trichiuridae

“Stromateoid” families not examined: Amarsipidae, Scombropidae,
Tetragonuridae; not examined but assumed affinity: Arripidae [31].

Comment: interfamilial resolution in Scombriformes is tenuous;
circumscription of scombriform families into suborders (e.g., Scombroidei,
Stromateoidei, Icostoidei) requires further work.

Series Carangimorpharia (94%)

Subseries Anabantomorphariae (=Anabantiformes *sensu* Li et al. [21])
(99%)

Order Synbranchiformes, new circumscription (98%)

Suborder Indostomoidei

Indostomidae

Suborder Synbranchoidei

Synbranchidae

Suborder Mastacembeloidei

Mastacembelidae

Not examined: Chaudhuriidae.

Order Anabantiformes (100%)

Suborder Anabantoidei (95%)

Anabantidae
Helostomatidae
Osphronemidae
Not examined: Badidae, Pristolepididae.
Suborder Channoidei (85%)
Channidae
Nandidae
Subseries Carangimorphariae (=Carangimorpha *sensu* Li et al. [21]) (100%)
Incertae sedis: Centropomidae (*sensu* Greenwood), Leptobramidae,
Menidae, Polynemidae, Sphyraenidae, Toxotidae.

Order Istiophoriformes, new (100%)

Istiophoridae
Xiphiidae

Order Carangiformes *sedis mutabilis* (not monophyletic)

Carangidae
Coryphaenidae
Echeneidae
Nematistiidae
Rachycentridae

Comment: Monophyly of Carangiformes is not significantly rejected by the data (see also [4]).

Order Pleuronectiformes *sedis mutabilis* (not monophyletic)

Suborder Psettoidae (100%)
Psettodidae

Suborder Pleuronectoidei (100%)

Achiridae
Achiropsettidae
Bothidae
Citharidae
Cynoglossidae
Paralichthyidae (not monophyletic)
Pleuronectidae
Poecilopsettidae
Rhombosoleidae (not monophyletic)
Samaridae
Scophthalmidae
Soleidae

Not examined: Paralichthodidae.

Comment: Although Psettodidae was not recovered as the sister group of pleuronectoids in the present analysis, the order was resolved as monophyletic by a recent study, albeit with low support [4].

Subseries Ovalentariae (*sensu* Smith & Near in Wainwright et al. [3];
=Stiassnyiformes *sensu* Li et al. [21]) (100%)

Incertae sedis: Ambassidae, Embiotocidae, Grammatidae (in part; not monophyletic), Plesiopidae, Polycentridae, Pomacentridae, Pseudochromidae (not monophyletic).

Superorder Cichlomorphae (93%)

Order Cichliformes

Cichlidae

Order Pholidichthyiformes

Pholidichthyidae

Superorder Atherinomorphae (100%)

Order Atheriniformes (100%)

Atherinidae

Atherinopsidae

Bedotiidae

Isonidae

Melanotaeniidae

Pseudomugilidae

Telmatherinidae

Not examined: Dentatherinidae, Notocheiridae, Phallostethidae.

Order Beloniformes (32%)

Suborder Adrianichthyoidei

Adrianichthyidae

Suborder Exocoetoidei (100%)

Belonidae (not monophyletic)

Exocoetidae (not monophyletic)

Hemiramphidae (not monophyletic)

Scomberesocidae

Zenarchopteridae (not monophyletic)

Order Cyprinodontiformes (57%)

Suborder Aplocheiloidei

Aplocheilidae

Suborder Cyprinodontoidei (100%)

Cyprinodontidae

Fundulidae

Poeciliidae

Not examined: Anablepidae, Goodeidae,

Nothobranchiidae, Profundulidae, Rivulidae, Valenciidae.

Superorder Mugilomorphae (100%)

Order Mugiliformes

Mugilidae

Superorder Blenniimorphae (100%)

Incertae sedis: Grammatidae (in part; not monophyletic) and Opistognathidae.

