Title	**Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness**
Authors	ZHI-QIANG ZHANG
Publication date	2011/12/23
Journal name	Zootaxa
Volume	3148
Pages	1–237
Description	Edited open-access book providing the total numbers of described species of animal phyla and an outline of the most updated higher classification to the family level for many groups. Chapters contributed by a team of over 100 specialists. An essential reference for those interested in biodiversity and animal classification.

Zootaxa 3148: 1–237 (2011)
www.mapress.com/zootaxa/

Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

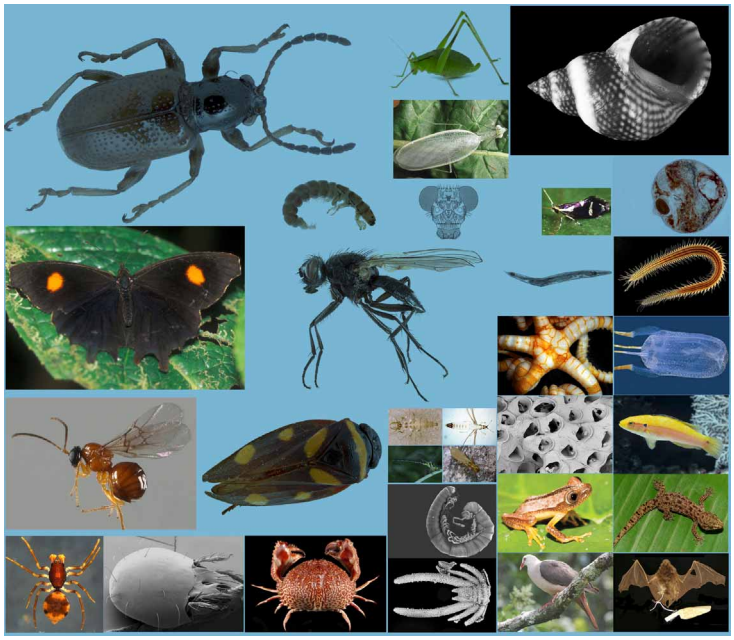
ZOOTAXA

3148

Animal biodiversity:

An outline of higher-level classification and survey of taxonomic richness

ZHI-QIANG ZHANG (ED.)
New Zealand Arthropod Collection, Landcare Research, Private Bag 92170, Auckland, New Zealand;
zhangz@landcareresearch.co.nz



Magnolia Press
Auckland, New Zealand

Accepted: published: 23 Dec. 2011

ZHI-QIANG ZHANG (ED.)
Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness
(*Zootaxa* 3148)

237 pp.; 30 cm.

23 Dec. 2011

ISBN 978-1-86977-849-1 (paperback)

ISBN 978-1-86977-850-7 (Online edition)

FIRST PUBLISHED IN 2011 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Animal biodiversity:
An outline of higher-level classification and survey of taxonomic richness

ZHI-QIANG ZHANG (ED.)

Table of contents

Zootaxa 3148: 7–12 (2011)
www.mapress.com/zootaxa/

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

Animal biodiversity: An introduction to higher-level classification and taxonomic richness

ZHI-QIANG ZHANG
Landcare Research, Private Bag 92170, Auckland 1142, New Zealand; ZhangZ@landcareresearch.co.nz

Abstract

For the kingdom Animalia, 1,552,319 species have been described in 40 phyla in a new evolutionary classification. Among these, the phylum Arthropoda alone represents 1,242,040 species, or about 80% of the total. The most successful group, the Insecta (1,020,007 species), accounts for about 66% of all animals. The most successful insect order, Coleoptera (387,100 species), represents about 38% of all species in 39 insect orders. Another major group in Arthropoda is the class Arachnida (112,201 species), which is dominated by the mites and ticks (Acari 54,617 species) and spiders (43,579 species). Other highly diverse arthropod groups include Crustacea (66,914 species), Trilobitomorpha (19,606 species) and Myriapoda (11,885 species). The phylum Mollusca (117,358 species) is more diverse than other successful invertebrate phyla Platyhelminthes (29,285 species), Nematoda (24,783 species), Echinodermata (20,509 species), Annelida (17,210 species) and Bryozoa (10,941 species). The phylum Craniata, including the vertebrates, represents 64,832 species (for Recent taxa, except for amphibians): among these 7,694 described species of amphibians, 31,958 species of "fish" and 5,750 species of mammals.

Introduction

Discovering and describing how many species inhabit the Earth remains a fundamental quest of biology, even when we are entering the "phylogenomic age" in the history of taxonomy. With so many important issues facing us—invasive species, climate change, habitat destruction and loss of biodiversity in particular, the need for authoritative taxonomic information is higher than ever. *Zootaxa* has been a major force in describing world's biodiversity in the last 10 years (Zhang 2011a). Most of the papers published in *Zootaxa* are descriptions of new taxa and taxonomic revisions interesting mainly to specialists. However, to reach a broader readership, we present, in this special volume, basic taxonomic data (classifications and diversity estimates) that are very important to the any user of biodiversity information. Extensions of results of taxonomic research to users, not only other taxonomists, but also all others, are important to achieve a greater impact for taxonomy.

The idea of this special volume was conceived in 2010—The International Year of Biodiversity. This volume is intended to be a collaborative effort by hundreds of taxonomists, each contributing a section on his/her group to the overall outline of the current, most-accepted taxonomy of the animal kingdom. The bulk of the volume will be a series of linear sequences of higher taxa (living and fossil, the latter to be indicated by a dagger (†)) from kingdom to family in a Linnaean hierarchy, using valid names following the International Code of Zoological Nomenclature. For each family, the best estimate of the number of described genera and species in the world is provided by specialists of the group. We want to present two types of important taxonomic information—how many species have been described and how they are classified—to the users of biodiversity information in an easily accessible volume, which is published for open access without cost to contributors.

Results

General account

Over 100 taxonomists contributed 43 outlines, some for phyla, some for classes and some for orders (see the outline below for notes and references to various outlines in this volume). About a quarter of the phyla were covered, with many gaps to be filled by specialists in future editions. During preparation of the volume, it quickly became evident that for many groups, there are different classifications for fossil and Recent taxa, and there is little dialogue among taxonomists working on Recent species and those on fossil. A good example is the outline on Porifera by Hooper *et al.* (2011), who tried to bring these together. The diversity estimates for many groups are deficient in fossil counts, and the total is therefore underestimated. We invite taxonomists working on both Recent and fossil taxa to joint effects in providing a more complete outline of animal classification in future editions.

For the kingdom Animalia, 1,552,319 species have been described in 40 phyla (see the list below). Among these, the phylum Arthropoda alone represents 1,242,040 species, or about 80% of the total. The most successful group, the Insecta (1,020,007 species), accounts for about 66% of all animals, or 82% of arthropods. The most successful insect order, Coleoptera (387,100 species), represents about 38% of all species in 39 insect orders. Another major group in Arthropoda is the class Arachnida (112,201 species), which is dominated by the mites and ticks (Acari 54,617 species) and spiders (43,579 species). Other highly diverse arthropod groups include Crustacea (66,914 species), Trilobitomorpha (19,606 species) and Myriapoda (11,885 species).

The phylum Mollusca (117,358 species) leads, by a significant margin, among other invertebrate phyla in diversity. Significant groups include: Platyhelminthes (29,285 species), Nematoda (24,783 species), Echinodermata (20,509 species), Annelida (17,210 species) and Bryozoa (10,941 species).

The phylum Craniata, including the vertebrates, represents 64,832 species (for Recent taxa, except for amphibians). Blackburn & Wake (2011; this volume) presented a new consensus classification for amphibians, with an estimate of 7,694 described species. Eschmeyer & Fong (2011) summarised data from the "Catalog of Fish" (31,958 species). Wilson & Reeder (2011, this volume) updated their list of 5,750 species of Mammalia.

An evo-Linnaean classification of animal phyla

There are different schemes of presenting a classification or translating a phylogeny into a classification. Without any phylogenetic information, the simplest way is to list all phyla by alphabetical order. The Catalogue of Life[1], for example, lists animal phyla alphabetically, with complete loss of phylogenetic information. Traditionally, taxonomists also list taxa of equal rank using a self-chosen sequence (if not alphabetical), with basal taxa listed first and most derived one at the end. With explicit phylogentic information available, Hennig (1965) showed that a linear sequence using a combined successive alphabet/number prefix can fully represent phylogentic relationships. A cladogram can be presented in a hierarchy with inclusions of less includive members into sets of more inclusive taxa, which are given higher ranks (e.g., Hennig 1966: fig. 18 and also Dubois 2006: fig. 3). Wiley (1979) proposed an annotated Linnaean hierarchy, with comments on natural taxa and competing systems, and this is applied, for example, to the list of Diptera in a hierarchical sequence (Pape *et al.* 2011, this volume), with taxa arranged more or less in phylogenetic sequence from the primitive (oldest) to the most advanced (youngest) taxa, and some clades not ranked. I, however, found the latter not the best way, in terms of both nomenclatural aspects and also the level of details in providing phylogentic information at the level of terminal taxa.

The phylogeny of the animal phyla is in a flux (Edgecombe *et al.* 2011), with five competing hypotheses among five major basal taxa: Ctenophora, Porifera, Placozoa, Cnidaria and Bilateria. Thus any nomenclature and classifications at the levels of subkingdom to superphylum will be unstable due to the problems at the most basal positions. Supporters of the PhyloCode (De Queiroz & Gauthier, 1992) tend to name all heirarchical nodes of a tree and the shortage of Linnaean ranks to deal with this is one reason for the rankless systems of nomenclature and their uses in classification. However, not all nodes of such trees need to be named (Dubois 2006, 2007), and nomenclatural ranks can be used consistently to express the positions of taxonomic categories in a hierarchical classification. Herein, I used a new method to present the "evo-Linnaean" classification of animal phyla: (1) The essence of this system is to use commonly used Linnaean ranks as much as possible and combine each of these ranks with a successive numbering system[2]. This system can easily cope with all levels in a phylogenetic tree.

1. Catalogue of Life: 5th December 2011 http://www.catalogueoflife.org/ (accessed on 18 Dec. 2011)

Dubois (2006) proposed a detailed standard nomenclatural hierarchy which altogether allows for 209 potential ranks by using additional prefix beyond what is commonly used (e.g. super, sub and infra-). However, between two major ranks (e.g. Kingdom and Phylum), the number of ranks is limited and not sufficient to express all possible levels of relationships among phyla. (2) I refer to this as the "evo-Linnaean" classification to indicate that this classification aims at reflecting evolutionary relationship as much as possible to set it apart from the traditional Linnaean classification, which has a typological connotation. Taxa should be arranged from basal-most to the most derived group following the relationship in a chosen hypothesis or reference tree. (3) New names for hypothesised taxa that lack consistent support are minimised. (4) To follow, as much as possible, the Codes of nomenclature. Although, names of taxa above the family-group are not fully regulated in the ICZN, it is a good practice to use existing names for the same taxa (Dubois 2006). This system is also applied to an evo-Linnaean classification of Arthropoda (Zhang, 2011b, this volume).

Kingdom **Animalia** Linnaeus, 1758 (1,552,319 species; of which †24,659)[3]

Phylum 1 **Ctenophora** Eschscholtz, 1829 (242 species)[4]

Phylum 2.1 **Porifera** Grant, 1826 (8,346 species)[5]

Phylum 2.2 1 **Placozoa** Grell, 1971 (1 species)

Phylum 2.2.2.1 **Cnidaria** Hatschek, 1888 (10,105 species)[6]

Phylum 2.2.2.2 **Myxozoa** Grassé, 1970 (2,402 species[7]) [8]

Phylum 2.2.2.3.1.1 **Xenoturbellida** Westblad, 1949 (2 species)[9]

Phylum 2.2.2.3.1.2 **Acoelomorpha** Ehlers, 1985 (393 species)

Phylum 2.2.2.3.2.1 **Orthonectida** Giard, 1877 (43 species)[10]

Phylum 2.2.2.3.2.2 **Rhombozoa** van Beneden, 1876 (123 species)[11]

Phylum 2.2.2.3.3.1.1.1 **Cephalochordata** Owen, 1846 (33 species)[12]

---

2. The International standard ISO 2145, which defines a typographic convention for the "numbering of divisions and subdivisions in written documents". It applies to any kind of document, including manuscripts, books, journal articles, and standards. It is commonly used in Table of Contents of books to express hierarchical structure. For example, Rasnitsyn & Quicke (2002) used the numbering system in the table of contents (pages vii–viii) to express the phylogenetic tree of Insecta (page 2).
3. This evo-Linnaean classification of animal phyla general follows consensus phylogenetic relationships summarised in Edgecombe *et al.* (2011). The poorly known extinct phylum †Trilobozoa is of uncertain placement. Only Recent species were counted for many insect orders and all of Myriapoda; most vertebrates and many invertebrate phyla; so the total number of species should be considered incomplete, as diversity of fossil taxa is underestimated.
4. Ctenophora was placed as sister group to the remaining animals (Porifera (Placozoa (Cnidaria, Bilateria))) in phylogenomic analyses by Dunn *et al.* (2008) and Hejnol et al. (2009). Diversity estimate based on WoRMS (2011). Ctenophora. In: Nicolas Bailly (2011). FishBase. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1248 on 2011-12-18.
5. Hooper *et al.* (2011, this volume), but number of fossil species unknown, although an attempt was able to integrate the classification of Recent and fossil Porifera.
6. Daly *et al.* (2007) included 5 classes: (1) Anthozoa with an estimate of 7,500 extant species, now updated by Crowther (2011, this volume) to 6,142 species; (2) Cubozoa 36 species, here updated to 42 species; (3) Hydrozoa 3500 species, updated to 3,643 species; (4) Scyphozoa 216 species, updated by 228 species (all updates by Zhang based on Zoological Record for new species since 2008); (5) Staurozoa 50 species.
7. Based on Lom & Dykova (2006), with updates of new species described from 2006 using *Zoological Record*.
8. Zrzavy *et al.* (1998) placed it within Cnidaria based on morphological and 18S ribosomal DNA evidence, recently, Evans et al. (2010), using phylogenomic and ribosomal data sets, showed existence of two relatively stable placements for myxozoans: within Cnidaria or the alternative hypothesis at the base of Bilateria. Cnidarian taxonomists currently do not consider myxozoans as cnidarians (Daly et al. 2007).
9. See Tyler & Schilling (2011, this volume), who treat this phylum as a subphylum of Xenacoelomorpha, following Philippe *et al.* (2011), who proposed the name Xenacoelomorpha for Xenoturbellida + Acoelomorpha.
10. Edgecombe *et al.* (2011) recognised two subgroups of Mesozoa, Orthonectida and Rhombozoa, as phyla but did not include them in the phylogentic tree. The placement of Mesozoa here follows Noordijk *et al.* (2010). Diversity estimates based on Furuya, H & van der Land, J. (2011). Orthonectida. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=14220 on 2011-12-17.
11. Diversity estimates based on WoRMS (2011) Rhombozoa. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=14219 on 2011-12-17.
12. Based Chapman (2009).

Phylum 2.2.2.3.3.1.1.2.1 **Tunicata** Lamarck, 1816 (2,792 species) [13]

Phylum 2.2.2.3.3.1.1.2.2 **Craniata** Linnaeus, 1758 (64,832 species)[14]

Phylum 2.2.2.3.3.1.2 1 **Echinodermata** (20,509 species; of which †13,000)[15]

Phylum 2.2.2.3.3.1.2.2 **Hemichordata** Bateson, 1885 (120 species)[16]

Phylum 2.2.2.3.3.2.1 **Chaetognatha** Leuckart 1854 (186 species; of which †7)[17]

Phylum 2.2.2.3.3.2.2.1.1 **Nematoda** Cobb, 1932 (24,783 species, of which †10)[18]

Phylum 2.2.2.3.3.2.2.1.2 **Nematomorpha** Vejdovsky, 1886 (351 species)[19]

Phylum 2.2.2.3.3.2.2.2 **Tardigrada** Doyère, 1840 (1,157 species)[20]

Phylum 2.2.2.3.3.2.2.3.1 **Onychophora** Grube, 1853 (182 species, †3)[21]

Phylum 2.2.2.3.3.2.2.3.2 **Arthropoda** von Siebold, 1848 (1,242,040 species; †6,182)[22]

Phylum 2.2.2.3.3.2.2.4.1 **Priapulida** Théel, 1906 (19 species)[23]

Phylum 2.2.2.3.3.2.2.4.2 **Loricifera** Kristensen, 1983 (30 species)[24]

Phylum 2.2.2.3.3.2.2.4.3 **Kinorhyncha** Reinhard, 1881 (179 species)[25]

Phylum 2.2.2.3.3.2.3.1.1 **Bryozoa** Ehrenberg, 1831 (10,941 species; of which †5,455)[26]

Phylum 2.2.2.3.3.2.3.1.2.1 **Entoprocta** Nitsche 1869 (169 species)[27]

Phylum 2.2.2.3.3.2.3.1.2.2 **Cycliophora** Funch & Kristensen, 1995 (2 species)[28]

Phylum 2.2.2.3.3.2.3.2.1.1 **Annelida** Lamarck, 1809 (17,210 species)[29]

Phylum 2.2.2.3.3.2.3.2.1.2 **Spincula** Rafinesque, 1814 (1,507 species)[30]

Phylum 2.2.2.3.3.2.3.2.1.3 **Echiura** Newby, 1940 (236 species)[31]

Phylum 2.2.2.3.3.2.3.2.2 **Mollusca** Linnaeus, 1758 (117,358 species)[32]

Phylum 2.2.2.3.3.2.3.2.3 **Nemertea** Schultze, 1851 (1,200 species)[33]

Phylum 2.2.2.3.3.2.3.2.4.1 **Brachiopoda** Duméril, 1806 (443 species)[34]

Phylum 2.2.2.3.3.2.3.2.4.2 **Phoronida** Hatschek, 1888 (10 species)[35]

13. Also as Urochordata. Diversity estimates based on Chapman (2009) with updates.
14. Total for Recent taxa, except for amphibians; (1) 31,958 "fish" species (Eschmeyer & Fong, 2011, this volume); (2) 7,694 species of Amphibia (Blackburn & Wake , 2011; this volume); (3) 5,750 of species of Mammalia (Wilson & Reeder 2011, this volume); (4) 9,990 species of birds (Chapman 2009); (5) 9,413 species of reptiles based on http://www.reptile-database.org/db-info/SpeciesStat.html (1 August update); it should be noted that this database listed 327 species of Testudines, whereas only 317 species of Testudines in Fritz (2011, this volume).
15. Updated from Pawson (2001), who estimated 7,000 living and 13,000 fossil species.
16. Based on Chapman (2009) with updates.
17. Based on Noordijk *et al.* (2010) with updates of 2010 and 2011 new names in Zoological Record.
18. See Hodda (2011, this volume).
19. Based on Poinar (2007) with updates.
20. Guidetti & Bertolani (2011, this volume): Heterotardigrada 444 species, Eutardigrada 712 species, Mesotardigrada 1 species.
21. See Mayer & Oliveira (2011, this volume).
22. See Zhang (2011b, this volume).
23. After Neuhaus, B. (2011). Priapulida. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=101063 on 2011-12-17.
24. Based on Chapman (2009) & Gad (2009a,b).
25. Based on Neuhaus *et al*. (2011).
26. Phil Bock (personal communication, 17 Aug. 2011).
27. Also as Kamptozoa; diversity estimates based on WoRMS (2011) Entoprocta. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1271 on 2011-12-09.
28. Based on Funch & Kristensen (1995), Obst et al. (2006).
29. Based on Chapman (2009) with updates of 2009–2011 new names in Zoological Record.
30. There are recent evidence that this phylum, along with, Echiura and Siboglinidae, is part of Annelida (Struck et al. 2011). Diversity estimate based on WoRMS (2011). Sipuncula. In: Saiz, J. (2011) World Sipuncula database. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1268 on 2011-12-17.
31. Diversity estimates based on WoRMS (2011). Echiura. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1269 on 2011-12-17.
32. Based on Noordijk et al. (2010) with updates of 2010 and 2011 new names in Zoological Record.
33. Based on Chapman (2009).
34. Based on WoRMS (2011). Brachiopoda. In: Emig, C.C. (Ed) (2011). World Brachiopoda database. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=1803 on 2011-12-18.
35. See Emig (2011, this volume).

Phylum 2.2.2.3.3.2.3.3.1 **Gastrotricha** Metschnikoff, 1864 (790 species)[36]

Phylum 2.2.2.3.3.2.3.3.2 **Platyhelminthes** Gegenbaur, 1859 (29,285 species)[37]

Phylum 2.2.2.3.3.2.3.3.3.1 **Gnathostomulida** Riedl, 1969 (109 species)[38]

Phylum 2.2.2.3.3.2.3.3.3.2 **Micrognathozoa** Kristensen & Funch, 2000 (1 species)[39]

Phylum 2.2.2.3.3.2.3.3.3.3.1 **Rotifera** Cuvier, 1817 (1,583 species)[40]

Phylum 2.2.2.3.3.2.3.3.3.3.2 **Acanthocephala** Koelreuther, 1771 (1,194 species, of which †2)[41]

Acknowledgements

I thank all the contributors of this special volume for their collaborative efforts and my colleague Dr Rich Leschen (Landcare Research) for review and comments. The author was supported by the New Zealand Foundation for Research, Science and Technology through backbone funding of the "Defining New Zealand's Land Biota" programme.

References

Blackburn, D.C. & Wake, D.B. (2011) Class Amphibia Gray, 1825. *In*: Zhang, Z.-Q. (Ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 39–55.

Chapman, A.D. (2009) Numbers of living species in Australia and the world. Second edition. – Australian Biodiversity Information Services, Toowoomba.

Daly, M., M.R. Brugler, P. Cartwright, A.G. Collins, M.N. Dawson, S.C. France, C.S. McFadden, D.M. Opresko, E. Rodriguez, S. Romano & J. Stake. (2007) The phylum Cnidaria: A review of phylogenetic patterns and diversity 300 years after Linnaeus. In: Zhang, Z.-Q. & Shear, W.A. (Eds) (2007) Linnaeus Tercentenary: Progress in Invertebrate Taxonomy. *Zootaxa*, 1668, 127–182.

De Queiroz, K. & Gauthier, J. (1994) Toward a phylogenetic system of biological nomenclature. *Trends in Ecology & Evolution*, 9, 27–31.

Dubois, A. (2006) Proposed Rules for the incorporation of nomina of higher-ranked zoological taxa in the International Code of Zoological Nomenclature. 2. The proposed Rules and their rationale. *Zoosystema*, 28, 165–258.

Dubois, A. (2007) Phylogeny, taxonomy and nomenclature: the problem of taxonomic categories and of nomenclatural ranks. *Zootaxa*, 1519, 27–68.

Dunn, C.W., Hejnol, A., Matus, D.Q., Pang, K., Browne, W.E., Smith, S.A., et al. (2008). Broad phylogenomic sampling improves resolution of the animal tree of life. *Nature*, 452, 745–749.

Edgecombe, G.D., Giribet, G., Dunn, C.W., Hejnol, A., Kristensen, R.M., Neves, R.C., Rouse, G.W., Worsaae, K. & Sørensen, M.V. (2011) Higher-level metazoan relationships: recent progress and remaining questions. *Organism Diversity and Evolurion*, 11, 151–172.

Emig, C.C. (2011) Phylum Phoronida Hatschek, 1888. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. Zootaxa, 3148, 230–230.

Eschmeyer, W. & Fong, J. (2011) Pisces. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 26–38.

Evans NM, Holder MT, Barbeitos MS, Okamura B. & Cartwright, P. (2010) The phylogenetic position of Myxozoa: exploring conflicting signals in phylogenomic and ribosomal data sets. Mol Biol Evol. 27(12), 2733–46

Fritz,U. (2011) Order Testudines Batsch, 1788. *In*: Zhang, Z.-Q. (Ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 61–62.

Funch , P. & Kristensen, R.M. (1995).Cycliophora is a new phylum with affinities to Entoprocta and Ectoprocta. *Nature*, 378 (6558), 711–714.

Gad, G. (2009a) A clearly identifiable postlarva in the life cycle of a new species of *Pliciloricus* (Loricifera) from the deep sea of the Angola Basin. *Zootaxa*, 2096, 50–81.

36. Based on Schwank & Bartsch (1990) with updates of new ones described since 1990.
37. Seth Tyler (Personal communication)
38. Based on WoRMS (2011). Gnathostomulida. Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=14262 on 2011-12-17.
39. Based Kristensen & Funch (2000), who originally proposed it as a class.
40. Segers (2011, this volume).
41. Edgecombe *et al.* (2011) subsumed this phylum into Rotifera, however, specialists of Ritifera and Acanthocephala have not yet fully accepted this (Segers 2011 & Monks 2011, this volume). Diversity estimate and classification, see Monks (2011).

Gad, G. (2009b) *Culexiregiloricus*, a new genus of Nanaloricidae (Loricifera) from the deep sea of the Guinea Basin (Southeast Atlantic). *Zootaxa*, 2096, 33–49.
Grimaldi, D. & Engel, M.S. (2005) *Evolution of the Insects*. Cambridge University Press, Cambridge, New York.
Guidetti, R. & Bertolani, R. (2011) Phylum Tardigrada Doyère, 1840. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 96–97.
Hejnol, A., Obst, M., Stamatakis, A., Ott, M., Rouse, G. W., Edgecombe, G. D., et al. (2009). Assessing the root of bilaterian animals with scalable phylogenomic methods. *Proceedings of the Royal Society, Series B*, 276, 4261–4270.
Hennig, W. (1965) Phylogenetic systematics. *Annual Review of Entomology*, 10, 97–116.
Hennig, W. (1966) *Phylogenetic Systematics*, translated by D. Davis and R. Zangerl.: University of Illinois Press, Urbana.
Hodda, M. (2011) Phylum Nematoda Cobb, 1932. *In*: Zhang, Z.-Q. (Ed.) *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 63–95.
Hooper, J.N.A., Van Soest, R.W.M. & Pisera, A. (2011) Phylum Porifera Grant, 1826. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 13–18.
Kristensen, R.M. & Funch, P. (2000) Micrognathozoa: A new class with complicated jaws like those of Rotifera and Gnathostomulida. *Journal of Morphology*, 246, 1–49.
Linnaeus, C. (1758) *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Editio decima, reformata. Tomus* I. Laurentii Salvii, Holmiae, 828 pp.
Lom, J. & Dykova, I. (2006) Myxozoan genera: definition and notes on taxonomy, life-cycle terminology and pathogenic species. *Folia Parasitologica*, 53, 1–36.
Mayer, G. & Oliveira, I.S. (2011) Phylum Onychophora Grube, 1853. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 98–98.
Monks, S. & Richardson, D.J. (2011) Phylum Acanthocephala Kohlreuther, 1771. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 234–237.
Neuhaus, B., Higgins, R.P. & Paavo, B. (2011) Ten Phylum Kinoryncha. *In*: Gordon, D.P. (ed.), New Zealand inventory of biodiversity. Volume 2. Kingdom Animalia. Chaetognatha, Ecdysozoa, ichnofossils. Canterbury University Press, Christchurch, New Zealand, pp. 50–89.
Noordijk, J., van Loon, A.J., Kleukers, R.M.J.C. & Nieukerken, E.J. van (2010) De Nederlandse biodiversiteit. *Nederlandse Fauna*, 10, 1–460.
Obst, M., Funch, P. & Kristensen R.M. (2006) A new species of Cycliophora from the mouthparts of the American lobster, *Homarus americanus* (Nephropidae, Decapoda). *Organisms Diversity and Evolution*, 6 (2), 83–97.
Pape, T., Blagoderov, V. & Mostovski ,M.B. (2011, this volume) Order Diptera Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richnes. *Zootaxa*, 3148, 222-229.
Pawson, D.L. (2007) Phylum Echinodermata. *Zootaxa*, 1668, 749–764.
Philippe, H., Brinkmann, H., Copley, R.R., Moroz, L.L., Nakano, H., Poustka, A.J., Wallberg, A., Peterson, K.J. & Telford, M.J. (2011) Acoelomorph flatworms are deuterostomes related to *Xenoturbella*. *Nature*, 470, 255–258.
Poinar Jr., G. (2008) Global diversity of hairworms (Nematomorpha: Gordiaceae) in freshwater. *Hydrobiologia*, 595 (1), 79–83.
Rasnitsyn, A.P. & Quicke D.L.J. (eds) (2002) *History of Insects.* Kluwer Academic Publishers, Dordrecht, Boston, London, 517 pp.
Schwank, P. & Bartsch, I. (1990) Gastrotricha und Nemertini. *Süßwasserfauna von Mitteleuropa* 3/1+2, 1–258.
Segers, H. (2011) Phylum Rotifera Cuvier, 1817. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 231–233.
Struck, T.H., Paul, C., Hill, N., Hartmann, S., Hösel, C., Kube, M., Lieb, B., Meyer, A., Tiedemann, R., Purschke, G. & Bleidorn, C. (2011) Phylogenomic analyses unravel annelid evolution. *Nature*, 471 (7336), 95–98.
Tyler, S. & Schilling, S. (2011b) Phylum Xenacoelomorpha Philippe, *et al*., 2011. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 24–25.
Wiley, E.O. (1979) An annotated Linnaean hierarchy, with comments on natural taxa and competing systems. *Systematic Zoology*, 28, 308–337.
Wilson, D.E. & Reeder, D.A. (2011) Class Mammalia Linnaeus, 17581. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 56–60.
Zhang, Z.-Q. (2011a) Accelerating biodiversity descriptions and transforming taxonomic publishing: the first decade of Zootaxa. *Zootaxa*, 2896, 1–7.
Zhang, Z.-Q. (2011b) Phylum Arthropoda von Siebold, 1848. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 99–103.
Zrzavy, J., Mihulka, S., Kepka, P., Bezdek, A. & Tietz, D. (1998) Phylogeny of the Metazoa based on morphological and 18S ribosomal DNA evidence. *Cladistics*, 14, 249–285.

Phylum **Porifera** Grant, 1826[1] (4 classes of living species [2], 4 classes of fossil species [3])

Class **Homoscleromorpha** Dendy, 1905 (1 order: no apparent fossil record)

Order **Homosclerophorida** Dendy, 1905 (2 families)

Family **Plakinidae** Schulze, 1880 (5 genera, 68 species)

Family **Oscarellidae** Lendenfeld, 1887 (2 genera, 17 species)

Class **Demospongiae** Sollas, 1885

Living Demospongiae (12 orders, one incertae sedis, and one genus *incertae sedis*)

Order **Spirophorida** Bergquist & Hogg, 1969 (3 families)

Family **Tetillidae** Sollas, 1886 (8 genera, 160 species)

Family **Samidae** Sollas, 1886 (1 genus, 1 species)

Family **Spirasigmidae** Hallmann, 1912 (2 genera, 2 species)

Order **Astrophorida** Sollas, 1888 (6 families)

Family **Ancorinidae** Schmidt, 1870 (15 genera, 303 species)

Family **Calthropellidae** Lendenfeld, 1906 (1 genus, 12 species)

Family **Geodiidae** Gray, 1867 (6 genera, 249 species)

Family **Pachastrellidae** Carter, 1875 (12 genera, 148 species)

Family **Thoosidae** Cockerell, 1925 (4 genera, 30 species)

Family **Thrombidae** Sollas, 1888 (2 genera, 7 species)

Order **Hadromerida** Topsent, 1928 (12 families)

Family **Acanthochaetetidae** Fischer, 1970 (2 genera, 5 species)

Family **Clionaidae** d'Orbigny, 1851 (11 genera, 194 species)

Family **Hemiasterellidae** Lendenfeld, 1889 (6 genera, 37 species)

Family **Placospongiidae** Gray, 1867 (3 genera, 10 species)

Family **Polymastiidae** Gray, 1867 (15 genera, 122 species)

Family **Spirastrellidae** Ridley & Dendy, 1886 (2 genera, 21 species)

Family **Stylocordylidae** Topsent, 1928 (1 genus, 8 species)

Family **Suberitidae** Schmidt, 1870 (11 genera, 218 species)

Family **Tethyidae** Gray, 1867 (14 genera, 119 species)

Family **Timeidae** Topsent, 1928 (1 genus, 53 species)

Family **Trachycladidae** Hallmann, 1917 (2 genera, 8 species)

Order **Chondrosida** Boury-Esnault & Lopès, 1985 (2 families)

Family **Chondrillidae** Schmidt, 1862 (4 genera, 32 species)

Family **Halisarcidae** Vosmaer, 1885 (1 genus, 21 species)

'Order **Lithistida'** (polyphyletic, 13 families + 1 *incertae sedis*)

Family **Azoricidae** Sollas, 1888 (3 genera, 12 species)

---

1. **BY** John N.A. Hooper, Rob W.M. Van Soest & Andrzej Pisera (for full contact details, see **Author names, roles and addresses** after **References**). The title of this contribution should be cited as "Phylum Porifera Grant, 1826. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Living Porifera includes 4 classes, 25 orders, 138 families, 722 genera, and 8,346 species as of 8 December 2012; fossil taxa include 4 classes, 34 orders, 191 families and 1032 genera, with a presently unknown number of described species.

2. **Living species:** The classification of Phylum Porifera follows the revision published in the *Systema Porifera* (Hooper & Van Soest, 2002), with recent additions and emendments published (e.g. Gazave et al. 2011) and online at the *World Porifera Database* (Van Soest et al., 2011).
Only living taxa are recorded in this synopsis, with the fossil fauna still largely unreconciled with the living fauna at higher levels of classification, and also not easily retrievable at the lower levels of classification (Rigby, 2004). Only sponges with a solid calcareous skeleton (Calcarea and some Demospongiae with basal skeletons), articulated skeletons (lithistid sponges), or fused siliceous skeletons (Hexactinosa and Lychniscosa) have a good fossil record. Knowledge of most other groups is rudimentary at best.]

3. **Fossil species:** The classification presented here is modified and simplified from the 2004 Treatise on fossil sponges (Rigby 2004 *in* Finks, Reid and Rigby, 2004). The fossil sponge classification is not concordant with the living sponge classification at higher taxonomic levels, and hence both classifications are presented separately. Moreover, fossil taxa are also not easily retrievable at the lower levels of this palaeontological classification, and consequently only the ordinal level taxonomy is listed here. This listing gives the number of included families and genera indicated for each order, and an indication of the oldest and youngest known representatives of the taxon (although fossil occurrence is usually not continuous).
The sponge fossil record is adequate only for taxa with a solid skeleton (i.e. some of the Class Calcarea, demosponges with a basal calcareous skeleton, 'lithistid' demosponges, Hexactinosa and Lychniscosa hexactinellids). There is a fossil record for the soft-bodied sponge with skeletons composed only of loose spicules but this record is still only poorly studied and also difficult to interpret taxonomically. The fossil record for sponges that have no spicules is even more extremely poor. These latter two categories represent the majority of modern day species and possibly also of extinct species, and hence it can be said that sponges are generally only poorly known from the fossil record. Fossil groups with exclusively calcareous skeletons, such as the Archaeocyatha and Stromatoporoidea—often now regarded as sponges—are not included in this present list because no comprehensive paleontological study is yet available.]

Family **Corallistidae** Sollas, 1888 (5 genera, 33 species)
Family **Desmanthidae** Topsent, 1893 (4 genera, 14 species)
Family **Isoraphinidae** Schrammen, 1924 (1 genus, 2 species)
Family **Macandrewiidae** Schrammen, 1924 (1 genus, 8 species)
Family **Neopeltidae** Sollas, 1888 (4 genera, 15 species)
Family **Phymaraphiniidae** Schrammen, 1924 (3 genera, 5 species)
Family **Phymatellidae** Schrammen, 1924 (3 genera, 9 species)
Family **Pleromidae** Sollas, 1888 (2 genera, 5 species)
Family **Scleritodermidae** Sollas, 1888 (5 genera, 25 species)
Family **Siphonidiidae** Lendenfeld, 1903 (3 genera, 11 species)
Family **Theonellidae** Lendenfeld, 1903 (5 genera, 56 species)
Family **Vetulinidae** Lendenfeld, 1903 (1 genus, 1 species)
'Lithistida' *incertae sedis* (3 genera, 6 species)

Order **Poecilosclerida** Topsent, 1928 (4 suborders)

Suborder **Microcionina** Hajdu, Van Soest & Hooper, 1994 (4 families)
Family **Acarnidae** Dendy, 1922 (13 genera, 121 species)
Family **Microcionidae** Carter, 1875 (9 genera (1 *incertae sedis*), 493 species)
Family **Raspailiidae** Hentschel, 1923 [4] (23 genera (2 *incertae sedis*), 246 species)
Family **Rhabderemiidae** Topsent, 1928 (1 genus, 30 species)

Suborder **Myxillina** Hajdu, Van Soest & Hooper, 1994 (11 families)
Family **Chondropsidae** Carter, 1886 (5 genera, 80 species)
Family **Coelosphaeridae** Hentschel, 1923 (8 genera, 208 species)
Family **Crambeidae** Lévi, 1963 (4 genera, 28 species)
Family **Crellidae** Hentschel, 1923 (5 genera, 77 species)
Family **Dendoricellidae** Hentchel, 1923 (3 genera, 17 species)
Family **Desmacididae** Schmidt, 1873 (2 genera, 13 species)
Family **Hymedesmiidae** Topsent, 1928 (10 genera, 284 species)
Family **Iotrochotidae** Dendy, 1922 (6 genera, 32 species)
Family **Myxillidae** Topsent, 1928 (8 genera, 136 species)
Family **Phellodermidae** Van Soest & Hajdu, 2002 (2 genera, 11 species)
Family **Tedaniidae** Ridley & Dendy, 1886 (3 genera, 84 species)

Suborder **Mycalina** Hajdu, Van Soest & Hooper, 1994 (9 families)
Family **Cladorhizidae** de Laubenfels, 1936 (6 genera, 113 species)
Family **Desmacellidae** Ridley & Dendy, 1886 (6 genera, 110 species)
Family **Esperiopsidae** Hentschel, 1923 (4 genera, 71 species)
Family **Guitarridae** Burton, 1929 (4 genera, 25 species)
Family **Hamacanthidae** Gray, 1872 (2 genera, 27 species)
Family **Isodictyidae** Dendy, 1924 (2 genera, 44 species)
Family **Merliidae** Kirkpatrick, 1908 (1 genus, 4 species)
Family **Mycalidae** Lundbeck, 1905 (2 genera, 245 species)
Family **Podospongiidae** de Laubenfels, 1936 (7 genera, 31 species)

Suborder **Latrunculina** Kelly & Samaai, 2002 (1 family)
Family **Latrunculiidae** Topsent, 1922 (5 genera, 51 species)

Order **Halichondrida** Gray, 1867 (5 families)
Family **Axinellidae** Carter, 1875 (11 genera, 225 species)
Family **Bubaridae** Hentschel, 1914 (4 genera, 27 species)
Family **Dictyonellidae** Van Soest, Diaz & Pomponi, 1990 (10 genera, 101 species)
Family **Halichondriidae** Vosmaer, 1887 (14 genera (3 *incertae sedis*), 290 species)
Family **Heteroxyidae** Dendy, 1905[5] (12 genera (1 *incertae sedis*), 63 species)

Order **Agelasida** Hartman, 1980 (2 families)

4. Hooper & van Soest (2002) list Sollasellidae Lendenfeld (1887) with single genus *Sollasella* Lendenfeld (1888) as a family of Hadromerida, but subsequent studies (van Soest et al. 2006; Erpenbeck et al. 2007) identified this as a genus of Raspailiidae
5. Hooper (2002) lists Family Desmoxyidae Hallmann, 1917 as the valid name for this taxon, but Dendy's earlier name Heteroxyidae takes prorioty (Van Soest & Hooper, 2005)

Family **Agelasidae** Lister, 1900 (1 genus, 35 species)
Family **Astroscleridae** Verril, 1907 (5 genera, 7 species)
Order **Haplosclerida** Topsent, 1928 (3 suborders)
Suborder **Haplosclerina** Topsent, 1928 (3 families)
Family **Callyspongiidae** de Laubenfels, 1936 (4 genera, 214 species)
Family **Chalinidae** Gray, 1867 (6 genera (1 *incertae sedis*), 478 species).
Family **Niphatidae** Van Soest, 1980 (9 genera, 157 species)
Suborder **Petrosina** Boury-Esnault & Van Beveren, 1982 (3 families)
Family **Phloeodictyidae** Carter, 1882 (5 genera, 122 species)
Family **Petrosiidae** Van Soest 1980 (4 genera, 125 species)
Family **Calcifibrospongiidae** Hartman, 1979 (1 genus, 1 species)
Suborder **Spongillina** Manconi & Pronzato, 2002 (6 families of living sponges, + 1 *incertae sedis*)
Family **Lubomirskiidae** Rezvoi, 1936 (4 genera, 11 species)
Family **Malawispongiidae** Manconi & Pronzato, 2002 (5 genera, 6 species)
Family **Metaniidae** Volkmer-Ribeiro, 1986 (5 genera, 27 species)
Family **Metschnikowiidae** Czerniawsky, 1880 (1 genus, 1 species)
Family **Potamolepidae** Brien, 1967 (6 genera, 31 species)
Family **Spongillidae** Gray, 1867 (24 genera, 173 species)
Spongillina *incertae sedis* (4 genera, 4 species)
Order **Dictyoceratida** Minchin, 1900 (5 families)
Family **Ircinidae** Gray, 1867 (3 genera, 110 species)
Family **Thorectidae** Bergquist, 1978 (24 genera, 167 species)
Family **Spongiidae** Gray, 1867 (7 genera (1 *incertae sedis*), 182 species).
Family **Dysideidae** Gray, 1867 (6 genera (1 *incertae sedis*), 90 species)
Family **Verticillitidae** Steinmann, 1882 [6] (Living fauna has 1 genus, 1 species)
Order **Dendroceratida** Minchin, 1900 (2 families)
Family **Darwinellidae** Merejkowsky, 1879 (4 genera, 45 species)
Family **Dictyodendrillidae** Bergquist, 1980 (4 genera, 26 species)
Order **Verongida** Bergquist, 1978 (4 families)
Family **Aplysinellidae** Bergquist, 1980 (3 genera, 14 species)
Family **Aplysinidae** Carter, 1875 (3 genera, 54 species)
Family **Ianthellidae** Hyatt, 1875 (3 genera, 19 species)
Family **Pseudoceratinidae** Carter, 1885 (1 genus, 6 species)
Demospongiae *incertae sedis* (1 genus, 1 species (*Myceliospongia*))
Fossil Demospongiae (4 subclasses, 22 orders, 9 suborders)
Subclass **Clavaxinellida** Levi 1956 Cryogenian - Holocene
Order **Protomonaxonida** Finks and Rigby 2004 Cryogenian-Holocene (14 familes, 39 genera)
Order **Hadromerida** Topsent, 1928 [7] Ordovician-Holocene (4 families, 15 genera)
Subclass **Choristida** Sollas 1880 Ordovician - Holocene
Order **Plakinida** Reid 1968, Lower Cretaceous- Holocene (3 families, 5 genera)
Order **Pachastrellida** Reid, 2004, Carboniferous –Holocene (3 families, 13 genera)
Order **Ancorinida** Reid 1968 Carboniferous –Holocene (3 families, 19 genera)
Order **Craniellida** Reid 1968, Upper Cretaceous – Holocene (1 family, 2 genera)
Order ***incertae sedis*** (3 families, 13 genera, Jurassic to Neogene)
Subclass **Tetractinomorpha** Levi, 1953 Ordovician - Holocene
Order **Streptosclerophorida** Dendy, 1924 Middle Ordovician –Holocene
Suborder **Eutaxicladina** Rauff, 1894 Middle Ordovician – Permian (1 family, 13 genera)
Order **Hadromerida** Topsent 1898, Permian – Holocene (3 families, 17 genera)
Subclass **Ceractinomorpha** Levi, 1953 Cambrian - Holocene
Order **Dictyoceratida** Minchin 1900 Lower Jurassic – Holocene (2 families, 5 genera)

6. Up until 2007 the genus *Vaceletia* (with a single Recent species) was included in the otherwise exclusive fossil Order Verticillitida Termier et al., 1997, previously allocated to a 'Class Sphinctozoa' Steinmann, 1882 (polyphyletic). Recent molecular evidence shows the living species is a member of the Dictoceratida (Wörheide, 2008).
7. Palaeontological authors also use the taxon 'Order Clavulina Vosmaer, 1887' for this clade.

Order **Verongida** Baerquist, 1978 Middle Cambrian – Holocene (2 families, 3 genera)
Order **Halichondrida** 1898, Paleogene – Holocene (1 family, 1 genus)
Order **Poecilosclerida** Topsent, 1928 Cretaceous- Holocene (6 families, 16 species)
Order **Haplosclerida** Topsent, 1898 Jurassic- Holocene (4 families, 18 species)
Order **Agelasida** Verrill 1907 Ordovician – Triassic (25 families, 145 species)
Order **Vaceletida** Finks and Rigby 2004 Lower Cambrian – Triassic (8 families, 51 species)
Order **Sigmatosclerophorida** Burton, 1956 [8] Ordovician –Holocene (1 family, 4 genera)
Subclass **Lithistida** Schmidt, 1870 Cambrian- Holocene
Order **Orchocladina** Rauff, 1895 Middle Cambrian-Permian (5 families, 114 genera)
Order **Tetralithistida** Lagneau-Herenger 1962 Upper Triassic- Holocene
Suborder **Tetracladina** Zittel 1878 Upper Triassic – Holocene (8 families 70 genera)
Suborder **Dicranocladina** Schrammen 1924 Upper Jurassic-Holocene (2 families, 16 species)
Suborder **Pseudorhizomorina** Schrammen, 1901 Cretaceous-Holocene (2 families, 2 genera)
Suborder **Didymorina** Rauff, 1893 Middle-Upper Jurassic (1 family, 5 species)
Order **Megalithistida** Reid, 2004 Lower Ordovician –Holocene
Suborder **Helomorina** Schrammen 1924 Upper Jurassic- Upper Cretaceous (1 family, 6 species)
Suborder **Megamorina** Zittel, 1878 Lower Ordovician-Holocene (4 families, 22 genera)
Order **Axinellida** Berquist 1967 Permian-Holocene (1 family, 1 species)
Order **Monalithistida** Lagneau-Herenger 1955 Lower Jurassic -Holocene
Suborder **Megarhizomorina** Schrammen 1924 Upper Cretaceous
Suborder **Sphaerocladina** Schrammen, 1910 Lower Jurassic-Holocene (2 families, 16 genera)
Order **Spirosclerophorida** Reid, 1963 Middle Cambrian-Holocene
Suborder **Rhizomorina** (10 families, 114 genera)
Class **Calcarea** Bowerbank, 1864
Living Calcarea (2 subclasses)
Subclass **Calcinea** Bidder, 1898 (2 orders)
Order **Clathrinida** Hartman, 1958 (6 families, +1 *incertae sedis*)
Family **Clathrinidae** Minchin, 1900 (2 genera, 86 species)
Family **Leucaltidae** Dendy & Row, 1913 (4 genera, 18 species)
Family **Leucascidae** Dendy, 1893 (2 genera, 16 species)
Family **Leucettidae** de Laubenfels, 1936 (2 genera, 24 species)
Family **Soleneiscidae** Borojevic, Boury-Esnault & Vacelet, 1990 (2 genera, 13 species)
Family **Levinellidae** Borojevic & Boury-Esnault, 1986 (3 genera, 4 species)
Clathrinida *incertae sedis* (1 genus (*Leucomalthe*), 1 species)
Order **Murrayonida** Vacelet, 1981 (3 families)
Family **Lelapiellidae** Borojevic, Boury-Esnault & Vacelet, 1990 (1 genus, 2 species)
Family **Murrayonidae** Dendy & Row, 1913 (1 genus, 1 species)
Family **Paramurrayonidae** Vacelet, 1967 (1 genus, 1 species)
Subclass **Calcaronea** Bidder, 1898 (3 orders)
Order **Leucosolenida** Hartman, 1958 (9 families)
Family **Leucosoleniidae** Minchin, 1898 (3 genera, 47 species)
Family **Amphoriscidae** Dendy, 1892 (3 genera, 33 species)
Family **Grantiidae** Dendy, 1892 (11 genera, 208 species)
Family **Heteropiidae** Dendy, 1893 (7 genera, 65 species)
Family **Lelapiidae** Dendy & Row, 1913 (5 genera, 8 species)
Family **Sycettidae** Dendy, 1892 (2 genera, 94 species)
Family **Jenkinidae** Borojevic, Boury-Esnault & Vacelet, 2000 (6 genera, 11 species)
Family **Achramorphidae** Borojevic, Boury-Esnault, Manuel & Vacelet, 2002 [9] (2 genera, 10 species)
Family **Sycanthidae** Lendenfeld, 1891 (2 genera, 4 species)
Order **Lithonida** Vacelet, 1981 (2 families)

8. This taxon is considered by neontological authors to contain ancestors of the Recent Haplosclerida and Poecilosclerida, and as such is possibly artificial
9. Family Staurorrhaphidae Jenkin, 1908 was previously used as the valid name for this taxon but was determined to be a *nomen nudum* (Van Soest, 2010)

Family **Minchinellidae** Dendy & Row, 1913 (5 genera, 19 species)
Family **Petrobionidae** Borojevic, 1979 (1 genus, 1 species)
Order **Baerida** Borojevic, Boury-Esnault & Vacelet, 2000 (3 families)
Family **Baeriidae** Borojevic, Boury-Esnault & Vacelet, 2000 (4 genera, 12 species)
Family **Trichogypsiidae** Borojevic, Boury-Esnault & Vacelet, 2000 (3 genera, 5 species)
Family **Lepidoleuconidae** Vacelet, 1967 (1 genus, 1 species)
Fossil species of Calcarea: Lower Cambrian – Holocene (1 subclass, 4 orders)
Subclass **Calcaronea** Bidder 1898 Lower Carboniferous - Holocene
Order **Sycettida** Bidder 1898 Carboniferous – Holocene (2 families, 4 genera)
Order **Stellispongiida** Finks and Rigby, 2004 Permian – Holocene (2 families, 30 genera)
Order **Sphaerocoeliida** Vacelet 1967 Permian – Cretaceous (1 family, 5 genera)
Order **Lithonida** Doederlein 1892 Jurassic – Holocene (1 family, 10 genera)
Class **Hexactinellida** Schmidt, 1870
Living Hexactinellida (2 subclasses)
Subclass **Amphidiscophora** Schulze, 1886 (1 order)
Order **Amphidiscosida** Schrammen, 1924 (3 families)
Family **Hyalonematidae** Gray, 1857 (5 genera, 129 species)
Family **Monorhaphididae** Ijima, 1927 (1 genus, 1 species)
Family **Pheronematidae** Gray, 1870 (6 genera, 45 species)
Subclass **Hexasterophora** Schulze, 1886 (5 orders)
Order **Hexactinosida** Schrammen, 1903 (8 families, + 1 *incertae sedis*)
Family **Aphrocallistidae** Gray, 1867 (2 genera, 12 species)
Family Auloplacidae Schrammen, 1912 (1 genus, 4 species)
Family **Craticulariidae** Rauff, 1893 (1 genus, 1 species)
Family **Cribrospongiidae** Roemer, 1864 (1 genus, 1 species)
Family **Dactylocalycidae** Gray, 1867 (2 genera, 7 species)
Family **Euretidae** Zittel, 1877 (17 genera, 67 species)
Family **Farreidae** Gray, 1872 (6 genera, 61 species)
Family **Tretodictyidae** Schulze, 1886 (8 genera, 30 species)
Hexactinosida *incertae sedis* (4 genera, 4 species)
Order **Aulocalycoida** Tabachnick & Reiswig, 2000 (2 families)
Family **Aulocalycidae** Ijima, 1927 (6 genera, 8 species)
Family **Uncinateridae** Reiswig, 2002 (2 genera, 3 species)
Order **Fieldingida** Tabachnick & Janussen, 2004 (1 family)
Family **Fieldingiidae** Tabachnick & Janussen, 2004 [10] (1 genus, 4 species)
Order **Lychniscosida** Schrammen, 1903 (2 families)
Family **Aulocystidae** Schulze, 1886 (2 genera, 6 species)
Family **Diapleuridae** Ijima, 1927 (1 genus, 3 species)
Order **Lyssacinosida** Zittel, 1877 (3 families)
Family **Euplectellidae** Gray, 1867 (27 genera, 99 species)
Family **Leucopsacidae** Ijima, 1903 (5 genera, 12 species)
Family **Rossellidae** Gray, 1872 (22 genera, 192 species)
Fossil Hexactinellida: Lower Cambrian – Holocene (2 subclasses, 6 orders)
Subclass **Amphidiscophora** Schulze, 1887 Lower Cambrian –Holocene
Order **Amphidiscosa** Schrammen 1924 Lower Cambrian- Holocene (4 families, 41 genera)
Order **Reticulosa** Reid, 1958 Ediacaran – Holocene (12 families 118 genera)
Order **Hemidiscosa** Schrammen, 1924 Carboniferous (1 family, 1 genus)
Subclass **Hexasterophora** Schulze 1887 Ordovician – Holocene
Order **Lyssacinosa** Zittel 1877 (12 families, 36 genera)
Order **Hexactinosa** Schrammen 1903 Upper Ordovician- Holocene (18 families, 134 genera)
Order **Lycniscosa** Schrammen, 1903 Jurassic- Holocene (10 families, 81 genera)
Class **Heteractinida** de Laubenfels, 1955 Lower Cambrian- Permian (2 orders, fossil species only)

10. This order and family were newly erected by Tabachnick *et al.* 2004 for the genus *Fieldingia* which was previously assigned to Hexactinosida *incertae sedis*

Order **Octactinellida** Hinde, 1887 (4 families, 32 genera)

Order **Hetairacyathida** Bedford and Bedford 1937 Lower Cambrian (1 family, 4 genera)

Fossil Porifera incertae sedis: (3 families, 46 genera)

Cited References

Erpenbeck, D.; Hooper, J.N.A.; List-Armitage, S.E.; Degnan, B.M.; Wörheide, G. & van Soest, R.W.M. (2007) Affinities of the family Sollasellidae (Porifera, Demospongiae). II. Molecular evidence. *Contributions to Zoology*, 76 (2), 95–102.

Gazave, E., Lapébie, P., Renard, E., Vacelet, J., Rocher,C., V. Ereskovsky, A., Lavrov, D. & Borchiellini, C. 2010. Molecular Phylogeny Restores the Supra-Generic Subdivision of Homoscleromorph Sponges (Porifera, Homoscleromorpha). *PLoS ONE*, 5(12), e14290.

Hooper, J.N.A. (2002) Family Desmoxyidae Hallmann, 1916. *In*: Hooper, J. N. A. & Van Soest, R. W. M. (ed.) *Systema Porifera. A guide to the classification of sponges*. Vol. 1 (Kluwer Academic/ Plenum Publishers: New York, Boston, Dordrecht, London, Moscow), pp. 755–772.

Hooper, J.N.A. & Van Soest, R.W.M. (eds) (2002) *Systema Porifera. A guide to the classification of sponges*. Vols 1-2 (Kluwer Academic/ Plenum Publishers: New York, Boston, Dordrecht, London, Moscow).

Rigby, J.K. (2004). Classification *in* Finks, R.M., Reid, R.E.H. & Rigby, J.K. (2004) *Treatise on Invertebrate Paleontology*, Part E Porifera (revised). Volume 3 pp. 1–8. (Geological Society of America and University of Kansas Press: New York & Lawrence, Kansas)

Tabachnick, K.R.; Janussen, D. 2004. Description of a new species and subspecies of *Fieldingia*, erection of a new family Fieldingidae and a new order Fieldingida (Porifera; Hexactinellida; Hexasterophora). In: Pansini, M.; Pronzato, R.; Bavestrello, G.; Manconi, R. (eds). Sponge science in the new millenium. *Bollettino dei Musei e degli Istituti Biologici dell' Universita di Genova*, 68, 623–637.

Van Soest, R.W.M. (2010). Staurorrhaphidae. In: Van Soest, R.W.M, Boury-Esnault, N., Hooper, J.N.A., Rützler, K, de Voogd, N.J., Alvarez, B., Hajdu, E., Pisera, A.B., Vacelet, J., Manconi, R., Schoenberg, C., Janussen, D., Tabachnick, K.R., Klautau, M. (2008). *World Porifera database*. Available online at http://www.marinespecies.org/porifera. Consulted on 2010-10-08)]

Van Soest, R.W.M, Boury-Esnault, N., Hooper, J.N.A., Rützler, K, de Voogd, N.J., Alvarez, B., Hajdu, E., Pisera, A.B., Vacelet, J., Manconi, R., Schoenberg, C., Janussen, D., Tabachnick, K.R., Klautau, M. (2008) *World Porifera database*. Available online at http://www.marinespecies.org/porifera. Consulted on 2010-10-08.

Van Soest, R.W.M. & Hooper, J.N.A. (2005) Resurrection of *Desmoxya* (Porifera: Halichondrida), with the description of a new species from Rockall Bank bathyal coral reefs, North Atlantic. *Journal of the Marine Biological Association UK*, 85, 1367–1371.

Van Soest, R.W.M.; Hooper, J.N.A.; Beglinger, E.J.; Erpenbeck, D. 2006. Affinities of the family Sollasellidae (Porifera, Demospongiae). I. Morphological evidence. *Contributions to Zoology*, 75 (3/4), 133–144.

Wörheide, G. (2008) A hypercalcified sponge with soft relatives: *Vaceletia* is a keratose demosponge. *Molecular Phylogenetics and Evolution*, 47(1), 433–438.

Author names, roles and addresses

John N.A. Hooper (Porifera), Queensland Museum, PO Box 3300, South Brisbane 4101, Queensland Australia john.hooper@qm.qld.gov.au

Rob W.M. Van Soest (Porifera), Netherlands Centre for Biodiversity Naturalis, Department of Marine Zoology, P.O.Box 9517 2300 RA Leiden, The Netherlands; rob.vansoest@ncbnaturalis.nl

Andrzej Pisera (fossil Porifera), Institute of Paleobiology, Polish Academy of Sciences, Ul. Twarda 51/55, 00-818 Warszawa, Poland apis@twarda.pan.pl

Class **Anthozoa** Ehrenberg, 1834[1] (2 subclasses)[2]
Subclass **Hexacorallia** Haeckel, 1866 (6 orders)
Order **Actiniaria** Hertwig, 1882 (3 suborders)[3]
Suborder **Endocoelantheae** Carlgren, 1925 (2 families)
Family **Actinernidae** Stephenson, 1922 (4 genera, 7 species)
Family **Halcuriidae** Carlgren, 1918 (2 genera, 10 species)
Suborder **Nynantheae** Carlgren, 1899 (3 infraorders)
Infraorder **Boloceroidaria** Carlgren, 1924 (2 families)
Family **Boloceroididae** Carlgren, 1924 (3 genera, 9 species)
Family **Nevadneidae** Carlgren, 1925 (1 genus, 1 species)
Infraorder **Thenaria** Carlgren, 1899
Acontiaria (14 families)
Family **Acontiophoridae** Carlgren, 1938 (3 genera, 5 species)
Family **Aiptasiidae** Carlgren, 1924 (6 genera, 26 species)
Family **Aiptasiomorphidae** Carlgren, 1949 (1 genus, 4 species)
Family **Antipodactinidae** Rodríguez, López-González, & Daly, 2009 (1 genus, 2 species)[4]
Family **Bathyphelliidae** Carlgren, 1932 (5 genera, 9 species)
Family **Diadumenidae** Stephenson, 1920 (1 genus, 9 species)
Family **Haliplanellidae** Hand, 1956 (1 genus, 1 species)[5]
Family **Hormathiidae** Carlgren, 1932 (20 genera, 131 species)
Family **Isophelliidae** Stephenson, 1935 (7 genera, 46 species)
Family **Kadosactinidae** Riemann-Zürneck, 1991 (2 genera, 6 species)
Family **Metridiidae** Carlgren, 1893 (2 genera, 7 species)
Family **Nemanthidae** Carlgren, 1940 (1 genus, 3 species)
Family **Sagartiidae** Gosse, 1858 (17 genera, 105 species)
Family **Sagartiomorphidae** Carlgren, 1934 (1 genus, 1 species)
incertae sedis (3 genera, 5 species)
Endomyaria (13 families)
Family **Actiniidae** Rafinesque, 1815 (55 genera, 328 species)
Family **Actinodendridae** Haddon, 1898 (3 genera, 9 species)
Family **Aliciidae** Duerden, 1895 (4 genera, 11 species)
Family **Capneidae** Gosse, 1860 (2 genera, 6 species)
Family **Condylanthidae**, Stephenson, 1922 (6 genera, 8 species)
Family **Homostichanthidae** Carlgren, 1900 (1 genus, 1 species)
Family **Iosactinidae** Riemann-Zürneck, 1997 (1 genus, 1 species)
Family **Liponematidae** Hertwig, 1882 (2 genera, 4 species)
Family **Phymanthidae** Andres, 1883 (2 genera, 13 species)
Family **Preactinidae** England in England & Robson, 1984 (2 genera, 2 species)
Family **Ptychodactinidae** Appellöf, 1893 (1 genus, 2 species)
Family **Stichodactylidae** Andres, 1883 (2 genera, 9 species)
Family **Thalassianthidae** Milne-Edwards, 1857 (4 genera, 8 species)
incertae sedis (12 genera, 38 species)
Mesomyaria (4 families)
Family **Actinoscyphiidae** Stephenson, 1920 (8 genera, 13 species)
Family **Actinostolidae** Carlgren, 1893 (19 genera, 68 species)
Family **Exocoelactiidae** Carlgren, 1925 (1 genus, 2 species)
Family **Isanthidae** Carlgren, 1938 (6 genera, 9 species)
Infraorder **Athenaria** Carlgren, 1899 (11 families)
Family **Andresiidae** Stephenson, 1922 (1 genus, 1 species)

1. **BY** Andrea L. Crowther (for full contact information, see **Author name and address** after **Cited references**). The title of this contribution should be cited as "Class Anthozoa Ehrenberg, 1834. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Anthozoa includes approximately 2 subclasses, 9 orders, 143 families, 954 genera and 6,142 species
2. Daly *et al.* (2007). Please refer to Daly et al. (2007) for a more complete discussion and list of references.
3. Fautin (2011a).
4. Rodríguez *et al.* (2009).
5. Fautin *et al.* (2009) [note: ICZN case 3493 pending to conserve *Haliplanella* Hand, 1953 (Actiniaria) over *Haliplanella* Treadwell, 1943 (Polychaeta). Haliplanellidae has 2 genera, 2 species.]

Family **Andvakiidae** Danielssen, 1890 (3 genera, 10 species)
Family **Edwardsiidae** Andres, 1881 (11 genera, 87 species)
Family **Galatheanthemidae** Carlgren, 1956 (1 genus, 2 species)
Family **Halcampidae** Andres, 1883 (8 genera, 23 species)
Family **Halcampoididae** Appellöf, 1896 (8 genera, 14 species)
Family **Haliactinidae** Carlgren, 1949 (6 genera, 8 species)
Family **Haloclavidae** Verrill, 1899 (11 genera, 32 species)
Family **Limnactiniidae** Carlgren, 1921 (1 genus, 2 species)
Family **Octineonidae** Fowler, 1894 (1 genus, 3 species)
Family **Polyopidae** Hertwig, 1882 (2 genera, 2 species)

Suborder **Protantheae** Carlgren, 1899 (1 family)
Family **Gonactiniidae** Carlgren, 1893 (2 genera, 2 species)

incertae sedis (13 genera, 15 species)

Order **Antipatharia** Milne-Edwards & Haime, 1857 (7 families)[6]
Family **Antipathidae** Ehrenberg, 1834 (8 genera, 141 species)
Family **Aphanipathidae** Opresko, 2004 (9 genera, 22 species)
Family **Cladopathidae** Kinoshita, 1910 (6 genera, 18 species)
Family **Leiopathidae** Haeckel, 1896 (1 genus, 6 species)
Family **Myriopathidae** Opresko, 2001 (5 genera, 33 species)
Family **Schizopathidae** Brook, 1889 (11 genera, 41 species)
Family **Stylopathidae** Opresko, 2006 (3 genera, 9 species)

Order **Ceriantharia** Perrier, 1883 (2 suborders)[7]

Suborder **Penicilaria** Hartog, 1977 (1 family)
Family **Arachnanthidae** McMurrich, 1910 (10 genera, 38 species)

Suborder **Spirularia** Hartog, 1977 (2 families)
Family **Botrucnidiferidae** Carlgren, 1912 (11 genera, 28 species)
Family **Cerianthidae** Milne-Edwards & Haime, 1852 (19 genera, 75 species)

Order **Corallimorpharia** Carlgren, 1940 (4 families)
Family **Corallimorphidae** Hertwig, 1882 (2 genera, 22 species)[8]
Family **Discosomatidae** Duchassaing & Michelotti, 1864 (4 genera, 20 species)
Family **Ricordeidae** Watzl, 1922 (1 genus, 2 species)
Family **Sideractiidae** Danielssen, 1890 (2 genera, 2 species)

Order **Scleractinia** Bourne, 1900 (27 families)[9]
Family **Acroporidae** Verrill 1902 (7 genera, 244 species)[10]
Family **Agariciidae** Gray, 1847 (6 genera, 43 species)
Family **Anthemiphylliidae** Vaughan 1907 (1 genus, 7 species)
Family **Astrocoeniidae** Koby, 1890 (2 genera, 4 species)
Family **Caryophylliidae** Gray, 1846 (43 genera, 294 species)
Family **Dendrophylliidae** Gray, 1847 (18 genera, 152 species)
Family **Euphyllidae** Veron, 2000 (4 genera, 13 species)
Family **Faviidae** Gregory, 1900 (23 genera, 125 species)
Family **Flabellidae** Bourne, 1905 (10 genera, 98 species)
Family **Fungiacyathidae** Chevalier, 1987 (1 genus, 20 species)
Family **Fungiidae** Dana, 1846 (11 genera, 43 species)
Family **Gardineriidae** Stolarski, 1996 (2 genera, 6 species)
Family **Guyniidae** Hickson, 1910 (1 genus, 1 species)
Family **Meandrinidae** Gray, 1847 (4 genera, 5 species)
Family **Merulinidae** Verrill, 1866 (5 genera, 12 species)
Family **Micrabaciidae** Vaughan, 1905 (4 genera, 13 species)
Family **Mussidae** Ortmann, 1890 (14 genera, 50 species)
Family **Oculinidae** Gray, 1847 (6 genera, 14 species)
Family **Pectiniidae** Vaughan & Wells, 1943 (6 genera, 28 species)
Family **Pocilloporidae** Gray, 1842 (1 genus, 8 species)

6. Opresko (2001, 2002, 2003, 2004, 2006).
7. pers. comm. Tina N. Molodtsova.
8. Fautin (2011b).
9. Cairns *et al.* (1999); Veron (2000a,b,c); Cairns (2009).
10. Wallace (1999); *Isopora* elevated by Wallace *et al.* (2007); *Alveopora* elevated by Dai & Horng (2009); Wallace *et al.* (2011).

Family **Poritidae** Gray, 1842 (5 genera, 92 species)
Family **Rhizangiidae** D'Orbigny, 1851 (4 genera, 32 species)
Family **Schizocyathidae** Stolarski, 2000 (3 genera, 3 species)
Family **Siderastreidae** Vaughan & Wells, 1943 (6 genera, 28 species)
Family **Stenocyathidae** Stolarski, 2000 (3 genera, 3 species)
Family **Trachyphylliidae** Verrill, 1901 (1 genus, 1 species)
Family **Turbinoliidae** Milne-Edwards & Haime, 1848 (23 genera, 57 species)

Order **Zoanthidea** (2 suborders)[11]

Suborder **Brachycnemina** Haddon and Shackleton, 1891 (3 families)
Family **Neozoanthidae** Herberts, 1972 (1 genus, 1 species)
Family **Sphenopidae** Hertwig, 1882 (2 genera, 42 species)
Family **Zoanthidae** Gray, 1840 (3 genera, 45 species)

Suborder **Macrocnemina** Haddon & Shackleton, 1891 (4 families)
Family **Epizoanthidae** Delage & Hérouard, 1901 (1 valid genus, 2 genera inquirenda, 43 valid species, 3 species inquirenda)
Family **Hydrozoanthidae** Sinniger, Reimer & Pawlowski, 2010 (2 genera, 5 species)[12]
Family **Microzoanthidae** Fujii & Reimer, 2011 (1 genus, 2 species)[13]
Family **Parazoanthidae** Delage & Hérouard, 1901 (6 genera, 29 species)[14]

incertae sedis (1 family)
Family **Abyssoanthidae** Reimer & Fugiwara, 2007 in Reimer *et al.* 2007 (1 genus, 2 species)[15]

Subclass **Octocorallia** (3 orders)[16]

Order **Alcyonacea** Lamouroux, 1816 (31 families)

Section **Protoalcyonaria** (2 families)
Family **Haimeidae** Wright, 1865 (2 genera, 2 species)
Family **Taiaroidae** Bayer & Muzik, 1976 (1 genus, 1 species)

Section **Alcyoniina** (5 families)
Family **Alcyoniidae** Lamouroux, 1812 (36 genera, 465 species)
Family **Nephtheidae** Gray, 1862 (20 genera, ~500 species)
Family **Nidaliidae** Gray, 1869 (8 genera, 89 species)
Family **Paralcyoniidae** Gray, 1869 (5 genera, 13 species)
Family **Xeniidae** Ehrenberg, 1828 (16 genera, 137 species)

Suborder **Calcaxonia** Grasshoff, 1999 (6 families)
Family **Chrysogorgiidae** Verrill, 1883 (14 genera, 92 species)
Family **Dendrobrachiidae** Brook, 1889 (1 genus, 3 species)
Family **Ellisellidae** Gray, 1859 (10 genera, ~100 species)
Family **Ifalukellidae** Bayer, 1955 (2 genera, 6 species)
Family **Isididae** Lamouroux, 1812 (38 genera, 135 species)
Family **Primnoidae** Milne Edwards, 1857 (37 genera, 210 species)[17]

Suborder **Holaxonia** (5 families)
Family **Acanthoaxiidae** van Ofwegen & McFadden, 2010 (1 genus, 1 species)[18]
Family **Acanthogorgiidae** Gray, 1859 (5 genera, 110 species)
Family **Gorgoniidae** Lamouroux, 1812 (15 genera, 260 species)
Family **Keroeididae** Kinoshita, 1910 (5 genera, 13 species)
Family **Plexauridae** Gray, 1859 (42 genera, 370 species)

Suborder **Scleraxonia** Studer, 1887 (7 families)
Family **Anthothelidae** Broch, 1916 (14 genera, 55 species)
Family **Briareidae** Gray, 1859 (2 genera, 10 species)
Family **Coralliidae** Lamouroux, 1812 (3 genera, 30 species)
Family **Melithaeidae** Gray, 1870 (6 genera, 104 species)
Family **Paragorgiidae** Kukenthal, 1916 (2 genera, 17 species)

11. pers. comm. James D. Reimer.
12. Sinniger *et al.* (2010); Reimer & Fujii (2010).
13. Fujii & Reimer (2011).
14. Sinniger *et al.* (2010).
15. Reimer *et al.* (2007).
16. Williams & Cairns (2009); pers. comm. Catherine S. McFadden.
17. Carins & Bayer (2009).
18. van Ofwegen & McFadden (2010).

Family **Parisididae** Aurivillius, 1931 (1 genus, 5 species)
Family **Subergorgiidae** Gray, 1859 (3 genera, 6 species)
Section **Stolonifera** Thomson & Simpson, 1909 (6 families)
Family **Acrossotidae** Bourne, 1914 (1 genus, 1 species)
Family **Clavulariidae** Hickson, 1894 (21 genera, 60 species)
Family **Coelogorgiidae** Bourne, 1900 (1 genus, 1 species)
Family **Cornulariidae** Dana, 1846 (1 genus, 4 species)
Family **Pseudogorgiidae** Utinomi & Harada, 1973 (1 genus, 1 species)
Family **Tubiporidae** Ehrenberg, 1828 (1 genus, 1 (or more) species)
Order **Helioporacea** Bock, 1938 (2 families)[19]
Family **Helioporidae** Moseley, 1876 (1 genus, 1 species)
Family **Lithotelestidae** Bayer & Muzik, 1977 (1 genus, 4 species)
Order **Pennatulacea** Verrill, 1865 (14 families)[20]
Family **Anthoptilidae** Kölliker, 1880 (1 genus, 2 species)
Family **Chunellidae** Kükenthal, 1902 (2 genera, 4 species)
Family **Echinoptilidae** Hubrecht, 1885 (2 genera, 7 species)
Family **Funiculinidae** Gray, 1870 (1 genus, 3 species)
Family **Halipteridae** Williams, 1995 (1 genus, 6 species)
Family **Kophobelemnidae** Gray, 1860 (3 genera, 18 species)
Family **Pennatulidae** Ehrenberg, 1834 (6 genera, 50 species)
Family **Protoptilidae** Kölliker, 1872 (2 genera, 7 species)
Family **Renillidae** Gray, 1870 (1 genus, 4 species)
Family **Scleroptilidae** Jungersen, 1904 (2 genera, 4 species)
Family **Stachyptilidae** Kölliker, 1880 (2 genera, 4 species)
Family **Umbellulidae** Kölliker, 1880 (1 genus, 9 species)
Family **Veretillidae** Herklots, 1858 (5 genera, 35 species)
Family **Virgulariidae** Verrill, 1868 (5 genera, 40 species)

Acknowledgments

I thank the following people for their invaluable assistance in compiling this list: Stephen D. Cairns, Daphne G. Fautin, Bert W. Hoeksema, Catherine S. McFadden, Tina N. Molodtsova, Dennis M. Opresko, James D. Reimer, & Carden C. Wallace.

Cited references

Bayer, F.M. (1981) Key to the genera of Octocorallia exclusive of Pennatulacea (Coelenterata: Anthozoa) with diagnoses of new taxa. *Proceedings of the Biological Society of Washington*, 94, 902–947.

Cairns, S.D. (2009) *In:* Roberts, J. M. (ed.) *Cold-water corals: the biology and geology of deep-sea coral habitats*. Cambridge University Press, New York, 334 pp.

Carins, S.D. & Bayer, F. M. (2009). A generic revision and phylogenetic analysis of the Primnoidae (Cnidaria: Octocorallia). *Smithsonian Contributions to Zoology*, 629, 1–79.

Cairns, S.D., Hoeksema, B.W. & Van der Land, J. (1999). Appendix: List of extant stony corals. *Atoll Research Bulletin*, 459, 13–46.

Dai, C.-F. & Horng, S. (2009) *Scleractinia Fauna of Taiwan. I. The Complex Group*. National Taiwan University, Taipei, Taiwan, 172 pp.

Daly, M., Brugler, M.R., Cartwright, P., Collins, A.G., Dawson, M. N., Fautin, D.G., France, S.C., McFadden, C.S., Opresko, D.M., Rodriguez, E., Romano, S.L., Stake, J.L. (2007) The phylum Cnidaria: A review of phylogenetic patterns and diversity 300 years after Linnaeus. *Zootaxa*, 1668, 127–182.

Fautin, D.G. (2011a) Hexacorallians of the World. http://geoportal.kgs.ku.edu/hexacoral/anemone2/index.cfm Last accessed 14 October 2011.

Fautin, D.G. (2011b) *Corallimorphus niwa* new species (Cnidaria: Anthozoa), New Zealand members of *Corallimorphus*, and redefinition of Corallimorphidae and its members. *Zootaxa*, 2775, 37–49.

Fautin, D.G., Hand, C., Daly, M. (2009) *Haliplanella* Hand, 1956 (Anthozoa, Actiniaria): proposed conservation by suppression of *Haliplanella* Treadwell, 1943 (Polychaeta). *Bulletin of Zoological Nomenclature*, 66(4), 312–316.

Fujii, T. & Reimer, J.D. (2011) Phylogeny of the highly divergent family Microzoanthidae (Anthozoa, Hexacorallia) from the Pacific.

19. Higher taxa from Bayer (1981).
20. Last revision done by Williams (1995).

Zoologica Scripta, 40, 418–431.
Opresko, D.M. (2001) Revision of the Antipatharia (Cnidaria: Anthozoa). Part I. Establishment of a new family, Myriopathidae. *Zoologische Mededelingen Leiden*, 75, 343–370.
Opresko, D.M. (2002) Revision of the Antipatharia (Cnidaria: Anthozoa). Part II. Schizopathidae. *Zoologische Mededelingen Leiden*, 76, 411–442.
Opresko, D.M. (2003) Revision of the Antipatharia (Cnidaria: Anthozoa). Part III. Cladopathidae. *Zoologische Mededelingen Leiden*, 77, 495–536.
Opresko, D.M. (2004) Revision of the Antipatharia (Cnidaria: Anthozoa). Part IV. Establishment of a new family, Aphanipathidae. *Zoologische Mededelingen Leiden*, 78, 209–240.
Opresko, D.M. (2006) Revision of the Antipatharia (Cnidaria: Anthozoa). Part V. Establishment of a new family, Stylopathidae. *Zoologische Mededelingen Leiden*, 80/4, 109–138.
Reimer, J.D. & Fujii, T. (2010) Four new species and one new genus of zoanthids (Cnidaria: Hexacorallia) from the Galápagos. *ZooKeys*, 42, 1–36.
Reimer, J.D., Hirano, S., Fujiwara, Y., Sinniger, F. & Maruyama, T. (2007) Morphological and molecular characterization of *Abyssoanthus nankaiensis*, a new family, new genus and new species of deep-sea zoanthid (Anthozoa: Hexacorallia: Zoantharia) from a northwest Pacific methane cold seep. *Invertebrate Systematics*, 21(3), 255–262.
Rodríguez, E., López-González, P.J. & Daly, M. (2009) New family of sea anemones (Actiniaria, Acontiaria) from deep polar seas. *Polar Biology*, 32, 703–717.
Sinniger, F., Reimer, J.D. & Pawlowski, J. (2010) The Parazoanthidae DNA taxonomy: description of two new genera. *Marine Biodiversity*, 40, 57–70.
van Ofwegen, L.P. & McFadden, C.S. (2010) A new family of octocorals (Anthozoa: Octocorallia) from Cameroon waters. *Journal of Natural History*, 44(1-2), 23–29.
Veron, J.E.N. (2000a) *Corals of the World, Volume I: Family Acroporidae*. Australian Institute of Marine Science, Townsville. 463pp.
Veron, J.E.N. (2000b) *Corals of the World, Volume II: Families Astrocoeniidae, Pocilloporidae, Euphyllidae, Oculinidae, Meandriniidae, Siderastreidae, Agariciidae, Fungiidae, Rhizangiidae, Pectiniidae, Merulinidae, Dendrophylliidae, Caryophylliidae.* Australian Institute of Marine Science, Townsville. 429pp.
Veron, J.E.N. (2000c). *Corals of the World, Volume III: Families Mussidae, Faviidae, Trachyphylliidae, Poritidae*. Australian Institute of Marine Science, Townsville. 490pp.
Wallace, C.C. (1999) *Staghorn Corals of the World: A Revision of the Coral Genus* Acropora. CSIRO Publishing, Collingwood. 421pp.
Wallace, C.C, Chen, C.A.C., Fukami, H. & Muir, P.R. (2007) Recognition of separate genera within *Acropora* based on new morphological, reproductive and genetic evidence from *A. togianensis*, and elevation of the subgenus *Isopora* Studer, 1878 to genus (Scleractinia: Astrocoeniidae; Acroporidae). *Coral Reefs*, 26, 231–239.
Wallace, C.C., Turak, E. & DeVantier, L. (2011) Novel characteristics in a conservative coral genus: three new species of *Astreopora* (Scleractinia: Acroporidae) from West Papua. *Journal of Natural History*, 45(31–32), 1905–1924.
Williams, G.C. (1995) Living genera of sea pens (Coelenterata: Octocorallia: Pennatulacea): illustrated key and synopsis. *Zoological Journal of the Linnean Society*, 113, 93–140.
Williams, G.C. & Cairns, S.D. (2009) Systematic list of valid Octocoral genera. http://research.calacademy.org/redirect?url=http://researcharchive.calacademy.org/research/izg/orc_home.html Last accessed 14 October 2011.

Author name and address

Andrea L. Crowther, Department of Ecology and Evolutionary Biology, and the Biodiversity Institute, The University of Kansas, 1200 Sunnyside Ave, Lawrence, KS 66045, USA; andreac@ku.edu

Phylum **Xenacoelomorpha**[1] [2] Philippe et al. 2011 (2 subphyla)
Subphylum **Xenoturbellida** Westblad, 1949 (1 family)
Family **Xenoturbellidae** Westblad, 1949 (1 genus, 2 species)
Subphylum **Acoelomorpha**[3] Ehlers, 1985 (2 classes)
Class **Nemertodermatida**[4] Karling, 1940 (2 families)
Family **Ascopariidae** Sterrer, 1998 (2 genera, 4 species)
Family **Nemertodermatidae** Steinböck, 1930 (4 genera, 5 species)
Class **Acoela**[5] Uljanin, 1870 (16 families)
Family **Diopisthoporidae** Westblad, 1940 (1 genus, 5 species)
clade **Bitesticulata** Jondelius, Wallberg, Hooge, and Raikova, 2011
Family **Paratomellidae** Dörjes, 1966 (2 genera, 3 species)
clade **Bursalia** Jondelius, Wallberg, Hooge, and Raikova, 2011
clade **Prosopharyngida** Jondelius, Wallberg, Hooge, and Raikova,2011
Family **Hallangiidae** Westblad, 1946 (2 genera, 2 species)
Family **Hofsteniidae** Bock, 1923 (3 genera, 6 species)
Family **Solenofilomorphidae** Dörjes, 1968 (5 genera, 10 species)
clade **Crucimusculata** Jondelius, Wallberg, Hooge, and Raikova, 2011
Family **Dakuidae** Hooge, 2003 (3 genera, 21 species)
Family **Isodiametridae** Hooge and Tyler, 2005 (22 genera, 90 species)
Family **Otocelididae** Westblad, 1948 (5 genera, 9 species)
Family **Proporidae** Gra?, 1882 (14 genera, 62 species)
clade **Aberrantospermata** Jondelius, Wallberg, Hooge, and Raikova, 2011
Family **Convolutidae** Gra?, 1905 (24 genera, 114 species)
Family **Mecynostomidae** Dörjes, 1968 (11 genera, 32 species)
Family *incertae sedis* **Actinoposthiidae** Hooge, 2001 (10 genera, 22 species)
Family i*ncertae sedis* **Antigonariidae** Dörjes, 1968 (1 genus, 1 species)
Family *incertae sedis* **Antroposthiidae** Faubel, 1976 (3 genera, 3 species)
Family *incertae sedis* **Nadinidae** Dörjes, 1968 (1 genus, 3 species)
Family *incertae sedis* **Tauridae** Kostenko, 1989 (1 genus, 1 species)

References cited

Bourlat, S.J., Nielsen, C., Lockyer, A.E., & Littlewood, T.J. (2003) *Xenoturbella* is a deuterostome that eats molluscs. *Nature*, 424, 925–928.

Egger, B., Steinke, D., Tarui, H., De Mulder, K., Arendt, D., Borgonie, G., Funayama, N., Gschwentner, R., Hartenstein, V., Hobmayer, B., Hooge, M., Hrouda, M., Ishida, S., Kobayashi, C., Kuales, G., Nishimura, O., Pfister, D., Rieger, R., Salvenmoser, W., Smith, J., Technau, U., Tyler, S., Agata, K., Salzburger, W., & Ladurner, P. (2009) To be or not to be a flatworm: The acoel controversy. *PLoS ONE* 4(5): e5502. doi:10.1371/journal.pone.0005502.

Franzén, A. & Afzelius, B.A. (1987) The ciliated epidermis of *Xenoturbella bocki* (Platyhelminthes, Xenoturbellida) with some phylogenetic considerations. *Zoologica Scripta*, 16, 9–17.

Giribet, G. (2008) Assembling the lophotrochozoan (=spiralian) tree of life. *Philosophical Transactions of The Royal Society B-bio-*

1. **BY** Seth Tyler and Stephen Schilling (For full authors' address, see after References Cited.) The title of this contribution should be cited as "Phylum Xenacoelomorpha Philippe, et al., 2011. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". At the time this was compiled, the Xenacoelomorpha comprised 2 subphyla, 2 classes, 19 families, 115 genera, and 395 species. These are taxa formerly classified in the Class Turbellaria of the Platyelminthes, which is now recognized to be paraphyletic and polyphyletic. (See also: http://turbellaria.umaine.edu)
2. Both molecular and ultrastructural data tie *Xenoturbella* to the Acoelomorpha (see Franzén and Afzelius 1987, Lundin 1998, Philippe *et al*. 2011), and because of the long-recognized deuterostomian characters of *Xenoturbella* (Reisinger 1960, Bourlat *et a*l. 2003, Telford 2008), placing the Acoelomorpha, as well, in the Deuterstomia or as sister group to it has been a possibility (Tyler, 2001). The most recent genomic phylogeny (Philippe et al. 2011) ties *Xenoturbella* and Acoelomorpha as sister groups composing the clade Xenacoelomorpha, which is ranked as a phylum of Deuterostomia, sister group to the Ambulacraria (phyla Echinodermata and Hemichordata); Xenacoelomorpha + Ambulacraria are together sister group to the phylum Chordata.
3. The relationship of the Acoelomorpha to the phylum Platyhelminthes is a matter of controversy (Egger *et a*l. 2009). A strong morphological character, in the nature of stem cells, unites Acoelomorpha and Platyhelminthes, but molecular phylogenies— whether from just a single molecule, such as 18S rDNA (Ruiz-Trillo et al. 1999), or from larger datasets on a genomic scale (Phillipe *et al.* 2011)—place the Acoelomorpha outside of the Platyhelminthes. That phylum occupies an uncertain position in the Lophotrochozoa (see Giribet 2008).
4. Sterrer (1998)
5. Classification following Dörjes (1968), Hooge *et al*. (2002), Jondelius *et al*. (2011)

logical Sciences, 363, 1513–1522.
Hooge MD, Haye P, Tyler S, Litvaitis MK, & Kornfield I 2002 Molecular systematics of the Acoela (Platyhelminthes) and its concordance with morphology. *Molecular Phylogeny and Evolution*, 24, 333–342.
Jondelius, U., Wallberg, A., Hooge, M., & Raikova, O.I. (2011) How the worm got its pharynx: phylogeny, classification and Bayesian assessment of character evolution in Acoela. *Systematic Biology*, 60(6), 845–871.
Lundin, K. (1998) The epidermal ciliary rootlets of *Xenoturbella bock*i (Xenoturbellida) revisited: new support for a possible kinship with the Acoelomorpha (Platyhelminthes). *Zoologica Scripta*, 27, 263–270
Philippe, H., Brinkmann, H., Copley, R.R., Moroz, L.L., Nakano, H., Poustka, A., Wallberg, A., Peterson, K.J., & Telford, M.J. (2011) Acoelomorph flatworms are deuterostomes related to *Xenoturbella*. *Nature*, 470, 255–260.
Reisinger, E. (1960) Was ist *Xenoturbella*? *Zeitschrift für wissenschaftliche Zoologie*, 164, 188–198.
Ruiz-Trillo, I., Riutort, M., Littlewood, D.T.J., Herniou, E.A., & Bagu˜n´a J. (1999) Acoel flatworms: earliest extant bilaterian metazoans, not members of Platyhelminthes. *Science*, 283, 1919–1923
Telford, M.J. (2008) Xenoturbellida: the fourth deuterostome phylum and the diet of worms. *Genesis*, 46, 580–586.
Tyler, S. (2001) The early worm—origins and relationships of the lower flatworms. *In*: Littlewood, T., & Bray, R., eds. *Interrelationships of the Platyhelminthes. T*aylor & Francis, London. pp 3–12.

Authors' address

Seth Tyler & Stephen Schilling, School of Biology and Ecology, University of Maine, 5751 Murray Hall, Orono, ME 04469, USA; styler@maine.edu (corresponding author)

"**Pisces**" [1]

Class **Myxini** (1 order)

Order **Myxiniformes** (1 family)

Family **Myxinidae** (5 genera, 76 species)

Class **Cephalaspidomorphi** (1 order)

Order **Petromyzontiformes** (1 family)

Family **Petromyzontidae** (9 genera, 43 species)

Class **Elasmobranchii** (11 orders)

Order **Hexanchiformes** (2 families)

Family **Hexanchidae** (3 genera, 4 species)

Family **Chlamydoselachidae** (1 genus, 2 species)

Order **Heterodontiformes** (1 family)

Family **Heterodontidae** (1 genus, 9 species)

Order **Orectolobiformes** (7 families)

Family **Rhincodontidae** (1 genus, 1 species)

Family **Parascylliidae** (2 genera, 8 species)

Family **Brachaeluridae** (1 genus, 2 species)

Family **Orectolobidae** (3 genera, 12 species)

Family **Hemiscylliidae** (2 genera, 17 species)

Family **Stegostomatidae** (1 genus, 1 species)

Family **Ginglymostomatidae** (3 genera, 3 species)

Order **Lamniformes** (7 families)

Family **Odontaspididae** (2 genera, 3 species)

Family **Mitsukurinidae** (1 genus, 1 species)

Family **Pseudocarchariidae** (1 genus, 1 species)

Family **Lamnidae** (3 genera, 5 species)

Family **Megachasmidae** (1 genus, 1 species)

Family **Cetorhinidae** (1 genus, 1 species)

Family **Alopiidae** (1 genus, 3 species)

Order **Carcharhiniformes** (8 families)

Family **Scyliorhinidae** (17 genera, 147 species)

Family **Proscylliidae** (3 genera, 7 species)

Family **Pseudotriakidae** (2 genera, 2 species)

Family **Leptochariidae** (1 genus, 1 species)

Family **Triakidae** (9 genera, 47 species)

Family **Hemigaleidae** (4 genera, 9 species)

Family **Carcharhinidae** (12 genera, 58 species)

Family **Sphyrnidae** (2 genera, 9 species)

Order **Squaliformes** (4 families)

Family **Dalatiidae** (18 genera, 77 species)

Family **Centrophoridae** (2 genera, 19 species)

Family **Squalidae** (2 genera, 29 species)

Family **Echinorhinidae** (1 genus, 2 species)

Order **Pristiophoriformes** (1 family)

1. **BY** William N. Eschmeyer & Jon D. Fong (for full contact details, see the **Author names and addresses** after **Cited references**). The title of this contribution should be cited as "Pisces. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
Recent Pisces currently include 534 families, 5,017 genera and 31,958 species.
This is a summary of higher classification to the level of families based on: Eschmeyer, W.N. & Fricke, R. (eds.) (2011) Catalog of Fishes electronic version. Available online from: http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. The history of knowledge and discovery marine fishes were summarised in Eschmeyer et al. (2010).

Family **Pristiophoridae** (2 genera, 7 species)
Order **Squatiniformes** (1 family)
Family **Squatinidae** (1 genus, 22 species)
Order **Pristiformes** (1 family)
Family **Pristidae** (2 genera, 7 species)
Order **Torpediniformes** (4 families)
Family **Narkidae** (6 genera, 12 species)
Family **Narcinidae** (4 genera, 31 species)
Family **Hypnidae** (1 genus, 1 species)
Family **Torpedinidae** (1 genus, 23 species)
Order **Rajiformes** (12 families)
Family **Rhinobatidae** (11 genera, 61 species)
Family **Arhynchobatidae** (12 genera, 94 species)
Family **Rajidae** (18 genera, 185 species)
Family **Anacanthobatidae** (2 genera, 13 species)
Family **Plesiobatidae** (1 genus, 1 species)
Family **Hexatrygonidae** (1 genus, 1 species)
Family **Dasyatidae** (8 genera, 87 species)
Family **Gymnuridae** (1 genus, 14 species)
Family **Myliobatidae** (7 genera, 44 species)
Family **Urolophidae** (2 genera, 30 species)
Family **Potamotrygonidae** (5 genera, 26 species)
Family **Urotrygonidae** (2 genera, 17 species)
Class **Holocephali** (1 order)
Order **Chimaeriformes** (3 families)
Family **Callorhinchidae** (1 genus, 3 species)
Family **Chimaeridae** (2 genera, 39 species)
Family **Rhinochimaeridae** (3 genera, 8 species)
Class **Actinopterygii** (46 orders)
Order **Polypteriformes** (1 family)
Family **Polypteridae** (2 genera, 12 species)
Order **Acipenseriformes** (2 families)
Family **Acipenseridae** (4 genera, 26 species)
Family **Polyodontidae** (2 genera, 2 species)
Order **Lepisosteiformes** (1 family)
Family **Lepisosteidae** (2 genera, 7 species)
Order **Amiiformes** (1 family)
Family **Amiidae** (1 genus, 1 species)
Order **Osteoglossiformes** (7 families)
Family **Osteoglossidae** (2 genera, 8 species)
Family **Arapaimidae** (2 genera, 2 species)
Family **Pantodontidae** (1 genus, 1 species)
Family **Hiodontidae** (1 genus, 2 species)
Family **Notopteridae** (4 genera, 10 species)
Family **Mormyridae** (21 genera, 195 species)
Family **Gymnarchidae** (1 genus, 1 species)
Order **Elopiformes** (2 families)
Family **Elopidae** (1 genus, 7 species)
Family **Megalopidae** (1 genus, 2 species)
Order **Albuliformes** (1 family)

Family **Albulidae** (2 genera, 12 species)

Order **Notacanthiformes** (2 families)

Family **Halosauridae** (3 genera, 16 species)

Family **Notacanthidae** (4 genera, 11 species)

Order **Anguilliformes** (15 families)

Family **Anguillidae** (1 genus, 20 species)

Family **Heterenchelyidae** (2 genera, 8 species)

Family **Moringuidae** (2 genera, 15 species)

Family **Chlopsidae** (8 genera, 22 species)

Family **Myrocongridae** (1 genus, 5 species)

Family **Muraenidae** (16 genera, 202 species)

Family **Synaphobranchidae** (12 genera, 37 species)

Family **Ophichthidae** (58 genera, 313 species)

Family **Colocongridae** (2 genera, 10 species)

Family **Congridae** (30 genera, 194 species)

Family **Muraenesocidae** (6 genera, 15 species)

Family **Derichthyidae** (2 genera, 3 species)

Family **Nemichthyidae** (3 genera, 9 species)

Family **Serrivomeridae** (2 genera, 10 species)

Family **Nettastomatidae** (6 genera, 43 species)

Order **Saccopharyngiformes** (4 families)

Family **Cyematidae** (2 genera, 2 species)

Family **Saccopharyngidae** (1 genus, 10 species)

Family **Eurypharyngidae** (1 genus, 1 species)

Family **Monognathidae** (1 genus, 15 species)

Order **Clupeiformes** (6 families)

Family **Denticipitidae** (1 genus, 1 species)

Family **Clupeidae** (56 genera, 200 species)

Family **Engraulidae** (17 genera, 146 species)

Family **Chirocentridae** (1 genus, 2 species)

Family **Pristigasteridae** (8 genera, 38 species)

Family **Sundasalangidae** (1 genus, 7 species)

Order **Gonorynchiformes** (4 families)

Family **Chanidae** (1 genus, 1 species)

Family **Gonorynchidae** (1 genus, 5 species)

Family **Kneriidae** (4 genera, 30 species)

Family **Phractolaemidae** (1 genus, 1 species)

Order **Cypriniformes** (7 families)

Family **Cyprinidae** (352 genera, 2838 species)

Family **Psilorhynchidae** (1 genus, 18 species)

Family **Cobitidae** (28 genera, 236 species)

Family **Balitoridae** (72 genera, 793 species)

Family **Vaillantellidae** (1 genus, 3 species)

Family **Gyrinocheilidae** (1 genus, 3 species)

Family **Catostomidae** (13 genera, 78 species)

Order **Characiformes** (19 families)

Family **Citharinidae** (3 genera, 8 species)

Family **Distichodontidae** (17 genera, 96 species)

Family **Alestidae** (21 genera, 120 species)

Family **Hepsetidae** (1 genus, 1 species)

Family **Hemiodontidae** (5 genera, 29 species)
Family **Parodontidae** (3 genera, 29 species)
Family **Curimatidae** (8 genera, 101 species)
Family **Prochilodontidae** (3 genera, 21 species)
Family **Anostomidae** (14 genera, 145 species)
Family **Chilodontidae** (2 genera, 8 species)
Family **Erythrinidae** (3 genera, 16 species)
Family **Lebiasinidae** (7 genera, 66 species)
Family **Gasteropelecidae** (4 genera, 10 species)
Family **Ctenoluciidae** (2 genera, 7 species)
Family **Acestrorhynchidae** (1 genus, 14 species)
Family **Cynodontidae** (5 genera, 14 species)
Family **Serrasalmidae** (16 genera, 86 species)
Family **Characidae** (156 genera, 1126 species)
Family **Crenuchidae** (12 genera, 82 species)

Order **Siluriformes** (38 families)
Family **Diplomystidae** (2 genera, 6 species)
Family **Lacantuniidae** (1 genus, 1 species)
Family **Ictaluridae** (7 genera, 51 species)
Family **Bagridae** (20 genera, 213 species)
Family **Cranoglanididae** (1 genus, 5 species)
Family **Austroglanididae** (1 genus, 3 species)
Family **Siluridae** (12 genera, 99 species)
Family **Schilbeidae** (15 genera, 65 species)
Family **Pangasiidae** (4 genera, 28 species)
Family **Amblycipitidae** (4 genera, 34 species)
Family **Amphiliidae** (12 genera, 90 species)
Family **Akysidae** (5 genera, 56 species)
Family **Sisoridae** (18 genera, 196 species)
Family **Erethistidae** (6 genera, 34 species)
Family **Clariidae** (15 genera, 115 species)
Family **Heteropneustidae** (1 genus, 4 species)
Family **Claroteidae** (15 genera, 90 species)
Family **Chacidae** (1 genus, 3 species)
Family **Olyridae** (1 genus, 4 species)
Family **Malapteruridae** (2 genera, 19 species)
Family **Ariidae** (30 genera, 147 species)
Family **Anchariidae** (2 genera, 6 species)
Family **Plotosidae** (10 genera, 40 species)
Family **Mochokidae** (11 genera, 205 species)
Family **Doradidae** (31 genera, 89 species)
Family **Auchenipteridae** (20 genera, 106 species)
Family **Pimelodidae** (30 genera, 104 species)
Family **Pseudopimelodidae** (6 genera, 35 species)
Family **Heptapteridae** (24 genera, 202 species)
Family **Cetopsidae** (5 genera, 42 species)
Family **Hypophthalmidae** (1 genus, 4 species)
Family **Aspredinidae** (13 genera, 39 species)
Family **Nematogenyidae** (1 genus, 1 species)
Family **Trichomycteridae** (41 genera, 248 species)

Family **Callichthyidae** (9 genera, 199 species)
Family **Loricariidae** (101 genera, 834 species)
Family **Scoloplacidae** (1 genus, 5 species)
Family **Astroblepidae** (1 genus, 55 species)

Order **Gymnotiformes** (5 families)
Family **Sternopygidae** (6 genera, 30 species)
Family **Apteronotidae** (15 genera, 84 species)
Family **Rhamphichthyidae** (3 genera, 14 species)
Family **Hypopomidae** (7 genera, 20 species)
Family **Gymnotidae** (2 genera, 37 species)

Order **Esociformes** (2 families)
Family **Esocidae** (1 genus, 5 species)
Family **Umbridae** (3 genera, 7 species)

Order **Osmeriformes** (13 families)
Family **Argentinidae** (2 genera, 27 species)
Family **Microstomatidae** (3 genera, 19 species)
Family **Bathylagidae** (8 genera, 23 species)
Family **Opisthoproctidae** (8 genera, 19 species)
Family **Alepocephalidae** (20 genera, 97 species)
Family **Platytroctidae** (13 genera, 40 species)
Family **Leptochilichthyidae** (1 genus, 3 species)
Family **Lepidogalaxiidae** (1 genus, 1 species)
Family **Osmeridae** (6 genera, 14 species)
Family **Plecoglossidae** (1 genus, 1 species)
Family **Salangidae** (6 genera, 20 species)
Family **Retropinnidae** (3 genera, 6 species)
Family **Galaxiidae** (7 genera, 50 species)

Order **Salmoniformes** (1 family)
Family **Salmonidae** (11 genera, 213 species)

Order **Stomiiformes** (4 families)
Family **Gonostomatidae** (8 genera, 33 species)
Family **Sternoptychidae** (10 genera, 75 species)
Family **Phosichthyidae** (7 genera, 24 species)
Family **Stomiidae** (28 genera, 292 species)

Order **Ateleopodiformes** (1 family)
Family **Ateleopodidae** (4 genera, 13 species)

Order **Aulopiformes** (17 families)
Family **Aulopidae** (3 genera, 11 species)
Family **Chlorophthalmidae** (2 genera, 19 species)
Family **Paraulopidae** (1 genus, 14 species)
Family **Ipnopidae** (6 genera, 33 species)
Family **Bathysauroididae** (1 genus, 1 species)
Family **Scopelarchidae** (4 genera, 18 species)
Family **Notosudidae** (3 genera, 17 species)
Family **Giganturidae** (1 genus, 2 species)
Family **Synodontidae** (4 genera, 68 species)
Family **Bathysauridae** (1 genus, 2 species)
Family **Paralepididae** (12 genera, 59 species)
Family **Anotopteridae** (1 genus, 3 species)
Family **Evermannellidae** (3 genera, 8 species)

Family **Omosudidae** (1 genus, 1 species)
Family **Alepisauridae** (1 genus, 2 species)
Family **Pseudotrichonotidae** (1 genus, 2 species)
Order **Myctophiformes** (2 families)
Family **Neoscopelidae** (3 genera, 6 species)
Family **Myctophidae** (33 genera, 250 species)
Order **Lampriformes** (7 families)
Family **Lampridae** (1 genus, 2 species)
Family **Veliferidae** (2 genera, 2 species)
Family **Lophotidae** (2 genera, 4 species)
Family **Radiicephalidae** (1 genus, 1 species)
Family **Trachipteridae** (3 genera, 11 species)
Family **Regalecidae** (2 genera, 5 species)
Family **Stylephoridae** (1 genus, 1 species)
Order **Polymixiiformes** (1 family)
Family **Polymixiidae** (1 genus, 10 species)
Order **Percopsiformes** (3 families)
Family **Percopsidae** (1 genus, 2 species)
Family **Aphredoderidae** (1 genus, 1 species)
Family **Amblyopsidae** (6 genera, 6 species)
Order **Gadiformes** (10 families)
Family **Muraenolepididae** (2 genera, 8 species)
Family **Bregmacerotidae** (1 genus, 14 species)
Family **Euclichthyidae** (1 genus, 1 species)
Family **Macrouridae** (35 genera, 397 species)
Family **Moridae** (18 genera, 107 species)
Family **Melanonidae** (1 genus, 2 species)
Family **Gadidae** (12 genera, 21 species)
Family **Lotidae** (6 genera, 21 species)
Family **Phycidae** (2 genera, 11 species)
Family **Merlucciidae** (5 genera, 24 species)
Order **Ophidiiformes** (5 families)
Family **Ophidiidae** (52 genera, 249 species)
Family **Carapidae** (8 genera, 34 species)
Family **Bythitidae** (48 genera, 197 species)
Family **Aphyonidae** (6 genera, 23 species)
Family **Parabrotulidae** (2 genera, 3 species)
Order **Batrachoidiformes** (1 family)
Family **Batrachoididae** (23 genera, 80 species)
Order **Lophiiformes** (18 families)
Family **Lophiidae** (4 genera, 24 species)
Family **Antennariidae** (13 genera, 47 species)
Family **Tetrabrachiidae** (2 genera, 2 species)
Family **Lophichthyidae** (1 genus, 1 species)
Family **Brachionichthyidae** (5 genera, 14 species)
Family **Chaunacidae** (2 genera, 15 species)
Family **Ogcocephalidae** (10 genera, 70 species)
Family **Caulophrynidae** (2 genera, 5 species)
Family **Neoceratiidae** (1 genus, 1 species)
Family **Melanocetidae** (1 genus, 6 species)

Family **Himantolophidae** (1 genus, 21 species)
Family **Diceratiidae** (2 genera, 6 species)
Family **Oneirodidae** (16 genera, 64 species)
Family **Thaumatichthyidae** (2 genera, 8 species)
Family **Centrophrynidae** (1 genus, 1 species)
Family **Ceratiidae** (2 genera, 4 species)
Family **Gigantactinidae** (2 genera, 22 species)
Family **Linophrynidae** (5 genera, 27 species)

Order **Gobiesociformes** (1 family)
Family **Gobiesocidae** (47 genera, 158 species)

Order **Atheriniformes** (10 families)
Family **Atherinidae** (14 genera, 68 species)
Family **Bedotiidae** (2 genera, 16 species)
Family **Melanotaeniidae** (7 genera, 76 species)
Family **Pseudomugilidae** (4 genera, 18 species)
Family **Atherinopsidae** (13 genera, 109 species)
Family **Notocheiridae** (1 genus, 1 species)
Family **Isonidae** (1 genus, 5 species)
Family **Telmatherinidae** (5 genera, 18 species)
Family **Dentatherinidae** (1 genus, 1 species)
Family **Phallostethidae** (4 genera, 21 species)

Order **Cyprinodontiformes** (10 families)
Family **Aplocheilidae** (2 genera, 14 species)
Family **Nothobranchiidae** (15 genera, 248 species)
Family **Rivulidae** (30 genera, 349 species)
Family **Profundulidae** (1 genus, 7 species)
Family **Fundulidae** (5 genera, 43 species)
Family **Valenciidae** (1 genus, 2 species)
Family **Goodeidae** (18 genera, 49 species)
Family **Poeciliidae** (41 genera, 343 species)
Family **Cyprinodontidae** (9 genera, 121 species)
Family **Anablepidae** (3 genera, 17 species)

Order **Beloniformes** (5 families)
Family **Scomberesocidae** (2 genera, 5 species)
Family **Belonidae** (10 genera, 45 species)
Family **Hemiramphidae** (13 genera, 115 species)
Family **Exocoetidae** (7 genera, 65 species)
Family **Adrianichthyidae** (2 genera, 32 species)

Order **Stephanoberyciformes** (4 families)
Family **Stephanoberycidae** (4 genera, 4 species)
Family **Hispidoberycidae** (1 genus, 1 species)
Family **Melamphaidae** (5 genera, 57 species)
Family **Gibberichthyidae** (1 genus, 2 species)

Order **Beryciformes** (7 families)
Family **Monocentridae** (2 genera, 4 species)
Family **Trachichthyidae** (8 genera, 47 species)
Family **Anomalopidae** (6 genera, 8 species)
Family **Diretmidae** (3 genera, 4 species)
Family **Anoplogastridae** (1 genus, 2 species)
Family **Berycidae** (2 genera, 10 species)

Family **Holocentridae** (8 genera, 84 species)

Order **Cetomimiformes** (5 families)

Family **Rondeletiidae** (1 genus, 2 species)

Family **Barbourisiidae** (1 genus, 1 species)

Family **Cetomimidae** (16 genera, 30 species)

Order **Zeiformes** (6 families)

Family **Cyttidae** (1 genus, 3 species)

Family **Oreosomatidae** (4 genera, 10 species)

Family **Parazenidae** (3 genera, 4 species)

Family **Zenionidae** (3 genera, 7 species)

Family **Grammicolepididae** (3 genera, 3 species)

Family **Zeidae** (2 genera, 6 species)

Order **Incertae sedis** (1 family)

Family **Elassomatidae** (1 genus, 7 species)

Order **Gasterosteiformes** (5 families)

Family **Hypoptychidae** (2 genera, 2 species)

Family **Gasterosteidae** (5 genera, 18 species)

Family **Aulorhynchidae** (1 genus, 1 species)

Family **Indostomidae** (1 genus, 3 species)

Family **Pegasidae** (2 genera, 5 species)

Order **Syngnathiformes** (5 families)

Family **Aulostomidae** (1 genus, 3 species)

Family **Fistulariidae** (1 genus, 4 species)

Family **Centriscidae** (5 genera, 12 species)

Family **Solenostomidae** (1 genus, 6 species)

Family **Syngnathidae** (56 genera, 340 species)

Order **Synbranchiformes** (3 families)

Family **Synbranchidae** (4 genera, 23 species)

Family **Mastacembelidae** (3 genera, 86 species)

Family **Chaudhuriidae** (6 genera, 10 species)

Order **Scorpaeniformes** (7 suborders)

Suborder **Scorpaenoidei** (13 families)

Family **Sebastidae** (7 genera, 132 species)

Family **Setarchidae** (3 genera, 6 species)

Family **Neosebastidae** (2 genera, 18 species)

Family **Scorpaenidae** (25 genera, 216 species)

Family **Apistidae** (3 genera, 3 species)

Family **Tetrarogidae** (17 genera, 40 species)

Family **Synanceiidae** (9 genera, 35 species)

Family **Eschmeyeridae** (1 genus, 1 species)

Family **Aploactinidae** (17 genera, 47 species)

Family **Pataecidae** (3 genera, 3 species)

Family **Gnathanacanthidae** (1 genus, 1 species)

Family **Congiopodidae** (4 genera, 8 species)

Suborder **Dactylopteroidei** (1 family)

Family **Dactylopteridae** (2 genera, 7 species)

Suborder **Platycephaloidei** (7 families)

Family **Plectrogeniidae** (1 genus, 2 species)

Family **Parabembridae** (1 genus, 2 species)

Family **Bembridae** (4 genera, 9 species)

Family **Triglidae** (10 genera, 122 species)
Family **Peristediidae** (6 genera, 49 species)
Family **Hoplichthyidae** (1 genus, 11 species)
Family **Platycephalidae** (18 genera, 74 species)
Suborder **Anoplopomatoidei** (1 family)
Family **Anoplopomatidae** (2 genera, 2 species)
Suborder **Hexagrammoidei** (1 family)
Family **Hexagrammidae** (5 genera, 12 species)
Suborder **Normanichthyoidei** (1 family)
Family **Normanichthyidae** (1 genus, 1 species)
Suborder **Cottoidei** (12 families)
Family **Rhamphocottidae** (1 genus, 1 species)
Family **Ereuniidae** (2 genera, 3 species)
Family **Bathylutichthyidae** (1 genus, 1 species)
Family **Cottidae** (63 genera, 250 species)
Family **Cottocomephoridae** (4 genera, 9 species)
Family **Comephoridae** (1 genus, 2 species)
Family **Abyssocottidae** (7 genera, 24 species)
Family **Hemitripteridae** (3 genera, 8 species)
Family **Psychrolutidae** (9 genera, 40 species)
Family **Agonidae** (21 genera, 46 species)
Family **Cyclopteridae** (6 genera, 27 species)
Family **Liparidae** (29 genera, 376 species)
Order **Perciformes** (21 suborders)
Suborder **Percoidei** (84 families)
Family **Centropomidae** (1 genus, 12 species)
Family **Ambassidae** (8 genera, 48 species)
Family **Percichthyidae** (11 genera, 36 species)
Family **Perciliidae** (1 genus, 2 species)
Family **Howellidae** (3 genera, 9 species)
Family **Lateolabracidae** (1 genus, 2 species)
Family **Latidae** (3 genera, 11 species)
Family **Acropomatidae** (8 genera, 32 species)
Family **Moronidae** (2 genera, 6 species)
Family **Polyprionidae** (2 genera, 4 species)
Family **Dinopercidae** (2 genera, 2 species)
Family **Serranidae** (73 genera, 522 species)
Family **Ostracoberycidae** (1 genus, 3 species)
Family **Symphysanodontidae** (1 genus, 12 species)
Family **Centrogenyidae** (1 genus, 1 species)
Family **Pseudochromidae** (24 genera, 143 species)
Family **Grammatidae** (2 genera, 13 species)
Family **Callanthiidae** (2 genera, 14 species)
Family **Plesiopidae** (12 genera, 49 species)
Family **Opistognathidae** (3 genera, 79 species)
Family **Terapontidae** (15 genera, 53 species)
Family **Banjosidae** (1 genus, 1 species)
Family **Kuhliidae** (1 genus, 12 species)
Family **Centrarchidae** (8 genera, 33 species)
Family **Percidae** (10 genera, 226 species)

Family **Priacanthidae** (4 genera, 18 species)
Family **Apogonidae** (29 genera, 334 species)
Family **Epigonidae** (7 genera, 37 species)
Family **Dinolestidae** (1 genus, 1 species)
Family **Sillaginidae** (3 genera, 34 species)
Family **Malacanthidae** (5 genera, 44 species)
Family **Lactariidae** (1 genus, 1 species)
Family **Scombropidae** (1 genus, 3 species)
Family **Pomatomidae** (1 genus, 1 species)
Family **Rachycentridae** (1 genus, 1 species)
Family **Echeneidae** (3 genera, 8 species)
Family **Carangidae** (30 genera, 147 species)
Family **Nematistiidae** (1 genus, 1 species)
Family **Coryphaenidae** (1 genus, 3 species)
Family **Leiognathidae** (9 genera, 49 species)
Family **Bramidae** (7 genera, 20 species)
Family **Caristiidae** (3 genera, 6 species)
Family **Arripidae** (1 genus, 4 species)
Family **Emmelichthyidae** (3 genera, 16 species)
Family **Lutjanidae** (17 genera, 108 species)
Family **Caesionidae** (4 genera, 22 species)
Family **Lobotidae** (1 genus, 2 species)
Family **Datnioididae** (1 genus, 5 species)
Family **Hapalogenyidae** (1 genus, 7 species)
Family **Gerreidae** (7 genera, 51 species)
Family **Haemulidae** (19 genera, 132 species)
Family **Sparidae** (36 genera, 130 species)
Family **Centracanthidae** (2 genera, 9 species)
Family **Lethrinidae** (5 genera, 41 species)
Family **Nemipteridae** (5 genera, 66 species)
Family **Sciaenidae** (66 genera, 290 species)
Family **Polynemidae** (8 genera, 42 species)
Family **Mullidae** (6 genera, 79 species)
Family **Pempheridae** (2 genera, 26 species)
Family **Glaucosomatidae** (1 genus, 4 species)
Family **Leptobramidae** (1 genus, 1 species)
Family **Bathyclupeidae** (1 genus, 7 species)
Family **Toxotidae** (1 genus, 7 species)
Family **Dichistiidae** (1 genus, 2 species)
Family **Kyphosidae** (14 genera, 51 species)
Family **Parascorpididae** (1 genus, 1 species)
Family **Drepaneidae** (1 genus, 3 species)
Family **Monodactylidae** (2 genera, 6 species)
Family **Chaetodontidae** (12 genera, 130 species)
Family **Pomacanthidae** (8 genera, 87 species)
Family **Enoplosidae** (1 genus, 1 species)
Family **Pentacerotidae** (8 genera, 13 species)
Family **Polycentridae** (4 genera, 4 species)
Family **Nandidae** (2 genera, 9 species)
Family **Badidae** (2 genera, 18 species)

Family **Oplegnathidae** (1 genus, 7 species)
Family **Cirrhitidae** (12 genera, 34 species)
Family **Chironemidae** (1 genus, 6 species)
Family **Aplodactylidae** (1 genus, 5 species)
Family **Cheilodactylidae** (4 genera, 27 species)
Family **Latridae** (3 genera, 7 species)
Family **Cepolidae** (5 genera, 22 species)
Suborder **Mugiloidei** (1 family)
Family **Mugilidae** (20 genera, 72 species)
Suborder **Labroidei** (6 families)
Family **Cichlidae** (221 genera, 1606 species)
Family **Embiotocidae** (13 genera, 23 species)
Family **Pomacentridae** (28 genera, 385 species)
Family **Labridae** (70 genera, 509 species)
Family **Odacidae** (6 genera, 12 species)
Family **Scaridae** (10 genera, 99 species)
Suborder **Zoarcoidei** (9 families)
Family **Bathymasteridae** (3 genera, 7 species)
Family **Zoarcidae** (59 genera, 297 species)
Family **Stichaeidae** (34 genera, 67 species)
Family **Cryptacanthodidae** (1 genus, 4 species)
Family **Pholidae** (3 genera, 15 species)
Family **Anarhichadidae** (2 genera, 5 species)
Family **Ptilichthyidae** (1 genus, 1 species)
Family **Zaproridae** (1 genus, 1 species)
Family **Scytalinidae** (1 genus, 1 species)
Suborder **Notothenioidei** (8 families)
Family **Bovichtidae** (3 genera, 11 species)
Family **Pseudaphritidae** (1 genus, 1 species)
Family **Eleginopsidae** (1 genus, 1 species)
Family **Nototheniidae** (16 genera, 59 species)
Family **Harpagiferidae** (1 genus, 12 species)
Family **Artedidraconidae** (4 genera, 28 species)
Family **Bathydraconidae** (11 genera, 18 species)
Family **Channichthyidae** (11 genera, 25 species)
Suborder **Trachinoidei** (12 families)
Family **Chiasmodontidae** (4 genera, 32 species)
Family **Champsodontidae** (1 genus, 13 species)
Family **Trichodontidae** (2 genera, 2 species)
Family **Ammodytidae** (7 genera, 26 species)
Family **Trachinidae** (2 genera, 9 species)
Family **Uranoscopidae** (8 genera, 51 species)
Family **Trichonotidae** (1 genus, 9 species)
Family **Creediidae** (8 genera, 17 species)
Family **Leptoscopidae** (3 genera, 5 species)
Family **Percophidae** (11 genera, 48 species)
Family **Pinguipedidae** (7 genera, 79 species)
Family **Cheimarrichthyidae** (1 genus, 1 species)
Suborder **Pholidichthyoidei** (1 family)
Family **Pholidichthyidae** (1 genus, 2 species)

Suborder **Blennioidei** (6 families)
Family **Tripterygiidae** (29 genera, 166 species)
Family **Labrisomidae** (14 genera, 118 species)
Family **Clinidae** (26 genera, 84 species)
Family **Chaenopsidae** (14 genera, 97 species)
Family **Dactyloscopidae** (9 genera, 48 species)
Family **Blenniidae** (57 genera, 398 species)
Suborder **Icosteoidei** (1 family)
Family **Icosteidae** (1 genus, 1 species)
Suborder **Callionymoidei** (2 families)
Family **Callionymidae** (19 genera, 187 species)
Family **Draconettidae** (2 genera, 14 species)
Suborder **Gobioidei** (8 families)
Family **Rhyacichthyidae** (2 genera, 3 species)
Family **Odontobutidae** (7 genera, 22 species)
Family **Eleotridae** (34 genera, 172 species)
Family **Gobiidae** (248 genera, 1630 species)
Family **Kraemeriidae** (2 genera, 9 species)
Family **Microdesmidae** (12 genera, 86 species)
Family **Xenisthmidae** (5 genera, 13 species)
Family **Schindleriidae** (1 genus, 3 species)
Suborder **Kurtoidei** (1 family)
Family **Kurtidae** (1 genus, 2 species)
Suborder **Acanthuroidei** (6 families)
Family **Ephippidae** (8 genera, 15 species)
Family **Scatophagidae** (2 genera, 4 species)
Family **Siganidae** (1 genus, 32 species)
Family **Luvaridae** (1 genus, 1 species)
Family **Zanclidae** (1 genus, 1 species)
Family **Acanthuridae** (6 genera, 84 species)
Suborder **Scombrolabracoidei** (1 family)
Family **Scombrolabracidae** (1 genus, 1 species)
Suborder **Sphyraenoidei** (1 family)
Family **Sphyraenidae** (1 genus, 29 species)
Suborder **Scombroidei** (3 families)
Family **Gempylidae** (16 genera, 25 species)
Family **Trichiuridae** (10 genera, 46 species)
Family **Scombridae** (15 genera, 53 species)
Suborder **Xiphioidei** (2 families)
Family **Xiphiidae** (1 genus, 1 species)
Family **Istiophoridae** (3 genera, 10 species)
Suborder **Stromateoidei** (6 families)
Family **Amarsipidae** (1 genus, 1 species)
Family **Centrolophidae** (8 genera, 29 species)
Family **Nomeidae** (3 genera, 17 species)
Family **Ariommatidae** (1 genus, 8 species)
Family **Tetragonuridae** (1 genus, 3 species)
Family **Stromateidae** (3 genera, 15 species)
Suborder **Anabantoidei** (3 families)
Family **Anabantidae** (4 genera, 31 species)

Family **Osphronemidae** (14 genera, 126 species)
Family **Helostomatidae** (1 genus, 1 species)
Suborder **Channoidei** (1 family)
Family **Channidae** (2 genera, 32 species)
Suborder **Caproidei** (1 family)
Family **Caproidae** (2 genera, 18 species)
Order **Pleuronectiformes** (11 families)
Family **Psettodidae** (1 genus, 3 species)
Family **Citharidae** (4 genera, 6 species)
Family **Scophthalmidae** (4 genera, 9 species)
Family **Paralichthyidae** (14 genera, 109 species)
Family **Bothidae** (20 genera, 166 species)
Family **Achiropsettidae** (4 genera, 4 species)
Family **Pleuronectidae** (40 genera, 105 species)
Family **Samaridae** (3 genera, 26 species)
Family **Achiridae** (9 genera, 34 species)
Family **Soleidae** (32 genera, 178 species)
Family **Cynoglossidae** (3 genera, 143 species)
Order **Tetraodontiformes** (10 families)
Family **Triacanthodidae** (11 genera, 23 species)
Family **Triacanthidae** (4 genera, 7 species)
Family **Balistidae** (12 genera, 41 species)
Family **Monacanthidae** (28 genera, 107 species)
Family **Aracanidae** (6 genera, 12 species)
Family **Ostraciidae** (8 genera, 28 species)
Family **Triodontidae** (1 genus, 1 species)
Family **Tetraodontidae** (26 genera, 189 species)
Family **Diodontidae** (7 genera, 18 species)
Family **Molidae** (3 genera, 4 species)
Class **Sarcopterygii** (3 orders)
Order **Coelacanthiformes** (1 family)
Family **Latimeriidae** (1 genus, 2 species)
Order **Ceratodontiformes** (1 family)
Family **Neoceratodontidae** (1 genus, 1 species)
Order **Lepidosireniformes** (2 families)
Family **Lepidosirenidae** (1 genus, 1 species)
Family **Protopteridae** (1 genus, 4 species)

Cited references

William N. Eschmeyer, Ronald Fricke, Jon D. Fong & Dennis A. Polack (2010) Marine fish diversity: history of knowledge and discovery (Pisces). *Zootaxa*, 2525, 19–50.

Author names and addresses

William N. Eschmeyer & Jon D. Fong, California Academy of Sciences, San Francisco, California, U.S.A. 94118; weschmeyer@calacademy.org; JFong@calacademy.org

Class **Amphibia** Gray, 1825[1,2,3]

Amphibia *incertae sedis*

†**Albanerpetontidae** Fox & Naylor, 1982 (†4)[4,5]

Order **Anura** Fischer von Waldheim, 1813 (frogs and toads) (410–466 genera; 6090 species; †~84)[6]

Family **Allophrynidae** Goin, Goin, & Zug, 1978 (1 genus; 1 species)[7]

Family **Alsodidae** Mivart, 1869 (3 genera; 32 species)[8]

---

1. **By** D.C. Blackburn & D.B. Wake (for full contact details, see the list after **References**). The title of this contribution should be cited as "Class Amphibia Gray, 182. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. The *Amphibian Species of the World* website (Frost, 2011), a continuation of Frost (1985), has guided our work; this site provides detailed information on the taxonomic history of the names we discuss here. Our decisions on which taxa to recognize and at what level are based on current literature and our assessment of current usage. Numbers of species used in our classification are based on the *AmphibiaWeb* website (www.amphibiaweb.org; Accessed 13 October 2011).
3. Linnaeus (1758) used Amphibia for a different assemblage of taxa than currently recognized, and authorship for the currently understood taxon is either de Blainville, 1816 (Dubois, 2004) or Gray, 1825. Frost *et al*. (2006) detail reasons for rejecting de Blainville as the authority. Phylogenetic analyses based on molecular data for extant taxa support the monophyly of a clade containing Anura, Caudata, and Gymnophiona (e.g., Zardoya & Meyer, 2001; San Mauro *et al*., 2005). Phylogenetic analyses of morphological characters, including from a wide-range of extinct taxa, support this clade, with the extinct family Albanerpetontidae included in the crown group (e.g., Sigurdsen & Green, 2011; Ruta *et al*., 2003; Laurin & Reisz, 1997; Trueb & Cloutier, 1991b). However, some morphology-based analyses support non-monophyly of extant amphibians by placing the Gymnophiona more closely to extant amniotes (e.g., Anderson, 2008; Anderson *et al*., 2008; but see Marjanović & Laurin, 2008, 2009) than to Anura and Caudata. Often the clade comprising extant amphibians has been referred to as Lissamphibia (Parsons & Williams, 1963; Romer, 1966; Duellman & Trueb, 1986; Bolt, 1991; Trueb & Cloutier, 1991a,b; see also Frost *et al*., 2006), but we note that this view is not universally held (Dubois, 1983, 2004). We refer to the most exclusive clade containing crown-group amphibians as Class Amphibia, although we recognize that Amphibia is also often applied to extinct tetrapod taxa that are included neither within extant amniotes nor extant amphibians.
4. Throughout the manuscript the numbers of genera inclusive of extinct taxa, are listed, followed by the number of extinct (†) genera.
5. Historically, the †Albanerpetontidae has been allied to the extant orders of amphibians (Fox & Naylor, 1982; Milner, 2000; McGowan, 2002). Phylogenetic analyses have reaffirmed a close relationship between †Albanerpetontidae, comprising four extinct genera (for recent summary see Sweetman & Gardner, in press), and the extant orders Anura and Caudata, although the precise relationships remain uncertain (Anderson *et al*., 2008; Ruta *et al*., 2003).
6. Many extinct anuran generic-level taxa exist, but most cannot be assigned with confidence to the families recognized here. A few are demonstrably outside of crown-group Anura (e.g., †*Czatkobatrachus*, †*Mesophryne*, †*Notobatrachus*, †*Prosalirus*, †*Triadobatrachus*, †*Vieraella*, †*Yizhoubatrachus*; Báez & Basso, 1996; Gao & Wang, 1998; Gao & Chen, 2004). When phylogenetic analyses or other evidence allow placement of an extinct genus with some confidence within the crown-group of a family of living species, we have opted to include that extinct taxon within that family. However, because of either a lack of thorough analyses or changing concepts of families, we cannot place many of these extinct taxa within currently recognized families. These extinct taxa include †*Altanulia*, †*Aralobatrachus*, †*Arariphrynus*, †*Avitabatrachus*, †*Aygroua*, †*Comobatrachus*, †*Cordicephalus*, †*Cratia*, †*Elkobatrachus*, †*Eobatrachus*, †*Eopelobates*, †*Eophractus*, †*Eorubeta*, †*Estesiella*, †*Estesina*, †*Estesius*, †*Eurycephalella*, †*Hatzegobatrachus*, †*Itemirella*, †*Kizylkuma*, †*Latonia*, †*Liaobatrachus*, †*Lithobatrachus*, †*Liventsovkia*, †*Lutetiobatrachus*, †*Macropelobates*, †*Messelobatrachus*, †*Neoprocoela*, †*Neusibatrachus*, †*Nezpercius*, †*Opisthocoelellus*, †*Palaeophrynos*, †*Paralatonia*, †*Pelophilus*, †*Pliobatrachus*, †*Proceratobatrachus*, †*Ranomorphus*, †*Ranavus*, †*Soevesoederberghia*, †*Sunnybatrachus*, †*Thaumastosaurus*, †*Theatonius*, †*Thoraciliacus*, and †*Uldzinia*; see Sanchíz (1998) for a review of most extinct anuran taxa.
7. Frost *et al*. (2006), avoiding families with only one genus, treated Allophryninae and Centroleninae as subfamilies of Centrolenidae. Phylogenetic analyses support a sister relationship between these clades (Austin *et al*., 2002; Faivovich *et al*., 2005; Wiens *et al*., 2005; Frost *et al*., 2006; Guayasamin *et al*., 2008), but the revision by Guayasamin *et al*. (2009) maintained Allophrynidae and Centrolenidae as separate families. We see either as acceptable and viable taxonomies.
8. Pyron & Wiens (2011) were unable to obtain a robust topology of several genera once considered leptodactylids (see also Correa *et al*., 2006; Frost *et al*., 2006; Grant *et al*., 2006) and recognized eight small families: Alsodidae, Batrachylidae, Ceratophryidae, Cycloramphidae, Hylodidae, Odontophrynidae, Rhinodermatidae, and Telmatobiidae. Previously, Grant *et al*. (2006) refined the taxonomy of Frost *et al*. (2006) by recognizing Hylodidae as distinct from the Cycloramphidae. Correa *et al*. (2006) resolved different relationships among these taxa, but used less comprehensive sampling. Both Nuin and do Val (2005) and Heinicke *et al*. (2009), with limited taxon sampling, showed that Cycloramphidae was likely not monophyletic. Frost *et al*. (2006) showed that *Rhinoderma* is nested within their Cycloramphidae; this was also suggested by Correa *et al*. (2006) who found *Rhinoderma* to be the sister taxon of *Insuetophrynus*. Relationships among some of these genera based on morphological data were discussed by Diaz & Valencia (1985), who included *Caudiverbera* (now *Calpytocephalella*) in this lineage, and Diaz (1989), with further details on potentially useful diagnostic features within this group provided by Alcalde & Blotto (2006), Cárdenas-Rojas *et al*. (2007), and Rabanal & Formas (2009). Grant *et al*. (2006) extended the taxonomy of Frost *et al*. (2006) by recognizing three subfamilies of Ceratophryidae. However, while several phylogenetic studies have suggested that these subfamilies form a clade (Faivovich *et al*., 2005; Frost *et al*., 2006; Grant *et al*., 2006), others have not (Darst & Cannatella, 2004; Wiens, 2005; Correa *et al*., 2006; Roelants *et al*., 2007; Heinicke *et al*., 2009; Pyron & Wiens, 2011; see also Ruane *et al*., 2011). Other studies are consistent with monophyly but did not include taxa from all three subfamilies (Wiens *et al*., 2005). While reporting monophyly, Frost *et al*. (2006) and Grant *et al*. (2006) differed in assessments of relationships among the subfamilies: Grant *et al*. (2006) found a sister relationship between Telmatobiinae and Ceratophryinae whereas Frost *et al*. (2006) reported a sister relationship between Batrachylinae and Ceratophryinae. Roelants *et al*. (2007) did not resolve Ceratophryidae as monophyletic, but reported a sister relationship between taxa in the Batrachylinae and Telmatobiinae. Heinicke *et al*. (2009) also did not resolve Ceratophryidae as monophyletic, but instead found a sister relationship between taxa in the Telamatobiinae and Ceratophryinae. Bossuyt & Roelants (2009) recognized two families, Telmatobiidae and Ceratophyridae, yet did not specify the content of these families, which is crucial given the uncertainty in relationships among the subfamilies. Given that Pyron & Wiens (2011) is the analysis to date with the most complete taxonomic sampling of taxa previously placed in the Ceratophryidae, Cycloramphidae, and Hylodidae, we follow their elevation to family level of the three subfamilies of Ceratophryidae of Grant *et al*. (2006). Córdova & Descailleaux (2005) provide a cladistic analysis of karyotypic data suggesting that *Telmatobius* is paraphyletic with respect to *Batrachophyrnus*. For the families Alsodidae and Batrachylidae, we follow the genus-level revision of Pyron & Wiens (2011) that resulted in placing *Hylorhina* and several *Batrachyla* species in *Eupsophus*.

Family **Alytidae** Fitzinger, 1843 (2 genera; 12 species; †6)[9]
Subfamily **Alytinae** Fitzinger, 1843 (1 genus; 5 species)
Subfamily **Discoglossinae** Günther, 1858 (1 genus; 7 species)
Family **Aromobatidae** Grant, Frost, Caldwell, Gagliardo, Haddad, Kok, Means, Noonan, Schargel & Wheeler, 2006 (5 genera; 103 species)[10]
Family **Arthroleptidae** Mivart, 1869 (8 genera; 144 species)[11]
Family **Ascaphidae** Fejérváry, 1923 (1 genus; 2 species)[12]
Family **Batrachylidae** Gallardo, 1965 (2 genera; 11 species)[13]
Family **Bombinatoridae** Gray, 1825 (2 genera; 10 species; †1)[14]
Family **Brachycephalidae** Günther, 1858 (2 genera; 49 species)[15]
Family **Brevicipitidae** Bonaparte, 1850 (5 genera; 32 species)[16]
Family **Bufonidae** Gray, 1825 (~10– ~48 genera; 568 species)[17]
Family **Calyptocephalellidae** Reig, 1960 (2 genera; 4 species)[18]
Family **Centrolenidae** Taylor, 1951 (12 genera; 150 species)[19]
Subfamily **Centroleninae** Taylor, 1951 (10 genera; 118 species)
Subfamily **Hyalinobatrachinae** Guayasamin, Castroviejo-Fisher, Trueb, Ayarzagüena, Rada, & Vilà, 2009 (2 genera; 32 species)

---

9. Analyses of molecular data support a clade containing *Alytes*, *Barbourula*, *Bombina*, and *Discoglossus* (Hay *et al*., 1995; Hoegg *et al*., 2004; San Mauro *et al*., 2004a, 2005; Roelants & Bossuyt, 2005; Frost *et al*., 2006; Gissi *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Blackburn *et al*., 2010). *Alytes* and *Discoglossus* have long been recognized as closely related from morphology-based phylogenetic analyses (e.g., Cannatella, 1985; Gao & Wang, 2001) and molecular phylogenetic analyses agree. Historically, the taxon containing these genera has been referred to as Discoglossidae. Sanchíz (1998) and Dubois (2005) noted the nomenclatural priority of Alytidae. Bossuyt & Roelants (2009) recognize Alytidae and Discoglossidae as separate families based on the extent of "evolutionary time" separating these clades, and this remains an appropriate alternative taxonomy, as would an alternative more inclusive family containing *Barbourula* and *Bombina* (and thus the Bombinatoridae, see below). We tentatively include six extinct taxa in the Alytidae (†*Callobatrachus*, †*Enneabatrachus*, †*Eodiscoglossus*, †*Prodiscoglossus*, †*Scotiophryne*, †*Wealdenbatrachus*, †*Zaphrissa*), although their phylogenetic relationships remain unclear (Sanchíz, 1998; Gao & Wang, 2001; Gao & Chen, 2004; Marjanoviæ & Laurin, 2007).
10. Grant *et al*. (2006) separated a family Aromobatidae (with three subfamilies: Allobatinae, Anomaloglossinae, Aromobatinae) from the Dendrobatidae. While some have rejected this partitioning (Santos *et al*., 2009; Santos & Cannatella, 2011; Pyron & Wiens, 2011), many in the research community (e.g., Verdade & Rodrigues, 2007; Manzanilla *et al*., 2009; Brown & Twomey, 2009) have found this partitioning useful and follow the taxonomy of Grant *et al*. (2006). We view either family-level taxonomy as a viable taxonomy. A supplementary document associated with Santos *et al*. (2009) disputes the higher-level taxonomy of Grant *et al*. (2006), but monophyly of the Dendrobatidae and Aromobatidae and the proposed subfamilies of Dendrobatidae receive strong support. The basic topology of generic relationships within Aromobatidae recovered by Santos *et al*. (2009), as well as by Pyron & Wiens (2011), differs little from that of Grant *et al*. (2006). Santos *et al*. (2009) find no support for the Anomaloglossinae. One composite taxon, which combined molecular data for *Allobates alagoanus* with morphological data from *A. olfersioides*, was resolved as sister to the remaining species of *Allobates* by Grant *et al*. (2006). Verdade & Rodrigues (2007) synonymized these two species, with *A. olfersioides* having priority. Santos *et al*. (2009) found this species (referred to in Supplementary Materials as *Colosthethus alagoanus*) to be the sister-taxon of all other species of Aromobatidae. This result renders *Allobates*, and thus Allobatinae, paraphyletic. Pending further analysis of intrafamilial relationships, we list no subfamilies for the Aromobatidae. Grant *et al*. (2006) and Santos *et al*. (2009) provide conflicting views on the number of genera recognized and allocated to the Aromobatidae and Dendrobatidae (see also Brown *et al*., 2011).
11. The Arthroleptidae (sensu Frost *et al*., 2006) has been recognized as a morphologically distinctive lineage for decades (Laurent 1941, 1942, 1951; see also Dubois, 1981). This includes recognition that *Leptopelis* may be more closely related to genera in the Arthroleptidae than to those in the Hyperoliidae, a hypothesis supported by a variety of molecular phylogenetic studies (Emerson *et al*., 2000; Biju & Bossuyt, 2003; Vences *et al*., 2003b; Bossuyt *et al*., 2006; Frost *et al*., 2006; Roelants *et al*., 2007). Frost *et al*. (2006) recognized two subfamilies: Leptopelinae (*Leptopelis*) and Arthroleptinae (*Arthroleptis*, *Astylosternus*, *Cardioglossa*, *Leptodactylodon*, *Nyctibates*, *Scotobleps*, and *Trichobatrachus*). However, uncertainty remains in the placement of *Leptopelis*, including the possibility that the Arthroleptinae sensu Frost *et al*. (2006) is paraphyletic with respect to *Leptopelis* (Vences *et al*., 2003b; Scott, 2005; Frost *et al*., 2006; Blackburn, 2008), and thus we do not recognize subfamilies of Arthroleptidae.
12. Frost *et al*. (2006) recognized Ascaphidae and Leiopelmatidae as subfamilies of Leiopelmatidae. Morphology-based hypotheses of phylogeny have either separated these two families as successively branching lineages at the base of anuran phylogeny (e.g., Cannatella, 1985) or resolved them as sister taxa (e.g., Báez & Basso, 1996; Wang *et al*., 2001). Green *et al*. (1989) found these taxa to be genetically divergent and suggested that *Ascaphus* could be more closely related to other clades of extant anurans than to *Leiopelma*, though recent molecular phylogenetic analyses have recognized these as sister taxa (e.g., Frost *et al*., 2006; Roelants *et al*., 2007; Irisarri *et al*., 2010; Pyron & Wiens, 2011). Bossuyt & Roelants (2009) maintained two families because of the degree of genetic divergence, as did Pyron & Wiens (2011).
13. See footnote 8.
14. Monophyly of Bombinatoridae is supported by both molecular (Blackburn *et al*., 2010) and morphology-based (Cannatella, 1985; Gao & Wang, 2001) phylogenetic studies. We include †*Paradiscoglossus* in the Bombinatoridae (Estes & Sanchíz, 1982). See also footnote 9.
15. Hedges *et al*. (2008) restricted Brachycephalidae to *Brachycephalus* and *Ischnocnema*. Brachycephalidae is one of four recognized families in the unranked taxon Terrarana (Hedges *et al*., 2008; Heinicke *et al*., 2009). A viable alternative taxonomy that avoids reliance on unranked taxa would be to recognize the families of Terrarana as subfamilies of Brachycephalidae.
16. Brevicipitidae (sensu Frost *et al*., 2006), long included in Microhylidae, is now recognized as a member of a larger clade endemic to sub-Saharan Africa (e.g., van der Meijden *et al*., 2004; Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Kurabayashi *et al*., 2011). Dubois (2005) enlarged the Brevicipitidae to also contain the taxa recognized here as Arthroleptidae, Hemisotidae, and Hyperoliidae, which is a viable alternative taxonomic arrangement that would produce a taxon with nearly 400 species.

