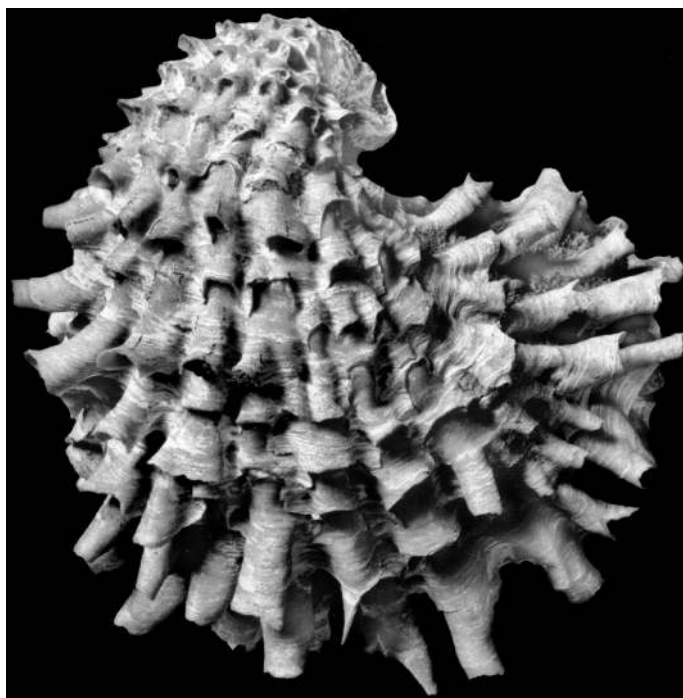


Paleontological Contributions

Number 4

A Synoptical Classification of the Bivalvia (Mollusca)

Joseph G. Carter, Cristian R. Altaba, Laurie C. Anderson, Rafael Araujo, Alexander S. Biakov, Arthur E. Bogan, David C. Campbell, Matthew Campbell, Chen Jin-hua, John C. W. Cope, Graciela Delvene, Henk H. Dijkstra, Fang Zong-jie, Ronald N. Gardner, Vera A. Gavrilova, Irina A. Goncharova, Peter J. Harries, Joseph H. Hartman, Michael Hautmann, Walter R. Hoeh, Jorgen Hylleberg, Jiang Bao-yu, Paul Johnston, Lisa Kirkendale, Karl Kleemann, Jens Koppka, Jiří Kříž, Deusana Machado, Nikolaus Malchus, Ana Márquez-Aliaga, Jean-Pierre Masse, Christopher A. McRoberts, Peter U. Middelfart, Simon Mitchell, Lidiya A. Nevesskaja, Sacit Özer, John Pojeta, Jr., Inga V. Polubotko, Jose Maria Pons, Sergey Popov, Teresa Sánchez, André F. Sartori, Robert W. Scott, Irina I. Sey, Javier H. Signorelli, Vladimir V. Silantiev, Peter W. Skelton, Thomas Steuber, J. Bruce Waterhouse, G. Lynn Wingard, and Thomas Yancey



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The University of Kansas

October 27, 2011

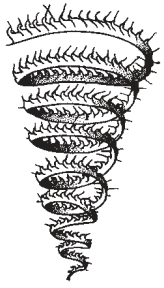
Lawrence, Kansas, USA

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Cover illustration: *Exogyra costata* Say, 1820, left valve, University of North Carolina 8264; Upper Cretaceous, Peedee Formation, milepost 49, near Donohue Landing, Cape Fear River, North Carolina; maximum shell length (left to right) = 6.1 cm (new).



Paleontological Contributions

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PREFACE

**Joseph G. Carter, Cristian R. Altaba, David C. Campbell,
Peter J. Harries, and Peter Skelton**

The following classification summarizes the suprageneric taxonomy of the Bivalvia for the upcoming revision of the Bivalvia volumes of the *Treatise on Invertebrate Paleontology*, Part N. The development of this classification began with Carter (1990a), Campbell, Hoekstra, and Carter (1995, 1998), Campbell (2000, 2003), and Carter, Campbell, and Campbell (2000, 2006), who, with assistance from the United States National Science Foundation, conducted large-scale morphological phylogenetic analyses of mostly Paleozoic bivalves, as well as molecular phylogenetic analyses of living bivalves. During the past several years, their initial phylogenetic framework has been revised and greatly expanded through collaboration with many students of bivalve biology and paleontology, many of whom are coauthors. During this process, all available sources of phylogenetic information, including molecular, anatomical, shell morphological, shell microstructural, bio- and paleobiogeographic as well as stratigraphic, have been integrated into the classification. The more recent sources of phylogenetic information include, but are not limited to, Carter (1990a), Malchus (1990), J. Schneider (1995, 1998a, 1998b, 2002), T. Waller (1998), Hautmann (1999, 2001a, 2001b), Giribet and Wheeler (2002), Giribet and Distel (2003), Dreyer, Steiner, and Harper (2003), Matsumoto (2003), Harper, Dreyer, and Steiner (2006), Kappner and Bieler (2006), Mikkelsen and others (2006), Neulinger and others (2006), Taylor and Glover (2006), Kříž (2007),

B. Morton (2007), Taylor, Williams, and Glover (2007), Taylor and others (2007), Giribet (2008), and Kirkendale (2009). This work has also benefited from the nomenclator of bivalve families by Bouchet and Rocroi (2010) and its accompanying classification by Bieler, Carter, and Coan (2010).