Order Blenniiformes, new circumscription (Li et al. [21] plus Gobiesocidae) (100%)

Suborder Gobiesocoidei

Gobiesocidae

Suborder Blennioidei *sedis mutabilis* (not monophyletic)

Blenniidae

Chaenopsidae

Clinidae

Dactyloscopidae

Labrisomidae (not monophyletic)

Tripterygiidae

Comment: While blennioids are not monophyletic in [Fig. S1](#), we note that preliminary analyses resulted in the reciprocal monophyly of gobiesocoids and blennioids, which is also congruent with a recent multi-locus analysis [3]. Monophyly of gobiesocoids and blennioids (as separate orders/suborders) is further supported by morphological evidence [1].

Series Percomorpharia (99%)

Incertae sedis: Acropomatidae (not monophyletic), Caesionidae, Caproidae, Centrogenyidae, Chaetodontidae, Emmelichthyidae, Enoplosidae, Epigonidae, Gerreidae, Haemulidae, Howellidae, Kuhliidae, Kyphosidae (not monophyletic), Lateolabracidae, Leiognathidae, Lobotidae, Lutjanidae (not monophyletic), Malacanthidae, Monodactylidae, Moronidae, Oplegnathidae, Percichthyidae (not monophyletic), Polyprionidae (not monophyletic), Pomacanthidae, Priacanthidae, Scatophagidae, Sciaenidae, Siganidae, Sillaginidae, Sinipercaidae, Terapontidae. Not examined: Datnioididae (assumed affinity with Lobotidae [11]); Callanthiidae, Cepolidae (see [21]); Dinolestidae, Dinopercidae, Ostracoberycidae, Pentacerotidae (see [26]).

Order Uranoscopiformes, new circumscription (=Paratrachiniformes *sensu* Li et al. [21]) (95%)

Ammodytidae

Pinguipedidae

Uranoscopidae

Not examined: Cheimarrichthyidae (see Li et al. [21]).

Order Labriformes *sensu stricto* (100%)

Labridae (not monophyletic)

Odacidae

Scaridae

Order Ehippiformes, new circumscription (100%)

Drepaneidae

Ehippidae

Comment: Greenwood et al. [32] hypothesized a close affinity between Drepane and ehippids.

Order Spariformes *sensu* Akazaki [33] and Johnson [34] (94%)

Lethrinidae

Sparidae

Possibly included (examined): Nemipteridae

Not examined but assumed affinity [34]: Centracanthidae

Comment: Akazaki [33] proposed that Lethrinidae

Sparidae, and Nemipteridae were closely related based on

specializations of the suspensorium and other features [29]. Johnson

[34] supported the monophyly of Akazaki's spariforms with the

addition of Centracanthidae.

Order Lophiiformes (100%)

Suborder Lophioidei (100%)

Lophiidae

Suborder Antennarioidei (100%)

Antennariidae

Not examined: Brachionichthyidae, Lophichthyidae,

Tetrabrachiidae.

Suborder Chaunacoidei (100%)

Chaunacidae

Suborder Ogcocephaloidei (100%)

Ogcocephalidae

Suborder Ceratioidei (not monophyletic)

Ceratiidae (not monophyletic)

Gigantactinidae

Himantolophidae

Melanocetidae

Oneirodidae

Not examined: Caulophrynidae, Centrophrynidae, Diceratiidae,

Linophrynidae, Neoceratiidae, Thaumatchthyidae.

Comment: The monophyly of Ceratioidei is challenged in this analysis due to misplacement of Cryptoceratias; however, another recent mitogenomic study provided evidence for the monophyly of the suborder [35].

Order Tetraodontiformes (100%)

Suborder Triacanthoidei (100%)

Triacanthodidae

Suborder Tetraodontoidei, new circumscription (100%)

Diodontidae

Tetraodontidae

Suborder Moloidei, new (100%)

Molidae

Suborder Balistoidei, new circumscription (100%)

Balistidae

Monacanthidae

Suborder Ostracioidei, new (100%)

Aracanidae

Ostraciidae

Suborder Triacanthoidei, new

Triacanthidae

Not examined or classified: Triodontidae.