Family **Ceratobatrachidae** Boulenger, 1884 (5 genera; ~86 species)[20]

Family **Ceratophryidae** Tschudi, 1838 (3 genera; 12 species; †3)[21]

Family **Ceuthomantidae** Heinicke, Duellman, Trueb, Means, MacCulloch & Hedges, 2009 (1 genus; 4 species)[22]

Family **Conrauidae** Dubois, 1992 (1 genus; 6 species)[23]

Family **Craugastoridae** Hedges, Duellman, & Heinicke, 2008 (2 genera; 115 species)[24]

Family **Cycloramphidae** Bonaparte, 1850 (2 genera; 33 species)[25]

Family **Dendrobatidae** Cope, 1865 (13 genera; 182 species)[26]

Subfamily **Colostethinae** Cope, 1867 (4 genera; 64 species)

Subfamily **Dendrobatinae** Cope, 1865 (8 genera; 59 species)

---

17. Generic-level taxonomy within Bufonidae is in a state of flux (Frost *et al*., 2006, 2009; Pauly *et al*., 2009). Controversy arises because the many species historically referred to *Bufo* do not form an exclusive clade with respect to morphologically distinct satellite taxa (e.g., *Ansonia*, *Capensibufo*, *Nectophrynoides*, *Pedostibes*, *Schismaderma*, *Stephopaedes*). In the interests of taxonomic stability, some workers prefer to maintain *Bufo* for readily recognized "toad"-like taxa, even to the point of reducing morphologically divergent taxa long recognized as genera to subgenera. This would result in a very large genus *Bufo*, with more than 450 species. Alternatively, approximately 50 genera would be recognized (Frost *et al*., 2006; Frost, 2011), with many species long placed in *Bufo* and having extensive literature references being placed in newly (or recently) created genera. Many of the generic-level taxonomic changes have been embraced already by much of the community of amphibian taxonomists (Pramuk *et al*., 2007; Van Bocxlaer *et al*., 2009, 2010; Maciel *et al*., 2010). Pyron & Wiens (2011) recognize 35 genera.
18. Calyptocephalellidae is recovered as monophyletic and a sister taxon of our Myobatrachidae (San Mauro *et al*., 2005; Wiens *et al*., 2005; Correa *et al*., 2006; Frost *et al*., 2006; Pyron & Wiens, 2011). Frost *et al*. (2006) referred to the clade containing *Calyptocephalella* and *Telmatobufo* as the Batrachophrynidae because it was not yet clear that *Batrachophrynus* is likely embedded within the genus *Telmatobius* (Aguilar & Pacheco, 2005; Córdova & Descailleaux, 2005; Aguilar & Valencia, 2009).
19. Guayasamin *et al*. (2009) recognized two subfamilies within the Centrolenidae. We follow Pyron & Wiens (2011) in placing the monotypic *Ikakogi* in the Centroleninae. See also footnote 7.
20. Multiple phylogenetic studies have revealed complicated relationships among clades variously assigned to the Ranidae (see Dubois, 1981, 1983, 1992, 2005; Duellman & Trueb, 1986), including clades recognized here as the Arthroleptidae, Mantellidae, and Rhacophoridae (Emerson *et al*., 2000; Vences *et al*., 2003bc; Roelants *et al*., 2004, 2007; Scott, 2005; van der Meijden *et al*., 2005; Bossuyt *et al*., 2006; Frost *et al*., 2006; Wiens, 2007; Wiens *et al*., 2009; Pyron & Wiens, 2011; see also Ford, 1990; Ruvinsky & Maxson, 1996; Biju & Bossuyt, 2003; Haas, 2003). Dubois (2005) suggested recognizing fourteen subfamilies of Ranidae (Ceratobatrachinae, Conrauinae, Dicroglossinae, Lankanectinae, Mantellinae, Micrixalinae, Nyctibatrachinae, Petropedetinae, Phrynobatrachinae, Ptychadeninae, Pyxicephalinae, Raninae, Ranixalinae, and Rhacophorinae); for a summary of the taxonomic history of "ranid" frogs, see Frost *et al*. (2006). The subfamilial taxa of Dubois (2005) were elevated to the family level by Frost *et al*. (2006), although several were combined into single families; Lankanectinae and Nyctibatrachinae were combined into the Nyctibatrachidae, and Conrauinae, Petropedetinae, and Ranixalinae were combined into the Petropedetidae (although Ranixalidae is recognized as a separate family by subsequent authors; Van Bocxlaer *et al*., 2006; Bossuyt & Roelants, 2009; Wiens *et al*., 2009). Some authors (Bossuyt *et al*., 2006; Wiens *et al*., 2009) follow the concept of Ranidae advocated by Dubois (2005), but there is growing use of the family-level taxonomy advocated by Frost *et al*. (2006). As pointed out by Frost *et al*. (2006), their unranked taxon Natatanura roughly corresponds to what previous workers have referred to as "ranids". There is high support for the Natatanura of Frost *et al*. (2006) from a variety of phylogenetic studies, although the relationships among these families remain unresolved (Vences *et al*., 2003bc; Roelants *et al*., 2004, 2007; Scott, 2005; Bossuyt *et al*., 2006; Wiens, 2007; Wiens *et al*., 2009; Pyron & Wiens, 2011). Ceratobatrachidae is supported as monophyletic (Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens *et al*., 2009; Ruane *et al*., 2011; Pyron & Wiens, 2011; see also Brown, 2004).
21. Based on recent phylogenetic studies (Evans *et al*., 2008; Ruane *et al*., 2011), we include three extinct genera in the Ceratophryidae (†*Baurubatrachus*, †*Beelzebufo*, †*Wawelia*). See also footnote 8.
22. Heinicke *et al*. (2009) described the Ceuthomantidae, as well as its sole genus *Ceuthomantis*, and showed that it is sister to a clade containing other families placed in the unranked taxon Terrarana.
23. The monophyly of a clade containing *Conraua* and *Petropedetes* (including taxa formerly placed in *Arthroleptides*) is supported in several phylogenetic analyses (Bossuyt *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens *et al*., 2009; Ruane *et al*., 2011), but not others (van der Meijden *et al*., 2005; Zimkus *et al*., 2010; Pyron & Wiens, 2011). Frost *et al*. (2006) resolved this clade to also contain the taxon here recognized as Ranixalidae, but this is not supported by subsequent analyses. Dubois (1992) considered the Conrauini to be a tribe within his subfamily Dicroglossinae (Ranidae of Dubois, 1992) and, by implication, included *Petropedetes* within the Phrynobatrachidae; Dubois (2005) later treated both Conrauinae and Petropedetinae as subfamilies of the Ranidae (sensu Dubois, 2005). In light of the uncertain sister relationship between these two clades and their likely deep divergence (Roelants *et al*., 2007), we recognize these as two distinct families, Conrauidae and Petropedetidae. For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
24. Hedges *et al*. (2008) proposed the Craugastoridae for the diverse *Craugastor* and its sister taxon, a new genus *Haddadus*. The Craugastoridae is one of four families in the unranked taxon Terrarana (Hedges *et al*., 2008; Heinicke *et al*., 2009; Padial *et al*., 2009). Pyron & Wiens (2011) found Craugastoridae sensu Hedges *et al*. (2009) to be embedded within the Strabomantidae sensu Hedges *et al*. (2009), and expanded the Craugastoridae to include all taxa previously assigned to Strabomantidae. However, because of low support values among basal nodes in this larger clade, the analysis of Pyron & Wiens (2011) does not reject the hypothesis that Craugastoridae is sister to the Strabomantidae. Higher-level relationships among these clades require further study.
25. See footnote 8.
26. Grant *et al*. (2006) recognize three subfamilies of Dendrobatidae (for discussion regarding taxa in the Aromobatidae, see footnote 10). The phylogenetic relationships resolved in other studies (Vences *et al*., 2000, 2003a; Roberts *et al*., 2006; Santos *et al*., 2009; Santos & Cannatella, 2011) support the tree topology on which the subfamily taxonomy of Grant *et al*. (2006) is based. Santos *et al*. (2009; see also Santos & Cannatella, 2011) argued that the partitioning of *Dendrobates* into six genera was unnecessary (*Adelphobates*, *Dendrobates*, *Excidobates*, *Minyobates*, *Oophaga*, *Ranitomeya*). Brown *et al*. (2011) discuss this matter at length and elect to recognize all six genera and describe a seventh genus, *Andinobates*.

Subfamily **Hyloxalinae** Grant, Frost, Caldwell, Gagliardo, Haddad, Kok, Means, Noonan, Schargel & Wheeler, 2006 (1 genus; 59 species)

Family **Dicroglossidae** Anderson, 1871 (12–14 genera; 177 species)[27]

Subfamily **Dicroglossinae** Anderson, 1871 (10–12 genera; 155 species)

Subfamily **Occidozyginae** Fei, Ye, & Huang, 1990 (2 genera; 22 species)

Family **Eleutherodactylidae** Lutz, 1954 (4 genera; 202 species)[28]

Subfamily **Eleutherodactylinae** Lutz, 1954 (2 genera; 195 species)

Subfamily **Phyzelaphryninae** Hedges, Duellman, & Heinicke, 2008 (2 genera; 7 species)

Family †**Gobiatidae** Roček & Nesov, 1993 (†3)[29]

Family **Heleophrynidae** Noble, 1931 (2 genera; 6–7 species)[30]

Family **Hemiphractidae** Peters, 1862 (6 genera; 95 species)[31]

Family **Hemisotidae** Cope, 1867 (1 genus; 9 species)[32]

Family **Hylidae** Rafinesque, 1815 (42–46 genera; 904 species; †1)[33]

Subfamily **Hylinae** Rafinesque, 1815 (36–39 genera 647 species;)

Subfamily **Pelodryadinae** Günther, 1858 (1–2 genera; 198 species)

Subfamily **Phyllomedusinae** Günther, 1858 (5 genera; 59 species)

Family **Hylodidae** Günther, 1858 (3 genera; 42 species)[34]

Family **Hyperoliidae** Laurent, 1943 (18 genera; 214 species)[35]

Family **Leiopelmatidae** Mivart, 1869 (1 genus; 4 species)[36]

Family **Leiuperidae** Bonaparte, 1850 (7 genera; 85 species)[37]

Family **Leptodactylidae** Werner, 1896 (6 genera; 105 species)[38]

---

27. Phylogenetic analyses of molecular data support monophyly of the Dicroglossidae (Kosuch *et al*., 2001; Roelants *et al*., 2004, 2007; Kurabayashi *et al*., 2005; van der Meijden *et al*., 2005; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Che *et al*., 2007; Wiens, 2007; Wiens *et al*., 2009; Ruane *et al*., 2011). Two clades, the subfamilies Dicroglossinae and Occidozyginae, also receive strong support (Kosuch *et al*., 2001; Roelants *et al*., 2004; Bossuyt *et al*., 2006; Frost *et al*., 2006; Che *et al*., 2007; Wiens *et al*., 2009; Ruane *et al*., 2011; Pyron & Wiens, 2011). Generic-level taxonomy and phylogenetic relationships within the Dicroglossinae remain unresolved (Dubois *et al*., 2001; Jiang *et al*., 2005; Che *et al*., 2007, 2009, 2010; Pyron & Wiens, 2011). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
28. Hedges *et al*. (2008) recognized two well-supported clades within the Eleutherodactylidae, one including *Diasporus* and the mega-diverse genus *Eleutherodactylus* and the other including the species-poor *Adelophryne* and the monotypic *Phyzelaphryne*.
29. The †Gobiatidae is an extinct family of three genera (†*Cretasalia*, †*Gobiates*, and †*Gobiatoides*) with obscure relationships to other families of Anura (Roček, 2008). Sanchíz (1998) questioned the validity of †*Gobiatoides*.
30. Molecular phylogenies have resolved the Heleophrynidae as the sister taxon of all other Neobatrachia (e.g., Hoegg *et al*., 2004; Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007). Van Dijk (2008) erected *Hadromophryne*, the validity of which is further supported by Pyron & Wiens (2011).
31. Monophyly of the Hemiphractidae has been controversial. Based on molecular phylogenetic analyses, some authors have found the Hemiphractidae to be paraphyletic (Darst & Cannatella, 2004), or polyphyletic (Faivovich *et al*., 2005; Frost *et al*., 2006), whereas others resolved it to be monophyletic (Wiens, 2007; Guayasamin *et al*., 2008; Heinicke *et al*., 2009; Pyron & Wiens, 2011). Frost *et al*. (2006) recognized three families (Amphignathodontidae, Cryptobatrachidae, Hemiphractidae). Because more recent studies have resolved this family as monophyletic, we maintain the Hemiphractidae for *Cryptobatrachus*, *Flectonotus*, *Gastrotheca*, *Hemiphractus*, and *Stefania*, as well as the resurrected *Fritziana* (Duellman *et al*., 2011).
32. The family Hemisotidae, containing only the genus *Hemisus*, is assumed to be monophyletic, though we know of no explicit test. Hemisotidae is the sister taxon of the Breviciptidae (Frost *et al*., 2006; Roelants *et al*., 2007; van der Meijden *et al*., 2007b; Wiens, 2007), a relationship previously suggested by morphological phylogenetic studies (Blommers-Schlösser, 1993; Channing, 1995). One viable alternative taxonomic arrangement would be to include Hemisotidae as a subfamily of the Brevicipitidae.
33. The content of the Hylidae has been extensively modified in recent years. Those frogs recognized above as the Hemiphractidae were previously considered part of the Hylidae (Duellman, 1970), but they are not necessarily closely related (Darst & Cannatella, 2004; Frost *et al*., 2006; Wiens, 2007; Heinicke *et al*., 2009). Most analyses agree in resolving a monophyletic lineage containing three subfamilies (Darst & Cannatella, 2004; Faivovich *et al*., 2005; Wiens *et al*., 2005; Frost *et al*., 2006; Pyron & Wiens, 2011), two of which (Pelodryadinae and Phyllomedusinae) form a clade sister to the third (Hylinae). However, there is some disagreement on the monophyly of Hylidae (Roelants *et al*., 2007), which, combined with deep genetic divergences, has led some authors to recognize each subfamily as a distinct family (Bossuyt & Roelants, 2009). We recognize a single family with three subfamilies. Faivovich *et al*. (2005) extensively revised the generic-level taxonomy of Hylinae. Generic-level taxonomy of the Pelodryadinae remains in flux with authors recognizing one or two genera (Faivovich *et al*., 2005; Frost *et al*., 2006; Rosauer *et al*., 2009; Tyler *et al*., 2009; Pyron & Wiens, 2011). For the Phyllomedusinae, Faivovich *et al*. (2010) synonymized *Hylomantis* and *Pachymedusa* with *Agalychnis*. The relationships of †*Australobatrachus* to currently recognized clades remains unclear.
34. The three genera of Hylodidae form a clade (Nuin & do Val, 2005; Frost *et al*., 2006; Grant *et al*. 2006; see also Pyron & Wiens, 2011) that Grant *et al*. (2006) resolved as the sister taxon of the Dendrobatidae + Aromobatidae (also suggested by morphological and karyological data; e.g., Lynch, 1971; Bogart, 1991; Augiar *et al*., 2004) and thus removed it from the Cyclorhamphidae, where it had been placed by Frost *et al*. (2006). Pyron & Wiens (2011) resolved Hylodidae as the sister taxon of Alsodidae, and not near the Dendrobatidae + Aromobatidae.
35. The Hyperoliidae is a diverse clade of eighteen genera, many of which have long been recognized as sharing morphological features (Laurent 1986; Drewes, 1984) and both morphological (Drewes, 1984) and molecular phylogenetic analyses support monophyly (Vences *et al*., 2003b; Frost *et al*., 2006; Veith *et al*., 2009). As detailed in footnote 11, the genus *Leptopelis* is now considered part of the Arthroleptidae, which is the sister taxon to Hyperoliidae.
36. See footnote 12.

Family **Mantellidae** Laurent, 1946 (12 genera; 198 species)[39]
Subfamily **Boophinae** Vences & Glaw, 2001 (1 genus; 72 species)
Subfamily **Laliostominae** Vences & Glaw, 2001 (2 genera; 4 species)
Subfamily **Mantellinae** Laurent, 1946 (9 genera; 122 species)
Family **Megophryidae** Bonaparte, 1850 (10 genera; 160 species)[40]
Family **Micrixilidae** Dubois, Ohler, & Biju, 2001 (1 genus; 11 species)[41]
Family **Microhylidae** Günther, 1858 (68 genera; 495 species)[42]
Subfamily **Asterophryinae** Günther, 1858 (22 genera; 252 species)
Subfamily **Cophylinae** Cope, 1889 (7 genera; 58 species)
Subfamily **Dyscophinae** Boulenger, 1882 (1 genus; 3 species)
Subfamily **Gastrophryninae** Fitzinger, 1843 (13 genera; 59 species)
Subfamily **Hoplophryninae** Noble, 1931 (2 genera; 3 species)
Subfamily **Kalophryninae** Mivart, 1869 (1 genus; 17 species)
Subfamily **Melanobatrachinae** Noble, 1931 (1 genus; 1 species)
Subfamily **Microhylinae** Günther, 1858 (9 genera; 71 species)
Subfamily **Otophryninae** Wassersug & Pyburn, 1987 (2 genera; 6 species)
Subfamily **Phrynomerinae** Noble, 1931 (1 genus; 5 species)
Subfamily **Scaphiophryninae** Laurent, 1946 (2 genera; 12 species)
Family **Myobatrachidae** Schlegel, 1850 (20 genera; 127 species; †1)[43]
Subfamily **Limnodynastinae** Lynch, 1969 (8 genera; 44 species)
Subfamily **Myobatrachinae** Schlegel, 1850 (12 genera; 83 species; †1)
Family **Nasikabatrachidae** Biju & Bossuyt, 2003 (1 genus; 1 species)[44]
Family **Nyctibatrachidae** Blommers-Schlösser, 1993 (2 genera; 29 species)[45]
Family **Odontophrynidae** Lynch, 1969 (3 genera; 36 species)[46]
Family †**Palaeobatrachidae** Špinar, 1972 (†4)[47]

37. Grant *et al*. (2006) recognized Leiuperidae for a clade of seven genera that Frost *et al*. (2006) included within the Leptodactylidae. Frost *et al*. (2006) did not resolve the Leiuperidae as monophyletic but both Correa *et al*. (2006) and Grant *et al*. (2006) did. Leiuperidae is treated as a subfamily of Leptodactylidae by Pyron & Wiens (2011).
38. Ruvinsky & Maxson (1996) showed that Leptodactylidae sensu Lynch (1971, 1973) is polyphyletic (see also Darst & Cannatella (2004), Faivovich *et al*. (2005), Wiens *et al*. (2005), and Carrera *et al*. (2006). Frost *et al*. (2006) partitioned Leptodactylidae into multiple families; Grant *et al*. (2006) modified this scheme by further partitioning (see also Pyron & Wiens, 2011). Based in part on previous work of Heyer (1998) and Kokobum & Giaretta (2005) and finding that *Adenomera* and *Lithodytes* form a clade sister to *Leptodactylus*, Frost *et al*. (2006) considered these genera to be synonyms of *Leptodactylus*. However, subsequent authors have provided evidence that these genera are morphologically distinct (Ponssa & Heyer, 2007), and both molecular (Pyron & Wiens, 2011) and morphology-based (de Sá *et al*., 2005; Ponssa *et al*., 2010) phylogenetic analyses suggest that *Adenomera* and *Lithodytes* are not nested within *Leptodactylus*.
39. Phylogenetic analyses provide strong support for the monophyly of the Mantellidae (Emerson *et al*., 2000; Vences *et al*., 2003bc; Roelants *et al*., 2004, 2007; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Vieites *et al*., 2009; Wiens *et al*., 2009; Ruane *et al*., 2011). The subfamilies (Boophinae, Laliostominae, and Mantellinae) are also strongly supported (Vences *et al*., 2003c; Roelants *et al*., 2004; Bossuyt *et al*., 2006; Frost *et al*., 2006; Glaw *et al*., 2006; Kurabayashi *et al*., 2008; Vieites *et al*., 2009; Wiens *et al*., 2009; Pyron & Wiens, 2011). Frost *et al*. (2006) included the Laliostominae in the Mantellinae, but the taxonomic community has not accepted this proposal (e.g., Glaw & Vences, 2006; Glaw *et al*., 2006; Hiobiarilanto *et al*., 2010) and these clades may not be sister to one another (Pyron & Wiens, 2011). The relationship of the monotypic *Tsingymantis* to the recognized subfamilies remains a point for future research (Glaw *et al*., 2006; Kurabayashi *et al*., 2008). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
40. The monophyly of the Megophryidae is widely accepted (e.g., Ford & Cannatella, 1993; Frost *et al*., 2006). The most significant recent taxonomic change is the recognition that *Leptobrachium* is paraphyletic with respect to *Vibrissaphora* (Rao & Wilkinson, 2008; Brown *et al*., 2009). We refrain from recognizing subfamilies within Megophryidae (Leptobrachiinae, Leptolalaginae, Megophryinae, as advocated by Delorme *et al*., 2006) until phylogenetic analyses with more inclusive taxon sampling are available. However, the molecular phylogenetic analysis by Pyron & Wiens (2011) generally supports the subfamilies of Delorme *et al*. (2006), but lacks sampling for *Leptobatrachella*; their analysis also suggests that *Xenophrys* may be paraphyletic with respect to both *Megophrys* and *Brachytarsophrys*.
41. The monophyly of the Micrixalidae, containing only the genus *Micrixalus*, is supported by phylogenetic analyses (Bossuyt *et al*., 2006; Van Bocxlaer *et al*., 2006; Frost *et al*., 2006; Wiens *et al*., 2009; see also Dubois *et al*., 2001). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
42. Following recognition of the Brevicipitidae (see footnote 16), there is strong support for the monophyly of the Microhylidae (Ford & Cannatella, 1993; Haas, 2003; van der Meijden *et al*., 2004, 2007b; Frost *et al*., 2006; Roelants *et al*., 2007; Kurabayashi *et al*., 2011). Based in part on the substantial divergences between subfamilies observed in DNA sequence data, Bossuyt & Roelants (2009) elevated each subfamily to family rank. However, Bossuyt & Roelants (2009) did not mention the Otophryninae, leaving its status uncertain, and failed to provide any details on the many taxa not assigned to subfamilies within the classification scheme of Frost *et al*. (2006). At this point, adopting a strategy in which each subfamily of Microhylidae is elevated to family would lead to many genera of unclear affinities being orphaned. Thus, we advocate recognizing the family Microhylidae with multiple subfamilies and leaving certain genera without subfamily designation. Based on Greenbaum (2006), we suggest that *Altigius*, *Melanophryne*, *Myersiella*, and *Syncope* should be included in the Gastrophryninae. Following Pyron & Wiens (2011) and Trueb *et al*. (2011), we tentatively include *Synapturanus* in the Otophryninae.

Family **Pelobatidae** Bonaparte, 1850 (1 genus; 4 species)[48]
Family **Pelodytidae** Bonaparte, 1850 (1 genus; 3 species; †2)[49]
Family **Petropedetidae** Noble, 1931 (1 genus; 12 species)[50]
Family **Phrynobatrachidae** Laurent, 1941 (1 genus; 84 species)[51]
Family **Pipidae** Gray, 1825 (4–5 genera; 33 species; †7)[52]
Family **Ptychadenidae** Dubois, 1987 (3 genera; 51 species)[53]
Family **Pyxicephalidae** Bonaparte, 1850 (13 genera; 67 species)[54]
Subfamily **Cacosterninae** Noble, 1931 (11 genera; 61 species)
Subfamily **Pyxicephalinae** Bonaparte, 1850 (2 genera; 6 species)
Family **Ranidae** Rafinesque, 1814 (10–16 genera; 369 species)[55]
Family **Ranixalidae** Dubois, 1987 (1 genus; 10 species)[56]
Family **Rhacophoridae** Hoffman, 1932 (15 genera; 333 species)[57]
Subfamily **Buergeriinae** Channing, 1989 (1 genus; 5 species)

---

43. From one to three families of myobatrachids (Myobatrachidae, Limnodynastidae, Rheobatrachidae) have been recognized. Ford & Cannatella (1993) questioned the monophyly of a single family (e.g., Heyer & Liem, 1976) and proposed that †*Rheobatrachus* may be most closely related to the Myobatrachinae (sensu Heyer & Liem, 1976). Several molecular phylogenetic analyses did not test the monophyly of each family (e.g., Read *et al*., 2001; Morgan *et al.*, 2007). Frost *et al*. (2006) found that twenty genera variously assigned to the three families form a clade, yet chose to recognize two families (Limnodynastidae and Myobatrachidae, the latter containing *Mixophyes* and †*Rheobatrachus*). Much of the uncertainty of higher-level taxonomy in this clade relates to *Mixophyes* and †*Rheobatrachus*, the relationships of which remain uncertain (Heyer & Liem, 1976; Farris *et al*., 1982; Frost *et al*., 2006; Roelants *et al*., 2007; Ruane *et al*., 2011; Pyron & Wiens, 2011). In several analyses, *Mixophyes* and †*Rheobatrachus* are not sister taxa and the relationships of these two genera to the other taxa in the Limnodynastidae and Myobatrachidae (sensu Frost *et al*., 2006) remain unclear (Roelants *et al*., 2007; Pyron & Wiens, 2011; Ruane *et al*., 2011). Bossuyt & Roelants (2009) recognized Rheobatrachidae, Limnodynastidae, and Myobatrachidae but mentioned neither †*Rheobatrachus* nor *Mixophyes* explicitly. To date, the most complete relevant analyses are those of Frost *et al*. (2006) and Pyron & Wiens (2011), which largely agree with one another, yet disagree on whether *Rheobatrachus* and *Mixophyes* form a clade. Because of remaining uncertainties in the placement of †*Rheobatrachus* and *Mixophyes*, we follow Pyron & Wiens (2011) by using two subfamilies for the single family Myobatrachidae. The genus †*Rheobatrachus* became extinct in the late 20th century.
44. The monotypic family Nasikabatrachidae (Biju & Bossuyt, 2003) is nearly universally accepted, although Frost *et al*. (2006) included the sole genus in the Sooglossidae. We follow the generally accepted practice of maintaining these as two distinct families (e.g., Frost, 2011; Pyron & Wiens, 2011).
45. Frost *et al*. (2006) subsumed the Lankanectinae and Nyctibatrachinae of Dubois (2005) into a single family, Nyctibatrachidae. The monophyly of this family, containing the two genera *Lankanectes* and *Nyctibatrachus*, receives high support from phylogenetic analyses (van der Meijden *et al*., 2005; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Wiens *et al*., 2009; Ruane *et al*., 2011; Pyron & Wiens, 2011; see also Dubois & Ohler, 2001). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
46. Pyron & Wiens (2011) found strong support for the monophyly of a clade of three genera (*Macrogenioglottus*, *Odontophrynus*, and *Proceratophrys*), which they recognized as the Odontophrynidae. See also footnote 8.
47. †Palaeobatrachidae contains four recognized extinct genera (†*Albionbatrachus*, †*Messelobatrachus*, †*Palaeobatrachus*, and †*Pliobatrachus*) and is generally allied to the extant Pipidae although the phylogenetic relationships of this family remain obscure (Sanchíz, 1998). The phylogenetic analyses of Gao & Wang (2001) and Gao & Chen (2004), which included †*Palaeobatrachus*, suggest that †Palaeobatrachidae may nest within the Pipidae, but a phylogenetic analysis with greater taxonomic sampling of extinct pipoid taxa supports the monophyly of Pipidae to the exclusion of †*Palaeobatrachus* (Trueb & Báez, 2006; see also Roček, 2003).
48. The well-supported Pelobatidae contains a single genus (*Pelobates*) with four species (Cannatella, 1985; Ford & Cannatella, 1993; Lathrop, 1997; García-París *et al*., 2003; Roelants & Bossuyt, 2005; Frost *et al*., 2006; Veith *et al*., 2006). Based in part on the morphological phylogenetic analysis of Cannatella (1985), Ford & Cannatella (1993) defined Pelobatidae to include *Pelobates* as well as *Scaphiopus* and *Spea* (see also, e.g., Noble, 1925). Analyses of morphological data by Lathrop (1997), Henrici & Haynes (2006), and Henrici (2009) further support this result as well as including the extinct taxa †*Elkobatrachus*, †*Macropelobates*, and †*Eopelobates* in the Pelobatidae. However, subsequent molecular phylogenetic analyses, as well as a combined analysis of larval and adult morphology (Pugener *et al*., 2003) indicate that *Pelobates*, *Scaphiopus*, and *Spea* do not form a clade exclusive of Pelodytidae and Megophryidae (see also footnote 39). We follow the results of these recent studies by recognizing Pelobatidae and Scaphiopodidae to be distinct families, although the relationships of the extinct taxa now remain uncertain and we consider these Anura *incertae sedis*.
49. The monophyly of the Pelodytidae, which contains a single genus (*Pelodytes*) with three species, is supported by phylogenetic analysis of mitochondrial DNA sequence data (García-París *et al*., 2003). Analyses of both morphological and molecular data support the Pelodytidae as a member of a larger clade containing the Pelobatidae, Scaphiopodidae, and Megophryidae (Cannatella, 1985; Ford & Cannatella, 1993; Hay *et al*., 1995; García-París *et al*., 2003; Pugener *et al*., 2003; Roelants & Bossuyt, 2005; San Mauro *et al*., 2005; Frost *et al*., 2006; Veith *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Ruane *et al*., 2011). †*Miopelodytes* and †*Tephrodytes* have been included in the Pelodytidae based on the fusion of the tibiale and fibulare (unique among archaeobatrachians; Cannatella, 1985), but the precise relationships of these two genera to *Pelodytes* remains unclear (Taylor, 1941; Henrici, 1994).
50. See footnote 23.
51. The monophyly of the Phrynobatrachidae, containing the single diverse genus *Phrynobatrachus*, is well supported by phylogenetic analyses (Scott, 2005; Bossuyt *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens *et al*., 2009; Ruane *et al*., 2011; Zimkus *et al*., 2010). While combined molecular and morphological data of Scott (2005) suggested paraphyly of *Phrynobatrachus* with respect to *Natalobatrachus*, the recent phylogenetic analysis of van der Meijden *et al*. (2011) demonstrate *Natalobatrachus* to be within the Pyxicephalidae. For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.

Subfamily **Rhacophorinae** Hoffman, 1932 (14 genera; 327 species)

Family **Rhinodermatidae** Günther, 1858 (2 genera; 3 species)[58]

Family **Rhinophrynidae** Günther, 1859 (1 genus; 1 species; †2–3)[59]

Family **Scaphiopodidae** Cope, 1865 (2 genera; 7 species)[60]

Family **Sooglossidae** Noble, 1931 (2 genera; 4 species)[61]

Family **Strabomantidae** Hedges, Duellman, & Heinicke, 2008 (17–19 genera; 572 species)[62]

Subfamily **Holoadeninae** Hedges, Duellman, & Heinicke, 2008 (6 genera; 47 species)

Subfamily **Strabomantinae** Hedges, Duellman, & Heinicke, 2008 (11–13 genera; 525 species)

Family **Telmatobiidae** Fitzinger, 1843 (2 genera; 60 species)[63]

Order **Caudata** Fischer von Waldheim, 1813 (salamanders) (67–68 genera; 614 species; †~66)[64]

---

52. Phylogenetic analyses of morphological and molecular data support the monophyly of the Pipidae (Cannatella, 1985; Cannatella & Trueb, 1988ab; Ford & Cannatella, 1993; Haas, 2003; Pugener *et al*., 2003; Evans *et al*., 2004; Roelants & Bossuyt, 2005; San Mauro *et al*., 2005; Frost *et al*., 2006; Trueb & Báez, 2006; Marjanović & Laurin, 2007; Roelants *et al*., 2007; Wiens, 2007; Irisarri *et al*., 2011; Ruane *et al*., 2011). The relationships of *Hymenochirus* and *Pseudhymenochirus* are unclear; some studies find these genera (typically represented only by *Hymenochirus*) to be more closely related to extant *Xenopus* (including *Silurana*; Roelants & Bossuyt, 2005; San Mauro *et al*., 2005; Roelants *et al*., 2007; Wiens, 2007; Irisarri *et al*., 2011; Ruane *et al*., 2011), or to *Pipa* (Cannatella, 1985; Cannatella & Trueb, 1988ab; Evans *et al*., 2004; Pugener *et al*., 2003; Báez & Harrison, 2005; Trueb *et al*., 2005; Marjanović & Laurin, 2007), or possibly sister to a clade containing both *Xenopus* and *Pipa* (Frost *et al*., 2006); see also de Sá & Hillis (1990). Because of these uncertainties, we refrain from recognizing subfamilies within the Pipidae. Cannatella & Trueb (1988a) recognized the genus *Silurana* as distinct from *Xenopus*, although one of these authors states that this was an unsound decision (Pauly *et al*., 2009). Diverse extinct taxa of the Pipidae include †*Eoxenopoides*, †*Llankibatrachus*, †*Pachycentrata* (Pipinae; Báez & Harrison, 2005; Trueb & Báez, 2006), †*Saltenia*, †*Shelania*, †*Singidella* (Pipinae; Báez & Harrison, 2005), and †*Vulcanobatrachus*. Other extinct taxa that may be more closely related to Pipidae than to Rhinophrynidae include †*Avitabatrachus*, †*Cordicephalus*, and †*Thoraciliacus*, and possibly the Palaeobatrachidae (Báez *et al*., 2000; Trueb *et al*., 2005; Trueb & Báez, 2006), but we do not include these taxa within the Pipidae.
53. The monophyly of the Ptychadenidae receives strong support from phylogenetic analyses (Scott, 2005; Bossuyt *et al*., 2006; van Bocxlaer *et al*., 2006; Wiens *et al*., 2009). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
54. Phylogenetic analyses of molecular data provide strong support for the monophly of the African endemic family Pyxicephalidae (van der Meijden *et al*., 2005, 2011; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Wiens *et al*., 2009; Zimkus *et al*., 2010; Pyron & Wiens, 2011) and its component subfamilies Cacosterninae and Pyxicephalinae (Scott, 2005; van der Meijden *et al*., 2005, 2011; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens *et al*., 2009; Zimkus *et al*., 2010; Pyron & Wiens, 2011). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
55. Phylogenetic analysies of molecular data provide strong support for the monophly of the African endemic family Pyxicephalidae (van der Meijden *et al*., 2005, 2011; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Wiens *et al*., 2009; Zimkus *et al*., 2010; Pyron & Wiens, 2011) and its component subfamilies Cacosterninae and Pyxicephalinae (Scott, 2005; van der Meijden *et al*., 2005, 2011; Bossuyt *et al*., 2006; Frost *et al*., 2006; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens *et al*., 2009; Zimkus *et al*., 2010; Pyron & Wiens, 2011). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
56. The Ranixalidae, containing only the genus *Indirana*, a well supported clade (Roelants *et al*., 2004, 2007; Bossuyt *et al*., 2006; Van Bocxlaer *et al*., 2006; Wiens *et al*., 2009; Ruane *et al*., 2011; Pyron & Wiens, 2011). For further details on taxonomy of taxa placed in the Ranidae of Dubois (2005), see footnote 20.
57. Rhacophoridae and its two subfamilies are clades (Emerson *et al*., 2000; Haas, 2003; Kurabayashi *et al*., 2005; Scott, 2005; van der Meijden *et al*., 2005; Bossuyt *et al*., 2006; Frost *et al*., 2006; Vences *et al*., 2003bc; Van Bocxlaer *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Li *et al*., 2009; Wiens *et al*., 2009; Yu *et al*., 2009; Ruane *et al*., 2011; Pyron & Wiens, 2011). Phylogenetic analyses led to the recognition of several additional rhacophorine genera (Biju *et al*., 2010; Meegaskumbura *et al*., 2010). For further details on taxa placed in the Ranidae by Dubois (2005), see footnote 20.
58. See footnote 8.
59. The Rhinophrynidae, represented today only by the monotypic *Rhinophrynus*, is the sister taxon of the extant Pipidae (Cannatella, 1985; Hay *et al*., 1995; Haas, 2003; Pugener *et al*., 2003; Roelants & Bossuyt, 2005; Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Ruane *et al*., 2011). The phylogenetic analyses of Gao & Wang (2001) and Gao & Chen (2004) support a sister relationship of *Rhinophrynus* with †*Palaeobatrachus*, but analyses with greater sampling of extinct pipoid taxa do not support this relationship (Trueb *et al*., 2005; Trueb & Báez, 2006; Marjanović & Laurin, 2007). We follow Henrici (1998) by including the fossil taxa †*Chelomophrynus* and †*Rhadinosteus*, and possibly †*Eorhinophrynus*, in the Rhinophrynidae.
60. The genera *Scaphiopus* and *Spea* form the monophyletic Scaphiopodidae (Cannatella, 1985; Lathrop, 1997; García-París *et al*., 2003; Roelants & Bossuyt, 2005; Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Ruane *et al*., 2011), which Ford & Cannatella (1993) included in the Pelobatidae. While the phylogenetic analyses of morphological data by Henrici & Haynes (2006) and Henrici (2009) did not resolve *Scaphiopus* and *Spea* as sister taxa to the exclusion of *Pelobates*, other phylogenetic analyses present evidence that these two genera form a clade. The phylogenetic relationships and family-level taxonomy of fossil taxa previously allied to *Pelobates*, *Scaphiopus*, and *Spea* remain unclear (Zweifel, 1956; Henrici & Haynes, 2006; Henrici, 2009) and we thus leave these unassigned to family. See also footnote 48.
61. Sooglossidae is a well supported clade (Nussbaum, 1982; Ford & Cannatella, 1993; Nussbaum & Wu, 2007; Frost *et al*., 2006; van der Meijden *et al*., 2007a; Pyron & Wiens, 2011). Partitioning of the diversity of this family into genera is supported by morphological, molecular, and acoustic data (Nussbaum & Wu, 2007; van der Meijden *et al*., 2007a; see also Nussbaum *et al*., 1982).
62. Hedges *et al*. (2008) proposed the Strabomantidae and its two subfamilies (Holoadeninae and Strabomantinae) for a diverse clade of Central and South American genera. Strabomantidae is one of four families in the unranked taxon Terrarana (Hedges *et al*., 2008; Heinicke *et al*., 2009). Subsequent molecular phylogenetic analyses with less taxon sampling have not resolved the two subfamilies as monophyletic (Heinicke *et al*., 2007, 2009), or even as forming a clade (Padial *et al*., 2009), but because these are based on substantially less sampling of taxa and/or genetic loci, we follow the subfamily taxonomy proposed by Hedges *et al*. (2008).See also footnote 24.
63. See footnote 8.

Family **Ambystomatidae** Gray, 1850 (1 genus; 32 species; †2)[65]
Family **Amphiumidae** Gray, 1825 (1 genus; 3 species; †1)[66]
Family †**Batrachosauroididae** Auffenberg, 1958 (†7)[67]
Family **Cryptobranchidae** Fitzinger, 1826 (2 genera; 3 species; †6)[68]
Family **Dicamptodontidae** Tihen, 1958 (1 genus; 4 species; †5)[69]
Family **Hynobiidae** Cope, 1859 (9 genera; 53 species; †1)[70]
Family †**Karauridae** Ivachnenko, 1978 (†2–3)[71]
Family **Plethodontidae** Gray, 1850 (27 genera; 418 species)[72]
  Subfamily **Hemidactyliinae** Hallowell, 1856 (20 genera; 322 species)
  Subfamily **Plethodontidinae** Gray, 1850 (7 genera; 96 species)
Family **Proteidae** Gray, 1825 (2 genera; 6 species; †2)[73]
  Subfamily **Proteinae** Gray, 1825 (1 genus; 1 species; †2)

64. We consider Caudata and Urodela to be synonyms and follow the argumentation of Frost *et al.* (2006) by recognizing Caudata as the appropriate name (for a contrasting view, see Dubois, 2004). Family-level assignment is currently not possible for ~25 extinct genera. Of these, †*Karaurus* and †*Kokartus* may be outside crown-group Caudata. Unassigned taxa, some of which are based on very limited material (e.g., †*Galverpeton*), are †*Apricosiren*, †*Batrachosauroides*, †*Bishara*, †*Chrysotriton*, †*Chunerpeton*, †*Comonecturoides*, †*Galverpeton*, †*Hemitrypus*, †*Hylaeobatrachus*, †*Iridotriton*, †*Jeholotriton*, †*Kiyatriton*, †*Laccotriton*, †*Liaoxitriton*, †*Marmorerpeton*, †*Mynbulakia*, †*Nesovtriton*, †*Paleoamphiuma*, †*Pangerpeton*, † *Prosiren*, †*Ramonellus*, †*Regalerpeton*, †*Seminobatrachus*, †*Sinerpeton*, †*Triassurus* (possibly not within Caudata; Estes, 1981; Milner, 2000), and †*Valdotriton*.
65. The monophyly is well established for Ambystomatidae and Dicamptodontidae, and the clades are sister taxa (Larson, 1991; Larson & Dimmick, 1993; Frost *et al*., 2006; Roelants *et al*., 2007; Vieites *et al*., 2007, 2009; Wiens, 2007; Zhang & Wake, 2009a; Pyron & Wiens, 2011). Frost *et al*. (2006) reduced Dicamptodontidae to a subfamily of Ambystomatidae to avoid two taxa each with only one genus. Significantly, the decision by Frost *et al.* (2006) to place the Dicamptodontidae in the Ambystomatidae because "each contain[s] a single genus" (p. 118) disregards the long recognition of extinct genera as belonging to these families (e.g., Estes, 1981). In light of the deep separation of the taxa (probably in excess of 100 my: Roelants *et al*., 2007; Zhang & Wake, 2009a; Vieites *et al*., 2009), the long fossil record of dicamptodontids, documentation of their former occurrence in Europe (Venczel, 2008), and substantial biological differences between the two clades, we recognize these as two distinct families. We follow Estes (1981) by including five extinct genera (†*Ambystomichnus* [an ichnotaxon; Peabody, 1954], †*Bargmannia*, †*Chrystotriton*, †*Geyeriella*, and †*Wolterstorffiella*) in the Dicamptodontidae. While we agree with Milner (2000) that the inclusion of these in Dicamptodontidae is based on very limited data (i.e., vertebral morphology; Estes, 1981), it is the only evidence at hand and serves as a hypothesis to be tested with additional data. Rogers (1976) described †*Amphitriton* as an extinct genus of Ambystomatidae; Estes (1981) and Milner (2000) have shown that the morphological features of this extinct taxon fall within the diversity observed in *Ambystoma*.
66. The monophyletic Amphiumidae contains three extant species of *Amphiuma*. Amphiumidae is the sister-taxon of the Plethodontidae (Larson & Dimmick, 1993; Frost *et al*., 2006; Roelants *et al*., 2007; Vieites *et al*., 2007, 2009; Wiens, 2007; Zhang & Wake, 2009a; Pyron & Wiens, 2011). We include †*Proamphiuma*, and refrain from including †*Paleoamphiuma* because of disagreements as to its affinities (Rieppel & Grande, 1998; Gardner, 2003).
67. The †Batrachosauroididae is an extinct, enigmatic family of uncertain phylogenetic affinity with seven currently recognized genera (†*Batrachosauroides*, †*Mynbulakia*, †*Opisthotriton*, †*Palaeoproteus*, †*Parrisia*, †*Peratosauroides*, and †*Prodesmodon*; Estes, 1969; Denton & O'Neill, 1998; Milner 2000). Estes (1981) considered batrachosauroidids to be closely related to extant proteids. Other enigmatic genera such as †*Hylaeobatrachus* and †*Prosiren* may also belong to this lineage (Milner, 2000)
68. The monophyletic Cryptobranchidae (e.g., Wiens, 2007; Zhang & Wake, 2009a; Pyron & Wiens, 2011) contains two extant genera (*Andrias* and *Cryptobranchus*) and two extinct genera (†*Aviturus* and †*Ulanurus*). Gubin (1991) placed †*Aviturus* and †*Ulanurus* in the subfamily †Aviturinae within the Cryptobranchidae, but we refrain from recognizing this subfamily taxonomy pending cladistic analyses. Four other extinct genera (†*Chunerpeton*, †*Jeholotriton*, †*Pangerpeton*, and †*Regalerpeton*) form a clade with extant cryptobranchids exclusive of other salamanders but these have not been formally included within the Cryptobranchidae (Zhang *et al.* 2009; Skutschas & Gubin, in press; see also Wang & Evans, 2006). Estes (1981) provides details on other taxa considered junior synonyms of *Andrias*. Skutschas (2009) also includes both †*Eoscapherpeton* and †*Horezmia* in the Cryptobranchidae.
69. See footnote 65.
70. Hynobiidae is monophyletic (e.g., Frost *et al*., 2006; Zhang & Wake, 2009a; Zheng *et al*., 2011; Pyron & Wiens, 2011) and sister to the Cryptobranchidae (Larson, 1991; Larson & Dimmick, 1993; Frost *et al*., 2006; Roelants *et al*., 2007; Vieites *et al*., 2007, 2009; Wiens, 2007; Zhang & Wake, 2009a; San Mauro, 2010; Pyron & Wiens, 2011). A close relationship between the Hynobiidae and Cryptobranchidae is supported by morphological data (Noble, 1925; Larsen, 1963; Larson & Dimmick, 1993). Molecular phylogenetic analysis of the recently rediscovered *Protohynobius puxiongensis* reveals that it is closely related to *Pseudohynobius* and nested well within Hynobiidae (Peng *et al*., 2010), thus invalidating the former subfamily Protohynobinae (Fei & Ye, 2000). We follow Venczel (1999) by including the extinct †*Parahynobius* in the Hynobiidae.
71. †Karauridae is an extinct family comprising two genera (†*Karaurus* and †*Kokartus*) from the Jurassic of middle Asia (Ivachnenko, 1978; Nessov, 1988). The †Karauridae is believed to be the sister taxon of extant salamanders (Evans & Milner, 1996; Evans *et al*., 2005; Skutschas & Martin, 2011; Skutschas & Gubin, in press). Another extinct genus, †*Marmorerpeton*, may be allied to the †Karauridae (Milner, 2000).
72. Evidence for two major clades within the Plethodontidae is strong (Vieites *et al*., 2007, 2011; Camp *et al*., 2009) and two subfamilies, Hemidactyliinae and Plethodontinae, are recognized (contra Pyron & Wiens, 2011). Vieites *et al*. (2011) recognized four tribes in the Hemidactyliinae and five in the Plethodontinae; their Bolitoglossini and Spelerpini were treated as subfamilies by Chippindale *et al*. (2004) and Pyron & Wiens, (2011). Each subfamily and each tribe is well resolved as monophyletic in molecular phylogenetic analyses (e.g., Chippindale *et al*., 2004; Mueller *et al*., 2004; Macey, 2005; Min *et al*., 2005; Frost *et al*., 2006; Wiens, 2007; Kozak *et al*., 2009; Vieites *et al*., 2011, Pyron and Wiens, 2011). However, inferred relationships among the tribes have changed over time with increases in phylogenetic data (Hedges & Maxson, 1993; Hay *et al*., 1995; Chippindale *et al*., 2004; Mueller *et al*., 2004; Macey, 2005; Min *et al*., 2005; Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Kozak *et al*., 2009; Vieites *et al*., 2011).

Subfamily **Necturinae** Fitzinger, 1843 (1 genus; 5 species)

Family **Rhyacotritonidae** Tihen, 1958 (1 genus; 4 species)[74]

Family **Salamandridae** Goldfuss, 1820 (21–22 genera; 86 species; †9)[75]

Subfamily **Pleurodelinae** Tschudi, 1838 (16–17 genera; 69 species; †7)

Subfamily **Salamandrinae** Goldfuss, 1820 (4 genera; 15 species; †1)

Subfamily **Salamandrininae** Fitzinger, 1843 (1 genus; 2 species)

Family †**Scapherpetontidae** Auffenberg & Goin, 1959 (†3)[76]

Family **Sirenidae** Gray, 1825 (2 genera; 4 species; †3)[77]

Order **Gymnophiona** Müller, 1832 (caecilians) (31 genera; 188; †3)[78]

Family **Caeciliidae** Rafinesque, 1814 (2 genera; 42 species)[79]

Family **Dermophiidae** Taylor, 1969 (4 genera; 14 species; †1)[80]

Family **Herpelidae** Laurent, 1984 (2 genera; 9 species)[81]

Family **Ichthyophiidae** Taylor, 1968 (3 genera; 50 species)[82]

Family **Indotyphlidae** Lescure, Renous & Gasc, 1986 (7 genera; 21 species)[83]

Family **Rhinatrematidae** Nussbaum, 1977 (2 genera; 11 species)[84]

Family **Scolecomorphidae** Taylor, 1969 (2 genera; 6 species)[85]

---

73. Monophyly of the Proteidae has long been debated (e.g., Larsen & Guthrie, 1974; Hecht & Edwards, 1976). Molecular phylogenetic studies recover a monophyletic Proteidae but with very long internal branches and a split likely in excess of 120 my (Frost *et al*., 2006; Roelants *et al*., 2007; Wiens, 2007; Zhang & Wake, 2009a). While we recognize a single family, there are extinct taxa assigned to Proteinae and a reasonable alternative would be to raise the subfamilies (Proteinae and Necturinae) to family level (Zhang & Wake, 2009a). The extinct taxa †*Mioproteus* and †*Orthophyia* are morphologically similar to *Proteus* (Estes, 1981; Milner, 2000) and we place these genera in the Proteinae.
74. The Rhyacotritonidae, containing only the genus *Rhyacotriton*, is sister to the clade comprising the Amphiumidae and Plethodontidae (Mueller *et al*., 2004; Min *et al*., 2005; Frost *et al*., 2006; Wiens *et al*., 2005; Roelants *et al*., 2007; Vieites *et al*., 2007, 2011; Wiens, 2007; Zhang & Wake, 2009a; Pyron & Wiens, 2011; Zheng *et al*., 2011).
75. Monophyly of the Salamandridae is well established based on morphological and molecular evidence (Wake & Özeti, 1969; Titus & Larson, 1995; Frost *et al*., 2006; Wiens, 2007; Roelants *et al*., 2007; Zhang *et al*., 2008; Zhang & Wake, 2009a; Pyron & Wiens, 2011). Molecular phylogenetic analyses reveal three well resolved clades of salamandrids (Weisrock *et al*., 2006; Zhang *et al*., 2008; Pyron & Wiens, 2011) that are each now recognized as a subfamily (Dubois & Raffaëlli, 2009). Following Estes (1981) and Dubois & Raffaëlli (2009), we recognize nine extinct genera in the Salamandridae, with seven in the Pleurodelinae (†*Brachycormus*, †*Carpathotriton*, †*Chelotriton*, †*Koallelia*, †*Oligosemia* [considered a possible synonym of *Triturus* by Estes, 1981], †*Palaeopleurodeles*, and †*Procynops*) and one in the Salamandrinae (†*Megalotriton*). Unlike Dubois & Raffaëlli (2009), we consider the extinct †*Archaeotriton* as Salamandridae *incertae sedis* because its affinities remain unclear (Estes, 1981; Venczel, 2008).
76. The extinct family †Scapherpetontidae includes three genera: †*Lisserpeton*, †*Piceoerpeton*, and †*Scapherpeton* (Estes, 1969; Naylor & Krause, 1981). Following Estes (1981), we recognize this as a distinct taxon instead of subsuming these genera within the Dicamptodontidae based on vertebral morphology (i.e., Edwards, 1976). The relationship of the †Scapherpetontidae to other salamander families remains unclear.
77. The phylogenetic relationship of the two genera of the Sirenidae (*Pseudobranchus* and *Siren*) to other salamanders has long been enigmatic (e.g., Boyden & Noble, 1933; Larsen, 1963; Estes, 1965). Its monophyly is well established, with most studies resolving it as the sister to a large clade (Salamandroidea) containing Ambystomatidae, Dicamptodontidae, Plethodontidae, Proteidae, Rhyacotritonidae, and Salamandridae (Wiens *et al*., 2005; Roelants *et al*., 2007; Wiens, 2007; Pyron & Wiens, 2011), although Zhang & Wake (2009a), using complete mitochondrial genomes, found Sirenidae to be sister to all other salamanders. We follow Evans *et al*. (1996) by including three extinct genera in the Sirenidae (†*Habrosaurus*, †*Kababisha*, and †*Noterpeton*), though we note that the affinities of these taxa remain enigmatic (Rage *et al*., 1993; Milner, 2000).
78. Doubts about monophyly led Frost *et al*. (2006) to recognize only three families: Caeciliidae, Typhlonectidae, and Rhinatrematidae. In order to resolve apparent paraphyly, Wilkinson *et al*. (2011) recognized nine familes. Their classification is compatible with the results of the most comprehensive molecular phylogenetic analyses (Roelants *et al*., 2007; Zhang & Wake, 2009b; Pyron & Wiens, 2011), yet many taxa remain unsampled. We adopt the classification of Wilkinson *et al*. (2011), which identifies major clades and presents detailed justifications for recognizing these as families (rather than subfamilies as in Pyron & Wiens, 2011); because of this recent presentation, we do not go into detailed summaries for each family of caecilians. The Caeciliidae (sensu Nussbaum & Wilkinson, 1989; see also Wilkinson & Nussbaum, 2006) is the family-level taxon most affected by changes proposed by Wilkinson *et al*. (2011); it is divided into five families (Caeciliidae, Dermophiidae, Herpelidae, Indotyphlidae, and Siphonopidae). †*Apodops*, described by Estes & Wake (1972) as a caeciliid based on stated similarities to *Dermophis*, *Gymnophis*, and *Geotrypetes*, is tentatively placed in the Dermophiidae (M. Wake, pers. comm.). Of the three extinct genera of Gymnophiona, only †*Apodops* is within crown-group Gymnophiona; †*Eocaecilia* and *Rubricaecilia* are likely sister to extant caecilians (Jenkins & Walsh, 1993; Evans & Sigogneau-Russell, 2001; Jenkins *et al*., 2007).
79. See footnote 78.
80. See footnote 78.
81. See footnote 78.
82. Most phylogenetic analyses agree in finding a close relationship between the Icthyophiidae and the former Uraeotyphlidae (Wilkinson & Nussbaum, 1996; Gower *et al*., 2002; Wilkinson *et al*., 2003; San Mauro *et al*., 2004b, 2009; Frost *et al*., 2006; Loader *et al*., 2007; Roelants *et al*., 2007; Gower *et al*., 2008; Gower & Wilkinson, 2009; Zhang & Wake, 2009b), although most of these studies are based on a single representative of each taxon. Frost *et al*. (2006) subsumed the Uraeotyphlidae within the Ichthyophiidae based on data for three specimens, one of which was unidentified to species. In studies with richer taxon sampling, Gower *et al*. (2002), Zhang & Wake (2009b), and Pyron & Wiens (2011) found *Ichthyophis* to be paraphyletic with respect to *Uraeotyphlus*, and *Ichthyophis* is paraphyletic with respect to *Caudicaecilia* (Roelants *et al*., 2007; Zhang & Wake, 2009b; Pyron & Wiens, 2011). The validity of genera in the Ichthyophiidae requires further research (i.e., Wilkinson *et al*., 2011).
83. See footnote 78.

Family **Siphonopidae** Bonaparte, 1850 (7 genera; 22 species)[86]

Family **Typhlonectidae** Taylor, 1968 (4 genera; 13 species)[87]

Cited References

Aguilar, C. & Pacheco, V. (2005) Contribución de la morfología bucofaríngea larval a la filogenia de *Batrachophrynus* y *Telmatobius*. *Monografía Herpetología*, 7, 219–238.

Aguilar, C. & Valencia, N. (2009) Relaciones filogenéticas entre telmatobiinidos (Anura, Ceratophryidae, Telmatobiinae) de los Andes centrales basado en la morfología de los estados larval y adultos. *Revista Peruana de Biología*, 16, 43–50.

Alcalde, L. & Blotto, B.L. (2006) Chrondrocranium, cranial muscles, and buccopharyngeal morphology on tadpoles of the controversial leptodactylid frog *Limnomedusa macroglossa* (Anura: Leptodactylidae). *Amphibia-Reptilia*, 27, 241–253.

Anderson, J.S. (2008) Focal review: The origin(s) of modern amphibians. *Evolutionary Biology*, 35, 231–247.

Anderson, J.S., Reisz, R.R., Scott, D., Fröbisch, N.B. & Sumida, S.S. (2008) A stem batrachian from the Early Permian of Texas and the origin of frogs and salamanders. *Nature*, 453, 515–518.

Austin, J.D., Lougheed, S.C., Tanner, K., Chek, A.A., Bogart, J.P. & Boag P.T. (2002) A molecular perspective on the evolutionary affinities of an enigmatic neotropical frog, *Allophryne ruthveni*. *Zoological Journal of the Linnean Society*, 134, 335–346.

Báez, A.M. & Basso, N.G. (1996) The earliest known frogs of the Jurassic of South America: review and cladistics appraisal of their relationships. *Münchner Geowissenschaftliche Abhandlungen*, 30, 131–158.

Báez, A.M. & T. Harrison (2005) A new pipine frog from an Eocene crater lake in north-central Tanzania. *Palaeontology*, 48, 723–737.

Báez, A.M., Trueb, L. & Calvo, J.O. (2000) The earliest known pipoid frog from South America: a new genus from the Middle Cretaceous of Argentina. *Journal of Vertebrate Paleontology*, 20, 490–500.

Biju, S.D. & Bossuyt, F. (2003) New frog family from India reveals an ancient biogeographical link with the Seychelles. *Nature*, 425, 711–714.

Biju, S.D., Schouche, Y., Dubois, A., Dutta, S.K. & Bossuyt, F. (2010) A ground-dwelling rhacophorid frog from the highest mountain peak of the Western Ghats of India. *Current Science*, 98, 1119–1125.

Blackburn, D.C. (2008) Biogeography and evolution of body size and life history of African frogs: phylogeny of squeakers (*Arthroleptis*) and long-fingered frogs (*Cardioglossa*) estimated from mitochondrial data. *Molecular Phylogenetics and Evolution*, 49, 806–826.

Blackburn, D.C., Bickford, D.P., Diesmos, A.C., Iskandar, D.T. & Brown, R.M. (2010) An ancient origin for the enigmatic flat-headed frogs (Bombinatoridae: *Barbourula*) from the islands of southeast Asia. *PLoS ONE*, 5, e12090.

Blommers-Schlösser, R.M.A. (1993) Systematic relationship of the Mantellinae Laurent 1946. *Ethology, Ecology & Evolution*, 5, 199–218.

Bogart, J.P. (1991) The influence of life history on karyotypic evolution in frogs. *In*: Green, D.M. & Sessions, S.K. (Eds.), *Amphibian Cytogenetics and Evolution*. Academic Press, San Diego, pp. 233–258.

Bolt, J.R. (1991) Lissamphibian origins. *In*: Schultze, H.-P. & Trueb, L. (Eds.), *Origins of the Higher Groups of Tetrapods: Controversy and Consensus*. Cornell University Press, Ithaca, pp. 194–222.

Bossuyt, F., Brown, R.M., Hillis, D.M., Cannatella, D.C. & Milinkovitch, M. (2006) Phylogeny and biogeography of a cosmopolitan frog radiation: Late Cretaceous diversification resultsed in continent-scale endemism in the family Ranidae. *Systematic Biology*, 55, 579–594.

Bossuyt, F. & Roelants, K. (2009) Frogs and toads (Anura). *In*: Hedges, S.B. & Kumar, S. (Eds.), *The Timetree of Life*. Oxford University Press, New York, pp. 357–364.

Boyden, A. & Noble, G.K. (1933) The relationships of some common Amphibia as determined by serological study. *American Museum Novitates*, 606, 1–24.

Camp, C. D., Peterman, W.E., Milanovich, J.R., Lamb, T., Maerz, J.C. & Wake, D.B. (2009) A new genus and species of lungless salamander (family Plethodontidae) from the Appalachian highlands of the south-eastern United States. *Journal of Zoology*, 279, 86–94.

Cannatella, D.C. (1985) *A Phylogeny of Primitive Frogs (Archaeobatrachians)*. Unpublished Ph.D. Thesis, University of Kansas, Lawrence, Kansas, 404 pp.

Cannatella, D.C. & Trueb, L. (1988a) Evolution of pipoid frogs: intergeneric relationships of the aquatic frog family Pipidae (Anura). *Zoological Journal of the Linnean Society*, 94, 1–38.

Cannatella, D.C. & Trueb, L. (1988b) Evolution of pipoid frogs: morphology and phylogenetic relationships of *Pseudhymenochirus*. *Journal of Herpetology*, 22, 439–456.

Cárdenas-Rojas, D.R., Rabanal, F. & Formas, J.R. (2007) The tadpole of *Hylorhina sylvatica* (Anura: Cyclorhamphidae) in southern Chile. *Zootaxa*, 1580, 51–62.

84. Rhinatrematidae is monophyletic (Wilkinson & Nussbaum, 1996; Frost *et al*., 2004; Roelants *et al*., 2007; Zhang & Wake, 2009b) and is the sister taxon of all other living Gymnophiona (Hedges *et al*., 1993; Wilkinson & Nussbaum, 1996; San Mauro *et al*., 2004b, 2009; Frost *et al*., 2006; Loader *et al*., 2007; Roelants *et al*., 2007; Gower *et al*., 2008; Gower & Wilkinson, 2009; see also Wake, 1993).

85. The Scolecomorphidae is a morphologically distinctive clade (Frost *et al*., 2006; Pyron & Wiens, 2011; Wilkinson *et al*., 2011).

86. See footnote 77.

87. While Pyron & Wiens (2011) suggest paraphyly of the aquatic Typhlonectidae with respect to the terrestrial Caeciliidae of Wilkinson *et al*. (2011), their analysis includes but two typhlonectid genera. The morphological similarities among typhlonectids and their distinctiveness in relation to other caecilians are well established (Wilkinson & Nussbaum, 1997, 1999).

Channing, A. (1995) The relationship between *Breviceps* (Anura: Microhylidae) and *Hemisus* (Hemisotidae) remains unequivocal. *Journal of the Herpetological Association of Africa*, 44, 55–57.
Che, J., Hu, J.-S., Zhou, W.-W., Murphy, R.W., Papenfuss, T.J., Chen, M.-Y., Rao, D.-Q., Li, P.-P. & Zhang, Y.-P. (2009) Phylogeny of the Asian spiny frog tribe Paini (family Dicroglossidae) sensu Dubois. *Molecular Phylogenetics and Evolution*, 50, 59–73.
Che, J., Pang, J., Zhao, H., Wu, G.-F., Zhao, E.-M. & Zhang, Y.-P. (2007) Molecular phylogeny of the Chinese ranids inferred from nuclear and mitochondrial DNA sequences. *Biochemical Systematics and Ecology*, 35, 29–39.
Che, J., Zhou, W.-W., Hu, J.-S., Yan, F., Papenfuss, T.J., Wake, D.B. & Zhang, Y.-P. (2010) Spiny frogs (Paini) illuminate the history of the Himalayan region and Southeast Asia. *Proceedings of the National Academy of Sciences USA*, 107, 13765–13770.
Córdova, J.H. & Descailleaux, J. (2005) El análisis cladistico preliminar de los cariotipos de cinco especies de Telmatobius y dos de Batrachophrynus no apoya su separación genérica. *In*: Lavilla, E.O. & De la Riva, I. (Eds.), *Estudio sobre las rana andinas de los géneros Telmatobius y Batrachophrynus (Anura: Leptodactylidae)*. *Monografías de Herpetología*, 7. Asociación Herpetológica Española, Valencia, pp. 187–217.
Correa, C., Veloso, A., Iturra, P. & Méndez, M.A. (2006) Phylogenetic relationships of Chilean leptodactylids: a molecular approach based on mitochondrial genes 12S and 16S. *Revista Chilena de Historia Natural*, 79, 435–450.
Darst, C.R. & Cannatella, D.C. (2004) Novel relationships among hyloid frogs inferred from 12S and 16S mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution*, 31, 462–475.
de Sá, R.O., Heyer, W.R. & Camargo, A. (2005) A phylogenetic analysis of *Vanzolinius* Heyer, 1974 (Amphibia, Anura, Leptodactylidae): taxonomic and life history implications. *Arquivos do Museu Nacional, Rio de Janiero*, 63, 707–726.
de Sá, R.O. & Hillis, D.M. (1990) Phylogenetic relationships of the pipid frogs *Xenopus* and *Silurana*: an integration of ribosomal DNA and morphology. *Molecular Biology and Evolution*, 7, 365–376.
Diaz, N.F. (1989) Phenetic and phylogenetic relationships of the Chilean *Alsodes* and *Telmatobius* (Amphibia, Leptodactylidae) and proposal of a new genus. *Studies on Neotropical Fauna and Environment*, 24, 25–33.
Diaz, N.F. & Valencia, J. (1985) Larval morphology and phenetic relationships of the Chilean *Alsodes*, *Telmatobius*, *Caudiverbera*, and *Insuetophrynus*. *Copeia*, 1985, 175–181.
Dubois, A. (1981) Liste des genres et sous-genres nominaux de Ranoidea (amphibiens anoures) du monde, avec identification de leurs espèces-types: conséquences nomenclaturales. *Monitore Zoologico Italiano, Supplemento*, 15, 225–284.
Dubois, A. (1983) Classification et nomenclature supragénérique des Amphibiens Anoures. *Bulletin Mensuel de la Société Linnéenne de Lyon*, 52, 270–276.
Dubois, A. (1992) Notes sur la classification des Ranidae (Amphibiens Anoures). *Bulletin Mensuel de la Société Linnéenne de Lyon*, 61, 305–332.
Dubois, A. (2004) The higher nomenclature of recent amphibians. *Alytes*, 22, 1–14.
Dubois, A. (2005) *Amphibia Mundi.* 1.1. An ergotaxonomy of recent amphibians. *Alytes*, 23, 1–24.
Dubois, A. (2007) Naming taxa from cladograms: a cautionary tale. *Molecular Phylogenetics and Evolution*, 42, 317–330.
Dubois, A. & Ohler, A. (2001) A new genus for an aquatic ranid (Amphibia, Anura) from Sri Lanka. *Alytes*, 19, 81–106.
Dubois, A., Ohler, A. & Biju, S.D. (2001) A new genus and species of Ranidae (Amphibia, Anura) from south-western India. *Alytes*, 19, 53–79.
Dubois, A. & Raffaëlli, J. (2009) A new ergotaxonomy of the family Salamandridae Goldfuss, 1820 (Amphibia, Urodela). *Alytes*, 26, 1–85.
Duellman, W.E. (1970) *The Hylid Frogs of Middle America*. Monograph of the Museum of Natural History, University of Kansas, Lawrence, Volumes I and II.
Duellman, W.E., Junfer, K.-H. & Blackburn, D.C. (2011) The phylogenetic relationship of geographically separated "*Flectonotus*" (Anura: Hemiphractidae), as revealed by molecular, behavioral, and morphological data. *Phyllomedusa*, 10, 15–29.
Duellman, W.E. & Trueb, L. (1986) *Biology of Amphibians*. McGraw-Hill, New York, 670 pp.
Emerson, S.B., Richards, C., Drewes, R.C. & Kjer, K.M. (2000) On the relationships among ranoid frogs: a review of the evidence. *Herpetologica*, 56, 209–230.
Estes, R. (1965) Fossil salamanders and salamander origins. *American Zoologist*, 5, 319–334.
Estes, R. (1969) The Batrachosauroididae and Scapherpetontidae, Late Cretaceous and Early Cenozoic salamanders. *Copeia*, 1969, 225–234.
Estes, R. (1981) *Part 2. Gymnophiona, Caudata. Handbuch der Paläoherpetologie*. P. Wellnhofer (Ed.). Fischer Verlag, Stuttgart, 115 pp.
Estes, R. & Sanchíz, B. (1982) New discoglossid and palaeobatrachid frogs from the Late Cretaceous of Wyoming and Montana, and a review of other frogs from the Lance and Hell Creek Formations. *Journal of Vertebrate Paleontology*, 2, 9–20.
Estes, R. & Wake, M.H. (1972) The first fossil record of caecilian amphibians. *Nature*, 239, 228–231.
Evans, B.J., Kelley, D.B., Tinsley, R.C., Melnick, D.J. & Cannatella, D.C. (2004) A mitochondrial DNA phylogeny of African clawed frogs: phylogeography and implications for polyploid evolution. *Molecular Phylogenetics and Evolution*, 33, 197–213.
Evans, S.E., Jones, M.E.H. & Krause, D.W. (2008) A giant frog with South American affinities from the Late Cretaceous of Madagascar. *Proceedings of the National Academy of Sciences USA*, 105, 2951–2956.
Evans, S.E., Lally, C., Chure, D.C., Elder, A. & Maisano, J.A. (2005) A Late Jurassic salamander (Amphibia: Caudata) from the Morrison Formation of North America. *Zoological Journal of the Linnean Society*, 143, 599–616.
Evans, S.E. & Milner, A.R. (1996) A metamorphosed salamander from the Early Cretaceous of Las Hoyas, Spain. *Philosophical Transactions of the Royal Society, Biological Sciences*, 351, 627–646.
Evans, S.E., Milner, A.R. & Werner, C. (1996) Sirenid salamanders and a gymnophionan amphibian from the Cretaceous of the Sudan. *Palaeontology*, 39, 77–95.
Evans, S.E. & Sigogneau-Russell, D. (2001) A stem-group caecilian (Lissamphibia: Gymnophiona) from the Lower Cretaceous of

North Africa. *Paleontology*, 44, 259–273.
Faivovich, J., Haddad, C.F.B., Baêta, D., Jungfer, K.-H., Álvares, G.F.R., Brandão, R.A., Sheil, C., Barrientos, L.S., Barrio-Amorós, C.L., Cruz, C.A.G. & Wheeler, W.C. (2010) The phylogenetic relationships of the charismatic poster frogs, Phyllomedusinae (Anura, Hylidae). *Cladistics*, 26, 227–261.
Faivovich, J., Haddad, C.F.B., Garcia, P.C.A., Frost, D.R., Campbell, J.A. & Wheeler, W.C. (2005) Systematic review of the frog family Hylidae, with special reference to Hylinae: phylogenetic analysis and taxonomic revision. *Bulletin of the American Museum of Natural History*, 294, 1–240.
Farris, J.S., Kluge, A.G. & Mickevich, M.F. (1982) Phylogenetic analysis, the monothetic group method, and myobatrachid frogs. *Systematic Zoology*, 31, 317–327.
Fei, L. & Ye, C. (2000) A new hynobiid subfamily with a new genus and new species of Hynobiidae from west China (in Chinese with English abstract). *Cultum Herpetologica Sinica Zunyi*, 8, 64–70.
Ford, L.S. (1990) *The Phylogenetic Position of Poison-dart Frogs (Dendrobatidae): Reassessment of the Neobatrachian Phylogeny with Commentary on Complex Character Systems.* Unpublished Ph.D. Thesis, University of Kansas, Lawrence, Kansas, 307 pp.
Ford, L.S. & Cannatella, D.C. (1993) The major clades of frogs. *Herpetological Monographs*, 7, 94–117.
Frost, D.R. (Ed.) (1985) *Amphibian Species of the World. A Taxonomic and Geographical Reference*. Allen Press and Association of Systematics Collections, Lawrence, Kansas, 732 pp.
Frost, D.R. (2011) *Amphibian Species of the World: an Online Reference. Version 5.5.* Accessible at http://research.amnh.org/vz/herpetology/amphibia
Frost, D.R., Grant, T., Faivovich, J., Bain, R.H., Haas, A., Haddad, C.F.B., de Sá, R.O., Channing, A., Wilkinson, M., Donnellan, S.C., Raxworthy, C.J., Campbell, J.A., Blotto, B.L., Moler, P., Drewes, R.C., Nussbaum, R.A., Lynch, J.D., Green, D.M. & Wheeler, W.C. (2006) The amphibian tree of life. *Bulletin of the American Museum of Natural History*, 297, 1–370.
Gao, K.-Q. & Chen, S. (2004) A new frog (Amphibia: Anura) from the Lower Cretaceous of western Liaoning, China. *Cretaceous Research*, 25, 761–769.
Gao, K.-Q. & Wang, Y. (2001) Mesozoic anurans from Liaoning Province, China, and phylogenetic relationships of archaeobatrachian anuran clades. *Journal of Vertebrate Paleontology*, 21, 460–476.
Gardner, J.D. (2003) The fossil salamander *Proamphiuma cretacea* Estes (Caudata; Amphiumidae) and relationships within the Amphiumidae. *Journal of Vertebrate Paleontology*, 23, 769–782.
Gissi, C., San Mauro, D., Pesole, G. & Zardoya, R. (2006) Mitochondrial phylogeny of Anura (Amphibia): a case study of congruent phylogenetic reconstruction using amino acid and nucleotide characters. *Gene*, 366, 228–237.
Glaw, F., Hoegg, S. & Vences, M. (2006) Discovery of a new basal relict lineage of Madagascan frogs and its implications for mantellid evolution. *Zootaxa*, 1334, 27–43.
Glaw, F. & Vences, M. (2006) Phylogeny and genus-level classification of mantellid frogs (Amphibia, Anura). *Organisms, Diversity & Evolution*, 6, 236–243.
Gower, D.J., Giri, V., Dharne, M.S. & Shouche, Y.S. (2008) Frequency of independent origins of viviparity among caecilians (Gymnophiona): evidence from the first 'live-bearing' Asian amphibian. *Journal of Evolutionary Biology*, 21, 1220–1226.
Gower, D.J., Kupfer, A., Oommen, O.V., Himstedt, W., Nussbaum, R.A., Loader, S.P., Presswell, B., Müller, H., Krishna, S.B., Boistel, R. & Wilkinson, M. (2002) A molecular phylogeny of icthyophiid caecilians (Amphibia: Gymnophiona: Icthyophiidae): out of India or out of south east Asia? *Proceedings of the Royal Society of London B*, 269, 1563–1569.
Gower, D.J. & Wilkinson, M. (2009) Caecilians (Gymnophiona). *In*: Hedges, S.B. & Kumar, S. (Eds.), *The Timetree of Life*. Oxford University Press, New York, pp. 369–372.
Grant, T., Frost, D.R., Caldwell, J.P., Gagliardo, R., Haddad, C.F.B., Kok, P.J.R., Means, D.B., Noonan, B.P., Schargel, W.E. & Wheeler, W.C. (2006) Phylogenetic systematics of dart-poison frogs and their relatives (Amphibia: Athesphatanura: Dendrobatidae). *Bulletin of the American Museum of Natural History*, 299, 1–262.
Green, D.M., Sharbel, T.F., Hitchmough, R.A. & Daugherty, C.H. (1989) Genetic variation in the genus *Leiopelma* and relationships to other primitive frogs. *Zeitschrift für Zoologische Systematik und Evolutionsforschung*, 27, 65–79.
Guayasamin, J.M., Castroviejo-Fisher, S., Ayarzagüena, J., Trueb, L. & Vilà, C. (2008) Phylogenetic relationships of glassfrogs (Centrolenidae) based on mitochondrial and nuclear genes. *Molecular Phylogenetics and Evolution*, 48, 574–595.
Guayasamin, J.M., Castroviejo-Fisher, S., Trueb, L., Ayarzagüena, J., Rada, M. & Vilà, C. (2009) Phylogenetic systematics of glassfrogs (Amphibia: Centrolenidae) and their sister taxon *Allophryne ruthveni*. *Zootaxa*, 2100, 1–97.
Gubin, Y.M. (1991) Paleocene salamanders from southern Mongolia. *Paleontological Journal*, 25, 91–102.
Haas, A. (2003) Phylogeny of frogs inferred from primarily larval characters (Amphibia: Anura). *Cladistics*, 19, 23–89.
Hay, J.M., Ruvinsky, I., Hedges, S.B. & Maxson, L.R. (1995) Phylogenetic relationships of amphibian families inferred from DNA sequences of mitochondrial 12S and 16S ribosomal RNA genes. *Molecular Biology and Evolution*, 12, 928–937.
Hedges, S.B., Duellman, W.E. & Heinicke, M.P. (2008) New World direct-developing frogs (Anura: Terrarana): molecular phylogeny, classification, biogeography, and conservation. *Zootaxa*, 1737, 1–182.
Hedges, S.B. & Maxson, L.R. (1993) A molecular perspective on lissamphibian phylogeny. *Herpetological Monographs*, 7, 27–42.
Hedges, S.B., Nussbaum, R.A. & Maxson, L.R. (1993) Caecilian phylogeny and biogeography inferred from mitochondrial DNA sequences of the 12S rRNA and 16S rRNA genes (Amphibia: Gymnophiona). *Herpetological Monographs*, 7, 64–76.
Heinicke, M.P., Duellman, W.E. & Hedges, S.B. (2007) Major Caribbean and Central American frog faunas originated by ancient oceanic dispersal. *Proceedings of the National Academy of Sciences USA*, 104, 10092–10097.
Heinicke, M.P., Duellman, W.E., Trueb, L., Means, D.B., MacCulloch, R.D. & Hedges, S.B. (2009) A new frog family (Anura: Terrarana) from South America and an expanded direct-developing clade revealed by molecular phylogeny. *Zootaxa*, 2211, 1–35.
Henrici, A.C. (1994) *Tephrodytes brassicarvalis*, new genus and species (Anura: Pelodytidae), from the Arikareean Cabbage Patch beds of Montana, USA, and pelodytid–pelobatid relationships. *Annals of Carnegie Museum*, 63, 155–183.

Henrici, A.C. (1998) A new pipoid anuran from the Late Jurassic Morrison Formation at Dinosaur National Monument, Utah. *Journal of Vertebrate Paleontology*, 18, 321–332.
Henrici, A.C. (2009) Reassessment of *Scaphiopus neuter* Kluge, 1966 (Anura: Pelobatoidea: Pelobatidae), based on new material from Anceney, Montana (Early Barstovian). *Annals of Carnegie Museum*, 78, 273–287.
Henrici, A.C. & Haynes, S.R. (2006) *Elkobatrachus brocki*, a new pelobatid (Amphibia: Anura) from the Eocene Elko Formation of Nevada. *Annals of Carnegie Museum*, 75, 11–35.
Heyer, W.R. (1998) The relationships of *Leptodactylus diedrus* (Anura, Leptodactylidae). *Alytes*, 16, 1–24.
Heyer, W.R. & Liem, D.S. (1976) Analysis of the intergeneric relationships of the Australian frog family Myobatrachidae. *Smithsonian Contributions to Zoology*, 233, 1–29.
Hillis, D.M. & Wilcox, T.P. (2005) Phylogeny of the New World true frogs (*Rana*). *Molecular Phylogenetics and Evolution*, 34, 299–314.
Hiobiarilanto, T.R., Randrianiaina, R.-D., Glos, J., Strauß, A. & Vences, M. (2010) Description of ten tadpoles in the genus *Boophis* from Madagascar. *Zootaxa*, 2694, 1–25.
Hoegg, S., Vences, M., Brinkmann, H. & Meyer, A. (2004) Phylogeny and comparative substitution rates of frogs inferred from sequences of three nuclear genes. *Molecular Biology and Evolution*, 21, 1188–1200.
Irisarri, I., San Mauro, D., Green, D.M. & Zardoya, R. (2010) The complete mitochondrial genome of the relict frog *Leiopelma archeyi*: insights into the root of the frog Tree of Life. *Mitochondrial DNA*, 21, 173–182.
Irisarri, I., Vences, M., San Mauro, D., Glaw, F. & Zardoya, R. (2011) Reversal to air-driven sound production revealed by a molecular phylogeny of tongueless frogs, family Pipidae. *BMC Evolutionary Biology*, 11, 114.
Ivachnenko, M.F. (1978) Urodelans from the Triassic and Jurassic of Soviet Central Asia. *Paleontologicheskiy Zhurnal*, 3, 84–89.
Jenkins, F.A., Jr. & Walsh, D.M. (1993) An Early Jurassic caecilian with limbs. *Nature*, 365, 246–250.
Jenkins, F.A., Jr., Walsh, D.M. & Carroll, R.L. (2007) Anatomy of *Eocaecilia micropodia*, a limbed caecilian of the Early Jurassic. *Bulletin of the Museum of Comparative Zoology*, 158, 285–366.
Jiang, J., Dubois, A., Ohler, A., Tillier, A., Chen, X., Xie, F. & Stöck, M. (2005) Phylogenetic relationships of the tribe Paini (Amphibia, Anura, Ranidae) based on partial sequences of mitochondrial 12s and 16s rRNA genes. *Zoological Science*, 22, 353–352.
Kokobum, M.N. de C. & Giaretta, A.A. (2005) Reproductive ecology and behavior of a species of *Adenomera* (Anura, Leptodactylinae) with endrotrophic tadpoles: systematic implications. *Journal of Natural History*, 39, 1745–1758.
Kosuch, J., Vences, M., Dubois, A., Ohler, A. & Böhme, W. (2001) Out of Asia: mitochondrial DNA evidence for an Oriental origin of tiger frogs, genus *Hoplobatrachus*. *Molecular Phylogenetic and Evolution*, 21, 398–407.
Kurabayashi, A., Kuramoto, M., Joshy, H. & Sumida, M. (2005) Molecular phylogeny of the ranid frogs from southwest India based on mitochondrial ribosomal RNA gene sequences. *Zoological Science*, 22, 525–534.
Kurabayashi, A., Sumida, M., Yonekawa, H., Glaw, F., Vences, M. & Hasegawa, M. (2008) Phylogeny, recombination, and mechanisms of stepwise mitochondrial genome reorganization in mantellid frogs from Madagascar. *Molecular Biology and Evolution*, 25, 874–891.
Kurabayashi, A., Yoshikawa, N., Sato, N., Hayashi, Y., Oumi, S., Fujii, T. & Sumida, M. (2010) Complete mitochondrial DNA sequence of the endangered frog *Odorrana ishikawae* (family Ranidae) and unexpected diversity of mt gene arrangements in ranids. *Molecular Phylogenetics and Evolution*, 56, 543–553.
Kurabayashi, A., Matsui, M., Belabut, D.M., Yong, H.-S., Ahmad, N., Sudin, A., Kuramoto, M., Hamidy, A. & Sumida, M. (2011) From Antarctica to Asia? New colonization scenario for Australian-New Guinean narrow mouth toads suggested from the findings on a mysterious genus *Gastrophrynoides*. *BMC Evolutionary Biology*, 11, 175.
La Marca, E. (2007) Sinopsis taxonómica de dos géneros nuevos de anfibios (Anura: Leptodactylidae) de los Andes de Venezuela. *Herpetotropicos*, 3, 67–87.
Larsen, J.H., Jr. (1963) *The Cranial Osteology of Neotenic and Transformed Salamanders and its Bearing on Interfamilial Relationships*. Unpublished Ph.D. thesis, University of Washington, Seattle, 214 pp.
Larsen, J.H., Jr. & Guthrie, D.J. (1974) Parallelism in the Proteidae reconsidered. *Copeia*, 1974, 635–643.
Larson, A. & Dimmick, W.W. (1993) Phylogenetic relationships of the salamander families: an analysis of congruence among morphological and molecular characters. *Herpetological Monographs*, 7, 77–93.
Lathrop, A. (1997) Taxonomic review of the megophryid frogs (Anura: Pelobatoidea). *Asiatic Herpetological Research*, 7, 68–79.
Laurent, R.F. (1941) Contribution à l'ostéologie et à la systématique des Rhacophorides africains. Première Note. *Revue de Zoologie et de Botanique Africaines*, 35, 85–111.
Laurent, R.F. (1942) Note sur l'ostéologie de *Trichobatrachus robustus*. *Revue de Zoologie et de Botanique Africaines*, 36, 56–60.
Laurent, R.F. (1951) Sur la nécessité de supprimer la famille des Rhacophoridae mais de créer celle des Hyperoliidae. *Revue de Zoologie et de Botanique Africaines*, 45, 116–122.
Laurent, R.F. (1986) The systematic position of the genus *Afrixalus* Laurent (Hyperoliidae). *Alytes*, 5, 1–6.
Laurin, M. & Reisz, R.R. (1997) A new perspective on tetrapod phylogeny. *In*: Sumida, S. & Martin, K.L.M. (Eds.), *Amniote Origins*. Academic Press, San Diego, pp. 5–59.
Li, J.-T., Che, J., Murphy, R.W., Zhao, H., Zhao, E.-M., Rao, D.-Q. & Zhang, Y.-P. (2009) New insights to the molecular phylogenetics and generic assessment in the Rhacophoridae (Amphibia: Anura) based on five nuclear and three mitochondrial genes, with comments on the evolution of reproduction. *Molecular Phylogenetics and Evolution*, 53, 509–522.
Lynch, J.D. (1971) Evolutionary relationships, osteology, and zoogeography of leptodactyloid frogs. *University of Kansas Museum of Natural History, Miscellaneous Publications*, 53, 1–238.
Lynch, J.D. (1973) The transition from archaic to advanced frogs. *In*: Vial, J.L. (Ed.), *Evolutionary Biology of the Anurans: Contemporary Research on Major Problems*. University of Missouri Press, Columbia, pp. 133–182.

Maciel, N.D., Collevatti, R.G., Colli, G.R. & Schwartz, E.F. (2010) Late Miocene diversification and phylogenetic relationships of the huge toads in the *Rhinella marina* (Linnaeus, 1758) species group (Anura: Bufonidae). *Molecular Phylogenetics and Evolution*, 57, 787–797.

Manzanilla, J., La Marca, E. & García-París, M. (2009) Phylogenetic patterns of diversification in a clade of Neotropical frogs (Anura: Aromobatidae: *Mannophryne*). *Biological Journal of the Linnean Society*, 97, 185–199.

Marjanović, D. & Laurin, M. (2007) Fossils, molecules, divergence times, and the origin of lissamphibians. *Systematic Biology*, 56, 369–388

Marjanović, D. & Laurin, M. (2008). A reevaluation of the evidence supporting an unorthodox hypothesis on the origin of extant amphibians. *Contributions to Zoology*, 77, 149–199.

Marjanović, D. & Laurin, M. (2009) The origin(s) of modern amphibians: a commentary. *Evolutionary Biology*, 36, 336–338.

Meegaskumbura, M., Meegaskumbura, S., Bowatte, G., Manamendra-Arachchi, K., Pethiyagoda, R., Hanken, J. & Schneider, C.J. (2010) *Taruga* (Anura: Rhacophoridae), a new genus of foam-nesting tree frogs endemic to Sri Lanka. *Ceylon Journal of Science*, 39, 75–94.

Milner, A.R. (2000) Mesozoic and Tertiary Caudata and Albanerpetontidae. *In*: Heatwole, H. & Carroll, R.L. (Eds.), *Amphibian Biology. Volume 4. Palaeontology*, Surrey Beatty & Sons, Chipping Norton, pp. 1412–1444.

Morgan, M.J., Roberts, J.D. & Keogh, J.S. (2007) Molecular phylogenetic dating supports an ancient endemic speciation model in Australia's biodiversity hotspot. *Molecular Phylogenetics and Evolution*, 44, 371–385.

Mueller, R.L., Macey, J.R., Jaekel, M., Wake, D.B. & Boore, J.L. (2004) Morphological homoplasy, life history evolution, and historical biogeography of plethodontid salamanders inferred from complete mitochondrial genomes. *Proceedings of the National Academy of Sciences USA*, 10, 13820–13825.

Nessov, L.A. (1988) Late Mesozoic amphibians and lizards of Soviety Middle Asia. *Acta Zoologica Cracovia*, 31, 475–486.

Noble, G.K. (1925) An outline of the relation of ontogeny to phylogeny within the Amphibia. *American Museum Novitates*, 165, 1–18.

Nuin, P.A.S. & do Val, F.C. (2005) Phylogenetic analysis of the subfamily Hylodinae (Anura, Leptodactylidae) based on morphological characters. *Amphibia-Reptilia*, 26, 139–147.

Nussbaum, R.A. (1982) Heterotopic bones in the hindlimbs of frogs in the families Pipidae, Ranidae, and Sooglossidae. *Herpetologica*, 38, 312–320.

Nussbaum, R.A. (1985) Systematics of caecilians (Amphibia: Gymnophiona) of the family Scolecomorphidae. *Occasional Papers of the Museum of Zoology, University of Michigan*, 713, 1–49.

Nussbaum, R.A., Jaslow, A. & Watson, J. (1982) Vocalization in frogs of the family Sooglossidae. *Journal of Herpetology*, 16, 198–204.

Nussbaum, R.A. & Wilkinson, M. (1989) On the classification and phylogeny of caecilians (Amphibia: Gymnophiona), a critical review. *Herpetological Monographs*, 3, 1–42.

Nussbaum, R.A. & Wu, S.-H. (2007) Morphological assessments and phylogenetic relationships of the Seychellean frogs of the family Sooglossidae (Amphibia: Anura). *Zoological Studies*, 46, 322–335.

Padial, J.M., Castroviejo-Fisher, S. & De la Riva, I. (2009) The phylogenetic relationships of *Yunganastes* revisited (Anura: Terrarana). *Molecular Phylogenetics and Evolution*, 52, 911–915.

Parsons, T.S. & Williams, E.E. (1963) The relationships of the modern Amphibia: a re-examination. *Quarterly Review of Biology*, 38, 26–53.

Pauly, G.B., Hillis, D.M. & Cannatella, D.C. (2009) Taxonomic freedom and the role of official lists of species names. *Herpetologica*, 65, 115–128.

Peabody, F. E. (1954) Trackways of an ambystomid salamander from the Paleocene of Montana. *Journal of Paleontology*, 28, 79–83.

Peng R., Zhang, P. , Xiong, J-L., Gu, H-J., Zeng, X-M. & Zou, F-D. (2010) Rediscovery of *Protohynobius puxiongensis* (Caudata: Hynobiidae) and its phylogenetic position based on complete mitochondrial genomes. *Molecular Phylogenetics and Evolution*, 56, 252–258.

Perez-Peña, P.E., Chavez, G., Twomey, E. & Brown, J.L. (2010) Two new species of *Ranitomeya* (Anura: Dendrobatidae) from eastern Amazonian Peru. *Zootaxa*, 2439, 1–23.

Ponssa, M.L. & Heyer, W.R. (2007) Osteological characterization of four putative species of the genus *Adenomera* (Anura: Leptodactylidae), with comments on intra- and interspecific variation. *Zootaxa*, 1403, 37–54.

Ponssa, M.L., Jowers, M.J. & de Sá, R.O. (2010) Osteology, natural history notes, and phylogenetic relationships of the poorly known Caribbean frog *Leptodactylus nesiotus* (Anura, Leptodactylidae). *Zootaxa*, 2646, 1–25.

Pramuk, J.B., Robertson, T., Sites, Jr., J.W. & Noonan, B.P. (2007) Around the world in 10 million years: biogeography of the nearly cosmopolitan true toads (Anura: Bufonidae). *Global Ecology and Biogeography*, 2007, 1–12.

Pugener, L.A., Maglia, A.M. & Trueb, L. (2003) Revisiting the contribution of larval characters to an analysis of phylogenetic relationships of basal anurans. *Zoological Journal of the Linnean Society*, 139, 129–155.

Pyron, R.A. & Wiens, J.J. (2011) A large-scale phylogeny of Amphibia including over 2,800 species, and a revised classification of extant frogs, salamanders, and caecilians. *Molecular Phylogenetics and Evolution*, 61, 543-583.

Rabanal, F.E. & Formas, J.R. (2009) Complementary diagnosis of the genus *Insuetophrynus* (Anura, Cyclorhamphidae) based on larval characters. *Zootaxa*, 2116, 59–67.

Rao, D.-Q. & Wilkinson, J.A. (2008) Phylogenetic relationships of the mustache toads inferred from mtDNA sequences. *Molecular Phylogenetics and Evolution*, 46, 61–73.

Read, K., Keogh, J.S., Scott, I.A.W., Roberts, J.D. & Doughty, P. (2001) Molecular phylogeny of the Australian frog genera *Crinia*, *Geocrinia*, and allied taxa (Anura: Myobatrachidae). *Molecular Phylogenetics and Evolution*, 21, 294–308.

Rieppel, O. & Grande. L. (1998) A well-preserved fossil amphiumid (Lissamphibia: Caudata) from the Eocene Green River Formation of Wyoming. *Journal of Vertebrate Paleontology*, 18, 700–708.

Roberts, J.L., Brown, J.L., von May, R., Arizabal, W., Presar, A., Symula, R., Schulte, R. & Summers, K. (2006) Phylogenetic relationships among poison frogs of the genus *Dendrobates* (Dendrobatidae): a molecular perspective from increased taxon sampling. *Herpetological Journal*, 16, 377–385.

Roček, Z. (2003) Larval development in Oligocene palaeobatrachid frogs. Acta *Palaeontologica Polonica*, 48, 595–607.

Roček, Z. (2008) The Late Cretaceous frog *Gobiates* from Central Asia: its evolutionary status and possible phylogenetic relationships. *Cretaceous Research*, 29, 577–591.

Roelants, K. & Bossuyt, F. (2005) Archaeobatrachian paraphyly and Pangaean diversification of crown-group frogs. *Systematic Biology*, 54, 111–126.

Roelants, K., Jiang, J. & Bossuyt, F. (2004) Endemic ranid (Amphibia: Anura) genera in southern mountain ranges of the Indian subcontinent represent ancient frog lineages: evidence from molecular data. *Molecular Phylogenetics and Evolution*, 31, 730–740.

Roelants, K., Gower, D.J., Wilkinson, M., Loader, S.P., Biju, S.D., Guillaume, K., Moriau, L. & Bossuyt, F. (2007) Global patterns of diversification in the history of modern amphibians. *Proceedings of the National Academy of Sciences USA*, 104, 887–892.

Rogers, K. (1976) Herpetofauna of the Beck Ranch Local Fauna (Upper Pliocene: Blancan) of Texas. *Publications of the Museum, Michigan State University, Paleontological Series*, 1, 163–200.

Romer, A. S. (1966) *Vertebrate Paleontology*. Third Edition. University of Chicago Press, Chicago, 468 pp.

Rosauer, D., Laffan, S.W., Crisp, M.D., Donnellan, S.C. & Cook, L.G. (2009) Phylogenetic endemism: a new approach for identifying geographical concentrations of evolutionary history. *Molecular Ecology*, 18, 4061–4072.

Ruane, S., Pyron, R.A. & Burbrink, F.T. (2011) Phylogenetic relationships of the Cretaceous frog *Beelzebufo* from Madagascar and the placement of fossil constraints based on temporal and phylogenetic evidence. *Journal of Evolutionary Biology*, 24, 274–285.

Ruta, M., Jeffery, J.E. & Coates, M.I. (2003) A supertree of early tetrapods. *Proceedings of the Royal Society of London B*, 270, 2507–2516.

Ruvinsky, I. & Maxson, L.R. (1996) Phylogenetic relationships among bufonoid frogs (Anura: Neobatrachia) inferred from mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution*, 5, 533–547.

San Mauro, D. (2010) A multilocus timescale for the origin of extant amphibians. *Molecular Phylogenetics and Evolution*, 56, 554–561.

San Mauro, D., García-París, M. & Zardoya, R. (2004a) Phylogenetic relationships of discoglossid frogs (Amphibia: Anura: Discoglossidae) based on complete mitochondrial genomes and nuclear genes. *Gene*, 343, 357–366.

San Mauro, D., Gower, D.J., Massingham, T., Wilkinson, M., Zardoya, R. & Cotton, J.A. (2009) Experimental design in caecilian systematics: phylogenetic information of mitochondrial genomes and nuclear *rag1*. *Systematic Biology*, 58, 425–438.

San Mauro, D., Gower, D.J., Oommen, O.V., Wilkinson, M. & Zardoya, R. (2004b) Phylogeny of caecilian amphibians (Gymnophiona) based on complete mitochondrial genomes and nuclear RAG1. *Molecular Phylogenetics and Evolution*, 33, 413–427.

San Mauro, D., Vences, M., Alcobendas, M., Zardoya, R. & Meyer, A. (2005) Initial diversification of living amphibians predated the breakup of Pangaea. *American Naturalist*, 165, 590–599.

Sanchíz, B. (1998) *Part 4. Salientia. Handbuch der Paläoherpetologie*. P. Wellnhofer (Ed.). Fischer Verlag, Stuttgart, 275 pp.

Santos, J.C. & Cannatella, D.C. (2011) Phenotypic integration emeges from aposematism and scale in poison frogs. *Proceedings of the National Academy of Sciences USA*, 108, 6175–6180.

Santos, J.C., Coloma, L.A., Summers, K., Caldwell, J.P., Ree, R. & Cannatella, D.C. (2009) Amazonian amphibian diversity is primarily derived from Late Miocene Andean lineages. *PLoS Biology*, 7, e1000056.

Scott, E. (2005) A phylogeny of ranid frogs (Anura: Ranoidea: Ranidae), based on a simultaneous analysis of morphological and molecular data. *Cladistics*, 21, 507–574.

Sigurdsen, T. & Green, D.M. (2001) The origin of modern amphibians: a re-evaluation. Zoological Journal of the Linnean Society, 162, 457–462.

Skutschas, P.P. (2009) Re-evaluation of *Mynbulakia* (Lissamphibia: Caudata) and description of a new salamander genus from the Late Cretaceous of Uzbekistan. *Journal of Vertebrate Paleontology*, 29, 659–664.

Skutschas, P.P. & Gubin, Y.M. (In press) A new salamander from the late Paleocene–early Eocene of Ukraine. *Acta Palaeontologica Polonica*, DOI:10.4202/app.2010.0101

Skutschas, P. & Martin, T. (2011) Cranial anatomy of the stem salamander *Kokartus honorarius* (Amphibia: Caudata) from the Middle Jurassic of Kyrgyzstan. *Zoological Journal of the Linnean Society*, 161, 816–838.

Stuart, B.L. (2008) The phylogenetic problem of *Huia* (Amphibia: Ranidae). Molecular *Phylogenetics and Evolution*, 46, 49–60.

Sweetman, S.C. & Gardner, J.D. (In press) A new albanerpetontid amphibian from the Early Cretaceous (Barremian) Wessex Formation of the Isle of Wight, southern England. *Acta Palaeontologica Polonica*, DOI:10.4202/app.2011.0109

Taylor, E.H. (1941) A new anuran from the middle Miocene of Nevada. *University of Kansas Science Bulletin*, 27, 61–69.

Trueb, L. & Báez, A. (2006) Revision of the Early Cretaceous *Cordicephalus* from Israel and an assessment of its relationships among pipoid frogs. *Journal of Vertebrate Paleontology*, 26, 44–59.

Trueb, L. & Cloutier, R. (1991a) Toward an understanding of the amphibians: two centuries of systematic history. *In*: Schultze, H.-P. & Trueb, L. (Eds.), *Origins of the Higher Groups of Tetrapods: Controversy and Consensus*. Cornell University Press, Ithaca, pp. 175–193.

Trueb, L., & Cloutier, R. (1991b) A phylogenetic investigation of the inter- and intrarelationships of the Lissamphibia (Amphibia: Temnospondyli). *In*: Schultze, H.-P. & Trueb, L. (Eds.), *Origins of the Higher Groups of Tetrapods: Controversy and Consensus*. Cornell University Press, Ithaca, pp. 223–313.

Trueb, L., Diaz, R. & Blackburn, D.C. (In press) Osteology and chondrocranial morphology of *Gastrophryne carolinensis* (Anura: Microhylidae), with a review of the osteological diversity of New World microhylids. *Phyllomedusa*.

Trueb, L., Ross, C.F. & Smith, R. (2005) A new pipoid anuran from the Late Cretaceous of South Africa. *Journal of Vertebrate Paleontology*, 25, 533–547.

Twomey, E. & Brown, J.L. (2008) Spotted poison frogs: rediscovery of a lost species and a new genus (Anura: Dendrobatidae) from northwestern Peru. *Herpetologica*, 64, 121–137.
Twomey, E. & Brown, J.L. (2009) Another new species of *Ranitomeya* (Anura: Dendrobatidae) from Amazonian Columbia. *Zootaxa*, 2302, 48–60.
Van Bocxlaer, I., Biju, S.D., Loader, S.P. & Bossuyt, F. (2009) Toad radiation reveals into-India dispersal as a source of endemism in the Western Ghats-Sri Lanka biodiversity hotspot. *BMC Evolutionary Biology*, 9, 131.
Van Bocxlaer, I., Loader, S.P., Roelants, K., Biju, S.D., Menegon, M. & Bossuyt, F. (2010) Gradual adaptation toward a range-expansion phenotype initiated the global radiation of toads. *Science*, 327, 679–682.
Van Bocxlaer, I., Roelants, K., Biju, S.D., Nagaraju, J. & Bossuyt, F. (2006) Late Cretaceous vicariance in Gondwanan amphibians. *PLoS ONE*, 1, e74.
van der Meijden, A., Boistel, R., Gerlach, J., Ohler, A., Vences, M. & Meyer, A. (2007a) Molecular phylogenetic evidence for paraphyly of the genus *Sooglossus*, with the description of a new genus of Seychellean frogs. *Biological Journal of the Linnean Society*, 91, 347–359.
van der Meijden, A., Crottini, A., Tarrant, J., Turner, A. & Vences, M. (2011) Multi-locus phylogeny and evolution of reproductive modes in the Pyxicephalidae, an African endemic clade of frogs. *African Journal of Herpetology*, 60, 1–12.
van der Meijden, Vences, M., Hoegg, S., Boistel, R., Channing, A. & Meyer, A. (2007b) Nuclear gene phylogeny of narrow-mouthed toads (Family: Microhylidae) and a discussion of competing hypotheses concerning their biogeographical origins. *Molecular Phylogenetics and Evolution*, 44, 1017–1030.
van der Meijden, A., Vences, M., Hoegg, S. & Meyer, A. (2005) A previously unrecognized radiation of ranid frogs in Southern Africa revealed by nuclear and mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution*, 37, 674–685.
van der Meijden, A., Vences, M. & Meyer, A. (2004) Novel phylogenetic relationships of the enigmatic brevicipitine and scaphiophrynine toads as revealed by sequences from the nuclear *Rag-1* gene. *Proceedings of the Royal Society of London, B*, 271, S378–S381.
van Dijk, D.E. (2008) Clades in heleophyrnid Salientia. *African Journal of Herpetology*, 57, 43–48.
Veith, M., Fromhage, L., Kosuch, J. & Vences, M. (2006) Historical biogeography of Western Palaearctic pelobatid and pelodytid frogs: a molecular phylogenetic perspective. *Contributions to Zoology*, 75, 109–120.
Veith, M., Kosuch, J., Rödel, M.-O., Hillers, A., Schmitz, A., Burger, M. & Lötters, S. (2009) Multiple evolution of sexual dichromatism in African reed frogs. *Molecular Phylogenetics and Evolution*, 51, 388–393.
Vences, M., Kosuch, J., Lötters, S., Widmer, A., Jungfer, K.-H., Köhler, J. & Veith, M. (2000) Phylogeny and classification of poison frogs (Amphibia: Dendrobatidae), based on mitochondrial 16S and 12S ribosomal RNA gene sequences. *Molecular Phylogenetics and Evolution*, 15, 34–40.
Vences, M., Kosuch, J., Boistel, R., Haddad, C. F. B., La Marca, E., Lötters, S. & Veith, M. (2003a) Convergent evolution of aposematic coloration in Neotropical poison frogs: a molecular phylogenetic perspective. *Organisms Diversity and Evolution*, 3, 215–226.
Vences, M., Kosuch, J., Glaw, F., Böhme, W. & Veith, M. (2003b) Molecular phylogeny of hyperoliid treefrogs: biogeographic origin of Malagasy and Seychellean taxa and re-analysis of familial paraphyly. *Journal of Zoological Systematics and Evolutionary Research*, 41, 205–215.
Vences, M., Vieites, D.R., Glaw, F., Brinkmann, H., Kosuch, J., Veith, M. & Meyer, A. (2003c) Multiple overseas dispersal in amphibians. *Proceedings of the Royal Society B*, 270, 2435–2442.
Venczel, M. (1999) Land salamanders of the family Hynobiidae from the Neogene and Quaternary of Europe. *Amphibia-Reptilia*, 20, 401–412.
Venczel, M. (2008) A new salamandrid amphibian from the Middle Miocene of Hungary and its phylogenetic relationships. *Journal of Systematic Palaeontology*, 6, 41–59.
Verdade, V.K. & Rodrigues, M.T. (2007) Taxonomic review of *Allobates* (Anura, Aromobatidae) from the Atlantic Forest, Brazil. *Journal of Herpetology*, 41, 566–580.
Vieites, D.R., Zhang, P. & Wake, D.B. (2009) Salamanders (Caudata). *In*: Hedges, S.B. & Kumar, S. (Eds.), *The Timetree of Life*. Oxford University Press, New York, pp. 365–368.
Vieites, D.R., M.-S. Min & Wake, D.B. (2007) Rapid diversification and dispersal during periods of global warming by plethodontid salamanders. *Proceedings of the National Academy of Sciences USA*, 104, 19903–19907.
Vieites, D.R., Nieto-Román, S., Wake, M.H. & Wake, D.B. (2011) A multigenic perspective on phylogenetic relationships in the largest family of salamanders, the Plethodontidae. *Molecular Phylogenetics and Evolution*, 59, 623–635.
Wake, D.B. & Özeti, N. (1969) Evolutionary relationships in the family Salamandridae. *Copeia*, 1969, 124–137.
Wake, M.H. (1993) Non-traditional characters in the assessment of caecilian phylogenetic relationships. *Herpetological Monographs*, 7, 42–55.
Wang, Y. & Evans, S.E. (2006) A new short-bodied salamander from the Upper Jurassic/Lower Cretaceous of China. *Acta Palaeontologica Polonica*, 51, 127–130.
Wang, Y., Gao, K. & Xu, X. (2001) Early evolution of discoglossid frogs: new evidence from the Mesozoic of China. *Naturwissenschaften*, 87, 417–420.
Weisrock, D.W., Papenfuss, T.J., Macey, J.R., Litvinchuk, S.N., Polymeni, R., Ugurtas, I.H., Zhao, E.-M., Jowkar, H. & Larson A. (2006) A molecular assessment of phylogenetic relationships and lineage accumulation rates within the family Salamandridae (Amphibia, Caudata). *Molecular Phylogenetics and Evolution*, 41, 368–383.
Wiens, J.J. (2007) Global patterns of diversification and species richness in amphibians. *American Naturalist*, 170, S86–S106.
Wiens, J.J., Fetzner, Jr., J.W., Parkinson, C.L. & Reeder, T.W. (2005) Hylid frog phylogeny and sampling strategies for speciose clades. *Systematic Biology*, 54, 719–748.

Wiens, J.J., Sukumaran, J., Pyron, R.A. & Brown, R.M. (2009) Evolutionary and biogeographic origins of high tropical diversity in Old World frogs (Ranidae). *Evolution*, 63, 1217–1231.
Wilkinson, M., Loader, S.P., Gower, D.J., Sheps, J.A. & Cohen, B.L. (2003) Phylogenetic relationships of African caecilians (Amphibia: Gymnophiona): insights from mitochondrial rRNA gene sequences. *African Journal of Herpetology*, 52, 83–92.
Wilkinson, M. & Nussbaum, R.A. (1996) On the phylogenetic position of the Uraeotyphlidae. *Copeia*, 1996, 550–562.
Wilkinson, M. & Nussbaum, R.A. (1997) Comparative morphology and evolution of the lungless caecilian *Atretochoana eiselti* (Taylor) (Amphibia: Gymnophiona: Typhlonectidae). *Biological Journal of the Linnean Society*, 62, 39–109.
Wilkinson, M. & Nussbaum, R.A. (1999) Evolutionary relationships of the lungless caecilian *Atretochoana eiselti* (Amphibia: Gymnophiona: Typhlonectidae). *Zoological Journal of the Linnean Society*, 126, 191–223.
Wilkinson, M. & Nussbaum, R.A. (2006) Caecilian phylogeny and classification. *In*: Exbrayat, J.-M. (Ed.), *Reproductive Biology and Phylogeny of Gymnophiona*. Science Publishers, Enfield, pp. 39–78.
Wilkinson , M., San Mauro, D., Sherratt, E. & Gower, D. J. (2011) A nine-family classification of caecilians (Amphibia: Gymnophiona). *Zootaxa*, 2874, 41–64.
Yu, G., Rao, D., Zhang, M. & Yang, J. (2009) Re-examination of the phylogeny of Rhacophoridae (Anura) based on mitochondrial and nuclear DNA. *Molecular Phylogenetics and Evolution*, 50, 571–579.
Zhang, G., Wang, Y., Jones, M.E.H. & Evans, S.E. (2009) A new Early Cretaceous salamander (*Regalerpeton weichangensis* gen. et sp. nov.) from the Huajiying Formation of northeastern China. *Cretaceous Research*, 30, 551–558.
Zhang, P., Papenfuss, T.J., Wake, M.H., Qu, L. & Wake, D.B. (2008) Phylogeny and biogeography of the family Salamandridae (Amphibia: Caudata) inferred from complete mitochondrial genomes. *Molecular Phylogenetics and Evolution*, 49, 586–597.
Zhang, P. & Wake, D.B. (2009a) Higher-level salamander relationships and divergence dates inferred from complete mitochondrial genomes. *Molecular Phylogenetics and Evolution*, 53, 492–508.
Zhang, P. & Wake, M.H. (2009b) A mitogenomic perspective on the phylogeny and biogeography of living caecilians (Amphibia: Gymnophiona). *Molecular Phylogenetics and Evolution*, 53, 479–491.
Zheng, Y., Peng, R., Kuro-o, M. & Zeng, X. (2011) Exploring patterns and extent of bias in estimating divergence time from mitochondrial DNA sequence data in a particular lineage: a case study from salamanders (Order Caudata). *Molecular Biology and Evolution*, 28, 2521–2535.
Zimkus, B.M., Rödel, M.-O. & Hillers, A. (2010) Complex patterns of continental speciation: molecular phylogenetics and biogeogrpahy of sub-Saharan puddle frogs (*Phrynobatrachus*). *Molecular Phylogenetics and Evolution*, 55, 883–900.
Zweifel, R.G. (1956) Two pelobatid frogs from the Tertiary of North America and their relationships to fossil and recent forms. *American Museum Novitates*, 1762, 1–46.

Author Addresses

David C. Blackburn, Department of Vertebrate Zoology & Anthropology, California Academy of Sciences, 55 Music Concourse Drive, San Francisco, California 94118 USA; dblackburn@calacademy.org
David B. Wake, Museum of Vertebrate Zoology and Department of Integrative Biology, University of California, Berkeley, California 94708-3160 USA; wakelab@berkeley.edu

Class **Mammalia** Linnaeus, 1758[1, 2] (2 subclasses)

- Subclass **Prototheria** Gill, 1872 (1 order)
  - Order **Monotremata** Bonaparte, 1837 (2 families)
    - Family **Tachyglossidae** Gill, 1872 (2 genera, 4 species)
    - Family **Ornithorhynchidae** Gray, 1825 (1 genus, 1 species)
- Subclass **Theria** Parker and Haswell, 1897 (2 infraclasses)
  - Infraclass **Marsupialia** Illiger, 1811 (7 orders)
    - Order **Didelphimorphia** Gill, 1872 (1 family)
      - Family **Didelphidae** Gray, 1821 (18 genera, 93 species)
    - Order **Paucituberculata** Ameghino, 1894 (1 family)
      - Family **Caenolestidae** Trouessart, 1898 (3 genera, 7 species)
    - Order **Microbiotheria** Ameghino, 1889 (1 family)
      - Family **Microbiotheriidae** Ameghino, 1887 (1 genus, 1 species)
    - Order **Notoryctemorphia** Kirsch, in Hunsaker, 1977 (1 family)
      - Family **Notoryctidae** Ogilby, 1892 (1 genus, 2 species)
    - Order **Dasyuromorphia** Gill, 1872 (3 families)
      - Family **Thylacinidae** Bonaparte, 1838 (1 genus, 1 species)
      - Family **Myrmecobiidae** Waterhouse, 1841 (1 genus, 1 species)
      - Family **Dasyuridae** Goldfuss, 1820 (20 genera, 70 species)
    - Order **Paramelemorphia** Ameghino, 1889 (3 families)
      - Family **Thylacomyidae** Bensley, 1903 (1 genus, 2 species)
      - Family **Chaeropodidae** Gill, 1872 (1 genus, 1 species)
      - Family **Peramelidae** 6 genera, 19 species)
    - Order **Diprotodontia** Owen, 1866 (3 suborders)
      - Suborder **Vombatiformes** Burnett, 1830 (2 families)
        - Family **Phascolarctidae** Owen, 1839 (1genus, 1 species)
        - Family **Vombatidae** Burnett, 1830 (2 genera, 3 species)
      - Suborder **Phalangeriformes** Szalay, in Archer, 1982 (2 superfamilies)
        - Superfamily **Phalangeroidea** Thomas, 1888 (2 families)
          - Family **Burramyidae** Broom, 1898 (2 genera, 5 species)
          - Family **Phalangeridae** Thomas, 1888 (6 genera, 30 species)
        - Superfamily **Petauroidea** Bonaparte, 1838 (4 families)
          - Family **Pseudocheiridae** Winge, 1893 (6 genera, 17 species)
          - Family **Petauridae** Bonaparte, 1838 (3 genera, 11 species)
          - Family **Tarsipedidae** Gervais and Verreaux, 1842 (1genus, 1 species)
          - Family **Acrobatidae** Aplin, 1987 (2 genera, 2 species)
      - Suborder **Macropodiformes** Ameghino, 1889 (3 families)
        - Family **Hypsiprymnodontidae** Collett, 1877 (1 genus, 1 species)
        - Family **Potoroidae** Gray, 1821 (4 genera, 10 species)
        - Family **Macropodidae** Gray, 1821 (11 genera, 65 species)
  - Infraclass **Placentalia** Owen, 1837 (21 Orders)
    - Order **Afrosoricida** Stanhope, 1998 (2 suborders)
      - Suborder **Tenrecomorpha** Butler, 1792 (1 family)
        - Family **Tenrecidae** Gray, 1821 (10 genera, 31 species)
      - Suborder **Chrysochloridea** Bloom, 1915 (1 family)
        - Family **Chrysochloridae** Gray, 1825 (9 genera, 22 species)
    - Order **Macroscelidea** Butler, 1956 (1 family)
      - Family Macroscelididae Bonaparte, 1838 (4 genera, 15 species)
    - Order **Tubulidentata** Huxley, 1872 (1 family)

---

1. **BY** D.E. Wilson & D.M. Reeder (for full contact details, see **Author names and addresses** after **References**). The title of this contribution should be cited as "Class Mammalia Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Classification of Recent Mammalia based on Wilson & Reeder (2005), with numbers updated in some cases. Recent Mammalia currently includes 157 families, 1,230 genera and 5,750 species

Family Orycteropodidae Gray, 1821 (1 genus, 1 species)
Order **Hyracoidea** Huxley, 1869 (1 family)
Family Procaviidae Thomas, 1892 (3 genera, 5 species)
Order **Proboscidea** Illiger, 1811 (1 family)
Family Elephantidae Gray, 1821 (2 genera, 3 species)
Order **Sirenia** Illiger, 1811 (2 families)
Family Dugongidae Gray, 1821 (1 genus, 1 species)
Family Trichechidae Gill, 1872 (1 genus, 3 species)
Order **Cingulata** Illiger, 1811 (1 family)
Family Dasypodidae Gray, 1821 (9 genera, 21 species)
Order **Pilosa** Flower, 1883 (2 suborders)
Suborder Folivora Delsuc et al., 2001 (2 families)
Family Bradypodidae Gray, 1821 (1 genus, 4 species)
Family Megalonychidae Ameghino, 1889 (1 genus, 2 species)
Suborder Vermilingua Illiger, 1811 (2 families)
Family Cyclopedidae Pocock, 1924 (1 genus, 1 species)
Family Myrmecophagidae Gray 1825 (2 genera, 3 species)
Order **Scandentia** Wagner, 1855 (2 families)
Family Tupaiidae Gray, 1825 (4 genera, 19 species)
Family Ptilocercidae Lyon, 1913 (1 genus, 1 species)
Order **Dermoptera** Illiger, 1811 (1 family)
Family Cynocephalidae Simpson, 1945 (2 genera, 2 species)
Order **Primates** Linnaeus, 1758 (2 suborders)
Suborder Strepsirrhini Geoffroy Saint-Hilaire, 1812 (3 infraorders)
Infraorder Lemuriformes Gray, 1821 (2 superfamilies)
Superfamily Cheirogaleoidea Gray, 1873 (1 family)
Family Cheirogaleidae Gray, 1873 (5 genera, 25 species)
Superfamily Lemuroidea Gray, 1821 (3 families)
Family Lemuridae Gray, 1821 (5 genera, 20 species)
Family Lepilemuridae Gray, 1870 (1 genus, 11 species)
Family Indridae Burnett, 1828 (3 genera, 12 species)
Infraorder Chiromyiformes Anthony & Coupin, 1931 (1 family)
Family Daubentoniidae (1 genus, 1 species)
Infraorder Lorisiformes Gregory, 1915 (2 families)
Family Lorisidae Gray, 1821 (5 genera, 9 species)
Family Galagidae Gray, 1825 (3 genera 19 species)
Suborder Haplorrhini Pocock, 1918 (2 infraorders)
Infraorder Tarsiiformes Gregory, 1915 (1 family)
Family Tarsiidae Gray, 1825 (1 genus, 8 species)
Infraorder Simiiformes Haeckel, 1866 (2 parvorders)
Parvorder Platyrrhini Geoffroy St. Hilaire, 1812 (4 families)
Family Cebidae Bonaparte, 1831 (6 genera, 60 species)
Family Aotidae Elliot, 1913 (1 genus, 8 species)
Family Pitheciidae Mivart, 1865 (4 genera, 42 species)
Family Atelidae Gray, 1825 (5 genera, 25 species)
Parvorder Catarrhini Geoffroy St. Hilaire, 1812 (2 superfamilies)
Superfamily Cercopithecoidea Gray 1821 (1 family)
Family Cercopithecidae Gray, 1821 (21 genera, 135 species)
Superfamily Hominoidea Gray, 1825 (2 families)
Family Hylobatidae Gray, 1871 (4 genera, 14 species)
Family Hominidae Gray, 1825 (4 genera, 7 species)
Order **Rodentia** Bowdich, 1821 (5 suborders)
Suborder Sciuromorpha Brandt, 1855 (3 families)
Family Aplondontiidae Brandt, 1855 (1 genus, 1 species)

Family Sciuridae Fischer, 1817 (58 genera, 285 species)
Family Gliridae Muirhead, 1819 (9 genera, 28 species)
Suborder Castorimorpha Wood, 1955 (3 families)
Family Castoridae Hemprich 1820 (1 genus, 2 species)
Family Heteromyidae Gray, 1868 (6 genera, 62 species)
Family Geomyidae Bonaparte, 1845 (6 genera, 40 species)
Suborder Myomorpha Brandt, 1855 (2 superfamilies)
Superfamily Dipodoidea Fischer, 1817 (1 family)
Family Dipodidae Fischer, 1817 (16 genera, 51 species)
Superfamily Muroidea Illiger, 1811 (6 families)
Family Platacanthomyidae (2 genera, 2 species)
Family Spalacidae Gray, 1821 (6 genera, 37 species)
Family Calomyscidae Vorontsov & Potapova, 1979 (1 genus, 8 species)
Family Nesomyidae Major, 1807 (21 genera, 65 species)
Family Cricetidae Fischer, 1817 (130 genera, 700 species)
Family Muridae Illiger, 1811 (150 genera, 752 species)
Suborder Anomaluromorpha Bugge, 1974 (2 families)
Family Anomaluridae Gervais, 1849 (3 genera, 7 species)
Family Pedetidae Gray, 1825 (1 genus, 2 species)
Suborder Hystricomorpha Brandt, 1855 (2 infraorders)
Infraorder Ctenodactylomorphi Chaline & Mein, 1979 (2 families)
Family Ctenodactylidae Chaline & Mein, 1979 (4 genera, 5 species)
Family Diatomyidae Mein & Ginsberg, 1997 (1 genus, 1 species)
Infraorder Hystricognathi Tullberg, 1899 (18 families)
Family Bathyergidae Waterhouse, 1841 (5 genera, 16 species)
Family Hystricidae Fischer, 1817 (3 genera, 11 species)
Family Petromuridae Tullberg, 1899 (1 genus, 1 species)
Family ThryonomyidaeFitzinger, 1867 (1 genus, 2 species)
Family Erethizontidae Bonaparte, 1845 (5 genera, 16 species)
Family Chinchillidae Bennett, 1833 (3 genera, 7 species)
Family Dinomyidae Peters, 1873 (1 genus, 1 species)
Family Caviidae Fischer, 1817 (6 genera, 20 species)
Family Dasyproctidae Bonaparte, 1838 (2 genera, 13 species)
Family Cuniculidae Miller & Gidley, 1918 (1 genus, 2 species)
Family Ctenomyidae Lesson, 1842 (1 genus, 60 species)
Family Octodontidae Waterhouse, 1840 (8 genera, 13 species)
Family Abrocomidae Miller & Gidley, 1918 (2 genera, 10 species)
Family Echimyidae Gray, 1825 (21 genera, 92 species)
Family Myocastoridae Ameghino, 1904 (1 genus, 1 species)
Family Capromyidae Smith, 1842 (8 genera, 20 species)
Family Heptaxodontidae Anthony, 1917 (4 genera, 4 species)
Order **Lagomorpha** Brandt, 1855 (3 families)
Family Ochotonidae Thomas, 1897 (1 genus, 30 species)
Family Prolagidae Gureev, 1964 (1 genus, 1 species)
Family Leporidae Fischer, 1817 (11 genera, 61 species)
Order **Erinaceomorpha** Gregory, 1910 (1 family)
Family Erinaceidae Fischer, 1814 (10 genera, 24 species)
Order **Soricomorpha** Gregory, 1910 (3 families)
Family Solenodontidae Gill, 1872 (1 genus, 4 species)
Family Soricidae Fischer, 1814 (26 genera, 385 species)
Family Talpidae Fischer, 1814 (17 genera, 39 species)
Order **Chiroptera** Blumenbach, 1779 (18 families)
Family Pteropodidae Gray, 1821 (42 genera, 190 species)
Family Rhinolophidae Gray, 1825 (1 genus, 80 species)

Family Hipposideridae Lydekker, 1891 (9 genera, 85 species)
Family Megadermatidae Allen, 1864 (4 genera, 5 species)
Family Rhinopomatidae Bonaparte, 1838 (1 genus, 4 species)
Family Craseonycteridae Hill, 1974 (1 genus, 1 species)
Family EmballonuridaeGervais, 1855 (13 genera, 51 species)
Family Nycteridae Van der Hoeven, 1855 (1 genus, 16 species)
Family Myzopodidae Thomas, 1904 (1 genus, 1 species)
Family Mystacinidae Dobson, 1875 (1 genus, 2 species)
Family Phyllostomidae Gray, 1825 (55 genera, 180 species)
Family Mormoopidae Saussure, 1860 (2 genera, 10 species)
Family Noctilionidae Gray, 1821 (1 genus, 2 species)
Family Furipteridae Gray, 1866 (2 genera, 2 species)
Family Thyropteridae Miller, 1907 (1 genus, 4 species)
Family Natalidae Gray, 1866 (3 genera, 9 species)
Family Molossidae Gervais, 1856 (16 genera, 104 species)
Family Vespertilionidae Gray, 1821 (48 genera, 425 species)

Order **Pholidota** (1 family)

Family Manidae Gray, 1821 (1 genus, 8 species)

Order **Carnivora** Bowdich, 1821 (2 suborders)

Suborder Feliformia Kretzoi, 1945 (7 families)

Family Nandiniidae Pocock, 1929 (1 genus, 1 species)
Family Felidae Fischer, 1817 (14 genera, 40 species)
Family Prionodontidae Pocock, 1933 (1 genus, 2 species)
Family Viverridae Gray, 1821(14 genera, 34 species)
Family Hyaenidae Gray, 1821 (4 genera, 4 species)
Family Herpestidae Bonaparte, 1845 (15 genera, 34 species)
Family Eupleridae Chenu, 1850 (7 genera, 8 species)

Suborder Caniformia Kretzoi, 1938 (9 families)

Family Canidae Fischer, 1817 (13 genera, 35 species)
Family Ursidae Fischer, 1817 (5 genera, 8 species)
Family Otariidae Gray, 1825 (7 genera, 16 species)
Family Odobenidae Allen, 1880 (1 genus, 1 species)
Family Phocidae Gray, 1821 (13 genera, 19 species)
Family Ailuridae Gray, 1843 (1 genus,1 species)
Family Procyonidae Gray, 1825 (6 genera, 12 species)
Family Mephitidae Bonaparte, 1845 (4 genera, 12 species)
Family Mustelidae Fischer, 1817 (22 genera, 57 species)

Order **Perissodactyla** Owen, 1848 (3 families)

Family Equidae Gray, 1821 (1 genus, 7 species)
Family Rhinocerotidae Gray, 1821 (4 genera, 5 species)
Family Tapiridae Gray, 1821 (1 genus, 4 species)

Order **Artiodactyla** Owen, 1848 (10 families)

Family Camelidae Gray, 1821 (3 genera, 6 species)
Family Suidae Gray, 1821 (6 genera, 17 species)
Family Tayassuidae Palmer, 1897 (3 genera, 3 species)
Family Hippopotamidae Gray, 1821 (2 genera, 2 species)
Family Tragulidae Milne-Edwards, 1864 (3 genera, 10 species)
Family Moschidae Gray, 1821 (1 genus, 7 species)
Family Cervidae Goldfuss, 1820 (18 genera, 53 species)
Family Bovidae Gray, 1821 (54 genera, 280 species)
Family Antilocapridae Gray, 1866 (1 genus, 1 species)
Family Giraffidae Gray, 1821 (2 genera, 2 species)

Order **Cetacea** Brisson, 1762 (2 suborders)

Suborder Mysticeti Flower, 1864 (4 families)

Family Balaenidae Gray, 1821 (2 genera, 4 species)
Family Balaenopteridae Gray, 1864 (2 genera, 8 species)
Family Eschrichtiidae Ellerman & Morrison-Scott, 1951 (1 genus, 1 species)
Family Neobalaenidae Gray, 1873 (1 genus, 1 species)
Suborder Odontoceti Flower, 1867 (7 families)
Family Delphinidae Gray, 1821 (17 genera, 36 species)
Family Monodontidae Gray, 1821 (2 genera, 2 species)
Family Phocoenidae Gray, 1825 (3 genera, 6 species)
Family Physeteridae Gray, 1821 (1 genus, 1 species)
Family Kogiidae Gill, 1871 (1 genus, 2 species)
Family Platanistidae Gray, 1846 (1 genus, 2 species)
Family Iniidae Gray, 1846 (1 genus, 2 species)
Family Lipotidae Zhou, Quian & Li, 1978 (1 genus, 1 species)
Family Pontoporiidae Gray, 1870 (1 genus, 1 species)
Family Ziphiidae Gray, 1865 (6 genera, 21 species)

References

Wilson, D.E. & Reeder, D.M. (2005) Mammal Species of the World, Third Edition. Johns Hopkins University Press, 2 volumes, 2,142 pages.

Author names and addresses

D.E. Wilson, Division of Mammals, National Museum of Natural History, NHB 390, MRC 108 Smithsonian Institution, P.O. Box 37012, Washington, D.C. 20013-7012 USA; wilsond@si.edu
DeeAnn M. Reeder, Department of Biology, Bucknell University, Lewisburg, PA 17837 USA; dreeder@bucknell.edu

Order **Testudines** Batsch, 1788[1] (2 suborders)[2]

Suborder **Cryptodira** Cope, 1868 (11 families)

Family **Carettochelyidae** Boulenger, 1887 (1 genus, 1 species)

Family **Cheloniidae** Oppel, 1811 (5 genera, 6 species)

Family **Chelydridae** Gray, 1831 (2 genera, 4 species)

Family **Dermatemydidae** Gray, 1870 (1 genus, 1 species)

Family **Dermochelyidae** Fitzinger, 1843 (1 genus, 1 species)

Family **Emydidae** Rafinesque, 1815 (12 genera, 49 species)[3]

Family **Geoemydidae** Theobald, 1868 (19 genera, 68 species)[4]

Family **Kinosternidae** Agassiz, 1857 (4 genera, 25 species)

Family **Platysternidae** Gray, 1869 (1 genus, 1 species)

Family **Testudinidae** Batsch, 1788 (16 genera, 51 species)[5]

Family **Trionychidae** Fitzinger, 1826 (13 genera, 31 species)[6]

Suborder **Pleurodira** Cope, 1864 (3 families)

Family **Chelidae** Gray, 1825 (14 genera, 52 species)[7]

Family **Pelomedusidae** Cope, 1868 (2 genera, 19 species)[8]

Family **Podocnemididae** Cope, 1868 (3 genera, 8 species)

References

Branch, W.R. (2007) A new species of tortoise of the genus *Homopus* (Chelonia: Testudinidae) from southern Namibia. *African Journal of Herpetology*, 56, 1–21.

Ennen, J.R., Lovich, J.E., Kreiser, B.R., Selman, W. & Qualls, C.P. (2010) Genetic and morphological variation between populations of the Pascagoula map turtle (*Graptemys gibbonsi*) in the Pearl and Pascagoula rivers with description of a new species. *Chelonian Conservation and Biology*, 9, 98–113.

Fritz, U. & Havaš, P. (2007) Checklist of chelonians of the world. *Vertebrate Zoology*, 57, 149–368.

Fritz, U., Guicking, D., Auer, M., Sommer, R.S., Wink, M. & Hundsdörfer, A.K. (2008) Diversity of the Southeast Asian leaf turtle genus *Cyclemys*: how many leaves on its tree of life? *Zoologica Scripta*, 37, 367–390.

Fritz, U., Schmidt, C. & Ernst, C.H. (2011a) Competing generic concepts for Blanding's, Pacific and European pond turtles (*Emydoidea*, *Actinemys* and *Emys*)—Which is best? *Zootaxa*, 2791, 41–53.

Fritz, U., Branch, W.R., Hofmeyr, M.D., Maran, J., Prokop, H., Schleicher, A., Široký, P., Stuckas, H., Vargas-Ramírez, M., Vences, M. & Hundsdörfer, A.K. (2011b) Molecular phylogeny of African hinged and helmeted terrapins (Testudines: Pelomedusidae: *Pelusios* and *Pelomedusa*). *Zoologica Scripta*, 40, 115–125.

Georges, A. & Thomson, S. (2010) Diversity of Australasian freshwater turtles, with an annotated synonymy and keys to species. *Zootaxa*, 2496, 1–37.

Le, M., McCord, W.P. & Iverson, J.B. (2007) On the paraphyly of the genus *Kachuga* (Testudines: Geoemydidae). *Molecular Phylogenetics and Evolution*, 45, 398–404.

Murphy, R.W., Berry, K.H., Edwards, T., Leviton, A.E., Lathrop, A. & Riedle, J.D. (2011) The dazed and confused identity of Agassiz's land tortoise, *Gopherus agassizii* (Testudines, Testudinidae) with the description of a new species, and its consequences for conservation. *ZooKeys*, 113, 39–71.

Praschag, P., Hundsdörfer, A.K. & Fritz, U. (2007a) Phylogeny and taxonomy of endangered South and South-east Asian freshwater turtles elucidated by mtDNA sequence variation (Testudines: Geoemydidae: *Batagur*, *Callagur*, *Hardella*, *Kachuga*, *Pangshura*). *Zoologica Scripta*, 36, 429–442.

Praschag, P., Hundsdörfer, A.K., Reza, A.H.M.A. & Fritz, U. (2007b) Genetic evidence for wild-living *Aspideretes nigricans* and a

1. **BY**: Uwe Fritz (for full contact address, see **Author name and address** after **References**). The title of this contribution should be cited as "Order Testudines Batsch, 1788. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Unless otherwise indicated, this list follows Fritz & Havaš (2007). The order Testudines currently includes, with respect to extant taxa, 14 families, 94 genera and 317 species.
3. See Fritz *et al.* (2011a) for a review of the debated generic delineation of the *Emys* group and Ennen *et al.* (2010) for a newly described *Graptemys* species.
4. *Callagur* and *Kachuga* are treated as synonymous with *Batagur*, see Le *et al.* (2007) and Praschag *et al.* (2007a); see also Praschag *et al.* (2007a, 2008) for species number within *Batagur* and Fritz *et al.* (2008) for species number within *Cyclemys*.
5. See Branch (2007) for a newly described *Homopus* species and Murphy *et al.* (2011) for a newly described *Gopherus* species.
6. *Aspideretes* is treated as synonymous with *Nilssonia* (Praschag *et al.* 2007b); species number within *Pelodiscus* follows Stuckas & Fritz (2011) and within *Lissemys*, Praschag *et al.* (2011).
7. Number of Australasian genera and species follows Georges & Thomson (2010).
8. Vargas-Ramírez *et al.* (2010), Wong *et al.* (2010) and Fritz *et al.* (2011b) suggested that *Pelomedusa*, treated as monotypic genus here, represents a diverse species complex with approximately 10 distinct species; also *Pelusios* contains most probably some additional unrecognized species (Fritz *et al.* 2011b).

molecular phylogeny of South Asian softshell turtles (Reptilia: Trionychidae: *Aspideretes*, *Nilssonia*). *Zoologica Scripta*, 36, 301–310.
Praschag, P., Sommer, R.S., McCarthy, C., Gemel, R. & Fritz, U. (2008) Naming one of the world's rarest chelonians, the southern *Batagur*. *Zootaxa*, 1758, 61–68.
Praschag, P., Stuckas, H., Päckert, M., Maran, J. & Fritz, U. (2011) Mitochondrial DNA sequences suggest a revised taxonomy of Asian flapshell turtles (*Lissemys* Smith, 1931) and the validity of previously unrecognized taxa (Testudines: Trionychidae). *Vertebrate Zoology*, 61, 147–160.
Stuckas, H. & Fritz, U. (2011) Identity of *Pelodiscus sinensis* revealed by DNA sequences of an approximately 180-year-old type specimen and a taxonomic reappraisal of *Pelodiscus* species (Testudines: Trionychidae). *Journal of Zoological Systematics and Evolutionary Research*, 49, 335–339.
Vargas-Ramírez, M., Vences, M., Branch, W.R., Daniels, S.R., Glaw, F., Hofmeyr, M.D., Kuchling, G., Maran, J., Papenfuss, T.J., Široký, P., Vieites, D.R. & Fritz, U. (2010) Deep genealogical lineages in the widely distributed African helmeted terrapin: evidence from mitochondrial and nuclear DNA (Testudines: Pelomedusidae: *Pelomedusa subrufa*). *Molecular Phylogenetics and Evolution*, 56, 428–440.
Wong, R.A., Fong, J.J. & Papenfuss, T.J. (2010) Phylogeography of the African helmeted terrapin, *Pelomedusa subrufa*: genetic structure, dispersal, and human introduction. *Proceedings of the California Academy of Sciences*, 61, 575–585.

Author name and address

Uwe Fritz, Museum of Zoology (Museum für Tierkunde), Senckenberg Dresden, A. B. Meyer Building, D-01109 Dresden, Germany; uwe.fritz@senckenberg.de

Phylum **Nematoda** Cobb 1932[1, 2] (3 classes)[3,4,5,6,7]

Class **Enoplea** Inglis 1983 (3 subclasses)[8]

Subclass **Enoplia** Pearse 1942 (2 superorders)

Superorder **Enoplica** Hodda 2007 (5 orders)[9]

Order **Enoplida** Filipjev 1929 (1 suborder)

Suborder **Enoplina** Chitwood & Chitwood 1937 (3 superfamilies)

Superfamily **Anoplostomatoidea** Gerlach & Riemann 1974 (1 family)[10]

Family **Anoplostomatidae** Gerlach & Riemann 1974 (2 subfamilies, 3 genera, 23 species)[11,12]

Superfamily **Enoploidea** Dujardin 1845 (2 families)

Family **Enoplidae** Dujardin 1845 (1 subfamily, 1 genus, 51 species)[13]

---

1. **BY** Mike Hodda (for full contact address, see **Author name and address** after **References**); the title of this paper should be cited as "Phylum Nematoda Cobb 1932. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Nematoda includes 3 classes, 31 orders, 267 families, 2829 genera and 24,783 species, with fossil taxa represented in 2 genera by 10 species. There are 7 genera and 7 species known only as fossils.
2. Rudolphi (1808) is most often cited as the author of the accepted name of the phylum, which is Nematoda. The first holophyletic diagnosis at Phylum rank used the name "Nemates" (Cobb 1932). The latter name has never been in wide use, and the competing claims of the two names have been discussed extensively (Chitwood 1957, 1958, Dougherty 1958a, 1958b). Following the principle outlined below, Cobb (1932) is cited as authority because his use is specifically as a phylum.
3. The evolutionary affinities of Nematoda have long been controversial (see discussion in Hodda 2007). The most recent molecular evidence has favoured affinities first with Nematomorpha, then with decreasing relationships to Kinorhyncha, Priapulida and Loricifera within a superphylum Ecdysozoa (Aguinaldo *et al.* 1997, Dunn *et al.* 2008). However, significant unresolved differences between phylogenies hypothesised using different taxa, assumptions, methods and lines of evidence remain.
4. Unless indicated otherwise, the classification follows Hodda (2007). The higher classification of the phylum has been interpreted in many ways, with consequent changes in the hierarchical level of many names (Hodda 2007). Above the level of the genus nematode classification has been—and continues to be—volatile. Particularly, analyses of accumulating molecular data have produced only broadly similar phylogenies, and consequently they implied only broadly similar classifications. In addition to topological differences, there remain substantial differences in the support for many groups, and support for branches are often low. Furthermore, composition and support for the various groups remains dependent on the genes and taxa selected as well as the methods of alignment and analysis (De Ley & Blaxter 2004, Hodda 2007, Holterman *et al.* 2006, Meldal *et al.* 2007, Nadler *et al.* 2007, Smythe *et al.* 2006, Van Megen *et al.* 2009). The present classification continues the tradition of regarding branch points in nematode phylogeny that are ambiguous, unsupported or differ between studies as polytomies (Hodda 2007).
5. For Phylum Nematoda, authorities cited in brackets after the main authority are the first to use a name at a particular level, irrespective of the concept represented by the name, and irrespective of uses at other levels. Current names follow the Pearse (1936) system of endings for higher taxa, as advocated by several authors (Chitwood 1958, Pearse 1936), and in wide use. Earlier authors, and those from the former USSR, used a different system of endings, and have been cited as authorities if clearly indicating the use of the name at the particular rank, irrespective of the ending applied to the stem name. In many cases the lower-level taxa included in a group now differs substantially from those when the name was proposed. Taxa are listed in alphabetical order.
6. The known diversity of Nematoda highly underestimates the estimated diversity, by a factor generally estimated at between 10 and 50, but which may be up to 3000 (Lambshead 1993, Brandt *et al.* 2007). Numbers of species in families generally follow the latest revision or checklist available, supplemented by electronic searches for subsequent descriptions (Anderson *et al.* 1974, Andrassy 1999, 2008, De Coninck 1965, Gerlach & Riemann 1974).
7. Ecologically, the phylum has species occurring in every geographic region on earth, probably has parasitic species in every other animal phylum where the body is significantly larger than the nematodes, has species parasitizing all terrestrial or aquatic and a few marine plants (mostly externally and below ground, but also internally and in stems and seeds), and has free-living species in every habitat on earth where liquid water is ever present (including Antarctica and the Arctic sea ice). Trophically, free-living species consume most other types of small-bodied organisms. Generally, only live organisms are consumed; that is nematodes are not saprobes.
   Trophic categories follow Hodda *et al.* (2009).
8. Enoplea have unique characters of the sperm nuclear envelope being retained in mature spermatozoa (absent in all other nematodes studied), no asymmetry in the dividing germ line (present in other nematodes), and no bilateral symmetry during early embryogenesis (present in other nematodes) (Baccetti *et al.* 1983, Justine 2002, Malakhov 1994, Schierenberg 2005, Voronov *et al.* 1998, Yushin 2003a,b). However, these character states are common in animals outside nematodes, and so they may represent plesiomorphies uninformative for phylogenetic analysis (Aleshin 2004). Oncholaimida have a nuclear envelope present (Yushin *et al.* 2002) as an apomorphy, but have affinities with Enoplia from molecular evidence (Holtermann *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). Spermatogenesis and development also provide evidence for the separation of Enoplia from Dorylaimia and Chromadorea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
9. Classification generally follows Lorenzen (1994).
10. Regarded as a superfamily on the basis of molecular evidence (Van Megen *et al.* 2009), as well as morphological differences (Lorenzen 1994) indicating that the clade is on the same level as the Enoploidea.
11. Mostly marine, two species known from freshwater (Smol & Coomans 2006).
12. Some molecular analysis suggests a close affinity to Enoplidae (Pegova *et al.* 2004). On this basis, only a single superfamily Enoploidea has been proposed (Smol & Coomans 2006). However, morphological evidence suggests a separate superfamily: the spacious, toothless buccal cavity surrounded by pharyngeal tissue only in the posterior section, the cephalic capsule lacking mucular insertions, and the constant position of the gonads to the left of the intestine are all apomorphic (Lorenzen 1994). Molecular analyses in broader contexts also suggest Enoplidae and Thoracostomopsidae are a separate clade from Anoplostomatidae (Van Megen *et al.* 2009) or the relationships are unresolved (Meldal *et al.* 2007). Hence a separate superfamily is justified.
13. Marine, microbivorous or predatory.

Family **Thoracostomopsidae** Filipjev 1927 (3 subfamilies, 21 genera, 197 species) [14]

Superfamily **Phanodermatoidea** Schuurmans Stekhoven 1935 (2 families)[15]

Family **Anticomidae** Filipjev 1918 (Hope & Murphy 1972) (1 subfamily, 6 genera, 63 species) [16,17]

Family **Phanodermatidae** Schuurmans Stekhoven 1935 (2 subfamilies, 9 genera, 72 species)[18]

Order **Ironida** Hodda 2007 (4 suborders) [19]

Suborder **Ironina** Siddiqi 1983 (1 superfamily)

Superfamily **Ironoidea** De Man 1876 (3 families)

Family **Ironidae** De Man 1876 (3 subfamilies, 11 genera, 67 species) [20]

Suborder **Oxystominina** Siddiqi 1983 (2 families) [21]

Superfamily **Oxystominoidea** Filipjev 1918 (2 families)

Family **Leptosomatidae** Filipjev 1916 (8 subfamilies, 34 genera, 188 species) [22]

Family **Oxystominidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (3 subfamilies, 12 genera, 171 species) [23,24]

Suborder **Rhabdolaimina** n. rank (1 superfamily) [25]

Superfamily **Rhabdolaimoidea** Chitwood 1951 (n. rank) (2 families) [26]

Family **Andrassyidae** Tchesunov & Gagarin 1999 (2 genera, 3 species) [27,28]

Family **Rhabdolaimidae** Chitwood 1951 (Gerlach & Riemann 1974) (3 subfamilies, 7 genera, 23 species)

Suborder **Campydorina** Jairajpuri 1983 (1 superfamily) [29]

Superfamily **Campydoroidea** Clark 1961 (Jairajpuri *et al.* 1976) (1 family)

Family **Campydoridae** Clark 1961 (1 genus, 2 species) [30]

Order **Tripyloidida** Hodda 2007 (1 superfamily)

Suborder **Tripyloidina** De Coninck 1965 (1 family)

Superfamily **Tripyloidoidea** De Coninck & Schuurmans Stekhoven 1933 (De Coninck 1965)

Family **Tripyloididae** De Coninck & Schuurmans Stekhoven 1933 (1 subfamily, 8 genera, 52 species) [31]

---

14. Mostly marine, three species from freshwater, predatory (Smol & Coomans 2006).
15. Regarded as a superfamily because both molecular and morphological evidence indicates divergence on the same level as Enoploidea and Anoplostomatoidea (Van Megen *et al*. 2009, Lorenzen 1994).
16. Regarded as related to the Phanodermatidae on the basis of similarities in the development of the cephalic region (Lorenzen 1994).
17. Marine, microbivorous.
18. Marine, microbivorous.
19. Classified at order level by Hodda (2007) on the basis of the affinities remaining unresolved (Holterman *et al.* 2006, Meldal *et al.* 2007, Smythe *et al.* 2006).
20. Subfamily Ironinae De Man 1876 occurs in freshwater aquatic and moist terrestrial habitats, while subfamily Thalassironinae Andrassy 1976 is marine.
21. Originally placed in order Alaimida on the basis of general similarities in the thin body shape and the rudimentary buccal cavity, here regarded as a suborder of Ironida on the basis of the oesophageal outline, the position of oesophageal glands, and molecular evidence.
22. Marine, microbivorous.
23. Mostly marine, but nine species are freshwater aquatic (Smol & Coomans 2006); microbivorous.
24. Created as subfamily Oxystomatinae by Filipjev (1918), and Oxystomininae by Chitwood (1935), raised to family by De Coninck & Schuurmans Stekhoven (1933).
25. Placed in Leptolaimoidea (Plectida) by De Ley & Blaxter (2004). Some molecular evidence suggests affinities with some Enoplida, Oncholaimida, and Tripylida (Holterman *et al.* 2006). The position of the genus *Syringolaimus* needs clarification, but if included in the Rhabdolaimidae, then the Rhabdolaimidae fits with Enoplica on molecular evidence (Meldal *et al.* 2007). The Rhabdolaimidae can be placed in Enoplida on the morphological characters of non-sprial and pocket shaped amphids (Lorenzen 1994). Curiously, Lorenzen (1994) excluded *Syringolaimus* from Rhabdolaimidae, placing it instead in Ironidae. Maggenti (1963) included the genus in Rhabdolaimidae. Placed as a suborder of Ironida in the current classification on the basis of the similarity of three anteriorly-placed teeth in an elongate buccal cavity, and an unequivocal placement within Ironida on molecular evidence (Van Megen *et al.* 2009).
26. n. rank.
27. Shares a number of morphological characteristics with Rhabdolaimidae (Tchesunov & Gagarin 1999). Other characters are in an unusual combination. Molecular data is lacking. The family may warrant a separate suborder. More investigation is warranted.
28. Terrestrial, feeding habits unknown.
29. Originally proposed under order Dorylaimida (Jairajpuri 1983), but very soon afterwards proposed independently in the order Enoplida (Siddiqi 1983). Hodda (2007) placed Campydorida as an order under Enoplica, on the basis of molecular evidence (Mullin *et al.* 2003). More recent molecular analyses suggest affinities with Ironina (Van Megen *et al.* 2009), so the group is now placed as a suborder within Ironida. Morphological characters can be interpreted in many ways, so do not provide unambiguous evidence for phylogeny.
30. Terrestrial, omnivorous.
31. Marine, microbivorus.

Superfamily **Trischistomatoidea** Andrassy 2007 (Zhao 2011) (1 family)
Family **Trischistomatidae** Andrassy 2007 (Zhao 2011) (1 subfamily, 2 genera, 17 species) [32]
Order **Alaimida** Siddiqi 1983 (1 suborder) [33]
Suborder **Alaimina** Clark 1961 (1 superfamily)
Superfamily **Alaimoidea** Micoletzky 1922 (1 family)
Family **Alaimidae** Micoletzky 1922 (3 subfamilies, 13 genera, 142 species) [34]
Order **Trefusiida** Lorenzen 1981 (1 suborder) [35]
Suborder **Trefusiina** Siddiqi 1983 (1 superfamily)
Superfamily **Trefusioidea** Gerlach 1966 (4 families) [36]
Family **Lauratonematidae** Gerlach 1953 (1 subfamily, 3 genera, 12 species) [37]
Family **Simpliconematidae** Blome & Schrage 1985 (1 subfamily, 1 genus, 3 species) [38]
Family **Trefusiidae** Gerlach 1966 (1 subfamily, 6 genera, 38 species) [39]
Family **Xenellidae** De Coninck 1965 (2 genera, 5 species) [40]
Superorder **Rhaptothyreica** n. rank (1 order)[41]
Order **Rhaptothyreida** Tchesunov 1997 (1 suborder)
Suborder **Rhaptothyreina** Hodda 2007 (1 superfamily)
Superfamily **Rhaptothyreiodea** Hope & Murphy 1969 (1 family) [42]
Family **Rhaptothyreidae** Hope & Murphy 1969 (1 genus, 2 species) [43]
Subclass **Oncholaimia** Hodda 2007
Superorder **Oncholaimica** Hodda 2007 (1 order) [44]
Order **Oncholaimida** Siddiqi 1983 (1 suborder) [45]
Suborder **Oncholaimina** De Coninck 1965 (1 superfamily)
Superfamily **Oncholaimoidea** Filipjev 1916 (De Coninck 1965) (2 families) [46]
Family **Enchelidiidae** Filipjev 1918 (1 subfamily, 18 genera, 171 species) [47]
Family **Oncholaimidae** Filipjev 1916 (7 subfamilies, 34 genera, 353 species) [48]
Subclass **Triplonchia** Hodda 2007 (1 superorder) [49]
Superorder **Triplonchica** Hodda 2007 (2 orders)
Order **Triplonchida** Cobb 1920 (1 suborder) [50]

32. Freshwater aquatic, microbivorous.
33. Alaimidae have been placed in Dorylaimea on the basis of the positions and orifices of the oesophageal glands and the amphidial apertures of some genera, and Enoplea on the basis of other characters. Molecular analyses consistently point to an affinity with Enoplea.
34. Terrestrial, predatory.
35. A very diverse group, paraphyletic on both molecular and morphological evidence (Holterman *et al.* 2006, Lorenzen 1994, Rusin *et al.* 2001), with part in Enoplea and part in Tripylea. Placed provisionally in Enoplica because this is assumed basal. Revision required.
36. Superfamily by Hodda (2007).
37. Marine, microbivorous.
38. Marine, microbivorous.
39. Marine, microbivorous.
40. Marine, microbivorous.
41. Unplaced in Hodda (2007). Placed as a superorder because affinities within Enoplia are still uncertain, but it falls within a broadened definition of the subclass.
42. Superfamily by Hodda (2007).
43. Marine, deep sea, mouthless, so trophic status uncertain, but seem to rely on prokaryotic organisms in their mid-gut (Tchesunov 1997).
44. Predatory, marine.
45. Placed as a separate class by Hodda (2007), on the basis of the morphological apomorphy of the spermatozoa having a nuclear envelope present (Yushin *et al.* 2002). Supported as a distinct clade, but with relationships on molecular evidence either unresolved (Meldal *et al.* 2007) or with affinities to Tripylida (Holterman *et al.* 2006) or Enoplia (Litvaitis *et al.* 2000, Van Megen *et al.* 2009), and on morphological evidence with affinities to both Tripylida and Enoplida.
46. Superfamily by De Coninck (1965).
47. Marine, predatory.
48. Marine, predatory.
49. Triplonchia was placed as the only subclass in Class Tripylea in previous classifications (Hodda 2007), on the basis of ambiguous morphological evidence, and weak (55-66%) or low molecular support for the dichotomous division of Nematoda into Enoplea and Chromadorea (Holterman *et al.* 2006, Meldal *et al.* 2006, Smythe *et al.* 2006), making a polytomy of Enoplea, Chromadorea, Tripylea, and Dorylaimea the only justified assumption. One species—*Tobrilus diversipapillatus*—has a gastrulation pattern highly common in animal kingdom, but uncommon in nematodes (Schierenberg 2005). Information on the patterns of gastrulation in other Triplonchia, Enoplea and Dorylaimea could potentially provide resolution for the early phylogeny of nematodes. In the absence of morphological or developmental evidence, recent molecular analyses show some affinities between the former Tripylea and the former Enoplea (Van Megen *et al.* 2009), so Tripylea is now placed as a subclass with the sole subclass of the former Enoplea in an enlarged class Enoplea.

Suborder **Diphtherophorina** Coomans & Loof 1970 (2 superfamilies)
Superfamily **Diphtherophoroidea** Thorne 1935 (Clark 1961) (1 family)
Family **Diphtherophoridae** Thorne 1935 (3 genera, 50 species) [51]
Superfamily **Trichodoroidea** Clark 1961 (Siddiqi 1974) (1 family)
Family **Trichodoridae** Clark 1961 (5 genera, 99 species) [52]
Order **Tripylida** Siddiqi 1983 (2 suborders)
Suborder **Tripylina** Andrassy 1974 (2 superfamilies) [53]
Superfamily **Tripyloidea** De Man 1876 (Clark 1961) (1 family)
Family **Tripylidae** De Man 1876 (2 subfamilies, 4 genera, 41 species) [54,55]
Superfamily **Tobriloidea** Filipjev 1918 (De Coninck 1965) (4 families)
Family **Pandolaimidae** Belogurov 1980 (1 genus, 5 species) [56]
Family **Rhabdodemaniidae** Filipjev 1934 (1 genus, 17 species) [57]
Family **Tobrilidae** Filipjev 1918 (De Coninck 1965) (3 subfamilies, 10 genera, 162 species) [58]
Family **Triodontolaimidae** De Coninck 1965 (Lorenzen 1978) (1 subfamily, 1 genus, 1 species) [59]
Suborder **Prismatolaimina** n. rank (2 superfamilies) [60]
Superfamily **Onchuloidea** Andrassy 1964 (n. rank) (1 family) [61]
Family **Onchulidae** Andrassy 1964 (2 subfamilies, 8 genera, 20 species) [62,63]
Superfamily **Prismatolaimoidea** Gerlach & Riemann 1974 (Hodda 2007) (3 families)
Family **Bastianiidae** De Coninck 1935 (2 genera, 10 species) [64,65]
Family **Odontolaimidae** Gerlach & Riemann 1974 (Lorenzen 1981) (1 subfamily, 1 genus, 4 species) [66]
Family **Prismatolaimidae** Gerlach & Riemann 1974 (2 genera, 38 species) [67,68]

50. Cobb (1920) used the name Triplonchia as an order, but this pre-dates the adoption of uniform endings for the names of higher taxa, so is credited as the authority here. Siddiqi (1983) was the first to propose the name at order level in its current form.
51. Terrestrial, plant-root feeding, but damage not normally economically important.
52. Terrestrial, plant-root feeding. Many species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
53. Division of Tripylina into two clades is supported by molecular evidence (Meldal *et al.* 2006).
54. Most species are freshwater aquatic and predatory.
55. Freshwater aquatic, predatory or omnivorous or microbivorous.
56. Marine, omnivorous.
57. Terrestrial, microbivorous.
58. The family Tobrilidae may include the genus *Trischistoma* (Holterman & Holovachov 2007, Zullini 2006), but excluded here (Zhao 2011).
59. Subfamily created by De Coninck (1965).
60. Placed with Tobriloidea by De Ley & Blaxter (2002). Some molecular analyses place the families Prismatolaimidae and Bastianiidae in a separate clade (Holterman *et al.* 2007, Van Megen *et al.* 2009), while others did not resolve their relationships (Meldal *et al.* 2006). None of the molecular analyses resolve the relationship of the families with Tobrilidae or Tripylidae. Morphological evidence has been interpreted as suggesting affinities with a number of different higher taxa. Recent analyses have suggested inclusion in Tripylida on the basis of the structure of the buccal cavity and cephalic sensillae (Hodda *et al.* 2004, Hodda 2007, Holovachov *et al.* 2008).
61. There is a unique structure of the oesophagus with gland cells interspersed with muscle, which defines the superfamily. Morphological similarities in the orifices of the oesophageal glands, cephalic sensillae, amphids and cardia support affinities with Prismatolaimidae (Hodda *et al.* 2004, Hodda 2007, Holovachov *et al.* 2008). Other interpretations include the family being totally unrelated to, closely related to, or a subset of, the Prismatolaimidae, and variously as belonging to the orders Trefusiida, Enoplida, Tripylida and Triplonchida (Goodey 1963, Andrássy 1964, De Coninck 1965, Riemann 1972, Andrássy 1976, Maggenti 1982, Siddiqi 1983, Maggenti 1991, Lorenzen 1994, Andrassy 2001a,b, De Ley & Blaxter 2002). Some authors have considered the evidence for higher systematics in this group inconclusive (Coomans & Raski 1988).
62. Hodda (2007) placed Onchulidae with Prismatolaimidae in Prismatolaimoidea, but with the inclusion of Bastianiidae with Prismatolaimidae in Prismatolaimoidea, continued inclusion of Onchulidae is no longer justified, so Onchulidae is placed in a new superfamily but with Prismatolaimoidea in a new suborder Prismatolaimina.
63. Terrestrial and freshwater aquatic, predatory.
64. Bastianiidae was family *incertae sedis* in the classifications of De Ley *et al.* (2006) and Hodda (2007). It has been included in Enoplida:Oxystominidae (Andrassy 1976), Tripylida:Prismatolaimidae (De Coninck 1935), Araeolaimida (Goodey 1963), and Chromadorida:Leptolaimina (Lorenzen 1994, Ryss 1988). The family was not included in some molecular analyses (Meldal *et al.* 2006, Smythe *et al.* 2006), but was resolved as a clade with Prismatolaimidae when it was included (Holterman *et al.* 2007, Van Megen *et al.* 2009). There are morphological similarities with Prismatolaimidae in the structure of the sensilla, amphid, cardia, supplements, spicules, spicular musculature, gubernaculum and organellum ovale (Coomans & Raski 1988, Holovachov 2006, Tchesunov & Sturhan 2002). The molecular and morphological evidence seems enough to place the family despite some evidence of other affinities.
65. Terrestrial, feeding habits unknown, probably microbivorous.
66. Freshwater aquatic or wet terrestrial habitats, microbivorous or algal feeding.
67. Subfamily created by Micoletzky (1922).
68. Terrestrial, microbivorous.

Class **Dorylaimea** Hodda 2007 (3 subclasses) [69]
Subclass **Bathyodontia** Hodda 2007 (2 superorders)
Superorder **Mononchica** Hodda 2007 (3 orders)
Order **Bathyodontida** Siddiqi 1983 (1 suborder) [70]
Suborder **Bathyodontina** Coomans & Loof 1970 (2 superfamilies)
Superfamily **Cryptonchoidea** Chitwood 1937 (2 families)
Family **Bathyodontidae** Clark 1961 (1 genus, 3 species) [71]
Family **Cryptonchidae** Chitwood 1937 (1 genus, 4 species)
Superfamily **Mononchuloidea** De Coninck 1965 (Coomans & Loof 1970) (1 family)
Family **Mononchulidae** De Coninck 1965 (Coomans & Loof 1970) (1 subfamily, 3 genera, 5 species) [72,73]
Order **Mermithida** Hyman 1951 (2 suborders)
Suborder **Aulolaimina** Hodda 2007 (2 superfamilies) [74]
Superfamily **Aulolaimoidea** Gerlach & Riemann 1973 (Hodda 2007) (1 family) [75]
Family **Aulolaimidae** Gerlach & Riemann 1973 (3 genera, 14 species) [76,77]
Superfamily **Isolaimioidea** Timm 1969 (1 family) [78]
Family **Isolaimiidae** Timm 1969 (1 genus, 11 species) [79]
Suborder **Mermithina** Andrassy 1971 (1 superfamily)
Superfamily **Mermithoidea** Braun 1883 (Wulker 1927) (2 families)
Family **Mermithidae** Braun 1883 (11 subfamilies, 102 genera, 599 species) [80,81]
Family **Tetradonematidae** Cobb 1919b (13 genera, 16 species) [82]

69. Regarded as a subset of Enoplia by Lorenzen (1981) on the basis of the presence of primarily non-spiral amphids, the group is unresolved in most molecular phylogenies (Meldal *et al.* 2006, Litvaitis *et al.* 2000, Smythe *et al.* 2006). However, Dorylaimea is clearly a separate branch in the latest molecular analysis (Van Megen *et al.* 2009). This position is compatible with morphological analysis (Lorenzen 1981) if the assumed character polarity is reversed, and non-spiral amphids become plesiomorphic rather than apomorphic. All Orders within Dorylaimea have the morphological apomorphy of oesophageal glands opening behind the nerve ring. The clade has been advanced before on other morphological evidence (Maggenti 1991). Using morphological evidence requiring some assumptions regarding homology, but considering the vertebrate-parasitic Trichocephalida, Dioctophymatida, Muspiceida and Mermithida rather than the free-living members of the groups, Spratt (2011) regarded these groups as having shared characters of onchiostyles with Triplochida within Enoplea, and thus supporting Dorylaimia as a subclass within an expanded Enoplea. He also pointed out the presence of a Demanian system appears limited to Muspiceidae (both species of the genus *Maseria*) and 11 genera of Oncholaimida, suggesting further links between Trichocephalia and Enoplea. The clade of Dorylaimia is also supported by other molecular evidence, although it has been equivocally included within Enoplea (De Ley & Blaxter 2004) or Chromadorea (Holterman *et al.* 2006). Spermatogenesis and development provide further evidence for the separation of Dorylaimea from Enoplea and Chromadorea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004). Herein the relation with Enoplea and Chromadorea is regarded as a polytomy (Aleshin *et al.* 1998, Hodda 2007).
70. Bathyodontida are equal in rank with Mononchida on the morphological grounds of the structure of the head and oesophagus (Coomans & Loof 1970). Molecular evidence also separates Bathyodontida from Mononchida (Holterman *et al.* 2006, Van Megen *et al.* 2009).
71. Terrestrial or freshwater aquatic, microbivorous.
72. Subfamily created by De Coninck (1965).
73. Terrestrial or freshwater aquatic, microbivorous.
74. Isolaimiidae placed with Mermithida on the basis of the tubules around the head, Isolaimiidae and Aulolaimidae are here placed together on the basis of molecular evidence (Van Megen *et al.* 2009). Morphologically, Aulolaimidae has been regarded as a separate family but with no apomorphy to justify any other placements within higher taxonomic ranks (Lorenzen 1981, 1994). Considering all evidence the family has been placed in Plectida (Haliplectoidea) and Plectia (De Ley & Blaxter 2004, Hodda 2007, respectively). Others considered the evidence inconclusive (Holovachov *et al.* 2007). With strong molecular support for affinities of Isolaimiidae and Aulolaimidae, the similarities in the head structure of Isolaimiidae and Mermithidae have added weight and justify placing Isolaimiidae and Aulolaimidae as a suborder within Mermithida.
75. Aulolaimidae has been placed with either Monhysterida or Plectida (Haliplectoidea) on molecular evidence (De Ley & Blaxter 2004, Holterman *et al.* 2006), but is unresolved in the latest molecular analysis (Van Megen *et al.* 2009). The family was placed within Enoplida (Ironoidea) or Plectida (Leptolaimina) on morphological grounds (Andrassy 1976, Lorenzen 1994). A polychotomy with Monhysterida and Plectida was therefore proposed, with consequent rank as a separate Order within the subclass Plectia (Hodda 2007).
76. Created as a subfamily by Jairajpuri & Hooper (1968).
77. Terrestrial, microbivorous.
78. Molecular evidence points to unresolved similarities of Isolaimioidea to Bathyodontia, Dorylaimida and Araeolaimida (De Ley & Blaxter 2004, Meldal *et al.* 2007, Holterman *et al.* 2006). Morphological evidence has been viewed as similarly inconclusive within the same group of phyla (Timm 1961, Theodorides 1965, De Coninck 1965). Isolaimina contains few, poorly-known species. It was regarded as a separate Order (Cobb 1919, Hodda 2007, Timm 1961), based on the apomorphy of 6 tubules around the head. As constituted in the present classification, Aulolaimina and Mermithida can accommodate the family on the basis of similarities in head structure and general body size. However, this placement is provisional and more investigation will be necessary to place the family with any certainty.
79. Terrestrial, microbivorous, rare.
80. Terrestrial, free-living but not feeding as adults and briefly as juveniles, internal parasites of arthropods for the rest of the life cycle. Uniformly fatal to the host.

Order **Mononchida** Jairajpuri 1969 (1 suborder)
Suborder **Mononchina** Kirjanova & Krall 1969 (2 superfamilies)
Superfamily **Anatonchoidea** Jairajpuri 1969 (Jairajpuri 1971) (2 families)
Family **Anatonchidae** Jairajpuri 1969 (2 subfamilies, 9 genera, 180 species) [83]
Family **Iotonchidae** Jairajpuri 1969 (2 subfamilies, 11 genera, 127 species) [84]
Superfamily **Mononchoidea** Filipjev 1934 (Clark 1961) (3 families)
Family **Cobbonchidae** Jairajpuri 1969 (1 subfamily, 4 genera, 36 species) [85]
Family **Mononchidae** Filipjev 1934 (Chitwood 1937) (2 subfamilies, 8 genera, 97 species) [86]
Family **Mylonchulidae** Jairajpuri 1969 (2 subfamilies, 14 genera, 104 species) [87]
Subclass **Dorylaimia** Inglis 1983 (1 superorder)
Superorder **Dorylaimica** Hodda 2007 (1 order)
Order **Dorylaimida** Pearse 1942 (2 suborders) [88]
Suborder **Dorylaimina** Chitwood 1933 (5 superfamilies) [89]
Superfamily **Actinolaimoidea** Thorne 1939 (Thorne 1967) (3 families)
Family **Actinolaimidae** Thorne 1939 (Meyl 1957) (4 subfamilies, 14 genera, 125 species) [90,91]
Family **Carcharolaimidae** Thorne 1967 (2 subfamilies, 6 genera, 35 species) [92 93]
Family **Trachypleurosidae** Thorne 1967 (1 subfamily, 1 genus, 5 species) [94]
Superfamily **Belondiroidea** Thorne 1939 (Thorne 1964) (1 family)
Family **Belondiridae** Thorne 1939 (3 subfamilies, 25 genera, 252 species) [95]
Superfamily **Dorylaimoidea** De Man 1876 (Thorne 1934) (4 families)
Family **Aporcelaimidae** Heyns 1965 (3 subfamilies, 16 genera, 211 species) [96]
Family **Dorylaimidae** De Man 1876 (4 subfamilies, 23 genera, 446 species) [97]
Family **Nordiidae** Siddiqi 1969 (5 subfamilies, 22 genera, 215 species) [98,99]
Family **Qudsianematidae** Jairajpuri 1965a (Siddiqi 1969) (7 subfamilies, 47 genera, 469 species) [100,101]
Superfamily **Longidoroidea** Thorne 1935 (Khan & Ahmad 1975) (2 families)
Family **Longidoridae** Thorne 1935 (Meyl 1961) (2 subfamilies, 7 genera, 222 species) [102,103]
Family **Xiphinematidae** Dalmasso 1969 (Khan & Ahmad 1975) (1 subfamily, 1 genus, 230 species) [104,105]

81. The number of species in this family will vary enormously depending on the concepts of species, and standard of description required (Curran & Hominick 1981). The figure cited here is a maximum (Rubtsov 1978). The actual number of species described may be only one third this estimate, omitting many synonyms or descriptions that are inadequate to ever re-diagnose the species.
82. Terrestrial, internal parasites of arthropods, including as adults.
83. Terrestrial or freshwater aquatic, predatory.
84. Terrestrial or freshwater aquatic, predatory.
85. Terrestrial or freshwater aquatic, predatory, microbivorous or omnivorous.
86. Terrestrial or freshwater aquatic, predatory, microbivorous or omnivorous.
87. Terrestrial or freshwater aquatic, predatory.
88. Classification generally follows Jairajpuri & Ahmad (1992)
89. Created as suborder Dorylaimata by Chitwood (1933), which pre-dates the adoption of uniform endings for higher taxa, hence the authority is Chitwood 1933, although the first to use the name Dorylaimina was Pearse (1936).
90. Created as a subfamily by Thorne (1939).
91. Terrestrial or freshwater aquatic, predatory.
92. Terrestrial or freshwater aquatic, predatory.
93. Placed as a subfamily of Qudsianematidae by Andrassy (1991), but separated as a family in Actinolaimoidea by Jairajpuri & Ahmad (1992). Here placed in Actinolaimoidea because extensive sclerotization, thickening and elaboration of the cheilostome is apomorphic to the superfamily.
94. Terrestrial or freshwater aquatic, predatory.
95. Terrestrial, mostly plant-root feeding, but not economically important.
96. Terrestrial or freshwater aquatic, predatory or omnivorous.
97. Terrestrial or freshwater aquatic, algal-feeding or omnivorous.
98. Created as a subfamily by Jairajpuri & AH Siddiqi (1964).
99. Terrestrial or freshwater aquatic with a very few estuarine species, algal-feeding, omnivorous, microbivorous or predatory.
100. Created as a subfamily by Jairajpuri (1965a).
101. Terrestrial or freshwater aquatic, algal-feeding or omnivorous.
102. Terrestrial, plant-root feeding. Some species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
103. Subfamily created by Thorne (1935).
104. Subfamily created by Dalmasso (1969).

Superfamily **Tylencholaimoidea** Filipjev 1934 (Ahmad & Jairajpuri 1983) (4 families) [106]
Family **Aulolaimoididae** Jairajpuri 1964 (4 genera, 15 species) [107]
Family **Leptonchidae** Thorne 1935 (6 subfamilies, 28 genera, 194 species) [108]
Family **Mydonomidae** Thorne 1964 (3 subfamilies, 14 genera, 116 species) [109]
Family **Tylencholaimidae** Filipjev 1934 (Siddiqi 1969) (4 subfamilies, 26 genera, 127 species) [110,111]
Suborder **Nygolaimina** Ahmad & Jairajpuri 1979 (1 superfamily)
Superfamily **Nygolaimoidea** Thorne 1935 (De Coninck 1965) (4 families)
Family **Aetholaimidae** Jairajpuri 1965b (Ahmad & Jairajpuri 1982) (1 genus, 5 species) [112,113]
Family **Nygellidae** Andrassy 1958 (Jairajpuri 1964) (1 subfamily, 1 genus, 5 species) [114]
Family **Nygolaimellidae** Clark 1961 (Heyns 1968) (2 subfamilies, 3 genera, 10 species) [115]
Family **Nygolaimidae** Thorne 1935 (Meyl 1961) (2 subfamilies, 10 genera, 107 species) [116]
Subclass **Trichocephalia** Hodda 2007 (1 superorder)
Superorder **Trichocephalica** Hodda 2007 (4 orders)
Order **Dioctophymatida** Ryzhikov & Sonin 1981 (1 suborder)
Suborder **Dioctophymatina** Chitwood 1933 (1 superfamily) [117]
Superfamily **Dioctophymatoidea** Railliet 1915 (Roman 1965) (2 families)
Family **Dioctophymatidae** Railliet 1915 (4 genera, 27 species) [118]
Family **Soboliphymatidae** Petrov 1930 (1 genus, 10 species) [119]
Order **Marimermithida** Rubtzov 1980 (1 suborder)
Suborder **Marimermithina** Hodda 2007 (1 superfamily)
Superfamily **Marimermithoidea** Rubtzov & Platonova 1974 (Hodda 2007) (1 family)
Family **Marimermithidae** Rubtzov & Platonova 1974 (5 genera, 6 species) [120]
Order **Muspiceida** (1 suborder) [121]
Suborder **Muspiceina** Bain & Chabaud 1968 (1 superfamily)
Superfamily **Muspiceioidea** Brumpt 1920 (Roman 1965) (2 families)
Family **Muspiceidae** Brumpt 1920 (5 genera, 8 species) [122,123]
Family **Robertdollfusiidae** Chabaud & Campana 1950 (4 genera, 6 species) [124]
Order **Trichocephalida** Spasski 1954 (1 suborder)
Suborder **Trichinellina** Hodda 2007 (1 superfamily)
Superfamily **Trichinelloidea** Ward 1907 (Hall 1916) (6 families)
Family **Anatrichosomatidae** Yamaguti 1961 (1 genus, 5 species) [125]
Family **Capillariidae** Railliet 1915 (1 subfamily, 18 genera, 390 species) [126]

105. Terrestrial, plant-root feeding. Some species are associated with transmission of viruses. Damage by many species, and their associated viruses, cause economically significant losses to crops.
106. Tylencholaiminae Filipjev 1934 has priority over Leptonchidae Thorne 1935 so is the correct name (Siddiqi 1982).
107. Terrestrial, plant-root feeding or omnivorous.
108. Terrestrial, plant-root feeding or omnivorous.
109. Terrestrial, plant-root feeding or omnivorous.
110. Subfamily created by Filipjev (1934).
111. Terrestrial or freshwater aquatic and one species estaurine, plant-root feeding or omnivorous.
112. Created as a subfamily by Jairajpuri (1965b).
113. Terrestrial, predatory or omnivorous.
114. Terrestrial, predatory or omnivorous.
115. Terrestrial, predatory or omnivorous.
116. Terrestrial or freshwater aquatic, predatory.
117. Created as suborder Dioctophymata (Chitwood 1933), but ante-dating adoption of current uniform endings for names of higher ranks. First to use in current form was Clark (1961).
118. Internal parasites of mammals.
119. Internal parasites of mammals.
120. Immature stages parasitic in body cavity of marine benthic invertebrates, adults free-living but non-feeding.
121. Placed in this superorder on morphological evidence (Anderson & Bain 1982, Spratt & Nicholas 2002).
122. Originally described as a sub-family by Brumpt (1930).
123. Internal parasites of mammals.
124. Internal parsites of birds.
125. Internal parasites of mammals.
126. Internal parasites of mammals.

Family **Cystoopsidae** Skryabin 1923 (2 subfamilies, 2 genera, 7 species) [127]
Family **Trichinellidae** Ward 1907 (4 genera, 16 species) [128]
Family **Trichosomoididae** Hall 1916 (Yorke & Maplestone 1926) (2 subfamilies, 5 genera, 25 species) [129]
Family **Trichuridae** Ransom 1911 (Railliet 1915) (1 subfamily, 6 genera, 107 species) [130]

Class **Chromadorea** Inglis 1983 (2 subclasses) [131]
Subclass **Chromadoria** Adamson 1987 (1 superorder)
Superorder **Chromadorica** Hodda 2007 (3 orders)
Order **Chromadorida** Chitwood 1933 (1 suborder)
Suborder **Chromadorina** Filipjev 1929 (1 superfamily)
Superfamily **Chromadoroidea** Filipjev 1917 (De Coninck & Schuurmans Stekhoven 1933) (5 families)
Family **Achromadoridae** Gerlach & Riemann 1973 (Lorenzen 1981) (2 subfamilies, 3 genera, 26 species) [132]
Family **Chromadoridae** Filipjev 1917 (5 subfamilies, 78 genera, 444 species) [133]
Family **Cyatholaimidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 23 genera, 215 species) [134]
Family **Ethmolaimidae** Lorenzen 1981 (1 subfamily, 4 genera, 84 species) [135]
Family **Neotonchidae** Lorenzen 1981 (1 subfamily, 5 genera, 25 species) [136]
Order **Desmodorida** De Coninck 1965 (1 suborder) [137]
Suborder **Desmodorina** De Coninck 1965 (2 superfamilies)
Superfamily **Desmodoroidea** Filipjev 1922 (Chitwood 1936) (3 families)
Family **Desmodoridae** Filipjev 1922 (Steiner 1927) (6 subfamilies, 35 genera, 318 species) [138]
Family **Draconematidae** Steiner 1930 (2 subfamilies, 15 genera, 82 species) [139,140]
Family **Epsilonematidae** Steiner 1927 (2 subfamilies, 13 genera, 396 species) [141]
Superfamily **Microlaimoidea** De Coninck & Schuurmans Stekhoven 1933 (Lorenzen 1981) (3 families)
Family **Aponchiidae** Gerlach 1963 (2 genera, 12 species) [142]
Family **Microlaimidae** De Coninck & Schuurmans Stekhoven 1933 (11 genera, 101 species) [143]
Family **Monoposthiidae** De Coninck 1965 (4 genera, 33 species) [144]
Order **Desmoscolecida** Filipjev 1929 (1 suborder) [145]
Suborder **Desmoscolecina** De Coninck 1965 (1 superfamily) [146]

---

127. Internal or external parasites of fish or reptiles.
128. Internal parasites of mammals.
129. Internal parasites of mammals.
130. Internal parasites of mammals.
131. Spermatogenesis and development provide evidence for the separation of Chromadorea from Dorylaimia and Enoplea (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
132. Terrestrial or freshwater aquatic, microbivorous.
133. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
134. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
135. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
136. Marine, microbivorous.
137. On all available evidence, regarded as a separate order (DeLey & Blaxter 2004, De Ley *et al.* 2006, Decraemer & Smol 2006, Hodda 2007), although molecular evidence has the group as a subset of Chromadorida (Van Megen *et al.* 2009) or grouped with Desmoscolecida (Litvaitis *et al.* 2000) or split among other groups (Holterman *et al.* 2006). Morphologically, it has been classified as a subset of Chromadorida (Lorenzen 1994), but this is compatible with the current classification if the Chromadorida of Lorenzen (1994) is here equivalent to superorder Chromadorica.
138. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
139. Created as subfamily Draconematini by Filipjev (1918).
140. Marine, microbivorous.
141. Marine, microbivorous.
142. Marine, microbivorous.
143. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
144. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
145. Originally named order Desmoscolecata (Filipjev 1929) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by De Coninck (1965).

Superfamily **Desmoscolecoidea** Shipley 1896 (Chitwood 1937) (3 families)
Family **Cyartonematidae** Tchesunov 1990 (1 subfamily, 9 genera, 35 species) [147]
Family **Desmoscolecidae** Shipley 1896 (2 subfamilies, 10 genera, 136 species) [148]
Family **Meyliidae** De Coninck 1965 (2 subfamilies, 15 genera, 157 species) [149]
Order **Selachinematida** n. rank (1 suborder)
Suborder **Selachinematina** n. rank (1 superfamily)
Superfamily **Selachinematoidea** De Coninck 1965 (Hodda 2007) (4 families) [150]
Family **Choanolaimidae** De Coninck 1965 (6 genera, 46 species) [151,152]
Family **Choniolaimidae** De Coninck & Schuurmans Stekhoven 1933 (1 genus, 5 species) [153,154]
Family **Richtersiidae** Kreis 1929 (De Coninck 1965) (2 genera, 21 species) [155,156]
Family **Selachinematidae** De Coninck 1965 (7 genera, 38 species) [157,158]
Subclass **Plectia** Hodda 2007 (4 superorders) [159]
Superorder **Monhysterica** Hodda 2007 (1 order)
Order **Monhysterida** Filipjev 1929 (3 suborders) [160]
Suborder **Araeolaimina** De Coninck 1965 (1 superfamily)
Superfamily **Axonolaimoidea** De Coninck & Schuurmans Stekhoven 1933 (Chitwood 1937) (5 families)
Family **Axonolaimidae** De Coninck & Schuurmans Stekhoven 1933 (13 genera, 2 subgenera, 124 species) [161]
Family **Bodonematidae** Jensen 1991 (1 genus, 1 species)
Family **Comesomatidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (3 subfamilies, 23 genera, 173 species) [162,163]
Family **Coninckiidae** Lorenzen 1981 (1 genus, 5 species) [164]

146. Originally named suborder Desmoscoleata (Chitwood 1933) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by De Coninck (1965).
147. Marine, microbivorous.
148. Overwhelmingly marine but with a few freshwater aquatic species, microbivorous.
149. Marine, microbivorous.
150. In molecular phylogenies, this group is either not represented (Meldal *et al.* 2007), unresolved (Holterman *et al.* 2006, Van Megen *et al*. 2009) or placed within Chromadorina (De Ley & Blaxter 2004). In morphological phylogenies, the group is either within the Chromadorina (Filipjev 1934, Lorenzen 1994), a sister group to Chromadorina within an expanded Chromadorida (Maggenti 1991), or within the Desmodorida (Chitwood & Chitwood 1950, De Coninck 1965, Gerlach & Riemann 1973, 1974). There are a number of seemingly unique morphological features in the group, such as the structure of the buccal cavity, the staining characteristics of the cuticle, the jointed structure of cephalic setae, and large intestinal cells (Filipjev 1934, Gerlach 1964, Lorenzen 1994). These morphological features, combined with the unresolved position in molecular analyses (Holterman *et al.* 2006, Van Megen *et al.* 2009), imply that the relationships with Chromadorida and Desmodorida must be viewed currently as a polytomy. Hence the group is afforded Order status equivalent to Chromadorida and Desmodorida.
151. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
152. Marine or estuarine, predatory.
153. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
154. Marine or estuarine, predatory.
155. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
156. Marine or estuarine, microbivorous.
157. Although the families Selachinematidae, Richtersiidae, Choniolaimidae and Choanolaimidae have been synonymized (Gerlach 1964, Lorenzen 1981), there remain many significant differences (Gerlach 1964). Given the possible nature of the Selachinematida as a distinct clade, these differences seem to justify regarding the differences as justifying family status. A revision of the entire Selachinematida is needed.
158. Marine, microbivorous or predatory.
159. Plectia are separated from Chromadoria on the basis of spermatogenesis (Yushin & Malakhov 2004).
160. Filipjev (1929) used the name Monhysterata as an order, but this pre-dates the adoption of uniform endings for the names of higher taxa, so is credited as the authority here. De Coninck (1965) was the first to propose the name at order level in its current form.
161. Marine, microbivorous.
162. Originally cited as Family Comesomidae (De Coninck & Schuurmans Stekhoven 1933). Placed here on the basis of molecular evidence from 2 genes and several analyses (Holterman *et al.* 2006, Meldal *et al.* 2007, Litvaitis *et al.* 2000, Van Megen *et al.* 2009). There is morphological evidence for inclusion in Monhysterida, and monophyly of the family, but not subfamily or superfamily placement (Lorenzen 1994).
163. Marine, microbivorous.
164. Marine, microbivorous.

Family **Diplopeltidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 15 genera, 118 species)

Suborder **Linhomoeina** Andrassy 1974 (1 superfamily)

Superfamily **Siphonolaimoidea** Chitwood 1937 (De Coninck 1965) (3 families)

Family **Fusivermidae** Tchesunov 1996 (1 genus, 1 species) [165]

Family **Linhomoeidae** Filipjev 1922 (Filipjev 1934) (3 subfamilies, 27 genera, 2 subgenera, 216 species) [166]

Family **Siphonolaimidae** Chitwood 1937 (2 subfamilies, 4 genera, 29 species) [167]

Suborder **Monhysterina** De Coninck & Schuurmans Stekhoven 1933 (2 superfamilies)

Superfamily **Monhysteroidea** De Man 1876 (De Coninck 1965) (1 family)

Family **Monhysteridae** De Man 1876 (17 genera, 244 species) [168]

Superfamily **Sphaerolaimoidea** Filipjev 1918 (De Coninck 1965) (2 families)

Family **Sphaerolaimidae** Filipjev 1918 (De Coninck & Schuurmans Stekhoven 1933) (2 subfamilies, 6 genera, 61 species) [169]

Family **Xyalidae** Chitwood 1951 (Lorenzen 1977) (3 subfamilies, 48 genera, 5 subgenera, 467 species) [170]

Superorder **Plectica** Hodda 2007 (3 orders)

Order **Benthimermithida** Tchesunov 1997 (1 suborder) [171]

Suborder **Benthimermithina** Hodda 2007 (1 superfamily)

Superfamily **Benthimermithoidea** Petter 1980 (Hodda 2007) (1 family)

Family **Benthimermithidae** Petter 1980 (3 genera, 33 species) [172]

Order **Leptolaimida** Hodda 2007 (1 suborder)

Suborder **Leptolaimina** Lorenzen 1981 (2 superfamilies)

Superfamily **Ceramonematoidea** Cobb 1933 (De Coninck 1965) (3 families)

Family **Ceramonematidae** Cobb 1933 (Schuurmans Stekhoven 1942) (2 subfamilies, 8 genera, 58 species) [173,174]

Family **Tarvaiidae** Lorenzen 1981 (1 subfamily, 1 genus, 8 species) [175]

Family **Tubolaimoididae** Lorenzen 1981 (1 subfamily, 2 genera, 4 species) [176]

Superfamily **Leptolaimoidea** Oerley 1880 (De Coninck 1965) (8 families)

Family **Aegialoalaimidae** Lorenzen 1981 (1 subfamily, 2 genera, 11 species) [177]

Family **Aphanolaimidae** Chitwood 1936 (Holovachov *et al.* 2002) (2 subfamilies, 4 genera, 67 species)

Family **Diplopeltoididae** Tchesunov 1990 (1 subfamily, 1 genus, 5 species) [178]

Family **Leptolaimidae** Oerley 1880 (3 subfamilies, 15 genera, 82 species) [179]

Family **Ohridiidae** Lorenzen 1981 (1 subfamily, 2 genera, 9 species) [180]

Family **Paramicrolaimidae** Lorenzen 1981 (1 subfamily, 1 genus, 5 species) [181]

---

165. Marine, microbivorous.
166. Overwhelmingly marine or estuarine but with a few freshwater aquatic species, microbivorous.
167. Marine or estuarine, microbivorous.
168. Mostly marine with many species in freshwater aquatic habitats and a few terrestrial species, microbivorous. Three genera living in gill chambers of freshwater aquatic or terrestrial crustaceans.
169. Freshwater aquatic or brackish waters, microbivorous.
170. Mostly marine but with some freshwater aquatic species, microbivorous.
171. Benthimermithida was unplaced in previous classifications (De Ley & Blaxter 2004, De Ley *et al.* 2006, Hodda 2007). Morphological evidence of phylogeny is unclear. Molecular evidence is lacking. Provisionally placed in Plectica on the basis of some similarity to Camacolaimus (Tchesunov 1997, Miljutin 2006).
172. Immature stages parasitic in body cavity of marine benthic invertebrates (*nematodes*, *polychaetes*, *priapulids*, *crustacea* and *holothuroids*), adults free-living but non-feeding.
173. Morphological affinities with Tarvaiidae and Diplopeltoididae (Tchesunov & Miljutina 2002). Created as a subfamily by Cobb (1933).
174. Marine, microbivorous.
175. Marine, microbivorous.
176. Marine, microbivorous.
177. Marine, microbivorous.
178. Marine, microbivorous.
179. Mostly marine but some freshwater aquatic and terrestrial species, microbivorous.
180. Marine, freshwater aquatic and terrestrial, free-living microbivorous or parasitic in terrestrial oligochaetes, benthic invertebrates and foraminifera (Holovachov & De Ley 2006, Hope & Tchesunov 1999, Miljutin 2006).

Family **Rhadinematidae** Lorenzen 1981 (1 subfamily, 1 genus, 1 species) [182]

Order **Plectida** Malakhov *et al.* 1982 (1 suborder)

Superfamily **Haliplectoidea** De Coninck 1965 (Andrassy 1974) (2 families)

Superfamily **Plectoidea** Oerley 1880 **(**Chitwood 1937) (4 families)

Family **Haliplectidae** Chitwood 1951 (De Coninck 1965) (3 genera, 24 species) [183,184]

Family **Peresianidae** Vitiello & De Coninck 1968 (Lorenzen 1981) (1 genus, 3 species) [185,186]

Suborder **Plectina** Malakhov *et al.* 1982 (2 superfamilies)

Family **Camacolaimidae** De Coninck & Schuurmans Stekhoven 1933 (14 genera, 65 species) [187,188]

Family **Chronogasteridae** Gagarin 1975 (4 genera, 50 species) [189,190]

Family **Metateratocephalidae** Eroshenko 1973 (2 genera, 9 species) [191,192]

Family **Plectidae** Oerley 1880 (3 subfamilies, 12 genera, 140 species) [193]

Superorder **Rhabditica** Hodda 2007 (5 orders)

Order **Diplogasterida** Inglis 1983 (4 suborders)

Suborder **Chambersiellina** Hodda 2007 (1 superfamily) [194]

Superfamily **Chambersielloidea** Thorne 1937 (Hodda 2007) (1 family)

Family **Chambersiellidae** Thorne 1937 (Sanwal 1957) (2 subfamilies, 7 genera, 16 species) [195]

Suborder **Diplogasterina** Paramonov 1952 (2 superfamilies) [196]

Superfamily **Cylindrocorporoidea** T. Goodey 1939 (Andrassy 1976) (1 family)

Family **Cylindrocorporidae** T. Goodey 1939 (3 genera, 22 species) [197] [198]

Family **Odontopharyngidae** Micoletzky 1922 (1 genus, 2 species)

Superfamily **Diplogasteroidea** Micoletzky 1922 (Goodey 1963) (6 families)

Family **Cephalobiidae** Travassos & Kloss 1960a (2 subfamilies, 6 genera, 30 species) [199]

Family **Diplogasteridae** Micoletzky 1922 (Steiner 1929) (1 subfamily, 15 genera, 239 species) [200,201]

---

181. Marine, microbivorous.
182. Marine, microbivorous.
183. Subfamily created by Chitwood (1951).
184. Marine, microbivorous.
185. Subfamily created by Vitiello & De Coninck (1968).
186. Marine, microbivorous.
187. Camacolaiminae was regarded as a subfamily of Leptolaimidae by Lorenzen (1994), but there was no morphological apomorphy to justify this placement. Molecular evidence suggests affinities with Plecoitoidea, so it is placed there (Van Megen *et al.* 2009).
188. Marine or freshwater aquatic or moist terrestrial habitats, microbivorous.
189. There is ongoing controversy over the rendering of names ending in "gaster" with a suffix. See note Suborder Diplogasterina Paramonov 1952 (2 superfamilies) : cited as either Chronogastridae (Siddiqi 2003, Holovachov 2004, Mountport 2005, Holovachov & De Ley 2006), or Chronogasteridae (Ettema *et al.* 2000, Gagarin 1993, Gagarin *et al*. 2003, Hodda 2003, 2007, Lorenzen 1981, Poinar & Sarbu 1994, Zullini *et al*. 2002).
190. Freshwater aquatic or terrestrial, microbivorous.
191. Metateratocephalidae (including the genera *Metateratocephalus* and *Euteratocephalus*) have been included in Teratocephalidae on morphological grounds (Lorenzen 1981, 1994). Other morphological evidence (Bostrom 1989) and molecular studies (Holtermann *et al.* 2006, Van Megen *et al.* 2009) have indicated separate evolutionary paths.
192. Freshwater aquatic or moist terrestrial habitats, microbivorous.
193. Terrestrial or freshwater aquatic or marine, microbivorous. Some species associated with arthropods as commensals.
194. On morphological evidence the family has been placed as unresolved in Rhabditia (Lorenzen 1994). On molecular evidence, the family has been unresolved within Diplogasterida (De Ley & Blaxter 2004). More research is clearly needed to place the few species in the family, superfamily and suborder into anything other than a separate suborder under Diplogasterida, equivalent in rank to Myolaimina (Goodey 1963).
195. Terrestrial, microbivorous.
196. There is controversy over the correct rendering of names based on the genus name *Diplogaster*, resting on formation of Latin adjectives and the form of nouns (Sudhaus & von Lieven 2003). The original use as a suborder was the form Diplogasterata n. subord (Paramonov 1952). Here, the most frequently used form is adopted. The position of the (well-defined) suborder was unresolved within Rhabditica on molecular evidence (Holterman *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009), but sometimes placed within Rhabditida (De Ley & Blaxter 2004). A separate clade of equal rank to Rhabditina and Tylenchina on morphological evidence (Lorenzen 1994).
197. Included in Rhabditida by Hodda (2007), placed in Diplogasterida on molecular evidence (Van Megen *et al*. 2009), the evidence for morphological placement has long been in doubt.
198. Terrestrial, microbivores or fungivores. Associated with insects. or rarely in mammal or reptile.
199. Internal parasites of insects.
200. Created as a subfamily by Micoletzky (1922).
201. Terrestrial, microbivorous or omnivorous or predatory. Often associated with invertebrates, and may be parasitic internally with value as biocontrol agents.

Family **Diplogasteroididae** Paramonov 1952 (3 genera, 40 species) [202]

Family **Neodiplogasteridae** Paramonov 1952 (Andrassy 1984) (1 subfamily, 2 genera, 10 species) [203,204]

Family **Pseudodiplogasteroididae** De Ley & Blaxter 2002 (1 genus, 2 species) [205,206]

Family **Tylopharyngidae** Filipjev 1918 (n. rank.) (1 subfamily, 2 genera, 3 species)

Suborder **Myolaimina** Inglis 1983 (2 superfamilies) [207]

Superfamily **Carabonematoidea** Stammer & Wachek 1952 (Hodda 2007) (1 family)

Family **Carabonematidae** Stammer & Wachek 1952 (1 genus, 1 species) [208,209]

Superfamily **Myolaimoidea** Goodey 1963 (Hodda 2007) (1 family)

Family **Myolaimidae** Goodey 1963 (4 genera, 22 species) [210]

Order **Drilonematida** n. rank (1 suborder)

Suborder **Drilonematina** n. rank (1 superfamily)

Superfamily **Drilonematoidea** Pierantoni 1916 (Chitwood 1950) (5 families)

Family **Creagrocercidae** Baylis 1943 (1 genus, 1 species) [211]

Family **Drilonematidae** Pierantoni 1916 (6 subfamilies, 16 genera, 56 species) [212,213]

Family **Homungellidae** Timm 1966 (2 genera, 12 species) [214]

Family **Mesidionematidae** Poinar 1978 (2 genera, 6 species) [215]

Family **Pharyngonematidae** Chitwood 1950 (Timm 1959) (1 subfamily, 3 genera, 4 species) [216,217]

Family **Scolecophilidae** Baylis 1943 (1 genus, 3 species) [218]

Family **Ungellidae** Chitwood 1950 (2 subfamilies, 13 genera, 69 species) [219]

Order **Panagrolaimida** Hodda 2007 (4 suborders) [220]

Suborder **Aphelenchina** Geraert 1966 (3 superfamilies) [221]

Superfamily **Aphelenchoidea** Fuchs 1937 (Thorne 1949) (1 family)

---

202. Terrestrial, microbivorous or omnivorous or predatory. Often associated with arthropods.
203. Created as a subfamily by Paramonov (1952).
204. Terrestrial, microbivorous or predatory.
205. Created as a subfamily by Koerner (1954).
206. Terrestrial, microbivorous or omnivorous. Associated with beetles, but not parasitic.
207. Affinities with Diplogasterida were suggested by most molecular analyses (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007), except where Myolaimidae was unresolved in the latest molecular analysis (Baerman *et al.* 2009, Van Megen *et al.* 2009). Morphologically, affinities with Rhabditida have been suggested also (Goodey 1963).
208. Molecular evidence of phylogeny of Carabonematidae is lacking (De Ley & Blaxter 2004, Van Megen *et al.* 2009). The position of the family is either unresolved within Rhabditina on morphological evidence (Stammer & Wachek 1952) or within Myolaimina (Inglis 1983). The family contains few, poorly-known species, and more investigation is required.
209. Parasites of beetles.
210. Terrestrial, microbivorous.
211. Internal parasites of terrestrial annelids.
212. Created as family Drilonemidae by Pierantoni (1916).
213. Internal parasites of terrestrial annelids.
214. Internal parasites of terrestrial annelids.
215. Internal parasites of terrestrial annelids.
216. Created as a subfamily by Chitwood 1950.
217. Internal parasites of terrestrial annelids.
218. Internal parasites of terrestrial annelids.
219. Internal parasites of terrestrial annelids.
220. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
221. Hodda (2007) considered the Superfamilies Aphelenchoioidea and Aphelenchoidea as belonging to the different suborders Panagrolaimina and Tylenchina, respectively, because of consistent differentiation with support on molecular evidence (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2006, Smythe *et al.* 2006). The most recent molecular evidence resolved the superfamilies into different clades with statistical support, but did not show closer affinities to either Panagrolaimina or Tylenchina (Van Megen *et al.* 2009). De Ley & Blaxter (2002), and De Ley *et al.* (2006), despite the clear molecular evidence, as well as morphological differences, consnsidered the morphological similarities most important and put the two groups together (as families Aphelenchidae and Aphelenchoididae) in infraorder Tylenchomorpha (= suborder Tylenchina in the current classification). Here the superfamilies are regarded as separate, based on both the molecular evidence and morphology. Morphological differences include most notably the development of the posterior oesophagus, the presence or absence of bursae and gubernacula, as well as other features. The present classification reflects the morphological differences as being apomorphies within Aphelenchina defining the superfamilies. but the superfamilies are together regarded as a suborder on the basis of the long-noticed morphological apomorphies, most prominently the form of the median oesophageal bulb and the position of the oesophageal gland orifices (Hunt 1993, Geraert 1966, Thorne 1949). The suborder reflects the differentiation of both superfamilies from Panagrolaimina and Tylenchina.

Family **Aphelenchidae** Fuchs 1937 (Steiner 1949) (1 subfamily, 1 genus, 27 species) [222,223]

Superfamily **Aphelenchoidoidea** Skarbilovich 1947 (Siddiqi 1980) (7 families)

Family **Acugutturidae** Hunt 1980 (Hunt 1993) (2 subfamilies, 3 genera, 5 species) [224]

Family **Aphelenchoididae** Skarbilovich 1947 (Paramonov 1953) (2 subfamilies, 10 genera, 213 species) [225,226]

Family **Berntsenidae** Hodda 2003 (1 genus, 2 species) [227]

Family **Ektaphelenchidae** Paramonov 1964 (1 subfamily, 4 genera, 57 species) [228]

Family **Entaphelenchidae** Nickle 1970 (1 subfamily, 4 genera, 10 species) [229]

Family **Parasitaphelenchidae** Ruehm 1956 (Siddiqi 1980) (2 subfamilies, 3 genera, 113 species) [230,231]

Family **Seinuridae** Husain & Khan 1967a (Baranovskaya 1981) (1 subfamily, 4 genera, 52 species) [232,233]

Superfamily **Paraphelenchoidea** T. Goodey 1951 (Hodda 2007) (1 family)

Family **Paraphelenchidae** T. Goodey 1951 (J.B. Goodey 1960) (1 subfamily, 1 genus, 24 species) [234,235]

Suborder **Cephalobina** Andrassy 1974 (1 superfamily) [236,237]

Superfamily **Cephaloboidea** Filipjev 1934 (Fuchs 1934) (6 families)

Family **Alirhabditidae** Suryawanshi 1971 (1 genus, 2 species) [238]

Family **Bicirronematidae** Andrassy 1978 (Holovachov *et al.* 2003) (1 subfamily, 2 genera, 5 species) [239,240]

Family **Cephalobidae** Filipjev 1934 (Chitwood & MacIntosh 1934) (2 subfamilies, 32 genera, 3 subgenera, 227 species) [241,242]

Family **Elaphonematidae** Heyns 1962a (Paramonov 1964) (1 subfamily, 3 genera, 9 species)[243]

Family **Metacrobelidae** Andrassy 1974 (1 genus, 3 species) [244,245]

222. Created as a subfamily by Fuchs (1937).
223. Terrestrial, fungivorous. Sometimes associated with plant damage.
224. External parasites of arthropods.
225. Created as a subfamily by Skarbilovich (1947).
226. Terrestrial, fungivores or plant-feeding above or below ground or predators. Some plant-feeding species cause economically significant damage. Some species are internal parasites of insects.
227. Associated externally with beetles.
228. External parasites of arthropods.
229. Internal parasites of arthropods
230. Created as a subfamily by Ruehm (1956).
231. Terrestrial, fungivores or plant-feeding above or below ground. Some species cause economically significant damage. Some species are associated with insects as vectors.
232. Created as a subfamily by Husain & Khan (1967a).
233. Terrestrial, predatory.
234. Created as a subfamily by T Goodey (1951). Paraphelenchidae are different from Aphelechidae in many of the same features used to separate Aphelenchoidoididae from Aphelenchidae. Hence the differences may reflect a deep divergence. Paraphelenchidae share a number of features with Tylenchidae, such as an oesophageal isthmus with nerve ring around it, oesophageal glands enclosed in a bulb, vulva a transverse slit, and cephalated spicules. Paraphelenchidae differ from Tylenchidae in the major characters: location of oesophageal gland orifices, development of median oesophageal bulb, formation of stylet, genital papillae and the presence of a bursa, plus others. Thus Paraphelenchidae differ from Aphelenchidae in similar features as those differentiating other superfamilies within Tylenchina. Hence Paraphelenchoidea may represent a unique line of evolution within Tylenchina, and it is afforded superfamily status, even though some molecular data show Paraphelenchidae form a clade with Aphelenchidae (Van Megen *et al.* 2009).
235. Terrestrial, fungivorous.
236. Cephalobina and Rhabditina have been traditionally placed together in an Order Rhabditida. Molecular evidence consistently places the Cephalobina with Panagrolaimina (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). In addition, it appears that the origin of nerve cells in the oesophagus may be different in Rhabditidae to that in Cephalobidae and Panagrolaimidae (Borgonie *et al*. 2000). Early development is also different in *Caenorhabditis elegans* (Rhabditida) and *Acrobeloides nanus* (Cephalobina) (Schierenberg 2000). The monophyly of the Cephalobina is supported on molecular evidence (Nadler *et al.* 2006).
237. Created as an Infraorder by De Ley & Blaxter 2002
238. Terrestrial, microbivorous.
239. Created as a subfamily by Andrassy (1978).
240. Terrestrial, microbivorous.
241. Created as subfamily by Artigas (1929) in a thesis, and Filipjev (1934).
242. Terrestrial, microbivorous.
243. Associates of terrestrial annelids.
244. Created as a subfamily by Paramonov (1964).
245. Terrestrial, microbivorous.

Family **Osstellidae** Heyns 1962b (Andrassy 1984) (4 genera, 13 species) [246,247]

Suborder **Panagrolaimina** Hodda 2007 (5 superfamilies)

Superfamily **Alloionematoidea** Chitwood & MacIntosh 1934 (Andrassy 1983) (1 family)

Family **Alloionematidae** Chitwood & MacIntosh 1934 (Poinar 1977) (1 subfamily, 4 genera, 6 species) [248,249]

Superfamily **Myenchoidea** Pereira 1931 (Poinar 1977) (1 family)

Family **Myenchidae** Pereira 1931 (Poinar 1977) (1 subfamily, 2 genera, 3 species) [250,251]

Superfamily **Panagrolaimoidea** Thorne 1937 (Andrassy 1976) (1 family)

Family **Panagrolaimidae** Thorne 1937 (Paramonov 1956) (4 subfamilies, 16 genera, 1 subgenus, 54 species) [252,253]

Superfamily **Steinernematoidea** Chitwood & Chitwood 1937 (Hodda 2007) (1 family)

Family **Steinernematidae** Chitwood & Chitwood 1937 (2 genera, 78 species) [254]

Superfamily **Strongyloidoidea** Chitwood & MacIntosh 1934 (De Ley & Blaxter 2002) (2 families)

Family **Strongyloididae** Chitwood & MacIntosh 1934 (3 genera, 70 species) [255]

Family **Rhabdiasidae** Railliet 1916 (6 genera, 76 species) [256]

Suborder **Tylenchina** Chitwood 1950 (4 superfamilies)

Superfamily **Anguinoidea** Nicoll 1935 (2 families) [257,258]

Family **Anguinidae** Nicoll 1935 (Siddiqi 1971) (2 subfamilies, 14 genera, 187 species) [259]

Family **Sychnotylenchidae** Paramonov 1967 (Golden 1971) (1 subfamily, 2 genera, 30 species) [260,261]

Superfamily **Criconematoidea** Taylor 1936 (Geraert 1966) (5 families)

Family **Criconematidae** Taylor 1936 (Thorne 1949) (5 subfamilies, 16 genera, 9 subgenera, 426 species) [262,263,264]

Family **Hemicycliophoridae** Skarbilovich 1959 (Geraert 1966) (1 subfamily, 2 tribes, 6 genera, 155 species) [265,266]

Family **Paratylenchidae** Thorne 1949 (Raski 1962) (1 subfamily, 3 genera, 2 subgenera, 131 species) [267,268]

---

246. Subfamily Osstellinae created by Heyns (1962a), and used as a family by De Ley & Coomans (1990), but Drilocephalobidae was used first at family level (Ali, Suryawanshi & Chisti, 1973).
247. Terrestrial, microbivorous.
248. Created as a subfamily by Chitwood & MacIntosh (1934).
249. Terrestrial, microbivorous, may be associated with invertebrates as internal or external parasites.
250. Created as a subfamily by Pereira (1931).
251. Internal parasites of hirudoid annelids or frogs.
252. Created as a subfamily by Thorne (1937).
253. Terrestrial, microbivorous, may be associated with invertebrates as internal or external parasites.
254. Terrestrial, microbivorous, internal parasites of arthropods used as biocontrol agents.
255. Internal parasites of vertebrates.
256. Internal parasites of amphibians or reptiles.
257. Whether the Anguinoidea have closer affinities to Tylenchoidea or Sphaerulariodea has been discussed for some time based on morphological and life history evidence (Siddiqi 1986, 2000). Molecular evidence does not resolve the issue unequivocally (Meldal *et al.* 2007, Holterman *et al.* 2006, Van Megen *et al.* 2009). A polytomy is assumed here.
258. Originally constituted as Family Anguillulinidae by Baylis & Daubney 1926, with the type genus *Anguillulina* Gervais & Van Beneden 1859, which was regarded as a senior synonym of the genus *Tylenchus* Bastian 1865. Chitwood (1935) re-established *Anguina* Scopoli 1777 and designated *Vibrio tritici* Steinbuch 1799 as type species by subsequent designation (syn *Rhabditis tritici* (Steinbuch 1799) Dujardin 1845, *Anguillula tritici* (Steinbuch 1799) Grube 1849, *Anguillulina tritici* (Steinbuch 1799) Gervais & Van Beneden 1859, *Tylenchus tritici* (Steinbuch 1799) Bastian 1865). The genus *Vibrio* refers to bacteria and Protozoa. The genus *Rhabditis* refers to a different genus. Thus, the oldest name is *Anguillulina tritici* (Steinbuch 1799) Gervais & Van Beneden 1859. This, however, was rejected as invalid by ICZN in rulings 329 & 341 (1958). After Chitwood's (1935) publication, Nicoll (in Zoological Record) proposed the replacement names Anguinidae and Anguinoidea, to replace the names Anguillulinidae and Anguillulinoidea (and, coincidentally, Tylenchidae as well).
Paramonov (1962) proposed Anguininae, which was raised to Family rank by Siddiqi (1971).
259. Terrestrial, plant-root or seed feeding. Some species cause economic damage. Some species associated with bacteria toxic to mammals.
260. External associates of beetles.
261. Originally created as a subfamily by Paramonov (1967).
262. Created as a subfamily by Taylor (1936).
263. Terrestrial, plant-root feeding. Some species cause economic damage.
264. Classification of Criconematidae follows Geraert 2010.
265. Created as a subfamily by Skarbilovich (1959), and as a superfamily by Siddiqi (2000).
266. Terrestrial, plant-root feeding. Some species cause economic damage.
267. Created as a subfamily by Thorne (1949).

Family **Sphaeronematidae** Raski & Sher 1952 (Geraert 1966) (2 subfamilies, 4 genera, 12 species) [269,270]

Family **Tylenchulidae** Skarbilovich 1947 (Kirjanova 1955) (1 subfamily, 3 genera, 17 species) [271,272]

Superfamily **Sphaerularioidea** Poinar 1975 (5 families)

Family **Allantonematidae** Pereira 1931 (Chitwood & Chitwood 1937) (2 subfamilies, 18 genera, 148 species)

Family **Iotonchiidae** Goodey 1953 (Skarbilovich 1959) (1 subfamily, 4 genera, 20 species) [273,274]

Family **Neotylenchidae** Thorne 1941 (Thorne 1949) (5 subfamilies, 14 genera, 89 species) [275]

Family **Parasitylenchidae** Siddiqi 1986 (5 subfamilies, 12 genera, 50 species) [276]

Family **Sphaerulariidae** Lubbock 1861 (Skarbilovich 1947) (1 subfamily, 3 genera, 28 species) [277,278]

Superfamily **Tylenchoidea** Oerley 1880 (Chitwood & Chitwood 1937) (14 families) [279]

Family **Atylenchidae** Skarbilovich 1959 (2 subfamilies, 2 genera, 7 species) [280]

Family **Belonolaimidae** Whitehead 1959 (Golden 1971) (1 subfamily, 4 genera, 19 species) [281,282]

Family **Boleodoridae** Khan 1964 (Brzeski & Sauer 1983) (2 subfamilies, 6 genera, 97 species)

Family **Dolichodoridae** Chitwood & Chitwood 1950 (Skarbilovich 1959) (2 subfamilies, 3 genera, 30 species) [283,284]

Family **Ecphyadophoridae** Skarbilovich 1959 (2 subfamilies, 8 genera, 25 species) [285]

Family **Heteroderidae** Filipjev 1934 (Skarbilovich 1947) (3 subfamilies, 15 genera, 148 species) [286,287]

Family **Hoplolaimidae** Filipjev 1934 (Weiser 1953) (3 subfamilies, 11 genera, 455 species) [288,289]

Family **Meloidogynidae** Skarbilovich 1959 (Wouts 1973) (2 subfamilies, 6 genera, 106 species) [290,291]

---

268. Terrestrial, plant-root feeding. Some species cause economic damage.
269. Created as a subfamily by Raski & Sher (1952).
270. Terrestrial, plant-root feeding. Some species cause economic damage.
271. Created as a subfamily by Skarbilovich (1947).
272. Terrestrial, plant-root feeding. Some species cause economic damage.
273. Created as a subfamily by Goodey (1953).
274. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding nematodes.
275. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding nematodes.
276. Alternating generations of internal parasites of insects and free-living fungivorous or plant-root feeding or rarely non-feeding nematodes.
277. Created as subfamily Spherulariaceae by Lubbock (1861).
278. Internal parasites of insects.
279. The arrangement of the families Tylenchidae, Boleodoridae, Ecphyadophoridae, Atylenchidae, Tylodoridae and Psilenchidae differs markedly among different analyses of relationships using both morphological and molecular evidence. Siddiqi (2000) regarded Tylenchidae, Ecphyadophoridae, Atylenchidae, Tylodoridae and Psilenchidae as separate families, but with Boleodorinae as subfamily of Tylenchidae (along with several others) and Psilenchidae in a separate suborder. Geraert (2008) regarded Atylenchinae, Boleodorinae, Ecphyadophorinae, Tylenchinae and Tylodorinae as subfamilies of a greater Tylenchidae and did not recognise Psilenchidae because it was embedded within Tylenchinae. Holterman *et al.* (2006, 2008) and Bert *et al.* (2008) identified Tylodoridae as divergent from the other families and Ecdyaphoridae as unresolved. Van Megen *et al.* (2009) resolved Tylenchidae into at least two different resolved clades (Tylenchinae and Duosulciinae), and Ecphyadophoridae was resolved from both, with the relationships of the other families unresolved. In view of this conflicting evidence, all the clades clearly identifiable by either molecular or morphological analyses are regarded as separate families arising separately from a polytomy. Only extensive analyses of many species from each of these clades, analysed using multiple genetic and morphological characters, are likely to satisfactorily resolve this situation.
280. Terrestrial or freshwater aquatic habitats, feed externally on plant roots. Not known to cause economic damage to plants.
281. Created as a subfamily by Whitehead (1959).
282. Terrestrial, feed externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.
283. Created as a subfamily by Chitwood (1950).
284. Terrestrial, feed mostly externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.
285. Terrestrial or freshwater aquatic habitats, feed externally on plant roots. Not known to cause economic damage to plants.
286. Created as a subfamily by Filipjev (1934).
287. Terrestrial or very rarely estuarine, feed mostly internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.
288. Created as a subfamily by Filipjev (1934).
289. Terrestrial or rarely freshwater aquatic, feed mostly externally on plant roots but may partially enter the root. Many cause economic damage, but some are not regarded as economic pests.

Family **Psilenchidae** Paramonov 1967 (Khan 1969) (2 subfamilies, 3 genera, 26 species) [292,293]

Family **Pratylenchidae** Thorne 1949 (Siddiqi 1963) (4 subfamilies, 12 genera, 233 species) [294,295]

Family **Rotylenchulidae** Husain & Khan 1967b (Fotedar & Handoo 1975) (3 subfamilies, 5 genera, 18 species) [296,297]

Family **Telotylenchidae** Siddiqi 1960 (Loof 1987) (4 subfamilies, 19 genera, 391 species) [298,299]

Family **Tylenchidae** Oerley 1880 (Marcinowski 1909) (3 subfamilies, 22 genera, 282 species) [300,301]

Family **Tylodoridae** Allen & Sher 1967 (Siddiqi 1976) (3 subfamilies, 7 genera, 29 species) [302,303]

Order **Rhabditida** Chitwood 1933 (7 suborders) [304]

Suborder **Ablechroiulina** Hodda 2007 (1 superfamily) [305]

Superfamily **Ablechroiuloidea** Hodda 2007 (1 family)

Family **Ablechroiulidae** Andrassy 1976 (Hodda 2007) (1 genus, 14 species) [306,307]

Suborder **Agfina** Hodda 2007 (1 superfamily) [308]

Superfamily **Agfoidea** Dougherty 1955 (Hodda 2007) (1 family)

Family **Agfidae** Dougherty 1955 (1 genus, 3 species) [309]

Suborder **Angiostomatina** n. rank

Superfamily **Angiostomatoidea** R. Blanchard 1895 (n. rank)

Family **Angiostomatidae** R. Blanchard 1895 (3 genera, 17 species)

---

290. Created as a subfamily by Skarbilovich (1959).
291. Terrestrial, feed mostly internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.
292. Created as a subfamily by Paramonov (1967).
293. Terrestrial, feed externally on plant roots. Some cause economic damage, but many are not regarded as economic pests.
294. Created as a subfamily by Thorne (1949).
295. Terrestrial, feed externally or internally on plant roots. Many cause economic damage, but some are not regarded as economic pests.
296. Created as a subfamily by Husain & Khan (1967b).
297. Terrestrial, feed mostly externally on plant roots but may partially enter the root. Some cause economic damage, but some are not regarded as economic pests.
298. Created as a subfamily by Siddiqi (1960). Telotylenchidae first used at family level by Loof (1987) when transferring the genus *Telotylenchus* to the family Tylenchorhynchidae Eliava 1964.
299. Terrestrial, feed externally on plant roots. Some cause economic damage, but some are not regarded as economic pests.
300. Created as a subfamily by Oerley (1880).
301. Mostly terrestrial or less frequently freshwater aquatic or very rarely estuarine or marine, plant-root or algal feeders. A few cause economic damage, but most are not regarded as economic pests.
302. Created as a subfamily by Paramonov (1967).
303. Terrestrial or rarely freshwater aquatic, feed externally on plant roots. Some cause economic damage, but many are not regarded as economic pests.
304. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
305. A separate suborder pending resolution of affinities, which are currently unresolved on morphological or molecular evidence (Andrassy 1974, Meldal *et al.* 2007). Includes the genus *Rhabditoides* (Andrassy 1976), and clearly within Rhabditida (Andrassy 1976, De Ley *et al.* 2006, Hodda 2007).
306. Andrássy (1976) originally proposed subfamily Ablechroiulinae to include the genera *Ablechroiulus* and *Rhabditoides* Goodey 1929, both genera having in common the possession of bundles of cirri–like bristles on lip region, among other features. Sudhaus & Fitch (2001) provided an updated classification of Rhabditidae Örley 1980 but maintained on the basis of morphological and molecular data that *Ablechroiulus* was a junior synonym of *Rhabditis* (*Rhabditis*), one of the 15 subgenera in which Sudhaus (1976) subdivided the genus. Andrássy (1976, 1983, 1984, 2005) did not accept Sudhaus' scheme. Molecular trees showed that one species of *Ablechroiulus* (*A. dudichi* or *Choriorhabditis dudichi* Sudhaus scheme), is not distinctly clustered with other representatives of the subgenus *Rhabditis*. This result was also obtained by Holterman *et al*. (2006). Kiontke & Fitch (2005) included three *Ablechroiulus* species in their molecular study (*brassicae*, *cristatus* and *dudichi*): *A. brassicae* clustered with *Rhabditis* species and the other two formed a clade at the base of the Eurhabditis group. The genus was re-examined by Abolafia & Pena Santaigo (2009, 2011), who briefly discussed the identity of *Ablechroiulus*, and characterized it mainly on the base of the presence of short labial setae, classifying it under the subfamily Rhabditinae Örley, 1880, and regarding Ablechroiulinae Andrássy, 1976 as a junior synonym of that taxon. In view of the highly unresolved position of the group, either morphologically or molecularly, it is here regarded as a separate clade. The cirri-like bristles are a unique apomorphy.
307. Terrestrial, microbivorous.
308. Placed with moderate support in Peloderidae on molecular evidence (Ross *et al.* 2010), but other molecular evidence is lacking (De Ley & Blaxter 2004). The position of Agfidae is unresolved on morphological evidence (Ribas & Casanova 2002, Inglis 1983), and it has been placed within Cylindrocorporoidea, Myolaimidae and Rhabditomorpha. There are only 3 species of the family, which are all parasites of slugs. All have an unusual combination of characters, some of which may be plesiomorphic for Rhabditina, and some of which may be apomorphic hence its current placement as a suborder. More investigation is required.
309. Terrestrial, microbivorous, internal parasites of molluscs.

Suborder **Brevibuccina** Hodda 2007 (1 superfamily) [310]
Superfamily **Brevibuccoidea** Paramonov 1956 (Hodda 2007) (1 family)
Family **Brevibuccidae** Paramonov 1956 (Goodey 1963) (1 subfamily, 2 genera, 4 species) [311,312]
Suborder **Bunonematina** Siddiqi 1980 (2 superfamilies) [313]
Superfamily **Bunonematoidea** Paramonov 1956 (Andrassy 1971) (2 families)
Family **Bunonematidae** Paramonov 1956 (10 genera, 2 subgenera, 42 species) [314,315]
Family **Pterygorhabditidae** Goodey 1963 (Andrassy 1971) (1 genus, 4 species) [316,317]
Superfamily **Odontopharyngoidea** Micoletzky 1922 (1 family)
Family **Odontopharyngidae** Micoletzky 1922 (1 genus, 2 species) [318,319]
Suborder **Peloderina** Hodda 2007 (1 superfamily)
Superfamily **Mesorhabditoidea** Andrassy 1976 (De Ley & Blaxter 2002) (3 families)
Family **Mesorhabditidae** Andrassy 1976 (De Ley & Blaxter 2002) (1 subfamily, 3 genera, 29 species) [320,321]
Family **Parasitorhabditidae** Lazarevskaya 1965 (Hodda 2007) (1 subfamily, 1 genus, 43 species) [322,323]
Family **Peloderidae** Andrassy 1976 (De Ley & Blaxter 2002) (1 subfamily, 4 genera, 32 species) [324,325]
Suborder **Rhabditina** Chitwood 1933 (3 superfamilies)
Superfamily **Heterorhabditoidea** Poinar 1975 (n. rank) (2 families) [326]
Family **Heterorhabditidae** Poinar 1975 (1 genus, 15 species) [327]
Family **Syrphonematidae** Laumond & Lyon 1971 (1 genus, 1 species)
Superfamily **Rhabditoidea** Oerley 1880 (Travassos 1920) (2 families)
Family **Diploscapteridae** Micoletzky 1922 (Andrassy 1983) (1 subfamily, 2 genera, 9 species) [328,329]
Family **Rhabditidae** Oerley 1880 (5 subfamilies, 38 genera, 11 subgenera, 229 species) [330]
Superfamily **Strongyloidea** Baird 1853 (Railliet & Henry 1913) (4 families) [331]
Family **Ancylostomatidae** Looss 1905 (Looss 1911) (2 subfamilies, 2 tribes, 6 subtribes, 20 genera, 144 species) [332,333]

310. On morphological evidence the family has been placed as unresolved in Rhabditida (Lorenzen 1994). On molecular evidence, the family has been unresolved within Rhabditida (De Ley & Blaxter 2004, Holterman *et al.* 2006, Meldal *et al.* 2007, Van Megen *et al.* 2009). In all cases a resolution between Rhabditina and Diplogasterina has not been possible.
311. Created as a subfamily by Paramonov (1956).
312. Terrestrial, microbivorous.
313. Diplogastrina [*sic*] and *Bunonema* have been regarded as closely related on the basis of five morphological synapomorphies: mainly related to fine structure of buccal cavity, but also genital papillae (Von Lieven & Sudhaus 2000). It is unclear what group(s) these characters are synapomorphies of: potentially they could be synapomorphies of Rhabditica, in which case these characters would not conflict with the molecular evidence placing *Bunonema* in Rhabditida (Holterman *et al.* 2006), but the affinities of Bunonematidae are unresolved in other analyses (Van Megen *et al.* 2009). Placed in Rhabditida on the basis of morphological similarity (De Ley *et al.* 2006, Goodey 1963, Hodda 2007), but as a separate suborder.
314. Created as a subfamily by Micoletzky (1922).
315. Terrestrial, microbivorous.
316. Created as a subfamily created by Goodey (1963).
317. Terrestrial, microbivorous.
318. Created as a subfamily by Filipjev & Schuurmans Stekhoven (1941).
319. Terrestrial, microbivorous or predatory.
320. Created as a subfamily by Andrassy (1976).
321. Terrestrial, microbivorous.
322. The genus *Parasitorhabditis* was previously placed in Rhabditidae, but it is unambiguously a separate clade associated with Peloderina on molecular evidence (Holterman *et al.* 2006, Meldal *et al.* 2007).
323. Terrestrial, microbivorous, associated with arthropods.
324. Created as a subfamily by Andrassy (1976).
325. Terrestrial, microbivorous, but includes a species living on wood mice hair follicles and the conjunctiva of mice, voles or lemmings.
326. A separate clade according to the molecular analysis of Chilton *et al.* (2006)
327. Terrestrial, microbivorous, internal associates of arthropods which are vectors of pathogenic bacteria and are used as biocontrol agents.
328. Created as a subfamily by Chitwood & Chitwood (1937).
329. Terrestrial, microbivorous.
330. Terrestrial, microbivorous, often associated with invertebrates, occasionally internally.
331. The authorities of supra generic taxa in this group have been discussed extensively (Dougherty 1944).
332. Created as a subfamily by Looss (1905).

Family **Metastrongylidae** Leiper 1912 (8 subfamilies, 4 tribes, 65 genera, 10 subgenera, 289 species) [334,335]

Family **Strongylidae** Baird 1853 (4 subfamilies, 9 tribes, 17 subtribes, 115 genera, 14 subgenera, 661 species) [336]

Family **Trichostrongylidae** Lieper 1908 (Leiper 1912) (3 subfamilies, 15 tribes, 29 subtribes, 224 genera, 6 subgenera, 1321 species) [337,338 339,340]

Order **Spirurida** Railliet 1914 (6 suborders) [341]

Suborder **Ascaridina** Inglis 1983 (5 superfamilies)

Superfamily **Ascaridoidea** Baird 1853 (Skryabin 1915) (5 families)

Family **Anisakidae** Railliet & Henry 1912b (Skryabin & Karokhin 1945) (4 subfamilies, 2 tribes, 18 genera, 224 species) [342,343]

Family **Ascaridae** Baird 1853 (4 subfamilies, 4 tribes, 34 genera, 402 species) [344]

Family **Crossophoridae** Baylis 1920 (Hartwich 1957) (1 subfamily, 2 genera, 2 species)

Family **Heterocheilidae** Railliet & Henry 1915 (1 genus, 2 species) [345,346]

Family **Raphidascarididae** Hartwich 1954 (Fagerholm 1990) (4 subfamilies, 1 tribe, 9 genera, 193 species) [347,348]

Superfamily **Cosmocercoidea** Skryabin & Shikhobalova 1951 (3 families)

Family **Atractidae** Railliet 1917 (Travassos 1920) (21 genera, 65 species) [349,350]

Family **Cosmocercidae** Railliet 1916 (Travassos 1925) (3 subfamilies, 23 genera, 187 species) [351,352]

Family **Kathlaniidae** Lane 1914 (Travassos 1918) (3 subfamilies, 19 genera, 158 species) [353,354]

Superfamily **Heterakoidea** Railliet & Henry 1912b (Chabaud 1957) (3 families)

Family **Ascaridiidae** Travassos 1920 (1 genus, 33 species) [355]

Family **Aspidoderidae** Skryabin & Shikhobalova 1947 (Freitas 1956) (2 subfamilies, 7 genera, 26 species) [356]

Family **Heterakidae** Railliet & Henry 1912b (3 subfamilies, 16 genera, 132 species) [357]

Superfamily **Seuratoidea** Hall 1916 (Chabaud *et al.* 1959) (5 families)

Family **Chitwoodchabaudiidae** Puylaert 1970 (1 genus, 1 species) [358]

Family **Cucullanidae** Cobbold 1864 (2 subfamilies, 5 genera, 5 subgenera, 219 species) [359]

Family **Quimperiidae** Gendre 1928 (Baylis 1930) (2 subfamilies, 18 genera, 79 species) [360,361]

333. Internal parasites of mammals.
334. Created as a subfamily by Lieper (1908).
335. Internal parasites of mammals.
336. Internal parasites of mammals or occasionally birds or reptiles.
337. Attributed also to Witenberg (1925) by De Ley & Blaxter (2002).
338. Internal parasites of amphibians, reptiles, birds or mammals.
339. Classification follows Durette-Desset Spratt & Beveridge (2012 Handbuch fuer Zoologie), and Durette Desset *et al.* (1999) except generally 1 full taxonomic rank lower
340. Ichthyostrongylidae Yamaguti 1961 of doubtful validity as a group and included here (Beveridge *et al.* 2010).
341. Spermatogenesis and development provide evidence for the separation of Spirurida, Rhabditida and Panagrolaimida (Yushin & Malakhov 2004, Schierenberg & Lahl 2004).
342. Created as a subfamily by Railiet & Henry (1912).
343. Internal parasites of vertebrates.
344. Internal parasites of amphibians, reptiles, birds or mammals, rarely of fish.
345. Subfamily created by Railliet & Henry (1912).
346. Internal parasites of marine mammals.
347. Created as a subfamily by Hartwich (1954).
348. Internal parasites of fish.
349. Created as a subfamily by Railliet (1917).
350. Internal parasites of vertebrates.
351. Created as a subfamily by Railiet (1916).
352. Internal parasites of amphibians or rarely of reptiles.
353. Created as a subfamily by Lane (1914).
354. Internal parasites of vertebrates.
355. Internal parasites of birds or rarely mammals.
356. Internal parasites of mammals.
357. Internal parasites of amphibians or reptiles or birds or mammals.
358. Internal parasites of amphibians.
359. Internal parasites of fish or rarely aquatic reptiles.

Family **Schneidernematidae** Freitas 1956 (2 subfamilies, 5 genera, 7 species) [362]
Family **Seuratidae** Hall 1916 (Railliet 1906) (3 subfamilies, 13 genera, 44 species) [363]
Superfamily **Subuluroidea** Travassos 1914 (Travassos 1930) (2 families)
Family **Maupasinidae** Inglis 1960 (1 genus, 2 species) [364]
Family **Subuluridae** Travassos 1914 (Yorke & Maplestone 1926) (5 subfamilies, 13 genera, 5 subgenera, 107 species) [365,366]
Suborder **Dracunculina** Hodda 2007 (2 superfamilies) [367]
Superfamily **Anguillicoloidea** Yamaguti 1935 (Moravec 2006) (1 family)
Family **Anguillicolidae** Yamaguti 1935 (2 genera, 5 species) [368]
Superfamily **Dracunculoidea** Stiles 1907 (Lieper 1912) (8 families)
Family **Daniconematidae** Moravec & Koie 1987 (3 genera, 4 species) [369]
Family **Dracunculidae** Stiles 1907 (Lieper 1912) (3 genera, 16 species) [370,371]
Family **Guyanemidae** Petter 1974 (2 subgenera, 6 genera, 15 species) [372]
Family **Micropleuridae** Baylis & Daubney 1926 (Travassos 1960) (2 subfamilies, 6 genera, 15 species) [373]
Family **Philometridae** Baylis & Daubney 1926 (3 sub families, 11 genera, 117 species) [374]
Family **Phlyctainophoridae** Roman 1965 (1 genus, 3 species) [375]
Family **Skrjabillanidae** Shigin & Shigina 1958 (2 subfamilies, 4 genera, 7 species) [376]
Family **Tetanonematidae** Skryabin & Shikhobalova 1948 (1 genus, 1 species)
Suborder **Gnathostomatina** Skryabin & Ivaschkin 1973 (1 superfamily) [377]
Superfamily **Gnathostomatoidea** Railliet 1895 (Ivaschkin 1960) (1 family)
Family **Gnathostomatidae** Railliet 1895 (3 subfamilies, 5 genera, 61 species) [378]
Suborder **Oxyurina** Railliet 1916 (2 superfamilies)
Superfamily **Oxyuroidea** Cobbold 1864 (3 families)
Family **Heteroxynematidae** Skryabin & Shikhobalova 1948 (2 subfamilies, 13 genera, 59 species) [379]
Family **Oxyuridae** Cobbold 1864 (54 genera, 23 subgenera, 257 species) [380]
Family **Pharyngodonidae** Travassos 1920 (13 genera, 6 subgenera, 359 species) [381]
Superfamily **Thelastomatoidea** Travassos 1929 (5 families)
Family **Hystrignathidae** Travassos 1929 (29 genera, 104 species) [382]
Family **Protrelloididae** Chitwood 1932 (Adamson & Van Waerebeke 1992) (1 subfamily, 5 genera, 27 species) [383,384]

360. Created as a subfamily by Gendre (1928).
361. Internal parasites of freshwater fish or amphibians.
362. Internal parasites of birds or mammals.
363. Internal parasites of amphibians or reptiles or birds or mammals.
364. Created as a subfamily by Lopez-Neyra (1945), but a synonym of Dubioxuridae Ortlepp 1937 which has not been used because the type genus *Duboxuris* Ortlepp 1937 has been synonymized with *Maupasina* Seurat 1913.
365. Internal parasites of birds or mammals.
366. Internal parasites of mammals.
367. The affinities of Dracunculoidea have long been with Spirurida on morphological grounds (Chabaud 1974), and were unresolved in early molecular analyses (Holterman *et al.* 2006, De Ley & Blaxter 2004), then clear molecular evidence was presented for affinities with Spirurida (Van Megen *et al.* 2009).
368. Internal parasites of fish.
369. Internal parasites of fish
370. Created as a subfamily by Stiles (1907).
371. Internal parasites of reptiles or birds or mammals.
372. Internal parasites of fish.
373. Internal parasites of reptiles.
374. Internal parasites of fish.
375. Internal parasites of selachian fish.
376. Internal parasites of freshwater fish.
377. Created as order Gnathostomatata.
378. Internal parasites of fish or amphibians or reptiles or mammals.
379. Internal parasites of birds or mammals (rodents or lagomorphs).
380. Internal parasites of mammals.
381. Internal parasites of fish or amphibians or reptiles, rarely of mammals.
382. Internal parasites of terrestrial insects.

Family **Pseudonymidae** Adamson & Buck 1990 (1 subfamily, 5 genera, 28 species) [385,386]
Family **Thelastomatidae** Travassos 1929 (39 genera, 242 species) [387]
Family **Travassosinematidae** Rao 1958 (10 genera, 46 species) [388]
Suborder **Rhigonematina** Inglis 1983 (2 superfamilies)
Superfamily **Ransomnematoidea** Travassos 1930 (3 families)
Family **Carnoyidae** Filipjev 1934 (Travassos & Kloss 1960) (1 subfamily, 14 genera, 54 species) [389]
Family **Hethidae** Skryabin & Shikhobalova 1951 (Travassos & Kloss 1960) (1 subfamily, 2 genera, 39 species) [390]
Family **Ransomnematidae** Travassos 1930 (3 genera, 16 species) [391]
Superfamily **Rhigonematoidea** Artigas 1930 (Kloss 1960) (3 families)
Family **Ichthyocephalidae** Travassos & Kloss 1958 (4 genera, 23 species) [392]
Family **Rhigonematidae** Artigas 1930 (3 genera, 60 species) [393]
Family **Xustromatidae** Hunt 2002 (4 genera, 13 species) [394]
Suborder **Spirurina** Railliet & Henry 1915 (10 superfamilies) [395]
Superfamily **Acuarioidea** Railliet Henry & Sissoff 1912 (Sobolev 1949) (1 family)
Family **Acuariidae** Railliet Henry & Sissoff 1912 (Chabaud 1975) (3 subfamilies, 39 genera, 2 subgenera, 299 species) [396,397]
Superfamily **Aproctoidea** Yorke & Maplestone 1926 (Chabaud 1975) (2 families)
Family **Aproctidae** Yorke & Maplestone 1926 (Skryabin & Shikhobalova 1945) (2 subfamilies, 6 genera, 59 species) [398,399]
Family **Desmidocercidae** Cramm 1927 (1 subfamily, 4 genera, 8 species) [400]
Superfamily **Camallanoidea** Railliet & Henry 1915 (Travassos 1920) (2 families)
Family **Camallanidae** Railliet & Henry 1915 (10 genera, 347 species) [401]
Family **Physalopteridae** Railliet 1893 (Lieper 1908) (3 subfamilies, 16 genera, 4 subgenera, 290 species) [402,403]
Superfamily **Diplotriaenoidea** Skryabin 1916 (Anderson 1958) (1 family) [404]
Family **Diplotriaenidae** Skryabin 1916 (Anderson 1958) (2 subfamilies, 13 genera, 107 species) [405]
Superfamily **Filarioidea** Weinland 1858 (Chabaud & Anderson 1959) (2 families)
Family **Filariidae** Weinland 1858 (Cobbold 1879) (2 subfamilies, 13 genera, 72 species) [406,407]

383. Created as a subfamily by Chitwood (1932).
384. Internal parasites of insects.
385. First subfamily Gyoeryiinae Kloss (1958), but with genus synonymization of genus *Gyoeryia* Kloss 1958 with *Pseudonymus* Diesing 1857 by Adamson & Van Waerebeke (1992), the first name used as a family was Pseudonymidae Adamson & Van Waerebeke 1992.
386. Internal parasites of terrestrial insects.
387. Parasites of invertebrates.
388. Parasites of diplopods and insects.
389. Internal parasites of diplopods or rarely myriapods.
390. Internal parasites of diplopods or rarely myriapods.
391. Internal parasites of diplopods or rarely myriapods.
392. Internal parasites of diplopods.
393. Internal parasites of diplopods or myriapods.
394. Parasites of diplopods or rarely myriapods.
395. Originally named suborder Spirurata (Railliet & Henry 1915) prior to adoption of current system of uniform endings of higher-ranked taxon names. First used in current form by Chitwood (1937).
396. Created as a subfamily by Railliet, Henry & Sisoff (1912).
397. Internal parasites of birds or rarely mammals.
398. Created as a subfamily by Yorke & Maplestone (1926).
399. Internal parasites of birds.
400. Internal parasites of birds.
401. Internal parasites of fish, amphibians and reptiles.
402. Created as a subfamily by Railliet (1893).
403. Internal parasites of fish, amphibians, reptiles and occasionally birds and mammals.
404. Created as a subfamily by Skryabin (1916).
405. Internal parasites of reptiles or birds.
406. Created as a subfamily by Weinland (1858).
407. Internal parasites of amphibians, reptiles, birds and mammals.

Family **Onchocercidae** Lieper 1911 (Chabaud & Anderson 1959) (6 subfamilies, 87 genera, 668 species) [408,409]

Superfamily **Habronematoidea** Chitwood & Wehr 1932 (Anderson *et al.* 1974) (4 families) [410]

Family **Cystidicolidae** Skryabin *et al.* 1949 (22 genera, 178 species) [411,412]

Family **Habronematidae** Chitwood & Wehr 1932 (Ivashkin 1961) (3 subfamilies, 21 genera, 5 subgenera, 131 species) [413,414]

Family **Hedruridae** Petter 1971 (1 genus, 12 species) [415]

Family **Tetrameridae** Travassos 1914 (3 subfamilies, 6 genera, 111 species) [416]

Superfamily **Lucionematoidea** Moravec *et al.* 1998 (n. rank) [417]

Family **Lucionematidae** Moravec *et al.* 1998 (1 genus, 1 species) [418]

Superfamily **Rictularioidea** Railliet 1916 (Anderson *et al.* 1974) (1 family)

Family **Rictulariidae** Railliet 1916 (5 genera, 5 subgenera, 91 species) [419,420]

Superfamily **Spiruroidea** Oerley 1885 (Railliet & Henry 1915) (5 families)

Family **Gongylonematidae** Sobolev 1949 (1 genus, 3 subgenera, 36 species) [421,422]

Family **Hartertiidae** Chabaud 1975 (2 genera, 11 species) [423,424]

Family **Spirocercidae** Chitwood & Wehr 1932 (Chabaud 1975) (3 subfamilies, 21 genera, 3 subgenera, 77 species) [425,426]

Family **Spiruridae** Oerley 1885 (11 genera, 58 species) [427]

Family **Tricheilidae** Wang & Wang 1991 (1 genus, 1 species) [428]

Superfamily **Thelazioidea** Railliet 1910 (Sobolev 1949) (3 families)

Family **Pneumospiruridae** Wu & Hu 1938 (3 genera, 10 species) [429]

Family **Rhabdochonidae** Skryabin 1946 (11 genera, 4 subgenera, 174 species) [430,431]

Family **Thelaziidae** Railliet 1910 (2 subfamilies, 7 genera, 8 subgenera, 82 species) [432]

Superorder **Teratocephalica** Hodda 2007 (1 order) [433]

Order **Teratocephalida** Goodey 1963 (1 suborder)

Suborder **Teratocephalina** Andrassy 1974 (1 superfamily)

Superfamily **Teratocephaloidea** Andrassy 1958 (Andrassy 1974) (1 family)

Family **Teratocephalidae** Andrassy 1958 (2 genera, 20 species) [434]

---

408. Created as a subfamily by Lieper (1911). Onchocercidae is preferred to Dipelonematidae Wehr 1935 because the former is in wide use and the latter is not.
409. Internal parasites of amphibians, reptiles, birds or mammals.
410. This superfamily should be designated Tetrameroidea because the family Tetrameridae Travassos 1914 has priority over Hedrurinae Railliet 1916, and Histiocephalinae Gendre 1922, and Habronematinae Chitwood & Wehr 1932 (Chabaud 1974). However, to preserve stability and because the other families are unusual for the group, Habronematoidea was chosen as the name for the group (Chabaud 1974).
411. Created as a subfamily by Skryabin (1946).
412. Internal parasites of fishes.
413. Habronematidae (originally created as a subfamily by Chitwood & Wehr (1932)) is used in preference to Histiocephalidae (derived from a subfamily created by Gendre (1922) because the former is in wide use and the latter has not been used (Chabaud 1975).
414. Internal parasites of birds and mammals.
415. Internal parasites of amphibians and reptiles.
416. Internal parasites of birds or marine mammals.
417. The sole species in the family Lucionematidae has an unusual suite of characters for Spirurida (Moravec *et al*. 1998), so is placed in a separate superfamily.
418. Parasites of freshwater fish.
419. Created as a subfamily by Hall (1916).
420. Internal parasites of mammals.
421. Created as a subfamily by Hall (1916).
422. Internal parasites of birds or mammals.
423. Created as a subfamily by Quentin (1970).
424. Internal parasites of birds.
425. Created as a subfamily by Chitwood & Wehr (1932).
426. Internal parasites of birds and mammals.
427. Internal parasites of vertebrates.
428. Parasites of reptiles.
429. Parasites of the lungs of mammals.
430. Created as a subfamily by Travassos *et al*. (1928).
431. Mostly internal parasites of fish, occasionally of other vertebrates.
432. Mostly parasites of bird or mammal eyes.

References

Abolafia, J. & Pena-Santiago, R. (2009) Nematodes of the order Rhabditida from Andalucia, Spain. The family Mesorhabditidae, with description of *Mesorhabditis carmenae* sp n. *Journal of Nematode Morphology and Systematics*, 12, 41–64.

Abolafia, J. & Pena-Santiago, R. (2011) *Ablechroiulus spelaeus* sp n. and *A. dudichi* Andrassy, 1970 from Andalucia Oriental, Spain, with a discussion of the taxonomy of the genus *Ablechroiulus* Andrassy, 1966 (Nematoda, Rhabditida, Rhabditidae). *Zootaxa*, 2922, 1–14.

Adamson, M.L. (1987) Phylogenetic analysis of the higher classification of the nematodes. *Canadian Journal Of Zoology*, 65, 1478–1482.

Adamson, M.L. & Buck, A. (1990) Pinworms from water scavenger beetles (Coleoptera, Hydrophilidae) with a description of a new species, *Zonothrix columbianus* sp.n. (Oxyurida, Pseudonymidae), from western Canada. *Journal of the Helminthological Society of Washington*, 57, 21–25.

Adamson, M.L. & Van Waerebeke, D. (1992) Revision of the Thelastomatoidea, Oxyurida of invertebrate hosts 3. Hystrignathidae. *Systematic Parasitology*, 21, 169–188.

Aguinaldo, A.M.A., Turbeville, J.M., Linford, L.S., Rivera, M.C., Garey, J.R., Raff, R.A. & Lake, J.A. (1997) Evidence for a clade of nematodes, arthropods and other moulting animals. *Nature*, 387, 489–493.

Ahmad, M. & Jairajpuri, M.S. (1979) Nygolaimina of India. *Proceedings of the Second National Congress of Parasitology Varanasi* 1979, 29.

Ahmad, M. & Jairajpuri, M.S. (1982) Nygolaimina of India. *Records of the Zoological Survey of India Occasional Paper* 1982, 1–71.

Ahmad, W. & Jairajpuri, M.S. (1983) 3 new species of Tylencholaimoidea (Nematoda, Dorylaimida) from India. *Nematologica*, 29, 367–374.

Aleshin, V.V. (2004) Whether variable cleavage of Enoplida (Nematoda) is primitive? Notes to D.A. Voronov article "Comparative embryology of Nematoda and the law of embryonic similarity". *Zhurnal Obshchei Biologii*, 65, 74–80.

Aleshin, V.V., Kedrova, O.S. & Miljutina, I.A. (1998) Relationships among nematodes based on the analysis of 18S rRNA gene sequences: molecular evidence for monophyly of chromadorian and secernentian nematodes. *Russian Journal of Nematology*, 6, 175–184.

Ali, M.S., Suryawanshi, M.V. & Chitty, K.Z. (1973) Two new species of *Drilocephalobus* Coomans & Goodey, 1965 (Nematoda: Drilocephalobidae n.fam.) from Marathwada, India with a revised classification of the superfamily Cephaloboidea (Paramonov, 1956) Paramonov, 1962. *Nematologica*, 19, 308–317.

Allen, M.W. & Sher, S.A. (1967) Taxonomic problems concerning the phytoparasitic nematodes. *Annual Review of Phytopathology*, 5, 247–264.

Anderson, R.C. (1958) On the classification of the Filarioidea with special reference to the Filariidae and the Stephanofilariidae. *Bulletin de la Societe zoologique de France*, 83, 144–157.

Anderson, R.C. & Bain, O. (1982) Keys to genera of the superfamilies Rhabditoidea, Dioctophymatoidea, Trichinelloidea and Muspiceoidea. In: Anderson, R.C., Chabaud, A.G. & Willmott S. (Eds) *CIH Keys to the Nematode Parasites of Vertebrates*. Commonwealth Institute of Helminthology, Farnham Royal, Supplement 9, pp1–26.

Anderson, R.C., Chabaud, A.G., Wilmott, S. (1974) General introduction. Glossary of terms. Keys to subclasses, orders and superfamilies. In: Anderson, R.C., Chabaud, A.G. & Willmott S. (Eds) *CIH Keys to the Nematode Parasites of Vertebrates*. Commonwealth Institute of Helminthology, Farnham Royal, 1, 1–17.

Andrassy, I. (1958) Erd u Susswassernematoden aus Bulgarien. *Acta zoologica Budapest*, 4, 1–88.

Andrassy, I. (1964) Onchulidae, a new family of the order Enoplida (Nematoda). *Opuscula Zoologica*, 5, 25–42.

Andrassy I. (1971) Two new species of the family Bunonematidae Nematoda. *Zoologischer Anzeiger*, 187, 257–265.

Andrassy, I. (1974) The evolution and classification of nematodes. *Magyar Tudomanyos Akademia Biologiai Tudmanyok Osztalyanak Kozlemenyei*, 17, 13–58.

Andrassy, I. (1976) *Evolution as a basis for the systematization of nematodes.* Pitman, London, pp288.

Andrassy, I. (1978) *Bicirronema caledoniense* new genus new species and *Amphidirhabditis longipapillata* new genus new species (Secernentia Rhabditida), two remarkable soil nematodes from New Caledonia southwestern Pacific Ocean. *Revue de Nematologie*, 1, 257–264.

Andrassy, I. (1983) *A taxonomic review of the suborder Rhabditina (Nematoda: Secernentia).* ORSTOM, Paris, pp 241.

Andrassy, I. (1984) *Klasse Nematoda (Ordnungen Monhysterida, Desmoscolecida, Araeolaimida, Chromadorida, Rhabdita).* Bestimmungsbuecher zur Bodenfauna Europas, Gustav Fischer Verlag, Stuttgart. pp 1–509.

Andrassy, I. (1991) The superfamily Dorylaimoidea (Nematoda) - a review. Family Qudsianematidae, 2. *Opuscula Zoologica (Budapest)*, 24, 3–55.

Andrassy, I. (1999) A census of genera and subgenera of free-living nematodes. *Journal of Nematode Morphology and Systematics* 2,

433. After a long period of uncertainty regarding phylogeny, Teratocephalidae was placed in a separate order on morphological evidence (Goodey 1963). Other interpretations have placed the family in Leptolaimina or Rhabditida (Lorenzen 1994, Andrassy 1976) or as unresolved (Zhang & Baldwin 2001, Blaxter *et al.* 2000). Molecular evidence suggests either a suborder within Rhabditida or Plectida (Holterman *et al.* 2006, Meldal *et al.* 2007) or an unresolved position (De Ley & Blaxter 2004). As a result of the conflicting evidence, an unresolved polytomy was suggested (Hodda 2007). The most recent molecular analysis placed the family as a separate, resolved clade equivalent with Rhabditica (Van Megen *et al.* 2009), hence confirming status as a superorder, but now resolved. Several authors have commented on the apparently very different phylogeny of this group, and speculated that such a high taxonomic level is not justified (eg Goodey 1963). However, current evidence means that this is the only viable status, and the Teratocephalidae is well supported molecularly (Van Megen *et al.* 2009).

434. Terrestrial, microbivorous.

45–68.
Andrassy, I. (2001a) Some species of curious genera of the class Penetrantia (Nematoda). *International Journal of Nematology*, 11, 43–57.
Andrassy, I. (2001b) On two uncommon structures in nematodes. *Opuscula Zoologica*, 33, 133–137.
Andrassy, I. (2005) Free-living nematodes of Hungary (Nematoda errantia). Volume I. *Pedozoologica Hungarica* 3, 1–518.
Andrassy, I. (2007) Free living nematodes of Hungary (Nematoda errantia): volume II. *Pedozoologica Hungarica* 4, 1-496.
Andrassy, I. (2008) Addenda to "A census of genera and subgenera of free-living nematodes". *Journal of Nematode Morphology and Systematics*, 12, 177–182.
Artigas, P. (1929) *Systematica dos nomatoideos dos arthropodos.* Thesis de Dout, Sao Paulo, unpaginated.
Artigas, P. (1930) Nematoides dos generos *Rhigonema* Cobb,1898 e *Dudekemia* n. gn. (Nematoda, Rhigonemidae n. n.). *Memorias de Instituto Oswaldo Cruz*, 24, 19–30.
Baccetti, B., Dallai, R., Dezio, S.G. & Marinari, A. (1983) The evolution of the nematode spermatozoon. *Gamete Research*, 8, 309–323.
Baermann, E.V., von Lieven, A.F. & Sudhaus, W. (2009) Revision and phylogeny of *Myolaimus* Cobb, 1920 (Secernentea, Nematoda) with the description of four new species. *Journal of Nematode Morphology and Systematics*, 12, 145–168.
Bain, O. & Chabaud, A.G. (1968) Description de *Riouxgolvinia rhinolophi* n. g., n. sp., Nematode parasite de Rhinolophe, montrant les affinites entre Muspiceoidea et Mermithoidea. *Annales de Parasitologie Humaine et Comparee* 43, 45–50.
Baird, W. (1853) Catalogue of the entozoan, or intestinal worms, contained in the collection of the British Museum. British Museum, London, 132pp.
Baranovskaya, I.A. (1981) Plant and soil nematodes (Aphelenchoididae and Seinuridae) *Nematody rastenii i pochv (afelenkhoididy i seinuridy)*. Nauka, Moscow, 234 pp.
Bastian, H.C. (1865) Monograph on the Anguillutidae, or Free Nematoids, marine, land, and freshwater, with descriptions of 100 new species. *Transactions of the Linnean Society*, 25, 73–180.
Baylis, H.A. (1920) On the Classification of the Ascaridae. I. The systematic value of certain characters of the alimentary canal. *Parasitology Cambridge*, 12, 253-264.
Baylis, H.A. (1930) Mission Saharienne Augieras Draper, 1927–1928. Parasitic Nematodes. *Bulletin du Museum Histoire Naturelle Paris*, 2, 117–130.
Baylis, H.A. (1943) Some nematode parasites of earthworms from the Indo-Malay region. *Parasitology*, 35, 112–127.
Baylis, H.A. & Daubney, R. (1926) *A synopsis of the families and genera of Nematoda*. British Museum (Natural History), London, 277pp.
Belogurov, O.I. (1980) Pandolaimidae Fam n (Nematoda, Enoplida) and comments on morphology and taxonomic status of *Pandolaimus ponticus*. *Zoologichesky Zhurnal*, 59, 1566–1568.
Bert, W., Leliaert, F., Vierstraete, A.R., Vanfleteren, J.R., Borgonie, G. (2008) Molecular phylogeny of the Tylenchina and evolution of the female gonoduct (Nematoda : Rhabditida). *Molecular Phylogenetics and Evolution* 48, 728–744.
Beveridge, I., Spratt, D.M. & Johnson, P.M. (2010) Diversity and distribution of helminth parasites in macropodoid marsupials. In: Coulson, G. & Eldridge, M. (Eds) Macropods: the biology of kangaroos, wallabies and rat-kangaroos. University of Melbourne, Melbourne, p231–242.
Blanchard, E. (1895) Maladies parasitaires, parasites animaux, parasites vegetaux a l'exclusion des Bacteries. In Bouchard, C.T. (Ed) *Traité de pathologie générale* 2. Anon., Paris, 960pp.
Blaxter, M., Dorris, M. & De Ley, P. (2000) Patterns and processes in the evolution of animal parasitic nematodes. *Nematology*, 2, 43–55.
Blome D. & Schrage, M. (1985) Free-living nematodes from Antarctica with a description of Simpliconematidae new family (Trefusiida) and a revision of *Filipjeva* (Monhysterida, Xyalidae). *Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven*, 21, 71–96.
Borgonie, G., Jacobsen, K. & Coomans, A. (2000) Embryonic lineage evolution in nematodes. *Nematology*, 2, 65–69.
Bostrom, S. (1989) The taxonomic position of some teratocephalid nematodes: a scanning electron microscope study. *Revue de Nematologie*, 12, 181–190.
Brandt, A., De Broyer, C., De Mesel, I., Ellingsen, K.E., Gooday, A.J., Hilbig, B., Linse, K., Thomson, M.R.A. & Tyler, P.A. (2007) The biodiversity of the deep Southern Ocean benthos. *Philosophical Transactions of the Royal Society B-Biological Sciences* 362, 39–66.
Braun, M. (1883) Die thierisher Parasiten des Menchen nebst einer Anleitung zur praktischen Beschaeftigung mit der Helminthologie fuer Stadierende und Aertze. Anon, Wurzburg, 233pp.
Brumpt, E. (1930) *Muspicea borreli* Sambon, 1925 et cancers des souris. *Annales de Parasitologie Paris*, 8, 309–343.
Brzeski, M.W. & Sauer, M.R. (1983) Scanning electron micrography of some Tylenchidae and Boleodoridae and reappraisal of the Boleodoridae. *Nematologica*, 28, 437–446.
Cameron, T.W.M. (1934) The Internal Parasites of Domestic Animals. A Manual for Veterinary surgeons. Anon., London, 292pp.
Chabaud, A.G. & Choquet, M.T. (1953) Nouveau essai de classification des filaires (superfamille des Filarioidea). *Annales de Parasitologie Humaine et Comparee*, 28, 172–192.
Chabaud, A.G. (1957) Sur la systematique des nematodes du sousordre des Ascaridina parasites des vertebres. *Bulletin de la Societe zoologique de France*, 82, 243–253.
Chabaud, A.G. (1974) Class Nematoda. Keys to subclasses, orders and superfamilies. In: Anderson, R.C., Chabaud, A.G. & Willmott S. (Eds) *CIH Keys to the Nematode Parasites of Vertebrates*. Commonwealth Institute of Helminthology, Farnham Royal, No. 1, 6–17.
Chabaud, A.G. (1975) Keys to genera of the order Spirurida. Part 2. Spiruroidea, Habronematoidea and Acuarioidea. In: Anderson,

R.C., Chabaud, A.G. & Willmott S. (Eds) *CIH Keys to the Nematode Parasites of Vertebrates*. Commonwealth Institute of Helminthology, Farnham Royal, No 3, 29–58
Chabaud, A.G. & Anderson, R.C. (1959) New attempt at classification of filaria (Superfamily Filarioidea). *Annales de Parasitologie Humaine et Comparee*, 34, 64–87.
Chabaud, A.G. & Campana, Y. (1950) Nouveau parasite remarquable par l'atrophie de ses organes: *Robertdollfusa paradoxa* (Nematoda, incertae sedis). *Annales de Parasitologie Humaine et Comparee*, 25, 325–334.
Chabaud, A.G., Campana-Rouget, Y & Brygoo, E.R. (1959) Les nematodes Seuratoidea nov sup fam et l'origine des Spirurida. *Comptes Rendus hebdomadaires des seances de l'academie des sciences*, 248, 1449–1451.
Chilton, N.B., Hruby-Chilton, F. Gasserk, R.B. & Beveridge, I (2006) The evolutionary origins of nematodes within the order Strongylida are related to predilection sites within hosts. *Molecular Phylogenetics and Evolution* 40, 118–128.
Chitwood, B.G. (1932) A synopsis of the Nematodes parasitic in insects of the family Blattidae. *Zeitschrift fuer Parasitenkunde*, 5, 14–50.
Chitwood, B.G. (1933) A revised classification of the Nematoda. *Journal of Parasitology Urbana*, 20, 131.
Chitwood, B.G. (1935) Nomenclatorial notes, l. *Proceedings of the Helminthological Society of Washington*, 2, 51–54.
Chitwood, B.G. (1936) Some marine nematodes from North Carolina. *Proceedings of the Helminthological Society of Washington*, 8, 1–16.
Chitwood, B.G. (1937) *A revised classification of the Nematoda*. In: Anon (Ed) *Skrjabin Jubilee Volume*. Nauka, Moscow, pp 69–80.
Chitwood, B.G. (1951) North American marine nematodes. *Texas Journal of Science*, 3, 627–672.
Chitwood, B.G. (1957) The english word "nema" revised. *Systematic Zoology*, 6, 184–186.
Chitwood, B.G. (1958) The designation of official names for higher taxa of invertebrates. *Bulletin of Zoological Nomenclature*, 15, 860–895.
Chitwood, B.G. & Chitwood, M.B. (1937) *An introduction to nematology. Volume 1*. Monumental Printing Co., Baltimore, 372 pp.
Chitwood, B.G. & Chitwood, M.B. (1950) *An introduction to nematology. Section I. Anatomy.* B.G. Chitwood, Washington DC, 213 pp.
Chitwood, B.G. & McIntosh, A. (1934) A new variety of *Alloionema* (Nematoda: Diplogasteridae), with a note on the genus. *Proceedings of the Helminthological Society of Washington*, 1, 37–38.
Chitwood, B.G. & Wehr, E.E. (1932) The value of head characters in Nematode taxonomy and relationships. *Journal of Parasitology Urbana*, 19, 167–168.
Clark, W.C. (1961) A revised classification of the order Enoplida (Nematoda). *New Zealand Journal of Science*, 4, 123–150.
Cobb, N.A. (1919a) *The orders and classes of Nemas. Contributions to a science of Nematology, No. VIII*. Waverley Press, Baltimore, pp 213–216.
Cobb, N.A. (1919b) *Tetradonema plicans* nov. gen. et spec., representing a new family, Tetradonematidae, as now found parasitic in larvae of the midge insect, *Sciara coprophila* Lintner. *Journal of Parasitology Urbana*, 5, 176–185.
Cobb, N.A. (1920) *One hundred new Nemas (type-species of 100 new genera). Contributions to a science of Nematology, No. IX*. Waverley Press, Baltimore, pp 217–343.
Cobb, N.A. (1932) The english word “nema”. *Journal of the American Medical Association*, 98, 75.
Cobbold, T. S. (1864) *Parasites*. Anon., London, 508pp.
Cobbold. (1879) *Parasites, a treatise on the entozoan of man and animals, including some account of the ectozoa*. Anon., London, unpaginated.
Coomans, A.V. & Raski, D.J. (1988) Two new species of *Prismatolaimus* De Man, 1880 (Nemata, Prismatolaimidae) in southern Chile. *Journal of Nematology*, 20, 288–303.
Coomans, A. & Loof, P.A.A. (1970) Morphology and taxonomy of Bathyodontina (Dorylaimida). *Nematologica*, 16, 180–196.
Cram, E.B. (1927) Bird parasites of the Nematode suborders Strongylata, Ascaridata, and Spirurata. *Bulletin of the U.S. National Museum, Washington*, 140, 1–465.
Curran, J. & Hominick, W.M. (1981) Description of *Gastromermis metae* sp n (Nematoda, Mermithidae) with an assessment of some diagnostic characters and species in *Gastromermis*. *Nematologica*, 27, 258–273.
Dalmasso, A. (1969) Anatomical and taxonomical study of the genera *Xiphinema*, *Longidorus* and *Paralongidorus* (Nematoda, Dorylaimidae). *Memoires du Museum National d'Histoire Naturelle Serie A Zoologie*, 61, 33–82.
De Coninck, L.A. (1935) Contribution a la connaissance des Nematodes libres du Congo Belge I. Les Nematodes libres des marais de la Nyamuamba (Ruwenzori) et des sources chaudes du Mont Banze. *Revue Zoologique et de Botanique Africaines, Tervueren*, 26, 211–232.
De Coninck, L. (1965) Systematiques des nematodes. Sousclasse des Adenophorea. Infra-classe des Chromadoria. Infra-classe des Enoplia. In: Grasse, P.P. (Ed) *Traite de Zoologie.* Masson, Paris, pp 601–608.
De Coninck, L.A.P & Schuurmans Stekhoven, J.H. (1933) Freeliving marine nemas of the Belgian coast. ii. With general remarks on the structure and the system of nemas. *Memoires du Museum de Histoire naturelle Belgique*, 58, 1–163.
Decraemer, W. & Smol, N. (2006) Orders Chromadorida, Desmodorida and Desmoscolecida. In: Eyualem A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp 497–573.
De Ley, P. & Blaxter, M. (2002) Systematic position and phylogeny. In: Lee, D.L. (Ed) *The biology of nematodes*. Taylor & Francis, London, pp 1–30.
De Ley, P. & Blaxter, M.L. (2004) A new system for Nematoda: combining morphological characters with molecular trees, and translating clades into ranks and taxa. *Nematology Monographs and Perspectives*, 2, 633–653.
De Ley, P. & Coomans, A. (1990) Terrestrial nematodes of the Galapagos Archipelago 1: Three rhabditida from Isla Fernandina. *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique Biologie*, 60, 5–22.
De Ley, P., Decraemer, W., Eyualem, A. (2006) Introduction: summary of present knowledge and research addressing the ecology and

taxonomy of freshwater nematodes. In: Eyualem A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp 3–30.
De Man, J.G. (1876) Onderzoekingen over vrij in de aarde levende Nematoden. *Tijdschrift Nederlandsche voor de Dierkunde Vereen*, 2, 78–196.
Diesing, K.M. (1857) *Denkschriften Akademie Wissenschaftliche, Wien*, 13, 10.
Dougherty, E.C. (1944) The genus *Metastrongylus* Molin, 1861 (Nematoda: Metastrongylidae). *Proceedings of the Helminthological Society of Washington*, 11, 66–73.
Dougherty, E.C. (1955) The genera and species of the subfamily Rhabditinae Micoletzky, 1922 (Nematoda) : a nomenclatorial analysis-including an addendum on the composition of the family Rhabditidae Orley, 1880. *Journal of Helminthology*, 29, 105–152.
Dougherty, E.C. (1958a) Questions arising in connection with the naming of orders and taxa of higher rank. *Bulletin of Zoological Nomenclature*, 15, 523–539.
Dougherty, E.C. (1958b) Notes on the naming of higher taxa, with special reference to the phylum (or class) Nematoda. *Bulletin of Zoological Nomenclature*, 15, 896–906.
Dujardin, F. (1845) *Histoire naturelle des helminthes ou vers intestinaux*. Libre Encycopedidique de Roret (Suites a Buffon), Paris, 652 pp.
Dunn, C.W., Hejnol, A., Matus, D.Q., Pang K., Browne, W.E., Smith, S.A., Seaver, E., Rouse, G.W., Obst, M., Edgecombe, G.D., Sorensen, M.V., Haddock, S.H.D., Schmidt-Rhaesa, A., Okusu, A., Kristensen, R.M., Wheeler, W.C., Martindale, M.Q. & Giribet, G. (2008) Broad phylogenomic sampling improves resolution of the animal tree of life. *Nature*, 452, 745–749.
Durette-Desset, M.C. & Chabaud, A.G. (1977) Tentative classification of nematodes-Trichostrongyloidea. *Annales de parasitologie humaine et compare*, 52, 539–558.
Durette-Desset, M.C., Hugot, J.P., Darlu, P. & Chabaud, A.G. (1999) A cladistic analysis of the Trichostrongyloidea (Nematoda). *International Journal for Parasitology*, 29, 1065–1086.
Eliava, I.Y. (1964) The position of the genus *Tylenchorhynchus* within the Tylenchoidea (Nematoda: Tylenchida). *Soobshcheniya Akademii Nauk Gruzinskol SSR.*, 34, 669–673.
Eroshenko, A.S. (1973) New data on taxonomy of the family Teratocephalidae Nematoda. *Zoologicheskii Zhurnal*, 52, 1768–1776.
Ettema, C.H., Rathbun, S.L. & Coleman, D.C. (2000) On spatiotemporal patchiness and the coexistence of five species of *Chronogaster* (Nematoda: Chronogasteridae) in a riparian wetland. *Oecologia*, 125, 444–452.
Fagerholm, H.P. (1990) Systematic position and delimitation of ascaridoid nematode parasites of the genus *Contracaecum* with a note on the superfamily Ascaridoidea. *Acta academiae aboensis ser b mathematica et physica*, 50, 1–27.
Farooqui, M.N. (1967) On a new family Mehdinematidae fam. nov. from *Gryllus domesticus*. *Zoologischer Anzeiger*, 178, 322–326.
Filipjev, I. (1916) Les nematodes libres contenus dans les collections du musee Zoologique de l'Academie Imperiale des Sciences de Petrograd. *Annales du Museum Zoologique de Academie des Sciences, Petrograd*, 21, 59–116.
Filipjev, I. (1917) Un Nematode libre nouveau de la mer Caspienue, *Chromadorissa* gen. nov. (Chromadoridae). *Revue de Zooogie Russe, Moscow*, 2, 29–30.
Filipjev, I.N. (1918) Free-living marine Nematodes from the vicinity of Sevastopol. Pt. I. *Trudy Osoboi Zoologicheskoi Laboratorii Sebastopolskoi Stantsii Rossiikoi series, 2*, 4, 1–614.
Filipjev, I.N. (1922) Encore sur les Nematodes libres de la Mer Noire. *Acta Instituti Agronomomici Stavropol (Zool)*, 1, 83–184.
Filipjev, I.N. (1927) Les Nematodes libres des mers septentrionales appartenant a la famille des Enoplidae. *Archiv fuer Naturgeschicht, Berlin*, 91, 1–216.
Filipjev, I.N. (1929) Classification of free-living Nematoda and relations to parasitic forms. *Journal of Parasitology Urbana*, 15, 281–282.
Filipjev, I.N. (1934) The classification of the free-living nematodes and their relation to the parasitic nematodes. *Smithsonian Miscellaneous Collections*, 89, 1–63.
Filipjev, I.N. & Schuurmans Stekhoven, J.H. (1941) *A manual of agricultural helminthology.* Brill, Leiden, 878 pp.
Fotedar, D.N. & Handoo, Z.A. (1975) A revised scheme of classification to order Tylenchida Thorne, 1949 (Nematoda). *Journal of Science, University of Kashmir*, 3, 55–82.
Freitas, J.F.T.de (1956) Notas sobre Heterakidae Railliet & Henrv 1914 (Nematoda, Subuluroidea). *Revista Brasileira de Biologia*, 16, 461–482.
Fuchs, A.G. (1937) Neue parasitische und halbparasitische Nematoden bei Borkenkafern und einige andere Nematoden. *Zoologisher Jahrbuch Jena (Syst.)*, 70, 291–380.
Gagarin, J.G. (1975) A contribution to the taxonomy and phylogeny of the superfamily Plectoidea (Nematoda). *Zoologicheskii Zhurnal*, 54, 503–509.
Gagarin, V.G. (1992) *Svobodnozhivushchie nematody presnykh vod SSSR*. Nauka, Moscow, 1–152.
Gagarin, V.G. (1993) *Svobodnozhivushchie nematody presnykh vod Rossii i sopredel'nykh stran: (otryady Monhysterida, Araeolaimida, Chromadorida, Enoplida, Mononchida)*. Nauka, Moscow, 1–352.
Gagarin, V.G. & Nguyen, V.T. (2003) New species of the genera *Chronogaster* (Araeolaimida: Chronogasteridae) and *Dorylaimellus* (Dorylaimida: Belondiridae) from Vietnam (Nematoda). *Zoosystematica Rossica*, 12, 145–149.
Gendre, E. (1922) Sur deux especes d'*Hadjelia*. *Proces Verbaux de la Societe Linnean Bordeaux*, 74, 26–32.
Gendre, E. (1928) Sur un Nematode nouveau, parasite des Poissons. *Bulletin de la Societe de pathologie exotique*, 19, 798–802.
Geraert, E. (1966) Systematic position of families Tylenchulidae and Criconematidae. *Nematologica*, 12, 362–368.
Geraert, E. (2008) *The Tylenchidae of the world: identification of the family Tylenchidae*. Academia Press, Gent, 540 pp.
Geraert, E. (2010) *The Criconematidae of the world: identification of the family Criconematidae*. Academia Press, Gent, 615 pp.
Gerlach, S.A. (1953) *Lauratonema* nov. gen.. Vertreter einer neuen Familie mariner Nematoden aus dem Kustengrundwasser. *Zoologisher Anzeiger*, 151, 43–52.