Comment: Suborders recognized by Santini and Tyler [36] are not recovered here or in previous molecular studies and thus a new subordinal classification is proposed.

Order Acanthuriformes, restricted circumscription (see also [37]) (100%)

Acanthuridae

Luvaridae

Zanclidae

Order Pempheriformes, new (100%)

Glaucosomatidae

Pempheridae

Comment: Tominaga [38] suggested that features of the cranium and swimbladder may be homologous in Pempheris and Glaucosoma.

Order Cirrhitiformes, new circumscription (similar to Cirrhitioidea *sensu* Greenwood [39], and Burrige and Smolenski [40]) (91%)

Cheilodactylidae

Cirrhitidae

Not examined but expected affinity [39,40]: Aplodactylidae, Chironemidae, Latridae.

Order Centrarchiformes, new circumscription (100%)

Centrarchidae

Elassomatidae

Order Perciformes, new circumscription (=Serraniformes *sensu* Li et al. [21], Lautredou et al. [41]) (89%)

Incertae sedis: Platycephalidae, Percophidae.

Not examined (14 families traditionally placed in Scorpaeniformes): Apistidae, Aploactinidae, Bembridae, Champsodontidae, Congiopodidae, Cottocomephoridae, Eschmeyeridae, Gnathanacanthidae, Hoplichthyidae, Neosebastidae, Pataecidae, Perryenidae, Plectrogeniidae, Zanclorhynchidae.

Suborder Serranoidei *sedis mutabilis* (19%)

Serranidae

Suborder Percoidei, restricted circumscription (100%)

Percidae

Not examined: Trachinidae.

Comment: Lautredou et al. [41] using seven nuclear markers obtained a clade uniting Percidae and Trachinidae with full support.

Suborder Notothenioidei (100%)

Pseudaphritidae

Eleginopsidae

Nototheniidae (not monophyletic)
Artedidraconidae (not monophyletic)
Harpagiferidae
Bathydraconidae (not monophyletic)
Channichthyidae
Bovichtidae
Suborder Scorpaenoidei, new circumscription (83%)
Scorpaenidae (not monophyletic)
Sebastidae (not monophyletic)
Setarchidae
Synanceiidae
Tetrarogidae
Suborder Trigloidei *sensu* Jordan [42] (100%)
Triglidae
Peristediidae
Suborder Cottioidei, new circumscription (=Cottimorpha *sensu* Li et al. [21]) (100%)
Not examined: Trichodontidae (see [26])
Comment: We have chosen to recognize clades within this suborder as infraorders, adopting the ending –ales for this rank.
Infraorder Anoplopomatales, new
Anoplopomatidae
Infraorder Gasterosteales (100%)
Aulorhynchidae
Gasterosteidae
Hypoptychidae
Infraorder Zoarcales (100%)
Anarhichadidae
Bathymasteridae (not monophyletic)
Cryptacanthodidae
Stichaeidae (not monophyletic)
Pholidae
Zaproridae
Zoarcidae
Not examined: Ptilichthyidae, Scytalinidae.
Infraorder Cottales (96%)
Agonidae (not monophyletic)
Cyclopteridae
Cottidae (not monophyletic)
Hexagrammidae (not monophyletic)
Liparidae
Psychrolutidae
Not examined: 8 families traditionally placed in Cottoidei:
Abyssocottidae, Bathylutichthyidae, Comephoridae,

Ereuniidae, Hemitripteridae, Normanichthyidae,
Parabembridae, Rhamphocottidae.

Superclass Sarcopterygii (96%)

Class Coelacanthimorpha (=Actinistia)

Order Coelacanthiformes

Latimeriidae

Class Dipnotetrapodomorpha *sedis mutabilis* (65%)

Subclass Dipnomorpha (100%)

Superorder Ceratodontae

Order Ceratodontiformes

Suborder Ceratodontoidei

Neoceratodontidae

Suborder Lepidosirenoidei (100%)

Lepidosirenidae

Protopteridae

Subclass Tetrapodomorpha (100%)

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