Gerlach, S.A. (1963) *Aponchium* Cobb, 1920, Typus einer neuen Familie freilebender Meeres-Nematoden. *Abhandlungen des Naturwissenschaftlichen vereins in Hamburg N.F.*, 7, 157–166.
Gerlach, S.A. (1964) Revision der Choniolaiminae und Selachinematinae (Freilebende Meeres-Nematoden). *Mitteilungen aus dem Hamburgischen zoologischen Museum und Instit*, 61, 23–50.
Gerlach, S.A. (1966) Bemerkungen zur Phylogenie der Nematoden. *Mitteilungen aus der Biologischen Bundesanstalt fur Land- and Forstwirtschaft*, 118, 25–39.
Gerlach, S.A. & Riemann, F. (1973) The Bremerhaven checklist of aquatic nematodes. A catalogue of Nematoda Adenophorea excluding the Dorylaimida. Part I. *Veroffentlichungen des Instituts fur Meeresforschung in Bremerhaven. Supplement 4, Heft 1.*, 1–404.
Gerlach, S.A. & Riemann, F. (1974) The Bremerhaven checklist of aquatic nematodes. A catalogue of Nematoda Adenophorea, excluding the Doryaimida. Part 2. *Veroffentlichungen des Instituts fur Meeresforschung in Bremerhaven. Supplement 4, Heft 2.*, 405–734.
Gervais, P. & Van Benedon, P.M. (1859) *Zoologie medicale. Expose methodique du regne animal, base sur l'anatomie, l'embryologie, et lapaleontologie; comprenant las description des especes employees en medicine, de celles qui sont venimeuses et de celles qui sont parasites de l'homme et des animaux.* Anon, Paris, 504pp.
Golden, A.M. (1971) Classification of the genera and higher categories of the order Tylenchida (Nematoda).In: Zuckerman, B.M., Mai, W.F. & Rohde, R.A. (Eds). *Plant parasitic nematodes. Volume I. Morphology, anatomy, taxonomy, and ecology.* Academic, New York, pp 191–232.
Goodey, J.B. (1960) The classification of the Aphelenchoidea Fuchs, 1937. *Nematologica*, 5, 111–126.
Goodey, J.B. (1963) *Soil and freshwater nematodes.* Methuen, London, 544 pp.
Goodey, T. (1929) On some new and little-known free-living Nematodes. *Journal of Helminthology*, 7, 27–62.
Goodey, T. (1939) *Cylindrocorpus* nom. nov. for *Cylindrogaster* Goodey, 1927 (Nematoda). *Journal of Helminthology London*, 17, 149–150.
Goodey, T. (1951) *Soil and freshwater nematodes. A monograph.* Methuen, London, 390 pp.
Goodey, T. (1953) On certain eelworms, including Butschli's *Tylenchus fungorum*, obtained from toadstools. *Journal of Helminthology*, 27, 81–94.
Grube, A.E. (1849) Ueber einige Anguillulen und die Entwicklung von *Gordius aquaticus*. *Archiv fuer Naturgeschichte Berlin Abteilung 15J*, 1, 358–375.
Hall, M.C. (1916) Nematode parasites of mammals of the orders Rodentia, Lagomorpha and Hyracoidea. *Proceedings of the U.S. National Museum*, 50, 1–247.
Hartwich, G. (1954) Zur Kenntnis der Gattung *Hamatospiculum* Skrjabin,1916 und *Parhamatospiculum* Skrjabin und Petrov, 1928 (Nematoda, Filarioidea). *Wissenschaftliche Zeitschrift der Martin-Luther-Universitat Halle Wittenberg*, 3, 659–663.
Hartwich, G. (1957) Zur Systematik der Nematoden-Superfamilie Ascaridoidea. *Zoologische Jahrbuecher (Systematik)*, 85, 211–252.
Heyns, J. (1962a) *Elaphonema mirabile* n. gen., n. sp. (Rhabditida), a remarkable new nematode from south Africa. *Proceedings of the Helminthological Society of Washington*, 29, 128–130.
Heyns, J. (1962b) *Osstella hamata* n. gen., n. sp., *Zeldia serrata* n. sp. and *Acrobeles thornei* n. sp., three new nematodes from South Africa (Rhabditida: Cephalobidae). *Nematologica*, 8, 301–306.
Heyns, J. (1965) On the morphology and taxonomy of the Aporcelaimidae, a new family of dorylaimoid nematodes. *Entomology Memoirs. Department of Agriculture and Forestry, Union of South Africa*, 10, 1–51.
Heyns, J. (1968) A monographic study of the nematode families Nygolaimidae and Nygolaimellidae. *Entomology Memoirs. Department of Agriculture and Forestry, Union of South Africa,* 19, 1–144.
Hodda M (2003) *A checklist of Aphelenchida*. CSIRO, Canberra, 138pp. Available from: http://www.ento.csiro.au/science/nematodes/checklist_dec2003.rtf (30 May 2010).
Hodda, M. (2007) Phylum Nematoda. *Zootaxa*, 1668, 265–293.
Hodda, M., Bloemers, G. & Wanless, F.R. (2004) The family Onchulidae: establishment of monophyly, rediagnosis, review and keys, with descriptions of three new species from tropical forests in Cameroon. *Journal of Nematode Morphology and Systematics*, 7, 131–151.
Hodda, M., Peters, L. & Traunspurger, W. (2009) Nematode biodiversity: terrestrial, marine & freshwater. In: Wilson, M. & Kakouli Duarte, T. (Eds) *Biomonitoring with nematodes*. CABI, Wallingford UK, pp 45–93.
Holovachov, O. (2004) Morphology, phylogeny and evolution of the superfamily Plectoidea Orley, 1880 (Nematoda : Plectida). *Annales Zoologici*, 54, 631–672.
Holovachov, O. (2006) *Morphology and systematics of the order Plectida Malakhov, 1982 (Nematoda)*. Thesis, University of Wageningen, Wageningen, 244 pp.
Holovachov, O., Bostrom, S. & Susulovsky, A. (2007) Description of *Aulolaimus multipapillatus* sp n. and *A. nannocephalus* Andrassy, 1972 with notes on taxonomy and phylogeny of the genus (Nematoda : Aulolaimidae). *Nematology*, 9, 201–214.
Holovachov, O. & De Ley, P. (2006) Order Plectida. In: Eyualem A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp. 611–647.
Holovachov, O, Esquivel, A. & Bongers, T. (2003) Free-living nematodes from nature reserves in Costa Rica. 4. Cephalobina. *Nematology*, 5, 1–15.
Holovachov, O., Winiszewska, G., Sturhan, D., Esquivel, A. & Wu, J. (2008) New genus, three new and two known species of the family Onchulidae Andrassy, 1964 with notes on systematics and biology of the family. *Journal of Nematode Morphology and Systematics*, 11, 1–30.
Holovachov, O., Zullini, A., Loof, P.A.A. & Bongers, T. (2002) Morphology and systematics of the genus *Anonchus* Cobb, 1913 (Nematoda : Leptolaimina) and reappraisal of the family Aphanolaimidae Chitwood, 1936 n. rank. *Nematology*, 4, 725–757.

Holterman, M. & Holovachov, O. (2007) Phylogeny and biogeography of Triplonchida. *Phytopathology*, 97, 132–133.
Holterman, M., Holovachov, O., van den Elsen, S., van Megen, H., Bongers, T., Bakker, J. & Helder, J. (2008) Small subunit ribosomal DNA-based phylogeny of basal Chromadoria (Nematoda) suggests that transitions from marine to terrestrial habitats (and vice versa) require relatively simple adaptations. *Molecular Phylogenetics and Evolution*, 48, 758–763.
Holterman, M., van der Wurff, A., van den Elsen, S., van Megen, H., Bongers, T., Holovachov, O., Bakker, J. & Helder, J. (2006) Phylum-wide analysis of SSU rDNA reveals deep phylogenetic relationships among nematodes and accelerated evolution toward crown clades. *Molecular Biology and Evolution*, 23, 1792–1800.
Hope, W.D. & Murphy, D.G. (1969) *Rhaptothyreus typicus* new genus new species, an abyssal marine nematode representing a new family of uncertain taxonomic position. *Proceedings of the Biological Society of Washington*, 82, 81–92.
Hope, W.D. & Murphy, D.G. (1972) A taxonomic hierarchy and checklist of the genera and higher taxa of marine nematodes. *Smithsonian Contributions to Zoology*, 137, 1–101.
Hope, W.D. & Tchesunov, A.V. (1999) *Smithsoninema inaequale* n.g. and n.sp (Nematoda, Leptolaimidae) inhabiting the test of a foraminiferan. *Invertebrate Biology*, 118, 95–108.
Hunt, D.J. (1980) *Acugutturus parasiticus*, new genus new species, a remarkable ecto-parasitic aphelenchoid nematode from *Periplaneta americana*, with proposal of Acugutturinae new subfamily. *Systematic Parasitology*, 1, 167–170.
Hunt, D.J. (1993) *Aphelenchida, Longidoridae and Trichodoridae: their systematics and bionomics*. CABI, Wallingford, 352 pp.
Hunt, D.J. (2002) The African Rhigonematoidea (Nematoda : Rhigonematida). 1. *Trachyglossus quintus* gen. n., sp n. (Xustrostomatidae fam. n.) with redescription of *Rhigonema multipapillatum* (Skrjabin, 1916) and designation of a neotype. *Nematology*, 4, 671–686.
Husain, S.I. & Khan, A.M. (1967a) On status of genera of superfamily Aphelenchoidea (Fuchs 1937) Thorne 1949 with descriptions of 6 new species of nematodes from India. *Proceedings of the Helminthological Society of WashingtonI*, 34, 167–174.
Husain, S.I. & Khan, A.M. (1967b). A new subfamily a new subgenus and 8 new species of nematodes from India belonging to superfamily Tylenchoidea. *Proceedings of the Helminthological Society of Washington*, 34, 175–186.
Hyman, L.H. (1951) *The invertebrates : Acanthocephala, Aschelminthes, and Entoprocta , the pseudocoelomate Bilateria.* McGraw-Hill, New York, 573 pp.
Inglis, W.G. (1960) Les nematodes de la famille des Maupasinidae. *Annales de Parasitologie Humaine et Comparee*, 35, 190–191.
Inglis, W.G. (1983) An outline classification of the phylum Nematoda. *Australian Journal of Zoology*, 31, 243–255.
Ivashkin, V.M. (1960) Nematodes of the subfamily Parabronematinae Skryabin, 1941 in the light of morphology and systematics. *Trudi Gelmintologicheskoi Laboratorii, Akademiya Nauk SSSR*, 10, 94–108.
Ivashkin, V.M. (1961) Classification of the subclass Phasmidia Chitwood & Chitwood, 1933. *Trudi Gelmintologicheskoi Laboratorii, Akademiya Nauk SSSR*, 11, 115–117.
Jairajpuri, M.S. (1964) Studies on Campydoridae and Leptonchidae (Nematoda - Dorylaimoidea) with description of *Basirotyleptus basiri* n gen , n sp , from India. *Proceedings of the Helminthological Society of Washington*, 31, 59–64.
Jairajpuri, M.S. (1965a) *Qudsianema amabilis* n gen n sp (Nematoda - Dorylaimoidea) from India. *Proceedings of the Helminthological Society of Washington*, 32, 72–78.
Jairajpuri, M.S. (1965b) Three new species of Dorylaimoidea (Nematoda) from India. *Proceedings of the Helminthological Society of Washington*, 32, 78–81.
Jairajpuri, M.S. (1969) Studies on Mononchida of India .1. Genera *Hadronchus, Iotonchus*, and *Miconchus* and a revised classification of Mononchida, new order. *Nematologica*, 15, 557–581.
Jairajpuri, M.S. (1971) On the synonymy of *Telotylenchus* Siddiqi, 1960 with *Trichotylenchus* Whitehead, 1959 (Nematoda: Tylenchida). *Indian Journal of Nematology*, 1, 3–6.
Jairajpuri, M.S. (1983) Observations on *Campydora* (Nematoda: Dorylaimida). *Nematologia Mediterranea*, 11, 33–42.
Jairajpuri, M.S. & Ahmad, W. (1992) *Dorylaimida - Free-living, predaceous and plant-parasitic nematodes.* Brill, Leiden, 458 pp.
Jairajpuri, M.S., Ahmad, M. & Bajaj, H.K. (1976) On the morphology and systematic position of *Campydora* Cobb, 1920 (Nematoda, Dorylaimida). In: Anon (Ed) *First National Convention of Indian Helminthology.* IARI, New Delhi, pp25–26.
Jairajpuri, M.S. & Hooper, D.J. (1968) A review of the genus *Aulolaimus* (Axonolaimidae Aulolaiminae new subfamily) with notes on the synonymy of the genus *Pandurinema*. *Journal of Helminthology*, 42, 41–52.
Jairajpuri, M.S. & Siddiqi, A.H. (1964) On new nematode genus *Nordia* (Dorylaimoidea - Nordianae n. subfam.) with remarks on genus *Longidorella* Thorne 1939. *Proceedings of the Helminthological Society of Washington*, 31,1–9.
Jensen, P. (1991) Bodonematidae Fam n (Nematoda, Monhysterida) accommodating *Bodonema vossi* gen et sp n from the deep-sea benthos of the Norwegian Sea. *Sarsia*, 76, 11–15.
Justine, J-L. (2002) Male and female gametes and fertilisation. In: Lee, D.L. (Ed) *The biology of nematodes*. Taylor & Francis, London, pp 73–119.
Khan, E. (1964) *Boleodorus mirus* n.sp. (Tylenchidae: Boleodorinae N. Sub-family) from Kufri, Simla (H.P.), India, with a key to the species of the genus *Boleodorus* Thorne, 1941. *Zoologischer Anzeiger*, 173, 336-341.
Khan, E. (1969) On the classification of Tylenchoidea. In: Anon (Ed) *First National Convention of Indian Helminthology.* IARI, New Delhi, p 26.
Khan, S.H. & Ahmad, S. (1975) Longidoroidea (Thorne, 1935) n. rank. (Nematoda: Dorylaimina) with description of *Xiphinema neoamericanum* n. sp. from India and proposal of a new name for *X. americanum* sensu Carvalho (1956) non Cobb, 1913. *Nematologia Mediterranea*, 3, 23–28.
Kiontke, K. & Fitch, D.H.A. (2005) The phylogenetic relationships of *Caenorhabditis* and other rhabditids. In: Girard, L.R. (Ed.) WormBook, The *C. elegans* Research Community, WormBook, pp. 1–11.
Kirjanova, E.S. (1955) *Kruglie chervil (nematode) paraziti rastenie.* Akademia Nauka SSR, Leningrad, 157pp.
Kirjanova, E.S. & Krall, E.L. (1969) *Parasitic nematodes of plants and their control measures. Volume I.* Nauka, Leningrad 447pp

Kloss, G.R. (1958) Nematodeos parasitos de Hydrophilidae (Col.). *Atas de la Sociedade do Biologia de Rio de Janeiro*, 2, 21–23.
Kloss, G.R. (1960) Organizacao filogenetica dos nematoides parasites intestinais de artropodos. (Nota previa). *Atas de la Sociedade do Biologia de Rio de Janeiro*, 4, 51–55.
Koerner, H. (1954) Die Nematodefauna des vergehenden Holzes und ihre Beziehungen zu den Insekten. *Zoologishe Jahrbucher Abteilung Systematik*, 82, 245–253.
Kreis, H.A. (1929) Freilebende marine Nematoden von der Nordwestkueste, Frankreichs (Trebeurden : Cotes du Nord). *Capita Zoologica* 2, 1–98.
Lambshead, P.J.D. (1993). Recent developments in marine benthic biodiversity research. *Recent developments in benthology*, 19, 5–24.
Lane, C. (1914) Bursate Nematodes from the Indian elephant. *Indian Journal of Medical Research Calcutta*, 2, 380–398.
Laumond, C. & Lyon, J.P. (1971) Le parasitisme de *Syrphonema intestinalis* n.g., n.sp., aux depens des syrphides (insectes dipteres) et la nouvelle famille des Syrphonematidae (Nematoda: Rhabditida). *Comptes Rendus Hebdomadaires des Seances de l' Academie Des Sciences Serie D* 272, 1789–1792.
Lazarevskaya, S.L. (1965) Nematodes of insects harmful to forests. I. Biological characteristics of nematodes belonging to the genus *Parasitorhabditis* Fuchs1937 (Rhabditidae, Parasitorhabditinae). *Trudy Gelmintologicheskoi Laboratorii*, 15, 93–102.
Leiper, R.T. (1908) An account of some Helminths contained in Dr. C.M. Wenyon's Collection from the Soudan. *Reports of the Wellcome Research Laboratory Khartoum*, 3, 186–199.
Leiper, R.T. (1911) Check-List of Helminthes parasitic in Equines. *Journal of the London School of Tropical Medicine*, 1, 22–26.
Leiper, R.T. (1912) Check-List of Helminthes parasitic in cattle. *Journal of the London School of Tropical Medicine*, 1, 115–122.
Litvaitis, M.K., Bates, J.W., Hope, W.D. & Moens, T. (2000) Inferring a classification of the Adenophorea (Nematoda) from nucleotide sequences of the D3 expansion segment (26/28S rDNA). *Canadian Journal of Zoology*, 78, 911–922.
Loof, P.A.A. (1987) Tylenchorhynchidae Eliava, 1964 a junior synonym of Telotylenchidae Siddiqi, 1960 (Nematoda: Tylenchoidea). *Revue de Nematologie*, 10, 123–124.
Looss, A. (1905) Notizen zur Helminthologie Aegyptens. vi. Das Genus *Trichostrongylus* n.g., mit zwei neuen gelegentlichen Parasiten des Menschen. *Centralblatt fuer Bakteriologie, Parasitenkunde und Infektionskrankheiten, Jena (i)*, 39, 408–422.
Looss, A. (1911) The anatomy and life history of *Ancylostoma duodenale* Dub. ii. Development in the free state. *Cairo Records of the Egyptian Government School of Medicine*, 4, 167–607.
Lopez-Neyra, C.R. (1945) Estudios y revision de la familia Subuluridae, con descripcion de especies nuevas. *Row Iberica Parasitica Granada*, 5, 271–329.
Lorenzen, S. (1977) Revision of the Xyalidae free living nematodes based on a critical analysis of 56 species from the North Sea and Baltic. *Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven*, 16, 197–262.
Lorenzen S. (1978) Triodontolaimidae free living nematodes rediscovery of the only species after 85 years. *Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven*, 17, 87–94.
Lorenzen, S. (1981) Entwurf eines phylogenetischen Systems der freilebenden Nematoden. *Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven Supplement*, 7, 1–472.
Lorenzen, S. (1994) *The phylogenetic systematics of freeliving nematodes*. Ray Society Publications No 162, London, 383pp.
Lubbock, J. (1861) On *Sphaerularia bombi*. *Natural History Review*, 1, 44–57.
Maggenti, A.R. (1963) Comparative morphology in nemic phylogeny. In: Dougherty, E.C., Brown, Z.N., Hanson, E.D. & Hartman, W.D. (Eds) *The lower Metazoa: comparative biology and phylogeny.* University of California Press, Berkeley, 273–282 pp
Maggenti, A.R., 1982. Nemata. In: Parker, S.P. (Ed) *Synopsis and classification of living organisims Volume 1*. McGraw-Hill, New York, pp 879–929.
Maggenti, A.R. (1991) Nemata: higher classification. In: Nickle, W.R. (Ed) *Manual of agricultural nematology.* Marcel Dekker, New York, pp 147–187.
Malakhov, V.V. (1994) *Nematodes: structure, development, classification, and phylogeny.* Smithsonian Institution Press, Washington, 286pp.
Malakhov, V.V., Ryzhikov, K.M. & Sonin, M.D. (1982) The system of large taxa of nematodes - subclasses, orders, suborders. *Zoologichesky Zhurnal*, 61, 1125–1134.
Malakhov, V.V. & Hope, W.D. (1994) *Nematodes: structure, development, classification, and phylogeny.* Smithsonian Institute Press, Washington DC, pp 1–286.
Marcinowski, K. (1909) Parasitisch und semiparasitisch an Pflanzen lebende Nematoden. *Arbeiten ueber biologie Anstalten Berlin*, 7, 1–192.
Mehdi A.S., Suryawanshi, M.V. & Chitty, K.Z. (1973) Two new species of *Drilocephalobus* Coomans & Goodey, 1965 (Nematoda: Drilocephalobidae n.fam.) from Marathwada, India with a revised classification of the superfamily Cephaloboidea (Paramonov, 1956) Paramonov, 1962. *Nematologica*, 19, 308–317.
Meldal, B.H.M., Debenham, N.J., De Ley, P., De Ley, I.T., Vanfleteren, J.R., Vierstraete, A.R., Bert, W., Borgonie, G., Moens, T., Tyler, P.A., Austen, M.C., Blaxter, M.L., Rogers, A.D. & Lambshead, P.J.D. (2007) An improved molecular phylogeny of the Nematoda with special emphasis on marine taxa. *Molecular Phylogenetics and Evolution*, 42, 622–636.
Meyl, A.H. (1957) Freeliving nematodes. *Resultats Scientifiques de l'Exploration Hydrobiologique du Lac Tanganika (1946–1947)*, 3, 27–51.
Meyl, A.H. (1961) Die freilebenden Erd- und Susswassernematoden (Fadenwurmer). *Die Tierwelt Mitteleuropas*, 1 (5a), 1–164.
Micoletzky, H. (1922) Die freilebenden Erd-Nematoden mit besonderer Berucksichtigung der Steiermark und der Bukowina, zugleich mit einer Revision samtlicher, nicht mariner, freilebender Nematoden in Form von Genus-Beschreibungen und Bestimmungsschlusseln. *Archiv fuer Naturgeschichte Berlin Abteilung A*, 87, 1–649.
Miljutin, D.M. (2006) The genus *Trophomera* Rubtsov & Platonova, 1974 with description of *T. litoralis* sp n. (Nematoda : Benthime-

rmithidae) from the tidal zone of the Kuril Archipelago and proposal of *Benthimermis* Petter, 1980 as a junior synonym. *Nematology*, 8, 411–423.
Miljutin, D.M. & Tchesunov, A.V. (2001) On the histological anatomy of *Benthimermis megala* Petter, 1987, a giant nematode from the Norwegian deep-sea (Nematoda : Benthimermithidae). *Nematology*, 3, 491–502.
Moravec, F. (2006) *Dracunculoid and anguillicoloid nematodes parasitic in vertebrates*. Academia, Praha, 634pp.
Moravec, F. & Koie, M. (1987) *Daniconema anguillae* gen et sp n, a new nematode of a new family Daniconematidae fam n parasitic in European eels. *Folia parasitological*, 34, 335–340.
Moravec, F., Molnar, K. & Szekely, C. (1998) *Lucionema balatonense* gen. et sp. n., a new nematode of a new family Lucionematidae fam. n. (Dracunculoidea) from the swimbladder of the European pikeperch, *Stizostedion lucioperca* (Pisces). *Folia Parasitologica*, 45, 57–61.
Mounport, D. (2005) *Chronogaster tessellata* n. sp (Nematoda : Chronogastridae) from Senegal. *Nematology*, 7, 53–57.
Mullin, P.G., Harris, T.S. & Powers, T.O. (2003) Systematic status of *Campydora* Cobb, 1920 (Nematoda : Campydorina). *Nematology*, 5, 699–711.
Nadler, S.A., De Ley, P., Mundo-Ocampo, M., Smythe, A.B., Stock, S.P., Bumbarger, D., Adams, B.J., De Ley, I.T., Holovachov, O. & Baldwin, J.G. (2006) Phylogeny of Cephalobina (Nematoda): Molecular evidence for recurrent evolution of probolae and incongruence with traditional classifications. *Molecular Phylogenetics and Evolution*, 40, 696–711.
Nadler, S.A., Carreno, R.A., Mejia-Madrid, H., Ullberg, J., Pagan, C., Houston, R. & Hugot, J.P. (2007) Molecular phylogeny of clade III nematodes reveals multiple origins of tissue parasitism. *Parasitology*, 134, 1421–1442.
Nickle, W.R. (1970) A taxonomic review of the Aphelenchoidea (Nematoda, Tylenchida). *Journal of Parasitology*, 56, 249.
Nicoll, W. (1935) Vermes. *Zoological Record*, 71, 123.
Oerley, L. (1880) Az anguillulidak maganrajza. A kir. m. termeszettudom. tarsulat altal a bugatdijjal jutalmazott palyamu. *Termeszettudom Fuzeetek*, 4, 16–150.
Oerley, L. (1885) A rhabditisek maganrajza orvosi es termeszetrajjsi szempontbol. Hat rajzlappal. *Mathematik es Termeszettudom Kozlemenyek, Magyar Tudoman Akademi Budapest*, 21, 1–134.
Ortlepp, R.J. (1937) Some undescribed species of the nematode genus *Physaloptera* Rud., together with a key to the sufficiently known forms. *Onderstepoort Journal Pretoria*, 9, 71–84.
Paramonov, A.A. (1952) Ecological classification of Phyto-nematodes. *Trudi Gelmintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 6, 338–369.
Paramonov, A.A. (1953) Revision of superfamily Aphelenchoidea Fuchs, 1937 (Nematoda : Tylenchata). In: Anon. (Ed) *K. I. Skrjabin Anniversary Volume*, Nauka, Moscow, pp 488–496.
Paramonov, A.A. (1956) To a revision of the Rhabditata, parasites of plants. *Trudi Gelmintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 8, 85–111.
Paramonov, A.A. (1962) *Principles of phytonematology. Vol. I. The origin of nematodes. Ecological and morphological characteristics of phytonematodes. General principles of taxonomy.* Izdatelstvo Akademil Nauk SSSR, Moscow, 480 pp.
Paramonov, A.A. (1964) *Principles of phytonematology. Vol. II. Taxonomy of phytonematodes.* Izdatelstvo Akademil Nauk SSSR, Moscow, 446 pp.
Paramonov, A.A. (1967) A critical review of the suborder Tylenchina (Filipjev, 1934) Nematoda: Secernentea). *Trudi Gelmintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 18, 78–101.
Pearse, A.S. (1936) Parasites from Yucatan. *Publications of the Carnegie Institution Washington*, 457, 45–50.
Pearse, A.S. (1942) *Introduction to parasitology.* Bailliere, Tindall & Cox, London, 357 pp.
Pegova, A.N., Krasnova, E.D., Aleshin, V.V. (2004) Evidence from the small and large ribosomal RNA structure suggests that *Anoplostoma rectospiculum* Gal'tsova, 1976 (Nematoda : Anoplostomatidae) is a member of the superfamily Enoploidea, not Oncholaimoidea. *Nematology* 6, 413–421.
Periera, C. (1931) *Myenchus boteloi* n. sp. curioso nematoide parasite de *Limnobella brasiliensis* Pinto (Hirudinea). Thesis, Sao Paolo, 29 pp.
Petrov, A.M. (1930) Zur Charakteristik des Nematoden aus Kamtschatkaer Zobeln *Soboliphyme baturini* nov. gen., nov. sp.. *Zoologisher Anzeiger Leipzig*, 86, 265–271.
Petter, A.J. (1971) Re-description of *Hedruris androphora* (Nematoda Hedruridae) and study of its development in the intermediate host. *Annales de Parasitologie Humaine et Comparee*, 46, 479–495.
Petter, A.J. (1974) Deux nouvelles especes de nematodes camallanine parasites de *Haploerythrinus unitaenictus* (Characidae, Cypriniformes) en Guyane, creation d'une nouvelle famille: les Guyanemidae (Dracunculoidea). *Bulletin du Museum nationale de Histoire naturelle Paris (Zoologie)*, 156, 803–812.
Petter, A.J. (1980) A new family of nematodes parasites of marine-invertebrates, the Benthimermithidae. *Annales de parasitologie humaine et compare*, 55, 209–224.
Pierantoni, U. (1916) I nematodi parassiti degli Oligocheti. *Napoli Boletin Societe Naturale* 28, 139–175.
Poinar, G.O. (1975) Description and biology of a new insect parasitic rhabditoid, *Heterorhabditis bacteriophora* n.gen., n.sp. (Rhabditida, Heterorhabditidae n.fam.). *Nematologica*, 21, 463–470.
Poinar, G.O. (1977) *CIH key to the groups and genera of nematode parasites of invertebrates.* Commonwealth Institute of Helminthology, Farnham Royal, 43 pp.
Poinar, G.O. (1978) *Mesidionema praecomasculatis* gen et sp n - Mesidionematidae fam n (Drilonematoidea, Rhabditida), a nematode parasite of earthworms. *Proceedings of the Helminthological Society of Washington*, 45, 97–102.
Poinar, G.O & Sarbu, S.M. (1994) *Chronogaster troglodytes* sp n (Nemata, Chronogasteridae) from Mobile cave, with a review of cavernicolous nematodes. *Fundamental and Applied Nematology*, 17, 231–237.
Puylaert, J.A. (1970) Description de *Chitwoodchabaudia skryabini* g. n., sp. n., (Chitwoodchabaudiidae fam. nov.), parasite de *Xeno-*

pus laevis victorianus Ahl. (Cosmocercoidea, Nematoda, Vermes). *Revue de Zoologie et de Botanique Africaines*, 81, 369–381.
Quentin, J-C. (1970) Larval morphogenesis of the Spirurid *Mastophorus muris*. *Annales de Parasitologie Humaine et Comparee*, 45, 839–855.
Railliet, A. (1893) *Traite de Zoologie medicale et agricole*. Anon., Paris, 442pp.
Railliet, A. (1895) Nematodes. In: Railliet A. (Ed.) *Traite de zoologie medicale et agricole. 2me ed.* Anon., Paris, pp 388–562.
Railliet, A. (1906) *Untitled*. Museum de Histoire naturelle, Paris, 269 pp.
Railliet, A. (1910) La famille des Thelaziidae. *Journal of Parasitology Urbana*, 2, 99–105.
Railliet, A. (1915) L'emploi des medicaments dans le traitement des maladies causees par des Nematodes. *Recueil de Medecine Veterinaire Paris*, 91, 490–513.
Railliet, A. (1916) Nematodes parasites des rongeurs par M. C. Hall. *Recueil de Medecine Veterinaire Paris*, 92, 517–521.
Railliet, A. & Henry, A. (1912) Observations sur les Strongylides du genre Nematodirus. *Bulletin de la Societe de pathologie exotique*, 5, 35–39.
Railliet, A. & Henry, A. (1912) Quelques Nematodes parasites des Reptiles. *Bulletin de la Societe de pathologie exotique*, 5, 251–259.
Railliet, A. & Henry, A. (1913) Observations sur les Nematodes parasites du genre *Aapidodera*, Railliet et Henry, 1912. *Bulletins de Museum Paris*, 1913, 93–99.
Railliet, A., Henry, A. (1915a) Sur les Nematodes du genre *Goezia* Zeder. *Bulletin de la Societe de pathologie exotique*, 8, 270–275.
Railliet, A. & Henry, A. (1915b) Sur les Nematodes du genre *Camallanus* Raill. et Henry1915 (*Cucullanus* Auct. non Mueller 1777). *Bulletin de la Societe de pathologie exotique*, 8, 446–452.
Railliet, A., Henry, A. & Sisoff, P. (1912) The affinity of Dispharagae (Acuaria Bremser), parasitical nematodes of birds. *Comptes Rendus des Seances de la Societe de Biologie et de ses Filiales*, 73, 622–624.
Ransom, B.H. (1911) The nematodes parasitic in the alimentary tract of cattle, sheep, and other ruminants. *U S Department of Agriculture Bureau Animal Industries Bulletin*, 127, 1–132.
Rao, P.N. (1958) Studies on the nematode parasites of insects and other arthropods. *Arquivos Museo Nacione Rio De Janeiro*, 46, 33–84.
Raski, D.J. (1962) Paratylenchidae n fam with descriptions of five new species of *Gracilacus* ng and an emendation of *Cacopaurus* Thorne, 1943, *Paratylenchus* Micoletzky, 1922 and Criconematidae Thorne, 1943. *Proceedings of the Helminthological Society of Washington*, 29, 189–207.
Raski, D.J. & Sher, S.A. (1952) *Sphaeronema californicum*, nov. gen., nov. spec. (Criconematidae: Sphaeronematinae, nov. subfam.) an endoparasite of the roots of certain plants. *Proceedings of the Helminthological Society of Washington*, 19, 77–80.
Ribas, A. & Casanova, J.C. (2002) *Agfa morandi* sp n. (Rhabditida, Agfidae) a parasite of *Limax* sp (Gastropoda, Limacidae). *Parasitology Research*, 88, 745–747.
Riemann, F. (1972) *Kinonchulus sattleri* n.g. n. sp. (Enoplida, Tripyloidea), an aberrant freeliving nematode from the lower Amazonas. *Veroffentlichungen des Instituts fuer Meeresforchungen in Bremerhaven*, 13, 317–326.
Roman, E. (1965) Systematique des nematodes. Sous-classe des Adenophorea. Ordre des Enoplides. Super-families des trichuroides, dioctophymatoides et muspiceoides. In: Grasse, P.P. (Ed) *Traite de Zoologie.* Masson, Paris, pp 705–726.
Ross, J.L., Ivanova, E.S., Spiridonov, S.E., Waeyenberge, L., Moens, M., Nicol, G.W. & Wilson, M.J. (2010) Molecular phylogeny of slug-parasitic nematodes inferred from 18S rRNA gene sequences. *Molecular Phylogenetics and Evolution*, 55, 738–743.
Rubtsov, I.A. (1978) *Mermitidy: klassifikatsiya, znachenie, ispol'zovanie*. Nauka, Moscow, 207 pp.
Rubtzov, I.A. (1980) The new marine parasitic nematode, *Abos bathycola*, from Priapulids and a taxonomic position of the family Marimermithidae in the class Nematoda. *Parazitologiya*, 14, 177–181.
Rubtsov, I.A. & Platonova, T.A. (1974) A new family of marine parasitic nematodes. *Zoologicheskii Zhurnal*, 53, 1445–1458.
Rudolphi, C.A. (1808) *Entozoorum sive vermium intestinalium histoiria naturalis.* Anon., Amsterdam, unpaginated.
Ruehm, W. (1956) Die Nematoden der Ipiden. *Parasitologische Schriftenreihe*, 6, 1–437.
Rusin, L.Y., Aleshin, V.V., Vladychenskaya, N.S., Miljutina, I.A., Kedrova, O.S. & Petrov, N.B. (2001) Trefusiidae are a subtaxon of marine enoplida (Nematoda): Evidence from primary structure of hairpin 35 and 48 loops of SSU rRNA gene. *Molecular Biology*, 35, 778–784.
Ryss, A.Y. (1988) Review of the genus *Prismatolaimus* (Araeolaimida). *Trudy Zoologicheskogo Instituta*, 180, 82–95.
Ryzhikov, K.M., Sonin, M.D. (1981) A system of nematodes - parasites of vertebrate animals. *Parazitologiya*, 15, 510–518.
Sanwal, K.C. (1957) Chambersiellidae n. fam. (Nematoda) with emended diagnosis of the genus *Chambersiella* Cobb, 1920, description of *C. bakeri* n. sp., and discussion of taxonomic position. *Canadian Journal of Zoology*, 35, 615–621.
Schierenberg, E. (2000) New approaches to a better understanding of nematode phylogeny: molecular and developmental studies. *Journal of Zoological Systematics and Evolutionary Research*, 38, 129–132.
Schierenberg, E. (2005) Unusual cleavage and gastrulation in a freshwater nematode: developmental and phylogenetic implications. *Development Genes and Evolution*, 215, 103–108.
Schierenberg, E. & Lahl, V. (2004) Embryology and phylogeny of nematodes. *Nematology Monographs and Perspectives*, 2, 667–679.
Schuurmans Stekhoven, J.H.S. (1935) Nematoda: Systematischer Teil, Nematoda errantia. In: Grimpe, G. & Wagler, E. (Eds) *Die Tierwelt der Nord- und Ostsee*. Anon., Leipzig, 173pp.
Schuurmans Stekhoven, J.H.S. (1942) The free living nematodes of the Mediterranean. III. The Balearic Islands. *Zooligishe Mededelingen (Leiden)*, 23, 229–262.
Scopoli, G.A. (1777) *Introductio ad historiam naturalem sistens genera lapidum, plantarum, et animalium hactenus detecta, caracteribus essentialibus donata, in tribus divisa, subinde ad leges naturae*. Gerle, Prague, 506pp.
Seurat, L.G. (1913) Sur quelques Nematodes du sud Tunisien. *Alger Bulletin de societe de histoire naturelle*, 4, 126–130.
Shigin, A.A. & Shigina, N.G. (1958) *Skrjabillanus tincae* gen. nov. spec. nov. (Nematoda : Camallanata) parasite of tench. In: Anon. (Ed) *Papers on Helminthology presented to K. I. Skrjabin on his 80th Birthday.* Nauka, Moscow, pp 395–399.

Shipley, A.E. (1896) Nemathelminthes. In: Harmer, S.F. & Shipley, A.E. (Eds) *The Cambridge Natural History.* Weldon u. Wesley, Cambridge, pp. 123–185.
Siddiqi, M.R. (1960) *Telotylenchus*, a new nematode genus from North India (Tylenchida: Telotylenchinae n. sub-fam.). *Nematologica*, 5, 73–77.
Siddiqi, M.R. (1963) On the classification of the Pratylenchidae (Thorne, 1949) nov. grad. (Nematoda : Tylenchida) with a description of *Zygotylenchus browni* nov. gen. et nov. sp.. *Zeitschrift fuer Parasitenkunde*, 23, 390–396.
Siddiqi, M.R. (1968) Five new species of Belondiroidea (Nematoda) from Sibsagar India with a revised classification of superfamily. *Proceedings of the Helminthological Society of Washington*, 35,248–258.
Siddiqi, M.R. (1969) *Crateronema* n gen (Crateronematidae n fam), *Poronemella* n gen (Lordellonematinae n sub-fam) and *Chrysonemoides* n gen (Chrysonematidae n fam) with a revised classification of Dorylaimoidea (Nematoda). *Nematologica*, 15, 81–100.
Siddiqi, M.R. (1971) Structure of the oesophagus in the classification of the superfamily Tylenchoidea (Nematoda). *Indian Journal of Nematology*, 1, 25–43.
Siddiqi, M.R. (1974) Systematics of the genus *Trichodorus* Cobb, 1913 (Nematoda, Dorlaimida), with descriptions of three new species. *Nematologica*, 19, 259–278.
Siddiqi, M.R. (1976) New plant nematode genera *Plesiodorus* (Dolichodorinae), *Meiodorus* (Meiodorinae subfam n), *Amplimerlinius* (Merliniinae) and *Gracilancea* (Tylodoridae grad n). *Nematologica*, 22, 390–416.
Siddiqi, M.R. (1980) The origin and phylogeny of the nematode orders Tylenchida Thorne, 1949 and Aphelenchida N. Ord. *Helminthological Abstracts, Series B.*, 49, 143–170.
Siddiqi, M.R. (1982) Seven new genera of dorylaimid nematodes from Colombian rain-forest. *Systematic Parasitology*, 4, 69–87.
Siddiqi, M.R. (1983) Phylogenetic relationships of the soil nematode orders Dorylaimida, Mononchida, Triplonchida and Alaimida, with a revised classification of the subclass Enoplia. *Pakistan Journal of Nematology*, 1, 79–110.
Siddiqi, M.R. (1986) *Tylenchida. Parasites of plants and insects*. CAB, Farnham Royal, 645 pp.
Siddiqi, M.R. (2000) *Tylenchida: parasites of plants and insects (2nd Ed.)*. CABI, New York, 833 pp
Siddiqi, M.R. (2003) *Keralanema spinicorpus* (Maggenti *et al*., 1983) gen. n., comb. n. (Nematoda: Chronogastridae). *International Journal of Nematology*, 13, 236.
Skarbilovich, T.S. (1947) On the reorganisation of the systematics of the nematodes belonging to the family Anguillulinidae Baylis and Daubney, 1926. *Doklady Akademi Nauk SSR New Series*, 57, 307–308.
Skarbilovich, T.S. (1959) On the structure of systematics of nematodes, order Tylenchida Thore, 1949. *Acta Parasitologia Polonica*, 7, 117–132.
Skryabin, K.I. (1915) *Vestnik obshest veterinarija, Petrograd*, 133, 1–10.
Skryabin, K.I. (1916) Parasitic trematodes and nematodes collected by the expedition of Prof. V. Dogiel and I. Sokolov in British East Africa. *Scientific results of the zoological expedition to British East Africa and Uganda by Prof. V. Dogiel and I. Sokolov in 1914*, 1(4), 1–157.
Skryabin, K.I. (1923) *Hastospiculum varani* n. gen, n. sp. Eine neue Filaria der reptilian. *Russki I Zhurnal Tropichesko i Medi t Siny*, 1, 40–44.
Skryabin, K.I. (1946) A new revision of the taxonomy of the nematodes Spirurata parasitizing in fishes. *Doklady Akademii nauk SSSR*, 54, 751–752.
Skryabin, K.I. & Karokhin, V.I. (1945) On the re-arrangement of nematodes of the order Ascaridata Skrjabin, 1915. *Doklady Akademii nauk SSSR*, 48, 297–299.
Skryabin, K.I. & Ivashkin, V.M. (1973) On the composition of the superfamily Gnathostomatoides Skryabin et Ivaschkin, 1968 and its elevation to the rank of suborder. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 23, 144–148.
Skrjabin, K.I. & Shikhobalova, N.P. (1945) A new rearrangement of the taxonomy of the nematodes belonging to the family Filariidae Cobbold, 1864. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 49, 690–692.
Skryabin, K.I. & Shikhobalova, N.P. (1947) Revision of the systematics of the nematode family Heterakidae. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 58, 719–721.
Skryabin, K.I. & Shikhobalova, N.P. (1948) Systematic revision of the family Subuluridae. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 60, 189–192.
Skryabin, K.I. & Shikhobalova, N.P. (1951) A reconstruction of the classification of nematodes of the suborder Oxyurata Skryabin, 1933. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 65, 5–8.
Skryabin, K.I., Shikhobalova, N.P. & Sobolev, A.A. (1949) *Descriptive catalogue of parasitic nematodes. Vol. I. Spirurata and Filariata*. Nauka, Moscow, 519 pp.
Skryabin, K.I. & Shults, R.E.S. (1937) *Helminth parasites of cattle*. Nauka, Moscow, 723 pp.
Smol, N. & Coomans, A. (2006) Order Enoplida. In: Eyualem, A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp 225–292.
Smythe, A.B., Sanderson, M.J. & Nadler, S.A. (2006) Nematode small subunit phylogeny correlates with alignment parameters. *Systematic Biology*, 55, 972–992.
Sobolev, A.A. (1949) Nematode classification. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 63, 273–277.
Spasski, A.A. (1954) On the occurrence of neonate forms among phasmidian nematodes. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 7 192–195.
Spasski, A.A. (1954) On the systematics of aphasmidian nematodes. *Trudy Gel'mintologicheskoi Laboratorii. Akademiya Nauk SSSR*, 8, 159–164.
Spratt, D.M. & Nicholas, W.L. (2002) Morphological evidence for the systematic position of the Order Muspiceida (Nematoda). *Transactions of the Royal Society of South Australia*, 126, 51–62.

Stammer, H.J. & Wachek, F. (1952) Ein neuer insektenparasitischer Nematode, *Carabonema hasei* n.g., n.sp. (Carabonematidae n. fam.). *Zoologischer Anzeiger*, 148, 185–193.
Steinbuch, J.G. (1799) Das Grasalchen, *Vibrio agrostis*. *Der Naturforscher*, 28, 233–259.
Steiner, G. (1927) A new nemic family Epsilonematidae. *Journal of Parasitology Urbana*, 14, 65–66.
Steiner, G. (1929) *Diplogaster entomophaga* n.sp., a new *Diplogaster* (Diplogasteridae, Nematodes) found on a *Pamphilus stellatus* (Christ) (Tenthredinidae, Hymenoptera). *Zoologischer Anzeiger*, 80, 143–145.
Steiner, G. (1930) Die Nematoden der Deutschen Sudpolar-Expedition 1901-1903. *Deutsche Sudpolar Expedition 1901-03*, 20, 167–216.
Steiner, G. (1949) Plant nematodes the grower should know. *Proceedings. Soil Science Society of Florida*, 4B, 72–117.
Stiles, C.W. (1907) The zoological characters of the roundworm genus *Filaria* Mueller, 1787, with a list of the threadworms reported for man. *Treasury Department, Public Health & Marine Hospital Service, Hygiene Laboratory, Bulletin*, 34, 31–51.
Sudhaus, W. (1967) Comparative studies on the phylogeny, systematics, ecology, biology and ethology of the Rhabditidae (Nematoda). *Zoologica (Stuttgart)*, 43, 1–29.
Sudhaus, W. & Fitch, D. (2001) Comparative studies on the phylogeny and systematics of the Rhabditidae (Nematoda). *Journal of Nematology*, 33, 1–70.
Sudhaus, W. & von Lieven, A.F. (2003) A phylogenetic classification and catalogue of the Diplogastridae (Secernentea, Nematoda). *Journal of Nematode Morphology and Systematics*, 6, 43–89.
Suryawanshi, M.V. (1971) *Alirhabditis indica* n.gen., n.sp. (Rhabditida: Alirhabditidae n.fam), *Tawdenema indicum* n.gen., n.sp. and *Syedella aurangabadensis* n.gen., n.sp. (Diplogasteridae) from Marathwada, India. *Nematologica*, 17, 542–552.
Taylor, A.L. (1936) The genera and species of the Criconematinae, sub-family of the Anguillulinidae (Nematoda). *Transactions of the American Microscopical Society*, 55, 391–421.
Tchesunov, A.V. (1990) A critical analysis of the family Aegialoalaimidae (Nematoda, Chromadoria), trends in evolutionary development of marine nematode pharynx and a proposal of two new families. *Zoologicheskii Zhurnal*, 69, 5–18.
Tchesunov, A.V. (1996) A new nematode family Fusivermidae fam n (Monhysterida) for *Fusivermis fertilis* gen n, sp n from the White Sea. *Nematologica*, 42, 35–41.
Tchesunov, A.V. (1997) Marimermithid nematodes: Anatomy, position in the nematode system, phylogeny. *Zoologichesky Zhurnal*, 76, 1283–1299.
Tchesunov, A.V & Gagarin, V.G. (1999) Descriptions of *Andrassya tundrovi* Gagarin, 1993 and *Malakhovia chernobyli* gen. n., sp n. (Nematoda : Andrassyidae fam. n.). *Nematology*, 1, 141–148.
Tchesunov, A.V. & Miljutina, M.A. (2002) A review of the family Ceramonematidae (marine free-living nematodes), with descriptions of nine species from the White Sea. *Zoosystematica Rossica*, 11, 3–39.
Tchesunov, A.V. & Sturhan, D. (2002) Redescription of *Dintheria tenuissima* de Man, 1921 (Nematoda : Bastianidae). *Russian Journal of Nematology*, 10, 37–42.
Theodorides, J. (1965) Systematique des nematodes. Sousclasse des Adenophorea. Ordre des Enoplides. Superfamille des Mermithoidea. In: Grasse, P.P. (Ed) *Traite de Zoologie.* Masson, Paris, pp 681–704.
Thorne, G. (1934) The classification of the higher groups of dorylaims. *Proceedings of the Helminthological Society of Washington*, 1, 19.
Thorne, G. (1935) Notes on free-living and plant-parasitic nematodes I. *Proceedings of the Helminthological Society of Washington*, 2, 46–47.
Thorne, G. (1937) A revision of the nematode family Cephalobidae Chitwood and Chitwood 1934. *Proceedings of the Helminthological Society of Washington*, 4, 1–16.
Thorne, G. (1939) A monograph of the nematodes of the superfamily Dorylaimoidea. *Capita Zoology*, 8, 1–261.
Thorne, G. (1941) Some nematodes of the family Tylenchidae which do not possess a valvular median esophageal bulb. *Great Basin Naturalist*, 37–85.
Thorne, G. (1949) On the classification of the Tylenchida, new order (Nematoda, Phasmidia). *Proceedings of the Helminthological Society of Washington*,16, 37–73.
Thorne, G. (1964) Nematodes of Puerto Rico: Belondiroidea new superfamily, Leptonchidae, Thorne, 1935 and Belonenchidae new family (Nemata, Adenophorea, Dorylaimida). *Technical Paper Agricultural Experiment Station Puerto Rico* 1, 1–51
Thorne, G. (1967) Nematodes of Puerto Rico: Actinolaimoidea new superfamily with a revision of its genera and species with addenda to Belondiroidea (Nemata, Adenophorea, Dorylaimida). *Technical Paper Agricultural Experiment Station Puerto Rico* 2, 1–48.
Timm, R.W. (1959) A new species of *Pharyngonema* (Nematoda: Pharyngonematidae) from the body cavity of earthworms. *Pakistan Journal of Biology and Agricultural Science*, 2, 42–46.
Timm, R.W. (1961) The systematic position of *Isolaimium* Cobb, 1920 (Nematoda), with a description of a new species. *Journal of the Bombay Natural History Society*, 58, 300–303.
Timm, R.W. (1966) Nematode parasites of the coelomic cavity of earthworms. III. *Homungella* new genus (Drilonematoidea: Homungellidae new family). *Biologia (Pakistan)*, 12, 1–5.
Timm, R.W. (1969) Genus *Isolaimium* Cobb 1920 (Order Isolaimida Isolaimiidae new family). *Journal of Nematology*, 1, 97–106.
Travassos, L. (1914) Contribuicoes para o conhecimento da fauna helmintologica brazileira. III. Sobre as especies brazileiras do genero *Tetrameres* Creplin 1846. *Memorias de Instituto. Oswaldo Cruz*, 6, 150–162.
Travassos, L. (1918) Informacoes sobre a farmilia Kathlanidae, n. nom. *Revista brasileira, Rio de Janeiro*, 2, 83–88.
Travassos, L. (1920) Esboco de uma chave geral dos Nematodes parasitos. *Revista veterinaria y zootechnica*, 10, 59–71.
Travassos, L. (1925) Contribuicoes para o conhecimento da Fauna Helmintolojica dos Batraquios do Brasil. Nematódeos intestinais. *Sciencia Medica*, 3, 673–687.
Travassos, L. (1929) Contribuicao preliminar a systematica dos nematodeos dos arthropodos. *Memorias de Instituto. Oswaldo Cruz*,

19 supplement, 19–25.
Travassos, L. (1930) Pesquizas helminthologicas realisados em Hamburgo. VIII. Informacoes sobre o genero *Pleurogenes* Loose, 1896. *Memorias de Instituto. Oswaldo Cruz*, 24, 251–256.
Travassos, L. (1960) Concerning nematodes of the body cavity of fish from Rio Amazonas. *Atas do Sociedad Biologicos de Rio de Janeiro*, 4, 15–20.
Travassos, L. & Kloss, G.R. (1958) Itchthyocephalidae, new family. *Boletin do Museo Paraense Emilio Goeldi Zoologi*, 17, 1–19.
Travassos, L. & Kloss, G.R. (1960a) Cephalobiidae, new family (Nematoda). *Atas do Sociedad Biologico de Rio de Janeiro*, 4, 50–51.
Travassos, L. & Kloss, G.R. (1960b) Sobore o genero *Rondonema* Artigas, 1926 (Nematoda). In: Anon. (Ed) *Libro homenaje al Dr. Eduardo Gaballero y Caballero, Jubileo 1930–1960*. Anon., Rio de Janiero, pp 511–519.
Travassos, L., Pereira, P.A. & Pereira, C. (1928) Fauna helminthologica dos peixes de aqua doce do Brasil. *Archivos Instituto Biologico, Sao Paulo*, 1, 5–68.
Van Megen, H., van den Elsen, S., Holterman, M., Karssen, G., Mooyman, P., Bongers, T., Holovachov, O., Bakker, J. & Helder, J. (2009) A phylogenetic tree of nematodes based on about 1200 full-length small subunit ribosomal DNA sequences. *Nematology*, 11, 927–950.
Vitiello, P. & De Coninck, L. (1968) *Peresiana annulata* n. gen., n. sp., type interessant de Desmoscolecida. *Rapports, Commission Internationale pour l'Exploration Scientifique de la Mer Mediterrane*, 19, 201–204.
von Lieven, AF. & Sudhaus, W. (2000) Comparative and functional morphology of the buccal cavity of Diplogastrina (Nematoda) and a first outline of the phylogeny of this taxon. *Journal of Zoological Systematics and Evolutionary Research*, 38, 37–63.
Voronov, D.A., Panchin, Y.V. & Spiridonov, S.E. (1998) Nematode phylogeny and embryology. *Nature*, 395, 28.
Wang, P. & Wang, Y. (1991) A study of nematode parasites of Amphibians and reptiles from Fujian, China, with descriptions of 1 new family, 1 new genus and 2 new species. *Wuyi Science Journal*, 8, 139–148.
Ward, H.B. (1907) Iconographia parasitorum hominis. *Studies from the Zoological Laboratory Nebraska, Lincoln*, 70, 1–24.
Wehr, E.E. (1935) A revised classification of the nematode superfamily Filarioidea. *Proceedings of the Helminthological Society of Washington*, 2, 84–88.
Weinland, D.F. (1858) *Systematic Catalogue of all Helminths found in Man. Appendix to: Human Cestoides: an essay on the Tapeworms of Man*. Metcalf & Co., Cambridge, pp83–90 of 93pp.
Weiser, W. (1953) Reports of the Lund University Chile Expedition 1948–1949. 10. Free-living nematodes. I. Enoploidea. *Lunds Universitets Arsskrift*, 49, 1–155.
Whitehead, A.G. (1959) *Trichotylenchus falciformis* n. g., n. sp. (Belonolaiminae n. subfam., Tylenchida Thorne, 1949) an associate of grass roots (*Hyparrhenia* sp.) in Southern Tanganyika. *Nematologica*, 4, 279–285.
Witenberg, G. (1925). Remarks on the Anatomical Structure and Systematic Position of the Stork's Lung-Filaria. *Journal of Helminthology, London*, 3, 203–208.
Wouts, W.M. (1973) A revision of the family Heteroderidae (Nematoda: Tylenchoidea). The family Heteroderidae and its subfamilies. *Nematologica*, 18, 439–446.
Wu, H.W. & Hu, Y.T. (1938) Parasitic nematodes from Hainan. *Sinensia*, 9, 275–297.
Wulker, G. (1927) Nematodes. In: Schulz, P. (Ed) *Biologic der Tiere Deutschlands*. Borntraeger, Berlin, Teil 3 No 64 pp 25.
Yamaguti, S. (1935). Studies on the Helminth Fauna of Japan. Part 9. *Japanese Journal of Zoology*, 6, 337–386.
Yamaguti, S. (1961) *Systema helminthum. Vol. Ill, pts. I-II. The Nematodes of Vertebrates*. Interscience Publishers, New York, 1261pp.
Yamaguti, S. & Hayama, S. (1961) A redescription of *Edesonfilaria malayensis* Yeh, 1960, with remarks on its systematic position. *Proceedings of the Helminthological Society of Washington*, 28, 83–86.
Yorke, W. & Maplestone, P.A. (1926) *The Nematode Parasites of Vertebrates*. J. & A. Churchill, London, 536 pp.
Yushin, V.V. (2003a) Ultrastructure of spermatogenesis in the free-living marine nematode *Anticoma possjetica* (Enoplida: Anticomidae). *Nematology*, 5, 777–788.
Yushin, V.V. (2003b) Ultrastructure of spermatozoa in the free-living marine nematode of the family Selachinematidae (Chromadorida: Cyatholaimina). *Russian Journal of Nematology*, 11, 81–90.
Yushin, V.V., Coomans, A. & Malakhov, V.V. (2002) Ultrastructure of spermatogenesis in the free-living marine nematode *Pontonema vulgare* (Enoplida, Oncholaimidae). *Canadian Journal of Zoology*, 80, 1371–1382.
Yushin, V.V. & Malakhov, V.V. (2004) Spermatogenesis and nematode phylogeny. *Nematology Monographs and Perspectives*, 2, 655–665.
Zhang, Y.C. & Baldwin, J.G. (2001). Ultrastructure of the postcorpus of the esophagus of *Teratocephalus lirellus* (Teratocephalida) and its use for interpreting character evolution in Secernentea (Nematoda). *Canadian Journal of Zoology*, 79, 16–25.
Zhao, (2011) A review of the genus *Trischistoma* Cobb, 1913 (Nematoda: Enoplida), with descriptions of four new species from New Zealand. *Zootaxa*, 3045, 1–25.
Zullini, A. (2006) Order Triplonchida. In: Eyualem, A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp 293–325.
Zullini, A., Loof, P.A.A. & Bongers, T. (2002) Free-living nematodes from nature reserves in Costa Rica. 3. Araeolaimida. *Nematology*, 4, 709–724.
Zullini, A. & Peneva, V. (2006) Order Mononchida. In: Eyualem, A., Andrassy, I. & Traunspurger, W. (Eds) *Freshwater nematodes: ecology and taxonomy.* CABI, Wallingford, pp 468–496.

Author name & address

Mike Hodda, CSIRO Ecosystem Sciences, GPO Box 1700, Canberra, ACT 2601, Australia; mike.hodda@csiro.au

Phylum **Tardigrada** Doyère, 1840 (3 classes)[1]

Class **Heterotardigrada** Marcus, 1927 (2 orders)

Order **Arthrotardigrada** Marcus, 1927 (8 families)

Family **Archechiniscidae** Binda, 1978 (1 genus, 3 species)

Family **Batillipedidae** Ramazzotti, 1962 (1 genus, 26 species)

Family **Coronarctidae** Renaud-Mornant, 1974 (2 genera, 8 species)

Family **Halechiniscidae** Thulin, 1928 (7 subfamilies, 28 genera, 88 species)

Family **Neoarctidae** de Zio Grimaldi, D'Addabbo Gallo & Morone De Lucia, 1992 (1 genus, 1 species)

Family **Neostygarctidae** de Zio Grimaldi, D'Addabbo Gallo & De Lucia Morone, 1987 (1 genus, 1 species)

Family **Renaudarctidae** Kristensen & Higgins, 1984 (1 genus, 1 species)

Family **Stygarctidae** Schulz, 1951 (2 subfamilies, 4 genera, 21 species)

Order **Echiniscoidea** Richters, 1926 (4 families)

Family **Echiniscoididae** Kristensen & Hallas, 1980 (2 genera, 11 species)

Family **Carphaniidae** Binda & Kristensen, 1986 (1 genus, 1 species)

Family **Oreellidae** Ramazzotti, 1962 (1 genus, 2 species)

Family **Echiniscidae** Thulin, 1928 (12 genera, 281 species)

Class **Mesotardigrada** Rahm, 1937 (1 order)[2]

Order **Thermozodia** Ramazzotti & Maucci, 1983 (1 family)

Family **Thermozodiidae** Rahm, 1937 (1 genus, 1 species)

Class **Eutardigrada** Richters 1926 (2 orders)

Order **Apochela** Schuster, Nelson, Grigarick & Christenberry, 1980 (1 family)

Family **Milnesiidae** Ramazzotti, 1962 (3 genera, 19+1† species)[3]

Order **Parachela** Schuster, Nelson Grigarick & Christenberry, 1980 (4 superfamilies, 9 families)

Family **Necopinatidae** Ramazzotti & Maucci, 1983 (1 genus, 1 species)[4]

incertae sedis (1 genus: *Apodibius*, 3 species)[4]

Superfamily **Eohypsibioidea** Bertolani & Kristensen, 1987 (1 family)

Family **Eohypsibiidae** Bertolani & Kristensen, 1987 (3 genera, 12 species)

Superfamily **Hypsibioidea** Pilato, 1969 (4 families)

Family **Calohypsibiidae** Pilato, 1969 (5 genera, 19 species)

Family **Hypsibiidae** Pilato, 1969 (3 subfamilies, 11 genera, 148 species)

Family **Microhypsibiidae** Pilato, 1998 (2 genera, 5 species)

Family **Ramazzottiidae** Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008 (2 genera, 29 species)

Superfamily **Isohypsibioidea** Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008 (2 families)[5]

Family †**Beornidae** Cooper, 1964 (1 genus, 1 species)[6]

Family **Isohypsibiidae** Sands, McInnes, Marley, Goodall-Copestake, Convey & Linse, 2008 (9 genera, 188 species)

Superfamily **Macrobiotoidea** Thulin, 1928 (2 families)

Family **Macrobiotidae** Thulin, 1928 (15 genera, 254 species)

Family **Murrayidae** Guidetti, Gandolfi, Rossi & Bertolani, 2005 (3 genera, 24 species)

---

1. **BY** Roberto Guidetti & Roberto Bertolani (for full contact details, see **Author names, addresses and roles** after **Cited references**). The title of this contribution should be cited as "Phylum Tardigrada Doyère, 1840. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". The classification and diversity estimates follow Guidetti and Bertolani (2005) and Degma and Guidetti (2007), with the necessary updating. The phylum is composed by three classes: Heterotardigrada, with 2 orders, 12 families, 55 genera and 444 species, Eutardigrada, with 2 orders, 4 superfamilies, 10 families, 55 genera and 712 species, Mesotardigrada, with 1 order, 1 family, 1 genera and 1 species.
2. Some authors do not consider this as a valid taxon (*e.g.*, Nelson 2002; Nelson & McInnes 2002).
3. *Milnesium swolenskyi* Bertolani & Grimaldi, 2000, fossil species found in Turonian amber (Bertolani & Grimaldi 2000).
4. The Necopinatidae and *Apodibius* (*incertae sedis*) are not ascribed to any superfamily. Pilato and Binda (2010) include *Apodibius* in Necopinatidae.
5. Taxon erected by Sands et al. (2008) but more in depth described, together with the family Isohipsibiidae, by Marley et al. (2011)
6. *Beorn leggi* Cooper, 1964, fossil species found in Upper Cretaceous amber (Cooper 1964).

Cited references

Bertolani, R. & Grimaldi, D. (2000) A new eutardigrade (Tardigrada: Milnesiidae) in amber from the Upper Cretaceous (Turonian) of New Jersey. *In*: D. Grimaldi (Ed.), *Studies on fossils in amber, with particular reference to the Cretaceous of New Jersey*, Backhuys Publishers, Leiden The Netherland, pp. 104–109.

Cooper, K.W. (1964) The first fossil tardigrade: *Beorn leggi* Cooper, from cretaceous amber. *Psyche*, 71, 41–48.

Degma, P. & Guidetti, R. (2007) Notes to the current checklist of Tardigrada. *Zootaxa*, 1579, 41–53.

Doyère, L. (1840) Mémoire sur les Tardigrades *Annales des sciences naturelles*, Ser. 2, Paris, 14, 269–361.

Guidetti, R. & Bertolani, R. (2005) Tardigrade taxonomy: an updated check list of the taxa and a list of characters used in their identification. *Zootaxa*, 845, 1–46.

Marley, N.J., McInnes, S.J. & Sands, C.J. (2011) Phylum Tardigrada: A re-evaluation of the Parachela. *Zootaxa*, 2819, 51–64.

Nelson, D.R. (2002) Current status of the Tardigrada: Evolution and Ecology. *Integrative and Comparative Biology*, 42, 652–659.

Nelson, D.R. & McInnes, S.J. (2002) Tardigrada. *In*: Rundle, S.D., Robertson, A.L. & Schmid-Araya, J.M. (Ed.), *Freshwater Meiofauna, Biology and Ecology*, Backhuys Publishers, Leiden, The Netherlands, pp. 177–215.

Pilato, G. & Binda, M.G. (2010) Definition of families, subfamilies, genera and subgenera of the Eutardigrada, and keys to their identification. *Zootaxa*, 2404, 1–54.

Sands, C.J., McInnes, S.J., Marley, N.J., Goodall-Copestake, W.P., Convey, P. & Linse, K. (2008) Phylum Tardigrada: an ‘‘individual’’ approach. *Cladistics*, 24, 1–11.

Author names, addresses and roles

ROBERTO GUIDETTI & ROBERTO BERTOLANI, Department of Biology, University of Modena and Reggio Emila, Via Campi 213/D, 41125, Modena, Italy; e-mail: roberto.guidetti@unimore.it

Both authors contribute to discuss and critically revise the taxonomic bibliography of the phylum.

Phylum **Onychophora** Grube, 1853[1] (4 families[2], 52 genera, 182 species, 2/3/3[3])

Family **Peripatidae** Evans, 1901 (11 genera, 73 species[4], 1/1)

Family **Peripatopsidae** Bouvier, 1907[5] (39 genera, 107 species[6])

Family **†Succinipatopsidae** Poinar, 2000 (1 genus, 1 species, 1/1)

Family **†Tertiapatidae** Poinar, 2000 (1 genus, 1 species, 1/1)

References

Bouvier, E.-L. (1904) Les œufs des Onychophores. *Nouvelles Archives du Muséum*, 6, 1–50.

Bouvier, E.-L. (1907) Monographie des Onychophores. *Annales des Sciences Naturelles, Zoologie et Biologie Animale [9e Série]*, 5, 61–318.

Evans, R. (1901) On two new species of Onychophora from the Siamese Malay States. *Quarterly Journal of Microscopical Science*, 44, 473–538.

Grimaldi, D.A., Engel, M.S. & Nascimbene, P.C. (2002) Fossiliferous cretaceous amber from Myanmar (Burma): its rediscovery, biotic diversity, and paleontological significance. *American Museum Novitates*, 3361, 3–72.

Grube, E. (1853) Über den Bau von *Peripatus edwardsii*. *Müller´s Archives of Anatomy and Physiology*, [1853], 322–360.

Poinar, G. (2000) Fossil onychophorans from Dominican and Baltic amber: *Tertiapatus dominicanus* n.g., n.sp. (Tertiapatidae n.fam.) and *Succinipatopsis balticus* n.g., n.sp. (Succinipatopsidae n.fam.) with a proposed classification of the subphylum Onychophora. *Invertebrate Biology*, 119, 104–109.

Contributor names and addresses

Georg Mayer, Institute of Biology, Animal Evolution & Development, University of Leipzig, Talstraße 33, D-04103 Leipzig, Germany. E-mail: gmayer@onychophora.com

Ivo de Sena Oliveira, Institute of Biology, Animal Evolution & Development, University of Leipzig, Talstraße 33, D-04103 Leipzig, Germany. E-mail: ivo.de_sena_oliveira@uni-leipzig.de

1. The title of this contribution should be cited as “Phylum Onychophora Grube, 1853. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness”.
2. Status of Tertiapatidae and Succinipatopsidae is uncertain (see Grimaldi *et al*., 2002).
3. Classification of fossils according to Grimaldi *et al*. (2002); x/y/z following totals indicating numbers of taxa based on fossil.
4. Additional seven “subspecies” and two “mutations” have been described, but their status is unclear.
5. The citation of Bouvier (1904) in this context is incorrect as he did not use the correct spelling of Peripatopsidae in his paper.
6. Three additional “variations” have been described, which have to be revised as it is unclear whether they represent additional species or not.

Phylum **Arthropoda** von Siebold, 1848[1] (1,242,040 species, of which †27,745)[2]
- Subphylum 1 †**Trilobitomorpha** Størmer, 1944 (19,606 species)[3]
- Subphylum 2 **Chelicerata** Heymons, 1901 (113,894 species, of which 1,957)[4]
  - Class 1 **Pycnogonida** Latreille, 1810 (1330 species, of which †8 species)[5]
  - Class 2 †**Aglaspidida** Walcott, 1911 (†11 species)[6]
  - Class 3.1 †**Xiphosura** Latreille, 1802 (†98 species)[7]
  - Class 3.2.1 †**Eurypterida** Burmeister, 1843 (†246 species)[8]
  - Class 3.2.2 †**Chasmataspidida** Caster & Brooks, 1956 (†8 species)[9]
  - Class 3.3 **Arachnida** Cuvier, 1812 (112,201, of which †1,586)[10]
    - Order 1.1 **Opiliones** Sundevall, 1833 (6,519 species, of which †35 species)[11]
    - Order 1.2 **Scorpiones** C.L. Koch, 1851 (2,068 species, of which †121 species)[12]
    - Order 2.1 **Solifugae** Sundevall, 1833 (1,116 species, of which †3 species)[13]
    - Order 2.2 **Pseudoscorpiones** de Geer, 1778 (3,494 species, of which †40 species)[14]
    - Order 3 **Palpigradi** Thorell, 1888 (83 species, of which †1 species)[15]
    - Order 4 †**Phalangiotarbida** Haase, 1890 (†31 species)[16]
    - Order 5 **Ricinulei** Thorell, 1876 (73 species, of which †15 species)[17]
    - Order 6.1 **Opilioacarida** Zakhvatkin, 1952 (37 species, of which †2 species)[18]
    - Order 6.2 **Holothyrida** Thon, 1905 (27 species)
    - Order 6.3 **Ixodida** Leach, 1815 (896 species, of which †5 species) [19]
    - Order 6.4 **Mesostigmata** G. Canestrini, 1891 (11,424 species)
    - Order 7.1 **Trombidiformes** Reuter, 1909 (25,821 species, of which †24 species)[20]
    - Order 7.2 **Scarcoptiformes** Reuter, 1909 (16,412 species, of which †113 species)[21]
    - Order 8.1 †**Trigonotarbida** Petrunkevitch, 1949 (†65 species)[22]
    - Order 8.2.1.1 †**Uraraneida** Selden & Shear in Selden e*t al*., 2008 (†2 species)[23]
    - Order 8.2.1.2 **Araneae** Clerck, 1757 (43,579 species, of which †1,106 species)[24]
    - Order 8.2.2.1 †**Haptopoda** Pocock, 1911 (†1 species)[25]

---

1. **BY** Zhi-Qiang Zhang (for full auhor addresses, see **Auhor name and address** after **References**). The title of this contribution should be cited as "Phylum Arthropoda von Siebold, 1848 *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". This classification at the subphylum level generally reflects the high level relationship summarized by Giribet & Edgecombe (2012: Fig. 5), with modification and updates as indicated (see notes on Crustacea).
   Fossil Marellomorpha not included in the phylogentic relationships focused on Recent taxa in Giribet & Edgecombe (2012). Grimaldi & Engel (2005) listed three genera.
2. Only Recent species were counted for many insect orders and all of Myriapoda; so the total number of species should be considered incomplete, as diversity of fossil taxa is underestimated.
3. See Adrain (2011, this volume).
4. There are broad consensus of high level relationship within Chelicerata (Dunlop 2010; Giribet & Edgecombe 2011); this classification at the class level generally reflects the high level relationship summarized by Giribet & Edgecombe (2011: Fig. 5), with modification and updates as indicated.
   Grimaldi & Engel (2005) listed three poorly kown arthropod taxa taxa (†Sidneyiida, †Emeraldellida Størmer, 1944 and †Sanctacarida); their placement is uncertain in the current system (e.g. Dunlop 2010; Giribet & Edgecombe 2012).
5. See Bamber (2011, this volume).
6. Data from J. Ortega-Hernandez (personal communication, 15 Dec. 2011).
7. Fossil horseshoe crabs; based on Dunlop *et al.* (2011).
8. Fossil sea scorpions; based on Dunlop *et al.* (2011).
9. Based on Dunlop *et al.* (2011).
10. Arachnid classification reflects mostly the phylogenetic hypothesis by Shultz (2007), but his Acaromorpha is now disputed (see Dunlop 2010).
11. See Kury (2011, this volume).
12. See Prendini (2011a, this volume).
13. See Prendini (2011b, this volume).
14. See Harvey (2011, this volume).
15. See Prendini (2011c, this volume).
16. Based on Dunlop *et al.* (2011).
17. See Prendini (2011d, this volume).
18. See Beaulieu *et al.* (2011, this volume), with a list of families and diversity estimates for each family within the mite superorder Parasitiformes, including Opilioacarida, Holothyrida, Ixodida and Mesostigmata.
19. Based on Guglielmone *et al.* (2010).
20. See Zhang *et al.* (2011, this volume). The second mite superorder, Acariformes, consists of Trombidiformes and Sarcoptiformes.
21. This order includes two suborders: Oribatida and Endeostigmata. Accoding to Schatz *et al.* (2011, this volume), Recent Oribatida (including Astigmata) currently include 249 families, 2399 genera and 16197 species; exclusively fossil taxa include 2 families, 20 genera and 108 species; Walter *et al.* (2011, this volume) estimated 10 families, 27 genera, 108 species for Endeostigmata, of which 3 genera and 5 species are based on fossil.
22. Based on Dunlop *et al.* (2011).
23. Selden *et al.* (2008).
24. See Dunlop & Penney (2011, this volume).

Order 8.2.2.2.1 **Amblypygi** Thorell, 1883 (170 species, of which †9 species)[26]
Order 8.2.2.2.2.1 **Thelyphonida** Latreille, 1804 (119 species, of which †9 species)[27]
Order 8.2.2.2.2.2 **Schizomida** Petrunkevitch, 1945 (264 species, of which †4 species)[28]
Subphylum 2.1 **Myriapoda** Latreille, 1802 (11,885 species)[29]
Class 1 **Chilopoda** Latreille, 1817 (3,100 species)[30]
Class 2.1 **Symphyla** Ryder, 1880 (197 species)[31]
Class 2.2.1 **Pauropoda** Lubbock, 1868 (835 species)
Class 2.2.2 **Diplopoda** de Blainville in Gervais, 1844 (7,753 species)
Subphylum 2.2.1 **Crustacea** Brünnich, 1772 (66,914 species)[32]
Subphylum 2.2.2 **Hexapoda** Latreille, 1825 (1,029,741 species, of which †6,182 species)[33]
Class 1.1 **Collembola** Lubbock, 1870 (8,130 species)[34]
Class 1.2.1 **Protura** Silvestri, 1907 (804 species)[35]
Class 1.2.2 **Diplura** Börner, 1904 (800 species)[36]
Class 2 **Insecta** Linnaeus, 1758 (1,020,007 species, of which †6,182 species)[37]
Order 1 **Archaeognatha** (513 species)[38]
Order 2.1 **Zygentoma** Börner, 1904 (561 species, of which †1 species)[39]
Order 2.2.1.1 **Ephemeroptera** Hyatt & Arms, 1890 (3,240 species)[40]
Order 2.2.1.2.1.1 †**Geroptera** Brodsky, 1994 (†2 species)[41]
Order 2.2.1.2.1.2.1 †**Protodonata** (†42 species)[42]
Order 2.2.1.2.1.2.2 **Odonata** Fabricius, 1792 (5,899 species)[43]
Order 2.2.1.2.2.1.1 †**Palaeodictyoptera** Goldenberg, 1877 (†115 species)[44]
Order 2.2.1.2.2.2.2.1 **Mischopterida** Handlirsch, 1906 (†100 species)[45]
Order 2.2.1.2.2.2.2.2 †**Diaphanopterodea** Handlirsch, 1906 (†50 species)[46]
Order 2.2.2.1 †**Paoliida** Handlirsch, 1906 (†12 species)[47]
Order 2.2.2.2.1 †**Caloneurodea** Martynov, 1938 (†14 species)[48]
Order 2.2.2.2.2 †**Titanoptera** Sharov, 1968 (†15 species)[49]

---

25. Based on Dunlop *et al.* (2011).
26. See Prendini (2011e, this volume).
27. See Prendini (2011f, this volume).
28. See Prendini (2011g, this volume).
29. Recent species only; many fossil species were described but were not included in this edition due to lack of time, so the total number of species should be considered incomplete.
30. See Shear (2011, this volume).
31. See Minelli (2011, this volume), which also covers Pauropoda and Diplopoda.
32. See Ahyong *et al.* (2011, this volume), which provided a classification of all families and an estimate of 1,003 families, 9,522 genera and 66,914 species for Recent Crustacea. Crustacea is paraphyletic according to Giribet & Edgecombe (2011). Here traditional consensus classification presented in Ahyong *et al.* (2011) is followed.
33. Classification reflects consensus phylogenetic relationship in Trautwein *et al.* (2012); inclusion of fossil orders follows Grimaldi & Engel (2005).
34. See Janssens & Christiansen (2011, this volume).
35. Based on Szeptycki (2007), and updated using Zoological Records from 2007.
36. This number is cited by Chapman (2009) and also Tree of Life Web Project. 1995. Diplura. Version 01 January 1995 (temporary). http://tolweb.org/Diplura/8204/1995.01.01 in The Tree of Life Web Project, http://tolweb.org/ .
37. Diversity estimates for fossil insects are not available for many orders and thus total diversity is underestimated.
38. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
39. Alternative name Thysanura; estimates based Foottit & Adler (2009) and updated using Zoological Records from 2008. Fossil taxa are represented in at least 1 family (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data may be incomplete.
40. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 3,046 species.
41. Fossil taxa are represented in 2 genera and 1 family (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data may be incomplete; Grimaldi & Engel (2005) mentioned "a few species" for this order.
42. Fossil taxa are represented in 27 genera and 5 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete. Zoological Record lists a total of 48 species/subspecies names.
43. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 5,680 species; Trueman (2007) mentioned "around 6,000 species" for Odonata.
44. Fossil taxa are represented in at least 82 genera and 25 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
45. Concept and estimates follow Rasnitsyn & Quicke (2002); this order includes two orders listed in Grimaldi & Engel (2005): †Dipliptera (=Archodonata Martynov, 1932) and †Megasecoptera Brongniart, 1885.
46. Based on Rasnitsyn & Quicke (2002).
47. Based on Prokop & Nel (2007).
48. Fossil taxa are represented in at least 11 genera and 7 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete; a total of 25 genera 9 families in David Eades. Polyneoptera Species File Online. Version 1.0/4.0. [retrieval date]. http://Polyneoptera.SpeciesFile.org, but Eades did not provide species for some genera.

Order 2.2.2.2.3 **Orthoptera** Olivier, 1789 (24,276 species, of which †421 species)[50]
Order 2.2.2.3.1 **Phasmida** Leach, 1815 (3,029 species, of which †15 species)[51]
Order 2.2.2.3.2 **Embioptera** Lameere, 1900 (464 species[52], of which †1 species)
Order 2.2.2.4.1 **Grylloblattodea** Brues & Melander, 1932 (34 species)[53]
Order 2.2.2.4.2 **Mantophasmatodea** Zompro, Klass, Kristensen & Adis, 2002 (21 species, of which †6 species)[54]
Order 2.2.2.5.1 **Plecoptera** Latreille 1802 (3,788 species[55], of which †45 species[56])
Order 2.2.2.5.2 **Dermaptera** deGeer, 1773 (1,978 species)[57]
Order 2.2.2.6.1 **Zoraptera** Silvestri, 1913 (37 species)[58]
Order 2.2.2.6.2.1 **Mantodea** Burmeister 1838 (2,400 species)[59]
Order 2.2.2.6.2.2 **Blattodea** Brunner, 1882 (7,314 species)[60]
Order 2.2.3.1 †**Miomoptera** Martynov 1927 (†47 species)[61]
Order 2.2.3.2.1 **Psocoptera** Shipley, 1904 (5,720 species)[62]
Order 2.2.3.2.2 **Phthiraptera** Haeckel, 1896 (5,102 species)[63]
Order 2.2.3.3.1 **Thysanoptera** Haliday, 1836 (6,019 species, of which †155 species)[64]
Order 2.2.3.3.2 **Hemiptera** Linnaeus 1758 (103,590)[65]
Order 2.2.4 †**Glosselytrodea** Martynov 1938 (†30 species)[66]
Order 2.2.5.1 **Hymenoptera** Linnaeus 1758[67] (116,861 species)[68]
Order 2.2.5.2.1.1.1 **Strepsiptera** Kirby 1813 (609 species)[69]
Order 2.2.5.2.1.1.2 **Coleoptera** Linnaeus, 1758 (387,100 species, of which †600 species)[70]
Order 2.2.5.2.1.2.1 **Neuroptera** Linnaeus, 1758 (5,868 species)[71]
Order 2.2.5.2.1.2.2.1 **Megaloptera** Latreille, 1802 (354 species)[72]
Order 2.2.5.2.1.2.2.2 **Raphidioptera** Navás, 1916 (254 species)[73]
Order 2.2.5.2.2.1.1 **Trichoptera** Kirby, 1813 (14,999 species, of which †608 species)[74]
Order 2.2.5.2.2.1.2 **Lepidoptera** Linnaeus, 1758 (157,424 species, of which †86 species)[75]
Order 2.2.5.2.2.2.1 **Diptera** Linnaeus, 1758 (159,294 species, of which †3,817 species)[76]
Order 2.2.5.2.2.2.2.1 **Siphonaptera** Latreille, 1825 (2,075 species)[77]
Order 2.2.5.2.2.2.2.2 **Mecoptera** Packard, 1886 (757 species)[78]

49. Based on Shcherbakov (2011).
50. See Ingrisch (2011, this volume).
51. See Brock and Marshall (2011, this volume) for Recent taxa only. Fossil taxa are represented in at least 14 genera and 9 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
52. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
53. Grimaldi & Engel (2005) mentioned 26 species placed in 5 genera in 1 family.
54. Updated with Arillo & Engel (2006), Eberhard *et al.* (2011). Note that this order and Grylloblattodea were placed in the order Notoptera by Arillo & Engel (2006).
55. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 3497 species.
56. Fossil taxa are represented in at least 22 genera and 10 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete.
57. Based on Foottit & Adler (2009) and updated using Zoological Records.
58. Based on Foottit & Adler (2009) and updated using Zoological Records.
59. Based on Otte, D., Spearman, L. & Martin, B.D.S. Mantodea Species File Online. Version 1.0/4.0. [retrieval date 15 Dec. 2011]. <http://Mantodea.SpeciesFile.org>.
60. See Beccaloni & Eggleton (2011, this volume), without fossils; including 2,692 species of termites (no longer an order).
61. Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search; this should be viewed as incomplete.
62. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
63. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
64. See Mound *et al.* (2011, this volume).
65. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
66. Based on Hong (2007) with updates.
67. Holometabola for 11 orders from Hymenoptera to Mecoptera.
68. Based on Hymenoptera Online http://hol.osu.edu/ (accessed 15 Dec. 2011), which placed these species in 7,745 genera and 118 families. Fossil taxa are represented in at least 789 genera and 89 families (Data from Paleobiology Database on 15 December, 2011 using "Taxon Count" search)—note that these data are incomplete. Foottit & Adler (2009), citing Huber in that volume, mentioned 144,695 species.
69. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
70. See Slipinski *et al.* (2011, this volume).
71. Based on Foottit & Adler (2009) and updated using Zoological Records.
72. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008; Foottit & Adler listed 328 species.
73. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.
74. See Holzenthal *et al.* (2011, this volume).
75. See Nieukerken *et al*. (211, this volume).
76. See Pape *et al.* (2011, this volume), but 5,969 dubious species not included in total count.
77. Based on Foottit & Adler (2009) and updated using Zoological Records.
78. Based on Foottit & Adler (2009) and updated using Zoological Records from 2008.

Acknowledgements

I thank Dr Rich Leschen (Landcare Research) and Dr Qing-Hai Fan (Biosecurity New Zealand) for reviews and comments. The author was supported by the New Zealand Foundation for Research, Science and Technology through backbone funding of the "Defining New Zealand's Land Biota" programme.

References

Adrain, J.M. (2011) Class Trilobita Walch, 1771. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 104–109.

Ahyong, S.T., Lowry, J.K., Alonso, M., Bamber. R.N., Boxshall. G.A., Castro, P., Gerken, S., Karaman, G.S., Goy, J.W., Jones, D.S., Meland, K., Rogers, D.C. & Svavarsson, J. (2011) Order Scorpiones C.L. Koch, 1850. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 165–191.

Arillo, A. & Engel, M.S. (2006) Rock crawlers in Baltic amber (Notoptera: Mantophasmatodea). *American Museum Novitates*, 3539, 1–10.

Aristov, D.S. (2009) A new family of the order Grylloblattida (Insecta) from the Middle Permian of Russia. *Paleontologicheskii Zhurnal*, (2), 59–63.

Beccaloni, G.W. & Eggleton, P. (2011) Order Blattodea Brunner von Wattenwyl, 1882. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 199–120.

Bamber, R.N. (2011) Class Pycnogonida Latreille, 1810. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 110–111.

Beaulieu, F., Dowling, A.P.G., Klompen, H., Moraes, G.J. de & Walter, D.E. (2011) Superorder Parasitiformes Reuter, 1909. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 123–128.

Brock, P. & Marshall, J. (2011) Phasmida Leach, 1815. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 198–198.

Chapman, A.D. (2009) Numbers of living species in Australia and the world. Second edition. – Australian Biodiversity Information Services, Toowoomba.

Eberhard, M.J.B., Picker, M.D. & Klass, K.-D. (2011) Sympatry in Mantophasmatodea, with the description of a new species and phylogenetic considerations. *Organisms Diversity & Evolution*, 11(1), 43–59.

Dunlop J.A. (2010) Geological history and phylogeny of Chelicerata. *Arthropod Structure & Development*, 39, .124–142.

Dunlop J.A. & Penney, D. (2011) Order Araneae Clerck, 1757. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 149–153.

Dunlop J.A., Penney D. & Jekel D. (2011) A summary list of fossil spiders and their relatives. *In*: Platnick, N. I. (ed.) The world spider catalog, version 12.0. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html DOI: 10.5531/db.iz.0001.

Foottit, R & Adler, P. (eds) (2009) *Insect Biodiversity: Science and Scoeity.* Blackwell Publishing, London, 623 pp.

Giribet, G. & Edgecombe, G.D. (2012) Reevaluating the Arthropod Tree of Life. *Annual Review of Entomology*, 57, 167–186.

Grimaldi, D. & Engel, M.S. (2005) *Evolution of the Insects*. Cambridge University Press, Cambridge, New York.

Guglielmone, A.A., Robbins, R.G., Apaneskevich, D.A., Petney, T.N., Estrada-Peña, A., Horak, I.G., Shao, R. & Barker, S. (2010) The Argasidae, Ixodidae and Nuttalliellidae (Acari: Ixodida) of the world: a list of valid species names. *Zootaxa*, 2528, 1–28.

Harvey, M.S. (2011) Order Pseudoscorpiones de Geer, 1778. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 119–120.

Hong, Y.C. (2007) Discovery of the fossil glosselytrods (Insecta: Glosselytrodea) from Shaanxi, China. *Acta Entomologica Sinica*, 50(3), 271–280.

Holzenthal, R.W., Morse, J.C. & Kjer, R.J., (2011) *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 209–211.

Ingrisch, S. (2011) Order Orthoptera Oliver, 1789. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 195–197.

Janssens, F. & Christiansen, K.A. (2011) Class Collembola Lubbock, 1870. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 192–194.

Kury, A.B. (2011) Order Opiliones Sundevall, 1833. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 112–114.

Mendes, L.F. (2002) Taxonomy of Zygentoma and Micrcoryphia: historical overview, present status and goals for the new millennium. Proc. Xth International Colloquium on Apterygota, České Budějovice 2000: Apterygota at the Beginning of the Third Millennium. Elsevier GmbH.

Minelli, A. (2011a) Class Trilobita**,** Class Symphyla and Class Pauropoda.. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 157–158.

Mound, L.A. (2011) Order Thysanoptera Haliday, 1836. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 201–202.

Nieukerken, E.J. van, Kaila, L., Kitching, I.J., Kristensen, N.P., Lees, D.C., Minet, J., Mitter, C., Mutanen, M., Regier, J.C., Simonsen, T.J., Wahlberg, N., Yen, S.-H., Zahiri, R., Adamski, D., Baixeras, J., Bartsch, D., Bengtsson, B.Å., Brown, J.W., Bucheli, S.R.,

Davis, D.R., De Prins, J., De Prins, W., Epstein, M.E., Gentili-Poole, P., Gielis, C., Hättenschwiler, P., Hausmann, A., Holloway, J.D., Kallies, A., Karsholt, O., Kawahara, A.Y., Koster, S. (J.C.), Kozlov, M.V., Lafontaine, J.D., Lamas, G., Landry, J.-F., Lee, S., Nuss, M., Park, K.-T., Penz, C., Rota, J., Schintlmeister, A., Christian Schmidt, B., Sohn, J.-C., Solis, M.A., Tarmann, G.M., Warren, A.D., Weller, S., Yakovlev, R.V., Zolotuhin, V.V. & Zwick, A. (2011) Order Lepidoptera Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 212–221.

Pape, T., Blagoderov, V. & Mostovski ,M.B. (2011, this volume) Order Diptera Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 222–229.

Prendini, L. (2011a) Order Scorpiones C.L. Koch, 1850. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 115–117.

Prendini, L. (2011b) Solifugae Sundevall, 1833. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 118–118.

Prendini, L. (2011c) Palpigradi Thorell, 1888. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 121–121.

Prendini, L. (2011d) Ricinulei Thorell, 1876. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 122–122.

Prendini, L. (2011e) Amblypygi Thorell, 1883. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 154–154.

Prendini, L. (2011f) Thelyphonida Latreille, 1804. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 155–155.

Prendini, L. (2011g) Schizomida Petrunkevitch, 1945. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 156–156.

Prokop, J. & & Nel, A. (2007) An enigmatic Palaeozoic stem-group: Paoliida, designation of new taxa from the Upper Carboniferous of the Czech Republic (Insecta: Paoliidae, Katerinkidae fam. n.). *African Invertebrates*, 48 (1), 77–86

Rasnitsyn, A.P. & Quicke D.L.J. (eds) (2002) *History of Insects.* Kluwer Academic Publishers, Dordrecht, Boston, London, 517 pp.

Selden, P.A., Shear, W.A. & Sutton, M.D. (2008) Fossil evidence for the origin of spider spinnerets, and a proposed arachnid order. *Proceedings of the National Academy of Sciences of the USA*, 105, 20781–20785.

Schatz, H., Behan-Pelletier, V.M., OConnor, B.M. & Norton, R.A. (2011) Suborder Oribatida van der Hammen, 1968. *In*: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 141–148.

Shcherbakov, D.E. (2011) The alleged Triassic palaeodictyopteran is a member of Titanoptera. *Zootaxa*, 3044, 65–68.

Shear, W. (2011) Class Diplopoda de Blainville in Gervais, 18441. *In*: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 159–164.

Shultz, J.W. (2007) A phylogenetic analysis of the arachnid orders based on morphological characters. *Zoological Journal of the Linnean Society*, 150, 221–265.

Slipinski, S.A., Leschen, R.A.B. & Lawrence, J.F. (2011) Order Coleoptera Linnaeus, 1758. *In*: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. Zootaxa*, 3148, 203–208.

Szeptycki, A. (2007) Cataloque of the world Protura. Wydawnictwa Instytutu Systematyki i Ewolucji Zwierzat Polskiej Akademii Nauk, Kraków.

Trautwein, M.D., Wiegmann, B.M., Beutel, R., Kjer, K.M. & Yeates, D.K. (2012) Advances in insect phylogeny at the dawn of the postgenomic era. *Annual Review of Entomology*, 57, 449–68.

Trueman, J.W.H. (2007) A brief history of the classification and nomenclature of Odonata. *Zootaxa*, 1668, 381–394.

Walter, D.E., Bolton, S., Uusitalo, M. & Zhang, Z.-Q. (2011) Suborder Endeostigmata Reuter, 1909. *In*: Zhang, Z-Q. (ed.) Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 139-140.

Zhang, Z.-Q., Fan, Q.-H., Pesic, V., Smit, H., Bochkov, A.V., Khaustov, A.A., Baker, A., Wohltmann, A., Wen, T.-H., Amrine, J.W., Beron, P., Lin, J.-Z., Gabrys, G. & Husband, R. (2011) Order Trombidiformes Reuter, 1909. *In*: Zhang, Z-Q. (ed.) Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 129–138.

Author name and address

Zhi-Qiang Zhang, New Zealand Arthropod Collection, Landcare Research, Private Bag 92170, Auckland, New Zealand; zhangz@landcareresearch.co.nz

Class **Trilobita** Walch, 1771[1] [2]

Order **Eodiscida** Kobayashi, 1939[3] (6 families)

Family **Calodiscidae** Kobayashi, 1943 (6 genera, 55 species)
Family **Eodiscidae** Raymond, 1913 (10 genera, 131 species)
Family **Hebediscidae** Kobayashi, 1944 (8 genera, 66 species)
Family **Tsunyidiscidae** Zhang, 1980 (1 genus, 50 species)
Family **Weymouthiidae** Kobayashi, 1943 (20 genera, 69 species)
Family **Yukoniidae** Zhang, 1980 (7 genera, 19 species)

Order **Redlichiida** Richter, 1932 (2 suborders)

Suborder **Olenellina** Walcott, 1890[4] (2 superfamilies)

Superfamily **Olenelloidea** Walcott, 1890 (2 families)
Family **Olenellidae** Walcott, 1890 (22 genera, 87 species)
Family **Holmiidae** Hupé, 1953 (15 genera, 56 species)

Superfamily **Fallotaspidoidea** Hupé, 1953 (5 families)
Family **Archaeaspididae** Repina, 1979 (6 genera, 13 species)
Family **Fallotaspididae** Hupé, 1953 (11 genera, 30 species)
Family **Judomiidae** Repina, 1979 (4 genera, 20 species)
Family **Neltneriidae** Hupé, 1953 (2 genera, 4 species)
Family **Nevadiidae** Hupé, 1953 (9 genera, 23 species)

Suborder **Redlichiina** Richter, 1932[5] (4 superfamilies)

Superfamily **Ellipsocephaloidea** Matthew, 1887 (6 families)
Family **Agraulidae** Raymond, 1913 (35 genera, 123 species)
Family **Bigotinidae** Hupé, 1953 (10 genera, 31 species)
Family **Ellipsocephalidae** Matthew, 1887[6] (72 genera, 313 species)
Family **Estaingiidae** Öpik, 1975 (20 genera, 77 species)
Family **Palaeolenidae** Hupé, 1953 (17 genera, 85 species)
Family **Yunnanocephalidae** Hupé, 1953 (4 genera, 19 species)

Superfamily **Emuelloidea** Pocock, 1970 (1 family)
Family **Emuellidae** Pocock, 1970 (4 genera, 7 species)

Superfamily **Paradoxidoidea** Hawle & Corda, 1847 (3 families)
Family **Centropleuridae** Angelin, 1854 (5 genera, 27 species)
Family **Paradoxididae** Hawle & Corda, 1847 (13 genera, 95 species)
Family **Xystriduridae** Whitehouse, 1939 (2 genera, 29 species)

Superfamily **Redlichioidea** Poulsen, 1927 (12 families)
Family **Abadiellidae** Hupé, 1953 (7 genera, 34 species)
Family **Chengkouaspididae** Zhang & Lin, 1980 (9 genera, 21 species)
Family **Dolerolenidae** Kobayashi, 1951 (4 genera, 12 species)

---

1. **BY** Jonathan M. Adrain (for full address, see **Contributor name and address** after **Literature cited**). The title of this contribution should be cited as "Class Trilobita Walch, 1771. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". The class includes 12 orders, 165 families, 3,725 genera and 19,606 species.
2. The currently accepted classification of trilobites is as outlined by Fortey (1997, 2001). Higher trilobite phylogeny remains essentially unresolved, despite some significant analyses of parts of the problem (e.g., Fortey & Chatterton 1988; Fortey 1990). Cambrian trilobites are mostly grouped in orders widely considered polyphyletic and/or paraphyletic. Monophyly of predominantly post-Cambrian orders is more generally agreed upon, but their relationships to each other, and to their Cambrian sister taxa, are all but unknown. The classification used herein is modified from that of Fortey (1997) in several ways. Agnostoid arthropods are excluded from Trilobita. Burlingiidae is excluded from Trilobita. Aulacopleurida and Olenida are listed as new ordinal concepts. Some families are classified differently (in several cases following Jell & Adrain [2003]). Many more families are regarded as Order Uncertain, rather than assigning them to a polyphyletic Order Ptychopariida. Despite these differences, the scheme used here owes much to the work of Fortey. The use of subgenera in trilobite work is often extremely subjective and rarely are they diagnosed or treated differently than genera. All valid genus-group names are dealt with as genera in this tabulation. I am grateful for comments by G.D. Edgecombe and S.R. Westrop.
3. Eodiscides have often been considered a paraphyletic group which includes the agnostoids within its structure, and the classification of Fortey (1997) recognized an Order Agnostida with a paraphyletic Suborder Eodiscina and a monophyletic Suborder Agnostina. Agnostoids are not regarded as ingroup Trilobita herein, and Eodiscida is considered monophyletic.
4. Olenellina is widely considered paraphyletic.
5. Redlichiina is widely considered paraphyletic. Several authors (e.g., Repina 1990; Geyer 1996; Jell 2003) have argued that it is polyphyletic, with multiple separate origins in Olenellina. This view has been countered by, e.g., Paterson & Edgecombe (2006), whose parsimony analysis supports a single origin.
6. Includes Protolenidae.

Family **Gigantopygidae** Harrington, 1959 (6 genera, 23 species)
Family **Kueichowiidae** Lu, 1965 (2 genera, 6 species)
Family **Mayiellidae** Zhang, 1966 (3 genera, 14 species)
Family **Menneraspididae** Pokrovskaâ, 1959 (1 genus, 3 species)
Family **Metadoxididae** Whitehouse, 1939 (9 genera, 19 species)
Family **Redlichiidae** Poulsen, 1927 (40 genera, 309 species)
Family **Redlichinidae** Zhang & Lin, 1980 (7 genera, 30 species)
Family **Saukiandidae** Hupé, 1953 (15 genera, 34 species)
Family **Yinitidae** Hupé, 1953 (12 genera, 47 species)

Order **Corynexochida** Kobayashi, 1935 (3 suborders)

Suborder **Corynexochina** Kobayashi, 1935 (9 families)
Family **Chengkouiidae** Zhu, 1980 (8 genera, 39 species)
Family **Corynexochidae** Angelin, 1854 (17 genera, 82 species)
Family **Dinesidae** Lermontova, 1940 (24 genera, 84 species)
Family **Dolichometopidae** Walcott, 1916 (55 genera, 265 species)
Family **Dorypygidae** Kobayashi, 1935 (39 genera, 408 species)
Family **Edelsteinaspididae** Hupé, 1953 (15 genera, 41 species)
Family **Jakutidae** Suvorova, 1959 (16 genera, 51 species)
Family **Oryctocephalidae** Beecher, 1897[7] (39 genera, 176 species)
Family **Zacanthoididae** Swinnerton, 1915 (26 genera, 114 species)

Suborder **Illaenina** Jaanusson, 1959[8] (4 families)
Family **Illaenidae** Hawle & Corda, 1847 (26 genera, 281 species)
Family **Panderiidae** Bruton, 1968 (4 genera, 26 species)
Family **Styginidae** Vogdes, 1890[9] (106 genera, 606 species)
Family **Tsinaniidae** Kobayashi, 1935 (10 genera, 47 species)

Suborder **Leiostegiina** Bradley, 1925 (4 families)
Family **Illaenuridae** Vogdes, 1890[10] (14 genera, 35 species)
Family **Kaolishaniidae** Kobayashi, 1955 (27 genera, 72 species)
Family **Leiostegiidae** Bradley, 1925 [11] (79 genera, 350 species)
Family **Shirakiellidae** Hupé, 1953 (5 genera, 12 species)

Order **Lichida** Moore, 1959[12] (2 families)
Family **Lichakephalidae** Tripp, 1957 (14 genera, 33 species)
Family **Lichidae** Hawle & Corda, 1847 (49 genera, 398 species)

Order **Odontopleurida** Whittington, 1959[13] (1 family)
Family **Odontopleuridae** Burmeister, 1843 (47 genera, 447 species)

Order **Phacopida** Salter, 1864[14] (3 suborders)

Suborder **Phacopina** Struve, 1959 (3 subfamilies)

Superfamily **Acastoidea** Delo, 1935[15] (2 families)

---

7. Includes Cheiruroididae.
8. The monophyly of Illaenina is uncertain, as Styginidae may have a sister taxon among taxa grouped within Leiostegiina. A relationship of Illaenina to Cambrian corynexochines is possible, but to this point weakly supported.
9. Styginidae is here regarded as incorporating the more derived taxa often separated as a Family Scutelluidae. Holloway (2007) has argued for restriction of Styginidae to mostly effaced Ordovician taxa, but his treatment was not phylogenetic and the family as thus restricted is almost certainly paraphyletic. Phillipsinellidae has generally been regarded as a separate family but it seems likely also to be ingroup Styginidae.
10. Fortey (1997, p. 299) listed Lecanopygidae, including Illaenuridae. I agree the families are synonyms, but Illaenuridae is the senior name. Fortey (1997, p. 300) listed Lecanopygidae a second time, assigned to Order Proetida.
11. Includes Pagodiidae**.**
12. Lichids have often (e.g., Thomas & Holloway 1988; Fortey 1997)) been considered closely related to odontopleurids. There is little clear evidence for this, save for broadly similar larval morphologies. I prefer to recognize separate, unambiguously monophyletic orders.
13. Fortey (1997, 2001) has advocated a relationship between the Cambrian dameselloideans and odontopleurids, but as yet little detailed evidence has been marshalled in support of this view.
14. There is general agreement that Phacopina and Cheirurina are phylogenetically related, but more question as to the relationship of Calymenina. The most compelling putative synapomorphies uniting the order involve the larval body plan, in particular the ventrolateral fringe of spines developed around the protocephalon in late protaspid stages (Chatterton *et al*. 1990). On this basis I include Calymenina within Phacopida but regard the question as open.
15. Follows an unpublished draft for revision of the Treatise on Invertebrate Paleontology kindly shared by G.D. Edgecombe.

Family **Acastidae** Delo, 1935[16] (76 genera, 394 species)
Family **Calmoniidae** Delo, 1935 (41 genera, 93 species)
Superfamily **Dalmanitoidea** Vogdes, 1890 (1 family)
Family **Dalmanitidae** Vogdes, 1890 (59 genera, 329 species)
Superfamily **Phacopoidea** Hawle & Corda, 1847 (2 families)
Family **Phacopidae** Hawle & Corda, 1847 (68 genera, 463 species)
Family **Pterygometopidae** Reed, 1905 (36 genera, 202 species)
Superfamily **Uncertain** (2 families)
Family **Diaphanometopidae** Jaanusson, 1959 (3 genera, 3 species)
Family **Prosopiscidae** Fortey & Shergold, 1984 (1 genus, 11 species)
Suborder **Cheirurina** Harrington & Leanza, 1957 (3 families)
Family **Cheiruridae** Hawle & Corda, 1847[17] (104 genera, 654 species)
Family **Encrinuridae** Angelin, 1854[18] (58 genera, 448 species)
Family **Pliomeridae** Raymond, 1913[19] (41 genera, 177 species)
Suborder **Calymenina** Swinnerton, 1915 (5 families)
Family **Bathycheilidae** Přibyl, 1953 (4 genera, 8 species)
Family **Bavarillidae** Sdzuy, 1957 (2 genera, 5 species)
Family **Calymenidae** Burmeister, 1843 (33 genera, 316 species)
Family **Homalonotidae** Chapman, 1890 (22 genera, 171 species)
Family **Pharostomatidae** Hupé, 1953[20] (7 genera, 47 species)
Order **Proetida** Fortey & Owens, 1975[21] (2 families)
Family **Proetidae** Salter, 1864[22] (309 genera, 1,927 species)
Family **Tropidocoryphidae** Přibyl, 1946 (74 genera, 510 species)
Order **Aulacopleurida** nov.[23] (15 families)
Family **Alokistocaridae** Resser, 1939 (41 genera, 183 species)
Family **Aulacopleuridae** Angelin, 1854 (19 genera, 268 species)
Family **Bathyuridae** Walcott, 1886 (49 genera, 229 species)
Family **Brachymetopidae** Prantl and Přibyl, 1951 (17 genera, 126 species)
Family **Crepicephalidae** Kobayashi, 1935[24] (14 genera, 93 species)
Family **Dimeropygidae** Hupé, 1953 (17 genera, 86 species)
Family **Ehmaniellidae** Sundberg, 1994[25] (9 genera, 106 species)
Family **Holotrachelidae** Warburg, 1925[26] (2 genera, 5 species)
Family **Hystricuridae** Hupé, 1953 (29 genera, 48 species)
Family **Marjumiidae** Kobayashi, 1935[27] (20 genera, 137 species)
Family **Rorringtoniidae** Owens, 1990 (7 genera, 32 species)
Family **Scharyiidae** Osmólska, 1957 (4 genera, 41 species)
Family **Solenopleuridae** Angelin, 1854 (82 genera, 326 species)
Family **Telephinidae** Marek, 1952[28] (9 genera, 129 species)

16. Includes the Ordovician "kloucekiines" but these are probably basal sister taxa of the remainder of the superfamily.
17. Includes Pilekiidae.
18. Includes Staurocephalidae.
19. Includes Hammatocnemidae.
20. May be ingroup Calymenidae.
21. Knowledge of the developmental progam of proetids and tropidocoryphids (e.g., Chatterton 1971; Edgecombe *et al*. 1997) has revealed a fundamentally different larval life history than that known for all of the other groups considered Proetida by Fortey & Owens (1975). Proetoideans have two known larval stages, with the first a non-adultlike, tiny, globular form, whereas the other groups (where known) have a series of adultlike larvae typically featuring paired spines or tubercles (absent from proetoideans). I consider that two well supported clades are involved, but that their sister group relationship is not clearly supported. Hence I recognize them as separate orders.
22. Includes Phillipsiidae. Distinction between Proetidae and Tropidocoryphidae dates from ideas developed by Owens (1973).
23. This order includes trilobites with several stages of flattened, adult-like larvae (where known) with a pattern of primary paired tubercles on the dorsal exoskeleton through ontogeny (and sometimes retained in the holaspid).
24. May be be ingroup Marjumiidae.
25. May be ingroup Marjumiidae.
26. May be ingroup Bathyuridae**.**
27. Includes Coosellidae**.**
28. Includes Opipeuteridae.

Family **Tricrepicephalidae** Palmer, 1955[29] (3 genera, 60 species)

Order **Asaphida** Salter, 1864[30] (3 superfamilies)

Superfamily **Asaphoidea** Burmeister, 1843 (2 families)

Family **Asaphidae** Burmeister, 1843 (156 genera, 850 species)

Family **Ceratopygidae** Linnarsson, 1869 (29 genera, 263 species)

Superfamily **Cyclopygoidea** Raymond, 1925 (3 families)

Family **Cyclopygidae** Raymond, 1925[31] (24 genera, 160 species)

Family **Nileidae** Angelin, 1854 (28 genera, 161 species)

Family **Taihungshaniidae** Sun, 1931 (6 genera, 41 species)

Superfamily **Trinucleoidea** Hawle & Corda, 1847 (5 families)

Family **Alsataspididae** Turner, 1940[32] (31 genera, 108 species)

Family **Dionididae** Gürich, 1907 (9 genera, 43 species)

Family **Liostracinidae** Raymond, 1937 (5 genera, 17 species)

Family **Raphiophoridae** Angelin, 1854 (38 genera, 251 species)

Family **Trinucleidae** Hawle & Corda, 1847 (50 genera, 225 species)

Order **Olenida** nov. (11 families)[33]

Family **Andrarinidae** Raymond, 1937 (3 genera, 18 species)

Family **Aphelaspididae** Palmer, 1960 (28 genera, 140 species)

Family **Asaphiscidae** Raymond, 1924[34] (22 genera, 134 species)

Family **Cedariidae** Raymond, 1937 (8 genera, 49 species)

Family **Dokimokephalidae** Kobayashi, 1935 (56 genera, 200 species)

Family **Eulomidae** Kobayashi, 1935 (34 genera, 156 species)

Family **Idahoiidae** Lochman, 1956 (18 genera, 60 species)

Family **Loganellidae** Rasetti, 1959 (4 genera, 18 species)

Family **Olenidae** Burmeister, 1843 (68 genera, 408 species)

Family **Parabolinoididae** Lochman, 1956 (14 genera, 66 species)

Family **Pterocephaliidae** Kobayashi, 1935 (40 genera, 112 species)

Family **Remopleurididae** Hawle and Corda, 1847[35] (68 genera, 398 species)

Order **Harpida** Whittington, 1959 (1 family)

Family **Harpetidae** Hawle & Corda, 1847[36] (19 genera, 168 species)

Order **Uncertain**[37] (58 families)

Family **Acrocephalitidae** Hupé, 1953 (18 genera, 42 species)

Family **Aldonaiidae** Hupé, 1953 (10 genera, 23 species)

Family **Amgaspididae** Černyševa, 1960 (5 genera, 20 species)

Family **Anomocarellidae** Hupé, 1955 (16 genera, 78 species)

Family **Anomocaridae** Poulsen, 1927 (51 genera, 155 species)

Family **Antagmidae** Hupé, 1953 (25 genera, 105 species)

Family **Atopidae** Hupé, 1953 (4 genera, 14 species)

Family **Auritamidae** Öpik, 1967 (1 genus, 5 species)

29. May be ingroup Marjumiidae.
30. Fortey & Chatterton (1988) argued for an expanded Asaphida, supported mainly by the putative synapomorphies of an asaphoid protaspid type and a ventral median cephalic suture. Many of the taxa they grouped appear to form a major, well supported clade. Several families are reassigned to the new Order Olenida herein, and the affinities of several others are regarded as uncertain and they are not assigned to an order.
31. Includes Bohemillidae.
32. Includes Orometopidae, Hapalopleuridae, Jegorovaiidae.
33. This order includes all trilobites with a highly specialized cephalic border structure, often reflected dorsally by the presence of pits in the anterior border furrow. The detailed evidence supporting the taxon will be presented elsewhere. It is likely that several of these traditionally recognized families will prove part of the same clade and they may be subject to synonymy.
34. Includes Emmrichellidae.
35. Includes Richardsonellidae (and Kainellidae).
36. Includes Entomaspididae.
37. Many of these families have previously been grouped in an Order Ptychopariida (sometimes recognized as a suborder). There has been a general narrative that such a group is a plesiomorphic grade from which other groups have been derived (e.g., Fortey 1997, pp. 295–297), but any genuine cohesion, even as a paraphyletic group, has never been demonstrated, and recognizing such a taxon obscures the unsettling reality of just how little we understand about trilobite phylogenetic history. The monophyly of many of these families is either in doubt or has never been addressed. Many of the species they contain are poorly known. The phylogenetic relationships within or between the families have rarely if ever been addressed. Collecting them in an "order" may perhaps be a comfort, but it serves no scientific purpose.

Family **Avoninidae** Lochman, 1936 (2 genera, 2 species)
Family **Bolaspididae** Howell, 1959 (5 genera, 17 species)
Family **Catillicephalidae** Raymond, 1938 (27 genera, 136 species)
Family **Changshaniidae** Kobayashi, 1935 (13 genera, 42 species)
Family **Cheilocephalidae** Shaw, 1956 (9 genera, 52 species)
Family **Conocoryphidae** Angelin, 1854 (9 genera, 113 species)
Family **Damesellidae** Kobayashi, 1935[38] (30 genera, 176 species)
Family **Diceratocephalidae** Lu, 1954 (7 genera, 22 species)
Family **Dikelocephalidae** Miller, 1889[39] (41 genera, 223 species)
Family **Ellipsocephaloididae** Hupé, 1955 (1 genus, 5 species)
Family **Elviniidae** Kobayashi, 1935 (28 genera, 94 species)
Family **Eurekiidae** Hupé, 1953 (11 genera, 32 species)
Family **Harpididae** Whittington, 1950 (13 genera, 45 species)
Family **Holocephalinidae** Hupé, 1953 (5 genera, 24 species)
Family **Hungaiidae** Raymond, 1924[40] (15 genera, 94 species)
Family **Ignotogregatidae** Zhang & Jell, 1987 (1 genus, 1 species)
Family **Inouyiidae** Zhang, 1963 (12 genera, 38 species)
Family **Isocolidae** Angelin, 1854 (10 genera, 20 species)
Family **Ityophoridae** Warburg, 1925 (2 genera, 2 species)
Family **Jamrogiidae** Bentley, Jago & Cooper, 2009 (2 genera, 3 species)
Family **Kingstoniidae** Kobayashi, 1933 (16 genera, 85 species)
Family **Lisaniidae** Zhang, 1963 (14 genera, 97 species)
Family **Llanoaspididae** Lochman, 1944 (13 genera, 42 species)
Family **Lonchocephalidae** Hupé, 1953 (29 genera, 88 species)
Family **Lorenzellidae** Zhang, 1963 (13 genera, 40 species)
Family **Mapaniidae** Zhang, 1963 (8 genera, 16 species)
Family **Menomoniidae** Walcott, 1916 (14 genera, 51 species)
Family **Missisquoiidae** Hupé, 1953 (6 genera, 27 species)
Family **Monkaspididae** Kobayashi, 1935 (8 genera, 26 species)
Family **Namanoiidae** Lermontova, 1951 (8 genera, 26 species)
Family **Nepeidae** Whitehouse, 1939 (6 genera, 25 species)
Family **Norwoodiidae** Walcott, 1916 (9 genera, 45 species)
Family **Onchonotopsidae** Shaw, 1966 (4 genera, 12 species)
Family **Papyriaspididae** Whitehouse, 1939 (11 genera, 26 species)
Family **Phylacteridae** Ludvigsen & Westrop, 1989 (7 genera, 29 species)
Family **Plethopeltidae** Raymond, 1925 (15 genera, 79 species)
Family **Polycyrtaspididae** Öpik, 1967 (2 genera, 6 species)
Family **Proasaphiscidae** Zhang, 1963[41] (74 genera, 312 species)
Family **Ptychaspididae** Raymond, 1924 (17 genera, 105 species)
Family **Ptychopariidae** Matthew, 1887[42] (160 genera, 624 species)
Family **Raymondinidae** Clark, 1924[43] (6 genera, 42 species)
Family **Rhyssometopidae** Öpik, 1967 (4 genera, 13 species)
Family **Sarkiidae** Hupé, 1953 (1 genus, 3 species)
Family **Shirakiellidae** Hupé, 1953 (5 genera, 12 species)
Family **Shumardiidae** Lake, 1907 (22 genera, 122 species)
Family **Sunaspididae** Zhang & Jell, 1987 (2 genera, 15 species)
Family **Utiidae** Kobayashi, 1935 (6 genera, 30 species)
Family **Wuaniidae** Zhang & Yuan, 1981 (15 genera, 69 species)

38. See note under Odontopleurida.
39. Includes Saukiidae.
40. Includes Dikelokephalinidae, following Ludvigsen *et al*. (1989, p. 28), but see Fortey (2010).
41. Includes Tengfengiidae and Holanshaniidae.
42. Ptychopariidae has been treated as a taxon of convenience and is likely polyphyletic.
43. Includes Glaphuridae and Celmidae.

Literature cited

Chatterton, B.D.E. (1971) Taxonomy and ontogeny of Siluro-Devonian trilobites from near Yass, New South Wales. *Palaeontographica Abteilung A*, 137, 1–108.

Chatterton, B.D.E., Siveter, D.J., Edgecombe, G.D. & Hunt, A.S. (1990) Larvae and relationships of the Calymenina (Trilobita). *Journal of Paleontology*, 64, 255–277.

Edgecombe, G.D., Chatterton, B.D.E., Vaccari, N.E. & Waisfeld, B.G. (1997) Ontogeny of the proetoid trilobite *Stenoblepharum*, and relationships of a new species from the Upper Ordovician of Argentina. *Journal of Paleontology*, 71, 419–433.

Fortey, R.A. (1990) Ontogeny, hypostome attachment and trilobite classification. *Palaeontology*, 33, 529–576.

Fortey, R.A. (1997) Classification. *In*: Kaesler, R.L. (Ed.), *Treatise on invertebrate paleontology. Part O. Arthropoda 1, Trilobita. Revised*. Geological Society of America and University of Kansas Press, Lawrence, Kansas, pp. 289–302.

Fortey, R.A. (2001) Trilobite systematics: The last 75 years. *Journal of Paleontology*, 75, 1141–1151.

Fortey, R.A. (2010) Trilobites of the genus *Dikelokephalina* from Ordovician Gondwana and Avalonia. *Geological Journal*, 2010, 1–11.

Fortey, R.A. & Chatterton, B.D.E. (1988) Classification of the trilobite suborder Asaphina. *Palaeontology*, 31, 165–222.

Fortey, R.A. & Owens, R.M. (1975) Proetida - a new order of trilobites. *Fossils and Strata*, 4, 227–239.

Geyer, G. (1996) The Moroccan fallotaspidid trilobites revisited. *Beringeria*, 18, 89–199.

Holloway, D.J. (2007) The trilobite *Protostygina* and the composition of the Styginidae, with two new genera. *Paläontologische Zeitschrift*, 81, 1–16.

Jell, P.A. (2003) Phylogeny of Early Cambrian trilobites. *In*: Lane, P.D., Siveter, D.J. & Fortey, R.A. (Eds.), Trilobites and their relatives. Contributions from the Third International Conference, Oxford 2001. *Special Papers in Palaeontology*, 70, 45–57.

Jell, P.A. & Adrain, J.M. (2003) Available generic names for trilobites. *Memoirs of the Queensland Museum*, 48, 331–553.

Ludvigsen, R., Westrop, S.R. & Kindle, C.H. (1989) Sunwaptan (Upper Cambrian) trilobites of the Cow Head Group, western Newfoundland, Canada. *Palaeontographica Canadiana*, 6, 1–175.

Owens, R.M. (1973) British Ordovician and Silurian Proetidae (Trilobita). *Monographs of the Palaeontographical Society*, 535, 1–98.

Paterson, J.R. & Edgecombe, G.D. (2006) The Early Cambrian trilobite family Emuellidae Pocock, 1970: Systematic position and revision of Australian species. *Journal of Paleontology*, 80, 496–513.

Repina, L.N. (1990) [Evolution of trilobites in their early stages of historical development]. *Akademiya Nauk SSSR, Sibirskoe Otdelenie, Instituta Geologii i Geofiziki Trudy*, 764, 34–44.

Thomas, A.T. & Holloway, D.J. (1988) Classification and phylogeny of the trilobite order Lichida. *Philosophical Transactions of the Royal Society of London B. Biological Sciences*, 321, 179–262.

Contributor name and address

JONATHAN M. ADRAIN, Department of Geoscience, University of Iowa, 121 Trowbridge Hall, Iowa City, IA 52242, USA. E-mail: jonathan-adrain@uiowa.edu

Class **Pycnogonida** Latreille, 1810 (4 orders)[1] [2]

- Order **†Palaeoisopoda** Hedgpeth, 1978 (1 family)
  - Family **†Palaeoisopodidae** Dubinin, 1957 (1 genus, 1 species)
- Order **†Palaeopantopoda** Broili, 1930 (1 family)
  - Family **†Palaeopantopodidae** Hedgpeth, 1955 (1 genus, 1 species)
- Order **†Nectopantopoda** Bamber, 2007 (1 family)
  - Family **†Haliestidae** Bamber, 2007 (1 genus, 1 species)
- Order **Pantopoda** Gerstäcker, 1863 (2 suborders)[3]
  - Suborder **Stiripasterida** Fry, 1978 (1 family)
    - Family **Austrodecidae** Stock, 1954 (2 genera, 56 species)[4]
  - Suborder **Eupantopodida** Fry, 1978 (6 superfamilies)
    - Superfamily **Colossendeidoidea** Hoek, 1881 (1 family)
      - Family **Colossendeidae** Hoek, 1881 (2 subfamilies)
        - Subfamily **Colossendeinae** Hoek, 1881 (4 genera, 75 species)
        - Subfamily **Hedgpethiinae** Pushkin, 1990 (2 genera, 27 species)
    - Superfamily **Ascorhynchoidea** Pocock, 1904 (2 families)[5]
      - Family **Ascorhynchidae** Hoek, 1881 (8 genera, 113 species)[6]
      - Family **Ammotheidae** Dohrn, 1881 (21 genera, 281 species)
      - Family ***incertae sedis*** (9 genera, 16 species)
    - Superfamily **Nymphonoidea** Pocock, 1904 (3 families)
      - Family **Nymphonidae** Wilson, 1878 (6 genera; 268 species)
      - Family **Callipallenidae** Hilton, 1942 (14 genera, 139 species)
      - Family **Pallenopsidae** Fry, 1978 (2 genera, 81 species)
    - Superfamily **Phoxichilidoidea** Sars, 1891 (2 families)
      - Family **Phoxichilidiidae** Sars, 1891 (4 genera, 154 species)
      - Family **Endeidae** Norman, 1908 (2 subfamilies)
        - Subfamily **Endeinae** Norman, 1908 (1 genus, 18 species)
        - Subfamily **†Palaeoendeinae** Bamber, 2007 (3 genera, 3 species)[7]
    - Superfamily **Pycnogonoidea** Pocock, 1904 (1 family)
      - Family **Pycnogonidae** Wilson, 1878 (3 genera, 75 species)
    - Superfamily **Rhynchothoracoidea** Fry, 1978 (1 family)
      - Family **Rhynchothoracidae** Thompson, 1909 (1 genus, 19 species)
  - Suborder ***†incertae sedis*** (2 genera, 2 species)

References

Bamber, R.N. (2007) A holistic re-interpretation of the phylogeny of the Pycnogonida Latreille, 1810 (Arthropoda). *In*: Zhang, Z.-Q & Shear, W.A. (Eds), Linnean Tercentenary. Progress in invertebrate taxonomy. *Zootaxa*, 1668, 295–312.

Bamber, R.N. & El Nagar, A. (Eds) (2011) Pycnobase: World Pycnogonida Database at http://www.marinespecies.org/pycnobase

Broili, F. (1930) Über ein neues exemplar von *Palaeopantopus. Sitzungsberichte der Bayerischen Akademie der Wissenschaften (Mathematisch-Naturwissenschaftliche Abteilung)*, 1930, 209–214.

Dohrn, A., (1881) Die Pantopoden des Golfes von Neapel und der angrenzenden Meeresabschnitte. *Monographie der Fauna und Flora des Golfes von Neapel*, 3, 1–252 ; pls I–XVIII.

Dubinin, V.R. (1957) On the orientation of the cephalic end of the Devonian pycnogonids of the genus *Palaeoisopus* and their systematic position in the Arthropoda. *Doklady Akademii Nauk SSSR*, 117, 881–884. [In Russian.]

Fry, W.G. (1978) A classification within the pycnogonids. *In*, Sea Spiders (Pycnogonida). *Zoological Journal of the Linnean Society of London*, 63, 35–58.

1. **BY** Roger Bamber (for full contact address, see **Author name and address** after **References**). the title of this paper should be cited as "Class Pycnogonida Latreille, 1810. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Currently recognized classification as in Bamber & El Nagar, 2011
3. As well as Suborder *incertae sedis* for two fossil genera
4. One genus, *Austrodecus* Hodgson 1907, contains three subgenera
5. As well as a group of genera in Ascorhynchoidea Family *incertae sedis*
6. *Boehmia dubia* Hedgpeth 1950 is considered *nomen dubium*
7. Bamber (2007) has suggested that two of these genera may be synonymous

Gerstäcker, C.E.A. (1863) Pantopoda. *In*: J.V. Carus & C.E.A. Gerstäcker (Eds), *Handbuch der Zoologie*, 2, 248–350.
Hedgpeth, J.W. (1950) Pycnogonida of the United States Navy Antarctic Expedition, 1947-48. *Proceedings of the Unites States National Museum*, 100 (3260), 147–160.
Hedgpeth, J.W. (1955) Pycnogonida. *In*: R. C. Moore (Ed.), *Treatise on Invertebrate Palaeontology, (P) Arthropoda*, 2, 163–170; 117–122. New York: Geological Society of America.
Hedgpeth, J.W. (1978) A reappraisal of the Palaeopantopoda with description of a species from the Jurassic. *In*: Sea Spiders (Pycnogonida). *Zoological Journal of the Linnean Society of London*, 63, 23–24.
Hilton, W.A. (1942) Pantopoda (continued). 11. Family Callipallenidae. *Journal of Entomology and Zoology of Pomona College*, 34, 38–41.
Hodgson, T.V. (1907) Pycnogonida. National Antarctic Expedition 1901–1904. *Reports of the National Antarctic Expedition of 1901–1904, Natural History*, 3, 1–72; 10 pls.
Hoek, P.P.C. (1881) Report on the Pycnogonida dredged by HMS *Challenger* 1873–76. *Reports of the Scientific Results of the Exploring Voyage of HMS* Challenger, 3 (10), 1–167; 21 pls.
Latreille, P.A. (1810) *Considérations Générales sur I'Ordre Naturel des Animaux composant les Classes des Crustacés, des Arachnides et des Insectes*, 39, 107, 115. Paris.
Norman, A.M. (1908) The Podosomata (= Pycnogonida) of the temperate Atlantic and Arctic Ocean. *Journal of the Linnean Society of London (Zoology)*, 30, 198–238; pls XXIX, XXX.
Pocock, G. (1904) Arachnida. *Encyclopedia Britannica*. 10th ed.
Pushkin A.F. 1990. Hedgpethiidae, a new family of Pycnogonida. *Trudy Zoologicheskova Instituta, Akademiya Nauk SSSR*, 218: 36-39.
Sars, G.O. (1891) Pycnogonidea. *Norwegian North-Atlantic Expedition, 1876–1878*, 6 (Zool. 20), 1–163; pls I–XV, 1 map.
Stock, J.H. (1954) Pycnogonida from Indo-West-Pacific, Australian and New Zealand waters. Papers from Dr Th. Mortensen's Pacific Expedition 1914–1916. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjøbenhavn*, 116, 1–168.
Thompson, W. D'Arcy (1909) Pycnogonida. *In*: S. F. Harmer & B. E. Shipley (Eds), *The Cambridge Natural History*, 501–542. London: Macmillan.
Wilson, E.B. (1878) Synopsis of the Pycnogonida of New England. *Transactions of the Connecticut Academy of Arts & Sciences*, 5, 1–26.

Author name and address

Roger N Bamber, ARTOO Marine Biology Consultants, Ocean Quay Marina, Belvidere Road, Southampton SO414 5QY, United Kingdom; roger.bamber@artoo.co.uk

Order **Opiliones** Sundevall, 1833[1] [2]

Suborder **Cyphophthalmi** Simon, 1879 (6 families)[3] [4]

Incertae sedis (3 genera, 3 species)

Family **Neogoveidae** Shear 1980 (9 genera, 22 species)

Family **Ogoveidae** Shear 1980 (1 genus, 3 species)

Family **Pettalidae** Shear 1980 (9 genera, 61 species)

Family **Sironidae** Simon 1879 (8 genera, 56 species, †1/3)[5]

Family **Stylocellidae** Hansen & Sørensen 1904 (6 genera, 35 species)

Family **Troglosironidae** Shear 1993 (1 genus, 13 species)

Suborder **Eupnoi** Hansen & Sørensen, 1904 (2 superfamilies)[6]

Superfamily **Caddoidea** Banks, 1892 (1 family)

Family **Caddidae** Banks, 1892 (6 genera, 25 species, †0/1)

Superfamily **Phalangioidea** Latreille, 1802 (4 families, †1)[7]

Phalangioidea incertae sedis (6 genera, 6 species, †6/6)[8]

Family † **Kustarachnidae** Petrunkevitch, 1949 (1 genus, 1 species)

Family **Neopilionidae** Lawrence, 1931 (17 genera, 60 species)

Family **Phalangiidae** Latreille, 1802 (55 genera, 393 species, †1/4)

Family **Sclerosomatidae** Simon, 1879 (154 genera, 1343 species, †2/4)

Suborder **Dyspnoi** Hansen & Sørensen, 1904 (2 superfamilies)

Dyspnoi incertae sedis (3 genera, 3 species, †3/3)[9]

Superfamily **Ischyropsalidoidea** Simon, 1879 (3 families)[10]

Family **Ceratolasmatidae** Shear, 1986 (2 genera, 5 species)

Family **Ischyropsalididae** Simon, 1879 (1 genus, 36 species)

Family **Sabaconidae** Dresco, 1970 (4 genera, 53 species, †0/1)

Superfamily **Troguloidea** Sundevall, 1833 (6 families, †2)

Family **Dicranolasmatidae** Simon, 1879 (1 genus, 18 species)

Family † **Eotrogulidae** Petrunkevitch, 1955 (1 genus, 1 species, †1/1)

Family **Nemastomatidae** Simon, 1872 (20 genera, 196 species, †0/4)

Family † **Nemastomoididae** Petrunkevitch, 1955 (1 genus, 2 species, †1/2)

Family **Nipponopsalididae** Martens, 1976 (1 genus, 4 species)

Family **Trogulidae** Sundevall, 1833 (6 genera, 47 species, †0/1)

Suborder **Laniatores** Thorell, 1876 (2 infraorders)[11]

Infraorder **Insidiatores** Loman, 1900 (2 superfamilies)[12]

Superfamily **Travunioidea** Absolon & Kratochvil, 1932 (3 families)

Family **Nipponony chidae** Suzuki, 1975 (4 genera, 10 species)

---

1. **BY** Adriano B. Kury (for full contact information, see **Contributor name and address** section after **References**). The title of this contribution should be cited as "Order Opiliones Sundevall, 1833. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. The order Opiliones includes 4 suborders, 49 families, 1663 genera, 6519 species (†3/17/35). Fossil taxa are indicated by a dagger (†) placed before the name. In the subtaxa counts, total counts are provided, and among them, numbers of fossil taxa are indicated as †x/y/z.
3. Family composition follows Boyer *et al.* (2007) and Giribet et al. (2010), noting that Sironidae may be paraphyletic.
4. Detailed information on genera and species may be found in Giribet (2000). This reference however is quickly becoming obsolete by the fast pace of discovery of new taxa and taxonomic refinements.
5. The original assignment of † *Palaeosiro* Poinar, 2008 to the Sironidae is weakly supported.
6. The family Stygophalangiidae Oudemans, 1933 has been erected for a species of the underground waters of Macedonia, but it is probably a member of the Acari. It is no longer cited in connection with the Opiliones.
7. Composition of extant families follows basically Crawford (1992), adding the changes proposed by Taylor (2011) regarding *Megalopsalis* Roewer 1923 and related genera.
8. I gathered here not only the Phalangioidea incertae sedis, but also the Eupnoi *incertae sedis* of Dunlop et. al. (2004), Dunlop & Anderson (2005), Huang et al. (2009) and Garwood et. al. (2011).
9. In spite of the original placement of † *Halitherses* Giribet & Dunlop, 2005 in the Troguloidea, later work (Garwood et. al. 2011) did not support this inclusion.
10. Composition of Ceratolasmatidae and Sabaconidae follows Giribet et al. (2010).
11. Hypotheses of deep relationships in the Laniatores are constantly changing. A compromise is made here among Giribet & Kury (2007), Giribet et al. (2010) and Sharma & Giribet (2011).
12. Here I have partly followed the numerous changes proposed by Mendes (2009), e.g., fusing the Briggsidae Özdikmen & Demir 2008 and the Cladonychiidae Hadži, 1935 with the Travuniidae.

Family **Paranonychidae** Briggs, 1971 (7 genera, 26 species)
Family **Travuniidae** Absolon & Kratochvil, 1932 (14 genera, 42 species, †1/1)
Superfamily **Triaenonychoidea** Sørensen, 1886 (2 families)
Family **Synthetonychiidae** Forster, 1954 (1 genus, 14 species)
Family **Triaenonychidae** Sørensen, 1886 (107 genera, 475 species)
Infraorder **Grassatores** Kury, 2002 (6 superfamilies, 25 families)[13]
Grassatores incertae sedis (66 genera, 93 species, †0/1)
Superfamily **Assamioidea** Sørensen, 1884 (2 families)
Family **Assamiidae** Sørensen, 1884 (264 genera, 474 species)
Family **Pyramidopidae** Sharma et al. 2011 (13 genera, 45 species)
Superfamily **Epedanoidea** Sørensen, 1886 (5 families)
Family **Epedanidae** Sørensen, 1886 (70 genera, 172 species)
Family **Petrobunidae** Sharma & Giribet, 2011 (1 genus, 3 species)
Family **Podoctidae** Roewer, 1912 (53 genera, 128 species)
Family **Sandokanidae** Özdikmen & Kury 2007 (6 genera, 72 species)
Family **Tithaeidae** Sharma & Giribet, 2011 (6 genera, 38 species)
Superfamily **Gonyleptoidea** Sundevall, 1833 (7 families)
Family **Agoristenidae** Šilhavý, 1973 (25 genera, 74 species)
Family **Cosmetidae** Koch, 1839 (125 genera, 716 species)
Family **Cranaidae** Roewer, 1913 (74 genera, 163 species)
Family **Gonyleptidae** Sundevall, 1833 (281 genera, 830 species)[14]
Family **Manaosbiidae** Roewer, 1943 (27 genera, 47 species)
Family **Stygnidae** Simon, 1879 (28 genera, 88 species)
Family **Stygnopsidae** Sørensen, 1932 (9 genera, 37 species)
Superfamily **Phalangodoidea** Simon, 1879 (1 family)
Family **Phalangodidae** Simon, 1879 (21 genera, 115 species)
Superfamily **Samooidea** Sørensen, 1886 (3 families)
Family **Biantidae** Thorell, 1889 (28 genera, 127 species)
Family **Samoidae** Sørensen, 1886 (25 genera, 50 species, †0/2)
Family **Stygnommatidae** Roewer, 1923 (1 genus, 33 species)
Superfamily **Zalmoxoidea** Sørensen, 1886 (6 families)
Family **Escadabiidae** Kury & Pérez, 2003 (6 genera, 8 species)
Family **Fissiphalliidae** Martens, 1988 (1 genus, 6 species)
Family **Guasiniidae** González-Sponga, 1997 (2 genera, 3 species)
Family **Icaleptidae** Kury & Pérez, 2002 (2 genera, 2 species)
Family **Kimulidae** Pérez et al. 2007 (10 genera, 36 species)
Family **Zalmoxidae** Sørensen, 1886 (70 genera, 206 species)

References

Boyer, S.L., Clouse, R., Benavides, L.R., Sharma, P., Schwendinger, P.J., Kuranarathna, I. & Giribet, G. (2007) Biogeography of the world: a case study from cyphophthalmid Opiliones, a globally distributed group of arachnids. *Journal of Biogeography*, 34, 2070–2085.

Crawford, R.L. (1992) Catalogue of the genera and type species of the harvestman superfamily Phalangioidea (Arachnida). *Burke Museum Contributions in Anthropology and Natural History*, 8, 1–60.

DaSilva, M.B. & Gnaspini, P. (2010) A systematic revision of Goniosomatinae (Arachnida : Opiliones : Gonyleptidae), with a cladistic analysis and biogeographical notes. *Invertebrate Systematics*, 23(6) ("2009"), 530–624.

Dunlop, J.A., Anderson, L.I. Kerp, H. & Hass, H. (2004) A harvestman (Arachnida: Opiliones) from the Early Devonian Rhynie cherts, Aberdeenshire, Scotland. *Transactions of the Royal Society of Edinburgh*, Earth science, 94, 341–354.

Dunlop, J.A., & L.I. Anderson (2005) A fossil harvestman (Arachnida, Opiliones) from the Misissippian of East Kirkton, Scotland.

13. In the recent literature, superfamilies of Grassatores are in a state of flux. Again I have opted for a compromise. Assignment of genera to families for the Neotropical groups follows Kury (2003).
14. In Gonyleptidae there have been recently a great number of subfamily reviews which exerted a great impact on the inner organization of the subfamilies, almost always resulting in a great deal of new generic and specific synonymies, e.g., DaSilva & Gnaspini (2010) and Mendes (2001). Total species number remained more or less constant because the descriptions of new species cancelled out the synonymies.

The Journal of Arachnology, 33, 482–489.
Garwood, R.J., Dunlop, J.A., Giribet, G. & Sutton, M.D. (2011) Anatomically modern Carboniferous harvestmen demonstrate early cladogenesis and stasis in Opiliones. *Nature Communications*, 2, 444.
Giribet, G. (2000) Catalogue of the Cyphophthalmi of the World (Arachnida, Opiliones). *Revista Ibérica de Aracnología*, 2, 49–76.
Giribet, G. & Kury, A.B. (2007) Chapter 3. Phylogeny and Biogeography. *In:* Pinto-da-Rocha, R., Machado, G. & Giribet, G. (Eds.), *Harvestmen: the biology of the Opiliones*. x + 597 pages. Harvard University Press, Cambridge and London, pp. 62–87.
Giribet, G., Vogt, L., Pérez, A., Sharma, P. & Kury, A. (2010) A multilocus approach to harvestmen phylogeny with emphasis on biogeography and the phylogeny of Laniatores. *Cladistics*, 26(4), 408–437.
Huang, D.-Y., Selden, P.A. & Dunlop, J.A. (2009) Harvestmen (Arachnida: Opiliones) from the Middle Jurassic of China. *Naturwissenschaften*, 96, 955–962.
Kury, A.B. (2003) Annotated catalogue of the Laniatores of the New World (Arachnida, Opiliones). *Revista Ibérica de Aracnología*, vol. especial monográfico, 1, 1–337.
Mendes, A.C. (2009) Avaliação do status sistemático dos táxons supragenéricos da infra-ordem Insidiatores Loman, 1902 (Arachnida, Opiliones, Laniatores). Unpublished Ph.D. thesis. Museu Nacional/UFRJ, Programa de Pós-Graduação em Zoologia, Rio de Janeiro, xvii + 108 p.
Mendes, A.C. (2011) Phylogeny and taxonomic revision of Heteropachylinae (Opiliones: Laniatores: Gonyleptidae). *Zoological Journal of the Linnean Society*, 163, 437–483.
Sharma, P. & Giribet, G. (2011) The evolutionary and biogeographic history of the armoured harvestmen – Laniatores phylogeny based on ten molecular markers, with the description of two new families of Opiliones (Arachnida). *Invertebrate Systematics*, 25, 106–142.
Taylor, C.K. (2011) Revision of the genus *Megalopsalis* (Arachnida: Opiliones: Phalangioidea) in Australia and New Zealand and implications for phalangioid classification. *Zootaxa*, 2773, 1–65.

Contributor name and address

Adriano B. Kury, Departamento de Invertebrados, Museu Nacional/UFRJ, Quinta da Boa Vista, São Cristóvão, 20.940-040, Rio de Janeiro, RJ, Brazil; adrianok@gmail.com

Order **Scorpiones** C.L. Koch, 1850 (2 suborders)[1,2,3]

†Suborder **Branchioscorpionina** Kjellesvig-Waering, 1986 (4 infraorders)

†Infraorder **Bilobosternina** Kjellesvig-Waering, 1986 (1 superfamily)

†Superfamily **Branchioscorpionoidea** Kjellesvig-Waering, 1986 (2 families)

†Family **Branchioscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Dolichophonidae** Petrunkevitch, 1953 (1 genus, 1 species)

†Infraorder **Holosternina** Kjellesvig-Waering, 1986 (10 superfamilies)

†Superfamily **Acanthoscorpionoidea** Kjellesvig-Waering, 1986 (2 families)

†Family **Acanthoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Stenoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 2 species)

†Superfamily **Allopalaeophonoidea** Kjellesvig-Waering, 1986 (1 family)

†Family **Allopalaeophonidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Superfamily **Archaeoctonoidea** Petrunkevitch, 1949 (1 family)

†Family **Archaeoctonidae** Petrunkevitch, 1949 (2 genera, 2 species)

†Superfamily **Eoctonoidea** Kjellesvig-Waering, 1986 (5 families)

†Family **Allobuthiscorpiidae** Kjellesvig-Waering, 1986 (2 genera, 2 species)

†Family **Anthracoscorpionidae** Fritsch, 1904 (4 genera, 6 species)

†Family **Buthiscorpiidae** Kjellesvig-Waering, 1986 (1 genus, 2 species)

†Family **Eoctonidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Garnettiidae** Dubinin, 1962 (1 genus, 1 species)

†Superfamily **Gigantoscorpionoidea** Kjellesvig-Waering, 1986 (1 family)

†Family **Gigantoscorpionidae** Kjellesvig-Waering, 1986 (2 genera, 2 species)

†Superfamily **Mesophonoidea** Wills, 1910 (6 families)

†Family **Centromachidae** Petrunkevitch, 1953 (5 genera, 5 species)

†Family **Heloscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Liassoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Mazoniidae** Petrunkevitch, 1913 (1 genus, 2 species)

†Family **Mesophonidae** Wills, 1910 (1 genus, 2 species)

†Family **Willsiscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Superfamily **Palaeoscorpioidea** Lehmann, 1944 (2 families)

†Family **Hydroscorpiidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Palaeoscorpiidae** Lehmann, 1944 (1 genus, 1 species)

†Superfamily **Proscorpioidea** Scudder, 1885 (3 families)

†Family **Proscorpiidae** Scudder, 1885 (2 genera, 2 species)

†Family **Labriscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Waeringoscorpionidae** Størmer, 1970 (1 genus, 1 species)

†Superfamily **Spongiophonoidea** Kjellesvig-Waering, 1986 (2 families)

†Family **Praearcturidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Family **Spongiophonidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†Superfamily **Stoermeroscorpionoidea** Kjellesvig-Waering, 1986 (1 family)

†Family **Stoermeroscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)

†*Incertae sedis* (1 genus, 1 species)

†Infraorder **Lobosternina** Pocock, 1911 (5 superfamilies)

†Superfamily **Isobuthoidea** Petrunkevitch, 1913 (5 families)

†Family **Eobuthidae** Kjellesvig-Waering, 1986 (1 genus, 3 species)

†Family **Eoscorpiidae** Scudder, 1884 (3 genera, 8 species)

†Family **Isobuthidae** Petrunkevitch, 1913 (4 genera, 5 species)

---

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Scorpiones C.L. Koch, 1850. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Scorpiones currently includes 18 families, 151 genera and 1947 species, fossil taxa include 47 families, 87 genera and 121 species.
2. Higher classification follows Fet et al. (2000) for fossil taxa (1758–1998) and Prendini & Wheeler (2005) for Recent taxa. Generic composition of families is identical in each case, except where noted (post-1998 for fossil taxa and post-2005 for Recent taxa).
3. The initial list of species was obtained from Fet et al. (2000) and updated using Hallan (2005) and Rein (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.

†Family **Kronoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Family **Pareobuthidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Superfamily **Loboarchaeoctonoidea** Kjellesvig-Waering, 1986 (1 family)
†Family **Loboarchaeoctonidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Superfamily **Palaeophonoidea** Thorell & Lindström, 1885 (1 family)
†Family **Palaeophonidae** Thorell & Lindström, 1885 (1 genus, 2 species)
†Superfamily **Paraisobuthoidea** Kjellesvig-Waering, 1986 (3 families)
†Family **Paraisobuthidae** Kjellesvig-Waering, 1986 (2 genera, 5 species)
†Family **Scoloposcorpionidae** Kjellesvig-Waering, 1986 (2 genera, 2 species)
†Family **Telmatoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Superfamily **Pseudobuthiscorpioidea** Kjellesvig-Waering, 1986 (2 families)
†Family **Pseudobuthiscorpiidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Family **Waterstoniidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Infraorder **Meristosternina** Kjellesvig-Waering, 1986 (3 superfamilies)
†Superfamily **Cyclophthalmoidea** Thorell & Lindström, 1885 (2 families)
†Family **Cyclophthalmidae** Thorell & Lindström, 1885 (1 genus, 3 species)
†Family **Microlabidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Superfamily **Palaeobuthoidea** Kjellesvig-Waering, 1986 (1 family)
†Family **Palaeobuthidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†Superfamily **Tiphoscorpionoidea** Kjellesvig-Waering, 1986 (1 family)[4]
†Family **Tiphoscorpionidae** Kjellesvig-Waering, 1986 (1 genus, 1 species)
†*Incertae sedis* (6 genera, 6 species)
Suborder **Neoscorpionina** Thorell & Lindström, 1885 (1 infraorder)
Infraorder **Orthosternina** Pocock, 1911 (23 families)
†Family **Akravidae** Levy, 2007 (1 genus, 1 species)[5]
†Family **Archaeobuthidae** Lourenço, 2001 (1 genus, 1 species)[6]
Family **Bothriuridae** Simon, 1880 (15 genera, 138 species)
Family **Buthidae** C.L. Koch, 1837 (56/†6 genera, 938/†17 species)[7]
Family **Chactidae** Pocock, 1893 (11/†1 genera, 178/†2 species)[8]
Family **Chaerilidae** Pocock, 1893 (1/†1 genera, 36/†1 species)[9]
†Family **Chaerilobuthidae** Lourenço, 2011 (1 genus, 1 species)[10]
Family **Diplocentridae** Karsch, 1880 (8 genera, 113 species)
Family **Euscorpiidae** Laurie, 1896 (4 genera, 25 species)
Family **Hemiscorpiidae** Pocock, 1893 (1 genus, 13 species)[11]
Family **Heteroscorpionidae** Kraepelin, 1905 (1 genus, 6 species)
Family **Hormuridae** Laurie, 1896 (9/†1 genera, 69/†1 species)[12]
Family **Iuridae** Thorell, 1876 (6 genera, 36 species)
†Family **Palaeoeuscorpiidae** Lourenço, 2003 (1 genus, 1 species)[13]
†Family **Palaeopisthacanthidae** Kjellesvig-Waering, 1986 (3 genera, 4 species)

4. Tiphoscorpionoidea and its component taxa were omitted by Fet et al. (2000).
5. This monotypic family was added after 2005.
6. This monotypic family was added after 1998.
7. Microcharmidae Lourenço, 1996 was synonymized with Buthidae and its component genera transferred to the latter (Volschenk et al., 2008). Ten genera were added to Buthidae after 2005: *Afghanobuthus* Lourenço, 2005; *Ananteroides* Borelli, 1911 (reinstated from synonymy); *Cicileiurus* Teruel, 2007; *Femtobuthus* Lowe, 2010; *Mauritanobuthus* Qi & Lourenço, 2007; *Pantobuthus* Lourenço & Duhem, 2009; *Physoctonus* Mello-Leitão, 1934 (reinstated from synonymy); *Picobuthus* Lowe, 2010; *Riftobuthus* Lourenço et al., 2010; *Saharobuthus* Lourenço & Duhem, 2009. Four buthid genera were synonymized after 2005: *Ankaranocharmus* Lourenço, 2004; *Microananteris* Lourenço, 2003; *Paraorthochirus* Lourenço & Vachon, 1997; *Simonoides* Vachon & Farzanpay, 1987.
8. A monotypic genus, *Araripescorpius* Bouret Campos, 1986 was transferred to Chactidae (Menon, 2007). The validity and taxonomic composition of several genera in this family continues to be disputed.
9. A monotypic genus, *Electochaerilus* Santiago-Blay et al., 2000, was added to Chaerilidae after 1998.
10. This monotypic family was added after 2005.
11. One hemiscorpiid genus, *Habibiella* Vachon, 1974, was synonymized after 2005 (Monod & Lourenço, 2005).
12. The older name, Hormuridae, is used instead of Liochelidae Fet & Bechly, 2001 (1879). Protoischnuridae Carvalho & Lourenço, 2001 was synonymized with Hormuridae (as Hemiscorpiidae), and *Protoischnurus* Carvalho & Lourenço, 2001 transferred to it (Menon, 2007). Another monotypic genus, *Tibetiomachus* Lourenço & Qi, 2006, was added to Hormuridae after 2005.
13. This monotypic family was added after 1998.

Family **Pseudochactidae** Gromov, 1998 (3 genera, 3 species)[14]
Family **Scorpionidae** Latreille, 1802 (5 genera, 128 species)[15]
Family **Scorpiopidae** Kraepelin, 1905 (5 genera, 48 species)
Family **Superstitioniidae** Stahnke, 1940 (1 genus, 1 species)[16]
Family **Troglotayosicidae** Lourenço, 1998 (2 genera, 3 species)
Family **Typhlochactidae** Mitchell, 1971 (4 genera, 10 species)
Family **Urodacidae** Pocock, 1893 (2 genera, 21 species)[17]
Family **Vaejovidae** Thorell, 1876 (17 genera, 181 species)[18]
†*Incertae sedis* (4 genera, 5 species)

Cited references

Fet, V., Sissom, W.D., Lowe, G. & Braunwalder, M.E. (2000) *Catalog of the Scorpions of the World* (*1758–1998*). The New York Entomological Society, New York.

Hallan, J. (2005) Synopsis of the Described Scorpiones of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Scorpiones1.htm (accessed on 16.x.2011).

Menon, F. (2007) Higher systematics of scorpions from the Crato Formation, Lower Cretaceous of Brazil. *Palaeontology*, 50, 185–195.

Monod, L. & Lourenço, W.R. (2005) Hemiscorpiidae (Scorpiones) from Iran, with descriptions of two new species and notes on biogeography and phylogenetic relationships. *Revue suisse de Zoologie*, 112, 869–941.

Prendini, L. & Wheeler, W.C. (2005) Scorpion higher phylogeny and classification, taxonomic anarchy, and standards for peer review in online publishing. *Cladistics*, 21, 446–494.

Rein, J.O. (2011) Species List. *In*: Rein, J.O. *The Scorpion Files*. Digital resource at http://www.ntnu.no/ub/scorpion-files/ (accessed on 16.x.2011).

Vignoli, V. & Prendini, L. (2009) Systematic revision of the troglomorphic scorpion family Typhlochactidae (Scorpiones: Chactoidea). *Bulletin of the American Museum of Natural History*, 326, 1–94.

Volschenk, E.S., Mattoni, C.I. & Prendini, L. (2008) Comparative anatomy of the mesosomal organs of scorpions (Chelicerata, Scorpiones), with implications for the phylogeny of the order. *Zoological Journal of the Linnean Society*, 154, 651–675.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

14. Two monotypic genera were added to Pseudochactidae after 2005: *Troglokhammouanus* Lourenço, 2007; *Vietbocap* Lourenço & Pham, 2010.
15. A monotypic genus, *Rugodentus* Bastawade et al., 2005, was added to Scorpionidae after 2005.
16. Vignoli & Prendini (2009) elevated Typhlochactinae Mitchell, 1971 to family, removing its component genera from Superstitioniidae.
17. A monotypic genus, *Aops* Volschenk & Prendini, 2008, was added to Urodacidae after 2005.
18. Six genera, some of dubious validity, were added to Vaejovidae after 2005: *Gertschius* Graham & Soleglad, 2007; *Hoffmannius* Soleglad & Fet, 2008; *Kochius* Soleglad & Fet, 2008; *Kuarapu* Francke & Ponce-Saavedra, 2010; *Stahnkeus* Soleglad & Fet, 2006; *Wernerius* Soleglad & Fet, 2008.

Order **Solifugae** Sundevall, 1833 (13 families)[1,2]

Family **Ammotrechidae** Roewer, 1934 (21/†1 genera, 88/†1 species)
Family **Ceromidae** Roewer, 1933 (3/†1 genera, 20/†1 species)
Family **Daesiidae** Kraepelin, 1899 (29 genera, 191 species)
Family **Eremobatidae** Kraepelin, 1901 (8 genera, 192 species)
Family **Galeodidae** Sundevall, 1833 (9 genera, 201 species)
Family **Gylippidae** Roewer, 1933 (5 genera, 27 species)
Family **Hexisopodidae** Pocock, 1897 (2 genera, 23 species)
Family **Karschiidae** Kraepelin, 1899 (4 genera, 40 species)
Family **Melanoblossiidae** Roewer, 1933 (6 genera, 16 species)
Family **Mummuciidae** Roewer, 1934 (10 genera, 20 species)
†Family **Protosolpugidae** Petrunkevitch, 1953 (1 genus, 1 species)
Family **Rhagodidae** Pocock, 1897 (27 genera, 99 species)
Family **Solpugidae** Leach, 1815 (17 genera, 196 species)

Cited references

Hallan, J. (2005) Synopsis of the Described Solifugae of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Solifugae1.htm (accessed on 16.x.2011).

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi, Uropygi, Schizomida, Palpigradi, Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 16.x.2011). Species 2000, Reading, UK.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Solifugae Sundevall, 1833. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Solifugae currently includes 12 families, 141 genera and 1113 species, fossil taxa include 1 family, 3 genera and 3 species.
2. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.

Order **Pseudoscorpiones** de Geer, 1778 (2 suborders)[1 2]

Suborder **Epiocheirata** Harvey, 1992 (2 superfamilies)

Superfamily **Chthonioidea** Daday, 1888 (4 families)

Family **Chthoniidae** Daday, 1888 (27 genera, 617 species [3 fs[3]])

† Family **Dracochelidae** Schawaller, Shear and Bonamo, 1991 (1 fg; 1 fs)

Family **Lechytiidae** Chamberlin, 1929 (1 genus, 23 species [1 fs])

Family **Pseudotyrannochthoniidae** Beier, 1932 (5 genera, 44 species)[4]

Family **Tridenchthoniidae** Balzan, 1892 (15 genera, 71 species [1 fg; 1 fs])

Superfamily **Feaelloidea** Ellingsen, 1906 (2 families)

Family **Feaellidae** Ellingsen, 1906 (1 genus, 12 species)

Family **Pseudogarypidae** Chamberlin, 1923 (2 genera, 7 species [4 fs])

Suborder **Iocheirata** Harvey, 1992 (5 superfamilies)

Superfamily **Neobisioidea** Chamberlin, 1930 (7 families)

Family **Bochicidae** Chamberlin, 1930 (12 genera, 41 species)

Family **Gymnobisiidae** Beier, 1947 (4 genera, 11 species)

Family **Hyidae** Chamberlin, 1930 (2 genera, 14 species)

Family **Ideoroncidae** Chamberlin, 1930 (11 genera, 59 species)

Family **Neobisiidae** Chamberlin, 1930 (32 genera, 576 species [4 fs])

Family **Parahyidae** Harvey, 1992 (1 genus, 1 species)

Family **Syarinidae** Chamberlin, 1930 (17 genera, 109 species)

Superfamily **Garypoidea** Simon, 1879 (6 families)

Family **Garypidae** Simon, 1879 (10 genera, 77 species)

Family **Garypinidae** Daday, 1888 (21 genera, 76 species [2 fs])[5]

Family **Geogarypidae** Chamberlin, 1930 (3 genera, 60 species [3 fs])

Family **Larcidae** Harvey, 1992 (2 genera, 15 species)

Family **Menthidae** Chamberlin, 1930 (5 genera, 12 species)

Family **Olpiidae** Banks, 1895 (35 genera, 264 species)

Superfamily **Cheiridioidea** Hansen, 1894 (2 families)[6]

Family **Cheiridiidae** Hansen, 1894 (6 genera, 71 species [1 fg; 3 fs])

Family **Pseudochiridiidae** Chamberlin, 1923 (2 genera, 12 species [1 fs])

Superfamily **Sternophoroidea** Chamberlin, 1923 (1 family)

Family **Sternophoridae** Chamberlin, 1923 (3 genera, 20 species)

Superfamily **Cheliferoidea** Risso, 1826 (4 families)

Family **Atemnidae** Kishida, 1929 (20 genera, 175 species [1 fg; 1 fs])

Family **Cheliferidae** Risso, 1826 (58 genera, 273 species [5 fg; 12 fs])

Family **Chernetidae** Menge, 1855 (115 genera, 657 species [1 fg; 3 fs])

Family **Withiidae** Chamberlin, 1931 (36 genera, 157 species [1 fg; 1 fs])

References

Harvey, M.S. (1992) The phylogeny and classification of the Pseudoscorpionida (Chelicerata: Arachnida). *Invertebrate Taxonomy*, 6, 1373–1435.

Harvey, M.S. (2011) Pseudoscorpions of the World, version 2.0. Western Australian Museum, Perth. http://www.museum.wa.gov.au/catalogues/pseudoscorpions/.

Judson, M.L.I. (1993) African Chelonethi: studies on the systematics, biogeography and natural history of African pseudoscorpions (Arachnida) [Abstract]. *Index to theses, with abstracts, accepted for higher degrees by the universities of Great Britain and Ireland*, 42, 697.

1. **BY** Mark Harvey (for full contact details, see **Author name and address** after **References**). The title of this contribution should be cited as "Order Pseudoscorpiones de Geer, 1778. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". There are 26 Recent families, 446 genera, and 3,454 species, fossil taxa include 1 family, 11 genera, 40 species. Taxon numbers are calculated to the end of 2010.
2. This classification is based on Harvey (1992), Murienne *et al.* (2008) and Harvey (2011)
3. "fs" refers to fossil species; and "fg" to fossil genera.
4. First raised to family level by Judson (1993)
5. First raised to family level by Judson (2005).
6. See Judson (2007)

Judson, M.L.I. (2005) Baltic amber fossil of *Garypinus electri* Beier provides first evidence of phoresy in the pseudoscorpion family Garypinidae (Arachnida: Chelonethi). *In:* Logunov, D.V. & Penney, D. (Eds.) *European Arachnology 2003 (Proceedings of the 21st European Colloquium of Arachnology, St.-Petersburg, 4-9 August 2003)*. Moscow, KMK Scientific Press Ltd, pp. 127–131.
Judson, M.L.I. (2007) First fossil record of the pseudoscorpion family Pseudochiridiidae (Arachnida, Chelonethi, Cheiridioidea) from Dominican amber. *Zootaxa*, 1393, 45–51.
Murienne, J., Harvey, M.S. & Giribet, G. (2008) First molecular phylogeny of the major clades of Pseudoscorpiones (Arthropoda: Chelicerata). *Molecular Phylogenetics and Evolution*, 49, 170–184.

Author name and address

Mark S. Harvey, Department of Terrestrial Zoology, Western Australian Museum, Locked Bag 49, Welshpool DC, Western Australia 6986, Australia; mark.harvey@museum.wa.gov.au

Order **Palpigradi** Thorell, 1888 (1 superfamily)[1,2,3]

Superfamily **Eukoenenioidea** Petrunkevitch, 1955 (2 families)

Family **Eukoeneniidae** Petrunkevitch, 1955 (4 genera, 75 species)

Family **Prokoeneniidae** Condé, 1996 (2 genera, 7 species)

†*Incertae sedis* (1 genus, 1 species)

Cited references

Carpenter, F.M. (1992) Superclass Hexapoda *In*: Moore, R.C. & Kaesler, R.L. (eds.). *Treatise on Invertebrate Paleontology. Part R, Arthopoda* 4, *vol*. 3. The Geological Society of America and University of Kansas Press, Boulder and Lawrence.

GBIF (Global Biodiversity Information Facility), Version 1.3.2. (2011). Digital resource at: http://data.gbif.org/ (accessed on 18.x.2011).

Hallan, J. (2005) Synopsis of the Described Palpigradi of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Palpigradi1.htm (accessed on 18.x.2011).

Handlirsch, A. (1906) *Die Fossilen Insekten und die Phylogenie der Rezenten Formen*. Wilhelm Engelmann, Leipzig.

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi*, *Uropygi*, *Schizomida*, *Palpigradi*, *Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 18.x.2011). Species 2000, Reading, UK.

Savory, T. (1974) On the arachnid order Palpigradi. *Journal of Arachnology*, 2, 43–45.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Palpigradi Thorell, 1888. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Palpigradi currently includes 2 families, 6 genera and 82 species, fossil taxa include 1 genus and 1 species.
2. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.
3. Family Sternarthronidae Haase, 1890, based on *Sternarthron zitteli* Haase, 1890, from the Jurassic of Germany, was excluded, following Harvey (2003). Although often assigned to Palpigradi (e.g. Savory, 1974; Hallan, 2005; GBIF, 2011), this taxon has also been placed in the insect order Phasmatodea Jacobson & Bianchi, 1902 (e.g. Handlirsch, 1906; Carpenter, 1992).

Order **Ricinulei** Thorell, 1876 (2 suborders)[1,2]
- Suborder **Neoricinulei** Selden, 1992 (1 superfamily)
  - Superfamily **Ricinoidoidea** Ewing, 1929 (1 family)
    - Family **Ricinoididae** Ewing, 1929 (3 genera, 58 species)
- †Suborder **Palaeoricinulei** Selden, 1992 (1 superfamily)
  - Superfamily **Curculioidoidea** Cockerell, 1916 (2 families)
    - Family **Curculioididae** Cockerell, 1916 (2 genera, 11 species)
    - Family **Poliocheridae** Scudder, 1884 (2 genera, 4 species)[3]

Cited references

Hallan, J. (2005) Synopsis of the Described Ricinulei of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Ricinulei1.htm (accessed on 16.x.2011).

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi*, *Uropygi*, *Schizomida*, *Palpigradi*, *Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 16.x.2011). Species 2000, Reading, UK.

Selden, P.A. (1992) Revision of the fossil ricinuleids. *Transactions of the Royal Society of Edinburgh*, *Earth Sciences*, 83, 595–634.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Ricinulei Thorell, 1876. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Ricinulei currently includes 1 family, 3 genera and 58 species, fossil taxa include 2 families, 4 genera and 15 species.
2. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.
3. *Poliochera pustulatus* Laurentiaux-Vieira & Laurentiaux, 1963 was excluded, as it may not be a ricinuleid (Selden, 1992).

Superorder **Parasitiformes** Reuter, 1909 (sensu Krantz & Walter 2009)[1] (4 orders)[2]
- Order **Opilioacarida** Zakhvatkin, 1952 (1 superfamily)
  - Superfamily **Opilioacaroidea** Redikorzev, 1937 (1 family)
    - Family **Opilioacaridae** Redikorzev, 1937 (10 genera, 35 species, 0/2)[3]
- Order **Holothyrida** Thon, 1905 (1 superfamily)
  - Superfamily **Holothyroidea** Thorell, 1882 (3 families)
    - Family **Allothyridae** van der Hammen, 1972 (2 genera, 3 species)
    - Family **Holothyridae** Thorell, 1882 (8 genera, 20 species)
    - Family **Neothyridae** Lehtinen, 1981 (3 genera, 4 species)
- Order **Ixodida** Leach, 1815 (1 superfamily)
  - Superfamily **Ixodoidea** Dugès, 1834 (3 families)
    - Family **Argasidae** Koch, 1844 (4 genera, 188 species, 0/2)
    - Family **Ixodidae** Dugès, 1834 (14 genera, 682 species, 2/4)
    - Family **Nuttalliellidae** Schulze, 1935 (1 genus, 1 species)
- Order **Mesostigmata** G. Canestrini, 1891 (3 suborders)[4]
  - Suborder **Sejida** Kramer, 1885 (2 superfamilies)
    - Superfamily **Sejoidea** Berlese, 1885 (3 families)
      - Family **Ichthyostomatogasteridae** Sellnick, 1953 (3 genera, 10 species)
      - Family **Sejidae** Berlese, 1885 (5 genera, 46 species)
      - Family **Uropodellidae** Camin, 1955 (1 genus, 6 species)
    - Superfamily **Heterozerconoidea** Berlese, 1892 (2 families)[5]
      - Family **Discozerconidae** Berlese, 1910 (2 genera, 3 species)
      - Family **Heterozerconidae** Berlese, 1892 (7 genera, 13 species)
  - Suborder **Trigynaspida** Camin & Gorirossi, 1955 (2 infraorders)
    - Infraorder[6] **Cercomegistina** Camin & Gorirossi, 1955 (1 superfamily)
      - Superfamily **Cercomegistoidea** Trägårdh, 1937 (6 families)
        - Family **Asternoseiidae** Vale, 1954 (2 genera, 3 species)[7]
        - Family **Cercomegistidae** Trägårdh, 1937 (5 genera, 13 species)
        - Family **Davacaridae** Kethley, 1977 (2 genera, 4 species)
        - Family **Pyrosejidae** Lindquist & Moraza, 1993 (2 genera, 3 species)
        - Family **Saltiseiidae** Walter, 2000 (1 genus, 1 species)
        - Family **Seiodidae** Kethley, 1977 (1 genus, 1 species)
    - Infraorder **Antennophorina** Camin & Gorirossi, 1955 (7 superfamilies)
      - Superfamily **Aenictequoidea** Kethley, 1977 (4 families)

---

1. **BY** Frédéric Beaulieu, Ashley P.G. Dowling, Hans Klompen, Gilberto J. de Moraes, David Evans Walter (for full contact details, see **Contributor names** and addresses after **References**). The title of this contribution should be cited as "Superorder Parasitiformes Reuter, 1909. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Reuter (1909) used Gamasiformes but provided an alternative, Parasitiformes, because "The genus *Gamasus* has recently been replaced by *Parasitus* because of priority considerations" (i.e. *Parasitus* Latreille, 1795, is a senior objective synonym of *Gamasus* Latreille, 1802). Reuter's Gamasiformes (Parasitiformes) contained three superfamilies (Holothyroidea, Gamasoidea [Parasitoidea], Ixodoidea) and five families (Holothyridae, Gamasidae [Parasitidae], Uropodidae, Argasidae, Ixodidae). In current usage (Krantz & Walter 2009), Parasitiformes consists of four orders (Opilioacarida, Holothyrida, Ixodida, Mesostigmata). Despite changes in concepts, ranks and/or name endings of higher taxa (beyond superfamily), we assigned authorships to the first author who mentioned the taxonomic name, except for Gamasina where the priority is not clear (see footnote #12). Within the Mesostigmata, we recognise 25 superfamilies, 109 families, 878 genera, and have records for approximately 11,424 species.
3. When available, the number of fossil genera (fg) and fossil species (fs) are indicated as fg/fs in the parentheses.
4. This taxonomic framework follows Lindquist et al. (2009a, b) with exceptions noted for various groups. Mesostigmata is equivalent to Gamasida of other workers. Genera and species estimates are from our records checked against the Zoological Record to 31 March 2011, relevant monographs (e.g. Berlese 1916, Hughes 1961, Gilyarov & Bregetova 1977, Shcherbak 1980, Hirschmann & Wiśniewski 1982, Karg 1993, De Moraes et al. 2004, Chant & McMurtry 2007, Mašán 2007, Papadoulis et al. 2009, Denmark & Evans 2011), and ITIS listings (Castilho et al. 2011 a, b, c).
5. In Lindquist et al. (2009a, b), Heterozerconoidea is treated as a separate cohort (i.e. infraorder), but we follow the results of Lekveishvili & Klompen (2004).
6. Cohort is traditionally used in Acarology for the rank of infraorder, which is used in most other fields of Zoology, and subcohort for hyporder, but for consistency with other disciplines we have switched to the more common zoological forms.
7. Includes *Holostethus longosetis* Karg & Schorlemmer, 2011, which they placed in the Fedrizziidae. However, this genus clearly belongs in the Asternoseiidae and is very close to, and perhaps a junior synonym of *Asternoseius* Berlese, 1910.

Family **Aenictequidae** Kethley, 1977 (1 genus, 1 species)
Family **Euphysalozerconidae** Kim, 2008 (1 genus, 1 species)
Family **Messoracaridae** Kethley, 1977 (2 genera, 3 species)
Family **Ptochacaridae** Kethley, 1977 (1 genus, 3 species)
Superfamily **Antennophoroidea** Berlese, 1892 (1 family)
Family **Antennophoridae** Berlese, 1892 (6 genera, 19 species)
Superfamily **Celaenopsoidea** Berlese, 1892 (8 families)
Family **Celaenopsidae** Berlese, 1892 (7 genera, 14 species)
Family **Costacaridae** Hunter, 1993 (1 genus, 1 species)
Family **Diplogyniidae** Trägårdh, 1941 (42 genera, 85 species)
Family **Euzerconidae** Trägårdh, 1938 (12 genera, 24 species)
Family **Megacelaenopsidae** Funk, 1975 (2 genera, 2 species)
Family **Neotenogyniidae** Kethley, 1974 (1 genus, 1 species)
Family **Schizogyniidae** Trägårdh, 1950 (6 genera, 10 species)
Family **Triplogyniidae** Funk, 1977 (2 genera, 11 species)
Superfamily **Fedrizzioidea** Trägårdh, 1937 (2 families)
Family **Fedrizziidae** Trägårdh, 1937 (3 genera, 34 species)[8]
Family **Klinckowstroemiidae** Camin & Gorirossi, 1955 (4 genera, 36 species)[9]
Superfamily **Megisthanoidea** Berlese, 1914 (2 families)
Family **Hoplomegistidae** Camin & Gorirossi, 1955 (1 genus, 7 species)
Family **Megisthanidae** Berlese, 1914 (1 genus, 30 species)
Superfamily **Paramegistoidea** Trägårdh, 1946 (1 family)
Family **Paramegistidae** Trägårdh, 1946 (5 genera, 30 species)
Superfamily **Parantennuloidea** Willmann, 1941 (3 families)
Family **Parantennulidae** Willmann, 1941 (3 genera, 5 species)
Family **Philodanidae** Kethley, 1977 (2 genera, 2 species)
Family **Promegistidae** Kethley, 1977 (1 genus, 1 species)
Suborder **Monogynaspida** Camin & Gorirossi, 1955 (2 infraorders)
Infraorder **Uropodina** Kramer, 1881 (4 superfamilies)
Superfamily **Microgynioidea** Trägårdh, 1942 (2 families)[10]
Family **Microgyniidae** Trägårdh, 1942 (2 genera, 4 species)
Family **Nothogynidae** Walter & Krantz, 1999 (1 genus, 2 species)
Superfamily **Thinozerconoidea** Halbert, 1915 (2 families)
Family **Protodinychidae** Evans, 1957 (1 genus, 3 species)
Family **Thinozerconidae** Halbert, 1915 (1 genus, 1 species)
Superfamily **Uropodoidea** Kramer, 1881 (30 families)[11]
Family **Baloghjkaszabiidae** Hirschmann, 1979 (1 genus, 3 species)
Family **Brasiluropodidae** Hirschmann, 1979 (2 genera, 18 species)
Family **Cillibidae** Trägårdh, 1944 (2 genera, 19 species)
Family **Clausiadinychidae** Hirschmann, 1979 (1 genus, 4 species)
Family **Cyllibulidae** Hirschmann, 1979 (1 genus, 32 species)
Family **Deraiophoridae** Trägårdh, 1952 (1 genus, 36 species)
Family **Dinychidae** Berlese, 1916 (1 genus, 34 species)
Family **Discourellidae** Baker & Wharton, 1952 (1 genus, 76 species)
Family **Eutrachytidae** Trägårdh, 1944 (1 genus, 36 species)
Family **Hutufeideriidae** Hirschmann, 1979 (1 genus, 9 species)

8. Family concept follows Seeman (2007; not Karg & Schorlemmer 2011).
9. Klinckowstroemiidae has traditionally been attributed to Trägårdh, but Trägårdh failed to designate a type species for *Klinckowstroemia* and so his family name was not valid. The genus name did not become available until Baker & Wharton (1952) designated a type and the family was first used by Camin & Gorirossi (1955). See Villegas-Guzman et al. (2009) for details.
10. In Lindquist et al. (2009a, b), Microgynioidea is treated as a separate cohort (infraorder), but we think that the weight of evidence supports treating this group as a member of the Uropodina.
11. The family arrangement of Uropodoidea follows Hirschmann (1979) with few exceptions (e.g. an expanded view of Trachytidae following Bloszyk et al. 2005).

Family **Kaszabjbaloghiidae** Hirschmann, 1979 (1 genus, 6 species)
Family **Macrodinychidae** Hirschmann, 1979 (4 genera, 22 species)
Family **Metagynuridae** Balogh, 1943 (2 genera, 17 species)
Family **Nenteriidae** Hirschmann, 1979 (2 genera, 128 species)
Family **Oplitidae** Johnston, 1968 (8 genera, 163 species)
Family **Phymatodiscidae** Hirschmann, 1979 (1 genus, 10 species)
Family **Polyaspididae** Berlese, 1913 (1 genus, 16 species)
Family **Prodinychidae** Berlese, 1917 (3 genera, 16 species)
Family **Rotundabaloghiidae** Hirschmann, 1979 (4 genera, 165 species)
Family **Tetrasejaspidae** Hirschmann, 1979 (1 genus, 15 species)
Family **Trachytidae** Trägårdh, 1938 (7 genera, 108 species)
Family **Trachyuropodidae** Berlese, 1917 (17 genera, 99 species)
Family **Trematuridae** Berlese, 1917 (13 genera, 401 species)
Family **Trichocyllibidae** Hirschmann, 1979 (5 genera, 57 species)
Family **Trichouropodellidae** Hirschmann, 1979 (1 genus, 11 species)
Family **Trigonuropodidae** Hirschmann, 1979 (1 genus, 87 species)
Family **Uroactiniidae** Hirschmann & Zirngiebl-Nicol, 1964 (3 genera, 67 species)
Family **Urodiaspididae** Trägårdh, 1944 (3 genera, 26 species)
Family **Urodinychidae** Berlese, 1917 (13 genera, 267 species)
Family **Uropodidae** Kramer, 1881 (9 genera, 261 species)
Uropodoidea, no assigned family (5 genera, 5 species)
Superfamily **Diarthrophalloidea** Trägårdh, 1946 (1 family)
Family **Diarthrophallidae** Trägårdh, 1946 (22 genera, 63 species)

Infraorder **Gamasina** Kramer, 1881 (4 hyporders)[12]
Hyporder **Epicriiae** Kramer, 1885 (3 superfamilies)
Superfamily **Epicrioidea** Berlese, 1885 (1 family)
Family **Epicriidae** Berlese, 1885 (4 genera, 48 species)
Superfamily **Heatherelloidea** Walter, 1997 (1 family)[13]
Family **Heatherellidae** Walter, 1997 (1 genus, 2 species)
Superfamily **Zerconoidea** G. Canestrini, 1891 (2 families)
Family **Coprozerconidae** Moraza & Lindquist, 1999 (1 genus, 1 species)
Family **Zerconidae** G. Canestrini, 1891 (36 genera, 390, species, 1/1)[14]
Hyporder **Arctacariae** Johnston, 1982 (1 superfamily)
Superfamily **Arctacaroidea** Evans, 1955 (1 family)
Family **Arctacaridae** Evans, 1955 (2 genera, 6 species)
Hyporder **Parasitiae** Evans & Till, 1979 (1 superfamily)
Superfamily **Parasitoidea** Oudemans, 1901 (1 family)
Family **Parasitidae** Oudemans, 1901 (35 genera, 426 species, 0/1)[15]
Hyporder **Dermanyssiae** Evans & Till, 1979 (6 superfamilies)
Superfamily **Veigaioidea** Oudemans, 1939 (1 family)
Family **Veigaiidae** Oudemans, 1939 (4 genera, 95 species)
Superfamily **Rhodacaroidea** Oudemans, 1902 (6 families)
Family **Digamasellidae** Evans, 1957 (13 genera, 261 species, 0/1)[16]
Family **Halolaelapidae** Karg, 1965 (4 genera, 80 species)[17]

12. Sensu Lindquist et al. (2009a, b). The name Gamasina apparently originates from Gammasides (sic) Leach, 1815, which was used as a family to accommodate a single genus, *Gamasus* Latreille, 1802 (misspelled *Gammasus*). However, Kramer (1881) provided a more defined concept under the name Gamasina.
13. In Lindquist et al. (2009a, b), Heatherelloidea is treated as a separate cohort (infraorder), but as noted in Walter (1997), the morphology suggests a close relationship to the families Epicriidae and Zerconidae. Further study of these unique Australian mites has reinforced this conclusion.
14. Zsolt Ujvári (pers. comm.). Relevant monographs (Błaszak 1976) and recent revisions such as Díaz-Aguilar & Ujvári (2010) were also consulted. One fossil genus (fg) and species (fs) has been described (Błaszak et al. 1995) (as fg/fs in list).
15. A fossil species of Eocene age, apparently the oldest known mesostigmatan, and attributable to the extant genus *Aclerogamasus* has been described (Witalinski 2000).
16. A fossil species of Miocene age attributable to an extant genus, *Dendrolaelaps*, has been described (Hirschmann 1971).
17. Species estimate and generic concepts follows Halliday (2008).

Family **Laelaptonyssidae** Womersley, 1956 (1 genus, 6 species)
Family **Ologamasidae** Ryke, 1962 (45 genera, 452 species)
Family **Rhodacaridae** Oudemans, 1902 (15 genera, 148 species)
Family **Teranyssidae** Halliday, 2006 (1 genus, 1 species)
Not assigned to a family (1 genus, 1 species)
Superfamily **Eviphidoidea** Berlese, 1913 (5 families)
Family **Eviphididae** Berlese, 1913 (19 genera, 108 species)
Family **Leptolaelapidae** Karg, 1978 (12 genera, 48 species)
Family **Macrochelidae** Vitzthum, 1930 (20 genera, 470 species)[18]
Family **Pachylaelapidae** Berlese, 1913 (26 genera, 199 species)
Family **Parholaspididae** Evans, 1956 (12 genera, 96 species)
Superfamily **Ascoidea** Voigts & Oudemans, 1905 (3 families)
Family **Ameroseiidae** Evans, 1961 (10 genera, 148 species)
Family **Ascidae** Voigts & Oudemans, 1905 (17 genera, 338 species)
Family **Melicharidae** Hirschmann, 1962 (12 genera, 201 species)[19]
Superfamily **Phytoseioidea** Berlese, 1916 (4 families)
Family **Blattisociidae** Garman, 1948 (11 genera, 369 species)
Family **Otopheidomenidae** Treat, 1955 (10 genera, 28 species)
Family **Phytoseiidae** Berlese, 1916 (90 genera, 2300 species)[20]
Family **Podocinidae** Berlese, 1913 (2 genera, 25 species)
Superfamily **Dermanyssoidea** Kolenati, 1859 (17 families)
Family **Dasyponyssidae** Fonseca, 1940 (2 genera, 2 species)
Family **Dermanyssidae** Kolenati, 1859 (2 genera, 26 species)
Family **Entonyssidae** Ewing, 1923 (9 genera, 27 species)
Family **Haemogamasidae** Oudemans, 1926 (5 genera, 78 species)
Family **Halarachnidae** Oudemans, 1906 (7 genera, 43 species)
Family **Hystrichonyssidae** Keegan, Yunker & Baker, 1960 (1 genus, 1 species)
Family **Iphiopsididae** Kramer, 1886 (14 genera, 68 species)
Family **Ixodorhynchidae** Ewing, 1923 (6 genera, 43 species)
Family **Larvamimidae** Elzinga, 1993 (1 genus, 4 species)
Family **Laelapidae** Berlese, 1892 (90 genera, 1316 species)[21]
Family **Macronyssidae** Oudemans, 1936 (34 genera, 233 species)
Family **Manitherionyssidae** Radovsky & Yunker, 1971 (1 genus, 1 species)
Family **Omentolaelapidae** Fain, 1961 (1 genus, 1 species)
Family **Rhinonyssidae** Trouessart, 1895 (8 genera, 510 species)
Family **Spelaeorhynchidae** Oudemans, 1902 (1 genus, 7 species)
Family **Spinturnicidae** Oudemans, 1901 (12 genera, 101 species)
Family **Varroidae** Delfinado & Baker, 1974 (2 genera, 6 species)

References

Baker, E.W. & Wharton, G.W. (1952) *An Introduction to Acarology.* Macmillan: New York, 465 pp.
Berlese, A. (1916) Centuria prima di Acari nuovi. *Redia*, 12, 19–66.
Beaulieu, F. (2009) Review of the mite genus *Gaeolaelaps* Evans & Till (Acari: Laelapidae), and description of a new species from North America, *G. gillespiei* n. sp. *Zootaxa*, 2158, 33–49.
Błaszak, C. (1976) A revision of the family Zerconidae (Acari, Mesostigmata) (Systematic studies on family Zerconidae – I). *Acarolo-*

18. See Emberson (2010).
19. See Naskrecki & Colwell (1998) for an exceptionally fine systematic analysis of two genera.
20. See De Moraes et al. (2004), Chant & McMurtry (2007), Papadoulis et al. (2009), and Denmark & Evans (2011).
21. Family and generic concepts largely follow the classification of Evans & Till (1966) as modified by Casanueva (1993) (but also see Walter & Campbell 2003, Dowling et al. 2007, Beaulieu 2009 & Dowling & OConnor 2010). In this treatment, the Laelapidae includes the monogeneric and digeneric subfamilies Alphalaelapinae Tipton, 1960, and Acanthochelinae Radovsky & Gettinger, 1999, respectively, and the large subfamilies Hirstionyssinae Evans & Till, 1966, Laelapinae Berlese, 1892, Hypoaspidinae Vitzthum, 1941, and Melittiphidinae Evans & Till, 1966. However, many genera cannot be assigned confidently to subfamilies, and the boundaries of the large subfamilies remain unclear. Species estimates were corrected for reported synonymies in the Chinese fauna following Ma (2006).

gia, 17, 553–569.
Błaszak, C., Cokendolpher, J.C. & Polyak, V.J. (1995) *Paleozercon cavernicolus*, n. gen., n. sp., fossil mite from a cave in the Southwestern U.S.A. (Acari, Gamasida: Zerconidae), with a key to Nearctic genera of Zerconidae. *International Journal of Acarology*, 21, 253–259.
Bloszyk, J., Halliday, R.B. & Dylewska, M. (2005) *Acroseius womersleyi* gen. nov., sp nov., a new genus and species of Uropodina from Australia (Acari: Trachytidae). *Systematic and Applied Acarology*, 10, 41–60.
Camin, J.H. & Gorirossi, F.E. (1955) A revision of the Suborder Meostigmata (Acarina), based on new interpretations of comparative morphological data. *Chicago Academy of Sciences Special Publication*, 11, 1–70.
Casanueva, M.E. (1993) Phylogenetic studies of the free-living and arthropod associated Laelapidae (Acari: Mesostigmata). *Guyana Zoologica*, 57, 21–46.
Castilho, R.C. & de Moraes, G.J. (2011) Mites GSDs: RhodacaridBase. *In*: Bisby, F.A., Y.R. Roskov, T.M. Orrell, D. Nicolson, L.E. Paglinawan, N. Bailly, P.M. Kirk, T. Bourgoin, G. Baillargeon (Eds.), *Species 2000 & ITIS Catalogue of Life: 2011 Annual Checklist*. DVD; Species 2000: Reading, UK. Available from: http://www.catalogueoflife.org/annual-check-list/2010/ (date of access March 2011).
Castilho, R.C., Silva, E.S. & de Moraes, G.J. (2011) Mites GSDs: OlogamasidBase. *In*: Bisby, F.A., Y.R. Roskov, T.M. Orrell, D. Nicolson, L.E. Paglinawan, N. Bailly, P.M. Kirk, T. Bourgoin, G. Baillargeon (Eds.), *Species 2000 & ITIS Catalogue of Life: 2011 Annual Checklist.* DVD; Species 2000: Reading, UK. Available from: http://www.catalogueoflife.org/annual-check-list/2010/ (date of access March 2011).
Castilho, R.C., Narita, J.P.Z., de Moraes, G.J. & McMurtry, J.A. (2011) Mites GSDs: PhytoseiidBase. *In*: Bisby, F.A., Y.R. Roskov, T.M. Orrell, D. Nicolson, L.E. Paglinawan, N. Bailly, P.M. Kirk, T. Bourgoin, G. Baillargeon (Eds.), *Species 2000 & IT IS Catalogue of Life: 2011 Annual Checklist.* DVD; Species 2000: Reading, UK. Available from: http://www.catalogueoflife.org/annual-check-list/2010/ (date of access March 2011).
Chant, D.A. & McMurtry, J.A. (2007) *Illustrated keys and diagnoses for the genera and subgenera of the Phytoseiidae of the world (Acari: Mesostigmata).* Indira Publishing House, West Bloomfield, 220 pp.
De Moraes, G.J., McMurtry, J.A., Denmark, H.A. & Campos, C.B. (2004) A revised catalog of the mite family Phytoseiidae. *Zootaxa*, 434, 1–494.
Denmark, H.A. & Evans, G.A. (2011) *Phytoseiidae of North America and Hawaii (Acari: Mesostigmata).* Indira Publishing House, West Bloomfield, 451 pp.
Díaz-Aguilar, I. & Ujvári, Z. (2010) New zerconid mites (Acari: Mesostigmata: Zerconidae) from Canada, with a review of the genus *Mixozercon* Halašková, 1963. *Zootaxa*, 2555, 1–29.
Dowling, A.P.G., Bochkov A.V., & OConnor, B.M. (2007) Revision of the genus *Andreacarus* (Acari: Laelapidae) with description of seven new species and a new genus for Australian species formerly placed in *Andreacarus*. *Journal of Medical Entomology*, 44:405–421.
Dowling, A.P.G. & OConnor, B.M. (2010) Phylogenetic relationships within the suborder Dermanyssina (Acari: Parasitiformes) and a test of dermanyssoid monophyly. *International Journal of Acarology*, 36, 299–312.
Emberson, R.W. (2010) A reappraisal of some basal lineages of the family Macrochelidae, with the description of a new genus (Acarina: Mesostigmata). *Zootaxa*, 2501, 37–53.
Evans, G.O. & Till, W.M. (1966) Studies on the British Dermanyssidae (Acari: Mesostigmata). Part II. Classification. *Bulletin of the British Museum (Natural History), Zoology*, 14, 107–370.
Gilyarov, M.S. & Bregetova, N.G. (Eds.) (1977) *A Key to the Soil-Inhabiting Mites, Mesostigmata*. Nauka, Leningrad, 717 pp. (in Russian).
Halliday, R.B. (2008) Two new species of littoral mites from Australia (Acari: Halolaelapidae). *Systematic & Applied Acarology*, 13, 214–230.
Hirschmann, W. (1971) A fossil mite of the genus *Dendrolaelaps* (Acarina, Mesostigmata, Digamasellidae) found in amber from Chiapas, Mexico. *University of California Publications in Entomology*, 63, 69–70.
Hirschmann, W. (1979) Stadiensystematik der Parasitiformes. Teil 1. Stadienfamilien und Stadiengattungen der Atrichopygidiina, erstellt im Vergleich zum Gangsystem Hirschmann 1979. *Acarologie Schriftenreihe für Vergleichende Milbenkunde*, 26, 57–68.
Hirschmann, W. & Wiśniewski, J. (1982) Weltweite Revision der Gattungen *Dendrolaelaps* Halbert 1915 und Longoseius Chant 1961 (Parasitiformes). Band 1. Beschreibung der Untergattungen und Arten, Bestimmungstabellen, Chaetotaxie, Porotaxie. *Acarologie Schriftenreihe für Vergleichende Milbenkunde*, 29 (1), 1–183.
Hughes, A.M. (1961) *The mites of stored food. First edition*. Technical Bulletin 9. Ministry of Agriculture, Fisheries and Food. Her majesty's Stationery Office, London, 287 pp.
Karg, W. (1993) Acari (Acarina), Milben. Parasitiformes (Anactinochaeta) Cohors Gamasina Leach, Raubmilben. 2, überarbeitete Auflage. *Die Tierwelt Deutschlands*, 59, 1–523.
Karg, W. & Schorlemmer, A. (2011) New insights into the systematics of Parasitiformes (Acarina) with new species from South America. *Acarologia*, 51, 3–29.
Kramer, P. 1881. Ueber die Prinzipien der Classification bei den Gamasiden. *Zeitschrift für die Gesammten Naturwissenschaften*, 54, 638–642.
Krantz, G.W. & Walter, D.E. (Eds) (2009) *A Manual of Acarology 3rd Edition*. Texas Tech University Press, Lubbock, 807 pp.
Lekveishvili, M. & Klompen, H. (2004) Phylogeny of infraorder Sejina (Acari: Mesostigmata). *Zootaxa*, 629, 1–19.
Lindquist, E.E., Krantz, G.W. & Walter, D.E. (2009a) Chapter 8, Classification. *In*: Krantz G.W. & Walter D.E. (Eds.), *A Manual of Acarology 3rd Edition*. Texas Tech. University Press, Lubbock, pp. 97–103.
Lindquist, E.E., Krantz, G.W. & Walter, D.E. (2009b) Chapter 12, Order Mesostigmata. *In*: Krantz G.W. & Walter D.E. (Eds.), *A Manual of Acarology 3rd Edition*. Texas Tech. University Press, Lubbock, pp. 124–232.

Ma, L.-M. (2006) New synonyms of gamasid mites (Acari: Mesostigmata). *Acta Arachnologica Sinica*, 15, 23–26.
Mašán, P. (2007) *A review of the family Pachylaelapidae in Slovakia with systematics and ecology of European species (Acari: Mesostigmata: Eviphidoidea)*. Institute of Zoology, Slovak Academy of Sciences, Bratislava, 247 pp.
Naskrecki, P. & Colwell, R.K. (1998) *Systematics and host plant affiliations of hummingbird flower mites of the genera* Tropicoseius *Baker & Yunker and* Rhinoseius *Baker & Yunker (Acari: Mesostigmata: Ascidae)*. Thomas Say Publications in Entomology, Monographs, iv + 185 pp.
Papadoulis, G.T., Emmanouel, N.G. & Kapaxidi, E.V. (2009) *Phytoseiidae of Greece and Cyprus (Acari: Mesostigmata)*. Indira Publishing House, West Bloomfield, 200 pp.
Reuter, E. (1909) Zur Morphologie und Ontogenie der Acariden mit besonderer Berücksichtigung von *Pediculopsis graminum*. *Acta Societas Scientiarum Fennicae*, 36, 1-288.
Shcherbak, G.I. (1980) *The Palearctic mites of the family Rhodacaridae*. Naukova Durnka, Kiev. 212 pp.
Seeman, O.D. (2007) Revision of the Fedrizziidae (Acari: Mesostigmata: Fedrizzioidea). *Zootaxa*, 1480, 1–55.
Villegas-Guzman, G.A., Pérez, T.M. & Reyes-Castillo, P. (2009) New species of the genus *Klinckowstroemia* Baker & Wharton from Mexico (Acari: Mesostigmata: Trigynaspida: Klinckowstroemiidae). *Zootaxa*, 2248, 1–46
Walter, D.E. (1997) Heatherellidae – a new family of Mesostigmata (Acari: Parasitiformes) based on two new species from rainforest litter in Australia. *International Journal of Acarology*, 23, 167–175.
Walter, D.E. & Campbell, N.J.H. (2003) Exotic vs endemic biocontrol agents: Would the real *Stratiolaelaps miles* (Berlese) (Acari: Mesostigmata: Laelapidae), please stand up? *Biological Control*, 26, 253–269.
Witalinski, W. (2000) *Aclerogamasus stenocornis* sp. n., a fossil mite from the Baltic amber (Acari: Gamasida: Parasitidae). *Genus* (Wroclaw), 11, 619–626.
Zoological Record 1864–March 2011 — Available from: http://thomsonreuters.com/products_services /science /science_products/a-z/zoological_record

Contributor names and addresses

Frédéric Beaulieu, Canadian National Collection of Insects, Arachnids & Nematodes, Agriculture and Agri-Food Canada, 960 Carling ave., KW Neatby bldg, Ottawa, ON, Canada K1A 0C6; Frederic.Beaulieu@AGR.GC.CA
Ashley P.G. Dowling, Department of Entomology, University of Arkansas, 319 Agriculture Building, Fayetteville, AR USA 72701
Hans Klompen, Acarology Laboratory, Ohio State University, 1315 Kinnear Rd., Columbus, OH, USA 43212
Gilberto J. de Moraes, Depto. Entomologia e Acarologia, Universidade de São Paulo/ Escola Superior de Agricultura "Luiz de Queiroz", 13418-900 Piracicaba-SP, Brazil)
David Evans Walter, Invertebrate Zoology, Royal Alberta Museum, 12845 - 102 Avenue, Edmonton, AB, Canada T5N 0M6

Order **Trombidiformes** Reuter, 1909[1, 2]

Suborder **Sphaerolichida** OConnor, 1984 (2 superfamilies)[3]

Superfamily **Lordalychoidea** Grandjean, 1939 (2 families)

Family **Lordalychidae** Grandjean, 1939 (1 genus, 16 species)

Superfamily **Sphaerolichoidea** Berlese, 1913

Family **Sphaerolichidae** Berlese, 1913 (1 genus, 5 species)

Suborder **Prostigmata** Kramer, 1877 (4 infraorders, 40 superfamilies)

Infraorder **Labidostommatina** Krantz, 1978 (1 superfamily)

Superfamily **Labidostommatoidea** Oudemans, 1904 (1 family)

Family **Labidostommatidae** Oudemans, 1904 (5 genera, 51 species; †0/2)[4]

Infraorder **Eupodina** Krantz, 1978 (5 superfamilies)

Superfamily **Bdelloidea** Dugès, 1834 (2 families)

Family **Bdellidae** Dugès, 1834 (15 genera, 256 Species; †0/5)[5]

Family **Cunaxidae** Thor, 1902 (27 genera, 329 species)[6]

Superfamily **Eriophyoidea** Nalepa, 1898 (3 families)[7]

Family **Phytoptidae** Murray, 1877 (20 genera, 164 species)[8]

Family **Eriophyidae** Nalepa, 1898 (274 genera, 3,790 species)[9]

Family **Diptilomiopidae** Keifer, 1944 (63 genera, 450 species)

Superfamily **Eupodoidea** Koch, 1842 (9 families)[10]

Family **Cocceupodidae** Jesionowska, 2010 (3 genera, 23 species)[11]

Family **Eupodidae** Koch, 1842 (10 genera, 69 species)[12]

Family **Dendrochaetidae** Olivier, 2008 (1 genus, 1 species)[13]

Family **Eriorhynchidae** Qin & Halliday, 1997 (1 genus, 5 species)

Family **Pentapalpidae** Olivier & Theron, 2000 (1 genus, 1 species)

Family **Penthaleidae** Oudemans, 1931 (5 genera, 16 species)[14]

Family **Penthalodidae** Thor, 1933 (6 genera, 35 species; ; †0/1)[15]

Family **Rhagidiidae** Oudemans, 1922 (28 genera, 157 species; ; †1/1)

Family **Strandtmanniidae** Zacharda, 1979 (1 genus, 2 species)[16]

---

1. **BY** Zhi-Qiang Zhang, Qing-Hai Fan, Vladimir Pesic, Harry Smit, Andre V. Bochkov, A. A. Khaustov, Anne Baker, Andreas Wohltmann, Tinghuan Wen, James W. Amrine, P. Beron, Jianzhen Lin, Grzegorz Gabrys & Robert Husband (for full auhor addresses, see **Contributor roles and addresses** after **References**). The title of this contribution should be cited as "Order Trombidiformes Reuter, 1909. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Trombididformes currently include 151 families, 2,235 genera, and 25,821 species, whereas fossil taxa include 10 genera and 24 species.
2. Higher classification and estimates of genera and species within families generally follow Walter *et al.* (2009), with revisions and updates as otherwise indicated. To be consistent with Beaulieu *et al.* (2011) and Schatz *et al.* (2011) in this volume, the rank cohort is not used and older names for higher taxa are used—also consistent with OConnor (1984) and Mironov & Bochkov (2009).
3. Based on Moraza (2008) and Walter *et al.* (2009), with updates.
4. Based on Dunlop & Bertrand (2011); throughout this paper, counts of genera and species are totals (Recent and fossil); †x/y refers x genera and y species, among the totals, are based on fossil.
5. Based on van der Schyff *et al.* (2003), Hernandes & Feres (2006), Hernandes *et al.* (2007), with updates.
6. Based on Den Heyer (2011).
7. Based on unpublished database of James Amrine.
8. One species of fossil (Dunlop *et al.* 2011).
9. Three species of fossil galls (Dunlop *et al.* 2011).
10. Species numbers do not include taxa that are evidently correctly placed in the Eupodoidea but are insufficiently defined for recognition. Many of these were described by C.L. Koch (see Thor & Willmann 1941). Jesionowska (2010) and Zacharda (1980) list species inquirendae for the Cocceupodidae and Rhagidiidae respectively.
11. Based on Jesionowska (2010).
12. Fain (1964) synonymized *Protereunetes* Berlese with *Ereynetes* Berlese. Despite Strandtmann (1970) reassigning eupodid species described in *Protereunetes* to *Eupodes* Koch, the generic name continued to be used by some authors. Fain's synonymy is accepted and *Protereunetes* is not here recognized as a eupodid genus.

    Jesionowska (2008) transferred *Hawaiieupodes* Strandtmann & Goff from the Eupodidae to the Penthalodidae. However, the unsettled diagnosis of the latter means that the new placement is also unsatisfactory. Consequently, the genus is here retained in the Eupodidae as originally assigned (Strandtmann & Goff 1978).

    Abou-Awad (1984) erected *Egypteupodes* on the basis of the absence of internal vertical setae (*iv*). Olivier and Theron (1997) synonymized the genus with *Eupodes* because they observed that, although minute, *iv* were present. However, because it is not clear whether these authors examined type material, *Egypteupodes* is included in the generic complement.
13. Published in 2008, 2009, too late to be included by Walter *et al.* (2009).
14. See first footnote for the Penthalodidae.

Superfamily **Halacaroidea** Murray, 1877 (2 families)
Family **Halacaridae** Murray, 1877 (63 genera, 1,118 species)[17]
Family **Pezidae** Harvey, 1990 (1 genus, 2 species)
Superfamily **Tydeoidea** Kramer, 1877 (4 families)[18]
Family **Triophtydeidae** André, 1980[19] (3 genera, 40 species)
Family **Ereynetidae** Oudemans, 1931 (29 genera, 180 species)
Family **Tydeidae** Kramer, 1877 (30 genera, 340 species; †1/2)
Family **Iolinidae** Pritchard, 1956 (36 genera, 125 species)
Infraorder **Anystina** van der Hammen, 1972 (2 hyporders, 22 superfamilies)
Hyporder **Anystae** Krantz, 1978 (5 superfamilies)
Superfamily **Adamystoidea** Cunliffe, 1957 (1 family)
Family **Adamystidae** Cunliffe, 1957 (4 genera, 20 species)[20]
Superfamily **Anystoidea** Oudemans, 1936 (3 families)
Family **Anystidae** Oudemans, 1936 (18 genera, 107 species; †2/5)[21]
Family **Pseudocheylidae** Oudemans, 1909 (3 genera, 15 species)[22]
Family **Teneriffiidae** Thor, 1911 (5 genera, 20 species)[23]
Superfamily **Caeculoidea** Berlese, 1883 (1 family)
Family **Caeculidae** Berlese, 1883 (7 genera, 73 species; †1/2)[24]
Superfamily **Pomerantzioidea** Baker, 1949 (1 family)
Family **Pomerantziidae** Baker, 1949 (2 genera, 6 species)[25]
Superfamily **Paratydeoidea** Baker, 1949 (1 family)
Family **Paratydeidae** Baker, 1949 (6 genera, 10 species)[26]
Family **Stigmocheylidae** Kethley, 1990 (1 genus, 4 species)[27]
Hyporder **Parasitengona** Oudemans, 1909 (17 superfamilies)[28]
Superfamily **Calyptostomatoidea** Oudemans, 1923 (1 family)[29]
Family **Calyptostomatidae** Oudemans, 1923 (1 genus, 6 species)
Superfamily **Erythraeoidea** Robineau-Desvoidy, 1828 (2 families)[30]
Family **Erythraeidae** Robineau-Desvoidy, 1828 (55 genera, 771 species)[31]
Family **Smarididae** Kramer, 1878 (10 genera, 53 species)[32]

15. **Penthalodidae**: Qin (1997) considered that *Protopenthalodes* Jesionowska would be better accommodated in either the Eupodidae or Penthaleidae, rather than the Penthalodidae as originally placed (Jesionowska 1989). However, he retained the genus in the latter until familial monophyly was resolved and a correct taxonomic position could be established.

    Jesionowska (2008) reassessed the importance of the epirostrum as a diagnostic familial character state and concluded that *Callipenthalodes* Qin, *Turanopenthalodes* Barilo and *Stereotydeus* Berlese should be removed from the Penthalodidae. Because she neither reassigned them to existing families nor erected new ones for them, these genera have been treated here as penthalodids.
16. Strandtmanniidae is considered a possible junior synonym of Rhagidiidae by Qin (1996).
17. Based on Bartsch (2009).
18. After Walter *et al.* (2009); we regret to note here that the data were not checked by a specialist.
19. H.M. André of Belgium (not M. André of France).
20. Based on Fuangarworn & Lekprayoon (2010).
21. Based on Meyer & Ueckermann (1987), Otto (1999, 2000), with updates.
22. Based on Ueckermann & Khanjani (2004).
23. Based on Judson (1994), Ueckermann & Khanjani (2002), Khanjani *et al.* (2011), with updates.
24. Based on Franz (1952), Coineau & Poinar (2001), with updates.
25. Based on Bochkov & Walter (2007).
26. Based on Seeman *et al.* (2000).
27. Based on Bochkov (2008a).
28. The classification above the family level is highly unsettled for this group (Zhang & Fan, 2007). One view is that water mites (Hydracarina) form a sister group to the rest of the terrestrial Parasitengona (Krantz 1978; Smith & Cook 1991; Witte 1991). A radically different view (Welbourn (1991), is that water mites and Trombidiina are considered sister groups, and together they form a sister group to Erythraeina (Erythraeoidea + Calyptostomatoidea). Walter *et al.* (2009) proposed Stygothrombiae for Stygothrombidioidea, which was not analysed in Witte (1991) and Welbourn (1991). Future analyses sampling all superfamilies of both water mites and terrestrial Parasitengona are much needed before any reliable classification of the Parasitengona at the ordinal level can be reached. Therefore we provide a list of superfamilies without choosing any higher classification.
29. Based on unpublished list of Beron, who also provided data for Erythraeoidea.
30. †*Pararainbowia martilli* Dunlop, 2007 is unplaced within the superfamily.
31. Based on Southcott (1961), Beron (2008) with updates. Dunlop *et al.* (2011) listed 13 species described from Baltic amber in 1854; these require checking.
32. Based on Southcott (1961), Zhang (2003), Beron (2008), Wohltmann (2010) with updates.

Family †**Proterythraeidae** Vercammen-Grandjean, 1973 (1 genus, 1 species; †1/1)

Superfamily **Amphotrombioidea** Zhang, 1998 (1 family)[33]

Family **Amphotrombiidae** Zhang, 1998 (1 genus, 1 species)

Superfamily **Allotanaupodoidea** Zhang & Fan, 2007 (1 family)[34]

Family **Allotanaupodidae** Zhang & Fan, 2007 (3 genera, 6 species)

Superfamily **Chyzerioidea** Womersley, 1954 (1 family)

Family **Chyzeriidae** Womersley, 1954 (11 genera, 30 species)[35]

Superfamily **Tanaupodoidea** Thor, 1935 (1 family)

Family **Tanaupodidae** Thor, 1935 (7 genera, 23 species; †1/1)[36]

Superfamily **Trombiculoidea** Ewing, 1929 (7 families)

Family **Johnstonianidae** Thor, 1935 (10 genera, 53 species)[37]

Family **Neotrombidiidae** Feider, 1959 (5 genera, 24 species)[38]

Family **Trombellidae** Leach, 1815 (19 genera, 41 species)[39]

Family **Leeuwenhoekiidae** Womersley, 1944 (33 genera, 230 species)

Family **Trombiculidae** Ewing, 1929 (152 genera, 3,100 species)[40]

Family **Walchiidae** Ewing, 1946 (19 genera, 298 species)

Family **Audyanidae** Southcott, 1987 (1 genus, 1 species)[41]

Superfamily **Trombidioidea** Leach, 1815 (4 families)

Family **Achaemenothrombiidae** Saboori, Wohltmann & Hakimitabar, 2010 (1 genus, 2 species)[42]

Family **Neothrombiidae** Feider, 1959 (16 genera, 25 species)[43]

Family **Microtrombidiidae** Thor, 1935 (126 genera, 437 species)[44]

Family **Trombidiidae** Leach, 1815 (25 genera, 253 species)[45]

Superfamily **Yurebilloidea** Southcott, 1996 (1 family)[46]

Family **Yurebillidae** Southcott, 1996 (1 genus, 1 species)[47]

Superfamily **Hydryphantoidea** Piersig, 1896 (8 families)[48]

Family **Hydryphantidae** Piersig, 1896 (51 genera, 329 species)

Family **Hydrodromidae** Viets, 1936 (2 genera, 28 species)

Family **Rhynchohydracaridae** Lundblad, 1936 (5 genera, 13 species)

Family **Teratothyadidae** Viets, 1929 (2 genera, 9 species)

Family **Ctenothyadidae** Lundblad, 1936 (2 genera, 3 species)

Family **Thermacaridae** Sokolow, 1927 (1 genera, 4 species)

Family **Zelandothyadidae** Cook, 1983 (2 genera, 3 species)

Family **Malgasacaridae** Tuzovskij, Gerecke & Goldschmidt 2007 (1 genus, 1 species)

Superfamily **Eylaoidea** Leach, 1815 (4 families)

Family **Eylaidae** Leach, 1815 (2 genera, 96 species)

Family **Limnocharidae** Grube, 1859 (5 genera, 44 species)

---

33. Based on larval stage only with similarities to both early-derivative water mites and Trombidina (Zhang 1998),
34. This superfamily was missed in the chapter on Trombidiformes in the *Manual of Acarology*, third edition (Walter *et al.* 2009). Zhang & Fan (2007) provided a key to superfamilies of terrestrial Parasitengona (based on post-larval stages).
35. Based on Zhang & Saboori (1995); Haitlinger (1999), Saboori *et al.* (2005), with updates.
36. Based on Newell (1957), Welbourn, W.C. (1991), Judson & Makol (2009) with updates.
37. Based on Newell (1957, 1960), Wohltmann *et al.* (2004), with updates.
38. Based on Lindquist & Vercammen-Grandjean (1971), Vercammen-Grandjean (1973), Feider (1977), Beron (1995), with updates.
39. Based on Southcott (1987), Welbourn (1991), Harvey (1996), Saboori *et al.* (2005) with updates.
40. An estimate to be varified.
41. Also placed by some authors in Trombellidae (Southcott 1987).
42. Known from larvae only; Saboori *et al.* (2010) provided a key to families of Trombidioidea based on larvae.
43. Based on Zhang (1994), Zhang & Fan (2005), Haitlinger (2007), Saboori *et al.* (2008) and Mąkol *et al.* (2009), with updates.
44. Based on Southcott (1993, 1994), Gabryś (1999), Wohltmann (2006), Mąkol & Laydanowicz (2010) with updates; Eutrombidiidae is merged into Microtrombidiidae based on phylogenetic work of Wohltmann (2006).
45. Updated based on Mąkol (2007) and Mąkol & Sevsay (2011). Includes Podothrombiidae recognized in Mąkol (2007) and some earlier papers cited by Mąkol (2007). Dunlop *et al.* (2011) listed 5 species described from Baltic amber in 1854; these require checking.
46. Updated from Southcott (1993) and Mąkol & Gabryś (2005).
47. Described by Southcott (1996) from larval stage only, initially placed in Trombidioidea *s.l.*, but was excluded from Trombidioidea *s.s.* by Saboori *et al.* (2010). Here it is placed in Yurebilloidea Southcott, 1996; superfamily rank is used here for the first time; decision by Z. Zhang. Based on larval characters, this superfamily is very closely related to Trombidoidea sin its strict sense.
48. Davids *et al.* (2006) with updates.

Family **Piersigiidae** Oudemans, 1902 (4 genera, 9 species)
Family **Apheviderulicidae** Gerecke, Smith & Cook, 1999 (1 genus, 3 species)
Superfamily **Hydrovolzioidea** Thor, 1905 (2 families)
Family **Hydrovolziidae** Thor, 1905 (3 genera, 16 species)
Family **Acherontacaridae** Cook, 1967 (2 genera, 19 species)
Superfamily **Hydrachnoidea** Leach, 1815 (1 family)
Family **Hydrachnidae** Leach, 1815 (1 genus, 131 species)
Superfamily **Lebertioidea** Thor, 1900 (10 families)
Family **Bandakiopsidae** Panesar, 2004 (3 genera, 4 species)
Family **Stygotoniidae** Cook, 1992 (1 genus, 1 species)
Family **Sperchontidae** Thor, 1900 (5 genera, 173 species)
Family **Rutripalpidae** Sokolow, 1934 (1 genus, 2 species)
Family **Teutonidae** Koenike, 1910 (2 genera, 6 species)
Family **Anisitsiellidae** Koenike, 1910 (29 genera, 159 species)
Family **Lebertiidae** Thor, 1900 (3 genera, 138 species)
Family **Acucapitidae** Wiles, 1996 (1 genus, 2 species)
Family **Oxidae** Viets, 1926 (2 genera, 126 species)
Family **Torrenticolidae** Piersig, 1902 (6 genera, 397 species)
Superfamily **Hygrobatoidea** Koch, 1842 (13 families)
Family **Pontarachnidae** Koenike, 1910 (2 genera, 40 species)
Family **Limnesiidae** Thor, 1900 (29 genera, 227 species)
Family **Omartacaridae** Cook, 1963 (2 genera, 14 species)
Family **Wettinidae** Cook, 1956 (4 genera, 9 species)
Family **Frontipodopsidae** Viets, 1931 (1 genus, 9 species)
Family **Ferradasiidae** Cook, 1980 (1 genus, 1 species)
Family **Lethaxonidae** Cook, Smith & Harvey, 2000 (3 genera, 16 species)
Family **Hygrobatidae** Koch, 1842 (82 genera, 846 species)
Family **Aturidae** Thor, 1900 (81 genera, 800 species)
Family **Feltriidae** Viets, 1926 (1 genus, 115 species)
Family **Unionicolidae** Oudemans, 1909 (18 genera, 477 species)
Family **Pionidae** Thor, 1900 (15 genera, 342 species)
Family **Astacocrotonidae** Thor, 1927 (1 genus, 1 species)
Superfamily **Arrenuroidea** Thor, 1900 (20 families)
Family **Momoniidae** Viets, 1926 (13 genera, 55 species)
Family **Nudomideopsidae** Smith, 1990 (3 genera, 31 species)
Family **Mideopsidae** Koenike, 1910 (8 genera, 113 species)
Family **Athienemanniidae** Viets, 1922 (16 genera, 43 species)
Family **Chappuisididae** Motas & Tanasachi, 1946 (2 genera, 13 species)
Family **Gretacaridae** Viets, 1978 (1 genus, 15 species)
Family **Neoacaridae** Motas & Tanasachi, 1947 (2 genera, 19 species)
Family **Mideidae** Thor, 1911 (2 genera, 6 species)
Family **Acalyptonotidae** Walter, 1911 (2 genera, 4 species)
Family **Kantacaridae** Imamura, 1959 (1 genus, 1 species)
Family **Nipponacaridae** Imamura, 1959 (1 genus, 3 species)
Family **Harpagopalpidae** Viets, 1924 (1 genus, 7 species)
Family **Arenohydracaridae** Cook, 1974 (1 genus, 3 species)
Family **Amoenacaridae** Smith & Cook, 1997 (1 genus, 3 species)
Family **Laversiidae** Cook, 1955 (1 genus, 1 species)
Family **Krendowskiidae** Viets, 1926 (4 genera, 52 species)
Family **Arrenuridae** Thor, 1900 (7 genera, 950 species)
Family **Bogatiidae** Motas & Tanasachi, 1948 (2 genera, 3 species)
Family **Hungarohydracaridae** Motas & Tanasachi, 1959 (5 genera, 17 species)
Family **Uchidastygacaridae** Imamura, 1956 (3 genera, 15 species)
Superfamily **Stygothrombidioidea** Thor, 1935 (1 family)

Family **Stygothrombiidae** Thor, 1935 (5 genera, 16 species)

Infraorder **Eleutherengona** Oudemans , 1909 (12 superfamilies)

Hyporder **Raphignathina** Kethley, 1982 (5 superfamilies)

Superfamily **Cheyletoidea** Leach, 1815 (5 families)

Family **Cheyletidae** Leach, 1815 (75 genera, 438 species)[49]

Family **Demodicidae** Nicolet, 1855 (7 genera, 108 species)[50]

Family **Harpirhynchidae** Dubinin, 1957 (14 genera, 93 species)[51]

Family **Psorergatidae** Dubinin, 1955 (3 genera, 73 species)[52]

Family **Syringophilidae** Lavoipierre, 1953 (63 genera, 259 species)[53]

Superfamily **Myobioidea** Mégnin, 1877 (1 family)

Family **Myobiidae** Mégnin, 1877 (54 genera, 503 species)[54]

Superfamily **Pterygosomatoidea** Oudemans, 1910 (1 family)

Family **Pterygosomatidae** Oudemans, 1910 (10 genera, 166 species)[55]

Superfamily **Raphignathoidea** Kramer 1877 (11 families)[56]

Family **Barbutiidae** Robaux, 1975 (1 genus, 5 species)[57]

Family **Caligonellidae** Grandjean, 1944 (5 genera, 50 species)[58]

Family **Camerobiidae** Southcott, 1957 (7 genera, 146 species; †0/1)[59]

Family **Cryptognathidae** Oudemans, 1902 (3 genera, 52 species)[60]

Family **Dasythyreidae** Walter & Gerson, 1998 (2 genera, 5 species)[61]

Family **Eupalopsellidae** Willmann, 1952 (5 genera, 40 species)[62]

Family **Homocaligidae** Wood, 1970 (2 genera, 8 species)[63]

Family **Mecognathidae** Gerson & Walter, 1998 (2 genera, 7 species)[64]

Family **Raphignathidae** Kramer, 1877 (3 genera, 57 species)[65]

Family **Stigmaeidae** Oudemans, 1931 (30 genera, 502 species)[66]

Family **Xenocaligonellididae** Gonzalez, 1978 (2 genera, 5 species)[67]

Superfamily **Tetranychoidea** Donnadieu 1875 (5 families)

Family **Allochaetophoridae** Reck, 1959 (1 genus, 2 species)[68]

Family **Linotetranidae** Baker & Pritchard, 1953 (4 genera, 16 species)[69]

Family **Tenuipalpidae** Berlese, 1913 (34 genera, 895 species)[70]

Family **Tetranychidae** Donnadieu 1875 (95 genera, 1,270 species)[71]

Family **Tuckerellidae** Baker & Pritchard, 1953 (1 genus, 28 species)[72]

Hyporder **Heterostigmata** Berlese, 1899 (7 superfamilies)

---

49. Based on Bochkov (2005) with additions.
50. Based on Bochkov (2009) with modifications.
51. Based on a unpublished database of A.V. Bochkov.
52. Based on Giesen (1990).
53. Based on Skoracki (2011) with additions.
54. Based on Bochkov (2009).
55. Based on Bochkov (2008b) with additions.
56. Based on a unpublished database of Q.-H. Fan.
57. Based on Fan *et al.* (2003) with additions.
58. Based on Fan (2005).
59. Based on Fan (2005) and Fan & Walter (2011) with additions.
60. Based on Doğan & Dönel (2010) and Fan (2005).
61. Based on Walter & Gerson (1998) with additions.
62. Based on Fan (2005) with additions.
63. Based on Fan (1997, 2005).
64. Based on Fan & Zhang (2005) and Fan (2005).
65. Based on Fan (2005) with additions.
66. Based on Fan & Zhang (2005), Meyer & Ueckermann (1989) and Fan (2005) with additions.
67. Based on Fan (2005).
68. Based on Meyer & Ueckermann (1997).
69. Baed on Bagheri *et al*. (2008) and Khanjani *et al*. (2011), with updates.
70. Based on Mesa *et al*. (2009) and Beard & Gerson (2009), with updates by Q.-H. Fan.
71. Based on Spider Mites Web (http://www.ensam.inra.fr/CBGP/spmweb/index.php). Dunlop *et al*. (2011) listed 2 species described from Baltic amber in 1854; these require checking.
72. Based on Meyer & Ueckermann (1997) with additions.

Superfamily **Dolichocyboidea** Mahunka, 1970 (1 family)
Family **Dolichocybidae** Mahunka, 1970 (6 genera, 37 species)[73]
Family **Crotalomorphidae** Lindquist & Krantz, 2002 (1 genus, 1 species)
Superfamily **Heterocheyloidea** Trägårdh, 1950 (1 family)
Family **Heterocheylidae** Trägårdh, 1950 (1 genus, 25 species)
Superfamily **Pyemotoidea** Oudemans, 1937 (4 families)
Family **Acarophenacidae** Cross, 1965 (7 genera, 31 species; †1/1)
Family **Caraboacaridae** Mahunka, 1970 (2 genera, 7 species)
Family **Resinacaridae** Mahunka, 1976 (2 genera, 2 species; †1/1)
Family **Pyemotidae** Oudemans, 1937 (1 genus, 24, species; †1/1)[74]
Superfamily **Pygmephoroidea** Cross, 1965 (4 families)[75]
Family **Pygmephoridae** Cross, 1965 (27 genera, 310 species)
Family **Scutacaridae** Oudemans, 1916 (24 genera, 802 species)
Family **Microdispidae** Cross, 1965 (17 genera, 109 species)
Family **Neopygmephoridae** Cross, 1965 (17 genera, 248 species)
Superfamily **Tarsocheyloidea** Atyeo & Baker, 1964 (1 family)
Family **Tarsocheylidae** Atyeo & Baker, 1964 (2 genera, 3 species)
Superfamily **Tarsonemoidea** Kramer, 1877 (2 families)
Family **Podapolipidae** Ewing, 1922 (30 genera, 239 species)
Family **Tarsonemidae** Kramer, 1877 (41 genera, 566 species)[76]
Superfamily **Trochometridioidea** Mahunka 1970 (2 families)
Family **Trochometridiidae** Mahunka 1970 (2 genera, 6 species)[77]
Family **Athyreacaridae** Lindquist, Kaliszewski & Rack, 1990 (1 genus, 1 species)
Hyporder incertae sedis
Superfamily **Cloacaroidea** Camin, Moss, Oliver & Singer, 1967 (2 families)[78]
Family **Cloacaridae** Camin, Moss, Oliver & Singer, 1967 (6 genera, 14 species)
Family **Epimyodicidae** Fain, Lukoschus & Rosmalen, 1982 (1 genus, 4 species)

References

Abou-Awad, B.A. (1984) The eupodid mites of Egypt (Acari: Eupodoidea: Eupodidae). *Acarologia*, 25(4), 329–335.

Bagheri, M., Irani-Nejad, K.H., Kamali, K., Khanjani, M., Saboori, A. & Lotfollahi, P. (2008) A new species of *Linotetranus* (Acari: Prostigmata: Linotetranidae) from Iran. *Zootaxa*, 1914, 65–68.

Bartsch, I. (2009) Checklist of marine and freshwater halacarid mite genera and species (Halacaridae: Acari) with notes on synonyms, habitats, distribution and descriptions of the taxa. *Zootaxa*, 1998, 1–170.

Beard, J.J. & Gerson, U. (2009) A new flat mite genus, *Acaricis* (Prostigmata: Tenuipalpidae), from Australian sedges (Cyperaceae). *Zootaxa*, 2073, 31–44.

Beaulieu, F., Dowling, A.P.G, Klompen, H., Moraes, G.J. de & Walter, D.E. (2011) Superorder Parasitiformes Reuter, 1909. *In*: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 123–128.

Beron, P. (1995) A new larval species of *Neotrombidium* (Acariformes, Actinedida: Neotrombidiidae) from Cuba. *Historia Naturalis Bulgarica*, 5, 13–18.

Beron, P. (2008) *Acarorum catalogus. I. Acariformes: Calyptostomatoidea (Calyptostomatidae), Erythraeoidea (Smarididae, Erythraeidae)*. Pensoft & NMNH, Sofia, 271 pp.

Bochkov, A. (2005) Synopsis of the described Actinedida of the world. Superfamily Cheyletoidea. *In*: Hallan, J. (Ed.), *Synopsis of the Described Arachnida of the World*. Available from: http://insects.tamu.edu/research/collection/hallan/acari/Family/Actinedida1.htm (accessed 23 November 2011)

Bochkov, A.V. (2008a) A review of the mite family Stigmocheylidae Berlese (Acari: Prostigmata). *Annales Zoologici*, 58, 311–325.

Bochkov, A.V. (2008b) Origin and evolution of parasitism in mites of the infraorder Eleutherengona (Acari: Prostigmata). Report I. Lower Raphignathae. *Parazitologiya*, 42, 337–359. [In Russia with English Summary]

73. Based on Hajiqanbar & Khaustov (2010) and Rahiminejad *et al.* (2011).
74. Based on Yu *et al*. (2010) and a recent fossil species in Khaustov & Perkovsky (2010).
75. The system of Pygmephoroidea follows Khaustov (2008).
76. Based on Lin & Zhang (2002) with updates.
77. Based on Mortazavi *et al.* (2011).
78. Based on Bochkov & OConnor (2008), see this work for discussion about position of this superfamily.

Bochkov, A.V. (2009) A review of mites of the parvorder Eleutherengona (Acariformes: Prostigmata) – permanent parasites of mammals. *Acarina*, Supplement 1, 1–149.
Bochkov, A.V. & OConnor, B.M. (2008) A new mite superfamily Cloacaroidea and its position within the Prostigmata (Acariformes). *The Journal of Parasitology*, 94, 335–344.
Bochkov, A.V. & Walter, D.E. (2007) The life-cycle of *Pomerantzia philippina* sp.n. (Prostigmata: Pomerantziidae) described from the Philippines. *Acarina*, 15, 159–170.
Coineau, Y. & Poinar, G. (2001) A Caeculidae from Dominican amber. *Acarologia*, 41(1–2), 141–144.
Davids, C., Di Sabatino, A., Gerecke, R., Gledhill, T. & Smit, H. (2006) Acari, Hydrachnidia I. *In*: Gerecke, R. (ed.): *Süßwasserfauna von Mitteleuropa*, Vol. 7, 2-1 (2007). Spektrum Elsevier, pp. 241–388.
Den Heyer, J. (2011) Some statistics on the taxonomy of the family Cunaxidae (Acari: Prostigmata). *In*: Moraes, G.J. de & Proctor, H. (Eds), Acarology XIII: Proceedings of the International Congress. *Zoosymposia*, 6, 34–38.
Doğan, S. & Dönel, G. (2010) *Cryptofavognathus*, a new genus of the family Cryptognathidae Oudemans (Acari: Raphignathoidea), with the description of a new species from Turkey. *Zootaxa*, 2533, 36–42.
Dunlop, J.A. (2007) A large parasitengonid mite (Acari, Erythraeoidea) from the Early Cretaceous Crato Formation of Brazil. *Fossil Record*, 10, 91–98.
Dunlop, J.A. & Bertrand, M. (2011) Fossil labidostomatid mites (Prostigmata: Labidostommatidae) from Baltic amber. *Acarologia*, 51(2), 191–198.
Dunlop, J.A., Penney, D. & Jekel, D. (2011) A summary list of fossil spiders and their relatives. *In*: Platnick, N. I. (ed.) The world spider catalog, version 12.0. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html DOI: 10.5531/db.iz.0001.
Fain, A. (1964) Les Ereynetidae de la collection Berlese à Florence designation d'une espèce type pour le genre *Ereynetes* Berlese. *Redia*, 49, 87–111.
Fan, Q.-H. (1997) The Homocaligidae (Acari: Raphignathoidea) from China, with description of two new species. *Entomologia Sinica*, 4, 337–342.
Fan, Q.-H. (2004) A catalogue of the genus *Eupalopsellus* Sellnick (Acari: Prostigmata, Eupalopsellidae) with the description of a new species from China. *Biologia, Bratislava*, 59(5), 533–545.
Fan, Q.-H. (2005) Superfamily Raphignathoidea. In: J. Hallan, (Ed.), *Synopsis of the described Actinedida of the World*. Available from: http://insects.tamu.edu/research/collection/hallan/acari/Family/Actinedida1.htm (accessed 5 Dec. 2011).
Fan, Q.-H. & Walter, D.E. (2011) *Acamerobia inflatus* gen. n. & sp. n. from Australia (Acari: Prostigmata: Raphignathoidea: Camerobiidae) with notes on the idiosomal chaetotaxy. *Zootaxa*, 3045, 45–56.
Fan, Q.-H., Walter, D.E. & Proctor, H.C. (2003) A Review of the family Barbutiidae (Acari: Raphignathoidea), with the description of two new species from Australia. *Systematic and Applied Acarology*, 8, 107–130.
Fan, Q.-H. & Zhang, Z.-Q. (2005) *Raphignathoidea (Acari: Prostigmata). Fauna of New Zealand 52*. Manaaki Whenua Press. 400 pp.
Feider, Z. (1977) Quelques acariens cavernicoles de Cuba de la super-famille Trombiculoidea. *In*: T. Orghidan, A. Núñez Jimenez *et al.* (Eds.), *Résultats des expéditions biospéologiques cubano-roumaines à Cuba. 2*. Institut de Spéologie "Emil Racovitza" Romania, pp. 201–208.
Franz, H. (1952) Revision der Caeculidae Berlese 1883 (Acari). *Bonner zoologische Beiträge*, 3(1–2), 91–124.
Fuangarworn, M. & Lekprayoon, C. (2010) *Adamystis thailandensis* sp. nov. (Acari: Prostigmata: Adamystidae), a new species of soil mites from Thailand with a key to world species of Adamystidae. *Zootaxa*, 2649, 61–68.
Gabryś, G. (1999) The world genera of Microtrombidiidae (Acari, Actinedida, Trombidioidea). *Monographs of the Upper Silesian Museum*, 2, 1–361.
Giesen, K.M.T. (1990) A review of the parasitic mite family Psorergatidae (Cheyletoidea: Prostigmata: Acari) with hypotheses on the phylogenetic relationships of species and species groups. *Zoologische Verhandelingen*, 259, 1–69.
Haitlinger, R. (1999) Three new species of larval Chyzeriidae associated with Orthoptera (Insecta) from Cyprus, Crete and Peru, with description of the new subfamily Perumaroptinae and three new genera *Napassenia*, *Cretessenia* and *Perumaropta* (Acari: Prostigmata). *Bollettino della Società Entomologica Italiana*, 131, 3–13.
Haitlinger, R. (2007) A new larval neothrombiid, *Giftitrombium skalaensis* gen. n., sp. n. (Acari: Prostigmata: Neothrombiidae) from Greece. *Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wrocławiu, Biologia Hodowla Zwierząt* LV, (559), 17–22.
Hajiqanbar , H. & Khaustov, A. (2010) A new species group and five new species of the genus *Pavania* (Acari: Dolichocybidae) associated with insects, with notes on leg chaetotaxy and the distribution of genera. *European Journal of Entomology*, 107(3), 441–453.
Harvey, M.S. (1996) A revised placement for *Austrotrombella* Southcott (Acarina: Hydryphantidae). *Transactions of the Royal Society of South Australia*, 120, 37–40.
Hernandes, F.A., Daud, R.D. & Feres, R.J.F. (2007) A new species of *Hexabdella* (Acari: Bdellidae) from Brazil. *Zootaxa*, 1501, 57–63.
Hernandes, F.A. & Feres, R.J.F. (2006) *Tetrabdella neotropica* (Acari: Bdellidae), a new genus and species from Brazil. *Zootaxa*, 1135, 57–68.
Jesionowska, K. (1989) New genus and new species of mite of the family Penthalodidae (Actinotrichida, Actinedida, Eupodoidea) from Poland. *Acta Zoologica Cracoviensia*, 32(3), 57–67.
Jesionowska, K (2008) Redescription of *Hawaiieupodes thermophilus* Strandtmann et Goff, 1978 (Acari: Prostigmata: Eupodoidea: Penthalodidae) from Hawaii, with a discussion of the systematic status of the taxon. *Annales Zoologici*, 58(2), 337–346.
Jesionowska, K. (2010) Cocceupodidae, a new family of eupodoid mites, with description of a new genus and two new species from Poland. Part I. (Acari: Prostigmata: Eupodoidea). *Genus*, 21(4), 637–658.
Judson, M. (1994) Studies on the morphology and systematics of the Teneriffiidae (Acari, Prostigmata). I: a new species of *Neotener-*

iffiola from Namibia. *Acarologia*, 35(2), 115–134.
Judson, M.L.I. & Mąkol, J. (2009) A mite of the family Tanaupodidae (Arachnida, Acari, Parasitengona) from the Lower Cretaceous of France. *Geodiversitas*, 31(1), 41–47.
Judson, M. & Wunderlich, J. (2003) Rhagidiidae (Acari, Eupodoidea) from Baltic amber. *Acta Zoologica Cracoviensia*, 46(supplement), 146–152.
Khanjani, M., Fayaz, B.A. & Ueckermann, E.A. (2011) A new species of the genus *Austroteneriffia* (Acari: Anystina: Teneriffiidae) from western Iran. *International Journal of Acarology*, 37(6), 550–555.
Khanjani, M., Fayaz, B.A. & Khanjani, M. (2011) Two new species of *Linotetranus* (Parasitiformes: Tetranychoidea: Linotetranidae) from Iran. *Zootaxa*, 2834, 47–56.
Khaustov, A.A. (2008) *Mites of the family Scutacaridae of Eastern Palaearctic*. Akademperiodyka, Kiev, 291 pp.
Khaustov, A.A. & Perkovsky, E.E. (2010) The first fossil record of mites of the family Pyemotidae (Acari: Heterostigmata), with description of a new species of the genus *Pyemotes* from Rovno amber. *Paleontologicheskii Zhurnal*, 4, 56–58.
Krantz, G.W. (1978) *A Manual of Acarology (second edition)*. Oregon State University Book Stores Inc., Corvallis. 509 pp.
Lin, J.-Z. & Zhang, Z.-Q. (2002) *Tarsonemidae of the world (Acari: Prostigmata): key to genera, geographical distribution, systematic catalogue & annotated bibliography*. Systematic & Applied Acarology Society, London, 440 pp.
Lindquist, E.E. & Vercammen-Grandjean, P.H. (1971) Revision of the chigger-like larvae of the genera *Neotrombidium* Leonardi and Monunguis Wharton, with a redefinition of the subfamily Neotrombidiinae Feider in the Trombidiidae (Acarina: Prostigmata). *Canadian Entomologist*, 103, 1557–1590.
Mąkol, J. (2007) Generic level review and phylogeny of Trombidiidae and Podothrombiidae (Acari: Actinotrichida: Trombidioidea) of the World. *Annales Zoologici*, 57(1), 1–194.
Mąkol, J. & Gabryś, G. (2005) *Caecothrombium deharvengi* sp. nov. (Acari: Actinotrichida: Eutrombidiidae) from Vietnam, with a proposal of Caecothrombiinae subfam. nov. *Zoologischer Anzeiger*, 243, 227–237.
Mąkol, J. & Łaydanowicz, J. (2010) A new species of *Valgothrombium* Willmann, 1940, with additional taxonomic data for Valgothrombiinae genera known as larvae (Acari: Prostigmata: Microtrombidiidae). *Zootaxa*, 2647, 16–34.
Mąkol, J., Łaydanowicz, J. & Kłosińska, A. (2009) A redescription of *Neothrombium neglectum* (Bruyant, 1909) with revision of *Neothrombium* (Acari: Neothrombiidae) and notes on the biology of species. *International Journal of Acarology*, 35, 275–301.
Mąkol, J. & Sevsay, S. (2011) Notes on the genus *Dolichothrombium* (Acari: Prostigmata: Trombidiidae) with description of a new species. *Zootaxa*. 2971, 1–16.
Mesa, N.C., Ochoa, R., Welbourn, W.C., Evans, G. & Moraes, G.J. de (2009) A catalog of the Tenuipalpidae (Acari) of the World with a key to genera. *Zootaxa*, 2098, 1–185.
Meyer, M.K.P. (Smith) & Ueckermann, E.A. (1987) A taxonomic study of some Anystidae (Acari: Prostigmata). *Entomology Memoir 68. Department of Agriculture and Fisheries, Republic of South Africa*, 1–37.
Meyer, M.K.P. (Smith) & Ueckermann, E.A. (1989) African Raphignathoidea (Acari: Prostigmata). *Entomology Memoir 74. Department of Agriculture and Water Supply, Republic of South Africa*, 1–58.
Meyer, M.K.P. (Smith) & Ueckermann, E.A. (1997) A review of some species of the families Allochaetophoridae, Linotetranidae and Tuckerellidae (Acari: Tetranychoidea). *International Journal of Acarology*, 23, 67–92.
Moraza, M. (2008) First records of Endeostigmata and Sphaerolichina mites (Acari: Sarcoptiformes and Trombidiformes) from the Iberian Peninsula and the Canary Islands. *Boletín de la Asociación Española de Entomología*, 32 (3–4), 293–304.
Mortazavi, A., Hajiqanbar, H. & Saboori, A. (2011) A new species of the family Trochometridiidae (Acari: Heterostigmatina) associated with *Paulusiella* sp. (Coleoptera: Elateridae) from Iran. *Zootaxa*, 2746, 57–68.
Newell, I.M. (1957) Studies on the Johnstonianidae (Acari, Parasitengona). *Pacific Science*, 11 (4), 396–466.
Newell, I.M. (1960) Charadracarus new genus, Charadracarinae new subfamily (Acari: Johnstonianidae) and the status of *Typhlothrombium* Berlese, 1910. *Pacific Science*, 14, 156–172.
Olivier, P.A.S (2008) Dendrochaetidae, a new family of mites (Acari: Prostigmata), with descriptions of a new genus and species from South Africa. *African Zoology*, 43(1), 16–24.
http://dx.doi.org/10.3377/1562-7020(2008)43[16:DANFOM]2.0.CO;2
Olivier, P.A.S. (2009) A replacement name for *Dendrodus* Olivier, 2008, and validation of Dendrochaetidae Olivier, 2008 nomen nudum (Acari: Prostigmata). *Zootaxa*, 2293, 68.
Olivier, P.A.S. & Theron, P.D. (1997) The genus *Eupodes* Koch, 1835 (Acari: Prostigmata: Eupodidae) from southern African soil and vegetation. Part 1. Characterisation of the genus, designation of the type species and descriptions of three new species. *Koedoe*, 40(2), 57–73.
Otto, J.C. (1999) The taxonomy of *Tarsotomus* Berlese and *Paratarsotomus* Kuznetsov (Acarina: Anystidae: Erythracarinae) with observations on the natural history of Tarsotomus. *Invertebrate Taxonomy*, 13, 749–803.
Otto, J.C. (2000) A cladistic analysis of Erythracarinae (Acarina: Prostigmata: Anystidae), with the description of a new genus. *Systematic Entomology*, 25, 447–484.
Hajiqanbar, H. & Khaustov. A. (2010) A new species group and five new species of the genus *Pavania* (Acari: Dolichocybidae) associated with insects, with notes on leg chaetotaxy and the distribution of genera. *European Journal of Entomology*, 107, 441–453. http://dx.doi.org/10.1603/AN11006.
Qin, T.-K. (1996) A review and cladistic analysis of the Eupodoidea (Acari: Acariformes). *Systematic & Applied Acarology*, 1, 77–105.
Qin, T.-K. (1997) A reconsideration of the taxonomic position of *Protopenthalodes* (Prostigmata: Eupodoidea). *Systematic & Applied Acarology*, 2, 253–255.
Rahiminejad, V., Hajiqanbar, H. & Fathipour, Y. (2011) Redefinition of the genus *Dolichocybe* (Acari: Dolichocybidae), with description of two new species associated with insects. *Annals of the Entomological Society of America*, 104(4), 627–635.

http://dx.doi.org/10.3161/000345411X603391
Saboori, A., Ueckermann, E.A. & Harten, A. van (2008) A new genus of Neothrombiidae (Acari: Trombidioidea) from Yemen. *Zootaxa*, 1925, 23–30.
Saboori, A., Zhang, Z.-Q. & Nemati, A. (2005) A new genus and species of larval Chyzeriidae (Acari: Prostigmata: Chyzeroidea) from Iran. *International Journal of Acarology*, 31, 51–56.
Saboori, A., Nemati, A. & Mossahebi, G. (2005). A new genus and species of Trombellidae (Acari: Trombidioidea) from Iran. *International Journal of Acarology*, 31 (1), 45–50.
Saboori, A., Wohltmann, A. & Hakimitabar, M. (2010) A new family of trombidioid mites (Acari: Prostigmata) from Iran. *Zootaxa*, 2611, 16–30.
Sayer, R.M., Smiley, R.L. & Walter, D.E. (1992) Report of a teneriffid mite (Acari) in Baltic amber and notes on recent discoveries, *International Journal of Acarology*, 18, 303–305.
Schatz, H., Behan-Pelletier, V.M., OConnor, B.M. & Norton, R.A. (2011) Suborder Oribatida van der Hammen, 1968. *In*: Zhang, Z-Q. (Ed.), *Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148, 141–148.
Seeman, O. & Walter, D.E. (2000) A review of the Paratydeidae (Acari: Prostigmata) with descriptions of the first Australian representatives, *Tanytydeus lamington* sp. nov. and *T. kakadu* sp. nov. *Acarologia*, 40, 393–400.
Skoracki, M. (2011) Quill mites (Acari: Syringophilidae) of the Palaearctic region. *Zootaxa*, 2840, 1–414.
Smith, I.M. & Cook, D.R. (1991) Water mites. *In*: Thorp, J.H. & Covich, A.P. (Eds.), *Ecology and classification of North American Freshwater Invertebrates*, Academic Press, New York, pp. 523-592.
Southcott, R.V. (1961). Studies on the systematics and biology of the Erythraeoidea (Acarina) with a critical revision of the genera and subgenera. *Australian Journal of Zoology*, 9(3), 367–610.
Southcott, R.V. (1987) The classification of the mite families Trombellidae and Johnstonianidae and related groups, with the description of a new larva (Acarina: Trombellidae: Nothotrombidium) from North America. *Transactions of the Royal Society of South Australia*, 111, 25–42.
Southcott, R.V. (1993) Revision of the taxonomy of the larvae of the subfamily Eutrombidiinae (Acarina: Microtrombidiidae). *Invertebrate Taxonomy*, 7, 885–959.
Southcott, R.V. (1994) Revision of the larvae of the Microtrombidiinae (Acarina: Microtrombidiidae) with notes on life histories. *Zoologica*, 144, 1–155.
Southcott, R V. (1996) Description of a new Australian mite (Acarina: Trombidioidea), with comments on superfamily classification. *Records of The South Australian Museum*, 29, 55–62.
Strandtmann, R.W. (1970) Acarina: Eupodiform Prostigmata of South Georgia. *Pacific Insects Monograph*, 23, 89–106.
Strandtmann, R.W. & Goff, M.L. (1978) The Eupodoidea of Hawaii (Acarina: Prostigmata). *Pacific Insects*, 19(3–4), 121–143.
Thor, S. & Willmann, C. (1941) Acarina. 7la Eupodidae, Penthalodidae, Penthaleidae, Rhagidiidae, Pachygnathidae, Cunaxidae. *Das Tierreich*, 71, 1–186.
Ueckermann, E.A. & Khanjani, M. (2002) A new species of the genus *Austroteneriffia* (Acari: Teneriffiidae) from Iran. *Systematic & Applied Acarology*, 7, 167–172.
Ueckermann, E.A. & Khanjani, M. (2004) A revision of the genus *Anoplocheylus* Berlese (Acari: Pseudocheylidae), with the description of two new and re-description of four known species. *Systematic & Applied Acarology*, 9, 53–68.
van der Hammen, L. (1972) A revised classification of the mites (Arachnidea, Acarida) with diagnoses, a key, and notes on phylogeny. *Zoologische Mededelingen*, 47(22), 273–292.
van der Schyff, J., Theron, P.D. & Ueckermann, E.A. (2003) Polytrichinae, a new subfamily of Bdellidae (Acari: Prostigmata) from the Afrotropical region. *African Plant Protection*, 9, 19–22.
Vercammen-Grandjean P.H. (1973) Sur les statuts de la famille des Trombidiidae Leach, 1815 (Acarina: Prostigmata). *Acarologia*, 15(1), 102–114.
Walter, D.E. & Gerson, U. (1998) Dasythyreidae, new family, and *Xanthodasythyreus* n. g. (Acari: Prostigmata: Raphignathoidea) from Australia. *International Journal of Acarology*, 24(3), 189–197.
Walter, D.E., Lindquist, E.E., Smith, I.M., Cook, D.R. & Krantz, G.W. (2009) Chapter thirteen Order Trombidiformes. *In*: Krantz, G.W. & Walter, D.E. (Eds.), *A Manual of Acarology Third edition*. Texas Tech University Press, Lubbock, pp. 233–420.
Welbourn, W.C. (1991) Phylogenetic studies of terrestrial Parasitengona. *In*: Dusbabek, F. & Bukva, V. (Eds.), *Modern Acarology Vol. 2*, The Hague: SPB Academic Publishing bv/Prague: Academia, pp. 163–170.
Witte, H. (1991) The phylogenetic relationships within the Parasitengonae. *In*: Dusbabek, F. & Bukva, V. (eds.), *Modern Acarology Vol. 2* Academia, Prague and SFB Academic publishing bv, The Hague, pp.171–182.
Wohltmann, A. (2006) The phylogenetic relationships of and within the Microtrombidiidae (Acari: Prostigmata: Parasitengona). *In*: Gabryś, G. & Ignatowicz, S. (Eds), *Advances in Polish Acarology*. Wydawnictwo SGGW, Warszawa, pp. 436–457.
Wohltmann, A. (2010) Notes on the taxonomy and biology of Smarididae (Acari: Prostigmata: Parasitengona). *Annales Zoologici* (Warsawa), 60(3), 355–381.
Wohltmann, A., Makol, J. & Gabryś, G. (2004) A revision of European Johnstonianinae (Acari: Prostigmata: Parasitengona: Trombidioidea). *Annales Zoologici* (Warszawa), 54 (3), 595–630.
Yu, L., Zhang, Z.-Q. & He, L. (2010) Two new species of *Pyemotes* closely related to *P. tritici* (Acari: Pyemotidae). *Zootaxa*, 2723, 1–40.
Zacharda, M. (1980) Soil mites of the family Rhagidiidae (Actinedida: Eupodoidea). Morphology, systematics, ecology. *Acta Universitatis Carolinae Biologica*, 1978(5–6), 489–785.
Zhang, Z.-Q. (1994) Neothrombiidae (Acari: Trombidioidea) of the world: systematic review with a phylogenetic analysis and descriptions of two new genera. *Oriental Insects*, 28, 205–237.
Zhang, Z.-Q. (1998) An unusual early-derivative larva of Parasitengona (Acari: Prostigmata) and proposal of a new superfamily. *Sys-*

tematic & Applied Acarology, 3, 159–170.
Zhang, Z.-Q. (2003) Taxonomic status of *Veithia* Oudemans, 1941 and redescriptions of two species described by Oudemans (Acari: Smarididae). *Zootaxa*, 145, 1–8.
Zhang, Z.-Q. & Fan, Q.-H. (2005) A new genus of Neothrombiidae (Acari: Trombidioidea) from New Zealand. *Systematic & Applied Acarology*, 10, 155–162.
Zhang, Z.-Q. & Fan, Q.-H. (2007) Allotanaupodidae, a new family of early derivative Parasitengona (Acari: Prostigmata). *Zootaxa*, 1517, 1–52.
Zhang, Z.-Q. & Saboori, A. (1995) A new record of the little known genus *Ralphaudyna* (Acari: Chyzeriidae) from Iran, with description of a new species. *International Journal of Acarology*, 21, 11–15.

Contributor roles and addresses (order of authors based on the amount of data contributed)

Zhi-Qiang Zhang (coordination, higher taxonomy and superfamilies/families not covered by others) New Zealand Arthropod Collection, Landcare Research, Private Bag 92170, Auckland, New Zealand; zhangz@landcareresearch.co.nz
Qing-Hai Fan (Raphignathoidea & Tetranychoidea) Plant Health & Environment Laboratory, MAF Biosecurity New Zealand, 231 Morrin Road, St Johns, PO Box 2095, Auckland 1072, New Zealand; qinghai.fan@maf.govt.nz
Vladimir Pesic (fresh water mite families except Limnesiidae, Unionicolidae, Arrenuridae, Pionidae) Department of Biology, University of Montenegro, Cetinjski put b.b., 81000 Podgorica, Montenegro; vladopesic@gmail.com
Harry Smit (fresh water mite families specially Limnesiidae, Unionicolidae, Arrenuridae, Pionidae) Netherlands Centre for Biodiversity Naturalis, P.O. Box 9517, 2300 RA Leiden, The Netherlands; Harry.Smit@ncbnaturalis.nl
Andre V. Bochkov (Cheyletoidea, Myobioidea, Pomerantizioidea, Pterygosomatoidea & Stygmochelidae) Zoological Institute of the Russian Academy of Sciences, Universitetskaya Embankment 1, 199034 St. Petersburg, Russia; andrevbochkov@gmail.com
A. A. Khaustov (Pygmephoroidea, Acarophenacidae, Caraboacaridae & Trochometridiidae) Nikita Botanical Gardens, National Scientific Center, Yalta, 98648 Ukraine; alkhaustov@mail.ru
Anne Baker (Eupodoidea) Department of Entomology, The Natural History Museum, London SW7 5BD, UK
Andreas Wohltmann (Tanaupodidae, Chyzeriidae, Johnstonianidae, Trombellidae, Microtrombidiidae) Findorffstr. 11, D-27721 Ritterhude, Germany; wohltman@uni-bremen.de
Tinghuan Wen (Trombiculidae, Leeuwenhoekiidae & Walchiidae) Shanghai Medical School, Fudan University, Shanghai, China
James W. Amrine (Eriophyoidea) Division of Plant and Soil Sciences, P.O. Box 6108, West Virginia University, Morgantown, WV 26506-6018, USA
P. Beron (Calyptostomatidae, Erythraeidae & Smarididae) National Museum of Natural History, Sofia, Hungary; beron@mail.bg
Jianzhen Lin (Tarsonemidae & Bdellidae) Research Institute of Plant Protection, Fujian Academy of Agricultural Sciences, Fuzhou 350013, China
Grzegorz Gabrys (Microtrombidiidae) Department of Zoology, University of Zielona Góra, Szafrana 1, 65-516 Zielona Góra, Poland; g.gabrys@wnb.uz.zgora.pl
Robert Husband (Podapolipidae) Biology Department, Adrian College, Adrian, Michigan 49221, U.S.A.; husbandadrian@aol.com

Suborder **Endeostigmata** Reuter, 1909[1, 2] (5 superfamilies, 10 families, 27 genera, 108 species; †3/5)

Infraorder **Bimichaliida** Oconnor, 1984 (1 superfamily)[3]

Superfamily **Alycoidea** G. Canestrini & Fanzago, 1877 (3 families)

Family **Alycidae** G. Canestrini & Fanzago, 1877 (6 genera, 29 species; †0/2)[4, 5]

Family **Nanorchestidae** Grandjean, 1937 (5 genera, 45 species; †1/1)

Family **Proterorhagiidae** Lindquist & Palacios-Vargas, 1991 (1 genus, 1 species)

Infraorder **Nematalycina** Lindquist, Krantz & Walter, 2009 (1 superfamily)[6]

Superfamily **Nematalycoidea** Strenke, 1954 (2 families)

Family **Micropsammidae** Coineau & Theron, 1983 (1 genus, 1 species)

Family **Nematalycidae** Strenke, 1954 (4 genera, 4 species)

Family **Proteonematalycidae** Kethley, 1989 (1 genus, 1 species)

Infraorder **Terpnacarida** Oconnor, 1984 (2 superfamilies)[7]

Superfamily **Oehserchestoidea** Kethley, 1977 (1 family)

Family **Oehserchestidae** Kethley, 1977 (1 genus, 4 species)

Family **Grandjeanicidae** Kethley, 1977 (1 genus, 3 species)

Superfamily **Terpnacaroidea** Grandjean, 1939 (1 family)

Family **Terpnacaridae** Grandjean, 1939 (2 genera, 11 species)[8]

Infraorder **Alicorhagiida** Oconnor, 1984 (1 superfamily)[9]

Superfamily **Alicorhagioidea** Grandjean, 1939 (1 family)

Family **Alicorhagiidae** Grandjean, 1939 (5 genera, 9 species; †2/2)

References

Beaulieu, F., Dowling, A.P.G, Klompen, H., Moraes, G.J. de & Walter, D.E. (2011) Superorder Parasitiformes Reuter, 1909. *In*: Zhang, Z-Q. (ed.) Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 123–128.

Lindquist, E , Krantz, G.W. & Walter, D.E. (2009) Chapter eigth. Classification. In: Krantz, G.W. & Walter, D.E. (eds) *A Manual of Acarology Third edition*. Texas Tech University Press, Lubbock, pp. 97–103.

Momen, F.M., Sayed, A.A. & Nasr, A.K. (2004) A new species of the genus *Terpnacarus* Grandjean (Acari: Terpnacaridae) from Egypt. *Zootaxa*, 543, 1–4.

Schatz, H, Behan-Pelletier, V.M., Oconnor, B.M. & Norton, R.A. (2011) Suborder Oribatida van der Hammen, 1968. *In*: Zhang, Z-Q. (ed.) Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 141–148.

Walter, D.E. (2009) Chapter fourteen. Suborder Endeostigmata. *In*: Krantz, G.W. & Walter, D.E. (eds) *A Manual of Acarology Third edition*. Texas Tech University Press, Lubbock, pp. 421–429.

Uusitalo, M. (2010) *Revision of the family Alycidae (Acariformes, Acari), with special reference to European species*. Helsinki University Print: Helsinki, 143 pp.

Zhang, Z.-Q., Fan, Q.-H., Pesic, V., Smit, H., Bochkov, A.V., Khaustov, A.A., Baker, A., Wohltmann, A., Wen, T.-H., Amrine, J.W., Beron, P., Lin, J.-Z. & Husband, R. (2011) Order Trombidiformes Reuter, 1909. *In*: Zhang, Z-Q. (ed.) Animal biodiversity: an outline of higher-level classification and survey of taxonomic richness. *Zootaxa*, 3148, 129–138.

Contributor roles and addresses

David Evans Walter (various families not covered by others) Invertebrate Zoology, Royal Alberta Museum, 12845 - 102 Avenue, Edmonton, AB, Canada T5N 0M6; David.Walter@gov.ab.ca

Samuel Bolton (Nematalycidae & Alicorhagiidae) Acarology Laboratory, Ohio State University, 1315 Kinnear Rd., Columbus, OH,

1. **BY** David Evans Walter, Samuel Bolton, Matti Uusitalo & Zhi-Qiang Zhang (for full auhor addresses, see **Contributor roles and addresses** after **References**). The title of this contribution should be cited as "Suborder Endeostigmata Reuter, 1909. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Higher classification and estimates of genera and species within families generally follow Lindquist et al. (2009), with updates as otherwise indicated. To be consistent with Beaulieu *et al.* (2011), Schatz *et al.* (2011) and Zhang et al. (2011), the rank cohort is not used and older names for higher taxa are used.
3. Senior synonym of Alycyina (Lindquist, Krantz & Walter, 2009).
4. Uusitalo (2010) revised this family with several new genera.
5. Throughout this paper, counts of genera and species are totals (Recent and fossil); †x/y refers x genera and y species, among the totals, are based on fossil.
6. Proposed originally by Lindquist, Krantz & Walter, 2009 at the rank of cohort.
7. Terpnacarina of Lindquist, Krantz & Walter (2009).
8. Based on Momen et al. (2004) with updates.
9. Alicorhagiinaof Lindquist, Krantz & Walter (2009).

USA 43212, USA; bolton.69@buckeyemail.osu.edu
Uusitalo, M. (Alycidae) Matti.Uusitalo@koulut.tampere.fi
Zhi-Qiang Zhang (coordination/correspondence; higher taxon nomenclature) New Zealand Arthropod Collection, Landcare Research, Private Bag 92170, Auckland, New Zealand; zhangz@landcareresearch.co.nz

Suborder **Oribatida** van der Hammen, 1968 (5 infraorders) [1,2,3]

- Infraorder **Palaeosomata** Grandjean, 1969 (3 superfamilies)
  - Superfamily **Acaronychoidea** Grandjean, 1932 (2 families)
    - Family **Acaronychidae** Grandjean, 1932 (1 genus, 3 species)
    - Family **Archeonothridae** Grandjean, 1954 (5 genera, 20 species)
  - Superfamily **Palaeacaroidea** Grandjean, 1932 (1 family)
    - Family **Palaeacaridae** Grandjean, 1932 (2 genera, 6 species)
  - Superfamily **Ctenacaroidea** Grandjean, 1954 (3 families)
    - Family **Adelphacaridae** Grandjean, 1954 (1 genus, 1 species)
    - Family **Aphelacaridae** Grandjean, 1954 (3 genera, 4 species; 1/1/0)
    - Family **Ctenacaridae** Grandjean, 1954 (5 genera, 6 species; 2/2/0)
- Infraorder **Enarthronota** Grandjean, 1969 (5 superfamilies)
  - Superfamily **Brachychthonioidea** Thor, 1934 (1 family)
    - Family **Brachychthoniidae** Thor, 1934 (11 genera, 169 species; 0/0/12)
  - Superfamily **Atopochthonioidea** Grandjean, 1949 (3 families)
    - Family **Atopochthoniidae** Grandjean, 1949 (1 genus, 2 species)
    - Family **Phyllochthoniidae** Travé, 1967 (1 genus, 3 species)
    - Family **Pterochthoniidae** Grandjean, 1950 (1 genus, 1 species)
  - Superfamily **Hypochthonioidea** Berlese, 1910 (4 families)
    - Family **Eniochthoniidae** Grandjean, 1947 (1 genus, 7 species; 0/0/1)
    - Family **Hypochthoniidae** Berlese, 1910 (5 genera, 25 species; 1/1/1)
    - Family **Lohmanniidae** Berlese, 1916 (25 genera, 205 species; 0/1/8)
    - Family **Mesoplophoridae** Ewing, 1917 (3 genera, 40 species; 0/0/1)
  - Superfamily **Protoplophoroidea** Ewing, 1917 (5 families)
    - Family **Cosmochthoniidae** Grandjean, 1947 (4 genera, 48 species; 1/1/6)
    - Family **Haplochthoniidae** van der Hammen, 1959 (3 genera, 15 species)
    - Family **Pediculochelidae** Lavoipierre, 1946 (1 genus, 7 species)
    - Family **Protoplophoridae** Ewing, 1917 (9 genera, 48 species; 0/1/3)
    - Family **Sphaerochthoniidae** Grandjean, 1947 (2 genera, 21 species)
  - Superfamily **Heterochthonioidea** Grandjean, 1954 (3 families)
    - Family **Arborichthoniidae** Balogh & Balogh, 1992 (1 genus, 1 species)
    - Family **Heterochthoniidae** Grandjean, 1954 (3 genera, 6 species)
    - Family **Trichthoniidae** Lee, 1982 (3 genera, 6 species; 0/0/1)
  - Unplaced families
    - Family **Protochthoniidae** Norton, 1988 (1 genus, 1 species; 1/1/0)
    - Family **Devonacaridae** Norton, 1988 (1 genus, 1 species; 1/1/0) [4]
- Infraorder **Parhyposomata** Grandjean, 1969 (1 superfamily)
  - Superfamily **Parhypochthonioidea** Grandjean, 1932 (3 families)
    - Family **Elliptochthoniidae** Norton, 1975 (1 genus, 9 species)
    - Family **Gehypochthoniidae** Strenzke, 1963 (1 genus, 9 species; 0/1/1)
    - Family **Parhypochthoniidae** Grandjean, 1932 (1 genus, 4 species; 0/0/1)
- Infraorder **Mixonomata** Grandjean, 1969 (7 superfamilies)
  - Superfamily **Nehypochthonioidea** Norton & Metz, 1980 (1 family)
    - Family **Nehypochthoniidae** Norton & Metz, 1980 (1 genus, 2 species)

---

1. **BY** Heinrich Schatz, Valerie M. Behan-Pelletier, Barry M. OConnor and Roy A. Norton (for full contact details, see **Contributor names and addresses** after **References**). The title of this contribution should be cited as "Suborder Oribatida van der Hammen, 1968. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Oribatida (including Astigmata) currently include 249 families, 2,399 genera and 16,197 species; exclusively fossil taxa include 2 families, 20 genera and 108 species.
2. This classification is based on Lindquist *et al.* (2009), Norton and Behan-Pelletier (2009), OConnor (2009) and an unpublished database maintained by H. Schatz. Instances of incongruence with other recent classifications, including those of Balogh and Balogh (1992), Woas (2002), Subías (2004) and Weigmann (2006), are noted by Norton and Behan-Pelletier (2009).
3. Where needed, information about fossil and questionable taxa is given by the following shorthand. In parentheses, the contributors to the cited totals that are fossil genera (fg), fossil species (fs), or *species inquirendae* (si) are listed as (fg/fs/si)
4. The inclusion of Devonacaridae Norton, 1988 in Enarthronota remains uncertain (Norton *et al.* 1988).

Superfamily **Eulohmannioidea** Grandjean, 1931 (1 family)
Family **Eulohmanniidae** Grandjean, 1931 (1 genus, 1 species)
Superfamily **Perlohmannioidea** Grandjean, 1954 (1 family)
Family **Perlohmanniidae** Grandjean, 1954 (2 genera, 10 species)
Superfamily **Epilohmannioidea** Oudemans, 1923 (1 family)
Family **Epilohmanniidae** Oudemans, 1923 (3 genera, 59 species; 0/0/2)
Superfamily **Collohmannioidea** Grandjean, 1958 (1 family)
Family **Collohmanniidae** Grandjean, 1958 (2 genera, 4 species; 1/2/0)
Superfamily **Euphthiracaroidea** Jacot, 1930 (3 families)
Family **Euphthiracaridae** Jacot, 1930 (5 genera, 158 species; 0/0/13)
Family **Oribotritiidae** Grandjean, 1954 (11 genera, 190 species; 0/1/2)
Family **Synichotritiidae** Walker, 1965 (4 genera, 15 species)
Superfamily **Phthiracaroidea** Perty, 1841 (1 family)
Family **Phthiracaridae** Perty, 1841 (10 genera, 817 species; 0/2/43)
Infraorder **Desmonomata** Woolley, 1973 (3 hyporders)
Hyporder **Nothrina** van der Hammen, 1982 (1 superfamily)
Superfamily **Crotonioidea** Thorell, 1876 (6 families)
Family **Crotoniidae** Thorell, 1876 (10 genera,164 species; 1/3/8)[5]
Family **Hermanniidae** Sellnick, 1928 (4 genera, 111 species; 0/1/9)
Family **Malaconothridae** Berlese, 1916 (4 genera, 157 species; 0/0/13)
Family **Nanhermanniidae** Sellnick, 1928 (8 genera, 65 species; 0/0/5)
Family **Nothridae** Berlese, 1896 (3 genera, 93 species; 0/4/17)
Family **Trhypochthoniidae** Willmann, 1931 (9 genera, 65 species; 1/3/15)
Hyporder **Brachypylina** Hull, 1918 (= Circumdehiscentiae Grandjean, 1954) (25 superfamilies)
Superfamily **Hermannielloidea** Grandjean, 1934 (2 families)
Family **Hermanniellidae** Grandjean, 1934 (10 genera, 57 species; 0/2/3)
Family **Plasmobatidae** Grandjean, 1961 (3 genera, 19 species; 0/0/3)
Superfamily **Neoliodoidea** Sellnick, 1928 (1 family)
Family **Neoliodidae** Sellnick, 1928 (4 genera, 55 species; 0/4/9)
Superfamily **Plateremaeoidea** Trägårdh, 1926 (8 families)
Family **Aleurodamaeidae** Paschoal & Johnston, 1984 (1 genus, 6 species; 0/0/1)
Family **Gymnodamaeidae** Grandjean, 1954 (7 genera, 64 species; 0/1/3)
Family **Licnobelbidae** Grandjean, 1965 (2 genera, 3 species)
Family **Licnodamaeidae** Grandjean, 1954 (3 genera, 12 species)
Family **Lyrifissellidae** Paschoal, 1989 (1 genus, 1 species)
Family **Pedrocortesellidae** Paschoal, 1987 (2 genera, 41 species; 0/0/1)
Family **Pheroliodidae** Paschoal, 1987 (10 genera, 66 species)
Family **Plateremaeidae** Trägårdh, 1926 (9 genera, 28 species; 1/2/1)
Superfamily **Damaeoidea** Berlese, 1896 (1 family)
Family **Damaeidae** Berlese, 1896 (27 genera, 291 species; 1/1/34)
Superfamily **Cepheoidea** Berlese, 1896 (7 families)[6]
Family **Anderemaeidae** Balogh, 1972 (4 genera, 12 species)
Family **Cepheidae** Berlese, 1896 (15 genera, 87 species; 0/3/10)
Family **Cerocepheidae** Mahunka, 1986 (3 genera, 4 species)
Family **Eutegeidae** Balogh, 1965 (10 genera, 32 species)
Family **Microtegeidae** Balogh, 1972 (2 genera, 31 species)
Family **Pterobatidae** Balogh & Balogh, 1992 (1 genus, 1 species)

5. Crotoniidae herein includes the classical family Camisiidae Oudemans, 1990. Recent studies, both molecular (Domes *et al.* 2007) and morphological (Colloff & Cameron 2009), show that Crotoniidae (*sensu stricto*) evolved within Camisiidae, which is then clearly paraphyletic. Crotoniidae is the older family-group name and must be used for the merged set of genera, despite the contrary indication by Colloff and Cameron (2010).
6. Due to their type genera having similar names, Cepheidae Berlese, 1896 is a junior homonym of Cepheidae Agassiz, 1862. An application to the International Commission on Zoological Nomenclature, to emend the spelling of the mite family-group name, is being prepared.

Family **Nosybeidae** Mahunka, 1994 (2 genera, 2 species)

Superfamily **Polypterozetoidea** Grandjean, 1959 (4 families)

Family **Nodocepheidae** Piffl, 1972 (1 genus, 7 species)

Family **Podopterotegaeidae** Piffl, 1972 (2 genera, 5 species)

Family **Tumerozetidae** Hammer, 1966 (1 genus, 5 species)

Family **Polypterozetidae** Grandjean, 1959 (1 genus, 1 species)

Superfamily **Microzetoidea** Grandjean, 1936 (1 family)

Family **Microzetidae** Grandjean, 1936 (49 genera, 197 species; 0/0/3)

Superfamily **Ameroidea** Bulanova-Zachvatkina, 1957 (14 families)[7]

Family **Ameridae** Bulanova-Zachvatkina, 1957 (7 genera, 37 species; 0/0/3)

Family **Amerobelbidae** Grandjean, 1961 (7 genera, 14 species)

Family **Basilobelbidae** Balogh, 1961 (2 genera, 19 species)

Family **Caleremaeidae** Grandjean, 1965 (2 genera, 7 species; 0/1/0)

Family **Ctenobelbidae** Grandjean, 1965 (1 genus, 23 species)

Family **Damaeolidae** Grandjean, 1965 (5 genera, 15 species; 0/0/1)

Family **Eremobelbidae** Balogh, 1961 (4 genera, 51 species; 0/0/3)

Family **Eremulidae** Grandjean, 1965 (4 genera, 53 species; 0/0/4)

Family **Heterobelbidae** Balogh, 1961 (2 genera, 16 species)

Family **Hungarobelbidae** Miko & Travé, 1996 (1 genus, 3 species)

Family **Oxyameridae** Aoki, 1965 (1 genus, 8 species)

Family **Rhynchoribatidae** Balogh, 1961 (2 genera, 29 species)

Family **Spinozetidae** Balogh, 1972 (2 genera, 3 species)

Family **Staurobatidae** Grandjean, 1966 (1 genus, 1 species)

Superfamily **Zetorchestoidea** Michael, 1898 (6 families)[8]

Family **Arceremaeidae** Balogh, 1972 (2 genera, 11 species)

Family **Eremaeidae** Oudemans, 1900 (8 genera, 93 species; 1/3/13)

Family **Megeremaeidae** Woolley & Higgins, 1968 (1 genus, 8 species)

Family **Niphocepheidae** Travé, 1959 (1 genus 4 species)

Family **Zetorchestidae** Michael, 1898 (6 genera, 25 species; 0/0/4)

Family **Archaeorchestidae** Arillo & Subías, 2000 (1 genus, 1 species; 1/1/0)

Superfamily **Gustavioidea** Oudemans, 1900 (7 families)

Family **Astegistidae** Balogh, 1961 (8 genera, 48 species; 0/3/0)

Family **Gustaviidae** Oudemans, 1900 (1 genus, 17 species; 0/0/4)

Family **Kodiakellidae** Hammer, 1967 (1 genus, 2 species)

Family **Liacaridae** Sellnick, 1928 (13 genera, 219 species; 0/1/22)

Family **Multoribulidae** Balogh, 1972 (2 genera, 3 species)

Family **Peloppiidae** Balogh, 1943 (19 genera, 81 species; 0/1/3)

Family **Tenuialidae** Jacot, 1929 (7 genera, 13 species)

Superfamily **Carabodoidea** C.L.Koch, 1837 (6 families)

Family **Carabocepheidae** Mahunka, 1986 (1 genus, 2 species)

Family **Carabodidae** C.L.Koch, 1837 (48 genera, 345 species; 1/4/23)

Family **Dampfiellidae** Balogh, 1961 (2 genera, 58 species)

Family **Nippobodidae** Aoki, 1959 (2 genera, 17 species)

Family **Otocepheidae** Balogh, 1961 (43 genera 408 species; 1/3/4)

Family **Tokunocepheidae** Aoki, 1966 (1 genus, 1 species)

Superfamily **Oppioidea** Grandjean, 1951 (17 families)[9]

---

7. This superfamily is often named Amerobelboidea, with the incorrect assumption that Amerobelbidae was first validly proposed by Grandjean (1954). As no diagnosis or other indication of distinguishing features accompanied the name, it was a nomen nudum at that time (Article 13.1 of the ICZN); Amerobelbidae was first validly proposed by Grandjean (1961). Therefore, Ameridae Bulanova-Zachvatkina, 1957 is the oldest of the family-group names.
8. We follow Grandjean (1967) in the grouping of Zetorchestidae with Eremaeidae and related families. Among them, the oldest available family-group name is Zetorchestidae Michael, 1898.
9. We tentatively follow Subías (2004) in removing from Oppioidea those families with highly modified ("pelopsiform" or "suctorial") gnathosomas and grouping them as Trizetoidea. Relationships among the families of both groups need more critical study.

Family **Autognetidae** Grandjean, 1960 (9 genera, 30 species; 0/0/2)
Family **Chaviniidae** Balogh, 1983 (1 genus, 2 species)
Family **Enantioppiidae** Balogh, 1983 (1 genus, 1 species)
Family **Epimerellidae** Ayyildiz & Luxton, 1989 (2 genera, 7 species)
Family **Granuloppiidae** Balogh, 1983 (4 genera, 20 species; 0/0/2)
Family **Hexoppiidae** Balogh, 1983 (1 genus, 1 species)
Family **Luxtoniidae** Mahunka, 2001 (1 genus, 1 species)
Family **Machadobelbidae** Balogh, 1958 (1 genus, 14 species)
Family **Machuellidae** Balogh, 1983 (2 genera, 13 species; 0/0/3)
Family **Oppiidae** Grandjean, 1951 (140 genera, 1045 species; 1/7/72)
Family **Papillonotidae** Balogh, 1983 (1 genus, 4 species)
Family **Platyameridae** Balogh & Balogh, 1983 (1 genus, 1 species)
Family **Quadroppiidae** Balogh, 1983 (5 genera, 43 species; 0/0/8)
Family **Sternoppiidae** Balogh & Mahunka, 1969 (1 genus, 11 species)
Family **Teratoppiidae** Balogh, 1983 (5 genera, 19 species)
Family **Thyrisomidae** Grandjean, 1953 (8 genera, 49 species; 0/1/6)
Family **Tuparezetidae** Balogh, 1972 (1 genus, 2 species)

Superfamily **Trizetoidea** Ewing, 1917 (3 families)
Family **Nosybelbidae** Mahunka, 1994 (1 genus, 1 species)
Family **Suctobelbidae** Jacot, 1938 (31 genera, 343 species; 0/0/12)
Family **Trizetidae** Ewing, 1917 (1 genus, 1 species)

Superfamily **Tectocepheoidea** Grandjean, 1954 (1 family)
Family **Tectocepheidae** Grandjean, 1954 (4 genera, 33 species; 0/1/6)

Superfamily **Limnozetoidea** Thor, 1937 (2 families)[10]
Family **Hydrozetidae** Grandjean, 1954 (1 genus, 33 species; 0/1/7)
Family **Limnozetidae** Thor, 1937 (2 genera, 16 species; 0/0/2)

Superfamily **Ameronothroidea** Willmann, 1931 (4 families)
Family **Ameronothridae** Willmann, 1931 (9 genera, 42 species; 0/0/3)[11]
Family **Fortuyniidae** van der Hammen, 1960 (3 genera, 14 species)
Family **Selenoribatidae** Strenzke, 1962 (6 genera, 14 species)
Family **Tegeocranellidae** Balogh P., 1987 (1 genus, 17 species)

Superfamily **Cymbaeremaeoidea** Sellnick, 1928 (1 family)
Family **Cymbaeremaeidae** Sellnick, 1928 (9 genera, 125 species; 2/5/4)

Superfamily **Eremaeozetoidea** Piffl, 1972 (2 families)
Family **Eremaeozetidae** Piffl, 1972 (2 genera, 37 species)
Family **Idiozetidae** Aoki, 1976 (1 genus, 3 species)

Superfamily **Licneremaeoidea** Grandjean, 1931 (9 families)
Family **Adhaesozetidae** Hammer, 1973 (2 genera, 4 species)
Family **Charassobatidae** Grandjean, 1958 (1 genus, 7 species)
Family **Dendroeremaeidae** Behan-Pelletier, Eamer & Clayton, 2005 (1 genus, 2 species)
Family **Eremellidae** Balogh, 1961 (3 genera, 11 species)
Family **Lamellareidae** Balogh, 1972 (3 genera, 8 species)
Family **Licneremaeidae** Grandjean, 1931 (2 genera, 21 species; 0/1/2)
Family **Micreremidae** Grandjean, 1954 (6 genera, 20 species; 0/2/1)
Family **Passalozetidae** Grandjean, 1954 (2 genera, 52 species; 0/1/3)
Family **Scutoverticidae** Grandjean, 1954 (9 genera, 72 species; 0/1/8)

Superfamily **Phenopelopoidea** Petrunkevich, 1955 (2 families)
Family **Phenopelopidae** Petrunkevich, 1955 (5 genera, 104 species; 0/1/17)
Family **Unduloribatidae** Kunst, 1971 (2 genera, 9 species; 0/2/0)

Superfamily **Achipterioidea** Thor, 1929 (3 families)
Family **Achipteriidae** Thor, 1929 (15 genera, 117 species; 0/2/19)

10. The superfamily name Hydrozetoidea Grandjean, 1954 is often used, but Limnozetoidea Thor, 1937 has priority.
11. Not included is the genus *Palaeonothrus* Krivolutsky and Sidorchuk, 2003, which was based on Holocene subfossil cuticles shown by Sidorchuk and Rasnitsyn (2009) to derive from hymenopterans.

Family **Epactozetidae** Grandjean, 1936 (2 genera, 5 species)
Family **Tegoribatidae** Grandjean, 1954 (13 genera, 42 species; 0/1/2)
Superfamily **Oribatelloidea** Jacot, 1925 (1 family)
Family **Oribatellidae** Jacot, 1925 (10 genera, 131 species; 0/2/8)
Superfamily **Oripodoidea** Jacot, 1925 (17 families)
Family **Caloppiidae** Balogh, 1960 (9 genera, 33 species)
Family **Campbellobatidae** Balogh & Balogh, 1984 (1 genera, 5 species)
Family **Drymobatidae** Balogh & Balogh, 1984 (1 genus, 1 species)
Family **Haplozetidae** Grandjean, 1936 (57 genera, 368 species; 0/1/25)
Family **Mochlozetidae** Grandjean, 1960 (10 genera, 63 species; 0/1/3)
Family **Nasobatidae** Balogh, 1972 (1 genus, 3 species; 0/0/1)
Family **Neotrichozetidae** Balogh, 1965 (1 genus, 1 species)
Family **Nesozetidae** Balogh & Balogh, 1984 (2 genera, 2 species)
Family **Oribatulidae** Thor, 1929 (47 genera, 301 species; 1/4/63)
Family **Oripodidae** Jacot, 1925 (25 genera, 109 species; 0/3/2)
Family **Parakalummidae** Grandjean, 1936 (6 genera, 47 species; 0/1/1)
Family **Scheloribatidae** Grandjean, 1933 (49 genera, 488 species; 0/5/34)
Family **Sellnickiidae** Balogh & Balogh, 1984 (1 genus, 2 species; 0/0/1)
Family **Stelechobatidae** Grandjean, 1965 (1 genus, 2 species)
Family **Symbioribatidae** Aoki, 1966 (2 genera, 3 species)
Family **Tubulozetidae** Balogh P., 1989 (1 genus, 1 species)
Family **Zetomotrichidae** Grandjean, 1954 (14 genera, 35 species)
Superfamily **Ceratozetoidea** Jacot, 1925 (10 families)[12]
Family **Ceratokalummidae** Balogh, 1970 (9 genera, 16 species)
Family **Ceratozetidae** Jacot, 1925 (51 genera, 319 species; 0/5/39)
Family **Chamobatidae** Grandjean, 1954 (3 genera, 49 species; 0/1/15)
Family **Euzetidae** Grandjean, 1954 (1 genus, 2 species; 0/0/1)
Family **Humerobatidae** Grandjean, 1971 (1 genus, 11 species; 0/0/2)
Family **Maudheimiidae** Balogh & Balogh, 1984 (1 genus, 4 species)
Family **Mycobatidae** Grandjean, 1954 (20 genera, 136 species; 0/0/8)
Family **Onychobatidae** Luxton, 1985 (1 genus, 1 species)
Family **Ramsayellidae** Luxton, 1985 (1 genus, 5 species)[13]
Family **Zetomimidae** Shaldybina, 1966 (3 genera, 20 species; 0/0/2)
Superfamily **Galumnoidea** Jacot, 1925 (2 families)
Family **Galumnellidae** Piffl, 1970 (7 genera, 35 species)
Family **Galumnidae** Jacot, 1925 (50 genera, 461 species; 0/2/36
Unplaced family
Family **Aribatidae** Aoki, Takaku & Ito, 1994 (1 genus, 1 species)[14]
Hyporder **Astigmata** Canestrini, 1891 (=Astigmatina Krantz & Walter, 2009) (11 superfamilies)
Superfamily **Schizoglyphoidea** Mahunka, 1978 (1 family)
Family **Schizoglyphidae** Mahunka, 1978 (1 genus, 1 species)
Superfamily **Histiostomatoidea** Berlese, 1897 (2 families)
Family **Guanolichidae** Fain, 1968 (3 genera, 4 species)

12. Not included are *Lamellobates* (9 spp.), *Paralamellobates* (4 spp.) and *Sacculozetes* (1 sp.). We follow Norton & Behan-Pelletier (2009) in considering their familial relationships unresolved, pending the discovery of their immatures. Woas (2002) suggested the family Lamellobatidae for these genera, but the name does not meet the criteria for availability (ICZN, Article 13.1).
13. Ramsayellidae Luxton, 1985 has not been recognized in recent classifications, being considered a junior synonym of Humerobatidae (by Subías 2004) or a possible junior synonym of Mycobatidae (by Norton & Behan-Pelletier 2009). However, these placements now seem doubtful and need reinvestigation. Adults of the single known genus, *Ramsayellus* Spain & Luxton, 1970, have characters distinct from those of either ceratozetoid family, and immature instars are not yet known.
14. The enigmatic family Aribatidae Aoki, Takaku & Ito, 1994 was grouped with Zetorchestoidea (as Eremaeoidea) by Subías (2004) but we follow Norton & Behan-Pelletier (2009) in considering the family unplaced, pending more complete analysis and discovery of immatures.

Family **Histiostomatidae** Berlese, 1897 (59 genera, 567 species)
Superfamily **Canestrinioidea** Berlese, 1884 (1 family)
Family **Canestriniidae** Berlese, 1884 (93 genera, 338 species)
Superfamily **Hemisarcoptoidea** Oudemans, 1904 (7 families)
Family **Hyadesiidae** Halbert, 1915 (2 genera, 47 species)
Family **Carpoglyphidae** Oudemans, 1923 (2 genera, 6 species)
Family **Algophagidae** Fain, 1975 (7 genera, 19 species)
Family **Meliponocoptidae** Fain & Rosa, 1983 (2 genera, 4 species)
Family **Hemisarcoptidae** Oudemans, 1904 (11 genera, 33 species)
Family **Winterschmidtiidae** Oudemans, 1923 (24 genera, 143 species; 1/1/0)
Family **Chaetodactylidae** Zachvatkin, 1941 (5 genera, 111 species)
Superfamily **Glycyphagoidea** Berlese, 1897 (7 families)
Family **Euglycyphagidae** Fain & Philips, 1977 (2 genera, 4 species)
Family **Pedetopodidae** Fain, 1969 (1 genus, 1 species)
Family **Chortoglyphidae** Berlese, 1897 (3 genera, 13 species)
Family **Echimyopodidae** Fain, 1967 (5 genera, 27 species)
Family **Aeroglyphidae** Zachvatkin, 1941 (4 genera, 19 species)
Family **Rosensteiniidae** Cooreman, 1954 (19 genera, 53 species)
Family **Glycyphagidae** Berlese, 1897 (42 genera, 204 species)
Superfamily **Acaroidea** Latreille, 1802 (6 families)
Family **Lardoglyphidae** Oudemans, 1927 (2 genera, 8 species)
Family **Suidasiidae** Hughes, 1948 (7 genera, 18 species; includes Sapracaridae Fain)
Family **Gaudiellidae** Atyeo, Baker & Delfinado, 1974 (5 genera, 7 species)
Family **Glycacaridae** Griffiths, 1977 (1 genus, 1 species)
Family **Scatoglyphidae** Zachvatkin & Volgin, 1956 (1 genus, 1 species)
Family **Acaridae** Latreille, 1802 (88 genera, 541 species; 0/0/37)
Superfamily **Hypoderatoidea** Murray, 1877 (1 family)
Family **Hypoderatidae** Murray, 1877 (19 genera, 73 species)
Superfamily **Sarcoptoidea** Murray, 1877 (12 families)
Family **Psoroptidae** Canestrini, 1892 (34 genera, 63 species)
Family **Lobalgidae** Fain, 1965 (2 genera, 7 species)
Family **Sarcoptidae** Murray, 1877 (15 genera, 117 species)
Family **Rhyncoptidae** Lawrence, 1956 (5 genera, 12 species)
Family **Chirorhynchobiidae** Fain, 1967 (1 genus, 3 species)
Family **Atopomelidae** Gunther, 1942 (46 genera, 420 species)
Family **Chirodiscidae** Trouessart, 1892 (27 genera, 230 species)
Family **Myocoptidae** Gunther, 1942 (6 genera, 63 species)
Family **Listrophoridae** Mégnin & Trouessart, 1884 (20 genera, 169 species)
Family **Gastronyssidae** Fain, 1956 (9 genera, 42 species)
Family **Pneumocoptidae** Baker, Camin, Cunliffe, Woolley & Yunker, 1958 (1 genus, 5 species)
Family **Lemurnyssidae** Fain, 1957 (2 genera, 4 species)
Superfamily **Pterolichoidea** Trouessart & Mégnin, 1884 (18 families)
Family **Ascouracaridae** Gaud & Atyeo, 1976 (7 genera, 21 species)
Family **Cheylabididae** Gaud, 1983 (3 genera, 5 species)
Family **Crypturoptidae** Gaud, Atyeo & Berla, 1973 (9 genera, 18 species)
Family **Eustathiidae** Oudemans, 1905 (18 genera, 65 species)
Family **Falculiferidae** Oudemans, 1905 (14 genera, 45 species)
Family **Gabuciniidae** Gaud & Atyeo, 1975 (16 genera, 72 species; 0/1/0)
Family **Kiwilichidae** Dabert, 1994 (1 genus, 2 species)
Family **Kramerellidae** Gaud & Mouchet, 1961 (7 genera, 52 species)
Family **Ochrolichidae** Gaud & Atyeo, 1978 (3 genera, 4 species)
Family **Oconnoriidae** Gaud, Atyeo & Klompen, 1989 (1 genus, 1 species)
Family **Pterolichidae** Trouessart & Mégnin, 1884 (122 genera, 389 species)
Family **Ptiloxenidae** Gaud, 1982 (3 genera, 21 species)

Family **Rectijanuidae** Gaud, 1961 (1 genus, 7 species)
Family **Syringobiidae** Trouessart, 1897 (17 genera, 75 species)
Family **Thoracosathesidae** Gaud & Mouchet, 1959 (1 genus, 2 species)
Family **Caudiferidae** Gaud & Atyeo, 1978 (3 genera, 4 species)
Family **Freyanidae** Dubinin, 1953 (17 genera, 75 species)
Family **Vexillariidae** Gaud & Mouchet, 1959 (12 genera, 36 species)
Superfamily **Analgoidea** Trouessart & Mégnin, 1884 (19 families)
Family **Alloptidae** Gaud, 1957 (29 genera, 174 species)
Family **Analgidae** Trouessart & Mégnin, 1884 (35 genera, 184 species; 0/0/13)
Family **Apionacaridae** Gaud & Atyeo, 1977 (4 genera, 7 species)
Family **Avenzoariidae** Oudemans, 1905 (18 genera, 143 species)
Family **Cytoditidae** Oudemans, 1908 (2 genera, 12 species; 0/0/1)
Family **Dermationidae** Fain, 1965 (10 genera, 47 species)
Family **Dermoglyphidae** Mégnin & Trouessart, 1884 (5 genera, 20 species)
Family **Epidermoptidae** Trouessart, 1892 (18 genera, 61 species) (includes Knemidokoptidae)
Family **Gaudoglyphidae** Bruce & Johnston, 1976 (1 genus, 1 species)
Family **Laminosioptidae** Vitzthum, 1931 (8 genera, 26 species)
Family **Proctophyllodidae** Trouessart & Mégnin, 1884 (46 genera, 463 species)
Family **Psoroptoididae** Gaud, 1958 (13 genera, 64 species)
Family **Pteronyssidae** Oudemans, 1941 (24 genera, 242 species)
Family **Ptyssalgidae** Atyeo & Gaud, 1979 (1 genus, 1 species)
Family **Pyroglyphidae** Cunliffe, 1958 (19 genera, 56 species)
Family **Thysanocercidae** Atyeo & Peterson, 1972 (1 genus, 10 species)
Family **Trouessartiidae** Gaud, 1957 (11 genera, 167 species)
Family **Turbinoptidae** Fain, 1957 (9 genera, 38 species)
Family **Xolalgidae** Dubinin, 1953 (27 genera, 111 species)
Unplaced families
Family **Heterocoptidae** Fain, 1967 (13 genera, 47 species)
Family **Lemanniellidae** Wurst, 2001 (1 genus, 2 species)
Family **Chetochelacaridae** Fain, 1987 (2 genera, 2 species)

References

Balogh, J. & Balogh, P. (1992) *The oribatid mites genera of the world*. The Hungarian National Museum Press, Budapest, vol. 1, 263 pp.

Colloff, M.J. & Cameron S.L. (2009) Revision of the oribatid mite genus *Austronothrus* Hammer (Acari: Oribatida): sexual dimorphism and a re-evaluation of the phylogenetic relationships of the family Crotoniidae. *Invertebrate Systematics*, 23, 87–110.

Domes, K., Norton, R.A., Maraun, M. & Scheu, S. (2007) Reevolution of sexuality breaks Dollo's law. *Proceedings of the National Academy of Sciences of the United States of America*, 104(17), 7139–7144.

Grandjean, F. (1954) Essai de classification des Oribates (Acariens). *Bulletin de la Société zoologique de France*, 78, 421–446.

Grandjean, F. (1961) Les Amerobelbidae (Oribates) (1re partie). *Acarologia*, 3, 303–343.

Grandjean, F. (1967) Nouvelles observations sur les Oribates (5e série). *Acarologia*, 9, 242–272.

Krivolutsky, D.A. & Sidorchuk E.A. (2003) Subfossil oribatid mites in the Holocene deposits of the Arkhangel'sk region. Doklady Akademii Nauk, 392, 421–425. [In Russian; English version pp. 428–431].

Lindquist, E.E., Krantz, G.W. & Walter, D.E. (2009) Classification. Chapter 8 *in*: Krantz, G.W. & Walter, D.E. (eds.), *A Manual of Acarology 3rd Edition*. Texas Tech. University Press, Lubbock, pp. 97–103.

Norton, R.A. & Behan-Pelletier V. (2009) Oribatida. Chapter 15 in: Krantz G.W. & Walter D.E. (eds.), *A Manual of Acarology 3rd Edition*. Texas Tech. University Press, Lubbock, pp. 421–564.

Norton, R.A., Bonamo P.M., Grierson J.D. & Shear W.A. (1988) Oribatid mite fossils from a terrestrial Devonian deposit near Gilboa, New York. *Journal of Paleontology*, 62, 259–269.

OConnor, B.M. (2009) Astigmatina. Chapter 16 *in*: Krantz, G.W. & Walter, D.E. (eds.), *A Manual of Acarology 3rd Edition*. Texas Tech. University Press, Lubbock, pp. 565–657.

Sidorchuk, E.A. & Rasnitsyn A.P. (2009) On the taxonomic position of *Palaeonothrus* Krivolutskii et Sidorchuk 2003 (Insecta: Hymenoptera: Ichneumonoidea, not Acariformes, Oribatida). *Paleontological Journal*, 43, 640–642.

Subías, L.S. (2004) Listado sistemático, sinonímico y biogeográfico de los Ácaros Oribátidos (Acariformes, Oribatida) del mundo (1758-2002). *Graellsia*, 60, 3–305.

Weigmann, G. (2006) *Hornmilben (Oribatida)*. Die Tierwelt Deutschlands, 76. Teil. Goecke & Evers, Keltern, 520 pp.

Woas, S. (2002) Acari: Oribatida. *In*: Adis J. (ed.), *Amazonian Arachnida and Myriapoda*. Pensoft Publishers, Sofia–Moscow, pp. 21–291.

Contributor names and addresses

Heinrich Schatz, Institute of Zoology, Leopold-Franzens University of Innsbruck, Technikerstr. 25, A-6020 Innsbruck, Austria; Heinrich.Schatz@uibk.ac.at

Valerie M. Behan-Pelletier, Agriculture and Agri-Food Canada, K.W. Neatby Building, Ottawa, Ontario, Canada K1A 0C6; behanpv@gmail.com

Barry M. OConnor, Museum of Zoology, University of Michigan, 1109 Geddes Ave., Ann Arbor, Michigan 48109 USA; bmoc@umich.edu

Roy A. Norton , State University of New York, College of Environmental Science and Forestry, Syracuse, N.Y., USA; ranorton@esf.edu

Order **Araneae** Clerck, 1757 (2 suborders)[1,2,3]

Suborder **Mesothelae** Pocock, 1892 (4 families)

Family †**Arthrolycosidae** Frič, 1904 (2 genera, 3 species; 2/3/0)[4]

Family †**Arthromygalidae** Petrunkevitch, 1923 (8 genera, 9 species; 8/9/0)[4]

Family †**Pyritaraneidae** Petrunkevitch, 1953 (2 genera, 3 species; 2/3/0)[4]

plesion fossil genus (1 genus, 1 species; 1/1/0)

Family **Liphistiidae** Pocock, 1892 (5 genera, 89 species)

Suborder **Opisthothelae** Pocock, 1892 (2 infraorders)

Opisthothelae *incerate sedis* (1 genus, 1 species; 1/1/0)

Infraorder **Mygalomorphae** Pocock, 1892 (2 superfamilies)

Superfamily **Atypoidea** Thorell, 1870 (2 families)

Family **Atypidae** Thorell, 1870 (5 genera, 52 species; 2/4/0)

Family **Antrodiaetidae** Gertsch *in* Comstock, 1940 (3 genera, 33 species; 1/1/0)

Unplaced family

Family **Mecicobothriidae** Holmberg, 1882 (6 genera, 11 species; 2/2/0)

Superfamily **Avicularoidea** Simon, 1874 (12 families)

Family **Hexathelidae** Simon, 1892 (13 genera, 106 species; 1/1/0)

Family **Dipluridae** Simon, 1889 (28 genera, 183 species; 3/4/0)

Family **Cyrtaucheniidae** Simon, 1892 (18 genera, 135 species; 0/1/0)

Family **Ctenizidae** Thorell, 1887 (11 genera, 129 species; 2/4/0)

Family **Idiopidae** Simon, 1892 (22 genera, 302 species)

Family **Actinopodidae** Simon, 1892 (3 genera, 40 species)

Family **Migidae** Simon, 1892 (10 genera, 91 species)

Family **Nemesiidae** Simon, 1892 (44 genera, 357 species; 2/2/0)

Family **Microstigmatidae** Roewer, 1942 (8 genera, 16 species; 1/1/0)

Family **Barychelidae** Simon, 1889 (44 genera, 304 species; 0/1/0)

Family **Theraphosidae** Thorell, 1870 (121 genera, 938 species; 1/1/0)

Family **Paratropididae** Simon, 1889 (4 genera, 8 species)

Infraorder **Araneomorphae** Smith, 1902 (number of superfamilies unclear)

Araneomorphae *incertae sedis* (2 genera, 2 species; 2/2/0)

Clade **Paleocribellatae** (1 family)

Family **Hypochilidae** Marx, 1888 (2 genera, 12 species)

Unnamed Clade

Superfamily **Austrochiloidea** Zapfe, 1955 (2 families)

Family **Austrochilidae** Zapfe, 1955 (3 genera, 9 species)

Family **Gradungulidae** Forster, 1955 (7 genera, 16 species)

Clade **Araneoclada** Platnick, 1977 (107 families)

Clade **Haplogynae** Simon, 1893 (20 families)

Superfamily **Dysderoidea** C. L. Koch, 1837 (5 families)

Family **Segestriidae** Simon, 1893 (7 genera, 140 species; 4/20/0)

Family **Dysderidae** C. L. Koch, 1837 (26 genera, 528 species; 2/9/0)

Family **Oonopidae** Simon, 1890 (88 genera, 793 species; 5/38/0)

Family **Orsolobidae** Cooke, 1965 (28 genera, 181 species)

Family †**Plumorsolidae** Wunderlich, 2008 (1 genus, 1 species; 1/1/0)[5]

---

1. **BY** Jason A. Dunlop and David Penney (for full contact details, see **Contributor names and addresses** after **References**). The title of this contribution should be cited as "Order Araneae Clerck, 1757. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. The phylogenetic scheme adopted here is primarily based on Coddington (2005), with updates. In this sense the sequence of families is similar to —but not identical with—that of Platnick's (2011) World Spider Catalog. Superfamily names and groupings have not reached a generally accepted consensus for some groups; especially within Haplogynae. Genus and species counts are based on Platnick (2011) for extant species, supplemented by the data of Dunlop *et al*. (2011) for fossil taxa. Araneae currently includes a total of 129 families, 4,191 genera and 43,579 species; of which 110, 3,849 and 42,473 respectively are extant.
3. Where needed, information about fossil and questionable taxa is given by the following shorthand. In parentheses, the contributors to the cited totals that are fossil genera (fg), fossil species (fs), or *species inquirendae* (si) are listed as (fg/fs/si).
4. The putatative fossil mesothele families merit revision (see comments in Penney & Selden 2006).

Superfamily **Pholcoidea** C. L. Koch, 1851 (3 families)
Family **Pholcidae** C. L. Koch, 1851 (86 genera, 1136 species; 2/14/0)
Family **Plectreuridae** Simon, 1893 (4 genera, 33 species; 2/3/0)
Family **Diguetidae** F. O. P.-Cambridge, 1899 (2 genera, 15 species)
Superfamily **Caponioidea** Simon, 1890 (2 families)
Family **Caponiidae** Simon, 1890 (15 genera, 85 species; 0/1/0)
Family **Tetrablemmidae** O. P.-Cambridge, 1873 (31 genera, 143 species; 1/2/0)
Superfamily **Scytodoidea** Blackwall, 1864 (4 families)
Family **Sicariidae** Keyserling, 1880 (2 genera, 127 species; 0/3/0)
Family **Scytodidae** Blackwall, 1864 (5 genera, 233 species; 0/5/0)
Family **Periegopidae** Simon, 1893 (1 genus, 2 species)
Family **Drymusidae** Simon, 1893 (1 genus, 15 species)
Superfamily **Leptonetoidea** Simon, 1890 (3 families)
Family **Ochyroceratidae** Fage, 1912 (15 genera, 163 species; 1/2/0)
Family **Leptonetidae** Simon, 1890 (20 genera, 269 species; 2/8/0)
Family **Telemidae** Fage, 1913 (7 genera, 61 species; 0/1/0)
Unplaced families
Family **Filistatidae** Ausserer, 1867 (17 genera, 114 species; 0/1/0)
Family †**Praeterleptonetidae** Wunderlich, 2008 (3 genera, 4 species; 3/4/0)[5]
Family †**Eopsilodercidae** Wunderlich, 2008 (2 genera, 2 species; 2/2/0)[5]
Clade **Entelegynae** Simon, 1893 (87 families)
Superfamily **Palpimanoidea** Thorell, 1870 (13 families)[6]
Family *incertae sedis* (1 genus, 1 species; 1/1/0)
Family **Archaeidae** C. L. Koch & Berendt, 1854 (13 genera, 54 species; 10/17/0)
Family **Mecysmaucheniidae** Simon, 1895 (8 genera, 26 species; 1/1/0)
Family **Pararchaeidae** Forster & Platnick, 1984 (7 genera, 35 species)
Family **Holarchaeidae** Forster & Platnick, 1984 (1 genus, 2 species)
Family **Huttoniidae** Simon, 1893 (1 genus, 1 species)
Family **Stenochilidae** Thorell, 1873 (2 genera, 13 species)
Family **Palpimanidae** Thorell, 1870 (15 genera, 131 species)
Family †**Micropalpimanidae** Wunderlich, 2008 (1 genus, 1 species; 1/1/0)[7]
Family †**Lagonomegopidae** Eskov & Wunderlich, 1995 (3 genera, 5 species; 3/5/0)
Family †**Grandoculidae** Penney, 2011 (1 genus, 1 species; 1/1/0)
Family †**Spatiatoridae** Petrunkevitch, 1942 (1 genus, 3 species; 1/3/0)[7]
Family **Malkaridae** Davies, 1980 (4 genera, 11 species)
Family **Mimetidae** Simon, 1881 (14 genera, 164 species; 1/8/0)[8]
Superfamily **Eresoidea** C. L. Koch, 1851 (3 families)
Family **Eresidae** C. L. Koch, 1851 (8 genera, 96 species)
Family **Oecobiidae** Blackwall, 1862 (9 genera, 118 species; 3/8/0)
Family **Hersiliidae** Thorell, 1870 (22 genera, 188 species; 7/14/1)
Unplaced families
Family †**Burmascutidae** Wunderlich, 2008 (1 genus, 1 species; 1/1/0)[5]
Family †**Salticoididae** Wunderlich, 2008 (1 genus, 1 species; 1/1/0)[5]
'Canoe tapetum' clade (68 families)
Orbiculariae Walckenaer, 1802 (21 families)

5. One of a number of rather poorly-defined fossil families in need of revision; often based on a small sample of (sometimes juvenile) specimens and in some cases published in non-peer reviewed journals.
6. The correct delimitation of Palpimanoidea has been controversial for many years (see e.g. Griswold *et al*. 2005, and references therein) and the issue is still not fully resolved. The inclusion here of the fossil families Lagonomegopidae and Grandoculidae also merits confirmation.
7. Probably huttoniids according to research in progress by Spanish and US researchers.
8. Although traditionally placed in Palpimanoidea the—probably paraphyletic—mimetids almost certainly belong in Orbiculariae (see again Griswold *et al*. 2005; Dimitrov et al. 2011) and maybe even within different superfamilies.

Superfamily **Deinopoidea** C. L. Koch, 1851 (2 families)
Family **Deinopidae** C. L. Koch, 1851 (5 genera, 59 species; 1/2/0)
Family **Uloboridae** Thorell, 1869 (27 genera, 286 species; 9/21/0)
Superfamily **Araneoidea** Latreille, 1806 (20 families)
Family *incertae sedis* (1 genus, 1 species; 1/1/0)
Family **Cyatholipidae** Simon, 1894 (28 genera, 71 species; 5/13/0)
Family **Synotaxidae** Simon, 1894 (25 genera, 112 species; 11/36/0)
Family **Nesticidae** Simon, 1894 (13 genera, 219 species; 4/11/0)
Family **Theridiidae** Sundevall, 1833 (153 genera, 2513 species; 34/189/0)
Family **Theridiosomatidae** Simon, 1881 (22 genera, 101 species; 6/12/0)
Family **Symphytognathidae** Hickman, 1931 (7 genera, 66 species)
Family **Anapidae** Simon, 1895 (47 genera, 177 species; 9/27/0)[9]
Family **Micropholcommatidae** Hickman, 1944 (20 genera, 67 species; 1/1/0)[10]
Family **Mysmenidae** Petrunkevitch, 1928 (26 genera, 133 species; 3/10/0)
Family †**Baltsuccinidae** Wunderlich, 2004 (1 genus, 2 species; 1/2/0)[5]
Family †**Protheridiidae** Wunderlich, 2004 (3 genera, 7 species; 3/7/0)[5]
Family **Synaphridae** Wunderlich, 1986 (4 genera, 14 species; 1/1/0)
Family **Pimoidae** Wunderlich, 1986 (4 genera, 45 species; 0/8/0)
Family †**Pumiliopimoidae** Wunderlich, 2008 (1 genus, 1 species; 1/1/0)[5]
Family **Sinopimoidae** Li & Wunderlich, 2008 (1 genus, 1 species)[11]
Family **Linyphiidae** Blackwall, 1859 (596 genera, 4461 species; 10/60/0)
Family **Tetragnathidae** Menge, 1866 (57 genera, 982 species; 10/27/0)
Family **Nephilidae** Simon, 1894 (9 genera, 81 species; 5/20/0)
Family **Araneidae** Simon, 1895 (185 genera, 3088 species; 17/68/0)
Family †**Juraraneidae** Eskov, 1984 (1 genus, 1 species; 1/1/0)[12]
Unplaced non-Orbiculariae families
Family **Nicodamidae** Simon, 1898 (9 genera, 29 species)
Family **Phyxelididae** Lehtinen, 1967 (12 genera, 54 species)
Family **Titanoecidae** Lehtinen, 1967 (5 genera, 49 species)
'Retrolateral tibial apophysis' (RTA) clade (44 families)
Superfamily **Dictynoidea** (4 families)
Family **Hahniidae** Bertkau, 1878 (30 genera, 252 species; 3/4/1)
Family **Dictynidae** O. P.-Cambridge, 1871 (71 genera, 617 species; 21/51/0)
Family **Cybaeidae** Simon, 1898 (11 genera, 179 species; 1/2/0)
Family **Desidae** Pocock, 1895 (38 genera, 183 species; 0/2/0)
Clade **'Amaurobioids'** (20 families)
Superfamily **Lycosoidea** Sundevall, 1833 (11 families)
Family *incertae sedis* (1 genus, 1 species; 1/1/0)
Family **Lycosidae** Sundevall, 1833 (119 genera, 2388 species; 1/6/0)
Family †**Parattidae** Petrunkevitch, 1922 (1 genus, 4 species; 1/4/0)[13]
Family **Trechaleidae** Simon, 1890 (19 genera, 121 species; 3/3/1)
Family **Pisauridae** Simon, 1890 (54 genera, 335 species; 2/1/1)
Family **Oxyopidae** Thorell, 1870 (10 genera, 433 species; 1/3/0)
Family **Senoculidae** Simon, 1890 (1 genus, 31 species)
Family **Stiphidiidae** Dalmas, 1917 (22 genera, 135 species)

9. Wunderlich (2011) treated some anapid genera as a distinct family, Comaromidae, but this was not accepted in the latest version of the Platnick Catalog.
10. Traditionally placed in Palpimanoidea; some workers (e.g. Lopardo *et al*. 2011) consider micropholcommatids a subfamily of Anapidae; but see Platnick (2011).
11. Status of this monotypic family dubious according to Platnick (2011); possibly an erigonine linyphiid (Hormiga 2008).
12. Possibly an araneid (see comments in Penney & Selden 2006).
13. Parattids are in need of revision and probably represent an assemblage of species assignable to one or more extant lycosoid families (see comments in Penney & Selden 2006).

Family **Psechridae** Simon, 1890 (2 genera, 30 species)
Family **Zoropsidae** Bertkau, 1882 (16 genera, 92 species; 3/14/0)
Family †**Insecutoridae** Petrunkevitch, 1942 (1 genus, 5 species; 1/5/0)[5]
Family **Ctenidae** Keyserling, 1877 (41 genera, 477 species; 1/1/0)
Unplaced families
Family **Agelenidae** C. L. Koch, 1837 (69 genera, 1156 species; 1/8/0)
Family **Amphinectidae** Forster & Wilton, 1973 (32 genera, 159 species)
Family **Cycloctenidae** Simon, 1898 (5 genera, 36 species)
Family **Amaurobiidae** Thorell, 1870 (51 genera, 278 species)
Family **Tengellidae** Dahl, 1908 (8 genera, 51 species)
Family **Zorocratidae** Dahl, 1913 (5 genera, 42 species)
Family **Miturgidae** Simon, 1885 (28 genera, 357 species; 0/2/0)
Family **Zodariidae** Thorell, 1881 (86 genera, 967 species; 9/11/0)
Family **Penestomidae** Simon, 1903 (1 genus, 9 species)
Family *incertae sedis* (1 genus, 1 species; 1/1/0)
Clade **Dionycha** (20 families)
Superfamily **Gnaphosoidea** Simon, 1893 (7 families)
Family **Ammoxenidae** Simon, 1893 (4 genera, 18 species)
Family **Cithaeronidae** Simon, 1893 (2 genera, 6 species)
Family **Gallieniellidae** Millot, 1947 (11 genera, 57 species)
Family **Trochanteriidae** Karsch, 1879 (25 genera, 182 species; 6/30/0)
Family **Lamponidae** Simon, 1893 (23 genera, 192 species)
Family **Prodidomidae** Simon, 1884 (30 genera, 304 species; 0/1/0)
Family **Gnaphosidae** Pocock, 1898 (123 genera, 2147 species; 6/24/0)
Unplaced families
Family *incertae sedis* (2 genera, 2 species; 2/2/0)
Family **Clubionidae** Simon, 1895 (26 genera, 601 species; 9/22/1)
Family **Anyphaenidae** Bertkau, 1878 (56 genera, 518 species; 0/4/0)
Family **Liocranidae** Simon, 1897 (31 genera, 182 species; 1/4/0)
Family **Corinnidae** Karsch, 1880 (96 genera, 1051 species; 9/37/0)
Family †**Ephalmatoridae** Petrunkevitch, 1950 (1 genus, 12 species; 1/12/0)[5]
Family **Chummidae** Jocqué, 2001 (1 genus, 2 species)
Family **Homalonychidae** Simon, 1893 (1 genus, 3 species)
Family **Zoridae** F. O. P.-Cambridge, 1893 (16 genera, 81 species; 2/2/0)
Family **Selenopidae** Simon, 1897 (10 genera, 241 species; 0/4/0)
Family **Sparassidae** Bertkau, 1872 (89 genera, 1124 species; 4/11/0)
Family **Philodromidae** Thorell, 1870 (31 genera, 537 species; 2/2/0)
Family **Thomisidae** Sundevall, 1833 (190 genera, 2183 species; 13/31/0)[14]
Family **Salticidae** Blackwall, 1841 (591 genera, 5430 species; 17/62/0)

References

Coddington, J.A. (2005) Phylogeny and classification of spiders. *In*: Ubick, D., Paquin, P., Cushing. P. E. & Roth, V. (eds.): *Spiders of North America*. American Arachnological Society, pp. 18–24.

Dimitrov, D., Lopardo, L., Giribet, G., Arnedo, M.A., Alvarez-Padilla, F. & Hormiga, G. (2011) Tangled in a sparse spider web: single origin of orb weavers and their spinning work unravelled by denser taxonomic sampling. Proceedings of the Royal Society B, doi10.1098/rspb.2011.2011.

Dunlop J.A., Penney, D. & Jekel, D. (2011) A summary list of fossil spiders and their relatives. *In:* Platnick, N. I. (ed.) *The world spider catalog, version 12.0*. American Museum of Natural History, online at http://research.amnh.org/entomology/spiders/catalog/index.html DOI: 10.5531/db.iz.0001.

Griswold, C.E., Ramírez, M.J., Coddington, J.A. & Platnick, N.I. (2005) Atlas of phylogenetic data for entelegyne spiders (Araneae: Aaneomorphae: Entelegynae) with comments on their phylogeny. *Proceedings of the California Academy of Sciences*, 56 (Supl. II), 1–324.

Hormiga, G. (2008) On the spider genus *Weintrauboa* (Araneae, Pimoidae), with a description of a new species from China and com-

14. Wunderlich's (2004) proposal of a separate family, Borboropactidae, for some fossil and living crab spiders has not been widely accepted.

ments on its phylogenetic relationships. *Zootaxa*, 1814, 1–20.
Lopardo, L., Giribet, G. & Hormiga, G. (2011) Morphology to the rescue: molecular data and the signal of morphological characters in combined phylogenetic analyses—a case study from mysmenid spiders (Araneae, Mysmenidae), with comments on the evolution of web architecture. *Cladistics*, 27, 278–330.
Penney, D. & Selden, P.A. (2006) Assembling the tree of life—phylogeny of spiders: a review of the strictly fossil spider families. *In*: Deltshev, C. & Stoev, P. (eds.): European Arachnology 2005. *Acta zoological bulgarica*, Suppl. No. 1, 25–39.
Platnick N. I. (2011) *The world spider catalog, version 12.0*. American Museum of Natural History, online at http://research.amnh.org/iz/spiders/catalog. DOI: 10.5531/db.iz.0001.
Wunderlich, J. (2004) The new spider (Araneae) family Borboropactidae from the tropics and fossil in Baltic amber. in: Wunderlich, J. (ed.): Fossil spiders in amber an copal. *Beiträge zur Araneologie*, 3, 1737–1746.
Wunderlich, J. (2011) Some fossil spiders (Araneae) in Eocene European ambers. in: Wunderlich, J. (ed.): Extant and fossil spiders (Araneae). *Beiträge zur Araneologie*, 6, 472–538.

Contributor names and addresses

Jason A. Dunlop, Museum für Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity at the Humboldt University Berlin, D-10115 Berlin, Germany; jason.dunlop@mfn-berlin.de
David Penney, Faculty of Life Sciences, The University of Manchester, Manchester M13 9PT, UK; david.penney@manchester.ac.uk

Order **Amblypygi** Thorell, 1883 (2 suborders)[1,2,3]
- Suborder **Euamblypygi** Weygoldt, 1996 (2 infraorders)
  - Infraorder **Charinina** Weygoldt, 1996 (1 superfamily)
    - Superfamily **Charinoidea** Weygoldt, 1996 (1 family)
      - Family **Charinidae** Quintero, 1896 (3 genera, 55 species)
  - Infraorder **Neoamblypygi** Weygoldt, 1996 (2 superfamilies)
    - Superfamily **Charontoidea** Simon, 1892 (1 family)
      - Family **Charontidae** Simon, 1892 (2 genera, 12 species)
    - Superfamily **Phrynoidea** Blanchard, 1852 (2 families)
      - Family **Phrynichidae** Simon, 1892 (7 genera, 34 species)
      - Family **Phrynidae** Blanchard, 1852 (4/†1 genera, 58/†2 species)
- Suborder **Paleoamblypygi** Weygoldt, 1996 (1 superfamily)
    - Superfamily **Paracharontoidea** Weygoldt, 1996 (1 family)
      - Family **Paracharontidae** Weygoldt, 1996 (1/†1 genera, 2/†2 species)
- *Incertae sedis* (†4 genera, †5 species)

Cited references

Hallan, J. (2005) Synopsis of the Described Amblypygi of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Amblypygi1.htm (accessed on 16.x.2011).

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi*, *Uropygi*, *Schizomida*, *Palpigradi*, *Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 16.x.2011). Species 2000, Reading, UK.

Weygoldt, P. (1996) Evolutionary morphology of whip spiders: Towards a phylogenetic system (Chelicerata: Arachnida: Amblypygi). *Journal of Zoological Systematics and Evolution Research*, 34, 185–202.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Amblypygi Thorell, 1883. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Amblypygi currently includes 5 families, 17 genera and 161 species, fossil taxa include 6 genera and 9 species.
2. Higher classification follows Weygoldt (1996).
3. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.

Order **Thelyphonida** Latreille, 1804 (1 family)[1,2,3]

Family **Thelyphonidae** Lucas, 1835 (18/†3 genera, 110/†9 species)

Cited references

Hallan, J. (2005) Synopsis of the Described Uropygi of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Uropygi1.htm (accessed on 16.x.2011).

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi*, *Uropygi*, *Schizomida*, *Palpigradi*, *Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 16.x.2011). Species 2000, Reading, UK.

Shultz, J.H. (2007) A phylogenetic analysis of the arachnid orders based on morphological characters. *Zoological Journal of the Linnean Society*, 150, 221–265.

Weygoldt, P. & Paulus, H.F. (1979) Untersuchungen zur Morphologie, Taxonomie und Phylogenie der Chelicerata. II. Cladogramme und die Entfaltung der Chelicerata. *Zeitschrift für die Zoologische Systematik und Evolutionforschung*, 17, 177–200.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Thelyphonida Latreille, 1804. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Thelyphonida currently includes 1 family, 18 genera and 110 species, fossil taxa include 3 genera and 9 species.
2. The earlier name, Thelyphonida, is applied to this order, rather than Uropygi Thorell, 1883, which more precisely refers to the monophyletic group comprising Thelyphonida and Schizomida Petrunkevitch, 1945 (Weygoldt & Paulus, 1979; Shultz, 2007).
3. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.

Order **Schizomida** Petrunkevitch, 1945 (1 suborder)[1,2]
Suborder **Schizomina** Petrunkevitch, 1945 (1 superfamily)
Superfamily **Hubbardioidea** Cook, 1899 (3 families)
†Family **Calcitronidae** Petrunkevitch, 1945 (1 genus, 2 species)
Family **Hubbardiidae** Cook, 1899 (44/†2 genera, 249/†2 species)
Family **Protoschizomidae** Rowland, 1975 (2 genera, 11 species)

Cited references

Hallan, J. (2005) Synopsis of the Described Schizomida of the World. *In*: Hallan, J. (ed.) *Biology Catalog*. Digital resource at: http://insects.tamu.edu/research/collection/hallan/Acari/Family/Schizomida1.htm (accessed on 16.x.2011).

Harvey, M.S. (2003) *Catalogue of the Smaller Arachnid Orders of the World*: *Amblypygi*, *Uropygi*, *Schizomida*, *Palpigradi*, *Ricinulei and Solifugae*. CSIRO Publishing, Collingwood.

Harvey, M.S. (2011) Smaller Arachnid Orders Catalogue (SAOCat) database. *In*: Bisby F.A., Roskov Y.R., Orrell T.M., Nicolson D., Paglinawan L.E., Bailly N., Kirk P.M., Bourgoin T., Baillargeon G. & Ouvrard D. (eds.). *Species 2000 & ITIS Catalogue of Life*: *2011 Annual Checklist*. Digital resource at http://www.catalogueoflife.org/annual-checklist/2011/ (accessed on 16.x.2011). Species 2000, Reading, UK.

Author's address

Lorenzo Prendini, Division of Invertebrate Zoology, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192, U.S.A.; lorenzo@amnh.org

1. **BY** Lorenzo Prendini (for full contact details, see **Author's address** after **References**). The title of this contribution should be cited as "Order Schizomida Petrunkevitch, 1945. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Schizomida currently includes 2 families, 46 genera and 260 species, fossil taxa include 1 family, 3 genera and 4 species.
2. The initial list of species was obtained from Harvey (2003) and updated using Hallan (2005) and Harvey (2011). Only valid species are included in the cited totals; *species inquirenda* and infraspecific taxa are excluded. Counts of fossil genera and species are preceded by †.

Class **Chilopoda** Latreille, 1817[1] (2 subclasses)[2]
- Subclass **Notostigmophora** Verhoeff, 1901 (1 order)
  - Order **Scutigeromorpha** Pocock, 1895 (3 families)
    - Family **Pselliodidae** Chamberlin, 1955 ((1 genus, ca. 3 species)
    - Family **Scutigeridae** Leach, 1814 (17 genera, ca. 50 species)
    - Family **Scutigerinidae** Attems, 1926 (2 genera, 3 species)
- Subclass **Pleurostigmophora** Verhoeff, 1901 (4 orders)[3]
  - Order **Lithobiomorpha** Pocock, 1895 (2 families)
    - Family **Henicopidae** (20 genera, ca. 120 species)
    - Family **Lithobiidae** (ca. 43 genera, ca. 1000 species)
  - Order **Craterostigmomorpha** Pocock, 1902 (1 family)
    - Family **Craterostigmidae** Pocock, 1902 (1 genus, 2 species)
  - Order **Scolopendromorpha** Pocock, 1895 (5 families)
    - Family **Cryptopidae** Kohlrausch, 1881 (2 genera, ca. 170 species)
    - Family **Mimopidae** Lewis (1 genus, 1 species)
    - Family **Plutoniumidae** Bollman, 1893 (2 genera, 7 species)
    - Family **Scolopendridae** Leach, 1814 (21 genera, ca. 420 species)
    - Family **Scolopocryptopidae** Pocock, 1896 (8 genera, ca. 80 species)
  - Order **Geophilomorpha** Pocock, 1895 (13 families)
    - Family **Aphilodontidae** Silvestri, 1909 (3 genera, 15+ species)
    - Family **Ballophilidae** Cook, 1896 (12 genera, ca. 80 species)
    - Family **Dignathodontidae** Cook, 1896 (4 genera, ca. 20 species)
    - Family **Eriphantidae** Crabill, 1970 (1 genus, 1 species)
    - Family **Geophilidae** Leach, 1815 (ca. 100 genera, ca. 560 species)
    - Family **Gonibregmatidae** Cook, 1896 (8 genera, ca. 15 species)
    - Family **Himantariidae** Bollman, 1893 (ca. 19 genera, ca. 70 species)
    - Family **Linotaeniidae** (7 genera, ca. 50 species)[4]
    - Family **Macronicophilidae** Verhoeff, 1925 (1 genus, 4 species)
    - Family **Mecistocephalidae** Bollman, 1893 (11 genera, ca. 170 species)
    - Family **Neogeophilidae** Silvestri, 1818 (2 genera, 4 species)
    - Family **Oryidae** Cook, 1896 (ca. 18 genera, ca. 45 species)
    - Family **Schendylidae** Cook, 1896 (ca. 35 genera, ca. 220 species)

Class **Symphyla** Ryder, 1880 (2 families)[5]
- Family **Scutigerellidae** Bagnall, 1913 (5 genera, 124 species)
- Family **Scolopendrellidae** Bagnall, 1913 (8 genera, 73 species)

Class **Pauropoda** Lubbock, 1868 (2 orders)[6]
- Order **Hexamerocerata** Remy, 1950 (1 family)
  - Family **Millotauropodidae** (1 genus, 8 species)
- Order **Tetramerocerata** Remy, 1950 (11 families)
  - Family **Pauropodidae** Lubbock, 1867 (23 genera, 679 species)
  - Family **Colinauropodidae** Scheller, 1985 (1 genus, 3 species)
  - Family **Eirmopauropodidae** Scheller, 2010 (1 genus, 1 species)
  - Family **Polypauropodidae** Remy, 1932 (3 genera, 29 species)
  - Family **Amphipauropodidae** Scheller, 2008 (1 genus, 2 species)

1. **BY** Alessandro Minelli (for full contact details, see **Author name and address** after **Cited references**). The title of this contribution should be cited as "Class Chilopoda**,** Class Symphyla and Class Pauropoda. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Class Chilopoda includes 24 families, ca 339 genera and ca. 3110 species; class Symphyla includes 2 families, 13 genera and 197 species; class Pauropoda includes 12 families, 46 genera and 835 species.
2. Taxonomic arrangement and estimated numbers of taxa according to Bonato (2011), Edgecombe (2011a,b), Edgecombe & Bonato (2011) and Zapparoli & Edgecombe (2011).
3. Within the Pleurostigmophora, Scolopendromorpha and Geophilomorpha are usually grouped together as Epimorpha. Less fixed is the phylogenetic position of Craterostigmomorpha, probably to be grouped together with the Epimorpha in a taxon Phylactometria, as proposed by Edgecombe & Giriber (2004).
4. Likely to be merged within Geophilidae.
5. Taxonomic arrangement and estimated numbers of taxa according to Szuchsic & Scheller (2011).
6. Taxonomic arrangement and estimated numbers of taxa according to Scheller (2011).

Family **Diplopauropodidae** Scheller, 1988 (1 genus, 2 species)
Family **Antichtopauropodidae** Scheller, 2010 (1 genus, 1 species)
Family **Brachypauropodidae** Silvestri, 1902 (6 genera, 28 species)
Family **Hansenauropodidae** Remy, 1934 (3 genera, 6 species)
Family **Eurypauropodidae** Ryder, 1879 (4 genera, 62 species)
Family **Sphaeropauropodidae** Verhoeff, 1934 (1 genus, 14 species)

Cited references

Bonato, L. (2011) Geophilomorpha. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 407–443.

Edgecombe, G. D. (2011a) Scutigeromorpha. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 363–370.

Edgecombe, G. D. (2011b) Craterostigmomorpha. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 390–391.

Edgecombe, G. D. & Bonato, L. (2011) Scolopendromorpha. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 392–407.

Edgecombe, G. D. & Giribet, G. (2004) Adding mitochondrial sequence data (16S rRNA and cytochrome c oxidase subunit I) to the phylogeny of centipedes (Myriapoda, Chilopoda): an analysis of morphology and four molecular loci. *Journal of Zoological Systematics and Evolutionary Research*, 42, 89–134.

Scheller, U. (2011) Pauropoda. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, 467–508.

Szuchsic, N. & Scheller, U. (2011) Symphyla. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 445–466.

Zapparoli, M. & Edgecombe, G.D. (2011) Lithobiomorpha. *In*: Minelli, A. (Ed) *The Myriapoda (Treatise on Zoology – Anatomy, Taxonomy, Biology)*, 1, Brill, Leiden, pp. 371–389.

Author name and address

Alessandro Minelli, Department of Biology, University of Padova, Via Ugo Bassi 58 B, I 35131 Padova, Italy
alessandro.minelli@unipd.it

Class **Diplopoda** de Blainville in Gervais, 1844[1] [2]

Subclass **Penicillata** Latrielle, 1831

Order **Polyxenida** Verhoeff, 1934[3] (2 superfamilies)

Superfamily **Polyxenoidea** Lucas, 1940 (3 families)

Family **Hypogexenidae** Schubart, 1947 (1 genus, 1 species)

Family **Lophoproctidae** Silvestri, 1897 (5 genera, 30 species)

Family **Polyxenidae** Lucas, 1840 (19 genera, 47 species)

Superfamily **Synxenoidea** Silvestri, 1923 (1 family)

Family **Synxenidae** Silvestri, 1923 (2 genera, 8 species)

Subclass **Chilognatha** Latrielle, 1802/1803 (2 infraclasses)

Infraclass **Pentazonia** Brandt, 1833 (2 superorders)

Superorder **Limacomorpha** Pocock, 1894 (1 order)

Order **Glomeridesmida** Cook, 1895 (2 families)

Family **Glomeridesmidae** Latzel 1884 (1 genus, 26 species)

Family **Termitodesmidae** Silvestri, 1911 (1 genus, 5 species), **NEW STATUS**[4]

Superorder **Oniscomorpha** Pocock, 1887 (2 orders)

Order **Glomerida** Brandt, 1833 (2 families)

Family **Doderiidae** Silvestri, 1904 (3 genera, 36 species)

Family **Glomeridae** Leach, 1816 (27 genera, 176 species)

Order **Sphaerotheriida** Brandt, 1833[5] (4 families)

Family **Sphaerotheriidae** C. L. Koch, 1847(2 genera, 55 species)

Family **Zephroniidae** Gray in Jones, 1843 (14 genera, 140 species)

Family **Procyliosomatidae** Wesener & VandenSpiegel, 2009 (1 genus, 10 species)

Family **Arthrosphaeridae** Jeekel, 1974 (4 genera, 100 Species)

Infraclass **Helminthomorpha** Pocock, 1887 (2 subterclasses)

Subterclass **Colobognatha** Brandt, 1834 (4 orders)

Order **Platydesmida** Cook, 1895 (2 families)

Family **Andrognathidae** Cope, 1869 (12 genera, 32 species)

Family **Platydesmidae** DeSaussure, 1860 (2 genera, 31 species)

Order **Polyzoniida** Cook, 1895 (3 families)

Family **Hirudisomatidae** Silvestri, 1896 (6 genera, 20 species)

Family **Polyzoniidae** Newport, 1844 (6 genera, 22 species)

Family **Siphonotidae** Cook, 1895 (12 genera, 32 species)

Order **Siphonocryptida** Cook, 1895

Family **Siphonocryptidae** Pocock, 1894 (2 genera, 6 species)

Order **Siphonophorida** Newport, 1844 (2 families)

Family **Siphonophoridae** Newport, 1844[6] (10 genera, 60? species)

---

1. **BY** William Shear (for full contact details, see **Contributor name and address** after **References cited**). The title of this contribution should be cited as "Class Diplopoda de Blainville in Gervais, 1844. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Diplopoda includes approximately 147 families, 1,868 genera and 7,753 species. The numbers are approximate because there is no up-to-date comprehensive listing of genera and species in this group
2. With few exceptions, this classification is based on the ones published by Hoffman (1980) and Shelley (2003). Astute critical histories of the development of diplopod classification are provided by both of these authors. Numbers of species and genera are based primarily on Hoffman (1980), but are to be considered estimates only, since a substantial proportion, perhaps a large majority, of milliped species await discovery and description, and neither Hoffman (1980) nor I exhaustively surveyed the literature in search of species, though Hoffman lists almost all genera up to 1978. For genera described after 1978, I made no attempt to track down all names but relied on a subjective estimate. The comments of Rowland Shelley, Henrik Enghoff, Thomas Wesener and Richard Hoffman materially improved this effort, but all errors are the sole responsibility of the author.
3. Hoffman (1980) listed 6 additional genera of Polyxenida as being of uncertain familial position. Changes from Shelley (2003) are as in Nguyen Duy-Jaquemin & Geoffroy (2003).
4. The elevation of Termitodesminae from subfamily to family has been suggested many times, most recently by Shelley (2011). Here that formal step is taken.
5. Classification as in Wesener & VandenSpiegel (2009). While placing the classification on a firmer phylogenetic footing these authors were not able to assign all generic names and did not attempt to estimate species numbers. Genus and species numbers supplied by Wesener (pers. comm., 2011).
6. Hoffman (1980) did not estimate species numbers. My number is an estimate based on an impression of the literature and on Jeekel (2001). Hoffman (1980) characterized the family as a "taxonomist's nightmare."

Family **Siphonorhinidae** Cook, 1895 (4 genera, 10 species)

Subterclass **Eugnatha** Attems, 1898 (3 superorders)

Superorder **Juliformia** Attems, 1926 (3 orders)

Order **Julida** Brandt, 1833 (5 superfamilies)

Superfamily **Blaniuloidea** C. L. Koch, 1847 (4 families)

Family **Blaniulidae** C. L. Koch, 1847 (19 genera, 46 species)

Family **Galliobatidae** Brolemann, 1921 (1 genus, 1 species)

Family **Okeanobatidae** Verhoeff, 1942 (2 genera, 4 species)

Family **Zosteractinidae** Loomis, 1943 (2 genera, 2 species)

Superfamily **Juloidea** Leach, 1814 (4 families)

Family **Julidae** Leach, 1814[7] (88 genera, 500? species)

Family **Rhopaloiulidae** Attems, 1926 (1 genus, 1 species)

Family **Trichoblaniulidae** Verhoeff, 1911 (1 genus, 4 species)

Family **Trichonemasomatidae** Enghoff, 1991 (1 genus, 1 species)

Superfamily **Nemasomatoidea** Bollman, 1893 (5 families)

Family **Chelojulidae** Enghoff, 1991 (1 genus, 1 species)

Family **Nemasomatidae** Bollman, 1893 (7 genera, 22 species)

Family **Pseudonemasomatidae** Enghoff, 1991 (1 genus, 1 species)

Family **Telsonemasomatidae** Enghoff, 1991 (1 genus, 1 species)

Superfamily **Paeromopodoidea** Cook, 1895 (2 families)

Family **Aprosphylosomatidae** Hoffman, 1961 (1 genus, 1 species)

Family **Paeromopodidae** Cook, 1895 (2 genera, 16 species)

Superfamily **Parajuloidea** Bollman, 1893 (2 families)

Family **Mongoliulidae** Pocock, 1903 (8 genera, 23 species)

Family **Parajulidae** Bollman, 1893[8] (27 genera, 115 species)

Order **Spirobolida** Cook, 1895[9] (2 suborders)

Suborder **Spirobolidea** Cook, 1895 (11 families)

Family **Allopocockiidae** Keeton, 1960 (3 genera, 7 species)

Family **Atopetholidae** Chamberlin, 1918 (14 genera, 45 species)

Family **Floridobolidae** Keeton, 1959 (1 genus, 1 species)

Family **Hoffmanobolidae** Shelley, 2001 (1 genus, 1 species)

Family **Messicobolidae** Loomis, 1968 (3 genera, 25 species)

Family **Pseudospirobolellidae** Brölemann, 1913 (2 genera, 4 species)

Family **Rhinocricidae** Brölemann, 1913[10] (16 genera, 110 species[11])

Familiy **Spirobolellidae** Brölemann, 1913 (8 genera, 90 species)

Family **Spirobolidae** Bollman, 1893[12] (6 genera, 22 species)

Family **Typhlobolellidae** Hoffman, 1969 (5 genera, 6 species)

Suborder **Trigoniulidea** Brölemann, 1913 (2 families)

Family **Pachybolidae** Cook, 1897 (33 genera, 150? species)

Family **Trigoniulidae** Attems, 1909[13] (21 genera, 45 species)

Order **Spirostreptida** Brandt, 1833[14] (2 suborders)

Suborder **Cambalidea** Cook, 1895[15] (5 families)

---

7. Genus and species estimates are especially difficult in this large family. An overly analytical approach to its classification has resulted in the naming of many subgenera (not included here in the generic count), up to 17 in the genus *Ommatoiulus*, most of which are monotypic. For several large genera, Hoffman (1980) was not able to estimate species numbers, so the number proposed here may be low.
8. The number of genera and species in this family, which dominates the milliped fauna of North America, is uncertain at this writing. The species number in particular is probably much too low, but is based on names presently in the literature.
9. Hoffman (1980) lists two genera of Spirobolida as being of uncertain familial status.
10. Pitz & Sierwald (2010) found this family to be the sister to all other spirobolidans but did not establish any higher taxon for it.
11. No accurate estimates of numbers are available for the 2 large genera *Eurhinocricus* and *Salpidobolus.*
12. Pitz & Sierwald (2010), in a phylogenetic analysis of Spirobolida, found this family to be possibly paraphyletic
13. According to Wesener (pers. comm. 2011) there are no characters that separate this family from Pachybolidae.
14. Classification of the Spirostreptida is presently controversial. Some consider both suborders, plus a Suborder **Epinannolenoidea** (Families Choctellidae and Pseudonannolenidae) to be full orders. Others would include Cambalidea as a suborder of Julida, or at least argue for a position of a separate Order Cambalida near Julida. At present there are few compelling arguments for any suggested arrangement, so I follow tradition.

Family **Cambalidae** Bollman,1893 (21 genera, 75? species)
Family **Cambalopsidae** Cook 1895[16] (10 genera, 80? species)
Family **Choctellidae** Chamberlin and Hoffman, 1950[17] (1 genus, 2 species)
Family **Iulomorphidae** Verhoeff, 1924 (9 genera, 35 species)
Family **Pseudonannolenidae** Silvestri, 1895[18] (7 genera, 50? species)
Suborder **Spirostreptidea** Brandt, 1833 (2 superfamilies)
Superfamily **Odontopygoidea** Attems, 1909 (2 families)
Family **Atopogestidae** Hoffman, 1980[19] (1 genus, 1 species)
Family **Odontopygidae** Attems. 1909[20] (40 genera, 335 species)
Superfamily **Spirostreptoidea** Pocock, 1894 (3 families)
Family **Adiaphorostreptidae** Hoffman, 1977 (1 genus, 1 species)
Family **Harpagophoridae** Attems, 1909 (31 genera, 160 species)
Family **Spirostreptidae** Brandt, 1833[21] (61 genera, 275 species)
Superorder **Nematophora** Verhoeff, 1913 (4 orders)
Order **Callipodida** Pocock, 1894[22] (3 suborders)
Suborder **Callipodidea** Pocock, 1894 (1 family)
Family **Callipodidae** Bollman, 1893 (2 genera, 5 species)
Suborder **Schizopetalidea** Hoffman, 1973 (5 families)
Family **Abacionidae** Shelley, 1979 (3 genera, 10 species)
Family **Caspiopetalidae** Lohmander, 1931 (1 genus, 8 species)
Family **Dorypetalidae** Verhoeff, 1900 (4 genera, 11 species)
Family **Paracortinidae** Wang & Zhang, 1993 (2 genera, 11 species)
Family **Schizopetalidae** Verhoeff 1909 (20 genera, 85 species)
Suborder **Sinocallipodidea** Shear, 2000 (1 family)
Family **Sinocallipodidae** Zhang, 1993 (1 genus, 5 species)
Order **Chordeumatida** Pocock 1894[23] (4 suborders)
Suborder **Chordeumatidea** Pocock 1894 (1 superfamily)
Superfamily **Chordeumatoidea** C. L. Koch, 1847 (2 families)
Family **Chordeumatidae** C. L. Koch, 1847 (5 genera, 21 species)
Family **Speophilosomatidae** Takakuwa, 1949 (1 genus, 6 species)
Suborder **Craspedosomatidea** Cook, 1895
Superfamily **Anthroleucosomatoidea** Verhoeff 1899 (4 families)
Family **Anthroleucosomatidae** Verhoeff 1899 (7 genera, 15 species)
Family **Haasiidae** Hoffman, 1980 (1 genus, 11 species)
Family **Origmatogonidae** Verhoeff 1914 (3 genera, 5 species)
Family **Vandeleumatidae** Mauriès, 1970 (3 genera, 8 species)
Superfamily **Brannerioidea** Cook, 1896 (12 families)
Family **Brachychaeteumatidae** Verhoeff, 1910 (3 genera, 13 species)
Family **Branneriidae** Cook, 1896 (1 genus, 2 species)
Family **Chaemosomatidae** Verhoeff, 1913 (2 genera, 8 species)

15. Here I follow Jeekel (2004). The internal classification of this suborder (or order) is extremely chaotic. "…it is hard to find a major millipede taxon which has undergone so many changes in its internal classification since 1900 (Jeekel 2004, p. 45)." In the 5 years since the publication of that comment, more changes have taken place but they are not recounted here; Shelley (2003) tracked those up to 2002. Species counts, however, are based on Hoffman (1980) since Jeekel (2004) listed all names without evaluating their validity. Ongoing activity in Cambalopsidae is greatly increasing the numbers of species in that family.
16. Includes **Glyphiulidae** Chamberlin, 1922, and **Pericambalidae** Silvestri, 1909, as listed by Shelley (2003).
17. Hoffman (1980) and Shelley (2003) both place this family in a Suborder Epinannolenidea.
18. Hoffman (1980) and Shelley (2003) both place this family in a Suborder Epinannolenidea.
19. According to Mauriès (1997) the validity of this family is questionable, as the only specimen of the single species may be teratological or an intercalary (periodomorphotic) stage, but he did not formally synonymize it.
20. The numbers of species in the large genus *Spinotarsus* cannot presently be estimated with any degree of accuracy. *Odontopyge*, once a very large genus, has been reduced to a few species but the residue of the genus as not been reassigned (Enghoff, pers. comm. 2011)
21. The numbers of genera and species in Spirostreptidae are uncertain because the status of several generic names is as yet unclear.
22. Arrangement follows Stoev, Sierwald & Billey 2008.
23. The arrangement here follows Shear (2000) with a few changes and additions. Hoffman (1980) listed 8 chordeumatidan genera as being of uncertain family position.

Family **Golovatchiidae** Shear, 1992 (1 genus, 1 species)
Family **Heterolatzeliidae** Verhoeff 1899 (2 genera, 3 species)
Family **Kashmireumatidae** Mauriès, 1982 (2 genera, 6 species)
Family **Macrochaeteumatidae** Verhoeff, 1914 (2 genera, 2 species)
Family **Microlympiidae** Shear & Leonard, 2003 (1 genus, 1 species)
Family **Niponiosomatidae** Verhoeff, 1941 (2 genera, 3 species)
Family **Tingupidae** Loomis,1966 (3 genera, 10 species)
Family **Trachygonidae** Cook, 1896 (3 genera, 3 species)
Superfamily **Cleidogonoidea** Cook, 1896 (6 families)
Family **Biokoviellidae** Mrsic, 1992 (1 genus, 1 species)
Family **Cleidogonidae** Cook, 1896[24] (8 genera, 152 species)
Family **Entomobielziidae** Verhoeff, 1899 (1 genus, 2 species)
Family **Lusitaniosomatidae** Schubart, 1953 (1 genus, 1 species)
Family **Opisthocheiridae** Ribaut, 1913 (6 genera, 24 species)
Family **Trichopetalidae** Verhoeff, 1914 (6 genera, 40 species)
Superfamily **Craspedosomatoidea** Gray in Jones, 1843 (3 families)
Family **Attemsiidae** Verhoeff, 1899 (16 genera, 24 species)
Family **Craspedosomatidae** Gray in Jones, 1843 (37 genera, 181 species)
Family **Haplobainosomatidae** Verhoeff ,1909 (4 genera, 7 species)
Superfamily **Haaseoidea** Attems, 1899 (1 family)
Family **Haaseidae** Attems, 1899[25] (3 genera, 17 species)
Superfamily **Neoatractosomatoidea** Verhoeff, 1901[26] (5 families)
Family **Altajellidae** Mikhaljova & Golovatch, 2001 (2 genera, 2 species)
Family **Cyrnosomatidae** Mauriès, 2003 (1 genus, 3 species)
Family **Faginidae** Attems, 1926[27] (1 genus, 1 species)
Family **Hoffmaneumatidae** Golovatch, 1978 (2 genera, 2 species)
Family **Mastigophorophyllidae** Verhoeff, 1899 (9 genera, 35 species)
Family **Neoactractosomatidae** Verhoeff, 1901 (9 genera, 12 species)
Superfamily **Verhoeffioidea** Verhoeff, 1899 (1 family)
Family **Verhoeffiidae** Verhoeff, 1899 (1 genus, 4 species)
Suborder **Heterochordeumatidea** Shear, 2000 (4 superfamilies)
Superfamily **Conotyloidea** Cook, 1896 (2 families)
Family **Adritylidae** Shear, 1971 (1 genus, 3 species)
Family **Conotylidae** Cook, 1896 (16 genera, 65 species)
Superfamily **Diplomaragnoidea** Attems, 1907 (1 family)
Family **Diplomaragnidae** Attems, 1907 (6 genera, 45 species)
Superfamily **Heterochordeumatoidea** Pocock, 1894 (5 families)
Family **Eudigonidae** Verhoeff , 1914 (2 genera, 4 species)
Family **Heterochordeumatidae** Pocock, 1894 (2 genera, 5 species)
Family **Megalotylidae** Golovatch, 1978 (2 genera, 8 species)
Family **Metopidiotrichidae** Attems, 1907 (7 genera, 60 species)
Family **Peterjohnsiidae** Mauriès, 1987[28] (1 genus, 2 species)
Superfamily **Pygmaeosomatoidea** Carl, 1941 (2 families)
Family **Lankasomatidae** Mauriès 1978 (2 genera, 16 species)
Family **Pygmaeosomatidae** Carl, 1941 (1 genus, 2 species)
Suborder **Striariidea** Cook, 1896 (2 superfamilies)
Superfamily **Caseyoidea** Verhoeff, 1909 (2 families)
Family **Caseyidae** Verhoeff, 1909 (7 genera, 45 species)

24. Entomobielziidae and Lusitaniosomatidae are very likely synonyms of Cleidogonidae.
25. Unfortunately the name of this family is nearly homonymous with that of the only distantly related Haasiidae Hoffman, 1980 (see above).
26. Mauriès (2003) removes Altajellidae, Hoffmaneumatidae and Mastigophorophyllidae from Neoatractosomatoidea and places them in a new superfamily, **Mastigophorophylloidea** Verhoeff, 1899.
27. A synonym of Neoatractosomatidae, according to Mauriès (2003).
28. Placed here with some doubt by Shear (2000)

Family **Urochordeumatidae** Silvestri, 1909 (1 genus, 1 species)
Superfamily **Striarioidea** Bollman, 1893 (3 families)
Family **Apterouridae** Loomis, 1966 (1 genus, 2 species)
Family **Buotidae** Shear, 2009 (1 genus, 1 species)
Family **Rhiscosomididae** Silvestri, 1909 (1 genus, 8 species)
Family **Striariidae** Bollman, 1893 (4 genera, 12 species)
Order **Stemmiulida** Cook, 1895 (1 family)
Family **Stemmiulidae** Pocock, 1894[29] (6 genera, 155 species)
Order **Siphoniulida** Cook, 1895[30] (1 family), **NEW PLACEMENT**
Family **Siphoniulidae** Pocock, 1894 (1 genus, 2 species)
Superorder **Merochaeta** Cook, 1895[31] (1 order)
Order **Polydesmida** Pocock, 1887 (4 suborders)
Suborder **Leptodesmidea** Brölemann, 1916 (5 superfamilies)
Superfamily **Chelodesmoidea** Cook, 1895 (1 family)
Family **Chelodesmidae** Cook, 1895 (230 genera, 450? species)
Superfamily **Platyrhacoidea** Pocock, 1895 (2 families)
Family **Aphelidesmidae** Brölemann, 1916[32] (17 genera, 119 species)
Family **Platyrhacidae** Pocock, 1895[33] (40 genera, 250? species)
Superfamily **Rhachodesmoidea** Carl, 1903 (2 families)
Family **Rhachodesmidae** Carl, 1903 (17 genera, 62 species)
Family **Tridontomidae** Loomis & Hoffman, 1962 (2 genera, 4 species)
Superfamily **Sphaeriodesmoidea** Humbert & DeSaussure, 1869 (3 families)
Family **Campodesmidae** Cook, 1896 (1 genus, 8 species)
Family **Holistophallidae** Silvestri, 1909 (7 genera, 11 species)
Family **Sphaeriodesmidae** Humbert & DeSaussure, 1869 (14 genera, 85 species)
Superfamily **Xystodesmoidea** Cook, 1895 (5 families)
Family **Eurymerodesmidae** Causey, 1951 (I genus, 30 species)
Family **Euryuridae** Pocock, 1909 (2 genera, 15 species)
Family **Gomphodesmidae** Cook, 1896[34] (54 genera, 146 species)
Family **Oxydesmidae** Cook, 1895[35] (34 genera, 153 species)
Family **Xystodesmidae** Cook, 1895 (56 genera, 465 species)
Suborder **Dalodesmidea** Hoffman, 1980 (2 families)
Family **Dalodesmidae** Cook, 1896 (55 genera, 250? species)
Family **Vaalogonopodidae** Verhoeff, 1940 (3 genera, 8 species)
Suborder **Strongylosomatidea** Brölemann, 1916 (1 family)
Family **Paradoxosomatidae** Daday, 1889 (142 genera, 650? species)
Suborder **Polydesmidea** Pocock, 1887[36] (2 infraorders)
Infraorder **Oniscodesmoides** Simonsen, 1990 (2 superfamilies)
Superfamily **Oniscodesmoidea** Simonsen, 1990
Family **Dorsoporidae** Loomis, 1958 (1 genus, 1 species)
Family **Oniscodesmidae** DeSaussure, 1860 (15 genera, 26 species)
Superfamily **Pyrgodesmoidea** Silvestri, 1896 (3 families)
Family **Ammodesmidae** Cook, 1896 (2 genera, 2 species)

29. Mauriès & Golovatch (2006) and Mauriès, Golovatch & Geoffroy (2010) considered all stemmiulid genera except the monotypic *Scoliogmus* and *Eostemmiulus* as synonyms of *Stemmiulus*, but this drastic change requires more argumentation before it can be accepted.
30. This order is placed here in Nematophora for the first time, based on male gonopod structure and the presence of spinnerets. Shelley (2003) listed it as Helminthomorpha *incertae sedis.*
31. Evidence is accumulating that Polydesmida is part of a clade that also encompasses Nematophora, and as such may not require a separate superordinal name, but Merochaeta is retained here until the relationships become clearer.
32. Genus and species counts provided by Richard Hoffman (pers. comm. 2011).
33. Species estimates are not available for the large genera *Platyrhacus* and *Barydesmus.*
34. Genus and species counts from the monograph by Hoffman (2005).
35. Genus and species counts from the monograph by Hoffman (1990).
36. Hoffman (1980) listed 28 genera in this suborder which cannot be placed as to family. Four family-group names have been based on genera on this list: **Atopodigonidae** Verhoeff, 1941, **Comodesmidae** Cook, 1896, **Eneillissominae** Verhoeff, 1939, and **Hynidesmidae** Cook, 1896.

Family **Cyrtodesmidae** Cook, 1896 (3 genera, 30 species)
Family **Pyrgodesmidae** Silvestri, 1896[37] (162 genera, 210 species)
Infraorder **Polydesmoides** Pocock, 1887 (4 superfamilies)
Superfamily **Haplodesmoidea** Cook, 1895 (1 family)
Family **Haplodesmidae** Cook, 1895[38] (6 genera, 30 species)
Superfamily **Opisotretoidea** Hoffman, 1980 (1 family)
Family **Opisotretidae** Hoffman, 1980 (6 genera, 8 species)
Superfamily **Polydesmoidea** Leach, 1815 (2 families)
Family **Cryptodesmidae** Karsch, 1880 (38 genera, 125 species)
Family **Polydesmidae** Leach, 1815[39] (27 genera, 235? species)
Superfamily **Trichopolydesmoidea** Verhoeff 1910[40] (4 families)
Family **Fuhrmannodesmidae** Brölemann, 1916 (55 genera[41], 80? species)
Family **Macrosternodesmidae** Brölemann 1916, (6 genera, 18 species)
Family **Nearctodesmidae** Chamberlin & Hoffman, 1958[42] (8 genera, 30 species)

References cited

Golovatch, S.I., Geoffroy, J.-J., Mauriès, J.-P. & VandenSpiegel, D. (2009) Review of the millipede family Haplodesmidae Cook, 1895, with descriptions of some new or poorly known species (Diplopoda, Polydesmida). *ZooKeys*, 7, 1–53.

Hoffman, R.L. (1980 ["1979"]). *Classification of the Diplopoda.* Muséum d'Histoire Naturelle, Genève. 237 pp.

Hoffman, R.L. (1990) Myriapoda 4, Polydesmida: Oxydesmidae. *Das Tierrieich*, 107, 1–512.

Hoffman, R.L. (2005) *Monograph of the Gomphodesmidae, a family of African polydesmoid millipeds.* Verlag des Naturhistorischen Museums Wien. 537 pp.

Jeekel, C.A.W. (2001) A bibliographic catalogue of the Siphonophorida (Diplopoda). *Myriapod Memoranda*, 3, 44–71.

Jeekel, C.A.W. (2004) A bibliographic catalog of the "Cambaloidea" (Diplopoda, Spirostreptida). *Myriapod Memoranda* 7, 43–109.

Mauriès, J.-P. (2003) *Schizmohetera olympica* sp. n. from Greece, with a reclassification of the superfamily Neoatractasomatoidea (Diplopoda: Chordeumatida). *Arthropoda Selecta* 12, 9–16.

Mauriès, J.-P. & Golovatch, S.I. (2006) *Stemmiulus deharvingi* sp. n., the first Stemmiulida to be reported from Indonesia (Diplopoda: Stemmiulida). *Arthropoda Selecta* 15, 91–98.

Mauriès, J.-P. , Golovatch, S.I. & Geoffroy, J.-J. (2010) Un nouveau genre et une nouvelle espèce de l'ordre Stemmiulida du Viet-Nam (Diplopoda). *Arthropoda Selecta* 19, 73–80.

Nguyen Duy-Jacquemin, M. & Geoffroy, J.-J. (2003) A revised comprehensive checklist, relational database, and taxonomic system of reference for the bristly millipedes of the world (Diplopoda, Polyxenida). *African Invertebrates* 44(1), 89–101.

Pitz, K. & Sierwald, P. (2010) Phylogeny of the millipede order Spirobolida (Arthropoda: Diplopoda: Helminthomorpha). *Cladistics* 26, 497–525.

Shear, W. A. (2000) On the milliped family Heterochordeumatidae, with comments on the higher classification of Order Chordeumatida (Diplopoda). *Invertebrate Taxonomy*, 14, 363–376.

Shelley, R.M. (2003 ["2002"]) A revised, annotated, family-level classification of the Diplopoda. *Arthropoda Selecta* 11, 187–207.

Shelley, R.M. (2011) The milliped order Glomeridesmida (Diplopoda: Pentazonia: Limacomorpha) in Oceania, the East Indies, and southeastern Asia; first records from Palau, the Philippines, Vanuatu, New Britain, the Island of New Guinea, Cambodia, Thailand, and Borneo and Sulawesi, Indonesia. *Insecta Mundi*, 0196, 1–11.

Stoev, P., Sierwald, P. & Billey, A. (2008) An annotated world catalogue of the millipede order Callipodida (Arthropoda: Diplopoda). *Zootaxa*, 1706, 1–50.

Wesener, T. & VandenSpiegel, D. (2009) A first phylogenetic analysis of giant pill-millipedes (Diplopoda: Sphaerotheriida), a new model Gondwanan taxon, with special emphasis on island gigantism. *Cladistics*, 25, 1–29.

Contributor name & address

William Shear, Department of Biology, Hampden-Sydney College, Hampden-Sydney, VA 23943, USA; wshear@hsc.edu

37. This family contains about 120 monotypic genera.
38. Golovatch *et al.* (2009) synonymized **Doratodesmidae** Cook, 1896, with this family.
39. The species number may not be accurate because Hoffman (1980) did not tally the species for the large genus *Polydesmus*. *Polydesmus* has 26 subgenera, some of which should be regarded as synonyms and some of which may be valid full genera.
40. Hoffman (1980) lists 5 genera in this superfamily of uncertain familial assignment; however, since then 4 of them have been placed.
41. Thirty-nine of the 55 genera in this family are monotypic. The family as a whole has been used as a "dumping-ground" for unrelated, small, tropical trichopolydesmoids.
42. Often considered a synonym of Macrosternodesmidae.

Subphylum **Crustacea** Brünnich, 1772 [1]

Class **Branchiopoda** Latreille, 1817 (2 subclasses)[2]

Subclass **Sarsostraca** Tasch, 1969 (1 order)

Order **Anostraca** Sars, 1867 (2 suborders)

Suborder **Artemiina** Weekers, Murugan, Vanfleteren, Belk and Dumont, 2002 (2 families)

Family **Artemiidae** Grochowski, 1896 (1 genus, 9 species)

Family **Parartemiidae** Simon, 1886 (1 genus, 18 species)

Suborder **Anostracina** Weekers, Murugan, Vanfleteren, Belk and Dumont, 2002 (6 families)

Family **Branchinectidae** Daday, 1910 (2 genera, 46 species)

Family **Branchipodidae** Simon, 1886 (6 genera, 36 species)

Family **Chirocephalidae** Daday, 1910 (9 genera, 78 species)

Family **Streptocephalidae** Daday, 1910 (1 genus, 56 species)

Family **Tanymastigitidae** Weekers, Murugan, Vanfleteren, Belk and Dumont, 2002 (2 genera, 8 species)

Family **Thamnocephalidae** Packard, 1883 (6 genera, 62 species)

Subclass **Phyllopoda** Preuss, 1951 (3 orders)

Order **Notostraca** Sars, 1867 (1 family)

Family **Triopsidae** Keilhack, 1909 (2 genera, 15 species)

Order **Laevicaudata** Linder, 1945 (1 family)

Family **Lynceidae** Baird, 1845 (3 genera, 36 species)

Order **Diplostraca** Gerstaecker, 1866 (3 suborders)

Suborder **Spinicaudata** Linder, 1945 (3 families)

Family **Cyzicidae** Stebbing, 1910 (4 genera, ~90 species)

Family **Leptestheriidae** Daday, 1923 (3 genera, ~37 species)

Family **Limnadiidae** Baird, 1849 (5 genera, ~61 species)

Suborder **Cyclestherida** Sars, 1899 (1 family)

Family **Cyclestheriidae** Sars, 1899 (1 genus, 1 species)

Suborder **Cladocera** Latreille, 1829 (4 infraorders)

Infraorder **Ctenopoda** Sars, 1865 (2 families)

Family **Holopediidae** Sars, 1865 (1 genus, 3 species)

Family **Sididae** Baird, 1850 (7 genera, 47 species)

Infraorder **Anomopoda** Stebbing, 1902 (12 families)

Family **Acantholeberidae** (1 genus, 1 species)

Family **Bosminidae** Baird, 1845 (2 genera, 14 species)

Family **Chydoridae** Stebbing, 1902 (49 genera, 269 species)

Family **Daphniidae** Straus, 1820 (5 genera, 121 species)

Family **Dumontidae** (1 genus, 1 species)

Family **Eurycercidae** (1 genus, 8 species)

Family **Gondwanotrichidae** Van Damme, Shiel & Dumont, 2007 (1 genus, 1 species)

Family **Ilyocryptidae** (1 genus, 28 species)

Family **Macrothricidae** Norman & Brady, 1867 (11 genera, 60 species)

Family **Moinidae** (2 genera, 29 species)

Family **Neothricidae** (1 genus, 3 species)

Family **Ophryoxidae** (2 genera, 3 species)

Infraorder **Onychopoda** Sars, 1865 (3 families)

Family **Cercopagididae** Mordukhai-Boltovskoi, 1968 (2 genera, 13 species)

Family **Podonidae** Mordukhai-Boltovskoi, 1968 (7 genera, 17 species)

---

1. **By** Shane T. Ahyong, James K. Lowry, Miguel Alonso, Roger N. Bamber, Geoffrey A. Boxshall, Peter Castro, Sarah Gerken, Gordan S. Karaman, Joseph W. Goy, Diana S. Jones, Kenneth Meland, D. Christopher Rogers, Jörundur Svavarsson (for full contact details, see the list of **Author roles and addresses** after **References**). The title of this contribution should be cited as "Subphylum Crustacea Brünnich, 1772. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". The Recent Crustacea in this paper includes approximately 1003 families, 9522 genera and 66914 species.
2. Based on Brendonck *et al.* (2008), Forró *et al.* (2008), Van Damme *et al.* (2007a, b), Rogers (2009), Rogers & Coronel (2011).

Family **Polyphemidae** Baird, 1845 (1 genus, 13 species)
Infraorder **Haplopoda** Sars, 1865 (1 family)
Family **Leptodoridae** Lilljeborg, 1900 (1 genus, 1 species)
Class **Remipedia** Yager, 1981 (1 order)[3]
Order **Nectiopoda** Schram, 1986 (3 families)
Family **Godzilliidae** Schram, Yager & Emerson, 1986 (3 genera, 4 species)
Family **Micropacteridae** Schram, Yager & Emerson, 1986 (1 genus, 1 species)
Family **Speleonectidae** Yager, 1981 (4 genera, 13 species)
Class **Cephalocarida** Sanders, 1955 (1 order)[4]
Order **Brachypoda** Birshteyn, 1960 (1 family)
Family **Hutchinsoniellidae** Sanders, 1955 (5 genera, 13 species)
Class **Maxillopoda** Dahl, 1956 (6 subclasses)
Subclass **Thecostraca** Gruvel, 1905 (3 infraclasses)
Infraclass **Facetotecta** Grygier, 1985 (1 genus, 11 species)[5]
Infraclass **Ascothoracida** Lacaze-Duthiers, 1880 (2 orders)[6]
Order **Dendrogastrida** Grygier, 1987 (3 families)
Family **Ascothoracidae** Grygier, 1987 (2 genera, 9 species)
Family **Ctenosculidae** Thiele, 1925 (3 genera, 3 species)
Family **Dendrogastridae** Gruvel, 1905 (3 genera, 38 species)
Order **Laurida** Grygier, 1987 (3 families)
Family **Lauridae** Gruvel, 1905 (4 genera, 19 species)
Family **Petrarcidae** Gruvel, 1905 (3 genera, 11 species)
Family **Synagogidae** Gruvel, 1905 (8 genera, 27 species)
Infraclass **Cirripedia** Burmeister, 1834 (3 superorders)[7]
Superorder **Acrothoracica** Gruvel, 1905 (2 orders)
Order **Cryptophialida** Kolbasov, 2009 (1 family)
Family **Cryptophialidae** Gerstaecker, 1866 (2 genera, 20 species)
Order **Lithoglyptida** Kolbasov, 2009 (2 families)
Family **Lithoglyptidae** Aurivillius, 1892 (7 genera, 36 species)
Family **Trypetesidae** Stebbing, 1910 (2 genera, 7 species)
Superorder **Rhizocephala** Müller, 1862 (2 orders)
Order **Akentrogonida** Häfele, 1911 (6 families)
Family **Chthamalophilidae** Bocquet-Védrine, 1961 (3 genera, 4 species)
Family **Clistosaccidae** Boschma, 1928 (2 genera, 2 species)
Family **Duplorbidae** Hoeg & Rybakov, 1992 (3 genera, 5 species)
Family **Mycetomorphidae** Hoeg & Rybakov, 1992 (1 genus, 1 species)
Family **Polysaccidae** Lützen & Takahashi, 1996 (1 genus, 2 species)
Family **Thompsoniidae** Hoeg & Rybakov, 1992 (5 genera, 17 species)
Family **Incertae Sedis** (1 genus, 1 species)
Order **Kentrogonida** Delage, 1884 (3 families)
Family **Lernaeodiscidae** Boschma, 1928 (3 genera, 16 species)
Family **Peltogastridae** Lilljeborg, 1860 (14 genera, 37 species)
Family **Sacculinidae** Lilljeborg, 1860 (7 genera, 169 species)
Superorder **Thoracica** Darwin, 1854 (4 orders)
Order **Ibliformes** Buckeridge & Newman, 2006 (1 suborder)
Suborder **Iblomorpha** Newman, 1987 (2 families)
Family **Iblidae** Leach, 1825 (2 genera, 3 species)
Family **Iblioiblidae** Buckeridge & Newman, 2006 (3 genera, 5 species)

3. Based on Koenamann *et al.* (2007) and Iliffe *et al.* (2010)
4. Based on Stuardo & Vega (2011)
5. Based on Kolbasov *et al.* (2007)
6. Based on Grygier (1987), WoRMS (2011a)
7. Based on Newman & Ross (1976), Grygier & Newman (1991), Buckeridge (1998), Jones (2000), Pitombo (2004), Chan *et al.* (2009), Buckeridge & Newman (2010), Newman (2011), WoRMS (2011b), Ross & Frick (2011).

Order **Lepadiformes** Buckeridge & Newman, 2006 (2 suborders)
Suborder **Heteralepadomorpha** Newman, 1987 (5 families)
Family **Anelasmatidae** Gruvel, 1905 (1 genus, 1 species)
Family **Heteralepadidae** Nilsson-Cantell, 1921 (3 genera, 39 species)
Family **Malacolepadidae** Hiro, 1937 (2 genera, 2 species)
Family **Microlepadidae** Zevina, 1980 (2 genera, 3 species)
Family **Rhizolepadidae** Zevina, 1980 (1 genus, 2 species)
Suborder **Lepadomorpha** Pilsbry, 1916 (4 families)
Family **Koleolepadidae** Hiro, 1933 (1 genus, 1 species)
Family **Lepadidae** Darwin, 1852 (3 genera, 12 species)
Family **Oxynaspididae** Gruvel, 1905 (1 genus, 20 species)
Family **Poecilasmatidae** Annandale, 1909 (8 genera, 40 species)
Order **Scalpelliformes** Buckeridge & Newman, 2006 (5 families)
Family **Calanticidae** Zevina, 1978 (10 genera, 44 species)
Family **Eolepadidae** Buckeridge, 1983 (4 genera, 7 species)
Family **Lithotryidae** Gruvel, 1905 (1 genus, 3 species)
Family **Pollicipidae** Leach, 1817 (2 genera, 7 species)
Family **Scalpellidae** Pilsbry, 1907 (28 genera, 268 species)
Order **Sessilia** Lamarck, 1818 (3 suborders)
Suborder **Brachylepadomorpha** Withers, 1923 (1 family)
Family **Neobrachylepadidae** Newman & Yamaguchi, 1995 (1 genus, 1 species)
Suborder **Verrucomorpha** Pilsbry, 1916 (2 families)
Family **Neoverrucidae** Newman, 1989 (2 genera, 2 species)
Family **Verrucidae** Darwin, 1854 (10 genera, 63 species)
Suborder **Balanomorpha** Pilsbry, 1916 (6 superfamilies)
Superfamily **Chionelasmatoidea** Buckeridge, 1983 (1 family)
Family **Chionelasmatidae** Buckeridge, 1983 (2 genera, 5 species)
Superfamily **Pachylasmatoidea** Utinomi, 1968 (1 family)
Family **Pachylasmatidae** Utinomi, 1968 (7 genera, 26 species)
Superfamily **Chthamaloidea** Darwin, 1854 (2 families)
Family **Catophragmidae** Utinomi, 1968 (2 genera, 2 species)
Family **Chthamalidae** Darwin, 1854 (11 genera, 48 species)
Superfamily **Coronuloidea** Leach, 1817 (3 families)
Family **Chelonibiidae** Pilsbry, 1916 (1 genus, 6 species)
Family **Coronulidae** Leach, 1817 (5 genera, 5 species)
Family **Platylepadidae** Newman & Ross, 1976 (5 genera, 15 species)
Superfamily **Tetraclitoidea** Gruvel, 1903 (3 families)
Family **Austrobalanidae** Newman & Ross, 1976 (5 genera, 14 species)
Family **Bathylasmatidae** Newman & Ross, 1971 (4 genera, 20 species)
Family **Tetraclitidae** Gruvel, 1903 (6 genera, 38 species)
Superfamily **Balanoidea** Leach, 1817 (3 families)
Family **Archaeobalanidae** Newman & Ross, 1976 (12 genera, 121 species)
Family **Balanidae** Leach, 1817 (16 genera, 94 species)
Family **Pyrgomatidae** Gray, 1825 (22 genera, 72 species)
Subclass **Tantulocarida** Boxshall & Lincoln, 1983 (5 families)[8]
Family **Basipodellidae** Boxshall & Lincoln, 1983 (7 genera, 8 species)
Family **Deoterthridae** Boxshall & Lincoln, 1987 (11 genera, 16 species)
Family **Doryphallophoridae** Huys, 1991 (2 genera, 4 species)
Family **Microdajidae** Boxshall & Lincoln, 1987 (2 genera, 6 species)
Family **Onceroxenidae** Huys, 1991 (1 genus, 2 species)
Subclass **Branchiura** Thorell, 1864 (1 order)[9]

8. Based on Knudsen *et al.* (2009), Savchenko & Kolbasov (2009), Kolbasov & Savchenko (2010), Mohrbeck *et al.* (2010).
9. Based on Boxshall (2011)

Order **Arguloida** Yamaguti, 1963 (1 family)
Family **Argulidae** Leach, 1819 (4 genera, 168 species)
Subclass **Pentastomida** Diesing, 1836 (2 orders)[10]
Order **Cephalobaenida** Heymons, 1935 (2 families)
Family **Cephalobaenidae** Fain, 1961 (4 genera, 50 species)
Family **Reighardiidae** Heymons, 1935 (2 genera, 3 species)
Order **Porocephalida** Heymons, 1935 (4 families)
Family **Linguatulidae** Heymons, 1935 (1 genus, 2 species)
Family **Porocephalidae** Fain, 1961 (5 genera, 22 species)
Family **Sebekiidae** Fain, 1961 (11 genera, 49 species)
Family **Subtriquetridae** Fain, 1961 (1 genus, 4 species)
Subclass **Mystacocarida** Pennak & Zinn, 1943 (1 order)[11]
Order **Mystacocaridida** Pennak & Zinn, 1943 (1 family)
Family **Derocheilocarididae** Pennak & Zinn, 1943 (2 genera, 13 species)
Subclass **Copepoda** Milne-Edwards, 1840 (1 infraclass)[12]
Infraclass **Progymnoplea** Lang, 1948 (1 order)
Order **Platycopioida** Fosshagen, 1985 (1 family)
Family **Platycopiidae** Sars, 1911 (4 genera, 11 species)
Infraclass **Neocopepoda** Huys & Boxshall, 1991 (2 superorders)
Superorder **Gymnoplea** Giesbrecht, 1882 (1 order)
Order **Calanoida** Sars, 1903 (47 families)
Family **Acartiidae** Sars, 1900 (4 genera, 97 species)
Family **Aetideidae** Giesbrecht, 1893 (33 genera, 277 species)
Family **Arctokonstantinidae** Markhaseva & Kosobokova, 2001 (2 genera, 2 species)
Family **Arietellidae** Sars, 1902 (14 genera, 60 species)
Family **Augaptilidae** Sars, 1905 (12 genera, 129 species)
Family **Bathypontiidae** Brodsky, 1950 (4 genera, 21 species)
Family **Boholinidae** Fosshagen & Iliffe, 1989 (1 genus, 2 species)
Family **Calanidae** Dana, 1846 (9 genera, 72 species)
Family **Candaciidae** Giesbrecht, 1893 (1 genus, 50 species)
Family **Centropagidae** Giesbrecht, 1893 (14 genera, 147 species)
Family **Clausocalanidae** Giesbrecht, 1893 (7 genera, 41 species)
Family **Diaixidae** Sars, 1902 (5 genera, 14 species)
Family **Diaptomidae** Baird, 1850 (64 genera, 566 species)
Family **Discoidae** Gordejeva, 1975 (4 genera, 31 species)
Family **Epacteriscidae** Fosshagen, 1973 (19 genera, 32 species)
Family **Eucalanidae** Giesbrecht, 1893 (2 genera, 21 species)
Family **Euchaetidae** Giesbrecht, 1893 (2 genera, 128 species)
Family **Fosshageniidae** Suárez-Morales & Iliffe, 1996 (2 genera, 5 species)
Family **Heterorhabdidae** Sars, 1902 (8 genera, 77 species)
Family **Hyperbionychidae** Ohtsuka, Roe & Boxshall, 1993 (2 genera, 3 species)
Family **Kyphocalanidae** Markhaseva & Schulz, 2009 (1 genus, 1 species)
Family **Lucicutiidae** Sars, 1902 (1 genus, 51 species)
Family **Megacalanidae** Sewell, 1947 (3 genera, 17 species)
Family **Mesaiokeratidae** Matthews, 1961 (1 genus, 9 species)
Family **Metridinidae** Sars, 1902 (3 genera, 47 species)
Family **Nullosetigeridae** Soh, Ohtsuka, Imabayashi & Suh, 1999 (1 genus, 10 species)
Family **Paracalanidae** Giesbrecht, 1893 (8 genera, 96 species)
Family **Parapontellidae** Giesbrecht, 1893 (2 genera, 2 species)

10. Based on Heymons (1935), Self (1969), Riley & Self (1981), Almeida & Christoffersen (1999), Junker & Boomker (2006), Almeida *et al.* (2008).
11. Based on Martin (2009)
12. Based on Boxshall (2004) and WoRMS (2011c). Note that species numbers must be considered approximate as numerous synonymic issues remain to be resolved. We follow Boxshall (2004) in treating Poecilostomatoida as part of Cyclopoida.

Family **Parkiidae** Ferrari & Markhaseva, 1996 (1 genus, 1 species)
Family **Phaennidae** Sars, 1902 (9 genera, 114 species)
Family **Pontellidae** Dana, 1853 (10 genera, 249 species)
Family **Pseudocyclopidae** Giesbrecht, 1893 (1 genus, 41 species)
Family **Pseudocyclopiidae** Sars, 1902 (5 genera, 14 species)
Family **Pseudodiaptomidae** Sars, 1902 (3 genera, 79 species)
Family **Rhincalanidae** Geletin, 1976 (1 genus, 6 species)
Family **Ridgewayiidae** M.S. Wilson, 1958 (11 genera, 34 species)
Family **Rostrocalanidae** Markhaseva, Schulz & Martínez Arbizu, 2009 (1 genus, 2 species)
Family **Ryocalanidae** Andronov, 1974 (1 genus, 6 species)
Family **Scolecitrichidae** Giesbrecht, 1893 (31 genera, 304 species)
Family **Spinocalanidae** Vervoort, 1951 (14 genera, 73 species)
Family **Stephidae** Sars, 1902 (4 genera, 38 species)
Family **Subeucalanidae** Giesbrecht, 1893 (1 genus, 10 species)
Family **Sulcanidae** Nicholls, 1945 (1 genus, 1 species)
Family **Temoridae** Giesbrecht, 1893 (4 genera, 64 species)
Family **Tharybidae** Sars, 1902 (5 genera, 56 species)
Family **Tortanidae** Sars, 1902 (1 genus, 41 species)

Superorder **Podoplea** Giesbrecht, 1882 (7 orders)

Order **Misophrioida** Gurney, 1933 (3 families)
Family **Misophriidae** Brady, 1878 (8 genera, 16 species)
Family **Palpophriidae** Boxshall & Jaume, 2000 (1 genus, 1 species)
Family **Speleophriidae** Boxshall & Jaume, 2000 (7 genera, 20 species)

Order **Cyclopoida** Burmeister, 1834 (88 families)
Family **Abrsidae** Karanovic, 2008 (1 genus, 1 species)
Family **Anchimolgidae** Humes & Boxshall, 1996 (30 genera, 133 species)
Family **Anomoclausiidae** Gotto, 1964 (1 genus, 1 species)
Family **Antheacheridae** M. Sars, 1870 (4 genera, 8 species)
Family **Anthessiidae** Humes, 1986(6 genera, 53 species)
Family **Archinotodelphyidae** Lang, 1949 (2 genera, 5 species)
Family **Ascidicolidae** Thorell, 1859(11 genera, 16 species)
Family **Bomolochidae** Sumpf, 1871(19 genera, 149 species)
Family **Botryllophilidae** Sars, 1921(7 genera, 82 species)
Family **Bradophilidae** Marchenkov, 2002 (2 genera, 2 species)
Family **Buproridae** Thorell, 1859 (1 genus, 3 species)
Family **Catiniidae** Bocquet & Stock, 1957 (4 genera, 8 species)
Family **Chitonophilidae** Avdeev & Sirenko, 1991 (9 genera, 17 species)
Family **Chondracanthidae** Milne Edwards, 1840 (48 genera, 196 species)
Family **Chordeumiidae** Boxshall, 1988 (6 genera, 13 species)
Family **Clausidiidae** Embleton, 1901 (15 genera, 116 species)
Family **Clausiidae** Giesbrecht, 1895 (11 genera, 28 species)
Family **Corallovexiidae** Stock, 1975 (2 genera, 10 species)
Family **Corycaeidae** Dana, 1852 (6 genera, 92 species)
Family **Cucumaricolidae** Bouligand & Delamare Deboutteville, 1959 (1 genus, 2 species)
Family **Cyclopettidae** Martínez Arbizu, 2000 (4 genera, 10 species)
Family **Cyclopicinidae** Sars, 1913 (1 genus, 8species)
Family **Cyclopidae** Dana, 1846 (72 genera, 850 species)
Family **Cyclopinidae** Sars, 1913 (13 genera, 68 species)
Family **Echiurophilidae** Delamare Deboutteville & Nunes-Ruivo, 1955 (2 genera, 3 species)
Family **Enterognathidae** Illg & Dudley, 1980(4 genera, 6 species)
Family **Enteropsidae** C.W.S. Aurivillius, 1885 (5 genera, 60 species)

Family **Entobiidae** Ho, 1984 (1 genus, 3 species)
Family **Erebonasteridae** Humes, 1987 (6 genera, 11 species)
Family **Ergasilidae** von Nordmann, 1832 (27 genera, 255 species)
Family **Eunicicolidae** Sars, 1918 (2 genera, 3 species)
Family **Fratiidae** Ho, Conradi & López-González, 1998 (1 genus, 1 species)
Family **Gastrodelphyidae** List, 1889 (3 genera, 11 species)
Family **Giselinidae** Martínez Arbizu, 2000 (2 genera, 4 species)
Family **Herpyllobiidae** Hansen, 1892 (5 genera, 29 species)
Family **Hemicyclopinidae** Martínez Arbizu, 2001 (8 genera, 28 species)
Family **Intramolgidae** Marchenkov & Boxshall, 1995(1 genus, 1 species)
Family **Kelleriidae** Humes & Boxshall, 1996(1 genus, 20 species)
Family **Lamippidae** Joliet, 1882 (10 genera, 70 species)
Family **Lernaeidae** Cobbold, 1879 (17 genera, 143 species)
Family **Lernaeosoleidae** Yamaguti, 1963 (2 genera, 2 species)
Family **Lichomolgidae** Kossmann, 1877 (29 genera 169 species)
Family **Lubbockiidae** Huys & Böttger-Schnack, 1997 (7 genera, 20 species)
Family **Macrochironidae** Humes & Boxshall, 1996 (5 genera, 30 species)
Family **Mantridae** Leigh-Sharpe, 1934 (3 genera, 3 species)
Family **Mesoglicolidae** de Zulueta, 1911 (1 genus, 1 species)
Family **Micrallectidae** Huys, 2001 (1 genus, 2 species)
Family **Myicolidae** Yamaguti, 1936(8 genera, 26 species)
Family **Mytilicolidae** Bocquet & Stock, 1957(4 genera, 14 species)
Family **Nereicolidae** Claus, 1875 (9 genera, 18 species)
Family **Notodelphyidae** Dana, 1853 (52 genera, 252 species)
Family **Octopicolidae** Humes & Boxshall, 1996 (1 genus, 3 species)
Family **Oithonidae** Dana, 1853 (4 genera, 83 species)
Family **Oncaeidae** Giesbrecht, 1893 (7 genera, 118 species)
Family **Ozmanidae** Ho & Thatcher, 1989 (1 genus, 2 species)
Family **Paralubbockiidae** Boxshall & Huys, 1990 (1 genus, 1 species)
Family **Philichthyidae** Vogt, 1877 (9 genera, 77 species)
Family **Philoblennidae** Izawa, 1976 (4 genera, 10 species)
Family **Phyllodicolidae** Delamare Deboutteville & Laubier, 1961 (2 genera, 3 species)
Family **Pionodesmotidae** Bonnier, 1898 (1 genus, 1 species)
Family **Polyankyliidae** Ho & Kim, 1997 (1 genus, 2 species)
Family **Psammocyclopinidae** Martínez Arbizu, 2001 (2 genera, 6 species)
Family **Pseudanthessiidae** Humes & Stock, 1972 (6 genera, 57 species)
Family **Pterinopsyllidae** Sars, 1913 (2 genera, 10 species)
Family **Rhynchomolgidae** Humes & Stock, 1972 (45 genera, 267 species)
Family **Sabelliphilidae** Gurney, 1927 (9 genera, 26 species)
Family **Saccopsidae** Lutzen, 1964 (1 genus, 4 species)
Family **Sapphirinidae** Thorell, 1860 (5 genera, 85 species)
Family **Schminkepinellidae** Martínez Arbizu, 2006 (5 genera, 9 species)
Family **Serpulidicolidae** Stock, 1979 (5 genera, 9 species)
Family **Shiinoidae** Cressey, 1975 (2 genera, 9 species)
Family **Smirnovipinidae** Martínez Arbizu, 1997 (4 genera, 11 species)
Family **Speleoithonidae** da Rocha & Iliffe, 1991 (1 genus, 3 species)
Family **Spiophanicolidae** Ho, 1984(1 genus, 1 species)
Family **Splanchnotrophidae** Norman & T. Scott, 1906 (5 genera, 23 species)
Family **Synapticolidae** Humes & Boxshall, 1996 (9 genera, 51 species)
Family **Synaptiphilidae** Bocquet, 1953 (3 genera, 9 species)
Family **Taeniacanthidae** C.B. Wilson, 1911 (17 genera, 108 species)
Family **Tegobomolochidae** G.V. Avdeev, 1978 (1 genus, 1 species)
Family **Telsidae** Ho, 1967 (1 genus, 2 species)
Family **Thamnomolgidae** Humes & Boxshall, 1996 (3 genera, 4 species)

Family **Thaumatopsyllidae** Sars, 1913 (4 genera, 5 species)
Family **Tuccidae** Vervoort, 1962 (1 genus, 1 species)
Family **Umarzurcolidae** Ho, Ohtsuka & Nakadachi, 2006 (1 genus, 1 species)
Family **Urocopiidae** Humes & Stock, 1972 (1 genus, 3 species)
Family **Vahiniidae** Humes, 1967 (1 genus, 2 species)
Family **Ventriculinidae** Leigh-Sharpe, 1934 (2 genera, 3 species)
Family **Xarifiidae** Humes, 1960 (5 genera, 92 species)
Family **Xenocoelomatidae** Bresciani & Lützen, 1966 (2 genera, 3 species)
Family **Incertae Sedis** (*Akessonia*-group) (3 genera, 3 species)
Family **Incertae Sedis** (*Axinophilus*-group) (2 genera, 3 species)
Family **Incertae Sedis** (*Endocheres*-group) (1 genus, 1 species)
Family **Incertae Sedis** (*Gonophysema*-group) (4 genera, 4 species)
Family **Incertae Sedis** (*Ive*-group) (2 genera, 2 species)
Family **Incertae Sedis** (*Octophiophora*-group) (2 genera, 2 species)
Family **Incertae Sedis** (*Pachos*-group) (1 genus, 3 species)
Family **Incertae Sedis** (*Ophelicola*-group) (1 genus, 1 species)
Family **Incertae Sedis** (*Teredicola*-group) (4 genera, 11 species)

Order **Gelyelloida** Huys, 1988 (1 family)
Family **Gelyellidae** Rouch & Lescher-Moutoué, 1977 (1 genus, 2 species)

Order **Mormonilloida** Boxshall, 1979 (1 family)
Family **Mormonillidae** Giesbrecht, 1893 (2 genera, 5 species)

Order **Harpacticoida** Sars, 1903 (59 families)
Family **Adenopleurellidae** Huys, 1990 (3 genera, 4 species)
Family **Aegisthidae** Giesbrecht, 1893 (13 genera, 89 species)
Family **Ameiridae** Monard, 1927 (48 genera, 455 species)
Family **Ancorabolidae** Sars, 1909 (15 genera, 81 species)
Family **Arenopontiidae** Martínez Arbizu & Moura, 1994 (6 genera, 39 species)
Family **Argestidae** Por, 1986 (20 genera, 95 species)
Family **Balaenophilidae** Sars, 1910(1 genus, 3 species)
Family **Cancrincolidae** Fiers, 1990 (4 genera, 8 species)
Family **Canthocamptidae** Sars, 1906 (61 genera, 1232 species)
Family **Canuellidae** Lang, 1944 (18 genera, 106 species)
Family **Chappuisiidae** Chappuis, 1940 (1 genus, 2 species)
Family **Cletodidae** T. Scott, 1904 (24 genera, 164 species)
Family **Cletopsyllidae** Huys & Willems, 1989 (5 genera, 16 species)
Family **Cristacoxidae** Huys, 1990 (2 genera, 4 species)
Family **Cylindropsyllidae** Sars, 1909 (9 genera, 31 species)
Family **Dactylopusiidae** Sars, 1905 (6 genera, 123 species)
Family **Darcythompsoniidae** Lang, 1936 (4 genera, 40 species)
Family **Ectinosomatidae** Sars, 1903(22 genera, 347 species)
Family **Euterpinidae** Brian, 1921 (1 genus, 3 species)
Family **Hamondiidae** Huys, 1990 (3 genera, 5 species)
Family **Harpacticidae** Dana, 1846 (15 genera, 142 species)
Family **Heteropsyllidae** Kornev & Chertoprud, 2008 (1 genus, 1 species)
Family **Idyanthidae** Lang, 1948 (8 genera, 22 species)
Family **Laophontidae** T. Scott, 1905 (76 genera, 475 species)
Family **Laophontopsidae** Huys & Willems, 1989 (3 genera, 15 species)
Family **Latiremidae** Božić, 1969 (2 genera, 6 species)
Family **Leptastacidae** Lang, 1948 (18 genera, 101 species)
Family **Leptopontiidae** Lang, 1948 (4 genera, 40 species)
Family **Longipediidae** Sars, 1903 (1 genus, 23 species)
Family **Louriniidae** Monard, 1927 (1 genus, 3 species)
Family **Metidae** Sars, 1910 (2 genera, 18 species)
Family **Miraciidae** Dana, 1846 (54 genera, 691 species)

Family **Nannopodidae** Brady, 1880 (6 genera, 16 species)
Family **Neobradyidae** Olofsson, 1917 (4 genera, 10 species)
Family **Normanellidae** Huys & Willems, 1989 (4 genera, 27 species)
Family **Novocriniidae** Huys & Iliffe, 1998 (2 genera, 4 species)
Family **Orthopsyllidae** Huys, 1990 (1 genus, 16 species)
Family **Parameiropsidae** Corgosinho & Martínez Arbizu, 2010 (1 genus, 8 species)
Family **Paramesochridae** Lang, 1944 (14 genera, 159 species)
Family **Parastenheliidae** Lang, 1936 (3 genera, 23 species)
Family **Parastenocarididae** Chappuis, 1940 (28 genera, 352 species)
Family **Peltidiidae** Sars, 1904 (11 genera, 115 species)
Family **Phyllognathopodidae** Gurney, 1932 (4 genera, 13 species)
Family **Porcellidiidae** Boeck, 1865 (9 genera, 85 species)
Family **Protolatiremidae** Božić, 1969 (1 genus, 1 species)
Family **Pseudotachidiidae** Lang, 1936 (25 genera, 160 species)
Family **Rhizotrichidae** Por, 1986 (2 genera, 21 species)
Family **Rhynchothalestridae** Lang, 1948 (2 genera, 10 species)
Family **Rometidae** Seifried & Schminke, 2003 (1 genus, 1 species)
Family **Rotundiclipeidae** Huys, 1988 (1 genus, 1 species)
Family **Superornatiremidae** Huys, 1996 (4 genera, 10 species)
Family **Tachidiidae** Boeck, 1865 (6 genera, 33 species)
Family **Tegastidae** Sars, 1904 (6 genera, 83 species)
Family **Tetragonicepsidae** Lang, 1944 (14 genera, 122 species)
Family **Thalestridae** Sars, 1905 (10 genera, 110 species)
Family **Thompsonulidae** Lang, 1944 (2 genera, 7 species)
Family **Tisbidae** Stebbing, 1910 (22 genera, 165 species)
Family **Zosimeidae** Seifrid, 2003 (3 genera, 19 species)
Family **Incertae Sedis** (8 genera, 12 species)

Order **Siphonostomatoida** Thorell, 1859 (43 families)
Family **Amasterasidae** Izawa, 2008 (1 genus, 1 species)
Family **Archidactylinidae** Izawa, 1996 (1 genus, 1 species)
Family **Artotrogidae** Brady, 1880 (22 genera, 124 species)
Family **Asterocheridae** Giesbrecht, 1899 (56 genera, 294 species)
Family **Brychiopontiidae** Humes, 1974 (2 genus, 2 species)
Family **Caligidae** Burmeister, 1834 (37 genera, 559 species)
Family **Calverocheridae** Stock, 1968 (1 genus, 3 species)
Family **Cancerillidae** Giesbrecht, 1897 (7 genera, 16 species)
Family **Cecropidae** Dana, 1849 (5 genera, 11 species)
Family **Codobidae** Boxshall & Ohtsuka, 2001 (1 genus, 1 species)
Family **Coralliomyzontidae** Humes & Stock, 1991 (4 genera, 6 species)
Family **Dichelesthiidae** Milne Edwards, 1840 (2 genera, 2 species)
Family **Dichelinidae** Boxshall & Ohtsuka, 2001 (1 genus, 2 species)
Family **Dinopontiidae** Murnane, 1967 (2 genera, 5 species)
Family **Dirivultidae** Humes & Dojiri, 1981 (13 genera, 51 species)
Family **Dissonidae** Yamaguti, 1963 (1 genus, 12 species)
Family **Ecbathyriontidae** Humes, 1987 (1 genus, 1 species)
Family **Entomolepididae** Brady, 1899 (7 genera, 12 species)
Family **Eudactylinidae** Wilson, 1922 (12 genera, 67 species)
Family **Hatschekiidae** Kabata, 1979 (8 genera, 150 species)
Family **Hyponeoidae** Heegaard, 1962(3 genera, 3 species)
Family **Kroyeriidae** Kabata, 1979 (3 genera, 27 species)
Family **Lernaeopodidae** Milne Edwards, 1840 (49 genera, 434 species)
Family **Lernanthropidae** Kabata, 1979 (8 genera, 145 species)
Family **Megapontiidae** Heptner, 1968 (1 genus, 10 species)
Family **Micropontiidae** Gooding, 1957 (1 genus, 2 species)

Family **Nanaspididae** Humes & Cressey, 1959 (5 genera, 19 species)
Family **Nicothoidae** Dana, 1849 (21 genera, 143 species)
Family **Pandaridae** Milne Edwards, 1840 (17 genera, 105 species)
Family **Pennellidae** Burmeister, 1834 (21 genera, 163 species)
Family **Pontoeciellidae** Giesbrecht, 1895 (1 genus, 1 species)
Family **Pseudocycnidae** Wilson, 1922 (3 genera, 5 species)
Family **Pseudohatschekiidae** Tang, Izawa, Uyeno & Nagasawa, 2010 (1 genus, 2 species)
Family **Rataniidae** Giesbrecht, 1897 (1 genus, 2 species)
Family **Scottomyzontidae** Ivanenko, Ferrari, & Smurov, 2001 (1 genus, 1 species)
Family **Sphyriidae** Wilson, 1919 (9 genera, 40 species)
Family **Sponginticolidae** Topsent, 1928 (1 genus, 2 species)
Family **Spongiocnizontidae** Stock & Kleeton, 1964 (1 genus, 3 species)
Family **Stellicomitidae** Humes & Cressey, 1958 (7 genera, 12 species)
Family **Tanypleuridae** Kabata, 1969 (1 genus, 1 species)
Family **Trebiidae** Wilson, 1905 (3 genera, 19 species)
Family **Incertae Sedis** (7 genera, 7 species)
Order **Monstrilloida** Sars, 1901 (1 family)
Family **Monstrillidae** Dana, 1849 (6 genera, 156 species)
Class **Ostracoda** Latreille, 1802 (2 subclasses)[13]
Subclass **Myodocopa** Sars, 1866 (2 orders)
Order **Myodocopida** Sars, 1866 (1 suborder)
Suborder **Myodocopina** Sars, 1866 (3 superfamilies)
Superfamily **Cypridinoidea** Baird, 1850 (1 family)
Family **Cypridinidae** Baird, 1850 (27 genera, 196 species)
Superfamily **Cylindroleberidoidea** Müller, 1906 (1 family)
Family **Cylindroleberididae** Müller, 1906 (31 genera, 306 species)
Superfamily **Sarsielloidea** Brady & Norman, 1896 (3 families)
Family **Philomedidae** Müller, 1906 (15 genera, 144 species)
Family **Rutidermatidae** Brady & Norman, 1896 (4 genera, 44 species)
Family **Sarsiellidae** Brady & Norman, 1896 (16 genera, 178 species)
Order **Halocyprida** Dana, 1853 (2 suborders)
Suborder **Cladocopina** Sars, 1865 (1 superfamily)
Superfamily **Polycopoidea** Sars, 1865 (1 family)
Family **Polycopidae** Sars, 1865 (14 genera, 123 species)
Suborder **Halocypridina** Dana, 1853 (2 superfamilies)
Superfamily **Halocypridoidea** Dana, 1853 (1 family)
Family **Halocyprididae** Dana, 1853 (54 genera, 235 species)
Superfamily **Thaumatocypridoidea** Müller, 1906 (1 family)
Family **Thaumatocyprididae** Müller, 1906 (4 genera, 35 species)
Subclass **Podocopa** Müller, 1894 (3 orders)
Order **Platycopida** Sars, 1866 (1 family)
Family **Cytherellidae** Sars, 1866 (6 genera, 126 species)
Order **Palaeocopida** Henningsmoean, 1953 (1 family)
Family **Punciidae** Hornibrook, 1949 (2 genera, 3 species)
Order **Podocopida** Sars, 1866 (5 suborders)
Suborder **Bairdiocopina** Sars, 1865 (1 superfamily)
Superfamily **Bairdioidea** Sars, 1865 (2 families)
Family **Bairdiidae** Sars, 1865 (12 genera, 179 species)
Family **Bythocyprididae** Maddocks, 1969 (5 genera, 88 species)
Suborder **Cypridocopina** Jones, 1901 (3 superfamilies)
Superfamily **Cypridoidea** Baird, 1845 (4 families)

13. Based on Martens & Savatenalinton (2011), WoRMS (2011d), Hart & Hart (1974) and Hobbs & Peters (1977).

Family **Candonidae** Kaufmann, 1900 (63 genera, 736 species)
Family **Cyprididae** Baird, 1845 (100 genera, 973 species)
Family **Ilyocyprididae** Kaufmann, 1900 (1 genus, 34 species)
Family **Notodromadidae** Kaufmann, 1900 (9 genera, 37 species)
Superfamily **Macrocypridoidea** Müller, 1912 (1 family)
Family **Macrocyprididae** Müller, 1912 (9 genera, 118 species)
Superfamily **Pontocypridoidea** Müller, 1894 (1 family)
Family **Pontocyprididae** Müller, 1894 (10 genera, 157 species)
Suborder **Cytherocopina** Baird, 1850 (2 superfamilies)
Superfamily **Cytheroidea** Baird, 1850 (31 families)
Family **Australocytheridae** Hartmann, 1980 (1 genus, 1 species)
Family **Bonaducecytheridae** Mackenzie, 1977 (1 genus, 1 species)
Family **Bythocytheridae** Sars, 1866 (32 genera, 165 species)
Family **Cobanocytheridae** Schornikov, 1975 (3 genera, 15 species)
Family **Cuneocytheridae** Mandelstam, 1959 (1 genus, 1 species)
Family **Cushmanideidae** Puri, 1973 (2 genera, 39 species)
Family **Cytheralisonidae** Jellinek & Swanson, 2003 (2 genera, 7 species)
Family **Cytherettidae** Triebel 1972 (3 genera, 20 species)
Family **Cytheridae** Baird, 1850 (28 genera, 165 species)
Family **Cytherideidae** Sars, 1925 (25 genera, 221 species)
Family **Cytheromatidae** Elofson, 1939 (7 genera, 46 species)
Family **Cytheruridae** Müller, 1894 (31 genera, 608 species)
Family **Entocytheridae** Hoff, 1942 (32 genera, 185 species)
Family **Eucytheridae** Puri, 1954 (2 genera, 21 species)
Family **Hemicytheridae** Puri, 1953 (58 genera, 447 species)
Family **Kliellidae** Schäfer, 1945 (2 genera, 2 species)
Family **Krithidae** Mandelstam, 1958 (6 genera, 80 species)
Family **Leptocytheridae** Hanai, 1957 (17 genera, 183 species)
Family **Limnocytheridae** Klie, 1938 (23 genera, 154 species)
Family **Loxoconchidae** Sars, 1925 (27 genera, 299 species)
Family **Microcytheridae** Klie, 1938 (1 genus, 33 species)
Family **Neocytherideidae** Puri, 1957 (3 genera, 31 species)
Family **Paradoxostomatidae** Brady & Norman, 1889 (25 genera, 296 species)
Family **Parvocytheridae** Hartmann, 1959 (3 genera, 11 species)
Family **Pectocytheridae** Hanai, 1957 (8 genera, 44 species)
Family **Psammocytheridae** Klie, 1938 (1 genus, 2 species)
Family **Saididae** Aranki, McKenzie, Reyment & Reyment 1992 (1 genus, 3 species)
Family **Schizocytheridae** Howe, 1961 (3 genera, 19 species)
Family **Thaerocytheridae** Hazel, 1967 (5 genera, 38 species)
Family **Trachyleberididae** Sylvester-Bradley, 1948 (102 genera, 494 species)
Family **Xestoleberididae** Sars, 1928 (12 genera, 189 species)
Family **Incertae Sedis** (1 genus, 1 species)
Superfamily **Terrestricytheroidea** Schornikov, 1969 (1 family)
Family **Terrestricytheridae** Schornikov, 1969 (1 genus, 5 species)
Suborder **Darwinulocopina** Sohn, 1988 (1 superfamily)
Superfamily **Darwinuloidea** Brady & Norman, 1889 (1 family)
Family **Darwinulidae** Brady & Norman, 1889 (5 genera, 31 species)
Suborder **Sigilliocopina** Martens, 1992 (2 superfamilies)
Superfamily **Sigillioidea** Mandelstam, 1960 (2 families)
Family **Saipanettidae** Mackenzie, 1968 (1 genus, 6 species)
Family **Sigilliidae** Mandelstam, 1960 (2 genera, 2 species)
Class **Malacostraca** Latreille, 1802 (3 subclasses)
Subclass **Phyllocarida** Packard, 1879 (1 order)
Order **Leptostraca** Claus, 1880 (3 families)[14]

Family **Nebaliidae** Samouelle, 1819 (5 genera, 36 species)
Family **Nebaliopsidae** Hessler, 1984 (2 genera, 2 species)
Family **Paranebaliidae** Walker-Smith & Poore, 2001 (3 genera, 6 species)

Subclass **Hoplocarida** Calman, 1904 (1 order)

Order **Stomatopoda** Latreille, 1817 (1 suborder) [15]

Suborder **Unipeltata** Latreille, 1825 (7 superfamilies)

Superfamily **Bathysquilloidea** Manning, 1967 (2 families)
Family **Bathysquillidae** Manning, 1967 (2 genera, 3 species)
Family **Indosquillidae** Manning, 1995 (1 genus, 1 species)

Superfamily **Gonodactyloidea** Giesbrecht, 1910 (7 families)
Family **Alainosquillidae** Moosa, 1991 (1 genus, 1 species)
Family **Hemisquillidae** Manning, 1980 (1 genus, 4 species)
Family **Gonodactylidae** Giesbrecht, 1910 (9 genera, 60 species)
Family **Odontodactylidae** Manning, 1980 (1 genus, 8 species)
Family **Protosquillidae** Manning, 1980 (7 genera, 36 species)
Family **Pseudosquillidae** Manning, 1977 (4 genera, 10 species)
Family **Takuidae** Manning, 1995 (3 genera, 7 species)

Superfamily **Erythrosquilloidea** Manning & Bruce, 1984 (1 family)
Family **Erythrosquillidae** Manning & Bruce, 1984 (1 genus, 2 species)

Superfamily **Lysiosquilloidea** Giesbrecht, 1910 (4 families)
Family **Coronididae** Manning, 1980 (5 genera, 10 species)
Family **Lysiosquillidae** Giesbrecht, 1910 (3 genera, 19 species)
Family **Nannosquillidae** Manning, 1980 (14 genera, 61 species)
Family **Tetrasquillidae** Manning & Camp, 1993 (8 genera, 18 species)

Superfamily **Squilloidea** Latreille, 1802 (1 family)
Family **Squillidae** Latreille, 1802 (46 genera, 176 species)

Superfamily **Eurysquilloidea** Manning, 1977 (1 family)
Family **Eurysquillidae** Manning, 1977 (6 genera, 31 species)

Superfamily **Parasquilloidea** Manning, 1995 (1 family)
Family **Parasquillidae** Manning, 1995 (3 genera, 13 species)

Subclass **Eumalacostraca** Grobben, 1892 (3 superorders)

Superorder **Syncarida** Packard, 1885 (2 orders) [16]

Order **Bathynellacea** Chappuis, 1915 (2 families)
Family **Bathynellidae** Chappuis, 1915 (26 genera, 91 species)
Family **Parabathynellidae** Noodt, 1965 (41 genera, 150 species)

Order **Anaspidacea** Calman, 1904 (5 families)
Family **Anaspididae** Thomson, 1893 (3 genera, 5 species)
Family **Koonungidae** Sayce, 1908 (2 genera, 3 species)
Family **Patagonaspididae** Grosso & Peralta, 2002 (1 genus, 1 species)
Family **Psammaspididae** Schminke, 1974 (2 genera, 2 species)
Family **Stygocarididae** Noodt, 1963 (4 genera, 10 species)

Superorder **Peracarida** Calman, 1904 (10 orders)

Order **Spelaeogriphacea** Gordon, 1957 (1 family)
Family **Spelaeogriphidae** Gordon, 1957 (3 genera, 4 species)

Order **Thermosbaenacea** Monod, 1927 (4 families)
Family **Halosbaenidae** Monod & Cals, 1988 (3 genera, 6 species)
Family **Monodellidae** Taramelli, 1954 (2 genera, 25 species)
Family **Thermosbaenidae** Monod, 1927 (1 genus, 1 species)
Family **Tulumellidae** Wagner, 1994 (1 genus, 3 species)

Order **Lophogastrida** Boas, 1883 (3 families)
Family **Eucopiidae** Dana, 1852 (1 genus, 10 species)

14. Based on Walker-Smith & Poore (2001), Haney & Martin (2004), Roccatagliata *et al.* (2010)
15. Based on Ahyong & Harling (2000), Ahyong (2001), Schram & Müller (2004) and Ahyong *et al.* (2009)
16. Based on Camacho (2006), Camacho *et al.* (2009), Hong & Cho (2009), Ranga Reddy & Totakura (2010).

Family **Lophogastridae** Sars, 1870 (6 genera, 36 species)
Family **Gnathophausiidae** Udrescu, 1984 (1 genus, 10 species)

Order **Mysida** Haworth, 1825 (4 families)
Family **Lepidomysidae** Clarke, 1961 (1 genus, 9 species)
Family **Mysidae** Haworth, 1825 (191 genera, 1139 species)
Family **Petalophthalmidae** Czerniavsky, 1882 (6 genera, 37 species)
Family **Stygiomysidae** Caroli, 1937 (1 genus, 6 species)

Order **Mictacea** Bowman, Garner, Hessler, Iliffe & Sanders, 1985 (1 family)
Family **Mictocarididae** Bowman & Iliffe, 1985 (1 genus, 1 species)

Order **Bochusacea** Gutu & Iliffe, 1998 (1 family)
Family **Hirsutiidae** Sanders, Hessler & Garner, 1985 (3 genera, 5 species)

Order **Amphipoda** (190 families)
Family **Acanthogammaridae** Garjajewia 1901 (41 genera, 159 species)
Family **Acanthonotozomatidae** Stebbing, 1906 (4 genera, 17 species)
Family **Acidostomatidae** Lowry & Stoddart, 2011 (2 genera, 11 species)
Family **Aetiopedesidae** Myers & Lowry, 2003 (1 genus, 1 species)
Family **Alicellidae** Lowry & De Broyer, 2008 (6 genera, 16 species)
Family **Allocrangonyctidae** Holsinger, 1989 (3 genera, 69 species)
Family **Amaryllididae** Lowry & Stoddart, 2002 (8 genera, 35 species)
Family **Amathillopsidae** Pirlot, 1934 (4 genera, 20 species)
Family **Ampeliscidae** Krøyer, 1842 (4 genera, 284 species)
Family **Amphilochidae** Boeck, 1871 (14 genera, 89 species)
Family **Ampithoidae** Stebbing, 1899 (13 genera, 170 species)
Family **Anapronoidae** Bowman & Gruner, 1973 (1 genus, 1 species)
Family **Anisogammaridae** Bousfield, 1977 (12 genera, 62 species)
Family **Aoridae** Stebbing, 1899 (24 genera, 228 species)
Family **Archaeoscinidae** K.H. Barnard, 1930 (2 genera, 6 species)
Family **Argissidae** Walker, 1904 (1 genus, 1 species)
Family **Aristiidae** Lowry & Stoddart, 1997 (5 genera, 39 species)
Family **Atylidae** Lilljeborg, 1865 (9 genera, 76 species)
Family **Baikalogammaridae** Kamaltynov 2001 (1 genus,1 species)
Family **Bateidae** Stebbing, 1906 (1 genus, 15 species)
Family **Behningiellidae** Kamaltynov 2001 (3 genera, 4 species)
Family **Biancolinidae** J.L. Barnard, 1972 (1 genus, 8 species)
Family **Bogidiellidae** Hertzog, 1936 (38 genera, 179 species)
Family **Bolttsiidae** Barnard & Karaman, 1987 (1 genus, 2 species)
Family **Bougisidae** Zeidler, 2004 (1 genus, 1 species)
Family **Brachyscelidae** Stephensen, 1923 (2 genera, 5 species)
Family **Calliopiidae** G.O. Sars, 1895 (25 genera, 101 species)
Family **Caprellidae** Leach, 1814 (88 genera, 401 species)
Family **Caprogammaridae** Kudrjaschov & Vassilenko, 1966 (1 genus, 2 species)
Family **Carangoliopsidae** Bousfield, 1977 (1 genus, 1 species)
Family **Cardenioidae** Barnard & Karaman, 1987 (1 genus, 1 species)
Family **Caspicolidae** Birstein, 1945 (1 genus, 1 species)
Family **Cebocaridae** Lowry & Stoddart, 2011 (9 genera, 15 species)
Family **Ceinidae** J.L. Barnard, 1972 (3 genera, 7 species)
Family **Cheidae** Thurston, 1982 (1 genus, 1 species)
Family **Cheirocratidae** Ren, 2006 (7 genera, 18 species)
Family **Cheluridae** Allman, 1847 (3 genera, 4 species)
Family **Chevaliidae** Myers & Lowry, 2003 (1 genus, 6 species)
Family **Chiltoniidae** J.L. Barnard, 1972 (6 genera, 11 species)
Family **Chuneolidae** Woltereck, 1909 (1 genus, 3 species)
Family **Colomastigidae** Stebbing, 1899 (2 genera, 48 species)
Family **Condukiidae** Barnard & Drummond, 1982 (1 genus, 2 species)

Family **Corophiidae** Leach, 1814 (25 genera, 149 species)
Family **Crangonyctidae** Bousfield, 1973 (9 genera, 225 species)
Family **Cressidae** Stebbing, 1899 (2 genera, 10 species)
Family **Crymostygidae** Kristjánsson & Svavarsson, 2004 (1 genus, 1 species)
Family **Cyamidae** Rafinesque, 1815 (6 genera, 31 species)
Family **Cyclocaridae** Lowry & Stoddart, 2011 (1 genus, 2 species)
Family **Cyphocarididae** Lowry & Stoddart, 1997 (2 genera, 13 species)
Family **Cyproideidae** J.L. Barnard, 1974 (18 genera, 44 species)
Family **Cystisomatidae** Willemöes-Suhm, 1875 (1 genus, 7 species)
Family **Dairellidae** Bovallius, 1877 (1 genus, 1 species)
Family **Dexaminidae** Leach, 1814 (11 genera, 121 species)
Family **Didymocheliidae** Bellan-Santini & Ledoyer, 1986 (2 genera, 4 species)
Family **Dikwidae** Coleman & Barnard, 1991 (1 genus, 2 species)
Family **Dogielinotidae** Gurjanova, 1953 (13 genera, 107 species)
Family **Dulichiidae** Laubitz, 1983 (6 genera, 27 species)
Family **Endevouridae** Lowry & Stoddart, 1997 (2 genera, 12 species)
Family **Eophliantidae** Sheard, 1936 (6 genera, 13 species)
Family **Epimeriidae** Boeck, 1871 (5 genera, 61 species)
Family **Eulimnogammaridae** Kamaltynov, 1999 (19 genera, 115 species)
Family **Eurytheneidae** Stoddart & Lowry, 2004 (1 genus, 3 species)
Family **Eusiridae** Stebbing, 1888 (10 genera, 111 species)
Family **Exoedicerotidae** Barnard & Drummond, 1982 (12 genera, 20 species)
Family **Gammaracanthidae** Bousfield, 1989 (2 genera, 6 species)
Family **Gammarellidae** Bousfield, 1977 (3 genera, 8 species)
Family **Gammaridae** Leach, 1814 (35 genera, ~386 species)
Family **Gammaroporeiidae** Bousfield, 1979 (1 genus, 1 species)
Family **Hadziidae** S. Karaman, 1943 (27 genera, 90 species)
Family **Hirondelleidae** Lowry & Stoddart, 2010 (1 genus, 16 species)
Family **Hyalidae** Bulycheva, 1957 (14 genera, 143 species)
Family **Haustoriidae** Stebbing, 1906 (8 genera, 45 species)
Family **Hyperiidae** Dana, 1852 (5 genera, 26 species)
Family **Hyperiopsidae** Bovallius, 1886 (3 genera, 14 species)
Family **Iciliidae** Dana, 1849 (1 genus, 7 species)
Family **Ingolfiellidae** Hansen, 1903 (12 genera, 45 species)
Family **Ipanemidae** Barnard & Thomas, 1988 (1 genus, 1 species)
Family **Iphigenellidae** Kamaltynov, 2001 (1 genus, 1 species)
Family **Iphimediidae** Boeck, 1871 (14 genera, 100 species)
Family **Isaeidae** Dana, 1853 (2 genera, 4 species)
Family **Ischyroceridae** Stebbing, 1899 (37 genera, 231 species)
Family **Iulopididae** Zeidler, 2004 (1 genus, 2 species)
Family **Izinkalidae** Lowry & Stoddart, 2010 (1 genus, 1 species)
Family **Kamakidae** Myers & Lowry, 2003 (10 genera, 32 species)
Family **Kergueleniidae** Lowry & Stoddart, 2010 (2 genera, 26 species)
Family **Kotumsaridae** Missouli, Holsinger & Reddy, 2007 (1 genus, 1 species)
Family **Kuriidae** J.L. Barnard, 1964 (1 genus, 2 species)
Family **Lafystiidae** G.O. Sars, 1895 (3 genera, 5 species)
Family **Lanceolidae** Bovallius, 1887 (4 genera, 23 species)
Family **Laphystiopsidae** Stebbing, 1899 (3 genera, 8 species)
Family **Lepidepecreellidae** Lowry & Stoddart, 2010 (1 genus, 10 species)
Family **Lestrigonidae** Zeidler, 2004 (6 genera, 17 species)
Family **Leucothoidae** Dana, 1852 (6 genera, 137 species)
Family **Liljeborgiidae** Stebbing, 1899 (4 genera, 104 species)
Family **Lucioblividae** Tomikawa 2007 (1 genus, 1 species)
Family **Lycaeidae** Claus, 1879 (2 genera, 7 species)

Family **Lycaeopsidae** Chevreux, 1913 (1 genus, 2 species)
Family **Lysianassidae** Dana, 1849 (78 genera, 491 species)
Family **Macrohectopodidae** Sowinsky, 1915 (2 genera, 2 species)
Family **Maeridae** Krapp-Schickel, 2008 (42 genera, 328 species)
Family **Maxillipiidae** Ledoyer, 1973 (2 genera, 3 species)
Family **Megaluropidae** Thomas & Barnard, 1986 (4 genera, 16 species)
Family **Melitidae** Bousfield, 1983 (46 genera, 181 species)
Family **Melphidippidae** Stebbing, 1899 (3 genera, 14 species)
Family **Mesogammaridae** Bousfield, 1977 (5 genera, 6 species)
Family **Metacrangonyctidae** Boutin & Missouli, 1988 (2+1 genera, 19+1 species)
Family **Metaingolfiellidae** Ruffo, 1969 (1 genus, 1 species)
Family **Microphasmidae** Stephensen & Pirlot, 1931 (3 genera, 6 species)
Family **Microprotopidae** Myers & Lowry, 2003 (1 genus, 5 species)
Family **Micruropodidae** Kamaltynov, 1999 (5 genera, 52 species)
Family **Mimonectidae** Bovallius, 1885 (2 genera, 6 species)
Family **Miramarassidae** Lowry, 2006 (1 genus, 1 species)
Family **Neomegamphopidae** Myers, 1981 (6 genera, 21 species)
Family **Neoniphargidae** Bousfield, 1977 (7 genera, 22 species)
Family **Nihotungidae** J.L. Barnard, 1972 (1 genus, 3 species)
Family **Niphargidae** Bousfield, 1977 (9 genera, 322 species)
Family **Ochlesidae** Stebbing, 1910 (4 genera, 19 species)
Family **Odiidae** Coleman & Barnard, 1991 (5 genera, 11 species)
Family **Oedicerotidae** Liljeborg, 1865 (44 genera, 244 species)
Family **Opisidae** Lowry & Stoddart, 1995 (4 genera, 17 species)
Family **Oxycephalidae** Bate, 1861 (8 genera, 18 species)
Family **Pachynidae** Lowry & Stoddart, 2011 (11 genera, 33 species)
Family **Pachyschesidae** Kamaltynov, 1999 (1 genus, 6 species)
Family **Pagetinidae** K.H. Barnard, 1931 (1 genus, 4 species)
Family **Pallaseidae** Tachteew, 2000 (8 genera, 21 species)
Family **Paracalliopiidae** Barnard & Karaman, 1982 (5 genera, 18 species)
Family **Paracrangonyctidae** Bousfield, 1983 (3 genera, 4 species)
Family **Paragammaropsidae** Myers & Lowry, 2003 (1 genus, 1 species)
Family **Paraleptamphopidae** Bousfield, 1977 (3 genera, 5 species)
Family **Paramelitidae** Bousfield, 1977 (17 genera, 711 species)
Family **Paraphronimidae** Bovallius, 1887 (1 genus, 2 species)
Family **Parascelidae** Bovallius, 1887 (5 genera, 7 species)
Family **Pardaliscidae** Boeck, 1871 (22 genera, 71 species)
Family **Perthiidae** Williams & Barnard, 1988 (1 genus, 2 species)
Family **Phliantidae** Stebbing, 1899 (7 genera, 23 species)
Family **Photidae** Boeck, 1871 (18 genera, 216 species)
Family **Phoxocephalidae** G.O. Sars, 1891 (81 genera, 368 species)
Family **Phoxocephalopsidae** Barnard & Drummond, 1982 (3 genera, 9 species)
Family **Phreatogammaridae** Bousfield, 1979 (2 genera, 5 species)
Family **Phronimidae** Rafinesque, 1815 (2 genera, 11 species)
Family **Phrosinidae** Dana, 1853 (3 genera, 8 species)
Family **Platyischnopidae** Barnard & Drummond, 1979 (8 genera, 15 species)
Family **Platyscelidae** Bate, 1862 (5 genera, 16 species)
Family **Pleustidae** Buchholz, 1874 (35 genera, 139 species)
Family **Pleioplateidae** J.L. Barnard, 1978 (1 genus, 2 species)
Family **Podoceridae** Leach, 1814 (8 genera, 72 species)
Family **Podoprionidae** Lowry & Stoddart, 1996 (1 genus, 4 species)
Family **Pontogammaridae** Bousfield, 1977 (13 genera, 40 species)
Family **Pontogeneiidae** Stebbing, 1906 (31 genera, 168 species)
Family **Pontoporeiidae** Dana, 1853 (6 genera, 34 species)

Family **Priscillinidae** d'Udekem d'Acoz, 2006 (1 genus, 2 species)
Family **Priscomilitaridae** Hirayama, 1988 (2 genera, 2 species)
Family **Prolanceolidae** Zeidler, 2009 (1 genus, 1 species)
Family **Pronoidae** Claus, 1879 (4 genera, 12 species)
Family **Proscinidae** Dana, 1853 (2 genera, 7 species)
Family **Pseudamphilochidae** Schellenberg, 1931 (1 genus, 1 species)
Family **Pseudocrangonyctidae** Holsinger, 1989 (2 genera, 18 species)
Family **Rakiroidae** Myers & Lowry, 2003 (1 genus, 1 species)
Family **Regaliidae** Lowry**,** 2006 (1 genus, 3 species)
Family **Salentinellidae** Bousfield, 1977 (2 genera, 22 species)
Family **Sanchoidae** Lowry, 2006 (1 genus, 2 species)
Family **Scinidae** Stebbing, 1888 (5 genera, 49 species)
Family **Scopelocheiridae** Lowry & Stoddart, 1997 (7 genera, 18 species)
Family **Sebidae** Waker, 1908 (3 genera, 31 species)
Family **Sicafodiidae** Just, 2004 (1 genus, 1 species)
Family **Sinurothoidae** Ren, 1999 (1 genus, 1 species)
Family **Sophrosynidae** Lowry & Stoddart, 2010 (1 genus, 14 species)
Family **Stegocephalidae** Dana, 1852 (25 genera, 108 species)
Family **Stenothoidae** Boeck, 1871 (41 genera, 293 species)
Family **Sternophysingidae** Holsinger, 1992 (1 genus, 8 species)
Family **Stilipedidae** Holmes, 1908 (5 genera, 20 species)
Family **Synopiidae** Dana, 1852 (17 genera, 91 species)
Family **Talitridae** Rafinesque, 1815 (57 genera, 268 species)
Family **Temnophliantidae** Griffiths, 1975 (2 genera, 2 species)
Family **Thoriellidae** Lowry & Stoddart, 2011 (4 genera, 5 species)
Family **Thurstonellidae** Lowry & Zeidler, 2008 (1 genus, 1 species)
Family **Trischizostomatidae** Liljeborg, 1865 (1 genus, 16 species)
Family **Tulearidae** Ledoyer, 1979 (1 genus, 1 species)
Family **Typhlogammaridae** Bousfield, 1979 (5 genera, 7 species)
Family **Unciolidae** Myers & Lowry, 2003 (17 genera, 41 species)
Family **Uristidae** Hurley, 1963 (22 genera, 184 species)
Family **Urohaustoriidae** Barnard & Drummond, 1982 (9 genera, 23 species)
Family **Urothoidae** Bousfield, 1978 (6 genera, 61 species)
Family **Valettidae** Stebbing, 1888 (1 genus, 5 species)
Family **Valettiopsidae** Lowry & De Broyer, 2008 (2 genera, 12 species)
Family **Vibiliidae** Dana, 1852 (3 genera, 23 species)
Family **Vicmusiidae** Just, 1990 (1 genus, 2 species)
Family **Vitjazianidae** Birstein & M. Vinogradov, 1955 (2 genera, 5 species)
Family **Wandinidae** Lowry & Stoddart, 1990 (2 genera, 4 species)
Family **Zobrachoidae** Barnard & Drummond, 1982 (5 genera, 5 species)

Order **Isopoda** Latreille, 1817 (11 suborders)[17]
Suborder **Asellota** Latreille, 1802 (4 superfamilies)
Superfamily **Aselloidea** Latreille, 1802 (2 families)
Family **Asellidae** Latreille, 1802 (22 genera, 393 species)
Family **Stenasellidae** Dudich, 1924 (10 genera, 75 species)
Superfamily **Gnathostenetroidoidea** Kussakin, 1967 (2 families)
Family **Gnathostenetroididae** Kussakin, 1967 (1 genus, 1 species)
Family **Protojaniridae** Fresi, Idato & Scipione, 1980 (6 genera, 15 species)
Superfamily **Janiroidea** Sars, 1897 (22 families)
Family **Acanthaspidiidae** Menzies, 1962 (4 genera, 34 species)
Family **Dendrotionidae** Vanhöffen, 1914 (3 genera, 25 species)
Family **Desmosomatidae** Sars, 1899 (19 genera, 145 species)

17. Based on Brandt & Poore (2003), Schotte *et al.* (2008) and Merrin (2011)

Family **Echinothambematidae** Menzies, 1956 (2 genera, 5 species)
Family **Haplomunnidae** Wilson, 1976 (5 genera, 11 species)
Family **Haploniscidae** Hansen, 1916 (8 genera, 128 species)
Family **Ischnomesidae** Hansen, 1916 (9 genera, 109 species)
Family **Janirellidae** Menzies, 1956 (3 genera, 42 species)
Family **Janiridae** Sars, 1897 (24 genera, 177 species)
Family **Joeropsididae** Nordenstam, 1933 (3 genera, 74 species)
Family **Katianiridae** Svavarsson, 1987 (2 genera, 6 species)
Family **Macrostylidae** Hansen, 1916 (1 genus, 77 species)
Family **Mesosignidae** Schultz, 1969 (2 genera, 17 species)
Family **Mictosomatidae** Wolff, 1965 (1 genus, 1 species)
Family **Munnidae** Sars, 1897 (6 genera, 109 species)
Family **Munnopsididae** Sars, 1869 (19 genera, 343 species)
Family **Nannoniscidae** Hansen, 1916 (12 genera, 84 species)
Family **Paramunnidae** Vanhöffen, 1914 (44 genera, 225 species)
Family **Pleurocopidae** Fresi & Schiecke, 1972 (1 genus, 3 species)
Family **Santiidae** Wilson, 1987 (5 genera, 28 species)
Family **Thambematidae** Stebbing, 1913 (2 genera, 5 species)
Family **Xenosellidae** Just, 2005 (1 genus, 1 species)
Superfamily **Stenetrioidea** Hansen, 1905 (2 families)
Family **Pseudojaniridae** Wilson, 1986 (3 genera, 7 species)
Family **Stenetriidae** Hansen, 1905 (9 genera, 81 species)
Superfamily **Incertae Sedis** (2 families)
Family **Microparasellidae** Karaman, 1933 (4 genera, 80 species)
Family **Vermectiadidae** Just & Poore, 1992 (1 genus, 1 species)
Suborder **Calabozoida** Van Lieshout, 1983 (1 family)
Family **Calabozoidae** Van Lieshout, 1983 (2 genera, 2 species)
Suborder **Cymothoida** Wägele, 1989 (4 superfamilies)
Superfamily **Anthuroidea** Leach, 1814 (6 families)
Family **Antheluridae** Poore & Lew Ton, 1988 (3 genera, 18 species)
Family **Anthuridae** Leach, 1814 (25 genera, 291 species)
Family **Expanathuridae** Poore, 2001 (7 genera, 58 species)
Family **Hyssuridae** Wägele, 1981 (6 genera, 39 species)
Family **Leptanthuridae** Poore, 2001 (11 genera, 100 species)
Family **Paranthuridae** Menzies & Glynn, 1968 (7 genera, 96 species)
Superfamily **Bopyroidea** Rafinesque, 1815 (5 families)
Family **Bopyridae** Rafinesque, 1815 (158 genera, 614 species)
Family **Colypuridae** Richardson, 1905 (1 genus, 1 species)
Family **Dajidae** Giard & Bonnier, 1887 (18 genera, 54 species)
Family **Entoniscidae** Kossmann, 1881 (16 genera, 40 species)
Family **Rhabdochiridae** Richardson, 1905 (1 genus, 1 species)
Superfamily **Cryptoniscoidea** Kossmann, 1880 (7 families)
Family **Asconiscidae** Bonnier, 1900 (1 genus, 1 species)
Family **Cabiropidae** Giard & Bonnier, 1887 (13 genera, 32 species)
Family **Crinoniscidae** Bonnier, 1900 (2 genera, 4 species)
Family **Cryptoniscidae** Kossmann, 1880 (8 genera, 24 species)
Family **Cyproniscidae** Bonnier, 1900 (2 genera, 9 species)
Family **Hemioniscidae** Bonnier, 1900 (3 genera, 10 species)
Family **Podasconidae** Bonnier, 1900 (2 genera, 5 species)
Family **Incertae Sedis** (16 genera, 17 species)
Superfamily **Cymothooidea** Leach, 1814 (9 families)
Family **Aegidae** White, 1850 (8 genera, 156 species)
Family **Anuropidae** Stebbing, 1893 (1 genus, 10 species)
Family **Barybrotidae** Hansen, 1890 (1 genus, 1 species)

Family **Cirolanidae** Dana, 1852 (61 genera, 488 species)
Family **Corallanidae** Hansen, 1890 (6 genera, 81 species)
Family **Cymothoidae** Leach, 1814 (43 genera, 386 species)
Family **Gnathiidae** Leach, 1814 (12 genera, 211 species)
Family **Protognathiidae** Wägele & Brandt, 1988 (1 genus, 2 species)
Family **Tridentellidae** Bruce, 1984 (1 genus, 21 species)
Suborder **Limnoriidea** Poore, 2002 (3 families)
Family **Hadromastacidae** Bruce & Müller, 1991 (1 genus, 3 species)
Family **Keuphyliidae** Bruce, 1980 (1 genus, 1 species)
Family **Limnoriidae** White, 1850 (4 genera, 60 species)
Suborder **Microcerberidea** Lang, 1961 (2 families)
Family **Atlantasellidae** Sket, 1980 (2 genera, 2 species)
Family **Microcerberidae** Karaman, 1933 (7 genera, 46 species)
Suborder **Oniscidea** Latreille, 1802 (38 families)
Family **Actaeciidae** Vandel, 1952 (1 genus, 8 species)
Family **Agnaridae** Schmidt, 2003 (2 genera, 13 species)
Family **Alloniscidae** Schmidt, 2003 (1 genus, 20 species)
Family **Armadillidae** Brandt, 1831 (80 genera, 702 species)
Family **Armadillidiidae** Brandt, 1833 (15 genera, 315 species)
Family **Ballioniscidae** Vandel, 1963 (3 genera, 10 species)
Family **Bathytropidae** Vandel, 1952 (9 genera, 28 species)
Family **Berytoniscidae** Vandel, 1973 (1 genus, 1 species)
Family **Buddelundiellidae** Verhoeff, 1930 (4 genera, 19 species)
Family **Cylisticidae** Verhoeff, 1949 (4 genera, 73 species)
Family **Delatorreidae** Verhoeff, 1938 (2 genera, 19 species)
Family **Detonidae** Budde-Lund, 1906 (3 genera, 41 species)
Family **Dubioniscidae** Schultz, 1995 (4 genera, 42 species)
Family **Eubelidae** Budde-Lund, 1904 (44 genera, 251 species)
Family **Halophilosciidae** Verhoeff, 1908 (2 genera, 10 species)
Family **Hekelidae** Ferrara, 1977 (1 genus, 1 species)
Family **Irmaosidae** Ferrara & Taiti, 1983 (1 genus, 2 species)
Family **Ligiidae** Leach, 1814 (8 genera, 91 species)
Family **Mesoniscidae** Verhoeff, 1908 (1 genus, 6 species)
Family **Olibrinidae** Vandel, 1973 (4 genera, 16 species)
Family **Oniscidae** Latreille, 1802 (11 genera, 53 species)
Family **Philosciidae** Kinahan, 1857 (114 genera, 569 species)
Family **Platyarthridae** Vandel, 1946 (9 genera, 122 species)
Family **Porcellionidae** Brandt, 1831 (22 genera, 458 species)
Family **Pudeoniscidae** Lemos de Castro, 1973 (2 genera, 4 species)
Family **Rhyscotidae** Budde-Lund, 1908 (2 genera, 24 species)
Family **Schoebliidae** Verhoeff, 1938 (1 genus, 2 species)
Family **Scleropactidae** Verhoeff, 1938 (28 genera, 103 species)
Family **Scyphacidae** Dana, 1852 (7 genera, 20 species)
Family **Spelaeoniscidae** Vandel, 1948 (6 genera, 17 species)
Family **Stenoniscidae** Budde-Lund, 1904 (2 genera, 8 species)
Family **Styloniscidae** Vandel, 1952 (11 genera, 86 species)
Family **Tendosphaeridae** Verhoeff, 1930 (3 genera, 6 species)
Family **Titaniidae** Verhoeff, 1938 (5 genera, 6 species)
Family **Trachelipodidae** Strouhal, 1953 (21 genera, 245 species)
Family **Trichoniscidae** Sars, 1899 (89 genera, 519 species)
Family **Turanoniscidae** Borutskii, 1969 (1 genus, 1 species)
Family **Tylidae** Dana, 1852 (2 genera, 26 species)
Family **Incertae Sedis** (1 genus, 2 species)
Suborder **Phoratopidea** Brandt & Poore, 2003 (1 family)

Family **Phoratopodidae** Hale, 1925 (1 genus, 1 species)
Suborder **Phreatoicidea** Stebbing, 1893 (6 families)
Family **Amphisopidae** Nicholls, 1943 (8 genera, 10 species)
Family **Hipsimetopidae** Nicholls, 1943 (6 genera, 9 species)
Family **Mesamphisopidae** Nicholls, 1943 (1 genus, 10 species)
Family **Phreatoicidae** Chilton, 1891 (13 genera, 47 species)
Family **Phreatoicopsidae** Nicholls, 1943 (2 genera, 4 species)
Family **Ponderellidae** Wilson & Keable, 2004 (1 genus, 2 species)
Family **Incertae sedis** (1 genus, 1 species)
Suborder **Sphaeromatidea** Wägele, 1989 (2 superfamilies)
Superfamily **Seroloidea** Dana, 1852 (3 families)
Family **Bathynataliidae** Kensley, 1978 (3 genera, 4 species)
Family **Plakarthriidae** Hansen, 1905 (1 genus, 3 species)
Family **Serolidae** Dana, 1852 (24 genera, 126 species)
Superfamily **Sphaeromatoidea** Latreille, 1825 (3 families)
Family **Ancinidae** Dana, 1852 (2 genera, 14 species)
Family **Sphaeromatidae** Latreille, 1825 (96 genera, 706 species)
Family **Tecticepitidae** Iverson, 1982 (1 genus, 13 species)
Suborder **Tainisopidea** Brandt & Poore, 2003 (1 family)
Family **Tainisopidae** Wilson, 2003 (2 genera, 7 species)
Suborder **Valvifera** Sars, 1882 (11 families)
Family **Antarcturidae** Poore, 2001 (17 genera, 116 species)
Family **Arcturidae** Dana, 1849 (14 genera, 156 species)
Family **Arcturididae** Poore, 2001 (1 genus, 2 species)
Family **Austrarcturellidae** Poore & Bardsley, 1992 (5 genera, 45 species)
Family **Chaetiliidae** Dana, 1849 (12 genera, 23 species)
Family **Holidoteidae** Wägele, 1989 (3 genera, 20 species)
Family **Holognathidae** Thomson, 1904 (4 genera, 25 species)
Family **Idoteidae** Samouelle, 1819 (22 genera, 184 species)
Family **Pseudidotheidae** Ohlin, 1901 (1 genus, 4 species)
Family **Rectarcturidae** Poore, 2001 (1 genus, 3 species)
Family **Xenarcturidae** Sheppard, 1957 (1 genus, 1 species)
Order **Tanaidacea** Dana, 1849 (3 suborders)
Suborder **Tanaidomorpha** Sieg, 1980 (2 superfamilies)
Superfamily **Tanaoidea** Dana, 1849 (1 family)
Family **Tanaidae** Dana, 1849 (19 genera, 30 species)
Superfamily **Paratanaoidea** Lang, 1949 (16 families)
Family **Anarthruridae** Lang, 1971 (9 genera, 20 species)
Family **Agathotanaidae** Lang, 1971 (3 genera, 39 species)
Family **Akanthophoreidae** Sieg, 1986 (3 genera, 32 species)
Family **Colletteidae** Larsen & Wilson, 2002 (16 genera, 57 species)
Family **Cryptocopidae** McLelland in Bird & Larsen, 2009 (6 genera, 10 species)
Family **Leptochelidae** Lang, 1973 (11 genera, 61 species)
Family **Leptognathiidae** Lang 1976 (2 genera, 36 species)
Family **Mirandotanaidae** Błażewicz-Paszkowycz & Bamber, 2009 (2 genera, 3 species)
Family **Nototanaidae** Sieg, 1976 (6 genera, 10 species)
Family **Paratanaidae** Lang, 1949 (7 genera, 34 species)
Family **Pseudotanaidae** Sieg, 1976 (4 genera, 42 species)
Family **Pseudozeuxidae** Sieg, 1982 (3 genera, 6 species)
Family **Tanaellidae** Larsen & Wilson, 2002 (4 genera, 40 species)
Family **Tanaissuidae** Bird & Larsen, 2010 (3 genera, 9 species)
Family **Typhlotanaidae** Sieg, 1986 (13 genera, 100 species)
Family **Incertae Sedis** (Anarthruridae *sensu lato*) (25 genera, 53 species)
Suborder **Neotanaidomorpha** Sieg, 1980 (1 family)

Family **Neotanaidae** Lang, 1956 (4 genera, 46 species)
Suborder **Apseudomorpha** Sieg, 1980 (12 families)
Superfamily **Apseudoidea** Leach, 1814 (12 families)
Family **Apseudellidae** Gutu, 1972 (1 genus, 1 species)
Family **Apseudidae** Leach, 1814 (22 genera, 167 species)
Family **Gigantapseudidae** Kudinova-Pasternak, 1978 (1 genus, 2 species)
Family **Kalliapseudidae** Lang, 1956 (11 genera, 41 species)
Family **Metapseudidae** Lang, 1970 (20 genera, 81 species)
Family **Numbakullidae** Gutu & Heard, 2002 (1 genus, 2 species)
Family **Pagurapseudidae** Lang, 1970 (8 genera, 39 species)
Family **Parapseudidae** Gutu, 1981 (18 genera, 84 species)
Family **Sphaeromapseudidae** Larsen, 2011 (1 genus, 1 species)
Family **Sphyrapodidae** Gutu, 1980 (6 genera, 19 species)
Family **Whiteleggiidae** Gutu, 1972 (2 genera, 3 species)
Family **Incertae Sedis** (1 genus, 1 species)
Order **Cumacea** Kroyer, 1846 (9 families)
Family **Bodotriidae** Scott, 1901 (36 genera, 379 species)
Family **Ceratocumatidae** Calman, 1905 (2 genera, 10 species)
Family **Diastylidae** Bate, 1856 (22 genera, 318 species)
Family **Gynodiastylidae** Stebbing, 1912 (12 genera, 106 species)
Family **Lampropidae** Sars, 1878 (15 genera, 114 species)
Family **Leuconidae** Sars, 1878 (16 genera, 139 species)
Family **Nannastacidae** Bate, 1866 (25 genera, 426 species)
Family **Pseudocumatidae** Sars, 1878 (12 genera, 30 species)
Family **Incertae sedis** (1 genus, 1 species)
Superorder **Eucarida** Calman, 1904 (3 orders)
Order **Euphausiacea** Dana, 1852 (2 families)[18]
Family **Bentheuphausiidae** Colosi, 1917 (1 genus, 1 species)
Family **Euphausiidae** Dana, 1852 (10 genera, 86 species)
Order **Amphionidacea** Williamson, 1973 (1 family)
Family **Amphionididae** Holthuis, 1955 (1 genus, 1 species)
Order **Decapoda** Latreille, 1802 (2 suborders)
Suborder **Dendrobranchiata** Bate, 1888 (2 superfamilies)[19]
Superfamily **Penaeoidea** Rafinesque, 1815 (5 families)
Family **Aristeidae** Wood-Mason, 1891 (9 genera, 26 species)
Family **Benthesicymidae** Wood-Mason, 1891 (5 genera, 39 species)
Family **Penaeidae** Rafinesque, 1815 (32 genera, 222 species)
Family **Sicyoniidae** Ortmann, 1898 (1 genus, 52 species)
Family **Solenoceridae** Wood-Mason, 1891 (9 genera, 83 species)
Superfamily **Sergestoidea** Dana, 1852 (2 families)
Family **Luciferidae** de Haan, 1849 (1 genus, 7 species)
Family **Sergestidae** Dana, 1852 (12 genera, 101 species)
Suborder **Pleocyemata** Burkenroad, 1963 (11 infraorders)[20]
Infraorder **Stenopodidea** Claus, 1872 (3 families)
Family **Macromaxillocarididae** (1 genus, 1 species)
Family **Spongicolidae** Schram, 1986 (7 genera, 39 species)
Family **Stenopodidae** Claus, 1872 (4 genera, 31 species)
Infraorder **Procaridoida** Chace & Manning, 1972 (1 superfamily)
Superfamily **Procaridoidea** Chace & Manning, 1972 (1 family)
Family **Procarididae** Chace & Manning, 1972 (2 genera, 6 species)
Infraorder **Caridea** Dana, 1852 (14 superfamilies)

18. Based on Baker *et al.* (1990)
19. Based on De Grave & Fransen (2011)
20. Based on De Grave & Fransen (2011)

Superfamily **Alpheoidea** Rafinesque, 1815 (4 families)
Family **Alpheidae** Rafinesque, 1815 (47 genera, 659 species)
Family **Barbouriidae** Christoffersen, 1987 (3 genera, 8 species)
Family **Hippolytidae** Dana, 1852 (37 genera, 336 species)
Family **Ogyrididae** Holthuis, 1955 (1 genus, 10 species)
Superfamily **Atyoidea** de Haan, 1849 (1 family)
Family **Atyidae** de Haan, 1849 (42 genera, 468 species)
Superfamily **Bresilioidea** Calman, 1896 (5 families)
Family **Agostocarididae** Hart & Manning, 1986 (1 genus, 3 species)
Family **Alvinocarididae** Christoffersen, 1986 (8 genera, 26 species)
Family **Bresiliidae** Calman, 1896 (2 genera, 9 species)
Family **Disciadidae** Rathbun, 1902 (4 genera, 12 species)
Family **Pseudochelidae** De Grave & Moosa, 2004 (1 genus, 3 species)
Superfamily **Campylonotoidea** Sollaud, 1913 (2 families)
Family **Bathypalaemonellidae** de Saint Laurent, 1985 (2 genera, 11 species)
Family **Campylonotidae** Sollaud, 1913 (1 genus, 5 species)
Superfamily **Crangonoidea** Haworth, 1825 (2 families)
Family **Crangonidae** Haworth, 1825 (23 genera, 219 species)
Family **Glyphocrangonidae** Smith, 1884 (1 genus, 88 species)
Superfamily **Nematocarcinoidea** Smith, 1884 (4 families)
Family **Eugonatonotidae** Chace, 1937 (1 genus, 2 species)
Family **Nematocarcinidae** Smith, 1884 (4 genera, 52 species)
Family **Rhynchocinetidae** Ortmann, 1890 (2 genera, 25 species)
Family **Xiphocarididae** Ortmann, 1895 (1 genus, 2 species)
Superfamily **Oplophoroidea** Dana, 1852 (2 families)
Family **Acanthephyridae** Dana, 1852 (7 genera, 55 species)
Family **Oplophoridae** Dana, 1852 (3 genera, 14 species)
Superfamily **Pasiphaeoidea** Dana, 1852 (1 family)
Family **Pasiphaeidae** Dana, 1852 (7 genera, 95 species)
Superfamily **Physetocaridoidea** Chace, 1940 (1 family)
Family **Physetocarididae** Chace, 1940 (1 genus, 1 species)
Superfamily **Palaemonoidea** Rafinesque, 1815 (8 families)
Family **Anchistioididae** Borradaile, 1915 (1 genus, 3 species)
Family **Desmocarididae** Borradaile, 1915 (1 genus, 2 species)
Family **Euryrhynchidae** Holthuis, 1950 (3 genera, 7 species)
Family **Gnathophyllidae** Dana, 1852 (4 genera, 14 species)
Family **Hymenoceridae** Ortmann, 1890 (2 genera, 3 species)
Family **Kakaducarididae** Bruce, 1993 (3 genera, 3 species)
Family **Palaemonidae** Rafinesque, 1815 (137 genera, 967 species)
Family **Typhlocarididae** Annandale & Kemp, 1913 (1 genus, 4 species)
Superfamily **Pandaloidea** Haworth, 1825 (2 families)
Family **Pandalidae** Haworth, 1825 (23 genera, 188 species)
Family **Thalassocarididae** Bate, 1888 (2 genera, 4 species)
Superfamily **Processoidea** Ortmann, 1890 (1 family)
Family **Processidae** Ortmann, 1890 (4 genera, 68 species)
Superfamily **Psalidopodoidea** Wood-Mason & Alcock, 1892 (1 family)
Family **Psalidopodidae** Wood-Mason & Alcock, 1892 (1 genus, 3 species)
Superfamily **Stylodactyloidea** Bate, 1888 (1 family)
Family **Stylodactylidae** Bate, 1888 (5 genera, 34 species)
Infraorder **Polychelida** Scholtz & Richter, 1995 (1 superafamily)[21]
Superfamily **Eryonoidea** de Haan, 1841 (1 family)
Family **Polychelidae** Wood-Mason, 1874 (6 genera, 37 species)

21. Based on Chan (2010)

Infraorder **Achelata** Scholtz & Richter, 1995 (2 families, 32 genera, 147 species)[22]
Superfamily **Palinuroidea** Latreille, 1802 (2 families)
Family **Palinuridae** Latreille, 1802 (12 genera, 59 species)
Family **Scyllaridae** Latreille, 1825 (20 genera, 88 species)
Infraorder **Glypheidea** Winkler, 1882 (1 superfamily)[23]
Superfamily **Glypheoidea** Winkler, 1882 (1 family)
Family **Glypheidae** Winkler, 1882 (2 genera, 2 species)
Infraorder **Astacidea** Latreille, 1802 (4 superfamilies)[24]
Superfamily **Enoplometopoidea** de Saint Laurent, 1988 (1 family)
Family **Enoplometopidae** de Saint Laurent, 1988 (1 genus, 12 species)
Superfamily **Nephropoidea** Dana, 1852 (1 family)
Family **Nephropidae** Dana, 1852 (14 genera, 54 species)
Superfamily **Astacoidea** Latreille, 1802 (2 families)
Family **Astacidae** Latreille, 1802 (3 genera, 11 species)
Family **Cambaridae** Hobbs, 1942 (12 genera, 428 species)
Superfamily **Parastacoidea** Huxley, 1879 (1 family)
Family **Parastacidae** Huxley, 1879 (15 genera, 165 species)
Infraorder **Axiidea** de Saint Laurent, 1979[25] (2 superfamilies)
Superfamily **Axioidea** Huxley, 1879 (9 families)
Family **Axiidae** Huxley, 1879 (44 genera, 112 species)
Family **Callianideidae** Kossmann, 1880 (2 genera, 4 species)
Family **Calocarididae** Ortmann, 1891 (11 genera, 30 species)
Family **Coralaxiidae** Sakai & De Saint Laurent, 1989 (2 genera, 4 species)
Family **Eiconaxiidae** Sakai & Ohta, 2005 9 (1 genus, 30 species)
Family **Eiconaxiopsididae** Sakai, 2010 (1 genus, 2 species)
Family **Meticonaxiidae** Sakai, 1992 (3 genera, 18 species)
Family **Micheleidae** Sakai, 1992 (1 genus, 13 species)
Family **Strahlaxiidae** Poore, 1994 (3 genera, 8 species)
Superfamily **Callianssoidea** Dana, 1852 (10 families)
Family **Anacalliacidae** Manning & Felder, 1991 (3 genera, 3 species)
Family **Bathycalliacidae** Sakai & Türkay, 1999 (2 genera, 2 species)
Family **Callianassidae** Dana, 1852 (22 genera, 171 species)
Family **Callianopsidae** Manning & Felder, 1991 (3 genera, 3 species)
Family **Ctenochelidae** Manning & Felder, 1991 (1 genus, 10 species)
Family **Eucalliacidae** Manning & Felder, 1991 (8 genera, 17 species)
Family **Gourretiidae** Sakai, 1999 (5 genera, 10 species)
Family **Lipkecallianassidae** Sakai, 2005 (1 genus, 1 species)
Family **Pseudogourretiidae** Sakai, 2005 (1 genus, 1 species)
Family **Thomassiniidae** de Saint Laurent, 1979 (5 genera, 13 species)
Infraorder **Gebiidea** de Saint Laurent, 1979[26] (1 superfamily)
Superfamily **Thalassinoidea** Latreille, 1831 (4 families)
Family **Axianassidae** Schmitt, 1924 (1 genus, 8 species)
Family **Laomediidae** Borradaile, 1903 (5 genera, 16 species)
Family **Thalassinidae** Latreille, 1831 (1 genus, 7 species)
Family **Upogebiidae** Borradaile, 1903 (13 genera, 163 species)
Infraorder **Anomura** MacLeay, 1838 (7 superfamilies)[27]
Superfamily **Lomisoidea** Bouvier, 1895 (1 family)

22. Based on Chan (2010)
23. Based on Chan (2010)
24. Based on De Grave *et al.* (2009), Chan (2010)
25. Based on De Grave *et al.* (2009), Sakai (2010).
26. Based on De Grave *et al.* (2009).
27. Based on Baba *et al.* (2008), Ahyong *et al.* (2010), Schnabel & Ahyong (2010), Boyko & McLaughlin (2010), McLaughlin *et al.* (2010a, b), Osawa & McLaughlin (2010).

Family **Lomisidae** Bouvier, 1895 (1 genus, 1 species)
Superfamily **Aegloidea** Dana, 1852 (1 family)
Family **Aeglidae** Dana, 1852 (1 genus, 69 species)
Superfamily **Chirostyloidea** Ortmann, 1892 (2 families)
Family **Chirostylidae** Ortmann, 1892 (5 genera, 276 species)
Family **Eumunididae** A. Milne-Edwards & Bouvier, 1900 (2 genera, 30 species)
Superfamily **Galatheoidea** Samouelle, 1819 (4 families)
Family **Galatheidae** Samouelle, 1819 (11 genera, 95 species)
Family **Munididae** Ahyong, Baba, Macpherson & Poore, 2010 (20 genera, 395 species)
Family **Munidopsidae** Ortmann, 1898 (4 genera, 250 species)
Family **Porcellanidae** Haworth, 1825 (30 genera, 277 species)
Superfamily **Hippoidea** Latreille, 1825 (3 families)
Family **Albuneidae** Stimpson, 1858 (9 genera, 48 species)
Family **Blepharipodidae** Boyko, 2002 (2 genera, 6 species)
Family **Hippidae** Latreille, 1825 (3 genera, 27 species)
Superfamily **Paguroidea** Latreille, 1802 (6 families)
Family **Coenobitidae** Dana, 1851 (2 genera, 19 species)
Family **Diogenidae** Ortmann, 1892 (20 genera, 428 species)
Family **Paguridae** Latreille, 1802 (75 genera, 542 species)
Family **Parapaguridae** Smith, 1882 (10 genera, 76 species)
Family **Pylochelidae** Bate, 1888 (10 genera, 41 species)
Family **Pylojacquesidae** McLaughlin & Lemaitre, 2001 (2 genera, 2 species)
Superfamily **Lithodoidea** Samouelle, 1819 (2 families)
Family **Hapalogastridae** Brandt, 1850 (5 genera, 8 species)
Family **Lithodidae** Samouelle, 1819 (10 genera, 121 species)
Infraorder **Brachyura** Latreille, 1802 (4 sections)[28]
Section **Dromiacea** de Haan, 1833 (3 superfamilies)
Superfamily **Homolodromioidea** Alcock, 1900 (1 family)
Family **Homolodromiidae** Alcock, 1900 (2 genera, 24 species)
Superfamily **Dromioidea** de Haan, 1833 (2 families)
Family **Dromiidae** de Haan, 1833 (41 genera, 124 species)
Family **Dynomenidae** Ortmann, 1892 (5 genera, 19 species)
Superfamily **Homoloidea** de Haan, 1839 (3 families)
Family **Homolidae** de Haan, 1839 (14 genera, 65 species)
Family **Latreilliidae** Stimpson, 1858 (2 genera, 7 species)
Family **Poupiniidae** Guinot, 1991 (1 genus, 1 species)
Section **Raninoida** de Haan, 1839 (1 superfamily)
Superfamily **Raninoidea** de Haan, 1839 (1 family)
Family **Raninidae** de Haan, 1839 (12 genera, 39 species)
Section **Cyclodorippoida** Ahyong *et al.* 2007 (1 superfamily)
Superfamily **Cyclodorippoidea** Ortmann, 1892 (3 families)
Family **Cyclodorippidae** Ortmann, 1892 (10 genera, 49 species)
Family **Cymonomidae** Bouvier, 1897 (5 genera, 38 species)
Family **Phyllotymolinidae** Tavares, 1998 (3 genera, 4 species)
Section **Eubrachyura** de Saint Laurent, 1980 (2 subsections)
Subsection **Heterotremata** Guinot, 1977 (28 superfamilies)
Superfamily **Aethroidea** Dana, 1851 (1 family)
Family **Aethridae** Dana, 1851 (7 genera, 35 species)
Superfamily **Bellioidea** Dana, 1852 (1 family)
Family **Belliidae** Dana, 1852 (4 genera, 7 species)
Superfamily **Bythograeoidea** Williams, 1980 (1 family)
Family **Bythograeidae** Williams, 1980 (6 genera, 14 species)

28. Based on De Grave *et al*. (2009) and Števčić (2011). Taxa erected by Števčić (2011) are accepted here at face value, but the nomenclatural validity of some of Števčić's family names requires closer scrutiny.

Superfamily **Calappoidea** Milne Edwards, 1837 (2 families)
Family **Calappidae** Milne Edwards, 1837 (2 families, 9 genera, 75 species)
Family **Matutidae** de Hann, 1841 (4 genera, 15 species)
Superfamily **Cancroidea** Latreille, 1802 (2 families)
Family **Atelecyclidae** Ortmann, 1893 (6 genera, 24 species)
Family **Cancridae** Latreille, 1802 (4 genera, 6 species)
Superfamily **Carpilioidea** Ortmann, 1893 (1 family)
Family **Carpiliidae** Ortmann, 1893 (1 genus, 2 species)
Superfamily **Cheiragonoidea** Ortmann, 1893 (1 family)
Family **Cheiragonidae** Ortmann, 1893 (2 genera, 3 species)
Superfamily **Corystoidea** Samouelle, 1819 (1 family)
Family **Corystidae** Samouelle, 1819 (4 genera, 9 species)
Superfamily **Dairoidea** Ng & Rodriguez, 1986 (2 families)
Family **Dacryopilumnidae** Serène, 1984 (1 genus, 2 species)
Family **Dairidae** Ng & Rodriguez, 1986 (1 genus, 1 species)
Superfamily **Dorippoidea** MacLeay, 1838 (2 families)
Family **Dorippidae** MacLeay, 1838 (9 genera, 19 species)
Family **Ethusidae** Guinot, 1977 (4 genera, 79 species)
Superfamily **Eriphioidea** MacLeay, 1838 (6 families)
Family **Dairodidae** Števčić, 2005 (1 genus, 3 species)
Family **Eriphiidae** MacLeay, 1838 (2 genera, 8 species)
Family **Hypothalassiidae** Karasawa & Schweitzer, 2006 (1 genus, 2 species)
Family **Menippidae** Ortmann, 1893 (5 genera, 10 species)
Family **Oziidae** Dana, 1851 (7 genera, 32 species)
Family **Platyxanthidae** Guinot, 1977 (5 genera, 7 species)
Superfamily **Gecarcinucoidea** Rathbun, 1904 (1 family)
Family **Gecarcinucidae** Rathbun, 1904 (58 genera, 349 species)
Superfamily **Goneplacoidea** MacLeay, 1838 (11 families)
Family **Acidopsidae** Števčić, 2005 (2 genera, 4 species)
Family **Chasmocarcinidae** Serène, 1964 (9 genera, 35 species)
Family **Conleyidae** Števčić, 2005 (1 genus, 1 species)
Family **Euryplacidae** Stimpson, 1871 (10 genera, 33 species)
Family **Goneplacidae** MacLeay, 1838 (16 genera, 67 species)
Family **Litocheiridae** Števčić, 2005 (2 genera, 3 species)
Family **Mathildellidae** Karasawa & Kato, 2003 (5 genera, 22 species)
Family **Neommatocarcinidae** Števčić, 2011 (1 genus, 1 species)
Family **Progeryonidae** Števčić, 2005 (3 genera, 7 species)
Family **Scalopidiidae** Števčić, 2005 (1 genus, 2 species)
Family **Vultocinidae** Ng & Manuel-Santos, 2007 (1 genus, 1 species)
Superfamily **Hexapodoidea** Miers, 1886 (1 family)
Family **Hexapodidae** Miers, 1886 (13 genera, 20 species)
Superfamily **Leucosioidea** Samouelle, 1819 (2 families)
Family **Iphiculidae** Alcock, 1896 (2 genera, 5 species)
Family **Leucosiidae** Samouelle, 1819 (69 genera, 447 species)
Superfamily **Majoidea** Samouelle, 1819 (6 families)
Family **Epialtidae** MacLeay, 1838 (81 genera, 375 species)
Family **Hymenosomatidae** MacLeay, 1838 (19 genera, 124 species)
Family **Inachidae** MacLeay, 1838 (39 genera, 204 species)
Family **Inachoididae** Dana, 1851 (10 genera, 39 species)
Family **Majidae** Samouelle, 1819 (47 genera, 194 species)
Family **Oregoniidae** Garth, 1958 (4 genera, 14 species)
Superfamily **Orithyoidea** Dana, 1853 (1 family)
Family **Orithyiidae** Dana, 1853 (1 genus, 1 species)
Superfamiliy **Palicoidea** Bouvier, 1898 (2 families)

Family **Crossotonotidae** Moosa & Serène, 1981 (2 genera, 6 species)
Family **Palicidae** Bouvier, 1898 (9 genera, 57 species)
Superfamily **Parthenopoidea** MacLeay, 1838 (1 family)
Family **Parthenopidae** MacLeay, 1838 (38 genera, 139 species)
Superfamily **Pilumnoidea** Samouelle, 1819 (3 families)
Family **Galenidae** Alcock, 1898 (4 genera, 9 species)
Family **Pilumnidae** Samouelle, 1819 (63 genera, 349 species)
Family **Tanaochelidae** Ng & Clark, 2000 (1 genus, 2 species)
Superfamily **Portunoidea** Rafinesque, 1815 (7 families)
Family **Carcinidae** MacLeay, 1838 (8 genera, 30 species)
Family **Catopridae** Borradaile, 1902 (2 genera, 10 species)
Family **Geryonidae** Colosi, 1923 (3 genera, 37 species)
Family **Macropipidae** Stephenson & Campbell, 1960 (8 genera, 28 species)
Family **Pirimelidae** Alcock, 1899 (2 genera, 5 species)
Family **Portunidae** Rafinesque, 1815 (23 genera, 307 species)
Family **Thiidae** Dana, 1852 (2 genera, 3 species)
Superfamily **Potamoidea** Ortmann, 1896 (2 families)
Family **Potamidae** Ortmann, 1896 (97 genera, 521 species)
Family **Potamonautidae** Bott, 1970 (18 genera, 138 species)
Superfamily **Pseudothelphusoidea** Ortmann, 1893 (1 family)
Family **Pseudothelphusidae** Ortmann, 1893 (41 genera, 276 species)
Superfamily **Pseudozoidea** Alcock, 1898 (4 families)
Family **Caecopilumnidae** Števčić, 2011 (1 genus, 3 species)
Family **Pilumnoididae** Gionot & Macpherson, 1987 (1 genus, 8 species)
Family **Planopilumnidae** Serène, 1984 (3 genera, 4 species)
Family **Pseudoziidae** Alcock, 1898 (3 genera, 10 species)
Superfamily **Retroplumoidea** Gill, 1894 (1 family)
Family **Retroplumidae** Gill, 1894 (2 genera, 10 species)
Superfamily **Trapezioidea** Miers, 1886 (3 families)
Family **Domeciidae** Ortmann, 1893 (4 genera, 6 species)
Family **Tetraliidae** Castro, Ng & Ahyong, 2004 (2 genera, 12 species)
Family **Trapeziidae** Miers, 1886 (6 genera, 38 species)
Superfamily **Trichodactyloidea** Milne Edwards, 1853 (1 family)
Family **Trichodactylidae** Milne Edwards, 1853 (15 genera, 49 species)
Superfamily **Xanthoidea** MacLeay, 1838 (3 families)
Family **Panopeidae** Ortmann, 1893 (26 genera, 84 species)
Family **Pseudorhombilidae** Alcock, 1900 (10 genera, 13 species)
Family **Xanthidae** MacLeay, 1838 (123 genera, 572 species)
Subsection **Thoracotremata** Guinot, 1977 (4 superfamilies)
Superfamily **Cryptochiroidea** Paul'son, 1875 (1 family)
Family **Cryptochiridae** Paul'son, 1875 (20 genera, 46 species)
Superfamily **Grapsoidea** MacLeay, 1838 (8 families)
Family **Gecarcinidae** MacLeay, 1838 (6 genera, 19 species)
Family **Glyptograpsidae** Schubart, Cuesta & Felder, 2002 (2 genera, 3 species)
Family **Grapsidae** MacLeay, 1838 (8 genera, 41 species)
Family **Percnidae** Števčić, 2005 (1 genus, 6 species)
Family **Plagusiidae** Dana, 1851 (4 genera, 18 species)
Family **Sesarmidae** Dana, 1851 (30 genera, 252 species)
Family **Varunidae** H. Milne Edwards, 1853 (36 genera, 146 species)
Family **Xenograpsidae** Ng, Davie, Schubart & Ng, 2007 (1 genus, 3 species)
Superfamily **Ocypodoidea** Rafinesque, 1815 (8 families)
Family **Camptandriidae** Stimpson, 1858 (18 genera, 36 species)
Family **Dotillidae** Stimpson, 1858 (9 genera, 59 species)
Family **Heloeciidae** H. Milne Edwards, 1852 (1 genus, 1 species)

Family **Macrophthalmidae** Dana, 1851 (7 genera, 65 species)
Family **Mictyridae** Dana, 1851 (1 genus, 4 species)
Family **Ocypodidae** Rafinesque, 1815 (2 genera, 115 species)
Family **Ucididae** Števčić, 2005 (1 genus, 2 species)
Family **Xenophthalmidae** Stimpson, 1858 (3 genera, 5 species)
Superfamily **Pinnotheroidea** de Haan, 1833 (2 families)
Family **Aphanodactylidae** Ahyong & Ng, 2009 (4 genera, 7 species)
Family **Pinnotheridae** de Haan, 1833 (53 genera, 297 species)
Superfamilies **Incertae Sedis**
Family **Brankocleistostomidae** Števčić, 2011 (1 genus, 1 species)
Family **Garthopilumnidae** Števčić, 2011 (1 genus, 1 species)
Family **Lazarocleistostomidae** Števčić, 2011 (1 genus, 1 species)

References

Ahyong, S.T. (2001) Revision of the Australian Stomatopod Crustacea. *Records of the Australian Museum*, Supplement 26, 1–326.

Ahyong, S.T., Baba, K., Macpherson, E., & Poore, G.C.B. (2010) A new classification of the Galatheoidea (Crustacea: Decapoda: Anomura). *Zootaxa*, 2676, 57–68.

Ahyong, S.T., Chan, T.-Y., & Liao, Y.-C. (2008) *A Catalog of the Mantis Shrimps (Stomatopoda) of Taiwan*. Taipei: National Science Council, Taiwan, R.O.C, 191 pp.

Ahyong, S.T., & Harling, C. (2000) The phylogeny of the stomatopod Crustacea. *Australian Journal of Zoology*, 48, 607–642.

Almeida, W.O., Freire, E.M.X. & Lopes, S.G. (2008) A new species of pentastomida infecting *Tropidurus hispidus* (Squamata: Tropiduridae) from Caatinga in Northeastern Brazil. *Brazilian Journal of Zoology*, 68(1), 199–203.

Almeida, W.O. & Christoffersen, M.L. (1999) A cladistic approach to relationships in Pentastomida. *Journal of Parasitology*, 85(4), 695–704.

Baba, K., Macpherson, E., Poore, G.C.B., Ahyong, S.T., Bermudez, A., Cabezas, P., Lin, C.-W., Nizinski, M., Rodrigues, C., & Schnabel, K. (2008) Catalogue of squat lobsters of the world (Crustacea: Decapoda: Anomura—families Chirostylidae, Galatheidae and Kiwaidae). *Zootaxa*, 1905, 1–220.

Baker, A.C., Boden, B.P. & Brinton, E. (1990) *A Practical Guide to the Euphausiids of the World*. Natural History Museum Publications, London, 96 pp.

Boyko, C.B. & McLaughlin, P.A. (2010) Annotated checklist of the anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheoidea) Part IV — Hippoidea. *Raffles Bulletin of Zoology*, Supplement 23, 139–151.

Boxshall, G. (2011) Arguloidea *In*: Walter, T.C., Boxshall, G. (Eds), World Copepoda database. (Accessed through: World Register of Marine Species at http://www.marinespecies.org/aphia.php?p=taxdetails&id=104069 on 10 Aug 2011).

Boxshall, G.A., Halsey, S.H. (2004) *An introduction to copepod diversity*. The Ray Society, London, 2 vols, 966 pp.

Brandt, A., & Poore, G.C.B. (2003) Higher classification of the flabelliferan and related Isopoda based on a reappraisal of relationships. *Invertebrate Systematics*, 17, 893–923.

Buckeridge, J.S. (1998) A new coral inhabiting barnacle of the genus *Chionelasmus* (Cirripedia, Balanomorpha) from New Caledonia, South-West Pacific. *Zoosystema*, 20(2), 167–176.

Buckeridge, J.S. & Newman, W.A. (2010) A review of the subfamily Elominiinae (Cirripedia: Thoracica: Austrobalanidae), including a new genus, *Protelminius* nov., from the Oligocene of New Zealand. *Zootaxa*, 2349, 39–54.

Brendonck, L., Rogers, D.C., Olesen, J., Weeks, S. & Hoeh, W.R. (2008) Global diversity of large branchiopods (Crustacea: Branchiopoda) in freshwater. *Hydrobiologia* 595, 167–176.

Camacho, A.I. (2006) An annotated checklist of the Syncarida (Crustacea, Malacostraca) of the world. *Zootaxa*, 1374, 1–54.

Camacho, A.I., Stanford, J.A., & Newell, R.L. (2009) The first record of Syncarida in Montana, USA: a new genus and species of Parabathynellidae (Crustacea, Bathynellacea) in North America. *Journal of Natural History*, 43, 309–321.

Chan, B.K.K., Prabowo, R.E., & Lee, K.-S. (2009) *Crustacean Fauna of Taiwan: Barnacles, Volume 1– Cirripedia: Thoracica excluding the Pyrgomatidae and Acastinae*. Keelung: National Taiwan Ocean University, 298 pp.

Chan, T.Y. (2010) Annotated checklist of the world's marine lobsters (Crustacea: Decapoda: Astacidea, Glypheidea, Achelata, Polychelida). *Raffles Bulletin of Zoology*, Supplement 23, 153–181.

De Grave, S. & Fransen, C.H.J.M. (2011) Carideorum Catalogus: the Recent species of the dendrobranchiate, stenopodidean, procaridid ean and caridean Shrimps (Crustacea: Decapoda). *Zoologische Mededelingen*, 85(9), 195–589.

De Grave, S., Pentcheff, N.D., Ahyong, S.T., Chan, T.-Y., Crandall, K.A., Dworschak, P.C., Felder, D.L., Feldmann, R.M., Fransen, C.H.J.M., Goulding, L.Y.D., Lemaitre, R., Low, M.E.Y., Martin, J.W., Ng, P.K.L., Schweitzer, C.E., Tan, S.H., Tshudy, D., Wetzer, R. (2009) A classification of living and fossil genera of decapod Crustaceans. *Raffles Bulletin of Zoology*, Supplement 21, 1–109.

Forró, L., Korovchinsky, N.M., Kotov, A.A., Petrusek, A. (2008) Global diversity of cladocerans (Cladocera; Crustacea) in freshwater. *Hydrobiologia*, 585, 177–184.

Grygier, M.J. (1987) Classification of the Ascothoracida (Crustacea). *Proceedings of the Biological Society of Washington*, 100(3),

452–458.
Grygier, M.J. & Newman, W.A. (1991) A new genus and two new species of Microlepadidae (Cirripedia: Pedunculata) found on western Pacific diadematid echinoids. *Galaxea*, 10, 1–22.
Haney, T.A., & Martin, J.W. (2004) A new genus and species of leptostracan (Crustacea: Malacostraca: Phyllocarida) from Guana Island, British Virgin Islands, and a review of leptostracan genera *Journal of Natural History*, 38, 447–469.
Hart, D.G. & Hart, C.W., Jr (1974) The ostracod family Entocytheridae. *Academy of Natural Sciences of Philadelphia. Monograph* 18, i–x, 1–239.
Hobbs, H.H., Jr, Peters, D.J. (1977) The entocytherid ostracods of North Carolina. *Smithsonian Contributions to Zoology*, 247, i–iv, 1–73.
Hong, S.J., & Cho, J.-L. (2009) Three new species of *Billibathynella* from Western Australia (Crustacea, Syncarida, Parabathynellidae). *Journal of Natural History*, 43, 2365–2390.
Heymons, R. (1935) Pentastomida. *In:* Bronns, H.G. (Ed.), *Klassen und Ordnungen des Tierreichs. Fünfter Band. IV Abteilung, Buch. 1*, 1–268. Akademische Verlagsgesellschaft m.b.H., Leipzig.
Iliffe, T.M., Otten, T., & Koenemann, S. (2010) *Godzilliognomus schrami*, a new species of Remipedia (Crustacea) from Eleuthera, Bahamas. *Zootaxa*, 2491, 61–68.
Jones, D.S. (2000) Crustacea Cirripedia Thoracica: Chionelasmatoidea and Pachylasmatoidea (Balanomorpha) of New Caledonia, Vanuatu and Wallis and Futuna Islands, with a review of all currently assigned taxa. *In*: Crosnier, A. (Ed.), Résultats des Campagnes MUSORSTOM, 21. *Mémoires du Muséum national d'Histoire naturelle*, 184, 141–283.
Junker, K. & Boomker, J. (2006) A check-list of the pentastomid parasites of crocodilians and freshwater chelonians. *Onderstepoort Journal of Veterinary Research*, 73, 27–36.
Koenemann, S., Schram, F.R., Hönemann, M., & Iliffe, T.M. (2007) Phylogenetic analysis of Remipedia (Crustacea). *Organisms, Diversity and Evolution*, 7, 33–51.
Kolbasov, G.A., Grygier, M.J., Ivanenko, V.N. & Vagelli, A.A. (2007) A new species of the Y-larva genus *Hansenocaris* Itô, 1985 (Crustacea: Thecostraca: Facetotecta) from Indonesia, with a review of Y-cyprids and a key to all their described species. *Raffles Bulletin of Zoology*, 55(2), 343–353.
Kolbasov, G.A. & Savchencko, A.S. (2010) *Microdajus tchesunovi* sp. n. (Tantulocarida, Microdajidae) – A new crustacean parasite of from the White Sea. *Experimental Parasitology*, 125(1), 13–22.
Martens, K. & Savatenalinton, S. (2011) A subjective checklist of the Recent, free-living, non-marine Ostracoda (Crustacea). *Zootaxa*, 2855, 1–79.
Martin, J.W. (2009) Cephalocarida and Mystacocarida (Crustacea) of the Gulf of Mexico. *In*: Felder, D.L. & Camp, D.K. (Eds), *Biodiversity.* Gulf of Mexico: Origin, Waters, and Biota 1. Texas A&M University Press, pp. 821–824.
McLaughlin, P.A., Komai, T., Lemaitre, R. & Rahayu, D.L. (2010a) Annotated checklist of the anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheoidea) Part I — Lithodoidea, Lomisoidea and Paguroidea. *Raffles Bulletin of Zoology*, Supplement 23, 5–107.
McLaughlin, P.A., Lemaitre, R. & Crandall, K.A. (2010b) Annotated checklist of the anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheoidea) Part III — Aegloidea. *Raffles Bulletin of Zoology*, Supplement 23, 131–137.
Merrin, K.L. (2011) *Nyctobadistes* gen. nov. (Isopoda: Asellota: Munnopsidae), a new genus from Tasmanian waters, Australia, with the description of a new species. *Zootaxa*, 3025, 59–65.
Mohrbeck, I., Martínez Arbizu, P. & Glatzel, T. (2010) Tantulocarida (Crustacea) from the Southern Ocean deep sea, and the description of three new species of *Tantulacus* Huys, Andersen & Kristensen, 1992. *Systematic Parasitology*, 77(2), 131–151.
Newman, W.A. (2011) Review: Acrothoracica, Burrowing Crustaceans. *Journal of Crustacean Biology*, 31(1), 209–211.
Newman, W.A. & Ross, A. (1976) Revision of the balanomorph barnacles; including a catalog of the species. *San Diego Society of Natural History*, Memoir 9, 1–108.
Osawa, M. & McLaughlin, P.A. (2010b) Annotated checklist of the anomuran decapod crustaceans of the world (exclusive of the Kiwaoidea and families Chirostylidae and Galatheidae of the Galatheoidea) Part II — Porcellanidae. *Raffles Bulletin of Zoology*, Supplement 23, 109–129.
Pitombo, F.B. (2004) Phylogenetic analysis of the Balanidae (Cirripedia, Balanomorpha). *Zoologica Scripta*, 33, 261–276.
Ranga Reddy, Y. & Totakura, V.R. (2010) A taxonomic revision of the genus *Habrobathynella* Schminke, 1973, with the description of four new species from southeastern India (Crustacea, Malacostraca, Bathynellacea). *Zootaxa*, 2532, 1–54.
Riley, J. & Self, J.T. (1981) A redescription of *Waddycephalus teretiusculus* (Baird, 1862) Sambon, 1922 and a revision of the taxonomy of the genus *Waddycephalus* (Sambon, 1922), pentastomid parasites of Asian, Australian and Indonesian snakes, with descriptions of eight new species. *Systematic Parasitology*, 3(4), 243–257.
Roccatagliata, D., Chiesa, I.L., Raffo, M.P., & Gómez Simes, E. (2010) On the occurrence of the genus *Paranebalia* (Crustacea: Phyllocarida: Leptostraca) in northern Patagonia, Argentina. *Zootaxa*, 2349, 65–68.
Rogers, D.C. (2009) Branchiopoda (Anostraca, Notostraca, Laevicaudata, Spinicaudata, Cyclestherida) *In*: Likens, G. E. (Ed.), *Encyclopedia of Inland Waters*. Vol. 2, 242–249. Oxford, Elsevier.
Rogers, D.C. & Coronel, J. S. (2011) A redescription of *Branchinecta pollicifera* Harding, 1940 and its placement in a new genus (Branchiopoda: Anostraca: Branchinectidae). *Journal of Crustacean Biology* 31, 717–724.
Ross, A. & Frick, M.G. (2011) Nomenclatural emendations of the family-group names Cylindrolepadinae, Stomatolepadinae, Chelolepadinae, Cryptolepadinae, and Tubicinellinae of Ross & Frick, 2007 — including current definitions of family-groups within the Coronuloidea (Cirripedia: Balanomorpha: Coronuloidea). *Zootaxa*, 3106, 60–66.
Sakai, K. (2010) Axioidea of the world and a reconsideration of the Callianassoidea (Decapoda, Thalassinoidea, Callianassida). *Crustaceana Monographs*, 13, 1–616.

Savchenko, A.S. & Kolbasov, G.A. (2009) *Serratotantulus chertoprudae* gen. et sp. n. (Crustacea, Tantulocarida, Basipodellidae): a new tantulocaridan from the abyssal depths of the Indian Ocean. *Integrative and Comparative Biology*, 49(2), 106–113.
Schnabel, K.E., & Ahyong, S.T. (2010) A new classification of the Chirostyloidea (Crustacea: Decapoda: Anomura). *Zootaxa*, 2687, 56–64.
Schotte, M., Boyko, C. B., Bruce, N. L., Poore, G.C.B., Taiti, S., Wilson, G.D.F. (Eds) (2008 onwards). World List of Marine Freshwater and Terrestrial Isopod Crustaceans. (Available online at http://www.marinespecies.org/isopoda) (accessed 30 Sept 2011).
Schram, F.R. & Müller, H.G. (2004) *Catalog and Bibliography of the Fossil and Recent Stomatopoda*. Leiden: Backhuys Publishers, 264 pp.
Self, J.T. (1969) Biological relationships of the Pentastomida: a bibliography on the Pentastomida. *Experimental Parasitology*, 21, 63–119.
Števčić, Z. (2011) Addition to the reclassification of the brachyuran crabs (Crustacea: Decapoda: Brachyura) part I. New taxa. *Natura Croatica* 20, 125–139.
Stuardo, J.R. & Vega, R. (2011) SEM study of *Sandersiella chilenica* sp.nov. (Cephalocarida), with a review of the integumentary structures and functional adaptations in the group. Gayana, 75(1), 99–122.
Van Damme, K., Shiel, R.J., Dumont, H.J. (2007a) *Notothrix halsei* gen. n., sp. n., representative of a new family of freshwater cladocerans (Branchiopoda, Anomopoda) from SW Australia, with a discussion of ancestral traits and a preliminary molecular phylogeny of the order. *Zoologica Scripta*, 36, 465–487.
Van Damme, K., Shiel, R.J., Dumont, H.J. (2007b) Gondwanotrichidae nom. nov. pro Nototrichidae Van Damme, Shiel & Dumont, 2007. *Zoologica Scripta*, 36, 623.
Walker-Smith, G.K., & Poore, G.C.B. (2001) A phylogeny of the Leptostraca (Crustacea) with keys to families and genera. *Memoirs of Museum Victoria*, 58, 383–410
WoRMS (2011a) Ascothoracida. *World Register of Marine Species* (http://www.marinespecies.org/aphia.php?p=taxdetails&id=22559) (accessed 10 Oct 2011).
WoRMS (2011b) Cirripedia. *World Register of Marine Species* (http://www.marinespecies.org/aphia.php?p=taxdetails&id=1082) (accessed 10 Oct 2011).
WoRMS (2011c) Copepoda. *World Register of Marine Species* (http://www.marinespecies.org/aphia.php?p=taxdetails&id=1080) (accessed 1 Oct 2011)
WoRMS (2011d) Ostracoda. *World Register of Marine Species* (http://www.marinespecies.org/aphia.php?p=taxdetails&id=1078) (accessed 30 Sep 2011).

Author roles and addresses

Shane T. Ahyong (Acrothoracica, Cephalocarida, Remipedia, Branchiura, Tantulacarida, Pentastomida, Facetotecta, Rhizocephala, Ostracoda, Anaspidacea, Euphausiacea, Decapoda, Hoplocarida) Australian Museum, 6 College St., Sydney, NSW 2010, Australia (shane.ahyong@austmus.gov.au; Jim.Lowry@austmus.gov.au)
James K. Lowry (Bathynellacea, Amphipoda) Australian Museum, 6 College St., Sydney, NSW 2010, Australia (shane.ahyong@austmus.gov.au; Jim.Lowry@austmus.gov.au)
Miguel Alonso (Branchiopoda) Departament d'Ecologia, Universitat de Barcelona, Diagonal 645, 08028 Barcelona (malonso@ub.edu)
Roger N. Bamber (Tanaidacea) ARTOO Marine Biology Consultants, Ocean Quay Marina, Belvidere Road, Southhampton SO14 5QY, UK (roger.bamber@artoo.co.uk)
Geoffrey A. Boxshall (Copepoda) Department of Zoology, The Natural History Museum, Cromwell Road, London SW7 5BD, UK (g.boxshall@nhm.ac.uk)
Peter Castro (Brachyura) Biological Sciences Department, California State Polytechnic University, Pomona, California 91768, USA (pcastro@csupomona.edu)
Sarah Gerken (Cumacea) Biological Sciences and Liberal Studies, University of Alaska, Anchorage, 3211 Providence Dr., Anchorage, AK 99508 (gerken.uaa@gmail.com)
Gordan S. Karaman (Amphipoda) P.O. Box 40, 81000 Podgorica, Montenegro, Yugoslavia (karaman@t-com.me)
Joseph W. Goy (Stenopodidea)Department of Biology, Harding University, 900 E. Center Ave., Box 12251, Searcy, Arkansas 72149-0001, USA (jwgoy@harding.edu)
Diana S. Jones (Thoracica) Western Australian Museum, 49 Kew Street, Welshpool, Western Australia 6106, Australia (diana.jones@museum.wa.gov.au)
Kenneth Meland (Mysida, Lophogastrida, Thermosbaenacea, Spelaeogriphacea, Mictacea, Boschusacea) University of Bergen, Department of Biology, PO Box 7800, N-5020 Bergen, Norway (Kenneth.Meland@bio.uib.no)
D. Christopher Rogers (Branchiopoda) Kansas Biological Survey, Kansas University, Higuchi Hall, 2101 Constant Avenue, Lawrence, Kansas 66047-3759, USA (branchiopod@gmail.com)
Jörundur Svavarsson (Isopoda) Institute of Biology, University of Iceland, Sturlugata 7, 101 Reykjavík, Iceland (jorundur@hi.is)

Class **Collembola** Lubbock, 1870 (4 orders)[1, 2]

Order **Poduromorpha** Börner, 1913[3] (6 superfamilies)

Superfamily **Neanuroidea** Börner, 1901[3] (3 families)

Family **Neanuridae** Börner, 1901[4] (161 genera, 1417 species)

Family **Brachystomellidae** Stach, 1949 (18 genera, 129 species)

Family **Odontellidae** Massoud, 1967 (13 genera, 131 species)

Superfamily **Poduroidea** Latreille, 1804[5] (1 family)

Family **Poduridae** Latreille, 1804 (1 genus, 1 species)

Superfamily **Hypogastruroidea** Börner, 1906[4] (2 families)

Family **Hypogastruridae** Börner, 1906 (39 genera, 682 species)

Family **Pachytullbergiidae** Stach, 1954 (3 genera, 3 species)

Superfamily **Gulgastruroidea** Lee & Thibaud, 1998 (1 family)

Family **Gulgastruridae** Lee & Thibaud, 1998 (1 genus, 1 species)

Superfamily **Onychiuroidea** Lubbock, 1867[2] (3 families)

Family **Paleotullbergiidae** Deharveng, 2004 (1 genus, 1 species)

Family **Onychiuridae** Lubbock, 1867 (51 genera, 567 species)

Family **Tullbergiidae** Bagnall, 1935 (32 genera, 215 species)

Superfamily **Isotogastruroidea** Thibaud & Najt, 1992 (1 family)

Family **Isotogastruridae** Thibaud & Najt, 1992 (1 genus, 7 species)

Order **Entomobryomorpha** Börner, 1913[6] (4 superfamilies)

Superfamily **Tomoceroidea** Schäffer, 1896 (2 families)

Family **Oncopoduridae** Carl & Lebedinsky, 1905 (2 genera, 52 species)

Family **Tomoceridae** Schäffer, 1896 (16 genera, 149 species)

Superfamily **Isotomoidea** Schäffer, 1896[6] (3 families)

Family **Isotomidae** Schäffer, 1896 (108 genera, 1346 species)

Family **Actaletidae** Börner, 1902[6] (2 genera, 10 species)

† Family **Protentomobryidae** Folsom, 1937 (1 genus, 1 species)

Superfamily **Entomobryoidea** Schäffer, 1896[6] (5 families)

Family **Microfalculidae** Massoud & Betsch, 1966 (1 genus, 1 species)

† Family **Praentomobryidae** Christiansen & Nascimbene, 2006 (2 genera, 2 species)

Family **Entomobryidae** Schäffer, 1896 (56 genera, 1678 species)

Family **Paronellidae** Börner, 1913[6] (39 genera, 511 species)

† Family **Oncobryidae** Christiansen & Pike, 2002 (1 genus, 1 species)

Superfamily **Coenaletoidea** Bellinger, 1985 (1 family)

Family **Coenaletidae** Bellinger, 1985 (1 genus, 2 species)

Order **Neelipleona** Massoud, 1971 (1 family)

Family **Neelidae** Folsom, 1896 (5 genera, 33 species)

Order **Symphypleona** Börner, 1901[7] (5 superfamilies)

Superfamily **Sminthuridoidea** Börner, 1906[8] (2 families)

Family **Mackenziellidae** Yosii, 1961 (1 genus, 1 species)

Family **Sminthurididae** Börner, 1906[9] (10 genera, 145 species)

Superfamily **Katiannoidea** Börner, 1913 (4 families)

Family **Katiannidae** Börner, 1913[10] (118 genera, 205 species)

---

1. **BY** Frans Janssens and Kenneth A. Christiansen (for full contact details, see the **Author names and addresses** after **Cited references**). The title of this contribution should be cited as "Class Collembola Lubbock, 1870. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". The class Collembola includes 33 families, 762 genera and 8,130 species.
2. The list is based on Bellinger, P.F., Christiansen, K.A. & Janssens, F. (1996–2010).
3. sensu D'Haese (2002)
4. sensu Deharveng (2004)
5. sensu Palacios-Vargas (1994)
6. sensu Soto-Adames et al. (2008)
7. sensu Massoud (1971)
8. sensu Fjellberg, (1989)
9. sensu Betsch & Massoud (1970)

Family **Spinothecidae** Delamare Deboutteville, 1961[11] (3 genera, 6 species)

Family **Arrhopalitidae** Stach, 1956[9] (2 genera, 131 species)

Family **Collophoridae** Bretfeld, 1999 (1 genus, 8 species)

Superfamily **Sturmioidea** Bretfeld, 1994 (1 family)

Family **Sturmiidae** Bretfeld, 1994 (1 genus, 2 species)

Superfamily **Sminthuroidea** Lubbock, 1862 (2 families)

Family **Sminthuridae** Lubbock, 1862[4] (27 genera, 245 species)

Family **Bourletiellidae** Börner, 1912[11] (36 genera, 245 species)

Superfamily **Dicyrtomoidea** Börner, 1906 (1 family)

Family **Dicyrtomidae** Börner, 1906[4] (8 genera, 200 species)

Cited references

Bagnall, R.S. (1935) On the Classification of the Onychiuridae (Collembola), with particular reference to the Genus *Tullbergia* Lubbock and its Allies. *Annals and Magazine of Natural History*, Ser. 10, 15, 236–242.

Bellinger, P.F. (1985) A new family of Collembola (Arthropoda, Tracheata). *Caribean Journal of Science*, 21 (3–4), 117–123.

Bellinger, P.F., Christiansen, K.A. & Janssens, F. (1996–2010) Checklist of the Collembola of the World. http://www.collembola.org (Accessed on October 4, 2010).

Betsch, J.-M. & Massoud, Z. (1970) Études sur les Insectes Collemboles. I. - Sydtématique, ultrastructure externe et écologie du genre Jeannenotia Stach, 1956 (Symphypléones, Sminthurididae n. comb.). Description de deux Collemboles nouveaux (Proisotoma et Sminthurides). *Revue d'Écologie et de Biologie du Sol*, 7(2), 153–225.

Börner, C. (1901) Zur Kenntnis der Apterygoten-Fauna von Bremen und der Nachbardistrikte. Beitrag zu einer Apterygoten-Fauna Mitteleuropas., *Abhandlungen des Naturwissenschaftlichen Vereins zu Bremen*, 17(1), 1–140.

Börner, C. (1902) Wieder ein neues Anurophorinen-Genus. (Vorläfige Mittheilung.). *Zoologischer Anzeiger*, 25, 605–607.

Börner, C. (1906) Das System der Collembolen nebst Beschreibung neuer Collembolen des Hamburger Naturhistorischen Museums. *Mitteilungen aus den Naturhistorischen Museum in Hamburg, XXIII. Jahrgang, 2. Beiheft zum Jahrbuch der Hamburgischen Wissenschaftlichen Austalten*, 23, 147–188.

Börner, C. (1913) Die Familien der Collembolen. *Zoologischer Anzeiger*, 41, 1–8.

Bretfeld, G. (1999) Synopses on Palaearctic Collembola, Volume 2. Symphypleona. *Abhandlungen und Berichte des Naturkundemuseums Görlitz*, 71(1), 1–318.

Carl, J. & Lebedinsky, J. (1905) Materialien zur Höhlenfauna der Krim. II. Aufsatz. Ein neuer Typus von Höhlenapterygoten. [Collembola included]. *Zoologischer Anzeiger*, 28, 562–565.

Christiansen, K.A. & Nascimbene, P. (2006) Collembola (Arthropoda, Hexapoda) from the mid Cretaceous of Myanmar (Burma). *Cretaceous Research*, 27, 318–363.

Christiansen, K.A. & Pike, E. (2002) Cretaceous Collembola (Arthropoda, Hexapoda) from the Upper Cretaceous of Canada. *Cretaceous Research*, 23, 165–188.

Deharveng, L. (2004) Recent advances in Collembola systematics, 6th International Seminar on Apterygota, Siena, Italy, 2002, *Pedobiologia*, 48, 415–433.

D'Haese, C.A. (2002) Were the first springtails semi-aquatic? A phylogenetic approach by means of 28S rDNA and optimization alignment. *Proceedings of Royal Society of London*, B, 269, 1143–1151.

Fjellberg, A. (1989) Redescription of Mackenziella psocoides Hammer, 1953 and discussion of its systematic position (Collembola, Mackenziellidae). *In* Dallai, R. (Ed.), *3rd International Seminar on Apterygota*, Siena, Italy, August 21-26, 1989. University of Siena, Siena, 1989, pp. 93–105.

Folsom, J.W. (1896) *Neelus murinus*, representing a new thysanuran family. *Psyche*, 7, 391–392.

Folsom, J.W. (1937) Nearctic Collembola or Springtails, of family Isotomidae. *United States National Museum, Bulletin* 168, Washington, 1–144.

Lee, B.-H. & Thibaud, J.-M. (1998) New Family Gulgastruridae of Collembola (Insecta) Based on Morphological, Ecobiological and Molecular Data. *Korean Journal of Biological Science*, 2, 451–454.

Lubbock, J. (1867) Notes on the Thysanura Part III. *Transactions of the Linnean Society*, 26, pp. 10.

Lubbock, J. (1873) *Monograph of the Collembola and Thysanura*. Ray Society, London, pp. 1–276.

Massoud, Z. (1967) Monographie des Neanuridae, Collemboles Poduromorphes a pièces buccales modifiées. *Biologie de l'Amérique Australe*, 3, 7–399.

Massoud, Z. (1971) Contribution à la connaissance morphologique et systématique des Collemboles Neelidae. *Revue d'Écologie et de Biologie du Sol*, 8(1), 195–198.

Massoud, Z. & Betsch, J.-M. (1966) Description de la nouvelle lignee de Collemboles Entomobryomorphes: Microfalculinae Massoud et Betsch. *Revue Écologie et Biologie de Sol*, Bd. 3.

Salmon, J.T. (1964) An Index to the Collembola, Volume 1..*Royal Society of New Zealand, Bulletin* No.7, 1–144.

Salmon, J.T. (1964) An Index to the Collembola, Volume 2. *Royal Society of New Zealand, Bulletin* No.7, 145–644.

10. sensu Bretfeld (1999)
11. sensu Bretfeld (1994)

Schäffer, C. (1896) Die Collembola der Umgebung von Hamburg und benachbarter Gebiete. *Mitteilungen aus den Naturhistorischen Museum in Hamburg*, Bd. 13.
Soto-Adames, F.N., Barra, J.-A., Christiansen, K. & Jordana R. (2008) Suprageneric classification of Collembola Entomobryomorpha. *Annals of the Entomological Society of America*, 101(3), 501–513.
Stach, J. (1949) *The Apterygotan Fauna of Poland in Relation to the World-Fauna of this group of Insects. Families: Neogastruridae and Brachystomellidae*, Kraków, pp. 1–341.
Stach, J. (1954) *The Apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family : Onychiuridae*. Kraków, p. 1–219.
Stach, J. (1956) *The Apterygotan fauna of Poland in relation to the world-fauna of this group of insects. Family : Sminthuridae*. Kraków, pp. 1–287.
Szeptycki, A. (1979) *Chaetotaxy of the Entomobryidae and its phylogenetical significance, Morpho-systematic studies on Collembola IV,* Kraków, pp. 1–218.
Thibaud, J.-M. & Najt, J. (1992) Isotogastruridae, a new family of terrestrial interstitial Collembola from the Lesser Antilles. *Bonner zoologisher Beitrag*, 43(4), 545–551.
Womersley, H. (1934) On some Collembola-Arthropleona from South Africa and Southern Rhodesia. *Annals of the South African Museum*, 30, 1–35.
Yosii, R. (1961) Phylogenetische Bedeutung der Chaetotaxie bei den Collembolen. *Contributions from the Biological Laboratory Kyoto University*, 12, 1–37.

Author names and addresses

Frans Janssens, Department of Biology, University of Antwerp, Antwerp, B-2020, Belgiu
frans.janssens@collembola.org
Kenneth A. Christiansen, Department of Biology, Grinnell College, PO Box V3, Grinnell, IA 50112-0806, USA
christak@grinnell.edu

Order **Orthoptera** Olivier, 1789 (2 suborders)[1, 2, 3, 4]

Suborder **Ensifera** Chopard, 1920 (6 superfamilies)[5, 6]

Superfamily **Hagloidea** Handlirsch, 1906 (1 extant family)

Family **Prophalangopsidae** Kirby, 1906 (7 genera, 8 species)

Superfamily **Stenopelmatoidea** Burmeister, 1838 (4 families)

Family **Anostostomatidae** Saussure, 1859 (41 genera, 206 species)

Family **Cooloolidae** Rentz, 1980 (1 genus, 4 species)

Family **Gryllacrididae** Blanchard, 1845 (94 genera, 675 species)

Family **Stenopelmatidae** Burmeister, 1838 (6 genera, 28 species)

Superfamily **Tettigonioidea** Krauss, 1902 (1 family)

Family **Tettigoniidae** Krauss, 1902 (1193 genera, 6827 species)

Superfamily **Rhaphidophoroidea** Walker, 1871 (1 family)

Family **Rhaphidophoridae** Walker, 1871 (77 genera, 497 species)

Superfamily **Schizodactyloidea** Blanchard, 1845 (1 family)

Family **Schizodactylidae** Blanchard, 1845 (2 genera, 15 species)

Superfamily **Grylloidea** Laicharting, 1781 (4 families)

Family **Gryllidae** Laicharting, 1781 (597 genera, 4664 species)

Family **Gryllotalpidae** Leach, 1815 (6 genera, 100 species)

Family **Mogoplistidae** Brunner von Wattenwyl, 1873 (30 genera, 365 species)

Family **Myrmecophilidae** Saussure, 1874 (5 genera, 71 species)

Suborder **Caelifera** Ander, 1936 (2 infraorders, 9 superfamilies)[7, 8]

Infraorder **Tridactylidea** (Brullé, 1835) Sharov, 1968 (1 superfamily)[9, 10]

Superfamily **Tridactyloidea** Brullé, 1835 (3 families)

Family **Cylindrachetidae** Bruner, 1916 (3 genera, 16 species)

Family **Ripipterygidae** Ander, 1939 (2 genera, 69 species)

Family **Tridactylidae** Brullé, 1835 (10 genera, 132 species)

Infraorder **Acrididea** (MacLeay, 1821) Sharov, 1968 (8 superfamilies)[11]

Superfamily **Tetrigoidea** Serville, 1838 (1 family)

Family **Tetrigidae** Serville, 1838 (221 genera, 1246 species)

Superfamily **Eumastacoidea** Burr, 1899 (8 families)[12]

Family **Chorotypidae** Stål, 1873 (43 genera, 160 species)

---

1. **BY** Sigfrid Ingrisch (for full address, see **Author address** after **References**). The title of this contribution should be cited as "Order Orthoptera Oliver, 1789. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Unless indicated otherwise, classification and diversity estimates follow the Orthoptera Species File (Eades *et al.* 2011) disregarding fossil taxa and temporary names.
3. Recent Orthoptera currently includes 40 families, 4418 genera and 23855 species, fossil taxa include 38 families, 257 genera and 421 species.
4. Fossil studies of Sharov (1968) and Gorochov (1995a) argue that all Orthoptera are descended from the Upper Carboniferous family Oedischiidae, which resembled modern Ensifera more than Caelifera. This might imply a paraphyletic Ensifera that contains an internally derived Caelifera. However, based on morphological analyses (Kevan 1977) and ribosomal phylogenetic analyses Rowell & Flook (1998), Flook et al. (1999) they are considered monophyletic clades. Jost & Shaw (2006) support the status of these two suborders as sister taxa.
5. First author using Ensifera according to Kevan (1977)
6. Although the higher taxa of Ensifera acknowledged as families or superfamilies by different authors were mainly the same, their systematic arrangement and proposed phylogenetic relations largely deviated between authors (Ander 1939, Zeuner 1939, Judd 1948, Ragge 1955, Sharov 1968, Gorochov 1995b,c). Current superfamilial classification of Ensifera is largely based on the phylogenetic studies by Jost & Shaw (2006) received from nuclear ribosomal and mitochondrial ribosomal genes. However, according to Legendre *et al* (2010) who repeated the analysis, monophyly of Stenopelmatoidea and the proposed phylogenetic relations between the superfamilies are not well supported.
7. Suborder Caelifera first mentioned in Ander (1936) according to Ander (1939).
8. Higher systematics of Caelifera as currently in use is largely based on molecular ribosomal phylogenetic analyses by Flook & Rowell (1998) and Flook *et al.* (1999, 2000).
9. Authorship for first use of Tridactylidea as infraorder according to Kevan (1977).
10. Tridactyloidea are separated from the remaining Caelifera in some analyses of the small subunit nuclear ribosomal gene sequences by Flook & Rowell (1998).
11. Authorship for first use of Acrididea as infraorder according to Kevan (1977).
12. The division of Eumastacoidea into families was proposed by Descamps (1973) who acknowledged eight families in two superfamilies, Eumastacoidea s.str. and Proscopoidea. A molecular phylogenetic analysis by Matt *et al.* (2008) supported the division into (sub)families but found no evidence for a grouping of the Proscopiidae with any of the existing branches of Eumastacoidea. Regarding that evidence Ingrisch & Rentz (2009) use a more traditional classification with only two families in Eumastacoidea: Eumastacidae and Proscopiidae and place the other families as subfamilies under Eumastacidae.

Family **Episactidae** Burr, 1899 (18 genera, 64 species)
Family **Eumastacidae** Burr, 1899 (47 genera, 230 species)
Family **Euschmidtiidae** Rehn, 1948 (61 genera, 191 species)
Family **Mastacideidae** Rehn, 1948 (2 genera, 10 species)
Family **Morabidae** Rehn, 1948 (42 genera, 123 species)
Family **Proscopiidae** Serville, 1838 (32 genera, 214 species)
Family **Thericleidae** Burr, 1899 (57 genera, 220 species)
Superfamily **Trigonopterygoidea** Walker, 1870 (2 families)
Family **Trigonopterygidae** Walker, 1870 (4 genera, 16 species)
Family **Xyronotidae** Bolívar, 1909 (2 genera, 4 species)
Superfamily **Tanaoceroidea** Rehn, 1948 (1 family)
Family **Tanaoceridae** Rehn, 1948 (2 genera, 3 species)
Superfamily **Pneumoroidea** Blanchard, 1845 (1 family)
Family **Pneumoridae** Blanchard, 1845 (9 genera, 17 species)
Superfamily **Pyrgomorphoidea** Brunner von Wattenwyl, 1882 (1 family)
Family **Pyrgomorphidae** Brunner von Wattenwyl, 1882 (143 genera, 455 species)
Superfamily **Acridoidea** MacLeay, 1821 (11 families)
Family **Acrididae** MacLeay, 1821 (1380 genera, 6016 species)
Family **Charilaidae** Dirsh, 1953 (4 genera, 5 species)
Family **Dericorythidae** Jacobson & Bianchi, 1902-1905 (22 genera, 179 species)
Family **Lathiceridae** Dirsh, 1954 (3 genera, 4 species)
Family **Lentulidae** Dirsh, 1956 (11 genera, 35 species)
Family **Lithidiidae** Dirsh, 1961 (4 genera, 13 species)
Family **Ommexechidae** Bolívar, 1884 (13 genera, 33 species)
Family **Pamphagidae** Burmeister, 1840 (94 genera, 448 species)
Family **Pyrgacrididae** Kevan, 1974 (1 genus, 2 species)
Family **Romaleidae** Brunner von Wattenwyl, 1893 (111 genera, 465 species)
Family **Tristiridae** Rehn, 1906 (18 genera, 25 species)

References

Ander, K. (1936) Orthoptera Saltatorias fylogeni på grundval av jämförande anatomiska studier. Pages 93–94 in Kemner, N.A. [ed.]. Det femte Nordiska Entomologmötet i Lund 3–6 augusti 1936. *Opuscula Entomologica*, 1, 93–94; Lund. [not seen, cited from Ander (1939)].

Ander, K. (1939) Vergleichend-Anatomische und Phylogenetische Studien über die Ensifera (Saltatoria). *Opuscula Entomologica, Supplementum*, 2, 1–306; Lund.

Descamps, M. (1973) Révision des Eumastacoidea (Orthoptera) aux échelons des familles et des sous-familles (genitalia, répartition, phylogénie). *Acrida (Paris)*, 2, 161–298; Paris.

Eades, D.C., Otte, D., Cigliano, M.M. & Braun, H. (2011) Orthoptera Species File Online. Version 2.0/4.0. [19.ix.2011] <http://Orthoptera.SpeciesFile.org>

Flook, P.K. & Rowell, C.H.F. (1998) Inferences about orthopteroid phylogeny and molecular evolution from small subunit nuclear ribosomal DNA sequences. *Insect Molecular Biology*, 7, 163–168.

Flook, P.K., Klee, S. & Rowell, C.H.F. (1999) Combined molecular phylogenetic analysis of the Orthoptera (Arthropoda, Insecta) and implications for their higher systematics. *Systematic Biology*, 48, 233–253.

Flook, P.K., Klee, S. & Rowell, C.H.F. (2000) Molecular phylogenetic analysis of the Pneumoroidea (Orthoptera, Caelifera): molecular data resolve morphological character conflicts in the basal Acridomorpha. *Molecular Phylogenetics and Evolution*, 15, 345–354.

Gorochov, A.V. (1995a) Contribution to the system and evolution of the order Orthoptera. *Zoologiceskii Zhurnal*, 74, 39–45; Moscow [Russian, English abstract].

Gorochov, A.V. (1995b) System and evolution of the suborder Ensifera (Orthoptera). Part I. *Trudy Zoologitscheskogo Instituta Russian Academia Nauk*, 260, 1–224; St. Petersburg [Russian].

Gorochov, A.V. (1995c) System and evolution of the suborder Ensifera (Orthoptera). Part II. *Trudy Zoologitscheskogo Instituta Russian Academia Nauk*, 260, 1–213; St. Petersburg [Russian].

Ingrisch, S. & Rentz, D.C.F. (2009) Orthoptera (Grasshoppers, Locusts, Katydids, Crickets). Pages 732–743 in: Resh, V.C. & Cardé, R.T. (Eds). *Encyclopedia of Insects*, 2nd ed. San Diego, San Francisco etc.

Jost, M.C. & Shaw, K.L. (2006) Phylogeny of Ensifera (Hexapoda: Orthoptera) using three ribosomal loci, with implications for the evolution of acoustic communication. *Molecular Phylogenetics and Evolution*, 38, 510–530.

Judd, W.W. (1948) A comparative study of the proventriculus of orthopteroid insects with reference to its use in taxonomy. *Canadian Journal of Research D*, 26, 93–161.

Kevan, D.K.McE. (1977) Suprafamilial classification of 'orthopteroid' and related insects, applying the principles of symbolic logic. A draft scheme for discussion and consideration. 2nd ed. *Lyman Entomological Museum and Research Laboratory, Note* 2, 1–27. Reprinted in: Kevan, D.K.McE. (Ed.) (1977) The higher classification of the orthopteroid insects. *Lyman Entomological Museum and Research Laboratory, Memoir,* 4, iv + 52 + 26 pp.; Ste Anne de Bellevue.

Legendre, F., Robillard, T., Song, H., Whiting, M.F. & Desutter-Grandcolas, L. (2010) One hundred years of instability in ensiferan relationships. *Systematic Entomology,* 35, 475–488.

Matt, S., Flook, P.K. & Rowell, C.H.F. (2008) A partial molecular phylogeny of the Eumastacoidea s. lat. (Orthoptera, Caelifera). *Journal of Orthoptera Research,* 17, 43–55.

Ragge, D.R. (1955) *The wing-venation of the Orthoptera Saltatoria, with notes on Dictyopteran wing-venation.* i–vi, 1–159, London (British Museum (Natural History).

Rowell, C.H.F. & Flook, P.K. (1998) Phylogeny of the Caelifera and the Orthoptera as derived from ribosomal gene sequences. *Journal of Orthoptera Research,* 7, 147–156.

Sharov, A.G. (1968) Phylogeny of the Orthopteroidea. *In*: Rodendorf, B.B. [ed.]. *Trudy Paleontologicheskago Instituta Academia Nauk U.S.S.R.* ,118, 251 pp. [Russian; English translation 1971, Jerusalem].

Zeuner, F.E. (1939) *Fossil Orthoptera Ensifera.* 321 pp., 80 pls; London (British Museum of Natural History).

Author address

Sigfrid Ingrisch, Zoological Research Museum Alexander Koenig (ZFMK), Adenauerallee 160, D-53113 Bonn, Germany; s.ingrisch@macbay.de

Order **Phasmida** Leach, 1815[1] [2] (3 suborders)

- Suborder **Agathemerodea** Zompro, 2004 (1 family)
  - Family **Agathemeridae** Bradler, 2003 (1 genus, 8 species)
- Suborder **Timematodea** Kevan. 1982 (1 family)
  - Family **Timematidae** Caudell, 1903 (1 genus, 21 species)
- Suborder **Verophasmatodea** Zompro, 2004 (2 infraorders)
  - Infraorder **Anareolatae** (2 families)
    - Family **Diapheromeridae** Kirby, 1904 (138 genera, 1210 species)
    - Family **Phasmatidae** Gray, 1835 (160 genera, 991 species)
  - Infraorder **Areolatae** (4 superfamilies)
    - Superfamily **Aschiphasmatoidea** Brunner von Wattenwyl, 1893 (3 families)
      - Family **Aschiphasmatidae** Brunner von Wattenwyl, 1893 (15 genera, 96 species)
      - Family **Damasippoididae** Zompro, 2004 (2 genera, 6 species)
      - Family **Prisopodidae** Brunner von Wattenwyl, 1893 (7 genera, 52 species)
    - Superfamily **Bacilloidea** Brunner von Wattenwyl, 1893 (3 families)
      - Family **Anisacanthidae** Günther, 1953 (10 genera, 31 species)
      - Family **Bacillidae** Brunner von Wattenwyl, 1893 (19 genera, 54 species)
      - Family **Heteropterygidae** Kirby, 1896 (27 genera, 103 species)
    - Superfamily **Phyllioidea** Brunner von Wattenwyl, 1893 (1 family)
      - Family **Phylliidae** Brunner von Wattenwyl, 1893 (4 genera, 51 species)
    - Superfamily **Pseudophasmatoidea** Rehn, J.A.G., 1904 (2 families)
      - Family **Heteronemiidae** Rehn, J.A.G., 1904 (12 genera, 79 species)
      - Family **Pseudophasmatidae** Rehn, J.A.G., 1904 (58 genera, 327 species)

References [3]

Bradler, S. (2009) *Die Phylogenie der Stab- und Gespentschrecken (Insecta: Phasmatodea). Vol 2.1 Species, Phylogeny and Evolution*. Universitätsverlag Göttingen, Göttingen, Germany.

Otte, D. & Brock, P. (2005) *Phasmida Species File. Catalog of Stick and Leaf Insects of the world*. The Insect Diversity Association at the Academy of Natural Sciences, Philadelphia

Zompro, O. (2004*) Revision of the genera of the Areolatae, including the status of Timema and Agathemera (Insecta, Phasmatodea)*. Goecke & Evers, Keltern-Weiler, Germany.

Author names & addresses

Paul D. Brock, Scientific Associate, Department of Entomology, The Natural History Museum, London
pauldbrock@btinternet.com

Judith Marshall, Scientific Associate, Department of Entomology, The Natural History Museum, London
j.marshall@nhm.ac.uk

1. The title of this contribution should be cited as "Order Phasmida Leach. 1815. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". the order Phasmida currently includes 13 families, 454 genera and 3029 species. The few described fossil phasmids (if belonging to the order) are excluded from the information above and from the Phasmida Species File.
   Based on: Brock, P.D. Phasmida Species File Online. Version 2.1/4.0. [retrieval date 22 April 2011]. http://Phasmida.SpeciesFile.org [a regularly updated on-line catalogue, used for these statistics]
2. Phasmida or Phasmatodea? The Code of the International Commission of Zoological Nomenclature has no rules for the construction of names of Orders, only for the names of family-groups, and genus- and species-level names. This may result in several names being in use for the same order, the name selected by any author being largely a matter of choice and therefore subject to some discussion or even prolonged argument. The names currently in use for the order of stick and leaf insects, or walking sticks, include Phasmida, Phasmatodea, Phasmatoptera and Cheleutoptera. Phasmida is the oldest and simplest name, first used by Leach in 1815 in 'Brewster's Edinburgh Encyclopaedia' volume 9, p.119, and widely used in major entomological textbooks, dictionaries and many scientific papers and books on phasmids. As there is no compulsion to select the 'grammatically correct' name [which some argue is Phasmatodea Jacobson & Bianchi, 1902], selection of a long established (and simple) name is reasonable, although the probability of persuading all colleagues to agree on the use of Phasmida is unlikely.
3. Recent references include Zompro (2004), Otte & Brock (2005), Bradler (2009); comprehensive books and catalogues of the phasmid fauna of various countries have been published in recent years, details available from PSF under Phasmida and synonyms.

Order **Blattodea** Brunner von Wattenwyl, 1882 [1] [2] (3 superfamilies)

Superfamily **Corydioidea** Saussure, 1864 [3] (2 families)

Family **Nocticolidae** Bolívar, 1892 (9 genera, 32 species)

Family **Corydiidae** Saussure, 1864 [4] (39 genera, 215 species)

Superfamily **Blaberoidea** Saussure, 1864 (2 families)

Family **Ectobiidae** Brunner von Wattenwyl, 1865 [5] (223 genera, 2381 species)

Family **Blaberidae** Saussure, 1864 (165 genera, 1198 species)

Superfamily **Blattoidea** Latreille, 1810 [6] (3 epifamilies)

Epifamily **Blattoidae** Latreille, 1810 (3 families)

Family **Blattidae** Latreille, 1810 (41 genera, 594 species)

Family **Lamproblattidae** McKittrick, 1964 (3 genera, 10 species)

Family **Tryonicidae** McKittrick & Mackerras, 1965 (10 genera, 47 species)

Epifamily **Cryptocercoidae** Handlirsch, 1925 (1 family)

Family **Cryptocercidae** Handlirsch, 1925 (1 genus, 12 species)

Epifamily **Termitoidae** Latreille, 1802 [7] (9 families)

Family **Mastotermitidae** Desneux, 1904 (1 genus, 1 species)

Family **Hodotermitidae** Desneux, 1904 (3 genera, 15 species)

Family **Archotermopsidae** Engel, Grimaldi & Krishna, 2009 (3 genera, 11 species)

Family **Stolotermitidae** Holmgren, 1910 (2 genera, 10 species)

Family **Kalotermitidae** Froggatt, 1897 (21 genera, 420 species)

Family **Stylotermitidae** Holmgren & Holmgren, 1917 (1 genus, 34 species)

Family **Rhinotermitidae** Froggatt, 1897 (12 genera, 280 species)

Family **Serritermitidae** Holmgren, 1910 (2 genera, 6 species)

Family **Termitidae** Latreille, 1802 (202 genera, 1915 species)

References

Beccaloni, G.W. *Blattodea Species File Online*. Version 1.2/4.0. World Wide Web electronic publication. <http://Blattodea.SpeciesFile.org> [accessed 2 June 2011] (A regularly updated world catalogue of the Blattodea excluding the Termitoidae (termites))

Eggleton, P., Beccaloni, G. & Inward, D. (2007) Invited reply: Response to Lo *et al. Biology Letters*, 3(5), 564–565.

Engel, M.S., Grimaldi, D.A. & Krishna, K. (2009) Termites (Isoptera): Their Phylogeny, Classification, and Rise to Ecological Dominance. *American Museum Novitates*, 3650, 1–27.

Engel, M.S. & Krishna, K. (2004) Family-group names for termites (Isoptera). *American Museum Novitates*, 3432, 1–9.

Inward, D., Beccaloni, G. & Eggleton, P. (2007) Death of an order: a comprehensive molecular phylogenetic study confirms that termites are eusocial cockroaches. *Biology Letters*, 3(3), 331–335.

Kevan, D.K.McE. (1977) Suprafamilial classification of "orthopteroid" and related insects, applying the principles of symbolic logic – a draft scheme for discussion and consideration. *In:* Kevan, D.K.McE. (Ed.) *The Higher Classification of the Orthopteroid Insects.* Lyman Entomological Museum and Research Laboratory, Memoir 4 (Special Publication 12), 79 pp.

---

1. BY George W. Beccaloni and Paul Eggleton (for full contact details, see the list for **Author addresses** after **References**). The title of this contribution should be cited as “Order Blattodea Brunner von Wattenwyl, 1882. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness”.
2. Blattodea are the cockroaches and termites. This classification excludes fossil taxa, since the taxonomic placement of many of these is uncertain. There are 7314 extant named species of Blattodea, of which 4622 are cockroaches and 2692 are termites. 133 valid cockroach species are not currently placed into a superfamily. Note that the Code of the International Commission of Zoological Nomenclature has no rules for the construction of the names of orders and several names are currently in use for this group, in particular the name Blattaria. Blattodea is the author’s preference because it is widely used and because the name ends with the suffix “–odea”, which is the same ending used for the name of its sister group, the Mantodea.
3. Polyphagoidea Saussure, 1864 is a junior subjective synonym of Corydioidea based on the First Reviser Principle of the ICZN Code (see below).
4. Polyphagidae Saussure, 1864 is a junior subjective synonym of Corydiidae. Brunner von Wattenwyl (1865) as First Reviser chose to use Corydiidae (based on Corydiens Saussure, 1864) as the name for the group rather than Polyphagidae (this name was first used in this form by Walker, 1868). Corydiidae was in common usage until Princis incorrectly synonymised it in 1950 (for details see Kevan (1977)).
5. An ICZN Ruling (Melville, 1982) states that the name Ectobiidae is to be given precedence over Blattellidae Karny, 1908 (the replacement name for Phyllodromiidae Brunner von Wattenwyl, 1865) whenever these names are used within a single superfamily.
6. Although Blattoidea Latreille, 1810 is a junior subjective synonym of Termitoidea Latreille, 1802 (which is the oldest family-group name for this group), Blattoidea is in prevailing usage as the name for this superfamily and it has therefore been retained in accordance with Article 35.5 of the ICZN Code.
7. These are the termites, which were formerly classified as order Isoptera (see Inward, Beccaloni & Eggleton (2007) and Eggleton, Beccaloni & Inward (2007)). The families listed here are those recognised by Engel, Grimaldi & Krishna (2009) (also see Engel & Krishna (2004)).

Melville, R.V. (1982) Opinion 1231. *Blatta germanica* Linnaeus, 1767 (Insecta, Dictuoptera): conserved and designated as type species of *Blattella* Caudell, 1903. *Bulletin of Zoological Nomenclature*, 39(4), 243–246.

Author addresses

George W. Beccaloni (Blattodea classification excluding the termites (i.e. epifamily Termitoidae)) Curator of orthopteroid insects, Department of Entomology, The Natural History Museum, London, UK; g.beccaloni@nhm.ac.uk

Paul Eggleton (Termite classification (epifamily Termitoidae)) Merit Researcher, Department of Entomology, The Natural History Museum, London, UK; p.eggleton@nhm.ac.uk

Order **Thysanoptera** Haliday, 1836[1,2,3]

Suborder **Terebrantia** Haliday, 1836[4]

Family **Aeolothripidae** Uzel, 1895 (28 genera, 201 species: †5/9)[5]

Family **Fauriellidae** Priesner, 1949 (4 genera, 5 species)

†Family **Hemithripidae** Bagnall, 1923 (1 genus, 15 species)

Family **Heterothripidae** Bagnall, 1912 (7 genera, 76 species: †3/4)[5]

†Family **Kerataothripidae** Sharov, 1972 (1 genus, 1 species)

†Family **Liassothripidae** Priesner, 1949 (1 genus. 1 species)

Family **Melanthripidae** Bagnall, 1913 (6 genera, 76 species: †2/10)

Family **Merothripidae** Hood, 1914 (5 genera, 18 species: †2/3)[5]

†Family **Moundthripidae** Nel, Azar & Nel, 2007 (1 genus, 1 species)

Family **Stenurothripidae** Bagnall, 1923 (12 genera, 24 species: †9/16)

Family **Thripidae** Stevens 1829[5]

Subfamily **Dendrothripinae** Priesner, 1925 (15 genera, 97 species: †4/5)

Subfamily **Panchaetothripinae**, Bagnall, 1912 (40 genera, 141 species: †2/5)

Subfamily **Sericothripinae** Karny, 1921 (3 genera, 148 species)

Subfamily **Thripinae** Stephens, 1829 (238 genera, 1680 species: †11/65)

†Family **Triassothripidae** Grimaldi & Shmakov, 2004 (2 genera, 2 species)

Family **Uzelothripidae** Hood, 1952 (1 genus, 1 species)

Suborder **Tubulifera** Haliday, 1836[4,6]

Family **Phlaeothripidae** Uzel, 1895

Subfamily **Idolothripinae** Bagnall, 1908 (82 genera, 712 species)

Subfamily **Phlaeothripinae** Uzel, 1895 (374 genera, 2820 species: †10/18)

Cited references

Bhatti, J.S. (1988) The orders Terebrantia and Tubulifera of the superorder Thysanoptera (Insecta). A Critical Appraisal. *Zoology (Journal of Pure and Applied Zoology)*, 1, 167–240.

Bhatti, J.S. (1990) Family group names in the Order Terebrantia (Insecta). *Zoology (Journal of Pure and Applied Zoology)*, 2, 185–192.

Bhatti, J.S. (1992a) The Order Tubulifera (Insecta): Its characters and classification into families. *Zoology (Journal of Pure and Applied Zoology)*, 3, 127–162.

Bhatti, J.S. (1992b) Family-group names in the Order Tubulifera of the superorder Thysanoptera (Insecta). *Zoology (Journal of Pure and Applied Zoology*), 3, 163–168.

Bhatti, J.S. (1998a) New structural features in the Order Tubulifera (Insecta). 1. Amalgamation of labro-maxillary complex with cranium and other cephalic structures. *Zoology (Journal of Pure and Applied Zoology)*, 5, 147–176.

Bhatti, J.S. (1998b) New structural features in the Order Tubulifera (Insecta). 2. Thoracic structures. *Zoology (Journal of Pure and Applied Zoology)*, 5, 177–252

Bhatti, J.S. (2006) The classification of Terebrantia (Insecta) into families. *Oriental Insects*, 40, 339–375.

Grimaldi, D. & Engel, M.S. (2005) *Evolution of the Insects*. Cambridge University Press, New York. 755pp.

Mound, L.A. (2011) Thysanoptera (Thrips) of the World – a checklist. http://www.ento.csiro.au/thysanoptera/worldthrips.html

1. **BY** Laurence A. Mound (for full contact details, see the list for **Author name and address** after **References**). The title of this contribution should be cited as "Order Thysanoptera Haliday, 1836. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". Recent Thysanoptera currently includes 9 families, 767 genera and 5864 species, taxa known only from fossils include 5 families, 47 genera and 155 species fossil taxa are represented in 12 families, 54 genera and 155 species. Thysanoptera is considered sister group to the Hemiptera within the Paraneoptera (Grimaldi & Engel, 2005)
2. Zherikin (2002) Included the Lophioneurina within an Order Thripida, referred to the Thysanoptera as Suborder Thripina, and considered the two suborders listed here as Infraorders Thripomorpha and Phloeothripomorpha.
3. The classification and diversity estimates given here follow Mound (2011).
4. Bhatti (1988) recognised as separate Orders the two suborders listed here, providing a catalogue of Family-group names in the Terebrantia (Bhatti, 1990), and in the Tubulifera (Bhatti, 1992b).
5. Bhatti (2006) treated Aeolothripidae, Heterothripidae, Merothripidae and Thripidae each as a superfamily, to include eight families, two families, two families, and nine families respectively. Among these 21 families, 11 were monogeneric, with 230 genera retained in the Thripidae.
6. Bhatti (1992a) recognised nine families within the Tubulifera; Bhatti (1998a) added four further families; Bhatti (1998b) added one further family. Among these 14 families, 10 were monogeneric, with more than 400 genera retained in the Phlaeothripidae.

[accessed 12.ix.2011]
Zherikin V.V. (2002) Order Thripida Fallén, 1914 (=Thysanoptera Haliday, 1836). The thrips, p. 133–143. In Rasnitsyn, A. P. & Quicke, D.L.J. (eds.), History of Insects. Kluwer Academic, Dordrecht.

Author name and address

Laurence A. Mound , CSIRO Ecosystems Sciences, GPO Box 1700, Canberra ACT 2601, Australia; Laurence.Mound@csiro.au

Order **Coleoptera** Linnaeus, 1758 (4 suborders)[1, 2]

†Suborder **Protocoleoptera** Tillyard, 1934 (3 superfamilies)

†Superfamily **Tshekardocoleoidea** Rohdendorf, 1944 (3 families)

†Family **Tshekardocoleidae** Rohdendorf, 1944 (13 genera, 18 species)

†Family **Labradorocoleidae** Ponomarenko, 1969 (1 genus, 1 species)

†Family **Oborocoleidae** Kukalová, 1969 (2 genera, 2 species)

†Superfamily **Permocupedoidea** Martynov, 1933 (2 families)

†Family **Permocupedidae** Martynov, 1933 (11 genera, 30 species)

†Family **Taldycupedidae** Rohdendorf, 1961 (6 genera, 18 species)

†Superfamily **Permosynoidea** Tillyard, 1924 (2 families)

†Family **Ademosynidae** Ponomarenko, 1968 (12 genera, 29 species)

†Family **Permosynidae** Tillyard, 1924 (3 genera, 14 species)

Suborder **Archostemata** Kolbe, 1908 (8 families)

Family **Crowsoniellidae** Iablokoff-Khnzorian, 1983 (1 genus, 1 species)

Family **Cupedidae** Laporte, 1836 (53(†44) genera, 120(†89) species)

Family **Micromalthidae** Barber, 1913 (2(†1) genera, 2(†1) species)

Family **Ommatidae** Sharp and Muir, 1912 (10(†8) genera, 120(†114) species)

Family **Jurodidae** Ponomarenko, 1985 (2(†1) genera, 3(†2) species)

†Family **Triadocupedidae** Ponomarenko, 1966 (8 genera, 16 species)

†Family **Magnocoleidae** Hong, 1998 (1 genus, 1 species)

†Family **Obrieniidae** Zherikhin and Gratshev, 1994 (5 genera, 7 species)

Suborder **Myxophaga** Crowson, 1955 (5 superfamilies)

†Superfamily **Asiocoleoidea** Rohdendorf, 1961 (2 families)

†Family **Asiocoleidae** Rohdendorf, 1961 (1 genus, 1 species)

†Family **Tricoleidae** Ponomarenko, 1969 (3 genera, 6 species)

†Superfamily **Rhombocoleoidea** Rohdendorf, 1961 (1 family)

†Family **Rhombocoleidae** Rohdendorf, 1961 (5 genera, 10 species)

Superfamily **Schizophoroidea** Ponomarenko, 1968 (3 families)

†Family **Schizophoridae** Ponomarenko, 1968 (20 genera, 36 species)

†Family **Catiniidae** Ponomarenko, 1968 (5 genera, 6 species)

†Family **Schizocoleidae** Rohdendorf, 1961 (4 genera, 30 species)

Superfamily **Lepiceroidea** Hinton, 1936 (1882) (2 families)

Family **Lepiceridae** Hinton, 1936 (1882) (1(†1) genus, 2(†1) species)[3]

Superfamily **Sphaeriusoidea** Erichson, 1845 (3 families)

Family **Torridincolidae** Steffan, 1964 (7 genera, 60 species)

Family **Hydroscaphidae** LeConte, 1874 (3 genera, 22 species)[4]

Family **Sphaeriusidae** Erichson, 1845 (2 (†1) genus, 20 (†1) species)

Suborder **Adephaga** Schellenberg, 1806 (17 families)

†Family **Tritarsusidae** Hong, 2002 (1 genus, 1 species)

Family **Gyrinidae** Latreille, 1810 (25 (†13) genera, 1000 (†118) species)

Family **Trachypachidae** C. G. Thomson, 1857 (22 (†21) genera, 57 (†51) species)

Family **Meruidae** Spangler and Steiner, 2005 (1 genus, 1 species)

Family **Rhysodidae** Laporte, 1840 (40 genera, 350 species)

Family **Carabidae** Latreille, 1802 (1500 genera, 40000 species)

---

1. **BY** S. A. Slipinski, R. A. B. Leschen, and J. F. Lawrence (for full contact details, see the list after **References**). The title of this contribution should be cited as "Order Coleoptera Linnaeus, 1758. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Recent Coleoptera currently includes 176 families, 29500 genera and 386500 species, fossil taxa includes 31 families, 230 genera and 600 species. The classification is based on Lawrence and Newton (1995) and Bouchard *et al.* (2011). Numbers for fossil taxa were derived from Kirejtshuk et al. (2010) and only numbers of fossils for extinct Protocoleoptera and Coleoptera families are provided, apart from extant primitive Polyphaga. Numbers for extant taxa were taken from the *Handbook of Zoology* chapters in Beutel & Leschen (2005) and Leschen et al. (2010) except where noted. Because up-to-date catalogues do not exist, numbers in the *Handbook* had included estimates and here we cross-referenced these estimates with recent catalogues (e.g., Löbl & Smetana 2007) and web-based information (e.g., Hallan 2010). Cut off date for the information contained here was 10 February 2011.
3. See Ge et al. (2010).
4. See Fikáček and Šípková (2009).

Family **Haliplidae** Aubé, 1836 (5 (†1) genera, 220 (†2) species)
†Family **Triaplidae** Ponomarenko, 1977 (1 genus, 2 species)
†Family **Colymbotethidae** Ponomarenko, 1994 (2 genera, 2 species)
†Family **Parahygrobiidae** Ponomarenko, 1977 (1 genus, 1 species)
†Family **Coptoclavidae** Ponomarenko, 1961 (14 genera, 32 species)
†Family **Liadytidae** Ponomarenko, 1977 (2 genera, 6 species)
Family **Noteridae** C. G. Thomson, 1859 (14 genera, 250 species)
Family **Amphizoidae** LeConte, 1853 (1 genus, 5 species)
Family **Aspidytidae** Ribera et al., 2002 (1 genus, 2 species)
Family **Hygrobiidae** Régimbart, 1879 (1837) (1 genus, 5 species)
Family **Dytiscidae** Leach, 1815 (190 (†6) genera, 4100 (†85) species)

Suborder **Polyphaga** Emery, 1886 (7 series)

Series **Staphyliniformia** Latreille, 1802 (2 superfamilies)

Superfamily **Hydrophiloidea** Latreille, 1802 (4 families)
Family **Hydrophilidae** Latreille, 1802 (200 genera, 3400 species)
Family **Sphaeritidae** Shuckard, 1839 (1 genus, 5 species)
Family **Synteliidae** Lewis, 1882 (1 genus, 7 species)
Family **Histeridae** Gyllenhal, 1808 (350 genera, 4300 species)

Superfamily **Staphylinoidea** Latreille, 1802 (6 families)
Family **Hydraenidae** Mulsant, 1844 (42 genera, 1600 species)
Family **Ptiliidae** Erichson, 1845 (80 genera, 650 species)
Family **Agyrtidae** C. G. Thomson, 1859 (8 genera, 70 species)
Family **Leiodidae** Fleming, 1821 (342 genera, 3700 species)
Family **Silphidae** Latreille, 1807 (15 genera, 200 species)
Family **Staphylinidae** Latreille, 1802 (3500 genera, 56000 species)

Series **Scarabaeiformia** Crowson 1960 (1 superfamily)

Superfamily **Scarabaeoidea** Latreille, 1802 (14 families)
Family **Pleocomidae** LeConte, 1861 (2 genera, 50 species)
Family **Geotrupidae** Latreille, 1802 (70 genera, 920 species)
Family **Belohinidae** Paulian, 1959 (1 genus, 1 species)
Family **Passalidae** Leach, 1815 (64 genera, 800 species)
Family **Trogidae** W. S. MacLeay, 1819 (5 genera, 300 species)
Family **Glaresidae** Kolbe, 1905 (3(†2) genera, 60 (†3) species)
Family **Diphyllostomatidae** Holloway, 1972 (1 genus, 3 species)
Family **Lucanidae** Latreille, 1804 (120(†6) genera, 1500 (†11) species)
Family **Ochodaeidae** Mulsant and Rey, 1871 (15 genera, 110 species, †2/3)
Family **Hybosoridae** Erichson, 1847 (77(†3) genera, 580 (†7) species)
Family **Glaphyridae** W. S. MacLeay, 1819 (11(†1) genera, 210(†6) species)
Family **Scarabaeidae** Latreille, 1802 (1900 genera, 27000 species)
†Family **Coprinisphaeridae** Genise, 2004 (4 genera, 9 species, ichnotaxon)
†Family **Pallichnidae** Genise, 2004 (2 genera, 3 species, ichnotaxon)

Series **Scirtiformia** Fleming, 1821 (1 superfamily)

Superfamily **Scirtoidea** Fleming, 1821 (6 families)
Family **Scirtidae** Fleming, 1821 (35 genera, 800 species)
Family **Decliniidae** Nikitsky et al., 1994 (1 genus, 2 species)
Family **Eucinetidae** Lacordaire, 1857 (11 genera, 53 species)
Family **Clambidae** Fischer von Waldheim, 1821 (6 genera, 170 species)
†Family **Elodophthalmidae** Kirejtshuk and Azar, 2008 (1 genus, 2 species)
†Family **Mesocinetidae** Kirejtshuk and Ponomarenko, 2010 (4 genera, 7 species)

Series **Elateriformia** Crowson 1960 (4 superfamilies)

Superfamily **Dascilloidea** Guérin-Méneville, 1843 (1834) (2 families)
Family **Dascillidae** Guérin-Méneville, 1843 (1834) (15 genera, 80 species)
Family **Rhipiceridae** Latreille, 1834 (7 genera, 70 species)

Superfamily **Buprestoidea** Leach, 1815 (1 family)

Family **Buprestidae** Leach, 1815 (470 genera, 14700 species)
Superfamily **Byrrhoidea** Latreille, 1804 (12 families)
Family **Byrrhidae** Latreille, 1804 (38 genera, 430 species)
Family **Elmidae** Curtis, 1830 (149 genera, 1500 species)
Family **Dryopidae** Billberg, 1820 (1817) (33 genera, 300 species)
Family **Lutrochidae** Kasap and Crowson, 1975 (1 genus, 11 species)
Family **Limnichidae** Erichson, 1846 (37 genera, 390 species)
Family **Heteroceridae** W. S. MacLeay, 1825 (15 genera, 300 species)
Family **Psephenidae** Lacordaire, 1854 (35 genera, 290 species)
Family **Cneoglossidae** Champion, 1897 (1 genus, 10 species)
Family **Ptilodactylidae** Laporte, 1836 (34 genera, 500 species)
Family **Chelonariidae** Blanchard, 1845 (3 genera, 250 species)
Family **Eulichadidae** Crowson, 1973 (2 genera, 30 species)
Family **Callirhipidae** Emden, 1924 (9 genera, 150 species)
Superfamily **Elateroidea** Leach, 1815 (20 families)
Family **Rhinorhipidae** Lawrence, 1988 (1 genus, 1 species)
Family **Artematopodidae** Lacordaire, 1857 (8 genera, 45 species)
Family **Brachypsectridae** LeConte and G. H. Horn, 1883 (1 genus, 5 species)
Family **Cerophytidae** Latreille, 1834 (3 genera, 21 species)
Family **Eucnemidae** Eschscholtz, 1829 (200 genera, 1500 species)
Family **Throscidae** Laporte, 1840 (5 genera, 150 species)
Family **Elateridae** Leach, 1815 (400 genera, 10000 species)
Family **Plastoceridae** Crowson, 1972 (1 genus, 2 species)
Family **Drilidae** Blanchard, 1845 (6 genera, 120 species)
Family **Omalisidae** Lacordaire, 1857 (3 genera, 8 species)
Family **Lycidae** Laporte, 1836 (160 genera, 4600 species)
Family **Telegeusidae** Leng, 1920 (3 genera, 10 species)
Family **Phengodidae** LeConte, 1861 (31 genera, 250 species)
Family **Rhagophthalmidae** E. Olivier, 1907 (6 genera, 30 species)[5]
Family **Lampyridae** Rafinesque, 1815 (110 genera, 2200 species)
Family **Omethidae** LeConte, 1861 (8 genera, 33 species)
Family **Cantharidae** Imhoff, 1856 (1815) (160 genera, 5100 species)
Family **Podabrocephalidae** Pic, 1930 (1 genus, 1 species)
†Family **Berendtimiridae** Winkler, 1987 (1 genus, 1 species)
†Family **Lasiosynidae** Kirejtshuk, Chang, Ren & Kun, 2010 (4 genera, 7 species)
Series **Derodontiformia** LeConte, 1861 (1 superfamily)
Superfamily **Derodontoidea** LeConte, 1861 (3 families)
Family **Derodontidae** LeConte, 1861 (4 genera, 30 species)
Family **Nosodendridae** Erichson, 1846 (1 genus, 50 species)
Family **Jacobsoniidae** Heller, 1926 (3 genera, 20 species)
Series **Bostrichiformia** Forbes, 1926 (1 superfamily)
Superfamily **Bostrichoidea** Latreille, 1802 (4 families)
Family **Dermestidae** Latreille, 1804 (50 genera, 1200 species)
Family **Endecatomidae** LeConte, 1861 (1 genus, 4 species)
Family **Bostrichidae** Latreille, 1802 (90 genera, 570 species)
Family **Ptinidae** Latreille, 1802 (230 genera, 2200 species)
Series **Cucujiformia** Lameere, 1938 (4 superfamilies)
Superfamily **Lymexyloidea** Fleming, 1821 (1 family)
Family **Lymexylidae** Fleming, 1821 (10 genera, 70 species)
Superfamily **Cleroidea** Latreille, 1802 (12 families)
Family **Phloiophilidae** Kiesenwetter, 1863 (1 genus, 1 species)
Family **Trogossitidae** Latreille, 1802 (50 genera, 600 species)

5. See Löbl & Smetana (2007).

Family **Chaetosomatidae** Crowson, 1952 (4 genera, 12 species)
Family **Metaxinidae** Kolibáč, 2004 (1 genus, 1 species)
Family **Thanerocleridae** Chapin, 1924 (7 genera, 30 species)
Family **Cleridae** Latreille, 1802 (200 genera, 3400 species)
Family **Acanthocnemidae** Crowson, 1964 (1 genus, 1 species)
Family **Phycosecidae** Crowson, 1952 (1 genus, 4 species)
Family **Prionoceridae** Lacordaire, 1857 (3 genera, 160 species)
Family **Mauroniscidae** Majer, 1995 (5 genera, 26 species)
Family **Melyridae** Leach, 1815 (300 genera, 6000 species)
†Family **Parandrexidae** Kirejtshuk, 1994 (3 genera, 5 species)

Superfamily **Cucujoidea** Latreille, 1802 (37 families)
Family **Boganiidae** Sen Gupta and Crowson, 1966 (5 genera, 11 species)
Family **Byturidae** Gistel, 1848 (7 genera, 24 species)
Family **Helotidae** Chapuis, 1876 (5 genera, 107 species)
Family **Protocucujidae** Crowson, 1954 (1 genus, 7 species)
Family **Sphindidae** Jacquelin du Val, 1860 (9 genera, 59 species)
Family **Biphyllidae** LeConte, 1861(7 genera, 200 species)
Family **Erotylidae** Latreille, 1802 (260 genera, 3500 species)
Family **Monotomidae** Laporte, 1840 (33 genera, 250 species)
Family **Hobartiidae** Sen Gupta and Crowson, 1966 (2 genera, 6 species)
Family **Cryptophagidae** Kirby, 1826 (60 genera, 600 species)
Family **Agapythidae** Sen Gupta and Crowson, 1969 (1 genus, 1 species)
Family **Priasilphidae** Crowson, 1973 (3 genera, 11 species)
Family **Phloeostichidae** Reitter, 1911 (5 genera, 14 species)
Family **Silvanidae** Kirby, 1837 (58 genera, 500 species)
Family **Cucujidae** Latreille, 1802 (4 genera, 44 species)
Family **Myraboliidae** Lawrence and Britton, 1991 (1 genus, 13 species)
Family **Cavognathidae** Sen Gupta and Crowson, 1966 (1 genus, 9 species)
Family **Lamingtoniidae** Sen Gupta and Crowson, 1969 (1 genus, 3 species)
Family **Passandridae** Blanchard, 1845 (9 genera, 109 species)
Family **Phalacridae** Leach, 1815 (51 genera, 640 species)
Family **Propalticidae** Crowson, 1952 (2 genera, 30 species)
Family **Laemophloeidae** Ganglbauer, 1899 (37 genera, 430 species)
Family **Tasmosalpingidae** Lawrence and Britton, 1991 (1 genus, 2 species)
Family **Cyclaxyridae** Gimmel et al., 2009 (1 genus, 2 species)
Family **Kateretidae** Kirby, 1837 (14 genera, 95 species)
Family **Nitidulidae** Latreille, 1802 (350 genera, 4500 species)
Family **Smicripidae** G. H. Horn, 1880 (1 genus, 6 species)
Family **Bothrideridae** Erichson, 1845 (38 genera, 400 species)
Family **Cerylonidae** Billberg, 1820 (52 genera, 450 species)
Family **Alexiidae** Imhoff, 1856 (1 genus, 50 species)
Family **Discolomatidae** G. H. Horn, 1878 (16 genera, 400 species)
Family **Endomychidae** Leach, 1815 (130 genera, 1800 species)
Family **Coccinellidae** Latreille, 1807 (360 genera, 6000 species)
Family **Corylophidae** LeConte, 1852 (30 genera, 200 species)
Family **Latridiidae** Erichson, 1842 (28 genera, 1000 species)
Family **Akalyptoischiidae** Lord et. al, 2010 (1 genus, 24 species)[6]
†Family **Sinisilvanidae** Hong, 2002 (1 genus, 1 species)

Superfamily **Tenebrionoidea** Latreille, 1802 (28 families)
Family **Mycetophagidae** Leach, 1815 (18 genera, 130 species)
Family **Archeocrypticidae** Kaszab, 1964 (10 genera, 60 species)
Family **Pterogeniidae** Crowson, 1953 (7 genera, 26 species)

6. See Lord et al. (2010).

Family **Ciidae** Leach, 1819 (42 genera, 650 species)
Family **Tetratomidae** Billberg, 1820 (13 genera, 150 species)
Family **Melandryidae** Leach, 1815 (60 genera, 420 species)
Family **Mordellidae** Latreille, 1802 (100 genera, 1500 species)
Family **Ripiphoridae** Gemminger, 1870 (1853) (38 genera, 400 species)
Family **Zopheridae** Solier, 1834 (190 genera, 1700 species)
Family **Ulodidae** Pascoe, 1869 (14 genera, 30 species)
Family **Promecheilidae** Lacordaire, 1859 (7 genera, 20 species)
Family **Chalcodryidae** Watt, 1974 (3 genera, 15 species)
Family **Trachelostenidae** Lacordaire, 1859 (1 genus, 2 species)
Family **Tenebrionidae** Latreille, 1802 (2300 genera, 20000 species)
Family **Prostomidae** C. G. Thomson, 1859 (2 genera, 30 species)
Family **Synchroidae** Lacordaire, 1859 (3 genera, 8 species)
Family **Stenotrachelidae** C. G. Thomson, 1859 (7 genera, 19 species)
Family **Oedemeridae** Latreille, 1810 (100 genera, 500 species)
Family **Meloidae** Gyllenhal, 1810 (120 genera, 3000 species)
Family **Mycteridae** Oken, 1843 (29 genera, 160 species)
Family **Boridae** C. G. Thomson, 1859 (3 genera, 4 species)
Family **Trictenotomidae** Blanchard, 1845 (2 genera, 13 species)
Family **Pythidae** Solier, 1834 (7 genera, 23 species)
Family **Pyrochroidae** Latreille, 1807 (30 genera, 167 species)
Family **Salpingidae** Leach, 1815 (45 genera, 300 species)
Family **Anthicidae** Latreille, 1819 (100 genera, 3000 species)
Family **Aderidae** Winkler, 1927 (50 genera, 900 species)
Family **Scraptiidae** Gistel, 1848 (35 genera, 500 species)
Superfamily **Chrysomeloidea** Latreille, 1802 (7 families)
Family **Vesperidae** Mulsant, 1839 (17 genera, 75 species)
Family **Oxypeltidae** Lacordaire, 1868 (2 genera, 3 species)[7]
Family **Disteniidae** J. Thomson, 1861 (32 genera, 336 species)
Family **Cerambycidae** Latreille, 1802 (5232 genera, 30079 species)[8]
Family **Megalopodidae** Latreille, 1802 (30 genera, 350 species)[9]
Family **Orsodacnidae** C. G. Thomson, 1859 (3 genera, 40 species)[9]
Family **Chrysomelidae** Latreille, 1802 (2114 genera, 32500 species)
Superfamily **Curculionoidea** Latreille, 1802 (8 families)[10]
Family **Nemonychidae** Bedel, 1882 (20 genera, 70 species)
Family **Anthribidae** Billberg, 1820 (372 genera, 3900 species)
Family **Belidae** Schoenherr, 1826 (38 genera, 375 species)
Family **Attelabidae** (150 genera, 2500 species)
Family **Caridae** Thompson, 1992 (4 genera, 6 species)
Family **Brentidae** Billberg, 1820 (400 genera, 4000 species)
Family **Curculionidae** Latreille, 1802 (4600 genera, 51000 species)
†Family **Ulyanidae** Zherikhin, 1993 (2 genera, 3 species)

Acknowledgements

We thank Petr Svacha (Vesperidae), Miguel Monne (Cerambycidae), Den Heffern (Cerambycidae), Antonio Santos-Silva (Disteniidae), and Chris Reid (Chrysomelidae) for assistance with the numbers of chrysomeloid families. RABL

7. See Kuschel (1955).
8. Number of genera was obtained by tripling the number of neotropical genera (1744) supplied by M. Monne (pers. com). Species number was obtained from Anonymous (2010).
9. See Hallan (2010).
10. See Oberprieler et al. (2007).

was supported in part by Foundation for Research, Science and Technology through the Defining New Zealand's Land Biota OBI.

Literature Cited

Anonymous. (2010) Biolib.cz. http://www.biolib.cz/en/taxon/id10991/ [accessed 6 January 2011].

Beutel, R. G., & Leschen, R.A.B. (2005) *Handbook of Zoology, Volume IV Arthropoda: Insecta, Part 38, Evolution and Systematics Coleoptera (Archostemata, Adephaga, Myxophaga, Polyphaga part.)*. Walter de Gruyter, Berlin. 567 p.

Bouchard, B, Bousquet, Y, Davies, A.E., Alonso-Zarazaga, M.A., Lawrence, J.F., Lyal, C.H.C., Newton, A.F., Reid, C.A.M., Schmitt, M., Ślipiński, S.A., Smith, A.B.T. (2011) Family-group names in Coleoptera. *Zookeys*, 88, 1–972.

Fikáček, M., Šípková H. (2009) New Asian *Hydroscapha*, with comments on male-female association of co-occuring species (Coleoptera, Myxophaga, Hydroscaphidae) *Zootaxa*, 2286, 31–48.

Ge, S.-Q., Friedrich, F. & Beutel, R. G. (2010) On the systematic position and taxonomic rank of the extinct myxophagan †*Haplochelus* (Coleoptera). *Insect Systematics & Evolution*, 41, 329–338.

Hallan, J. (2010) S*ynopsis of the described Coleoptera of the world.* http://insects.tamu.edu/research/collection/hallan/test/Arthropoda/Insects/Coleoptera/Family/Coleoptera1.htm [accessed 6 January 2011].

Kirejtshuk, A.G., Ponomarenko, F.G. & Zherikhin, V.V. (2010) *Catalogue of fossil Coleoptera.* http://www.zin.ru/animalia/coleoptera/eng/paleosys.htm. [Accessed November 2010].

Kuschel, G. (1955) Una nueva espécie de *Cheloderus* Castelnau. *Revista Chilena de Entomología*, 4, 251–254.

Lawrence, J .F. & Newton, A. F. (1995) Families and subfamilies of Coleoptera (with selected genera, notes, references and data on family-group names). *In:* Pakaluk, J. & Ślipiński, S. A. (Eds), *Biology, Phylogeny, and Classification of Coleoptera: Papers Celebrating the 80th Birthday of Roy A. Crowson*. Muzeum Instytut Zoologii PAN, Warszawa, pp. 779–1006.

Leschen, R.A.B., Beutel, R.G., & Lawrence, J.F. (2010) *Handbook of Zoology, Coleoptera Volume 2: Morphology and Systematics (Elateroidea, Bostrichformia, Cucujiformia partim).* Walter de Gruyter, Berlin. 786 p.

Löbl, I. & Smetana A. (2007) *Catalogue of Palaearctic Coleoptera. Volume 4. Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea and Cucujoidea.* Apollo Books, Stenstrup. 935 p.

Lord, N.P., Hartley, C.S., Lawrence, J.F., McHugh, J.V., Whiting, M.F., & Miller, K.B. (2010) Phylogenetic analysis of the Minute Brown Scavenger Beetles (Coleoptera: Latridiidae), and recognition of a new beetle family, Akalyptoischionidae, fam. n. (Coleoptera: Cucujoidea). *Systematic Entomology*, 35, 753–763.

Oberprieler, R.G., Marvaldi, A.E. & Anderson, R.S. (2007) Weevils, weevils, weevils everywhere. *In*: Zhang, Z.-Q. & Shear, W.A. (Eds.) *Linnaeus Tercentenary: Progress in Invertebrate Taxonomy. Zootaxa*, 1668, 491–520.

Author names and contact addresses

S.A. Slipinski, CSIRO Ecosystem Sciences, GPO Box 1700, Canberra, ACT, 2601, Australia

R.A.B. Leschen, New Zealand Arthropod Collection, Private Bag 92170, Auckland, New Zealand (corresponding author; leschenr@landcareresearch.co.nz)

J.F. Lawrence, CSIRO Ecosystem Sciences, GPO Box 1700, Canberra, ACT, 2601, Australia

Order **Trichoptera** Kirby, 1813 [1] (2 suborders)[2, 3, 4]

Suborder **Annulipalpia** Martynov, 1924 (3 superfamilies)[5]

Superfamily **Philopotamoidea** Stephens, 1829 (2 families)

Family **Philopotamidae** Stephens, 1829 (25 genera, 1194 species, of which †6/26)[6]

Family **Stenopsychidae** Martynov, 1924 (3 genera, 95 species, †0/1)

Superfamily **Psychomyioidea** Walker, 1852 (9 families, of which †2)[7]

Family **Dipseudopsidae** Ulmer, 1904 (5 genera, 120 species, of which †0/6)

Family **†Dysoneuridae** Sukatsheva, 1968 (†3 genera, †6 species)

Family **Ecnomidae** Ulmer, 1903 (10 genera, 483 species, of which †1/14)

Family **†Electralbertidae** Botosaneanu & Wichard, 1983 (†1 genus, †1 species)

Family **Kambaitipsychidae** Malicky, 1992 (1 genus, 2 species)

Family **Polycentropodidae** Ulmer, 1903 (26 genera, 901 species, of which †10/95)

Family **Pseudoneureclipsidae** Ulmer, 1951 (2 genera, 120 species, of which †0/4)

Family **Psychomyiidae** Walker, 1852 (13 genera, 530 species, of which †2/8)

Family **Xiphocentronidae** Ross, 1949 (7 genera, 173 species, of which †0/1)

Superfamily **Hydropsychoidea** Curtis, 1835 (1 family)

Family **Hydropsychidae** Curtis, 1835 (39 genera, 1820 species, of which †2/12)

Suborder **Integripalpia** Martynov 1924 (2 infraorders, 8 superfamilies)[8]

Family **†Ningxiapsychidae** Hong & Li, 2004 (†1 genus, †1 species)

Family **†Vitimotauliidae** Sukatsheva, 1968 (†3 genera, †18 species)

Superfamily **Glossosomatoidea** Wallengren, 1891 (1 family)

Family **Glossosomatidae** Wallengren, 1891 (23 genera, 689 species, of which †1/7)

Superfamily **Hydroptiloidea** Stephens, 1836 (2 families)

Family **Hydroptilidae** Stephens, 1836 (75 genera, 2141 species, of which †3/17)

Family **Ptilocolepidae** Martynov, 1913 (2 genera, 18 species, of which †0/2)

Superfamily **Rhyacophiloidea** Stephens, 1836 (2 families)

Family **Hydrobiosidae** Ulmer, 1905 (52 genera, 410 species, of which †2/3)

Family **Rhyacophilidae** Stephens, 1836 (6 genera, 783 species, of which †1/9)

Infraorder **Brevitentoria** Weaver, 1984 (3 superfamilies)[9]

Superfamily **Leptoceroidea** Leach, 1815 (7 families)

---

1. By RALPH W. HOLZENTHAL, JOHN C. MORSE & KARL M. KJER (for full contact details, see the list after **References**). The title of this contribution should be cited as "Order Trichoptera Kirby, 1813. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. Extant and readily classified fossil families only (fossil families identified with "†"). The superorder Amphiesmenoptera Hennig, 1969, stem group Protomeropina Tillyard, 1926 (5 fossil families with 13 genera and 30 species) and fossil families Necrotauliidae Handlirsch, 1906 (9 genera, 28 species) and Prorhyacophilidae Riek, 1955 (1 genus, 2 species) are not included in Trichoptera by us. Also, 10 genera and 244 species are ichnotaxa, available names in Trichoptera for the fossilized work of caddisfly larvae (i.e., fossilized caddisfly cases), not assigned to any more-inclusive taxa. Furthermore, 3 fossil genera and 9 fossil species are available names for substitution fossils that have not been assigned to more-inclusive taxa. In total, the order Trichoptera as here defined includes 56 families (49 mostly extant, 7 entirely fossil), 688 genera (601 mostly extant, 85 entirely fossil, 2 *nomina dubia*), and 14,999 species (14,291 extant, 608 fossil, 100 *nomina dubia*). For a review of fossil Trichoptera taxa see Ulmer (1912), Ivanov & Sukatcheva (2002), Wichard (2007) and Morse (2011). For a general review of the diversity, distribution, biology, and phylogeny of the order see Holzenthal et al. (2007b), de Moor & Ivanov (2008), Wiggins (2004), and Morse (1997).
3. Unless otherwise indicated, the classification follows Morse (2011). Diversity estimates are from Morse (unpublished data) and include extant and fossil genera and species as well as species *nomina dubia* (of uncertain identity).
4. There is general consensus that the order contains at least 2 monophyletic suborders, Annulipalpia, the retreat-making caddisflies, and the Integripalpia, the case-making caddisflies. The monophyly of a 3rd suborder, Spicipalpia Weaver, 1984, the cocoon-making caddisflies (including Rhyacophilidae, Hydrobiosidae, Glossosomatidae, Hydroptilidae, and Ptilocolepidae) is equivocal; morphological evidence of its monophyly is spurious (Ivanov 1997, 2002) and molecular studies have failed to recover a monophyletic Spicipalpia, although support for paraphyly is weak (Kjer et al. 2001, Kjer et al. 2002, Holzenthal et al. 2007a).
5. = Hydropsychina Rhodendorf, 1977 as used by Ivanov (2002). Ivanov (2002) included Rhyacophiloidea within Hydropsychina.
6. Throughout the list, †x/y indicates x genera and y species are fossil among the totals (e.g., for Philopotamidae 25 total genera, 1194 total species, of which 6 genera and 26 species are fossil).
7. A monophyletic Psychomyioidea was recognized by Ivanov (2002) on morphological evidence; its monophyly and sister-group relationship to Hydropsychidae has been consistently recovered in molecular studies, with strong bootstrap support (Holzenthal et al. 2007a). For recent taxonomic changes within Psychomyioidea see Chamorro & Holzenthal (2011).
8. = Phryganeina Rohdendorf, 1977 as used by Ivanov (2002). In molecular studies, the "spicipalpian" superfamilies Rhyacophiloidea, Glossosomatoidea, and Hydroptiloidea are consistently recovered within a strongly supported, monophyletic Integripalpia, reflecting the earlier classification of Ross (1967).
9. Infraorders Brevitentoria and Plenitentoria are strongly supported as monophyletic clades in molecular analyses (e.g., Holzenthal et al. 2007a). However, relationships among superfamilies and families within these clades generally remain unresolved.

Family **Atriplectididae** Neboiss, 1977 (4 genera, 6 species)
Family **Calamoceratidae** Ulmer, 1905 (10 genera, 187 species, of which †2/5)
Family **Molannidae** Wallengren, 1891 (2 genera, 45 species, of which †0/4)
Family **Leptoceridae** Leach, 1815 (52 genera, 2037 species, of which †4/17)
Family **Limnocentropodidae** Tsuda, 1942 (1 genus, 15 species)
Family **Odontoceridae** Wallengren, 1891 (18 genera, 160 species, of which †3/6)
Family **Philorheithridae** Mosely, 1936 (9 genera, 30 species)
Superfamily **Sericostomatoidea** Stephens, 1836 (12 families)
Family **Anomalopsychidae** Flint, 1981 (2 genera, 27 species)
Family **Antipodoeciidae** Ross, 1967 (1 genus, 1 species)
Family **Barbarochthonidae** Scott, 1985 (1 genus, 1 species)
Family **Beraeidae** Wallengren, 1891 (7 genera, 59 species, of which †0/2)
Family **Calocidae** Ross, 1967 (7 genera, 23 species)
Family **Chathamiidae** Tillyard, 1925 (2 genera, 5 species)
Family **Conoesucidae** Ross, 1967 (11 genera, 43 species)
Family **Helicophidae** Mosely, 1953 (9 genera, 44 species)
Family **Helicopsychidae** Ulmer, 1906 (10 genera, 283 species, of which †8/14)
Family **Hydrosalpingidae** Scott, 1985 (1 genus, 1 species)
Family **Petrothrincidae** Scott, 1985 (1 genus, 14 species)
Family **Sericostomatidae** Stephens, 1836 (23 genera, 111 species, of which †4/4)
Superfamily **Tasimioidea** Riek, 1968 (1 family)
Family **Tasimiidae** Riek, 1968 (4 genera, 9 species)
Infraorder **Plenitentoria** Weaver, 1984 (2 superfamilies)
Family **Kokiriidae** McFarlane, 1964 (6 genera, 15 species)[10]
Superfamily **Limnephiloidea** Kolenati, 1848 (7 families, of which †1)
Family **Apataniidae** Wallengren, 1886 (21 genera, 203 species)
Family **Goeridae** Ulmer, 1903 (11 genera, 184 species, of which †0/4)
Family **Limnephilidae** Kolenati, 1848 (100 genera, 884 species, of which †1/4)
Family **Rossianidae** Gall, 1996 (2 genera, 2 species)
Family **†Taymyrelectronidae** Botosaneanu & Wichard, 1983 (†1 genus, †1 species)
Family **Thremmatidae** Martynov, 1935 (3 genera, 52 species)
Family **Uenoidae** Iwata, 1927 (4 genera, 31 species)
Superfamily **Phryganeoidea** Leach, 1815 (9 families, of which †2)
Family **†Baissoferidae** Sukatsheva, 1968 (†1 genus, †4 species)
Family **Brachycentridae** Ulmer, 1903 (8 genera, 113 species, of which †1/2)
Family **†Kalophryganeidae** Haupt, 1956 (†1 genus, †1 species)
Family **Lepidostomatidae** Ulmer, 1903 (11 genera, 483 species, of which †4/12)
Family **Oeconesidae** Tillyard, 1921 (6 genera, 18 species)
Family **Phryganeidae** Leach, 1815 (21 genera, 120 species, of which †4/36)
Family **Phryganopsychidae** Wiggins, 1959 (1 genus, 4 species)
Family **Pisuliidae** Ross, 1967 (2 genera, 19 species)
Family **Plectrotarsidae** Mosely, 1953 (4 genera, 6 species, of which †1/1)

References

Chamorro, M.L. & Holzenthal, R.W. (2011) Phylogeny of Polycentropodidae Ulmer, 1903 (Trichoptera: Annulipalpia: Psychomyioidea) inferred from larval, pupal and adult characters. *Invertebrate Systematics*, 25, 219–253.

de Moor, F.C. & Ivanov, V.D. (2008) Global diversity of caddisflies (Trichoptera: Insecta) in freshwater. *Hydrobiologia*, 595, 393–407.

Holzenthal, R.W., Blahnik, R.J., Kjer, K.M. & Prather, A.P. (2007a) An update on the phylogeny of caddisflies (Trichoptera). *In*: J. Bueno-Soria, R. Barba-Alvarez & B. Armitage (Eds), *Proceedings of the 12th International Symposium on Trichoptera*. The Caddis Press, Columbus, Ohio, pp. 143–153.

Holzenthal, R.W., Blahnik, R.J., Prather, A.L. & Kjer, K.M. (2007b) Order Trichoptera Kirby, 1813 (Insecta), caddisflies. *Zootaxa*,

10. Holzenthal *et al*. (2007b) included Kokiriidae in Plenitentoria based on molecular evidence (Holzenthal et al. 2007a), but without assignment to a superfamily.

1668, 639–698.
Ivanov, V.D. (1997) Rhyacophiloidea: A paraphyletic taxon. *In*: R.W. Holzenthal & O.S. Flint, Jr. (Eds), *Proceedings of the 8th International Symposium on Trichoptera*. Ohio Biological Survey, Columbus, Ohio, pp. 189–193.
Ivanov, V.D. (2002) Contribution to the Trichoptera phylogeny: New family tree with considerations of Trichoptera-Lepidoptera relations. *Nova Supplementa Entomologica (Proceedings of the 10th International Symposium on Trichoptera),* 15, 277–292.
Ivanov, V.D. & Sukatcheva, I.D. (2002) Order Trichoptera Kirby, 1813. The caddisflies (=Phryganeida Latreille, 1810). *In*: A. P. Rasnitsyn & D. L. J. Quicke (Eds), *History of Insects*. Kluwer Academic Publishers, Dordrecht, The Netherlands, pp. 199–222.
Kjer, K.M., Blahnik, R.J. & Holzenthal, R.W. (2001) Phylogeny of Trichoptera (Caddisflies): Characterization of signal and noise within multiple datasets. *Systematic Biology,* 50, 781–816.
Kjer, K.M., Blahnik, R.J. & Holzenthal, R.W. (2002) Phylogeny of caddisflies (Insecta, Trichoptera). *Zoologica Scripta,* 31, 83–91.
Morse, J.C. (1997) Phylogeny of Trichoptera. *Annual Review of Entomology,* 42, 427–450.
Morse, J.C. (2011) Trichoptera World Checklist. Available from http://www.clemson.edu/cafls/departments/esps/database/trichopt/index.htm (accessed 5 December 2011).
Ross, H.H. (1967) The evolution and past dispersal of the Trichoptera. *Annual Review of Entomology,* 12, 169–206.
Ulmer, G. (1912) *Die Trichopteren des Baltischen Bernsteins. Beiträge zur Naturkunde Preussens, 10*. Leipzig: Schriften der Physikalisch-Ökonomischen Gesellschaft zu Königsberg.
Weaver, J.S., III (1984) The evolution and classification of Trichoptera. Part I: The groundplan of Trichoptera. *In*: J. C. Morse (Ed), *Proceedings of the 4th International Symposium on Trichoptera*. Dr. W. Junk, The Hague, pp. 413–419.
Wichard, W. (2007) Overview and descriptions of caddisfiles (Insecta, Trichoptera) in Dominican amber (Miocene). *Stuttgarter Beiträge zur Naturkunde Serie B (Geologie und Paläontologie),* 366, 1–51.
Wiggins, G.B. (2004) *Caddisflies: The underwater architects*. University of Toronto Press, Toronto.

Author addresses

RALPH W. HOLZENTHAL, Department of Entomology, University of Minnesota, 1980 Folwell Ave., Room 219, St. Paul, Minnesota, 55108, USA (holze001@umn.edu)
JOHN C. MORSE, School of Agricultural, Forest, and Environmental Sciences, Clemson University, 114 Long Hall, 230 Parkway Drive, Box 340310, Clemson, South Carolina, 29634, USA (jmorse@clemson.edu)
KARL M. KJER, Department of Ecology, Evolution and Natural Resources, Cook College, Rutgers University, New Brunswick, New Jersey, 08901, USA (kjer@aesop.rutgers.edu)

Order **Lepidoptera** Linnaeus, 1758 (4 suborders) (15,578 genera, 157,424 species, 50/86) [1 2 3]

† **Unassigned early lepidopterans** (4 families)

† Family **unassigned** (12 genera, 16 species, 12/16) [4]

† Family **Archaeolepidae** Whalley, 1985 (1 genus, 1 species, 1/1) [5]

† Family **Mesokristenseniidae** Huang, Nel & Minet, 2010 (1 genus, 3 species, 1/3) [6]

† Family **Eolepidopterigidae** Rasnitsyn, 1983 (1 genus, 1 species, 1/1) [7]

† Family **Undopterigidae** Kozlov, 1988 (1 genus, 1 species, 1/1) [8]

Suborder **Zeugloptera** Chapman, 1917 (1 superfamily)

Superfamily **Micropterigoidea** Herrich-Schäffer, 1855 (1 family)

Family **Micropterigidae** Herrich-Schäffer, 1855 (21 genera, 160 species, 3/6) [9]

Suborder **Aglossata** Speidel, 1977 (1 superfamily)

Superfamily **Agathiphagoidea** Kristensen, 1967 (1 family)

Family **Agathiphagidae** Kristensen, 1967 (1 genus, 2 species)

Suborder **Heterobathmiina** Kristensen & Nielsen, 1983 (1 superfamily)

Superfamily **Heterobathmioidea** Kristensen & Nielsen, 1979 (1 family)

Family **Heterobathmiidae** Kristensen & Nielsen, 1979 (1 genus, 3 species)

Suborder **Glossata** Fabricius, 1775 (6 infraorders, all following)

Infraorder **Dacnonypha** Hinton, 1946 (1 superfamily)

Superfamily **Eriocranioidea** Rebel, 1901 (1 family)

Family **Eriocraniidae** Rebel, 1901 (5 genera, 29 species, 0/1)

Clade **Coelolepida** Nielsen & Kristensen, 1996 (5 infraorders, all following) [10]

Infraorder **Acanthoctesia** Minet, 2002 (1 superfamily)

Superfamily **Acanthopteroctetoidea** Davis, 1978 (1 family)

Family **Acanthopteroctetidae** Davis, 1978 (2 genera, 5 species)

Infraorder **Lophocoronina** Common, 1990 (1 superfamily)

Superfamily **Lophocoronoidea** Common, 1973 (1 family)

Family **Lophocoronidae** Common, 1973 (1 genus, 6 species)

Clade **Myoglossata** Kristensen & Nielsen, 1981 (3 infraorders, all following)

Infraorder **Neopseustina** Davis & Nielsen, 1980 (1 superfamily)

Superfamily **Neopseustoidea** Hering, 1925 (1 family)

Family **Neopseustidae** Hering, 1925 (4 genera, 14 species)

Clade **Neolepidoptera** Packard, 1895 (2 infraorders, all following)

---

1. **By** Erik J. van Nieukerken, Lauri Kaila, Ian J. Kitching, Niels P. Kristensen, David C. Lees, Joël Minet, Charles Mitter, Marko Mutanen, Jerome C. Regier, Thomas J. Simonsen, Niklas Wahlberg, Shen-Horn Yen, Reza Zahiri, David Adamski, Joaquin Baixeras, Daniel Bartsch, Bengt Å. Bengtsson, John W. Brown, Sibyl Rae Bucheli, Donald R. Davis, Jurate De Prins, Willy De Prins, Marc E. Epstein, Patricia Gentili-Poole, Cees Gielis, Peter Hättenschwiler, Axel Hausmann, Jeremy D. Holloway, Axel Kallies, Ole Karsholt, Akito Y. Kawahara, Sjaak (J.C.) Koster, Mikhail V. Kozlov, J. Donald Lafontaine, Gerardo Lamas, Jean-François Landry, Sangmi Lee, Matthias Nuss, Kyu-Tek Park, Carla Penz, Jadranka Rota, Alexander Schintlmeister, B. Christian Schmidt, Jae-Cheon Sohn, M. Alma Solis, Gerhard M. Tarmann, Andrew D. Warren, Susan Weller, Roman V. Yakovlev, Vadim V. Zolotuhin, Andreas Zwick (for full contact details, see the list after **References**). The title of this contribution should be cited as "Order Lepidoptera Linnaeus, 1758. In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".
2. The classification largely follows that in the Handbook of Zoology (Kristensen 1998), and the later update (Kristensen *et al.* 2007). Recent molecular studies of Ditrysia (Regier *et al.* 2009; Mutanen *et al.* 2010) are responsible for several novelties, such as the position of the butterflies (Papilionoidea) and the synonymy of Sesioidea with Cossoidea.
3. When possible, numbers of genera and species are based on counts in existing databases, whether published (then cited) or personal. Where not available, often for larger taxa, numbers provided by Handbook authors were updated with Zoological Record data (up to early July 2011). Lepindex (Beccaloni *et al.* 2005) has been an additional source; x/y for numbers of genera/species represented by fossil.
4. Including "homoneurous" (or probably homoneurous) lepidopteran genera not certainly placed to family (taxa listed in Table 13.1 [1, 3-6] of Grimaldi & Engel (2005), plus - at least - the following six genera: *Archiptilia* Handlirsch, 1939, *Electrocrania* Kusnezov, 1941, *Epididontus* Handlirsch, 1939, *Palaeosabatinca* Kozlov, 1988, *Parataulius* Handlirsch, 1939, and *Xena* Martins-Neto, 1999).
5. The presence of wing scales is supposed to indicate that this fossil is lepidopteran (Kristensen & Skalski 1998; Grimaldi & Engel 2005). This family and the following three are listed in "stratigraphical" order.
6. A group from the middle Jurassic of China best placed among unassigned early Lepidoptera, although this group might be sister to Micropterigidae (Huang *et al.* 2010).
7. Including with certainty only *Eolepidopterix jurassica* Rasnitsyn, 1983.
8. Including with certainty only *Undopterix sukatshevae* Skalski, 1979.
9. With the already known, but still unnamed species, the global total is around 260 species.
10. Junior homonym of Coelolepida in Agnatha, but unlikely to be confused.

Infraorder **Exoporia** Common, 1975 (2 superfamilies) [11]
Superfamily **Mnesarchaeoidea** Eyer, 1924 (1 family)
Family **Mnesarchaeidae** Eyer, 1924 (1 genus, 7 species)
Superfamily **Hepialoidea** Stephens, 1829 (5 families)
Family **Palaeosetidae** Turner, 1922 (4 genera, 9 species)
Family **Prototheoridae** Meyrick, 1917 (1 genus, 12 species)
Family **Neotheoridae** Kristensen, 1978 (1 genus, 1 species)
Family **Anomosetidae** Tillyard, 1919 (1 genus, 1 species)
Family **Hepialidae** Stephens, 1829 (62 genera, 606 species, 2/2)
Infraorder **Heteroneura** Tillyard, 1918 (34 superfamilies, all following)
Clade **Nepticulina** Meyrick, 1928 (1 superfamily)
Superfamily **Nepticuloidea** Stainton, 1854 (2 families) [12]
Family **Nepticulidae** Stainton, 1854 (13 genera, 819 species, 1/13)
Family **Opostegidae** Meyrick, 1893 (7 genera, 192 species)
Clade **Eulepidoptera** Kiriakoff, 1948 (33 superfamilies, all following)
Clade **Incurvariina** Börner, 1939 (2 superfamilies)
Superfamily **Andesianoidea** Davis & Gentili, 2003 (1 family)
Family **Andesianidae** Davis & Gentili, 2003 (1 genus, 3 species)
Superfamily **Adeloidea** Bruand, 1850 (5 families) [13]
Family **Heliozelidae** Heinemann & Wocke, 1876 (12 genera, 123 species)
Family **Adelidae** Bruand, 1850 (5 genera, 294 species)
Family **Incurvariidae** Spuler, 1898 (11 genera, 51 species) [14]
Family **Cecidosidae** Bréthes, 1916 (5 genera, 16 species)
Family **Prodoxidae** Riley, 1881 (9 genera, 98 species)
Clade **Etimonotrysia** Minet, 1984 (2 superfamilies)
Superfamily **Palaephatoidea** Davis, 1986 (1 family)
Family **Palaephatidae** Davis, 1986 (7 genera, 57 species)
Superfamily **Tischerioidea** Spuler, 1898 (1 family)
Family **Tischeriidae** Spuler, 1898 (3 genera, 110 species) [15]
Clade **Ditrysia** Börner, 1925 (29 superfamilies, all following)
Superfamily **unassigned** (1 family)
Family **unassigned** (25 genera, 100 species) [16]
Family **Millieriidae** Heppner, 1982 (3 genera, 4 species) [17]
Superfamily **Tineoidea** Latreille, 1810 (3 families) [18]
Family **Eriocottidae** Spuler, 1898 (6 genera, 80 species)
Family **Psychidae** Boisduval, 1829 (241 genera, 1,350 species) [19]
Family **Tineidae** Latreille, 1810 (357 genera, 2,393 species) [20]
Superfamily **Gracillarioidea** Stainton, 1854 (3 families) [21]

11. Diversity of all families in Exoporia updated from Nielsen *et al.* (2000).
12. See van Nieukerken (2010).
13. The frequently used name Incurvarioidea is a junior synonym of Adeloidea. As the latter name has been used occasionally before 2000, ICZN article 35.5 does not apply, and priority has to be followed here.
14. The monobasic Crinopterygidae Spuler, 1898 is here considered a subfamily of Incurvariidae.
15. Updated from Diškus & Puplesis (2003).
16. This group comprises a number of genera that cannot be placed with confidence in any currently known family, although some could be attributed to one of the following superfamilies. New family group taxa are probably needed for some of these. Included here are, e.g.: the probably non-monophyletic *Pseudurgis* group, excluded from Cossidae (Mey 2007), the *Heliocosma* group, excluded from Tortricidae (Horak & Common 1996), the genus *Titanomis* Meyrick, 1888 (Hoare 2001), the genus *Allotoma* Roepke, 1944 (Holloway 1999), which is probably Bombycoidea, a number of genera excluded from Heliodinidae (Hsu & Powell 2005), *Kenguichardia* Holloway, 1987 in Noctuoidea, and several others.
17. Raised to family by Rota (2011).
18. Although Tineoidea could not be shown to be monophyletic (Mutanen *et al.* 2010), we retain it as support is conflicting for the dismembering of the superfamily.
19. Psychidae now also contain Arrhenophaninae as a subfamily (Mutanen *et al.* 2010). Diversity updated with Arrhenophanidae from Sobczyk (2011).
20. See Robinson (2009). Acrolophinae are included as a subfamily of Tineidae (Mutanen *et al.* 2010).

Family **Roeslerstammiidae** Bruand, 1850 (13 genera, 53 species) [22]
Family **Bucculatricidae** Fracker, 1915 (4 genera, 297 species) [23]
Family **Gracillariidae** Stainton, 1854 (101 genera, 1,866 species, 1/2) [24]
Superfamily **Yponomeutoidea** Stephens, 1829 (10 families)
Family **Yponomeutidae** Stephens, 1829 (95 genera, 363 species) [25]
Family **Argyresthiidae** Bruand, 1850 (1 genus, 157 species)
Family **Plutellidae** Guenée, 1845 (48 genera, 150 species)
Family **Glyphipterigidae** Stainton, 1854 (28 genera, 535 species) [26]
Family **Ypsolophidae** Guenée, 1845 (7 genera, 163 species)
Family **Attevidae** Mosher, 1916 (1 genus, 52 species)
Family **Praydidae** Moriuti, 1977 (3 genera, 47 species)
Family **Heliodinidae** Heinemann & Wocke, 1876 (13 genera, 69 species)
Family **Bedelliidae** Meyrick, 1880 (1 genus, 16 species)
Family **Lyonetiidae** Stainton, 1854 (32 genera, 204 species)
Clade **Apoditrysia** Minet, 1983 (26 superfamilies, all following) [27]
Superfamily **unassigned** (2 families)
Family **Prodidactidae** Epstein & Brown, 2003 (1 genus, 1 species)
Family **Douglasiidae** Heinemann & Wocke, 1876 (2 genera, 29 species) [28]
Superfamily **Simaethistoidea** Minet, 1991 (1 family)
Family **Simaethistidae** Minet, 1991 (2 genera, 4 species)
Superfamily **Gelechioidea** Stainton, 1854 (21 families) [29] [30]
Family **Autostichidae** Le Marchand, 1947 (72 genera, 638 species) [31]
Family **Lecithoceridae** Le Marchand, 1947 (100 genera, 1,200 species)
Family **Xyloryctidae** Meyrick, 1890 (60 genera, 524 species)
Family **Blastobasidae** Meyrick, 1894 (24 genera, 377 species) [32]
Family **Oecophoridae** Bruand, 1850 (313 genera, 3,308 species) [33]
Family **Schistonoeidae** Hodges, 1998 (1 genus, 1 species)
Family **Lypusidae** Herrich-Schäffer, 1857 (3 genera, 21 species) [34]
Family **Chimabachidae** Heinemann, 1870 (2 genera, 6 species)
Family **Peleopodidae** Hodges, 1974 (7 genera, 28 species) [35]

21. Although Roeslerstammiidae is older than Gracillariidae, Gracillarioidea can be used as superfamily name, following ICZN article 35.5: Roeslerstammioidea has never been used as a published name prior to 2000.
22. Amphitheridae Meyrick, 1914 is a junior synonym: see van Nieukerken & Karsholt (2006).
23. *Tritymba* Lower, 1894 (with nine Australian species), is transferred from Plutellidae to Bucculatricidae following the results of the analysis by Mutanen *et al.* (2010).
24. See De Prins & De Prins (2011a).
25. Since the monophyly of the extended Yponomeutidae in the sense of Kyrki (1990) had already been strongly questioned (e.g. Dugdale *et al.* 1998), and in molecular analyses (Mutanen *et al.* 2010, C. Mitter pers. obs.) constituent taxa never form a monophylum, we have placed Argyresthiidae, Praydidae and Attevidae as separate families.
26. This now includes subfamilies Orthoteliinae (extended, see Heppner 2003), Acrolepiinae (see Gaedike 1997) and Glyphipteriginae.
27. The order of superfamilies in Apoditrysia is very tentative; and their relationships are still unsettled.
28. Douglasiidae have been removed from Gracillarioidea, as two separate molecular analyses consistently placed them in Apoditrysia (Mutanen *et al.* 2010; Kawahara *et al.* 2011).
29. The position of Gelechioidea in Apoditrysia follows Kaila (2004) and Mutanen *et al.* (2010). However, its sister group is completely unknown. Therefore, we tentatively place this superfamily at the base of Apoditrysia. The present division into families is highly tentative; new molecular results indicate the need for future changes.
30. As previously noted (Hodges 1998), there are senior names for Gelechiidae and Depressariinae that should be suppressed due to their infrequent and forgotten use. At least at superfamily level, ICZN Article 35.5 probably applies. An application for suppression of these names will be prepared by some of the present authors.
31. In addition to the groups included by Hodges (1998), Autostichidae now also contains Glyphidocerinae and Deocloninae. The monotypic genus *Oecia* Walsingham, 1897, formerly in Schistonoeidae: Oeciinae, is here placed in subfamily Holcopogoninae (Gozmány 2000).
32. Elevation to family level and placement of Blastobasidae is updated from Baldizzone *et al.* (2006) and supported by Kaila (2004) and Bucheli & Wenzel (2005).
33. Contains the subfamilies Oecophorinae and Deuterogoniinae (see Saito 2005). Stathmopodidae are here treated as a separate family.
34. Lypusidae were synonymised with Amphisbatidae Spuler, 1910 by Heikkilä & Kaila (2010), but Amphisbatidae is the junior synonym. Most of the genera previously included in Amphisbatidae (e.g. Hodges 1998; Lvovsky 2011) have now been moved to Depressariinae in Elachistidae.
35. New synonym: Carcinidae Meyrick, 1906 (based on *Carcina* Hübner, 1825), invalid as it is a junior homonym of Carcinidae MacLeay, 1838 (based on *Carcinus* Leach, 1814) in Malacostraca: Decapoda, Brachyura.

Family **Elachistidae** Bruand, 1850 (161 genera, 3,201 species) [36]
Family **Syringopaidae** Hodges, 1998 (1 genus, 1 species)
Family **Coelopoetidae** Hodges, 1978 (1 genus, 3 species)
Family **Stathmopodidae** Janse, 1917 (44 genera, 408 species)
Family **Epimarptidae** Meyrick, 1914 (1 genus, 4 species) [37]
Family **Batrachedridae** Heinemann & Wocke, 1876 (10 genera, 99 species)
Family **Coleophoridae** Bruand, 1850 (5 genera, 1,386 species) [38]
Family **Momphidae** Herrich-Schäffer, 1857 (6 genera, 115 species)
Family **Pterolonchidae** Meyrick, 1918 (2 genera, 8 species)
Family **Scythrididae** Rebel, 1901 (30 genera, 669 species) [39]
Family **Cosmopterigidae** Heinemann & Wocke, 1876 (135 genera, 1,792 species) [40]
Family **Gelechiidae** Stainton, 1854 (500 genera, 4,700 species) [41]
Superfamily **Alucitoidea** Leach, 1815 (2 families)
Family **Tineodidae** Meyrick, 1885 (12 genera, 19 species) [42]
Family **Alucitidae** Leach, 1815 (9 genera, 216 species) [43]
Superfamily **Pterophoroidea** Latreille, 1802 (1 family)
Family **Pterophoridae** Latreille, 1802 (90 genera, 1,318 species) [44]
Superfamily **Carposinoidea** Walsingham, 1897 (2 families) [45]
Family **Copromorphidae** Meyrick, 1905 (9 genera, 43 species)
Family **Carposinidae** Walsingham, 1897 (19 genera, 283 species)
Superfamily **Schreckensteinioidea** Fletcher, 1929 (1 family)
Family **Schreckensteiniidae** Fletcher, 1929 (2 genera, 8 species)
Superfamily **Epermenioidea** Spuler, 1910 (1 family)
Family **Epermeniidae** Spuler, 1910 (10 genera, 126 species) [46]
Superfamily **Urodoidea** Kyrki, 1988 (1 family)
Family **Urodidae** Kyrki, 1988 (3 genera, 66 species)
Superfamily **Immoidea** Common, 1979 (1 family)
Family **Immidae** Common, 1979 (6 genera, 245 species)
Superfamily **Choreutoidea** Stainton, 1858 (1 family)
Family **Choreutidae** Stainton, 1858 (18 genera, 406 species)
Superfamily **Galacticoidea** Minet, 1986 (1 family)
Family **Galacticidae** Minet, 1986 (3 genera, 19 species)
Superfamily **Tortricoidea** Latreille, 1802 (1 family)
Family **Tortricidae** Latreille, 1802 (1,071 genera, 10,387 species) [47]
Superfamily **Cossoidea** Leach, 1815 (7 families) [48]

36. Elachistidae here include subfamilies Elachistinae, Depressariinae, Hypertrophinae, Ethmiinae, Aeolanthinae, Stenomatinae, Agonoxeninae and Parametriotinae (Hodges 1998; Kaila 2004).
37. Previously considered a subfamily of Batrachedridae.
38. Updated from Baldizzone *et al.* (2006). In contrast to Hodges (1998), Coleophoridae, Momphidae, Blastobasidae and Pterolonchidae are here treated as separate families.
39. Updated from Passerin d'Entreves & Roggero (2007).
40. Updated from Sinev (2002).
41. Based on an estimate for the largest subfamily Gelechiinae and actual counts of Physoptilinae, Dichomeridinae and Pexicopiinae.
42. Updated from Gielis (2003). Tineodidae appeared as paraphyletic in a molecular analysis (Mutanen *et al.* 2010). Based on that work, *Isonomeutis* Meyrick, 1988 from New Zealand is moved here from Copromorphidae.
43. Updated from Gielis (2003).
44. Updated from Gielis (2003).
45. The name Copromorphoidea Meyrick, 1905, introduced by Meyrick (1928), is a junior synonym of Carposinoidea, which although introduced as a superfamily by Diakonoff (1961), and several times used before 2000, is attributable to Walsingham (1897) as the author of the family on which the name is based.
46. Updated from Gaedike (1996).
47. See Baixeras *et al*. (2010).
48. Cossoidea and Sesioidea were never monophyletic and were much intermixed in recent molecular analyses (Regier *et al.* 2009; Mutanen *et al.* 2010). Although the monophyly of these superfamilies together is also uncertain, we tentatively synonymise Sesioidea with Cossoidea. It is possible that only by combining them with Zygaenoidea will a well-supported monophyletic group be eventually achieved.

Family **Brachodidae** Agenjo, 1966 (14 genera, 137 species) [49]
Family **Cossidae** Leach, 1815 (151 genera, 971 species) [50]
Family **Dudgeoneidae** Berger, 1958 (6 genera, 57 species) [51]
Family **Metarbelidae** Strand, 1909 (18 genera, 196 species) [52]
Family **Ratardidae** Hampson, 1898 (3 genera, 10 species)
Family **Castniidae** Boisduval, 1828 (34 genera, 113 species)
Family **Sesiidae** Boisduval, 1828 (154 genera, 1,397 species) [53]
Superfamily **Zygaenoidea** Latreille, 1809 (12 families)
Family **Epipyropidae** Dyar, 1903 (9 genera, 32 species)
Family **Cyclotornidae** Meyrick, 1912 (1 genus, 5 species)
Family **Heterogynidae** Rambur, 1866 (1 genus, 10 species)
Family **Lacturidae** Heppner, 1995 (8 genera, 120 species)
Family **Phaudidae** Kirby, 1892 (3 genera, 15 species) [54]
Family **Dalceridae** Dyar, 1898 (11 genera, 80 species)
Family **Limacodidae** Duponchel, 1845 (301 genera, 1,672 species)
Family **Megalopygidae** Herrich-Schäffer, 1855 (23 genera, 232 species)
Family **Aididae** Schaus, 1906 (2 genera, 6 species)
Family **Somabrachyidae** Hampson, 1920 (4 genera, 8 species)
Family **Himantopteridae** Rogenhofer, 1884 (11 genera, 80 species) [55]
Family **Zygaenidae** Latreille, 1809 (170 genera, 1,036 species)
Clade **Obtectomera** Minet, 1986 (12 superfamilies, all following)
Superfamily **Whalleyanoidea** Minet, 1991 (1 family)
Family **Whalleyanidae** Minet, 1991 (1 genus, 2 species)
Superfamily **Thyridoidea** Herrich-Schäffer, 1846 (1 family)
Family **Thyrididae** Herrich-Schäffer, 1846 (93 genera, 940 species)
Superfamily **Hyblaeoidea** Hampson, 1903 (1 family)
Family **Hyblaeidae** Hampson, 1903 (2 genera, 18 species)
Superfamily **Calliduloidea** Moore, 1877 (1 family)
Family **Callidulidae** Moore, 1877 (7 genera, 49 species)
Superfamily **Papilionoidea** Latreille, 1802 (7 families) [56]
Family **Papilionidae** Latreille, 1802 (32 genera, 570 species, 3/4) [57]
Family **Hedylidae** Guenée, 1858 (1 genus, 36 species)
Family **Hesperiidae** Latreille, 1809 (570 genera, 4,113 species, 2/2)
Family **Pieridae** Swainson, 1820 (91 genera, 1,164 species, 5/6)
Family **Riodinidae** Grote, 1895 (1827) (146 genera, 1,532 species, 3/4)
Family **Lycaenidae** Leach, 1815 (416 genera, 5,201 species, 1/1)
Family **Nymphalidae** Rafinesque, 1815 (559 genera, 6,152 species, 11/21)
Superfamily **Pyraloidea** Latreille, 1809 (2 families) [58]
Family **Pyralidae** Latreille, 1809 (1,055 genera, 5,921 species)
Family **Crambidae** Latreille, 1810 (1,020 genera, 9,655 species)
Superfamily **Mimallonoidea** Burmeister, 1878 (1 family)
Family **Mimallonidae** Burmeister, 1878 (27 genera, 194 species)

49. This includes also Pseudocossinae Heppner, 1984 (see Minet 1991).
50. Cossidae in the sense of the Handbook (Edwards *et al.* 1998) and Davis *et al.* (2008) were not monophyletic in recent molecular analyses (Regier *et al.* 2009; Mutanen *et al.* 2010). Here they include only Zeuzerinae, Hypoptinae and Cossinae, almost as the treatment in Schoorl (1990). For diversity of Old World taxa see Yakovlev (2011).
51. Dudgeoneidae now also include Cossulinae, following Mutanen *et al.* (2010), a relationship already suggested by Edwards *et al.* (1998).
52. Afrotropical diversity from De Prins & De Prins (2011b), to which two Oriental genera and ca. 20 species are added.
53. Diversity follows Pühringer & Kallies (2011).
54. Family status of Phaudidae is supported by molecular analyses (Niehuis *et al.* 2006; Mutanen *et al.* 2010).
55. Anomoeotidae Hering, 1937 are here regarded as subfamily of Himantopteridae (Mutanen *et al.* 2010).
56. Current placement and composition of butterflies (including Hesperiidae and Hedylidae) is strongly supported by both large molecular studies (Regier *et al.* 2009; Mutanen *et al.* 2010). Diversity numbers follow G. Lamas' database, only partly published (Lamas 2008).
57. *Chilasa* Moore [1881] is included in *Papilio* Linnaeus, 1758 as a junior synonym, following the most recent phylogenetic studies (Zakharov *et al.* 2004; Simonsen *et al.* 2011).
58. Diversity based on two databases (Beccaloni *et al.* 2005; Nuss *et al.* 2010).

Clade **Macroheterocera** Chapman, 1893 (5 superfamilies) [59]

Superfamily **Drepanoidea** Boisduval, 1828 (3 families) [60]

Family **Cimeliidae** Chrétien, 1916 (2 genera, 6 species) [61]

Family **Doidae** Donahue & Brown, 1987 (2 genera, 6 species) [62]

Family **Drepanidae** Boisduval, 1828 (122 genera, 660 species)

Superfamily **Lasiocampoidea** Harris, 1841 (1 family)

Family **Lasiocampidae** Harris, 1841 (224 genera, 1,952 species)

Superfamily **Bombycoidea** Latreille, 1802 (10 families) [63]

Family **Apatelodidae** Neumoegen & Dyar, 1894 (10 genera, 145 species) [64]

Family **Eupterotidae** Swinhoe, 1892 (53 genera, 339 species)

Family **Brahmaeidae** Swinhoe, 1892 (7 genera, 65 species) [65]

Family **Phiditiidae** Minet, 1994 (4 genera, 23 species) [66]

Family **Anthelidae** Turner, 1904 (9 genera, 94 species) [67]

Family **Carthaeidae** Common, 1966 (1 genus, 1 species)

Family **Endromidae** Boisduval, 1828 (12 genera, 59 species) [68]

Family **Bombycidae** Latreille, 1802 (26 genera, 185 species)

Family **Saturniidae** Boisduval, 1837 (169 genera, 2,349 species)

Family **Sphingidae** Latreille, 1802 (206 genera, 1,463 species, 2/2)

Superfamily **Geometroidea** Leach, 1815 (4 families)

Family **Epicopeiidae** Swinhoe, 1892 (9 genera, 20 species)

Family **Sematuridae** Guenée,1858 (6 genera, 40 species)

Family **Uraniidae** Leach, 1815 (90 genera, 686 species)

Family **Geometridae** Leach, 1815 (2,002 genera, 23,002 species) [69]

Superfamily **Noctuoidea** Latreille, 1809 (6 families) [70]

Family **Oenosandridae** Miller, 1991 (4 genera, 8 species)

Family **Notodontidae** Stephens, 1829 (704 genera, 3,800 species)

Family **Erebidae** Leach, 1815 (1,760 genera, 24,569 species) [71]

Family **Euteliidae** Grote, 1882 (29 genera, 520 species) [72]

Family **Nolidae** Bruand, 1847 (186 genera, 1,738 species)

Family **Noctuidae** Latreille, 1809 (1,089 genera, 11,772 species) [73]

---

59. We prefer to use the term Macroheterocera for the well-supported moth clade identified in recent large molecular studies (Regier *et al.* 2009; Mutanen *et al.* 2010), to avoid confusion with the popular term macrolepidopterans, now freed for popular use for a polyphyletic assemblage of larger moths and butterflies.
60. Inclusion of Cimeliidae and Doidae follows tentatively recent molecular results (Regier *et al.* 2009; Mutanen *et al.* 2010) and is supported by some morphological characters.
61. See Yen & Minet (2007) for synonymy of Axiidae Rebel, 1919 (a homonym of Axiidae Huxley, [1879] in Malacostraca: Decapoda) and its replacement by the name Cimeliidae.
62. Doidae are moved from Noctuoidea, see Drepanoidea above.
63. Classification of Bombycoidea follows Zwick *et al.* (2011).
64. Removed from Bombycidae and raised to family by Zwick (2008).
65. Lemoniidae were synonymized with Brahmaeidae by Zwick (2008).
66. Removed from Bombycidae and raised to family by Zwick *et al.* (2011).
67. Removed from Lasiocampoidea by Zwick *et al.* (2011).
68. Zwick *et al.* (2011) synonymized three groups with Endromidae: Mirinidae, Primostictini and Oberthueriini (previously placed in Bombycidae - Prismostictinae).
69. Diversity updated from Scoble & Hausmann (2007).
70. The classification of Noctuoidea follows the recent studies of Zahiri *et al.* (2011) and Lafontaine & Schmidt (2010). Doidae are moved from Noctuoidea to Drepanoidea (see there). The six families recognized were all highly supported in the molecular analyses (Zahiri *et al.* 2011). Molecular analyses are as yet inconclusive in establishing robust phylogenetic relationships among the four families of quadrifid noctuoids, so the traditional sequence based on morphology is followed, placing Euteliidae after Erebidae and Nolidae before Noctuidae.
71. Erebidae include the former families Arctiidae Leach, 1815 and Lymantriidae Hampson, 1893 as subfamilies. Micronoctuidae Fibiger, 2005 is subordinate within Hypenodinae (Lafontaine & Schmidt 2010; Zahiri *et al.* 2011). Diversity is updated from Poole (1989), numbers for arctiines and lymantriines are estimates.
72. Euteliidae comprise Euteliinae and Stictopterinae (Zahiri *et al.* 2011). Diversity is updated from Poole (1989).
73. Noctuidae comprise essentially the trifine noctuoids (see Lafontaine & Schmidt 2010; Zahiri *et al.* 2011). Diversity is updated from Poole (1989).

Acknowledgements

The authors for the Lepidoptera chapter are grateful to Dana Campbell (University of Maryland) for opening the Leptree forum for discussions amongst us (Leptree Team 2011). Support to Joaquín Baixeras was provided by grant CGL2008-00605 of the Spanish Government (Ministerio de Ciencia e Innovación). Jurate De Prins is grateful to the Belgian Science Policy Office for granting her study on Gracillariidae (contract MO/37/022) and the Belgian Biodiversity Platform (head Dr. André Heughebaert) for the kind technical assistance to make the taxonomic data available online. David Lees was supported by INRA-EFPA during preparation of this work. We thank Thomas Sobczyk (Hoyerswerda, Germany) for providing data from his in press catalogue.

Cited references

Baixeras, J., Brown, J.W. & Gilligan, T.M. (2010) *T@RTS, online world catalogue of the Tortricidae (Version 1.4.0)*. Available from http://www.tortricidae.com/catalogue.asp

Baldizzone, G., Wolf, H. van der & Landry, J.-F. (2006) Coleophoridae, Coleophorinae (Lepidoptera). *World Catalogue of Insects*, 8, 1–215.

Beccaloni, G., Scoble, M., Robinson, G. & Pitkin, B. (2005) *The global Lepidoptera names index*. Natural History Museum. Available from http://www.nhm.ac.uk/research-curation/projects/lepindex/index.html

Bucheli, S.R. & Wenzel, J. (2005) Gelechioidea (Insecta: Lepidoptera) systematics: A reexamination using combined morphology and mitochondrial DNA data. *Molecular Phylogenetics and Evolution*, 35, 380–394. doi:10.1016/j.ympev.2005.02.003

Davis, S.R., Gentili-Poole, P. & Mitter, C. (2008) A revision of the Cossulinae of Costa Rica and cladistic analysis of the world species (Lepidoptera: Cossidae). *Zoological Journal of the Linnean Society*, 154 (2), 222–277. doi: 10.1111/j.1096-3642.2008.00406.x

De Prins, J. & De Prins, W. (2011a) *Global taxonomic database of Gracillariidae (Lepidoptera)*. Belgian Biodiversity Platform. Available from http://www.gracillariidae.net

De Prins, J. & De Prins, W. (2011b) *Afromoths, online database of Afrotropical moth species (Lepidoptera)*. Belgian Biodiversity Platform. Available from http://www.afromoths.net

Diakonoff, A. (1961) Taxonomy of the higher groups of the Tortricoidea. *Verhandlungen des XI. Internationalen Kongresses für Entomologie*, 1 ([96]), 124–126.

Diškus, A. & Puplesis, R. (2003) Catalogue of the world Nepticuloidea & Tischerioidea. *In*: Puplesis, R. & Diškus, A. (Eds) *Nepticuloidea ir Tischerioidea (Lepidoptera) pasaulio ir Lietuvos faunoje. The Nepticuloidea & Tischerioidea (Lepidoptera) - a global review, with strategic regional revisions*, Lutute publishers, Kaunas, pp. 318–436.

Dugdale, J.S., Kristensen, N.P., Robinson, G.S. & Scoble, M.J. (1998) The Yponomeutoidea. *In*: Kristensen, N.P. (Ed) *Lepidoptera, Moths and Butterflies, 1. Evolution, systematics and biogeography*, Handbuch der Zoologie/ Handbook of Zoology, 4 (35), De Gruyter, Berlin, New York, pp. 119–130.

Edwards, E.D., Gentili, P., Horak, M., Kristensen, N.P. & Nielsen, E.S. (1998) The Cossoid/Sesioid assemblage. *In*: Kristensen, N.P. (Ed) *Lepidoptera, Moths and Butterflies, 1. Evolution, systematics and biogeography*, Handbuch der Zoologie/ Handbook of Zoology, 4 (35), De Gruyter, Berlin, New York, pp. 181–197.

Gaedike, R. (1996) Copromorphoidea: Epermeniidae *Lepidopterorum Catalogus (new series)*, 4 (48), i–viii, 1–20.

Gaedike, R. (1997) Yponomeutoidea: Acrolepiidae. *Lepidopterorum Catalogus (new series)*, 5 (55), i–viii, 1–20.

Gielis, C. (2003) Pterophoroidea & Alucitoidea (Lepidoptera). *World Catalogue of Insects*, 4, 1–198.

Gozmány, L.A. (2000) *Holcopogonidae*. Microlepidoptera Palaearctica 10, Goecke & Evers, Keltern, 176 pp.

Grimaldi, D.A. & Engel, M.S. (2005) *Evolution of the insects*, Cambridge University Press, New York, NY etc., XV, 755 pp.

Heikkilä, M. & Kaila, L. (2010) Reassessment of the enigmatic Lepidopteran family Lypusidae (Lepidoptera: Tineoidea; Gelechioidea). *Systematic Entomology*, 35, 71–89. doi: 10.1111/j.1365-3113.2009.00483.x

Heppner, J.B. (2003) Primitive sedge moths from New Zealand and Tasmania: transfer of *Proditrix* and relatives to Orthoteliinae (Lepidoptera: Glyphipterigidae). *Lepidoptera News*, 2, 31–42.

Hoare, R.J.B. (2001) New Zealand's most enigmatic moth - what we know about *Titanomis sisyrota*. *Department of Conservation Science Internal Series*, 5, 1–17. http://www.doc.govt.nz/upload/documents/science-and-technical/DSIS5.pdf

Hodges, R.W. (1998) The Gelechioidea. *In*: Kristensen, N.P. (Ed) *Lepidoptera, Moths and Butterflies, 1. Evolution, systematics and biogeography*, Handbuch der Zoologie/ Handbook of Zoology, 4 (35), De Gruyter, Berlin, New York, pp. 131–158.

Holloway, J.D. (1999) The moths of Borneo: family Lymantriidae. *Malayan Nature Journal*, 53, 1–188.

Horak, M. & Common, I.F.B. (1996) *Heliocosma* group. *In*: Nielsen, E.S., Edwards, E.D. & Rangsi, T.V. (Eds) *Checklist of the Lepidoptera of Australia*, Monographs on Australian Lepidoptera, 4, CSIRO, Collingwood, pp. 47–49.

Hsu, Y.-F. & Powell, J.A. (2005) Phylogenetic relationships within Heliodinidae and systematics of moths formerly assigned to *Heliodines* Stainton (Lepidoptera: Yponomeutoidea). *University of California Publications in Entomology*, 124, i–xii, 1–158. doi: http://repositories.cdlib.org/ucpress/ucpe/vol 124

Huang, D., Nel, A. & Minet, J. (2010) A new family of moths from the Middle Jurassic (Insecta: Lepidoptera). *Acta Geologica Sinica - English Edition*, 84, 874–885. doi: 10.1111/j.1755-6724.2010.00233.x

Kaila, L. (2004) Phylogeny of the superfamily Gelechioidea (Lepidoptera: Ditrysia): an exemplar approach. *Cladistics*, 20, 303–340. doi: 10.1111/j.1096-0031.2004.00027.x

Kawahara, A.Y., Ohshima, I., Kawakita, A. Regier, J.C., Mitter, C., Cummings, M.P., Davis, D.R., Wagner, D.L., De Prins, J. &

Lopez-Vaamonde, C. 2011. Increased gene sampling strengthens support for higher-level groups within leaf-mining moths and relatives (Lepidoptera: Gracillariidae). *BMC Evolutionary Biology*, 11, 182. doi:10.1186/1471-2148-11-182

Kristensen, N.P. (Ed) (1998) *Lepidoptera, moths and butterflies. Volume 1: evolution, systematics and biogeography*. Handbuch der Zoologie/ Handbook of Zoology, 4, De Gruyter, Berlin, New York, 487 pp.

Kristensen, N.P. & Skalski, A.W. (1998) Phylogeny and palaeontology. *In*: Kristensen, N.P. (Ed) *Lepidoptera, Moths and Butterflies, 1. Evolution, systematics and biogeography*, Handbuch der Zoologie/ Handbook of Zoology, 4, De Gruyter, Berlin, New York, pp. 7–25.

Kristensen, N.P., Scoble, M.J. & Karsholt, O. (2007) Lepidoptera phylogeny and systematics: the state of inventorying moth and butterfly diversity. *Zootaxa*, 1668, 699–747. http://www.mapress.com/zootaxa/2007f/zt01668p747.pdf

Kyrki, J. (1990) Tentative reclassification of Holarctic Yponomeutoidea (Lepidoptera). *Nota Lepidopterologica*, 13, 28–42.

Lafontaine, J.D. & Schmidt, B.C. (2010) Annotated check list of the Noctuoidea (Insecta, Lepidoptera) of North America north of Mexico. *ZooKeys*, 40, 1–239. doi: 10.3897/zookeys.40.414

Lamas, G. (2008) *Global butterfly names: various checklists*. Taxome Project. Available from http://www.ucl.ac.uk/taxome/gbn/

Leptree Team (2011) *LepTree: A genomics inspired community collaboration*. Available from http://www.leptree.net/

Lvovsky, A. (2011) *Fauna Europaea: Amphisbatidae, Chimabachidae, Deocleonidae, Depressariidae, Oecophoridae, Schistonoeidae. In:* Karsholt, O. & Nieukerken, E. J. van (Eds). Lepidoptera, Moths. Fauna Europaea version 2.4. Fauna Europaea, Copenhagen, Amsterdam, Paris. Available from http://www.faunaeur.org/

Mey, W. (2007) Microlepidoptera: smaller families. *In:* W. Mey, W. (Ed), The Lepidoptera of the Brandberg Massif in Namibia Part 2. *Esperiana Memoir*, 4, 9–30.

Meyrick, E. (1928) *A revised handbook of British Lepidoptera*, Watkins & Doncaster, London, vi+914 pp.

Minet, J. (1991) Tentative reconstruction of the ditrysian phylogeny (Lepidoptera: Glossata). *Entomologica Scandinavica*, 22 (1), 69–95. doi: 10.1163/187631291x00327

Mutanen, M., Wahlberg, N. & Kaila, L. (2010) Comprehensive gene and taxon coverage elucidates radiation patterns in moths and butterflies. *Proceedings of the Royal Society B: Biological Sciences*, 277, 2839–2848. doi: 10.1098/rspb.2010.0392

Niehuis, O., Yen, S.-H., Naumann, C.M. & Misof, B. (2006) Higher phylogeny of zygaenid moths (Insecta: Lepidoptera) inferred from nuclear and mitochondrial sequence data and the evolution of larval cuticular cavities for chemical defence. *Molecular Phylogenetics and Evolution*, 39 (3), 812–829. doi: 10.1016/j.ympev.2006.01.007

Nielsen, E.S., Robinson, G.S. & Wagner, D.L. (2000) Ghost-moths of the world: a global inventory and bibliography of the Exoporia (Mnesarchaeoidea and Hepialoidea) (Lepidoptera). *Journal of Natural History*, 34, 823–878. doi: 10.1080/002229300299282

Nieukerken, E.J. van & Karsholt, O. (2006) The validity of the family name Roeslerstammiidae Bruand (Lepidoptera). *Nota Lepidopterologica*, 29, 113–120. http://www.repository.naturalis.nl/document/50442

Nieukerken, E.J. van (2010) *Nepticulidae and Opostegidae of the world*. Scratchpads, biodiversity online. Available from http://nepticuloidea.info/

Nuss, M., Landry, B., Vegliante, F., Tränkner, A., Mally, R., Hayden, J., Segerer, A., Li, H., Schouten, R., Solis, M.A., Trofimova, T., De Prins, J. & Speidel, W. (2010) *GlobiZ: Global Information System on Pyraloidea*. Senckenberg Collection of Natural History, Museum of Zoology, Dresden (Germany). Available from http://www.pyraloidea.org

Passerin d'Entreves, P. & Roggero, A. (2007) Gelechioidea: Scythrididae. *Lepidopterorum Catalogus (new series)*, 3 (44), i–xiv, 1–85.

Poole, R.W. (1989) Noctuidae, 3 volumes. *Lepidopterorum Catalogus (new series)*, 118, i–xii, 1–1314.

Pühringer, F & Kallies, A. (2011) *Checklist of the Sesiidae of the world (Lepidoptera: Ditrysia)*. Available from http://www.sesiidae.net/Checklst.htm

Regier, J.C., Zwick, A., Cummings, M.P., Kawahara, A.Y., Cho, S., Weller, S., Roe, A., Baixeras, J., Brown, J.W., Parr, C., Davis, D.R., Epstein, M., Hallwachs, W., Hausmann, A., Janzen, D.H., Kitching, I.J., Solis, M.A., Yen, S.-H., Bazinet, A.L. & Mitter, C. (2009) Toward reconstructing the evolution of advanced moths and butterflies (Lepidoptera: Ditrysia): an initial molecular study. *BMC Evolutionary Biology*, 9 (1), 280. doi: 10.1186/1471-2148-9-280

Robinson, G.S. (2009) *Biology, distribution and diversity of tineid moths*, Southdene & Natural History Museum London, Kuala Lumpur, 143 pp.

Rota, J. (2011) Data partitioning in Bayesian analysis: molecular phylogenetics of metalmark moths (Lepidoptera: Choreutidae). *Systematic Entomology*, 36, 317–329. doi: 10.1111/j.1365-3113.2010.00563.x

Saito, T. (2005) Immature stages of two species of the genus *Deuterogonia* (Lepidoptera, Oecophoridae) in Japan, with remarks on the systematic position of the genus. *Tinea*, 18, 45–54.

Schoorl, J.W. (1990) A phylogenetic study on Cossidae (Lepidoptera: Ditrysia) based on external adult morphology. *Zoologische Verhandelingen*, 263, 1–295. http://www.repository.naturalis.nl/record/317816

Scoble, M.J. & Hausmann, A. (2007) *Online list of valid and available names of the Geometridae of the World*. Lepidoptera Barcode of Life, iBOL. Available from http://www.lepbarcoding.org/geometridae/species_checklists.php

Simonsen, T.J., Zakharov, E.V., Djernaes, M., Cotton, A.M., Vane-Wright, R.I. & Sperling, F.A.H. (2011) Phylogenetics and divergence times of Papilioninae (Lepidoptera) with special reference to the enigmatic genera *Teinopalpus* and *Meandrusa*. *Cladistics*, 27, 113–137. doi: 10.1111/j.1096-0031.2010.00326.x

Sinev, S.Y. (2002) World catalogue of cosmopterigid moths (Lepidoptera: Cosmopterigidae). Katalog roskoshnykh uzkokrylykh molej (Lepidoptera: Cosmopterigidae). *Trudy Zoologicheskogo Instituta*, 293, 1–183.

Sobczyk, T. (2011) Psychidae (Lepidoptera). *World Catalogue of Insects*, 10, 1–475. [in press]

Yakovlev, R.V. (2011) Catalogue of the family Cossidae of the Old World (Lepidoptera). *Neue Entomologische Nachrichten*, 66, 1–129.

Yen, S.-H. & Minet, J. (2007) Cimelioidea: a new superfamily name for the Gold Moths (Lepidoptera: Glossata). *Zoological Studies*, 46 (3), 262–271. http://zoolstud.sinica.edu.tw/Journals/46.3/262.pdf

Zahiri, R., Kitching, I.J., Lafontaine, J.D., Mutanen, M., Kaila, L., Holloway, J.D. & Wahlberg, N. (2011) A new molecular phylogeny offers hope for a stable family level classification of the Noctuoidea (Lepidoptera). *Zoologica Scripta*, 40, 158–173. doi: 10.1111/j.1463-6409.2010.00459.x
Zakharov, E.V., Caterino, M.S. & Sperling, F.A.H. (2004) Molecular phylogeny, historical biogeography, and divergence time estimates for swallowtail butterflies of the genus *Papilio* (Lepidoptera: Papilionidae). *Systematic Biology*, 53, 193–215. doi:10.1080/10635150490423403
Zwick, A. (2008) Molecular phylogeny of Anthelidae and other bombycoid taxa (Lepidoptera: Bombycoidea). *Systematic Entomology*, 33, 190–209. doi: 10.1111/j.1365-3113.2007.00410.x
Zwick, A., Regier, J.C., Mitter, C. & Cummings, M.P. (2011) Increased gene sampling yields robust support for higher-level clades within Bombycoidea (Lepidoptera). *Systematic Entomology*, 36, 31–43. doi: 10.1111/j.1365-3113.2010.00543.x

Author addresses

Erik J. van Nieukerken (co-ordination Lepidoptera, Nepticuloidea, Adeloidea, various smaller groups) Netherlands Centre for Biodiversity Naturalis, PO Box 9517, NL-2300 RA Leiden Netherlands; nieukerken@naturalis.nl (corresponding author)
Lauri Kaila (Lepidoptera classification, Gelechioidea) Finnish Museum of Natural History, P.O. Box 17, FI-00014 University of Helsinki Finland; lkaila@mappi.helsinki.fi
Ian J. Kitching (co-ordination Lepidoptera, Bombycoidea, Lasiocampoidea, Noctuoidea) Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD United Kingdom; i.kitching@nhm.ac.uk
Niels P. Kristensen (Lepidoptera classification, non-Heteroneura) Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø Denmark; npkristensen@snm.ku.dk
David C. Lees (Lepidoptera classification, Unassigned early lepidopterans, Micropterigidae, Callidulidae) Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD United Kingdom/UR 633 Zoologie Forestière, Institut National de la Recherche Agronomique, Orléans 45075 France; dclees@gmail.com
Joël Minet (Lepidoptera classification, Unassigned early lepidopterans, Callidulidae, Geometroidea) Muséum National d'Histoire Naturelle, Département Systématique et Evolution, UMR CNRS 7205, Case Postale 50 (Entomologie), FR-75231 Paris Cedex 05 France; minet@mnhn.fr
Charles Mitter (Lepidoptera classification) Department of Entomology, University of Maryland, College Park MD 20742 USA; cmitter@umd.edu
Marko Mutanen (Lepidoptera classification) Zoological Museum, Department of Biology, University of Oulu, PO Box 3000, FI-90014 Oulu Finland; marko.mutanen@oulu.fi
Jerome C. Regier (Lepidoptera classification) Institute for Bioscience and Biotechnology Research & Department of Entomology, University of Maryland, 5140 Plant Sciences Bldg. College Park, MD 20742 USA; regier@umd.edu
Thomas J. Simonsen (co-ordination Lepidoptera; Exoporia, Papilionidae, Nymphalidae, Pyraloidea) Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD United Kingdom; t.simonsen@nhm.ac.uk
Niklas Wahlberg (Lepidoptera classification) Laboratory of Genetics, Department of Biology, University of Turku, FI-20014 Turku Finland; niklas.wahlberg@utu.fi
Shen-Horn Yen (Lepidoptera: Zygaenoidea, Thyrididae, Crambidae) Department of Biological Sciences, National Sun Yat-Sen, University, 70 Lien Hai Rd, Kaohsiung 804 Taiwan; shenhornyen@mail.nsysu.edu.tw
Reza Zahiri (Lepidoptera: Noctuoidea) Laboratory of Genetics, Department of Biology, University of Turku, FI-20014 Turku Finland; Reza.Zahiri@utu.fi
David Adamski (Lepidoptera: Blastobasidae, Autostichidae) Department of Entomology, National Museum of Natural History, Smithsonian Institution Washington, DC 20013-7012 USA; adamskid@si.edu
Joaquin Baixeras (Lepidoptera: Tortricoidea) Cavanilles Institute of Biodiversity and Evolutionary Biology, University of Valencia, P.O.Box 22085, ES- 46071 Valencia Spain; joaquin.baixeras@uv.es
Daniel Bartsch (Lepidoptera: Sesiidae) State Museum of Natural History Stuttgart, Rosenstein 1, DE-70191 Stuttgart Germany; daniel.bartsch@smns-bw.de
Bengt Å. Bengtsson (Lepidoptera: Scythrididae) Lokegatan 3, SE-386 93 Färjestaden Sweden; bengt.a.bengtsson@gmail.com
John W. Brown (Lepidoptera: Tortricoidea) SEL, USDA, Smithsonian Institution, P.O. Box 37012, National Museum Natural History, E-517, MRC 168, Washington, DC 20013-7012 USA; john.brown@ars.usda.gov
Sibyl Rae Bucheli (Lepidoptera: Gelechioidea) Department of Biological Sciences, Sam Houston State University, Box 2116, Huntsville TX 77341 USA; bucheli@shsu.edu
Donald R. Davis (Lepidoptera: Neopseustidae, Tineoidea, Epipyropidae) Entomology, NHB 105, P.O. Box 37012, Smithsonian Institution, Washington, DC, USA, 20013-7012; davisd@si.edu
Jurate De Prins (Lepidoptera: Gracillariidae) Royal Museum for Central Africa, Leuvensesteenweg 13, BE-3080 Tervuren Belgium; jurate.de.prins@africamuseum.be
Willy De Prins (Lepidoptera: Gracillariidae) Netherlands Centre for Biodiversity Naturalis, PO Box 9517, 2300 RA Leiden The Netherlands; willy.deprins@gmail.com
Marc E. Epstein (Lepidoptera: Zygaenoidea) California Dept. of Food & Agriculture, Plant Pest Diagnostics Branch, 3294 Meadowview Ave, Sacramento, CA 95832-1448 USA; marc.epstein@cdfa.ca.gov
Patricia Gentili-Poole (Lepidoptera: Cossoidea) Department of Entomology, Smithsonian Institution, Washington DC 20013-

7012 USA; gentilip@si.edu
Cees Gielis (Lepidoptera: Pterophoridae, Alucitoidea) Netherlands Centre for Biodiversity Naturalis, PO Box 9517, NL-2300 RA Leiden Netherlands; c.gielis@net.hcc.nl
Peter Hättenschwiler (Lepidoptera: Psychidae) Seeblickstrasse 4, CH-8610 Uster Switzerland; peter.haettenschwiler@dative.ch
Axel Hausmann (Lepidoptera: Geometroidea) Bavarian State Collection of Zoology, Münchhausenstr. 21, DE-81247 Munich Germany; Axel.Hausmann@zsm.mwn.de
Jeremy D. Holloway (Lepidoptera: Noctuoidea, various Apoditrysia) Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD United Kingdom; j.holloway@nhm.ac.uk
Axel Kallies (Lepidoptera: Brachodidae, Sesiidae) The Walter and Eliza Hall Institute of Medical Research, 1G Royal Parade, 3050 Parkville Victoria Australia; axelkallies@hotmail.com
Ole Karsholt (Lepidoptera: Gelechiidae) Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø Denmark, OKarsholt@snm.ku.dk
Akito Y. Kawahara (Lepidoptera: Gracillarioidea) McGuire Center For Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, SW 34th Street and Hull Road, PO Box 112710, Gainesville, FL 32611-2710 USA; kawahara@flmnh.ufl.edu
Sjaak (J.C.) Koster (Lepidoptera: Gelechioidea) Netherlands Centre for Biodiversity Naturalis, PO Box 9517, NL-2300 RA Leiden Netherlands; sjaak.koster@planet.nl
Mikhail V. Kozlov (Lepidoptera: Adelidae) Section of Ecology, University of Turku, FI-20014 Turku, Finland; mikoz@utu.fi
J. Donald Lafontaine (Lepidoptera: Noctuoidea) Canadian National Collection of Insects, Arachnids, and Nematodes , Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa ON K1A 0C6 Canada; Don.Lafontaine@agr.gc.ca
Gerardo Lamas (Lepidoptera: Papilionoidea) Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Apartado 14-0434, Lima-14 Peru; glamasm@unmsm.edu.pe
Jean-François Landry (Lepidoptera: Gelechioidea) Canadian National Collection of Insects, Arachnids, and Nematodes , Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa ON K1A 0C6 Canada; Jean-Francois.Landry@agr.gc.ca
Sangmi Lee (Lepidoptera: Gelechiidae) Mississippi Entomological Museum, PO Box 9775, Mississippi State University, Mississippi State, MS 39762 USA; microlepi@hotmail.com
Matthias Nuss (Lepidoptera: Pyraloidea) Senckenberg Naturhistorische Sammlungen Dresden, Museum für Tierkunde, Königsbrücker Landstr. 159, DE-01109 Dresden Germany; matthias.nuss@senckenberg.de
Kyu-Tek Park (Lepidoptera: Lecithoceridae) McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611-2710 USA; ktpark02@gmail.com
Carla Penz (Lepidoptera: Nymphalidae) Department of Biological Sciences, University of New Orleans, 2000 Lakeshore Drive, New Orleans, LA 70148 USA; cpenz@uno.edu
Jadranka Rota (Lepidoptera: Choreutidae, Millieriidae) Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, DK-2100 Copenhagen Ø Denmark; Jrota@snm.ku.dk
Alexander Schintlmeister (Lepidoptera: Notodontidae) Calberlastr. 3, DE-01326 Dresden Germany; schintlm@aol.com
B. Christian Schmidt (Lepidoptera: Noctuoidea) Canadian Food Inspection Agency, Canadian National Collection of Insects, Arachnids and Nematodes, 960 Carling Avenue, Ottawa, ON, Canada K1A 0C6; Chris.Schmidt@inspection.gc.ca
Jae-Cheon Sohn (Lepidoptera: Yponomeutoidea) Department of Entomology, University of Maryland, 4112 Plant Sciences Bldg., College Park, MD 20742 USA; jsohn@umd.edu
M. Alma Solis (Lepidoptera: Pyraloidea) SEL, USDA, Smithsonian Institution, P.O. Box 37012, National Museum Natural History, E-517, MRC 168, Washington, DC 20013-7012 USA; Alma.solis@ars.usda.gov
Gerhard M. Tarmann (Lepidoptera: Zygaenidae) Tiroler Landesmuseum Ferdinandeum, Naturwissenschaftliche Sammlungen, Feldstrasse 11a, AT-6020 Innsbruck Austria; g.tarmann@tiroler-landesmuseen.at
Andrew D. Warren (Lepidoptera: Hesperiidae) McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, SW 34th Street and Hull Road, P. O. Box 112710, Gainesville, FL 32611-2710; hesperioidea@yahoo.com
Susan Weller (Lepidoptera: Noctuoidea) J.F. Bell Museum of Natural History, 10 Church St, S.E., Room 300, University of Minnesota, St. Paul MN 55455 USA; welle008@umn.edu
Roman V. Yakovlev (Lepidoptera: Cossoidea) South-Siberian Botanical Garden, Altai State Uni., ul. Chkalova 57-81, RU-656049 Barnaul Russia; cossus_cossus@mail.ru
Vadim V. Zolotuhin (Lepidoptera: Lasiocampoidea, Bombycoidea) Ablukova 13-12, RU- 432005 Uljanovsk Russia v.zolot@mail.ru
Andreas Zwick (Lepidoptera: Lasiocampoidea, Bombycoidea) State Museum of Natural History Stuttgart, Rosenstein 1, DE-70191 Stuttgart Germany; andreas.zwick@smns-bw.de

Order **Diptera** Linnaeus, 1758 (159,294 species, 3,817 fossil species, 5,969 dubious species)[1]

Suborder **NEMATOCERA** Dumeril, 1805 (9 subordinate groups) Paraphyletic, Sequential

Incertae Sedis (7 families)

Family †Asiochaoboridae Hong & Wang, 1990 (4 genera, 4 species)

Family †Eopolyneuridae Rohdendorf, 1962 (2 genera, 2 species)

Family †Hyperpolyneuridae Rohdendorf, 1962 (1 genus, 1 species)

Family †Luanpingitidae Zhang, 1986 (1 genus, 1 species)

Family †Palaeophoridae Rohdendorf, 1951 (1 genus, 1 species)

Family †Serendipidae Evenhuis, 1994 (2 genera, 3 species)

Family †Tethepomyiidae Grimaldi & Arillo, 2009 (1 genus, 1 species)

Infraorder **Deuterophlebiomorpha** Rohendorf, 1961 (1 family)

Family Deuterophlebiidae Edwards, 1922 (1 genus, 14 species)

Infraorder **Nymphomyiomorpha** Rohdendorf, 1964 (1 family)

Family Nymphomyiidae Tokunaga, 1932 (1 genus, 8 species, 0/1)

Infraorder **Tipulomorpha** Rohdendorf, 1961 (6 families)[2] Sequential

Family †Vladipteridae Shcherbakov, 1995 (4 genera, 5 species)[3]

Family Trichoceridae Rondani, 1841 (15 genera, 183 species, 9/24/3)[4]

Family Pediciidae Osten Sacken, 1859 (12 genera, 496 species, 2/9/1)[5]

Family Limoniidae Rondani, 1856 (188 genera, 10,777 species, 56/389/29) Para- or polyphyletic

Family Cylindrotomidae Schiner, 1863 (9 genera, 82 species, 0/14)

Family Tipulidae Latreille, 1802 (39 genera, 4,415 species, 2/94/25)

Infraorder [unnamed] (1 family)

Family †Tillyardipteridae Lukashevich & Shcherbakov, 1999 (2 genera, 2 species)[6]

---

1. **BY** Thomas Pape, Vladimir Blagoderov & Mikhail B. Mostovski (for full contact details, see **Author names & addresses** after **Cited references**). The title of this contribution should be cited as "Order DIPTERA Linnaeus, 1758. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".

   This listing of Diptera taxa follows the classification used by ***Systema Dipterorum*** (see www.diptera.org). Documentation for this classification as well as the ability to search for details on names and species is available there. ***Systema Dipterorum*** now documents more than a quarter of a million names (270,219) for some 160,000 (159,294) species. Unfortunately, due to the lack of support, the ***Systema Dipterorum*** is not up to date and many records remain incomplete. While some 2010-names are included, the last complete check against the ***Zoological Record*** was back in 2007 (volume 143, December 2007). The numbers presented here follow from a version prepared at the end of 2010 and passed along to the 2011 Catalogue of Life, Annual Checklist.

   The number for species includes dubious species, that is, species which are not well defined or known. These (5,969 names), however, represent about four per cent of the total names here tabulated and are not segregated as they may represent valid species and, clearly, they are much less than the number of unrecognized species. The number of dubious species is given for each family after that for fossil genera/fossil species. The standard estimate of undescribed species of arthropods is about 90%, that is, the described species are only 10% of the total.

   The classification largely follows from the **Diptera Tree of Life** analysis and cladogram (Wiegmann *et al.*, 2011) and departures from this classification are annotated as appropriate with footnotes. Basic information on family and higher-taxon names is largely based on Sabrosky (1999) and that for fossils on Evenhuis (1994). The fossils, however, are extensively annotated as there have been major changes in their family classification.

   Our list is hierarchical, arranged more or less in phylogenetic sequence from the primitive (oldest) to the most advanced (youngest) taxa. We have reluctantly assigned the traditional Linnaean ranks to the groups in our list, with the caveat that this implies an equivalence that does not exist. We have annotated our list to show the status of each group. The default is that the group is monophyletic and arrangement is alphabetic. If a taxon is sister to all the groups that follow, then the word "Sequential" is inserted after the name of the group to which these follow. Groups, which are either para- or polyphyletic are marked as such. Groups, which can not be accurately placed, are marked as *Incertae Sedis* at the level to which the placement is known. That is, if a lower-ranked group can not, for example, be placed within any of the subordinate groups of Nematocera, then that lower-ranked group is listed FIRST after Nematocera and is marked as *Incertae Sedis*. Then the fossil taxa are arranged alphabetically or sequentially, and extant taxa may be listed sequentially or included in the alphabetic list of fossil taxa. See Wiley (1979) for more details on annotated Linnaean hierarchies.

   Warning: While groups may have the same rank, they may not be equivalent and should not be used to make comparisons between similarly ranked taxa. For example, the family Limoniidae contains over 10,000 species and is over 235 million years old, whereas the family Braulidae contains only 7 species and is less than 30 million years old.

   This work is a joint effort and the order of authorship simply follows seniority, that is, oldest first to junior-most last. MM and VB were responsible for the fossils, TP oversaw the extant taxa and were in charge of bringing the manuscript into its final format. Special acknowledgments are due to F.C. Thompson, who assembled most of the data for this chapter and was a driving force on all stages of work on the manuscript, as well as to the Schlinger Foundation for its support of ***Systema Dipterorum*** over the years, without which this review would not have been possible.
2. The arrangement of the families of Tipulomorpha follows from Petersen *et al*. (2010).
3. Including *Triassochorista jinsuoguanensis* Hong and Guo, 2003 (Blagoderov *et al.*, 2007).
4. Including Musidoromimidae Rohdendorf, 1962 (Blagoderov *et al.*, 1994).
5. Including Diplopolyneuridae Rohdendorf, 1962 (Krzemiñski, 1992), Gracilitipulidae Hong & Wang, 1990, Zhangobiidae Evenhuis, 1994 (Blagoderov *et al.*, 2002), Archilimoniidae Krzeminski & Krzeminska, 2003 (Blagoderov *et al.*, 2007).

Infraorder **Ptychopteromorpha** Wood & Borkent, 1986 (3 families)
Family †Hennigmatidae Shcherbakov, 1995 (3 genera, 4 species)
Family †Nadipteridae Lukashevich, 1995 (1 genus, 3 species)
Family Ptychopteridae Osten Sacken, 1862 (27 genera, 156 species, 23/148/2)[7]
Infraorder **Psychodomorpha** Hennig, 1968 (5 families)
Family †Ansorgiidae Krzemiński & Lukashevich, 1993 (1 genus, 1 species)
Family Blephariceridae Loew, 1861 (39 genera, 331 species, 6/8/2)[8]
Family †Grauvogeliidae Krzemiński, 1999 (2 genera, 2 species)
Family Psychodidae Newman, 1834 (144 genera, 3,026 species, 22/68/44)
Family Tanyderidae Osten Sacken, 1880 (12 genera, 55 species, 3/17)
Infraorder **Culicomorpha** Hennig, 1948 (9 families)
Incertae Sedis (1 family)
Family †Protendipedidae Rohdendorf, 1951 (2 genera, 3 species)
---------- Extant taxa, Sequential
Family Dixidae Schiner, 1868 (9 genera, 197 species, 0/11/1)
Family Corethrellidae Edwards, 1932 (1 genera, 111 species, 0/7)
Family Chaoboridae Newman, 1834 (33 genera, 89 species, 15/35)[9]
Family Culicidae Meigen, 1818 (46 genera, 3,725 species, 3/20/41)
Family Thaumaleidae Bezzi, 1913 (10 genera, 183 species, 1/1)
Family Simuliidae Newman, 1834 (35 genera, 2,121 species, 6/14)
Family Ceratopogonidae Newman, 1834 (130 genera, 5,902 species, 12/258/152)
Family Chironomidae Newman, 1834 (541 genera, 7,290 species, 75/237/1,700)[10]
Clade **NEODIPTERA** Michelsen, 1994 (3 subordinate groups) Sequential
Infraorder **Perissommatomorpha** Rohdendorf, 1977 (2 families)
Family †Boholdoyidae Kovalev, 1985 (2 genera, 3 species)
Family Perissommatidae Colless, 1962 (5 genera, 9 species, 4/5)[11]
Infraorder **Bibionomorpha** Hennig, 1954 (33 families)
Incertae Sedis (4 families)
Family †Siberhyphidae Kovalev, 1985 (1 genus, 1 species)
Family †Tanyderophrynidae Rohdendorf, 1962 (1 genus, 1 species)
Family †Tipulodictyidae Rohdendorf, 1962 (1 genus, 1 species)
Family †Tipulopleciidae Rohdendorf, 1962 (1 genus, 1 species)
----------Fossil taxa
Family †Antefungivoridae Rohdendorf, 1938 (9 genera, 44 species)
Family †Archizelmiridae Rohdendorf, 1962 (4 genera, 5 species)
Family †Crosaphididae Kovalev, 1983 (1 genus, 2 species)
Family †Elliidae Krzeminska, Blagoderov & Krezmiński, 1993 (2 genera, 4 species)
Family †Eoditomyiidae Ansorge, 1996 (1 genus, 1 species)
Family †Heterorhyphidae Ansorge & Krzemiński, 1995 (1 genus, 1 species)
Family †Mesosciophilidae Rohdendorf, 1946 (8 genera, 14 species)
Family †Paraxymyiidae Rohdendorf, 1946 (7 genera, 12 species)[12]
Family †Pleciofungivoridae Rohdendorf, 1946 (17 genera, 63 species)
Family †Procramptonomyiidae Kovalev, 1983 (4 genera, 7 species)
Family †Protopleciidae Rohdendorf, 1946 (9 genera, 21 species)[13]
Family †Protorhyphidae Handlirsch, 1906 (7 genera, 19 species)

6. Including Rhaetaniidae Krzemiński and Krzemińska, 2002.
7. Architendipedidae Rohdendorf, 1962 and Eoptychopteridae Handlirsch, 1906 are included in Ptychopteridae after Lukashevich (2008).
8. Including Sinotendipedidae Hong & Wang, 1990 (Blagoderov *et al.*, 2002).
9. Including Dixamimidae Rohdendorf, 1959 and Rhaetomyiidae Rohdendorf, 1962 (Lukashevich, 1996).
10. Including Protobibionidae Rohdendorf, 1946 (Ashe, 1983).
11. Including Limnorhyphidae Hong, 1983.
12. Including Parapleciidae Hong, 1983 and genera considered by authors within Eopleciidae. *Eoplecia primitiva* Handlirsh, 1920 is a synonym of *Mesorhyphus nanus* Handlirsch, 1920, so Eopleciidae is a synonym of Anisopodidae (Ansorge & Krzemiński, 1995).
13. Including Pleciodictyidae Rohdendorf, 1962, Protoligoneuridae Rohdendorf, 1964, Palaeopleciidae Rohdendorf, 1962 (Blagoderov, 1995), Dyspolyneuridae Rohdendorf, 1961 (Krzemiński, 1992).

Family †Protoscatopsidae Rohdendorf, 1946 (2 genera, 2 species)
---------- Extant taxa, Sequential
Family Anisopodidae Knab, 1912 (24 genera, 196 species, 18/47)[14]
Family Canthyloscelididae Enderlein, 1912 (5 genera, 17 species, 0/1)
Family Scatopsidae Newman, 1834 (34 genera, 407 species, 2/17/19)
Family Valeseguyidae Amorim & Grimaldi, 2006 (3 genera, 3 species, 2/2)[15]
Family Axymyiidae Shannon, 1921 (6 genera, 8 species, 3/4)
Family Hesperinidae Schiner, 1864 (2 genera, 10 species, 1/2)
Family Bibionidae Fleming, 1821 (12 genera, 1,102 species, 5/342/11)[16]
Family Pachyneuridae Schiner, 1864 (7 genera, 8 species, 2/3)
Family Ditomyiidae Keilin, 1919 (8 genera, 98 species, 0/4)
Family Diadocidiidae Winnertz, 1863 (4 genera, 39 species, 2/5)
Family Mycetophilidae Newman, 1834 (233 genera, 4,525 species, 53/375/49)[17]
Family Bolitophilidae Winnertz, 1863 (2 genera, 61 species, 1/2)
Family Keroplatidae Rondani, 1856 (90 genera, 993 species, 12/40/26)
Family Lygistorrhinidae Edwards, 1925 (15 genera, 44 species, 7/12)
Family Rangomaramidae Jaschhof & Didham, 2002 (13 genera, 32 species, 1/5)[18]
Family Sciaridae Billberg, 1820 (92 genera, 2,455 species, 4/153/84)
Family Cecidomyiidae Newman, 1835 (761 genera, 6,296 species, 9/110/396)

Suborder **BRACHYCERA** Macquart, 1834 (2 subordinate groups) Sequential

Clade **Orthorrhapha** Brauer, 1863 (7 subordinate groups) Mono- or paraphyletic[19]

Incertae Sedis (4 families)
Family †Eomyiidae Rohdendorf, 1962 (1 genus, 1 species)
Family Nemestrinidae Griffith & Pidgeon, 1832 (26 genera, 300 species, 7/23/1)
Family †Prosechamyiidae Blagoderov & Grimaldi, 2007 (1 genus, 2 species)
Family †Rhagionemestriidae Ussatchov, 1968 (2 genera, 3 species)

Superfamily [unnamed] (2 families)
Family Acroceridae Leach, 1815 (55 genera, 400 species, 7/8/1)
Family Hilarimorphidae Williston, 1896 (2 genera, 36 species, 1/4)

Superfamily [unnamed] (1 family)
Family Vermileonidae Williston, 1886 (12 genera, 61 species, 2/2)

Superfamily **Asiloidea** Latreille, 1802 (11 families) Sequential
Family Bombyliidae Latreille, 1802 (275 genera, 5,382 species, 22/18/31)
Family Asilidae Latreille, 1802 (555 genera, 7,531 species, 8/52/186)
Family †Cratomyiidae Mazzarolo & Amorim, 2000 (2 genera, 2 species)
Family †Protapioceridae Ren, 1998 (1 genus, 3 species)
Family Mydidae Latreille, 1809 (66 genera, 498 species, 1/3/2)
Family Apioceridae Bigot, 1857 (1 genera, 143 species)
Family Evocoidae Yeates, Irwin & Wiegmann 2006 (1 genus, 1 species)
Family Apsilocephalidae Nagatomi, Saigusa, Nagatomi & Lyneborg, 1991 (4 genera, 7 species, 1/3)
Family Scenopinidae Burmeister, 1835 (25 genera, 420 species, 1/4)
Family †Protomphralidae Rohdendorf, 1957 (2 genera, 2 species)
Family Therevidae Newman, 1834 (128 genera, 1,143 species, 9/14/25)

Superfamily **Rhagionoidea** Latreille, 1802 (6 families) Sequential
Family Austroleptidae Nagatomi, 1982 (1 genus, 8 species)

14. Sinoditomyiidae Hong, 2002 are included in Anisopodidae: Mycetobiinae.
15. Valeseguyidae are placed as sister to the Scatopsidae and Canthyloscelididae following from Amorin & Grimaldi (2006).
16. Cascopleciidae Poinar, 2010 merely represent a typical bibionid with an abberant antenna and are here synonymized with Bibionidae (subfamily Pleciinae).
17. The genus *Manota* Williston, 1896 is retained in the Mycetophilidae as placed by Rindal *et al*. (2009), not as the sister to Ditomyiidae as in the **Diptera Tree of Life** analysis. Also, Huaxiasciaritidae Hong, 2002 are included here.
18. The circumscription and placement of the Rangomaramidae follow from Amorim and Rindal (2007).
19. The orthorrhaphan Dipteran have usually been considered a paraphyletic grade (e.g., Hennig 1973) but emerged as monophyletic in the **Diptera Tree of Life** analysis. Pending more firm evidence on orthorrhaphan relationships, we are here applying a classification with seven subordinate groups given rank as superfamilies.

Family Bolbomyiidae Stuckenberg, 2001 (1 genus, 4 species, 0/1)
Family †Palaeostratiomyiidae Rohdendorf, 1938 (1 genus, 1 species)
Family Rhagionidae Latreille, 1892 (47 genera, 756 species, 28/62/28)
Family †Rhagionempididae Rohdendorf, 1951 (5 genera, 5 species)
Family †Eostratiomyiidae Rohdendorf, 1951 (1 genus, 1 species)
Superfamily **Stratiomyoidea** Latreille, 1802 (4 families)
Family Panthophthalmidae Bigot, 1886 (2 genera, 20 species)
Family Stratiomyidae Latreille, 1802 (385 genera, 2,690 species, 9/22/24)
Family Xylomyidae Verrall, 1901 (4 genera, 138 species, 0/4)
Family †Zhangsolvidae Nagatomi & Yang, 1998 (1 genus, 1 species)
Superfamily **Tabanoidea** Latreille, 1802 (5 families)[20]
Family Athericidae Nowicki, 1873 (12 genera, 133 species, 2/9/7)
Family Oreoleptidae Zloty, Sinclair & Pritchard, 2005 (1 genus, 1 species)
Family Pelecorhynchidae Enderlein, 1922 (2 genera, 49 species)
Family Tabanidae Latreille, 1802 (156 genera, 4,434 species, 10/29/46)
Family †Uranorhagionidae Zhang, Yang & Ren, 2010 (2 genera, 5 species)
Superfamily **Xylophagoidea** Fallén, 1810 (5 families)
Family †Archisargidae Rohdendorf, 1951 (6 genera, 17 species)
Family †Eremochaetidae Ussatchov, 1968 (9 genera, 16 species)
Family †Kovalevisargidae Mostovski, 1997 (2 genera, 2 species)
Family †Protobrachyceridae Rohdendorf, 1964 (1 genus, 3 species)
Family Xylophagidae Fallén, 1810 (15 genera, 145 species, 6/9/2)
Clade **EREMONEURA** Lameere, 1906 (3 subordinate groups) Sequential
Incertae Sedis (1 family)
Family †Chimeromyiidae Grimaldi, Cumming & Arillo, 2009 (2 genera, 8 species)
Superfamily **Empidoidea** Latreille, 1804 (8 families)
Family Atelestidae Hennig, 1970 (11 genera, 22 species, 7/11)
Family Brachystomatidae Melander, 1908 (20 genera, 153 species, 0/6/6)
Family Dolichopodidae Latreille, 1809 (268 genera, 7,358 species, 29/123/90)
Family Empididae Latreille, 1804 (104 genera, 3,142 species, 32/93/104)
Family Homalocnemiidae Collin, 1928 (1 genus, 7 species)
Family Hybotidae Macquart, 1823 (75 genera, 2,005 species, 7/33/68)
Family "*Iteaphila*-group" (2 genera, 27 species)
Family Oreogetonidae Chvála, 1976 (1 genus, 36 species)
Superfamily **Apystomyioidea** Nagatomi & Liu, 1994 (1 family)
Family Apystomyiidae Nagatomi & Liu, 1994 (1 genus, 1 species)
Clade **CYCLORRHAPHA** Brauer, 1863 (2 subordinate groups) Sequential
Infraorder **ASCHIZA** Becher, 1882 (2 subordinate groups) Paraphyletic, Sequential
Superfamily **Phoroidea** Curtis, 1833 (5 families) Sequential
Family Lonchopteridae Macquart, 1823 (6 genera, 65 species, 2/2/1)
Family Opetiidae Rondani, 1856 (5 genera, 10 species, 4/6)
Family Platypezidae Latreille, 1829 (29 genera, 277 species, 10/25/1)
Family Ironomyiidae McAlpine & Martin, 1966 (5 genera, 17 species, 4/14)
Family Phoridae Curtis, 1833 (302 genera, 4,202 species, 23/97/5)
Superfamily **Syrphoidea** Latreille, 1802 (2 families) Sequential
Family Pipunculidae Walker, 1834 (22 genera, 1,428 species, 2/8/15)[21]
Family Syrphidae Latreille, 1802 (209 genera, 6,107 species, 10/92/24)
Infraorder **SCHIZOPHORA** Becher, 1882 (2 subordinate groups) Sequential
Clade **Archischiza** Enderlein, 1936 (1 family)
Family Conopidae Latreille, 1802 (52 genera, 831 species, 2/3/18)[22]
Clade **Muscaria** Enderlein, 1936 (2 subordinate groups)

20. The arrangement of the Tabanoidea (Tabanomorpha of authors) follows from Kerr (2010).
21. The Pipunculidae are retained as the sister to the Syrphidae, their traditional placement, whereas the **Diptera Tree of Life** analysis has them as sister to Schizophora.

Parvorder **ACALYPTRATAE** Macquart, 1835 (9 subordinate groups) Para- or polyphyletic[23]
- Superfamily **Carnoidea** Newman, 1834 (7 families) Paraphyletic?
  - Family Australimyzidae Griffiths, 1972 (1 genus, 9 species)
  - Family Canacidae Jones, 1906 (28 genera, 323 species, 0/1)
  - Family Carnidae Newman, 1834 (6 genera, 92 species, 1/2)
  - Family Chloropidae Rondani, 1856 (194 genera, 2,885 species, 2/5/35)
  - Family Inbiomyiidae Buck, 2006 (1 genus, 11 species)
  - Family Milichiidae Schiner, 1862 (20 genera, 288 species, 1/10)
  - Family Nannodastiidae Papp, 1980 (2 genera, 5 species)
- Superfamily **Ephydroidea** Zetterstedt, 1837 (7 families) Sequential
  - Family Ephydridae Zetterstedt, 1837 (128 genera, 1,994 species, 0/2/19)
  - Family Drosophilidae Rondani, 1856 (76 genera, 4,017 species, 3/14/6)
  - Family Braulidae Egger, 1853 (2 genera, 7 species)
  - Family Cryptochetidae Brues & Melander, 1932 (3 genera, 34 species, 1/1)
  - Family Camillidae Frey, 1921 (5 genera, 42 species, 1/2/1)
  - Family Curtonotidae Enderlein, 1914 (3 genera, 65 species, 0/1)[24]
  - Family Diastatidae Hendel, 1917 (4 genera, 50 species, 1/2)
- Superfamily **Lauxanioidea** Macquart, 1835 (3 families)
  - Family Celyphidae Bigot, 1852 (8 genera, 115 species, 0/0/7)
  - Family Chamaemyiidae Hendel, 1910 (24 genera, 351 species, 1/1/2)
  - Family Lauxaniidae Macquart, 1835 (168 genera, 1,900 species, 3/5/60)[25]
- Superfamily **Nerioidea** Westwood, 1840 (3 families)
  - Family Cypselosomatidae Hendel, 1931 (13 genera, 35 species, 2/2)
  - Family Micropezidae Blanchard, 1840 (52 genera, 583 species, 1/10/22)
  - Family Neriidae Westwood, 1840 (19 genera, 112 species, 0/0/1)
- Superfamily **Opomyzoidea** Fallén, 1820 (17 families) Paraphyletic?
  - Family Acartophthalmidae Czerny, 1928 (2 genera, 6 species, 1/1)
  - Family Agromyzidae Fallén, 1823 (41 genera, 3,017 species, 7/20/10)
  - Family Anthomyzidae Czerny, 1903 (22 genera, 95 species, 2/2)
  - Family Asteiidae Rondani, 1856 (10 genera, 138 species, 1/2)
  - Family Aulacigastridae Duda, 1924 (5 genera, 19 species, 1/1)
  - Family Clusiidae Handlirsch, 1884 (17 genera, 363 species, 2/3)
  - Family Fergusoninidae Tonnoir, 1937 (1 genus, 29 species)
  - Family Marginidae McAlpine, 1991 (1 genus, 3 species)
  - Family Megamerinidae Hendel, 1913 (4 genera, 16 species, 1/1)
  - Family Neminidae McAlpine, 1983 (3 genera, 14 species)
  - Family Neurochaetidae McAlpine, 1978 (3 genera, 22 species, 0/2)
  - Family Odiniidae Hendel, 1920 (14 genera, 65 species, 1/1)
  - Family Opomyzidae Fallén, 1820 (4 genera, 61 species, 0/2/6)
  - Family Pallopteridae Loew, 1862 (12 genera, 71 species, 2/1/1)
  - Family Periscelididae Oldenberg, 1914 (11 genera, 91 species, 1/8)
  - Family Teratomyzidae Hennig, 1969 (7 genera, 8 species)
  - Family Xenasteiidae Hardy, 1980 (1 genus, 13 species)
- Superfamily **Sciomyzoidea** Fallén, 1820 (11 families)
  - Family Coelopidae Hendel, 1910 (14 genera, 35 species, 0/0/3)
  - Family Dryomyzidae Schiner, 1862 (6 genera, 30 species, 2/5/2)
  - Family Helcomyzidae Hendel, 1924 (4 genera, 12 species)

22. The Conopidae are placed as basal to all other schizophoran groups following the original work of Enderlein (1936), the recent study by Gibson *et al.* (2010) and the **Diptera Tree of Life** analysis.
23. The Acalyptratae remain a para- or polyphyletic assemblage. The **Diptera Tree of Life** analysis did, however, retrieve some superfamily groups as monophyletic. These are Ephydroidea, Lauxanioidea, Nerioidea, Sciomyzoidea and Tephritoidea and we accept them as so defined. The other groups remain as previously defined.
24. Kirk-Spriggs (2007) contents that the fossil *Curtonotum gigas* Theobald. 1937 can not be placed in either of the families Drosophilidae or Curtonotidae. However we have left it as *incertae sedis* within the Curtonotidae.
25. The Eurychoromyiidae Hendel, 1910 are treated as a subfamily of Lauxaniidae following Gaimari & Silva (2010).

Family Huttoninidae Steyskal, 1965 (1 genera, 8 species)
Family Helosciomyzidae Steyskal, 1965 (10 genera, 23 species)
Family Heterocheilidae McAlpine, 1991 (1 genus, 2 species)
Family Natalimyzidae Barraclough & McAlpine, 2006 (1 genus, 1 species)[26]
Family Phaeomyiidae Verbeke, 1950 (2 genera, 4 species, 1/1)
Family Ropalomeridae Schiner, 1868 (8 genera, 33 species, 0/0/1)[27]
Family Sciomyzidae Fallén, 1820 (66 genera, 618 species, 3/13/37)
Family Sepsidae Walker, 1833 (38 genera, 345 species, 1/5/12)[28]
Superfamily **Sphaeroceroidea** Macquart, 1835 (5 families) Paraphyletic?
Family Chyromyidae Schiner, 1863 (4 genera, 139 species, 1/1/1)
Family Heleomyzidae Westwood, 1840 (76 genera, 738 species, 6/17/9)
Family Heteromyzidae Fallén, 1820 (1 genera, 7 species, 0/1)
Family Mormotomyiidae Austen, 1936 (1 genus, 1 species)[29]
Family Sphaeroceridae Macquart, 1835 (137 genera, 1,571 species, 9/3/17)
Superfamily **Tanypezoidea** Rondani, 1856 (7 families)
Family Diopsidae Bilberg, 1820 (14 genera, 194 species, 1/3/2)
Family Gobryidae McAlpine, 1997 (1 genus, 5 species)
Family Nothybidae Frey, 1927 (1 genus, 8 species)
Family Psilidae Macquart, 1835 (13 genera, 322 species, 2/2/12)
Family Somatiidae Hendel, 1935 (1 genus, 7 species)
Family Syringogastridae Prado, 1969 (1 genus, 10 species)
Family Tanypezidae Rondani, 1856 (5 genera, 68 species, 0/1/1)
Superfamily **Tephritoidea** Newman, 1834 (10 families) Sequential
Family †Proneottiphilidae Hennig, 1969 (1 genus, 1 species)
Family Richardiidae Loew, 1868 (34 genera, 178 species, 3/3)
Family Lonchaeidae Rondani, 1856 (10 genera, 504 species, 0/0/7)
Family Piophilidae Macquart, 1835 (14 genera, 83 species, 0/1/6)
Family Ulidiidae Macquart, 1835 (110 genera, 678 species, 1/3/31)
Family Platystomatidae Schiner, 1862 (128 genera, 1,164 species, 0/2/9)
Family Ctenostylidae Bigot, 1882 (6 genera, 10 species)
Family Tachiniscidae Kertész, 1903 (3 genera, 3 species)
Family Pyrgotidae Loew, 1868 (58 genera, 351 species, 0/1/1)
Family Tephritidae Newman, 1834 (492 genera, 4,716 species, 1/4/49)
Parvorder **CALYPTRATAE** Robineau-Desvoidy, 1830 (3 subordinate groups)[30]
Incertae Sedis (2 families)
Family †Eophlebomyiidae Cockerell, 1925 (1 genus, 1 species)
Family †Hoffeinsmyiidae Michelsen, 2009 (1 genus, 1 species)
Superfamily **Hippoboscoidea** Samouelle, 1819 (2 families) Sequential
Family Glossinidae Theobald, 1903 (1 genus, 25 species, 0/1)
Family Hippoboscidae Samouelle, 1819 (68 genera, 782 species, 0/1)[31]
Superfamily **Muscoidea** Latreille, 1802 (4 families) Paraphyletic, Sequential
Family Fanniidae Schnabl & Dziedzicki, 1911 (4 genera, 359 species)
Family Muscidae Latreille, 1802 (187 genera, 5,218 species, 2/8/58)
Family Anthomyiidae Robineau-Desvoidy, 1830 (53 genera, 1,941 species, 3/14/196)[32]
Family Scathophagidae Robineau-Desvoidy, 1830 (57 genera, 419 species, 0/0/55)

26. According to Barraclough & McAlpine (2006) at least 20 more new species remain to be described.
27. In the **Diptera Tree of Life** analysis the Ropalomeridae were sister to a clade consisting of Asteiidae, Fergusoninidae, Xenasteiidae and Australimyzidae. This family, however, is here retained in its traditional placement among the Sciomyzoidea.
28. In the **Diptera Tree of Life** analysis the Sepsidae were the sister to the Acartophthalmidae. This family, however, is here retained in its traditional placement among the Sciomyzoidea.
29. Mormotomyiidae are returned to their original placement next to the Sphaeroceridae.
30. The arrangement of the groups of Calyptratae follows from Kutty *et al.* (2010).
31. The Streblidae are retained as a subordinate (and possibly paraphyletic) unit of the Hippoboscidae which are viewed as sister to the Glossinidae as earlier workers and recently Kutty *et al.* (2010) have documented. The position of Streblidae as sister of Glossinidae and other hippoboscids in the **Diptera Tree of Life** analysis is probably due to the very restricted taxon sampling.

Superfamily **Oestroidea** Leach, 1815 (7 families)[33]
Family Calliphoridae Brauer & Bergenstamm, 1889 (97 genera, 1,525 species, 1/1/346)
Para- or polyphyletic
Family Mystacinobiidae Holloway, 1976 (1 genus, 1 species)
Family Oestridae Leach, 1815 (30 genera, 176 species, 4/6/16)
Family Rhiniidae Bauer & Bergenstamm, 1889 (30 genera, 376 species)
Family Rhinophoridae Robineau-Desvoidy, 1863 (27 genera, 174 species, 0/0/17)[34]
Family Sarcophagidae Macquart, 1834 (173 genera, 3,094 species, 0/0/203)
Family Tachinidae Robineau-Desvoidy, 1830 (1,597 genera, 9,626 species, 5/5/1,438)

References

Amorim, D. de S. & Grimaldi, D.A. (2006) Valeseguyidae, a new family of Diptera in the Scatopsoidea, with a new genus in Cretaceous amber from Myanmar. *Systematic Entomology*, 31, 508–516.

Amorim, D. de S. & Rindal, E. (2007) Phylogeny of the Mycetophiliformia, with proposal of the subfamilies Heterotrichinae, Ohakuneinae, and Chiletrichinae for the Rangomaramidae (Diptera, Bibiomomorpha). *Zootaxa*, 1535, 1–92.

Ansorge, J. & Krzemiñski, W. (1995) Revision of *Mesorhyphus* Handlirsch, *Eoplecia* Handlirsch and *Heterorhyphus* Bode (Diptera: Anisopodomorpha, Bibionomorpha) from the Upper Liassic of Germany. *Palaeontologische Zeitschrift*, 69, 167–172.

Ashe, P. (1983) A catalogue of chironomid genera and subgenera of the world including synonyms (Diptera: Chironomidae). *Entomologica Scandinavica, Supplement*, 17, 68 pp.

Barraclough, D.A. & McAlpine, D.K. (2006) Natalimyzidae, a new African family of acalyptrate flies (Diptera: Schizophora: Sciomyzoidea). *African Invertebrates*, 47, 117–134.

Blagoderov, V.A. (1996) Revision of the nematoceran family Protopleciidae (Insecta: Diptera) from the Early Jurassic Sogyuty locality, Kyrgyzstan. *Paleontologicheskii Zhurnal*, 30, 210–216.

Blagoderov, V., Grimaldi, D.A. & Fraser, N.C. (2007) How time flies for flies: Diverse Diptera from the Triassic of Virginia and early radiation of the Order. *American Museum Novitates*, 3572, 39 pp.

Blagoderov, V., Krzemiñski, W. & Lukashevich, E. (1994) Revision of some fossil dipteran families described by Rohdendorf. *Third International Congress of Dipterology. Abstract Volume*. Guelph, pp. 19–20.

Blagoderov, V.A., Lukashevich, E.D. & Mostovski. M.B. (2002) Order Diptera. Pp. 227–240. In: Rasnitsyn, A.P. & Quicke, D.L.J. (eds.) *History of insects*. Kluwer Academic Publishers. Dordrecht/Boston/London.

Enderlein, G. (1936) 22. Ordnung: Zweiflügler, Diptera. Abt. 16, pp. 1–238. In Brohmer, P., Erhmann, P. & Ulmer, G. (Eds), *Die Tierwelt Mitteleuropas*. Vol. 6, Insekten. III. Teil. Leipzig.

Evenhuis, N.L. (1994) *Catalogue of the fossil flies of the world (Insecta: Diptera)*. Backhuys Publishers, Leiden. [i] + 600 pp.

Gaimari, S.D. & Silva, V.C. (2010) Revision of the Neotropical subfamily Eurychoromyiinae (Diptera: Lauxaniidae). *Zootaxa*, 2342, 1–64.

Gibson, J.F., Skevington, J.H. & Kelso, S. (2010) Placement of Conopidae (Diptera) within Schizophora based on mtDNA and nrDNA gene regions. *Molecular Phylogenetics and Evolution*, 56, 91–103.

Grimaldi, D.A. & Arillo, A. (2008) The Tethepomyiidae, a new family of enigmatic Cretaceous Diptera. *Alavesia*, 2, 259–265.

Grimaldi, D.A., Cumming, J.M. & Arillo, A. (2009) Chimeromyiidae, a new family of Eremoneuran Diptera from the Cretaceous. *Zootaxa*, 2078, 34–54.

Hong, Y.-c. (1983) *Middle Jurassic fossil insects in North China*. Geological Publishing House, Beijing. 223 p. [In Chinese.]

Kirk-Spriggs, A.H. (2007) A reappraisal of the type fossil of *Curtonotum* †*gigas* Theobald, 1937 (Diptera: Curtonotidae) a compression fossil of early Oligocene age from Provence, France. *Annals of the Eastern Cape Museum*, 6, 13–20.

Krzemiñski, W. (1992) The oldest Polyneura (Diptera) and their importance to the phylogeny of the group. *Acta zoologia cracoviensia*, 35, 45–52.

Kutty, S.N., Pape, T., Wiegmann, B.M. & Meier, R. (2010) Molecular phylogeny of the Calyptratae (Diptera: Cyclorrhapha) with an emphasis on the superfamily Oestroidea and the position of Mystacinobiidae and McAlpine's fly. *Systematic Entomology*, 35, 614–635.

Lukashevich, E.D. (1996) Mesozoic Dixidae (Insecta: Diptera) and the systematic position of the genera *Dixamima* Rohdendorf, 1964

32. The Anthomyiidae are considered possibly paraphyletic by Kutty *et al.* (2010) based on a molecular analysis, but given the morphological support for monophyly (Michelsen, 1991), the family is here viewed as monophyletic.
33. Kutty *et al.* (2010) provided a molecular phylogeny for the Oestroidea, but branch support is very low for most clades.
34. The Rhinophoridae were found to be polyphyletic based on the molecular analysis by Kutty *et al.* (2010), but given the morphological evidence they are here treated as monophyletic (Pape & Arnaud, 2001).

and *Rhaetomyia* Rohdendorf, 1962. *Paleontologicheskii Zhurnal*, 2003, 48–53.
Lukashevich, E.D. (2008) Ptychopteridae(Insecta: Diptera): history of its study and limits of the family. *Paleontologicheskii Zhurnal*, 42, 68–77.
Michelsen, V. (1991) Revision of the aberrant New World genus *Coenosopsia* Diptera: Anthomyiidae, with a discussion of anthomyiid relationships. *Systematic Entomology*, 16, 85–104.
Pape, T. (2006) Phylogeny and evolution of the bot flies. Pp. 20–50. In: Colwell, D., Scholl, P. & Hall, M. (eds) *The Oestrid Flies: Biology, Host-Parasite Relationships, Impact and Management*. CABI Publishers. Wallingford.
Pape T. & Arnaud, P.H., Jr. (2001) *Bezzimyia* — a genus of native New World Rhinophoridae (Insecta, Diptera). *Zoologica Scripta*, 30, 257–297.
Petersen, M.J., Bertone, M.A., Wiegmann, B.M. & Courtney, G.W. (2010) Phylogenetic synthesis of morphological and molecular data reveals new insights into the higher-level classification of Tipuloidea (Diptera). *Systematic Entomology*, 35, 526–545.
Poinar, G., Jr. (2010) *Cascoplecia insolitus* (Diptera: Cascopleciidae), a new family, genus, and species of flower-visiting, unicorn fly (Bibionomorpha) in Early Cretaceous Burmese amber. *Cretaceous Research*, 31, 71–76.
Rindal, E., Søli, G.E.E. & Bachman, L. (2009) Molecular phylogeny of the fungus gnat family Mycetophilidae (Diptera, Mycetophiliformia). *Systematic Entomology*, 34, 524–532.
Sabrosky, C.W. (1999) Family-Group Names in Diptera. An annotated catalog. *Myia*, 10, 1–360.
Solórzano Kraemer, M.M. & Nel, A. (2009) First recorded evidence in the fossil record of snipe flies (Diptera: Rhagionidae) in Cretaceous amber, France. *Cretaceous Research*, 30, 13671375.
Wiegmann, B.M., Trautwein, M.D., Winkler, I.S., Barr, N.B., Kim, J.-W., Lambkin, C., Bertone, M.A., Cassel, B.K., Bayless, K.M., Heimberg, A.M., Wheeler, B.M., Petersen, K.J., Pape, T., Sinclair, B.J., Skevington, J.H., Blagoderov, V., Caravas, J., Kutty, S.N., Schmidt-Ott, U., Kampmeier, G.E., Thompson, F.C., Grimaldi, D.A., Beckenbach, A.T., Courtney, G.W., Friederich, M., Meier, R. & Yeates, D.K. (2011) Episodic Radiations in the Fly Tree of Life. *Proceedings of the National Academy of Sciencies*, Washington, 108, 5690–5695.
Wiley, E.O. (1979) An annotated Linnaean hierarchy, with comments on natural taxa and competing systems. *Systematic Zoology*, 28, 308–337.

Author names and addresses

Thomas Pape, Natural History Museum of Denmark, University of Copenhagen, Universitetsparken 15, 2100 Copenhagen Ø, Denmark; tpape@snm.ku.dk
Vladimir Blagoderov, Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom v.blagoderov@nhm.ac.uk
Mikhail B. Mostovski, Department of Natural Sciences, Natal Museum, Private Bag 9070 Pietermaritzburg, 3200 South Africa mmostovski@nmsa.org.za

Phylum **Phoronida** Hatschek, 1888 (0 class)[1]

CLASS (0 order)

Order (0 family)

Family (2 genera, 10 species)

Phoronis Wright, 1856 (7 species)[2] [3]

Phoronopsis Gilchrist, 1907 (3 species)[2] [3]

Cited references

Emig, C.C. (1985) Phylogenetic systematics in Phoronida (Lophophorata). *Zeitschrift für Zoologische Systematik und Evolutionsforschung*, 23 (3), 184–193.

Emig, C.C. (2010) Fossil Phoronida and related ichnotaxa. *Carnets de Géologie / Notebooks on Geology*, Note brève / Letter 2010/03 (CG2010_L03), 5 p.

Emig, C.C., Roldán C. & Viéitez, J. M. (2005) Filo Phoronida. *Fauna Ibérica*, Museo de Ciencias Naturales, CSIC Madrid, 27, 54–56.

Gilchrist, J.D. (1907) New forms of the Hemichordates from South Africa. *Transactions of the South African Philosophical Society*, *17*, 151–176.

Hatschek, B. (1888) *Lehrbuch der Zoologie*. Gustav Fischer, Jena, 1. Lieferung, 144 pp.

Wright, T.S. (1856) Description of two tubicolar animals. *Proceedings of the Royal Physical Society of Edinburgh*, 1, 165–167.

Author name and address

Christian C. Emig, BrachNet, 20, Rue Chaix, F – 13007 Marseille France; BrachNet@aliceadsl.fr

1. The title of this contribution should be cited as “Phylum Phoronida Hatschek, 1888. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness”.

   In the hierarchy of the Phoronida, now accepted, no class, order, family have been expressly described and no diagnosis is available. The increase of databases regarding biodiversity tends towards an alteration in classification, because technically the hierarchical fields must be filled. Consequently the tendency is to use the designation family Phoronidae, which has no validity. The proposal of a revision in order to satisfy the Preamble of the ICZN, that is interpreted as requiring the preservation of the hierarchic succession *species* > *genus* > phylum is needed to avoid imbroglio in a group composed of only 10 valid species (Emig, 1985; Emig *et al*., 2005).

   Note: The phoronid larva, which common name is actinotroch, keeps a separate “generic” name considered as a technical term under *Actinotrocha* followed by a ”*species*” name which is sometimes still different from the adult species name.
2. See http://paleopolis.rediris.es/Phoronida/ and http://www.marinespecies.org/phoronida/
3. About fossil forms see Emig (2010) and http://paleopolis.rediris.es/Phoronida/SYST/PHORONIDA/Pho_Fossil_EN.html

Phylum **Rotifera** Cuvier, 1817 (2 classes)[1,2,3]

Class **Pararotatoria** Sudzuki, 1964 (1 order)

Order **Seisonacea** Wesenberg-Lund, 1899 (1 family)

Family **Seisonidae** Wesenberg-Lund, 1899 (2 genera, 3 species)

Class **Eurotatoria** De Ridder, 1957 (2 subclasses)

Subclass **Bdelloidea** Hudson, 1884 (4 families)

Family **Adinetidae** Hudson and Gosse, 1889 (2 genera, 20 species)

Family **Habrotrochidae** Bryce, 1910 (3 genera, 152 species)

Family **Philodinavidae** Harring, 1913 (3 genera, 6 species)

Family **Philodinidae** Ehrenberg, 1838 (12 genera, 283 species)

Subclass **Monogononta** Plate, 1889 (2 superorders)

Superorder **Pseudotrocha** Kutikova, 1970 (1 order)

Order **Ploima** Hudson and Gosse, 1886 (23 families)[4]

Family **Asciaporrectidae** De Smet, 2006 (1 genus, 3 species)

Family **Asplanchnidae** Eckstein, 1883 (3 genera, 15 species)

Family **Birgeidae** Harring and Myers, 1924 (1 genus, 1 species)

Family **Brachionidae** Ehrenberg, 1838 (7 genera, 170 species)[5]

Family **Clariaidae** Kutikova, Markevich and Spiridonov, 1990 (1 genus, 1 species)

Family **Cotylegaleatidae** De Smet, 2007 (1 genus, 1 species)[6]

Family **Dicranophoridae** Harring, 1913 (19 genera, 233 species)[7]

Family **Epiphanidae** Harring, 1913 (5 genera, 17 species)[8]

Family **Euchlanidae** Ehrenberg, 1838 (5 genera, 27 species)

Family **Gastropodidae** Harring, 1913 (2 genera, 12 species)

Family **Ituridae** Sudzuki, 1964 (1 genus, 6 species)

Family **Lecanidae** Remane, 1933 (1 genus, 201 species)[9]

Family **Lepadellidae** Harring, 1913 (5 genera, 163 species)

Family **Lindiidae** Harring and Myers, 1924 (1 genus, 16 species)

Family **Microcodidae** Hudson and Gosse, 1886 (1 genus, 1 species)

Family **Mytilinidae** Harring, 1913 (2 genera, 29 species)

Family **Notommatidae** Hudson and Gosse, 1886 (19 genera, 280 species)[10,11]

Family **Proalidae** Harring and Myers, 1924 (4 genera, 55 species)[12]

Family **Scaridiidae** Manfredi, 1927 (1 genus, 7 species)

Family **Synchaetidae** Hudson and Gosse, 1886 (3 genera, 56 species)[13]

---

1. **BY** H. Segers (for full contact details, see **Author name and address** and addresses after **Cited references**). The title of this contribution should be cited as "Phylum Rotifera Cuvier, 1817. *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness".

   Unless indicated otherwise, the classification and diversity estimates follow Segers (2002; 2007; 2008) and Wallace *et al.* (2006). There is a general consensus that there are three main groups of rotifers, Seisonida with one family and three species, Bdelloidea with four families and 461 species, and Monogononta with 2 superorders, 3 orders, 30 families and 1583 species.
2. Molecular and ultrastructural evidence indicates that Acanthocephala is a taxon of highly adapted, endoparasitic rotifers (e.g., Garey *et al.* 1996; 1998; Mark Welch 2000; Giribert *et al.* 2000). A number of recent authors follow Ahlrichs (1997) who proposed the name Syndermata for the clade ("Rotifera", (Seisonacea, Acanthocephala)), after removal of Seisonacea from Rotifera. This proposition, being rather artificial, is not generally accepted (Mark Welch 2000; Segers 2002, Sørensen & Giribet 2006).
3. There is evidence that the known diversity of Rotifera is highly underestimated, by a factor up to fourteen (Fontaneto *et al.* 2007; Schröder & Walsh 2007; Suatoni *et al.* 2006; Walsh *et al*. 2009).
4. Markevich (1989) and Sørensen (2002) advocate a subdivision of Ploima in a number of subordinate taxa; more recent analysis, however, show that the available data are inconclusive (Sørensen & Giribet 2006).
5. For *Keratella*, however, see Segers & De Smet (2008a)
6. See De Smet (2007a)
7. De Smet (2007b) included
8. De Smet & Gibson (2007) included
9. Fontaneto *et al.* (2008) included
10. See Wilts *et al*. (2009); Jersabek et al (2011) included
11. For the position and taxonomy of *Pseudoploesoma*, see Segers & De Smet (2008b)
12. See Wilts *et al*. (2009)
13. For the position and taxonomy of *Pseudoploesoma*, see Segers & De Smet (2008b); De Paggi & Paggi (2011) included

Family **Tetrasiphonidae** Harring and Myers, 1924 (1 genus, 1 species)
Family **Trichocercidae** Harring, 1913 (3 genera, 72 species)
Family **Trichotriidae** Harring, 1913 (3 genera, 23 species)
Superorder **Gnesiotrocha** Kutikova, 1970 (2 orders)
Order **Flosculariacea** Harring, 1913 (5 families)
Family **Conochilidae** Harring, 1913 (2 genera, 7 species)
Family **Flosculariidae** Ehrenberg, 1838 (8 genera, 54 species)[14]
Family **Hexarthridae** Bartos, 1959 (1 genus, 18 species)
Family **Testudinellidae** Harring, 1913 (3 genera, 45 species)[15]
Family **Trochosphaeridae** Harring, 1913 (3 genera, 19 species)
Order **Collothecaceae** Harring, 1913 (2 families)
Family **Atrochidae** Harring, 1913 (3 genera, 4 species)
Family **Collothecidae** Harring, 1913 (2 genera, 47 species)

Cited references

Ahlrichs, W. H. (1997) Epidermal ultrastructure of *Seison nebaliae* and *Seison annulatus*, and a comparison of epidermal structures within Gnathifera. *Zoomorphology*, 117, 41–48.

De Paggi, S.J. & Paggi, J.C. (2011) A new species of *Polyarthra* Ehrenberg, 1834 belonging to the *vulgaris*-group (Rotifera: Monogononta: Synchaetidae) from Argentina, with a key to the identification of species in the Neotropical Region. *Zootaxa*, 2828, 51–57

De Smet, W.H. (2007a) Cotylegaleatidae, a new family of Ploima (Rotifera: Monogononta), for *Cotylegaleata perplexa* gen. et sp. nov., from freshwater benthos of Belgium. *Zootaxa*, 1425, 35–43.

De Smet, W.H. (2007b) Description of two new species of *Myersinella* (Rotifera: Monogononta: Dicranophoridae) from the Mediterranean. *Journal of the Marine Biology Association of the United Kingdom*, 87, 1105–1110.

De Smet, W.H. (2009) A review of the marine and brackish-water species of *Testudinella* (Rotifera: Monogononta, Testudinellidae), with the description of two new species. *Zootaxa*, 2092, 1–20.

De Smet, W.H. & Gibson, J.A.E. (2007) *Rhinoglena kutikovae* n.sp. (Rotifera: Monogononta: Epiphanidae) from the Bunger Hills, East Antarctica: a probable relict species that survived Quaternary glaciations on the continent. *Polar Biology*, 31, 595–603.

Fontaneto, D., Herniou, E.A., Barraclough, T.G., Ricci, C. & Melone, G. (2007) On the reality and recognisability of asexual organisms: morphological analysis of the mastricatory apparatus of bdelloid rotifers. *Zoologica Scripta*, 36, 361–370.

Fontaneto, D., Segers, H. & Melone, G. (2008) Marine rotifers from the Northern Adriatic Sea, with description of *Lecane insulaconae* sp. nov. (Rotifera: Monogononta: Lecanidae). *Journal of the Marine Biological Association of the United Kingdom*, 88, 253–258.

Garey, J.R., Near, T.J., Nonnemacher, M.R. & Nadler, S.A. (1996) Molecular evidence for Acanthocephala as a sub-taxon of Rotifera. Journal of Molecular Evolution, 43, 287–292.

Garey, J.R., Schmid-Rhaesa, A., Near, T.J. & Nadler, S.A. (1998) The evolutionary relationships of rotifers and acanthocephalans. *Hydrobiologia*, 387/388, 83–91.

Giribert, G., Distel, D.L., Polz, M., Sterrer, W. & Wheeler, W.C., 2000, Triploblastic relationships with emphasis on the acoelomates and the position of Gnathostomulida, Cycliophora, Plathelminthes, and Chaetognatha: A combined approach of 18S rDNA sequences and morphology, *Systematic Biology*, 49, 539–562.

Jersabek, C.D., Weithoff, G. & Weisse, T. (2011) *Cephalodella acidophila* n. sp. (Monogononta: Notommatidae), a new rotifer species from highly acidic mining lakes. *Zootaxa*, 2939, 50–58.

Mark Welch, D.B., 2000, Evidence from a protein-coding gene that acanthocephalans are rotifers, Invertebrate Biology, 119, 17–26.

Markevich, G.I., 1989, Morphology and principal organization of the sclerotized system of the rotifer mastax. *In* Kutikova L.A. (Ed.) *in Biologiya, Sistematika I Funkcionalnaya Morfologiya Presnovodick Zhivotnick. Institut Biologii Vnutrenny Vod. Akademija Nauk* SSSR, 56, 27–82 (in Russian).

Meksuwan, P., Pholpunthin, P. & Segers, H. (2011) Diversity of sessile rotifers (Gnesiotrocha, Monogononta, Rotifera) in Thale Noi Lake, Thailand. *Zootaxa*, 2997, 1–18.

Schröder, T. & Walsh, E.J. (2007). Cryptic speciation in the cosmopolitan *Epiphanes senta* complex (Monogononta, Rotifera) with the description of new species. *Hydrobiologia*, 593, 129–140.

Segers, H. (2002) The nomenclature of the Rotifera: annotated checklist of valid family- and genus-group names. *Journal of Natural History*, 36, 631–640.

Segers, H. (2007) Annotated checklist of the rotifers (Phylum Rotifera), with notes on nomenclature, taxonomy and distribution. *Zootaxa*, 1564, 1–104.

Segers, H. (2008) Global diversity of rotifers (Phylum Rotifera) in freshwater. *Hydrobiologia*, 595, 49–59.

Segers, H. & De Smet, W.H. (2008a) Diversity and Endemism in Rotifera: a review, and *Keratella* Bory de St Vincent. *In* Foissner W. (Ed.) *Protist diversity and geographic distribution*. *Biodiversity and Conservation*, 17, 303–316.

14. Segers & Shiel (2008) and Meksuwan et al (2011) included
15. De Smet (2009) and Wei & De Smet (2011) included

Segers, H. & De Smet, W.H. (2008b) A comparative study on the morphology and classification of genus *Pseudoploesoma* Myers, 1938 (Rotifera: Monogononta). *Zoologischer Anzeiger*, 247, 113–122.
Segers, H. & Shiel, R.J. (2008) Diversity of cryptic Metazoa in *Australian* freshwaters: a new genus and two new species of sessile rotifer (Rotifera, Monogononta, Gnesiotrocha, Flosculariidae). Zootaxa, 1750, 19–31.
Sørensen, M.V. (2002) On the evolution and morphology of the rotiferan trophi, with a cladistic analysis of Rotifera. *Journal of Zoological and Systematic Evolutionary Research*, 40, 129–154.
Sørensen, M.V. & Giribet, G. (2009) A modern approach to rotiferan phylogeny: Combining morphological and molecular data. *Molecular Phylogenetics and Evolution*, 40, 585–608.
Suatoni, E., Vicario, S., Rice, S., Snell, T. & Caccone, A. (2006) An analysis of species boundaries and biogeographic patterns in a cryptic species complex: the rotifer *Brachionus plicatilis*. *Molecular Phylogenetics and Evolution*, 41, 86–98.
Wallace, R.L., Snell, T.W. & Ricci, C. (2006) Rotifera vol. 1: Biology, Ecology and Systematics (2nd edition). *Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, Volume 23*. (ed. Segers, H., Dumont, H.J.). Kenobi productions, Ghent, Belgium and Backhuys Academic Publishing bv, The Hague, The Netherlands, 299 pp.
Walsh, E.J., Schröder, T. , Wallace R.L. & Rico-Martinez, R. (2009) Cryptic speciation in *Lecane bulla* (Monogononta: Rotifera) in Chihuahuan Desert waters. *Verhandlungen Internationale Vereinigung Limnologie*, 30, 1046–1050.
Wei, N. & De Smet, W.H. (2011) Two new brackish-water species of *Testudinella* (Rotifera: Testudinellidae) from Qi'ao Island in the Pearl River estuary, China, with a key to marine and brackish-water *Testudinella*. *Zootaxa*, 3051, 41–56.
Wilts, E.F., Bininda-Emonds, O.R.P. & Ahlrichs, W.H. (2009) Comparison of the predatory rotifers *Pleurotrocha petromyzon* (Ehrenberg, 1830) and *Pleurotrocha sigmoidea* Skorikov, 1896 (Rotifera: Monogononta: Notommatidae) based on light and electron microscopic observation. *Zootaxa*, 2130, 1–20.

Author name and address

Hendrik Segers, Belgian Biodiversity Platform, Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B – 1000 Brussels Belgium; Hendrik.segers@naturalsciences.be

Phylum **Acanthocephala** Kohlreuther, 1771[1 2 3]

Class **Archiacanthocephala** Meyer, 1931 [4 5]

Order **Apororhynchida**

Family **Apororhynchidae** (1 genus, 7 species)

Order **Gigantorhynchida**

Family **Gigantorhynchidae** (2 genera, 59 species)

Order **Moniliformida**

Family **Moniliformidae** (3 genera, 18 species)

Order **Oligacanthorhynchida**

Family **Oligacanthorhynchidae** (9 genera, 93 species) [6]

Class **Eoacanthocephala** Van Cleave, 1936

Order **Gyracanthocephala**

Family **Quadrigyridae** (12 genera, 98 species)

Order **Neoechinorhynchida**

Family **Dendronucleatidae** (1 genus, 3 species)

Family **Neoechinorhynchidae** (16 genera, 145 species)

Family **Tenuisentidae** (2 genera, 2 species)

Class **Polyacanthocephala** Amin, 1987 [7]

Order **Polyacanthorhynchida** Amin, 1987

Family **Polyacanthorhynchidae** (1 genus, 4 species)

Class **Palaeacanthocephala** Meyer, 1931

Order **Echinorhynchida** Southwell and Macfie, 1925

Family **Arhythmacanthidae** (7 genera, 40 species) [8]

Family **Cavisomidae** (10 genera, 28 species) [9]

---

1. **BY** Scott Monks and Dennis J. Richardson (for full auhor addresses, see the list after **References**). The title of this contribution should be cited as "Phylum Acanthocephala Kohlreuther, 1771 *In*: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness". At the time this was written, recent Acanthocephala includes 4 classes, 10 orders, 22 families, 147 genera, and 1194 species; fossil taxa includes 1 family, 3 genera, and 5 species
2. Amin (1985) and Golvan (1994) were used for an initial list of species. Only known valid species are included; species inquirenda, incertae sedis, etc., are not included. Because of the nature of the list, subgenera and subspecies were not taken into account. Any omissions to this list are unintentional and any taxonomic errors are the responsibility of the authors.
3. The increased number of recent descriptions of acanthocephalans is an indicator that the number of species listed herein is vastly underestimated, particularly in groups that parasitize marine fish. As well, the assignment of species to particular groups is currently in flux, with some authors synonymizing groups (for example, Pichelin & Cribb 2001) and others disagreeing with those decisions (Amin *et al*. 2011a, for example, as an opposing view), compounding the problem. The application of molecular techniques is also changing, and sometimes confirming, classical views on the phylogenetic history of the phylum (see references below), so one should expected many organizational changes in the near future.
4. A phylogenetic study of 22 species of Acanthocephala by Monks (2001) did not support Archiacanthocephala as a monophyletic group, but the author did not discount recognition of the class because his study mainly focused on Palaeacanthocephala. The molecular evidence of García-Varela *et al*. (2000) provided strong support for the monophyly of the class as a sister group to the clade (Palaeacanthocephala + (Eoacanthocephala + Palaeacanthocephala)).
5. Archiacanthocephala has been considered to represent a phylogenetic and numerical relic of a much larger clade that might have parasitized now-extinct species of definitive hosts (ancestors of mammals and birds) (see Monks 2001), an hypothesis that has not been tested by any more comprehensive morphological or a molecular analysis. Analyses that includes calibration of a molecular clock or comparison of the relative number of sequence changes in various taxa might shed further light on this possibility. A second hypothesis that is suggested by the comparison of archiacanthocephalans with other much more speciose groups that also contain species that parasitize birds (Centrorhynchidae, Plagiorhynchidae, Polymorphidae, etc.) is that these latter groups may be of more recent origin than the Archiacanthocephala, a possibility which also should be amendable to study using molecular techniques.
6. In addition to the species included herein, eggs of an undescribed species of *Echinopardalis* Travassos, 1918 have been reported from coprolites (Noroñha et al. 1994). The contribution of this area of research to our knowledge of the taxonomy of the Acanthocephala has not been fully explored (see Wilke & Hall 1975 and Reinhard 1990 for some basic information on this area of study).
7. The four species of *Polyacanthorhynchus* Travassos, 1920 classically have been assigned a family within the Palaeacanthocephala (see Amin 1985). Later, Amin (1987) erected the class Polyacanthocephala with one order, one family, and one genus (*Polyacanthorhynchus*) for these four species. Molecular analyses by García-Varela *et al.* (2002) placed the proposed Class as a sister group to the Class Eoacanthocephala, a sister clade to Palaeacanthocephala. However, these authors (García-Varela *et al.* 2002) noted that they could not exclude the possibility that Polyacanthocephala constitutes a new order within Eoacanthocephala that would be placed basal to those orders currently assigned to the class. This assignment was supported, but not commented on, by García-Varela & González-Oliver (2008). The basal position of Polyacanthocephala in this arrangement supported by the studies mentioned above could be interpreted in either manner, but no other studies have provided an objective reason to favor one interpretation over the other; pending future studies, Polyacanthocephala is considered herein as a putative class *sensu* Amin 1987.
8. Hypoechinorhynchidae was considered to be a junior synonym of Arhythmacanthidae by Pichelin (1999), who transferred *Hypoechinorhynchus* Yamaguti, 1939 to the Subfamily Arhythmacanthinae; to date, this arrangement has remained unquestioned so it is followed herein.

Family **Transvenidae** (3 genera, 7 species)
Family **Echinorhynchidae** (8 genera, 126 species) [10] [11]
Family **Fessisentidae** (1 genus, 6 species)
Family **Heteracanthocephalidae** (2 genera, 7 species) [12]
Family **Illiosentidae** (14 genera, 51 species) [13] [14]
Family **Pomphorhynchidae** (5 genera, 50 species)
Family **Rhadinorhynchidae** (25 genera, 119 species) [15]
Order **Polymorphida** Petrochenko, 1956
Family **Centrorhynchidae** (3 genera, 107 species) [16]
Family **Plagiorhynchidae** (8 genera, 78 species) [17]
Family **Polymorphidae** (13 genera, 145 species) [18]
Order **Heteramorphida** Amin and Van Ha, 2011
Family **Pyrirhynchidae** (1 genus, 1 species)
† Unplaced fossil taxa [19]
† **Zhijinitidae** Qian, 1978 (3 genera, 5 species)

Cited references

Amin, O.M. (1985) Classification. *In:* Crompton, D.W.T. & Nickol, B.B. (Eds.) *Biology of the Acantho cephala*. Cambridge University Press, Cambridge, England, pp. 27–72.

Amin, O.M. (1987) Key to the families and subfamilies of Acanthocephala, with the erection of a new class (Polyacanthocephala) and a new order (Polyacanthoryhnchida). *Journal of Parasitology*, 73, 1216–1219.

Amin, O.M. (1992) Review of the genus *Polymorphus* Lühe, 1911 (Acantocephala: Polymorphidae), with the synonymization of *Hexaglandula* Petrochenko, 1950 and *Subcorynosoma* Hoklova, 1967, and a key to the species. *Qatar University Science Journal*, 12, 115–123.

Amin, O.M., Canaris, A.G. & Kinsella, J.M. (1999) A taxomonic reconsideration of the genus *Plagiorynchus s. lat.* (Acanthocephala:

9. The status of Diplosentidae was reviewed by Pichelin & Cribb (2001), who synonymized that family with Cavisomidae. Taxonomic decisions concerning these taxa can be found in that work.
10. Özdikmen (2008) discovered that Qiu *et al.* (1983) had used the name *Acanthocephalus* Qiu, H., et al., 1983 for a genus of trilobites and corrected this synonymy.
11. It has been acknowledged formally that there are species of *Echinorhynchus* Zoega in Muller, 1776 that have gone unrecognized (Wayland *et al.* 2005), but systematists have resisted putting specific names for the members of the species complex, even though they are known to represent identifiably separate entities. If, in the future, these forms are described as species instead of morphotypes (see Wayland 2010), the number of species assigned to this family, and others (see Martínez-Aquino *et al.* 2009 for another example), may increase greatly.
12. Pichelin *et al.* (2002) reviewed the Heteracanthocephalidae and established the current arrangement of the family.
13. Members of Illiosentidae have been reorganized several times since the conception of the concept by Golvan (1960). The general scheme proposed by Monks (2001), to recognize both *Tegorhynchus* Van Cleave, 1921 and *Illiosentis* Van Cleave and Lincicome, 1939, is followed herein; this proposal was further supported by Monks & Pulido-Flores (2002).
14. The results of the analysis by Monks (2001) suggested that *Leptorhynchoides* Kostylev, 1924 should be assigned to Illiosentidae. This was supported by García-Varela & González-Oliver (2008), who further suggested that *Pseudoleptorhynchoides* Salgado-Maldonado, 1976 should also be part of Illiosentidae. It is interesting that each of the three genera, *Illiosentis*, *Leptorhynchoides*, and *Pseudoleptorhynchoides*, were originally proposed as members of Rhadinorhynchidae. Although this has received little discussion in the literature, that arrangement is followed herein (but see Pichelin & Cribb 2001 for another perspective).
15. Rhadinorhynchidae has suffered the same taxonomic fortune as Illiosentidae, and their fates, in terms of taxa assigned to one or the other, have always been intertwined. Amin *et al.* (2011b) provided a review of *Rhadinorhynchus* Lühe, 1911 and recommended that *Raorhynchus* Tripathi, 1959 be considered as a junior synonym of the former genus pending a revision of the latter; *Raorhynchus* is still considered valid herein pending the aforementioned revision.
16. Centrorhynchidae, particularly *Centrorhynchus* Van Cleave, 1916, contains numerous species that originally were described from only a few individuals. Many of those species have been reported only once and their identity currently is unclear (see Richardson *et al.* 2010 for a recent example). Amin *et al.* (2010) suggested that *Sphaerirostris* Golvan, 1956 also undoubtedly contains synonyms. Thus, the family is in need of revision, which would alter the number of taxa included herein.
17. Amin *et al.* (1999) and Lisitsyna (2010) have provided partial reviews of the family.
18. As noted by Sardella *et al.* (2005), the controversy over the synonymy of *Hexaglandula* Petrochenko, 1950 with *Polymorphus* Lühe, 1911 has existed for some time. Amin (1992) formally placed the species then assigned to *Hexaglandula* in *Polymorphus*, but Nickol *et al.* (2002) defended the recognition of both genera on the basis of morphological and life-cycle data. The continued recognition of the 2 taxa as separate entities has been supported by García-Varela & Pérez-Ponce de León (2008) using molecular data. More recent studies (García-Varela *et al.* 2011) identified *Hexaglandula corynosoma* (Travassos, 1915) Petrochenko, 1958, among the taxa included in their study, as sister taxa to *Ibirhynchus dimorpha* (Schmidt, 1973) García-Varela, Pérez-Ponce de León, Aznar, and Nadler, 2011.
19. Several fossil taxa from the Cambrian have been suggested as proto-acanthocephalans or ancestral forms (Qian & Yin 1984). It is unclear how many "acanthocephalan" taxa might be included in this or other families (Elicki & Wotte, 2003), but it at least is interesting to contemplate the possibility.

Plagiorhynchus), with descriptions of South African *Plagiorhynchus* (*Prosthorhynchus*) *cylindraceus* from shore birds and *P. (P.) malayensis*, and a key to the species of the subgenus *Prosthorhynchus*. *Journal of the Helminthological Society of Washington*, 66, 123–132.

Amin, O.M., Heckmann, R.A., Halajian, A. & Eslami, A. (2010) Redescription of *Sphaerirostris picae* (Acanthocephala: Centrorhynchidae) from magpie, *Pica pica*, in northern Iran, with special reference to unusual receptacle structures and notes on histopathology. *Journal of Parasitology*, 96, 561–568.

Amin, O.M., Heckmann, R.A. & Van Ha, N. (2011a) Description of *Heterosentis holospinus* n. sp. (Acanthocephala: Arhythmacanthidae) from the striped eel catfish, *Plotosus lineatus*, in Halong Bay, Vietnam, with a key to species of *Heterosentis* and reconsideration of the Subfamilies of Arhythmacanthidae. *Comparative Parasitology*, 78, 29–38.

Amin, O.M., Heckmann, R.A. & Van Ha, N. (2011b) Description of two new species of *Rhadinorhynchus* (Acanthocephala, Rhadinorhynchidae) from marine fish in Halong Bay, Vietnam, with a key to species. *Acta Parasitologica*, 56, 67–77.

Elicki, O. & Wotte, T. (1938) Cambroclaves from the Cambrian of Sardinia (Italy) and Germany: constraints for the architecture of western Gondwana and the palaeogeographical and palaeoecological potential of cambroclaves. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 195, 55–71.

García-Varela, M., Cummings, M.P., Pérez-Ponce de León, G., Gardner, S.L. & Laclette, J.P. (2002) Phylogenetic analysis based on 18S ribosomal RNA gene sequences supports the existence of class Polyacanthocephala (Acanthocephala). *Molecular Phylogenetics and Evolution*, 23, 288–292.

García-Varela, M. & González-Oliver, A. (2008) The systematic position of *Leptorhynchoides* (Kostylew, 1924) and *Pseudoleptorhynchoides* (Salgado-Maldonado, 1976), inferred from nuclear and mitochondrial DNA gene sequences. *Journal of Parasitology*, 94, 959–962.

García-Varela, M. & Pérez-Ponce de León, G. (2008) Validating the systematic position of *Profilicollis* Meyer, 1931 and *Hexaglandula* Petrochenko, 1950 (Acanthocephala: Polymorphidae) using Cytochrome C Oxidase (cox 1). *Journal of Parasitology*, 94, 212–217.

García-Varela, M., Pérez-Ponce de León, G., Aznar, F.J. & Nadler, S.A. (2011) Erection of *Ibirhynchus* gen. nov. (Acanthocephala: Polymorphidae), based on molecular and morphological data. *Journal of Parasitology*, 97, 97–105.

García-Varela, M., Pérez-Ponce de León, G., De la Torre, P., Cummings, M.P., Sarma, S.S.S. & Laclette, J.P. (2000) Phylogenetic relationship of Acanthocephala based on analysis of 18S ribosomal RNA gene sequences. *Journal of Molecular Evolution*, 50, 532–540.

Golvan, Y.J. (1960) Le phylum des Acanthocephala. Troisième note. La classe des Palaeacanthocephala (Meyer, 1931) (à suivre) [part 2]. *Annales de Parasitologie Humaine et Comparée*, 35, 138–165.

Golvan, Y.J. (1994) Nomenclature of the Acanthocephala. *Research and Reviews in Parasitology*, 54, 135–205.

Lisitsyna, O.I. (2010) Morphological variability of *Plagiorhynchus* (*Prosthorhynchus*) *cylindraceus* (Acanthocephala, Plagiorhynchidae) and its importance in assessment of taxonomy structure of the subgenus. *Vestnik Zoologii*, 44, 35–44.

Martínez-Aquino, A., Reyna-Fabián, M.E., Rosas-Valdez, R., Razo-Mendivil, U., Pérez-Ponce de León, G. & García-Varela, M. (2009) Detecting a complex of cryptic species within *Neoechinorhynchus golvani* (Acanthocephala: Neoechinorhynchidae) inferred from ITSs and LSU rDNA gene sequences. *Journal of Parasitology*, 95, 1040–1047.

Monks, S. (2001) Phylogeny of the Acanthocephala based on morphological characters. *Systematic Parasitology*, 48, 81–116.

Monks, S. & Pulido-Flores, G. (2002) Reevaluation and emended diagnosis of *Illiosentis* and *I. heteracanthus* (Acanthocephala: Illiosentidae). *Journal of Parasitology*, 88, 365–369.

Nickol, B.B., Heard, R.W. & Smith, N.F. (2002) Acanthocephalans from crabs in the southeastern U.S., with the first intermediate hosts known for *Arhythmorhynchus frassoni* and *Hexaglandula corynosoma*. *Journal of Parasitology*, 88, 79–83.

Noroñha, D., Ferreira, L.F., Rangel, A., Araujo, A. & Corrêa-Gomes, D. (1994) *Echinopardalis* sp. (Acanthocephala, Oligacanthorhynchidae) eggs in felid coprolites dated from 9,000 years before present, found in the Brazilian Northeast. *Memorias do Instituto Oswaldo Cruz, Rio de Janeiro*, 89, 119–120.

Özdikmen, H. (2008) Nomenclatural changes for three preoccupied trilobites genera. *Munis Entomology and Zoology*, 3, 317–320.

Pichelin, S. (1999) *Hypoechinorhynchus robustus* sp. n. from *Notolabrus parilus* (Labridae) from Western Australia with a discussion on the validity of the Hypoechinorhynchidae (Acanthocephala: Palaeacanthocephala). *Folia Parasitologica*, 46, 311–315.

Pichelin, S.P. & Cribb, T.H. (2001) The status of the Diplosentidae (Acanthocephala: Palaeacanthocephala) and a new family of acanthocephalans from Australian wrasses (Pisces: Labridae). *Folia Parasitologica*, 48, 289–303.

Pichelin, S., Smales, L. & Bray, R.A. (2002) A discussion on the Heteracanthocephalidae Petrochenko, 1956 (Acanthocephala: Palaeacanthocephala). *Systematic Parasitology*, 52, 145–152.

Qian, Y. & Yin, G. (1984) Zhijinitidae and its stratigraphical significance (in Chinese with English abstract). *Acta Palaeontologica Sinica*, 22, 82–94.

Qiu, H., Lu, Y., Zhu, Z., Bi, D., Lin, T., Zhou, Z., Zhang, Q., Qian, Y., Ju, T., Han, N. & Wei, X. (1983) [Trilobita]. *In: Paleontological Atlas of East China. Part 1: Early Paleozoic*. Nanjing Institute of Geology and Mineral Resources, Geological Publishing House, Beijing, China, pp. 657.

Reinhard, K.J. (1990) Archaeoparasitology in North America. *American Journal of Physical Anthropology*, 82, 145–163.

Richardson, D.J., Monks, S., García-Varela, M. & Pulido-Flores, G. (2010) Redescription of *Centrorhynchus microcephalus* (Bravo-Hollis, 1947) Golvan, 1956 (Acanthocephala: Centrorhynchidae) from the groove-billed ani (*Crotophaga sulcirostris*) in Veracruz, Mexico. *Comparative Parasitology*, 77, 164–171.

Sardella, N., Mattiucci, S., Timi, J., Bastida, R., Rodríguez, D. & Nascetti, G. (2005) *Corynosoma australe* Johnston, 1937 and *C. cetaceum* Johnston and Best, 1942 (Acanthocephala: Polymorphidae) from marine mammals and fishes in Argentinian waters: allozyme markers and taxonomic status. *Systematic Parasitology*, 61, 143–156.

Wayland, M.T. (2010) Proboscis profiler: a tool for detecting acanthocephalan morphotypes. *Systematic Parasitology*, 76, 159–167.

Wayland, M.T., Gibson, D.I. & Sommerville, C. (2005) Morphometric discrimination of two allozymically diagnosed sibling species of the *Echinorhynchus gadi* Zoega in Müller complex (Acanthocephala) in the North Sea. *Systematic Parasitology*, V60, 139–149.

Wilke, P.J. & Hall, H.J. (1975) Analysis of ancient feces: a discussion and annotated bibliography. Department of Anthropology, University of California, Berkeley, California, 47 pp.

Author addresses

Scott Monks, Universidad Autónoma del Estado de Hidalgo (UAEH), Centro de Investigaciones Biológicas, Apdo. Postal 1-69, Pachuca, C.P. 42001, Hidalgo, México; smonks@uaeh.edu.mx; scottmonks@hotmail.com (corresponding author)

Dennis J. Richardson, Quinnipiac University, BC-SCI, 275 Mt. Carmel Ave., Hamden, CT 06518 U.S.A.; Dennis.Richardson@quinnipiac.edu