This classification strives to indicate the most likely phylogenetic position for each taxon. Uncertainty is indicated by a question mark before the name of the taxon. Many of the higher taxa continue to undergo major taxonomic revision. This is especially true for the superfamilies Sphaerioidea and Veneroidea, and the orders Pectinida and Unionida. Because of this state of flux, some parts of the classification represent a compromise between opposing points of view. Placement of the Trigonioidea is especially problematic. This Mesozoic superfamily has traditionally been placed in the order Unionida, as a possible derivative of the superfamily Unionoidea (see Cox, 1952; Sha, 1992, 1993; Gu, 1998; Guo, 1998; Bieler, Carter, & Coan, 2010). However, Chen Jin-hua (2009) summarized evidence that Trigonioidea was derived instead from the superfamily Trigonioidea. Arguments for these alternatives appear equally strong, so we presently list the Trigonioidea, with question, under both the Trigoniida and Unionida, with the contents of the superfamily indicated under the Trigoniida.

Typified Versus Descriptive Names

The present classification gives preference to typified names over descriptive names above the family-group, following the recommendation by Stys and Kerzhner (1975) and Starobogatov (1991). Typified names are more useful than descriptive names, because their

¹Author information provided in Appendix 4, p. 29 herein.

root indicates taxonomic affiliation and their suffix can be modified to reflect taxonomic rank. Descriptive names can be advantageous for indicating a key morphological feature, but this feature may not characterize all members of the group (e.g., the Palaeotaxodonta), and descriptive names indicate nothing about the phylogenetic placement of the taxon.

We agree with Dubois (2005) that adoption of a descriptive name should be guided by the spirit of priority and adherence to original definition. The term original definition is presently interpreted in a phylogenetic sense to mean the monophyletic clade defined by the original members of the taxon, their common ancestor, and all of its descendants. We have, therefore, not formally adopted the terms Palaeoheterodonta and Heterodonta, the original definitions of which have no useful phylogenetic equivalent in the present classification. These descriptive names, as well as the phylogenetically more useful Euheterodonta and Nepiomorphia, are, however, placed in the classification in bold-face type after their synonymous, or approximately synonymous, typified name. The descriptive names Autobranchia, Protobranchia, Pteriomorphia, and Heteroconchia are presently formally adopted. Grobben's (1894) Autolamellibranchiata is herein replaced with the shorter, more euphonic Autobranchia, following C. M. Kolesnikov (1977), T. Waller (1978), Naumov (2006), and Bieler, Carter, and Coan (2010).

Authorship and Priority of Nomina above the Family-Group

The ICZN (1999) *Code* does not regulate taxon names above the family-group. Previous workers have used various guidelines to determine the composition, authorship, and priority of such names. Some have based these names on the oldest valid and available included family-group name in the group, or the first publication to define the group in a modern sense, or the oldest valid and available typified name above the family-group. We have adopted the latter guideline, with separate authorship and priority for names above and within the family-group. For example, the hyporder name Antipleuroidei Křř, 2007, is presently adopted, even though it contains the superfamily Dualinoidea Conrath, 1887, because order Antipleuroidea Křř, 2007 is the oldest valid and available typified name above the family-group for this clade. Similarly, Hippuritida Newell, 1965, is adopted for an order that includes some families established as early as 1847 and 1848. In cases where a new name above the family-group is needed, but an appropriate typified root name above the family-group is not available, the earliest valid and available typified name in the family-group is used as the root, but with a new publication date. Separate priority for names above and within the family-group is preferred because it allows for the retention of a number of widely used but otherwise lesser priority names above the family-group, such as order Hippuritida.

Typified names above the family-group, which are based on a junior generic synonym or homonym, are presently regarded as unavailable and are disregarded for purposes of priority. This is a departure from the ICZN (1999) *Code* rules for family-group names. For example, *Anatina* Lamarck, 1818, is a junior homonym of *Anatina* Schumacher, 1817. Consequently, the suborder Anatinacea P. Fischer, 1887, based on *Anatina* Lamarck, 1818, is not available and has no bearing on the priority of any other typified name above the family-group. Also, the suborder Saxicavoidea Morretes, 1949, is unavailable because it is based on *Saxicava* Fleuriu de Bellevue,

1802, a junior synonym of *Hiatella* Bosc *ex* Daudin MS, 1801, and the suborder Saxicavoidea has no bearing on the priority of the presently adopted order Hiattellida. However, typified names above the family-group are not presently regarded as unavailable on the basis that their nominal family-group name is a junior synonym of another family-group name. For example, the suborder Leptonidina Dall, 1889, is available despite the fact that its nominal family-group name, Leptonidae J. Gray, 1847b, is now a junior synonym of Lasaeidae J. Gray, 1842.

Priority is presently given to the higher ranking of two or more simultaneously published typified or descriptive names above the family-group. This is an extension of Article 24.1 of the ICZN (1999) *Code* for family-group names. For example, order Pectinacea J. Gray, 1854a, has priority over the simultaneously established (unspecified rank above family-group but below suborder) Anomiaina J. Gray, 1854a. Changes in the rank, spelling, and/or taxonomic composition of a descriptive name are not presently considered to be a valid basis for changing the author and date of the descriptive name.

Paraphyletic and polyphyletic taxa. Paraphyletic higher taxa are unavoidable in a classification that includes ancestors and descendants. This is illustrated by J. Schneider's (1995, 1998a, 1998b, 2002) revision of the superfamily Cardioidea. Schneider reduced superfamily Tridacnoidea to subfamily Tridacninae within Cardiidae to eliminate paraphyly of Cardioidea with respect to Tridacnoidea. However, this reduction in rank merely shifted paraphyly from Cardioidea to its subfamily Cerastodermatinae, the ancestral stock group for Tridacninae. Building a taxonomy that includes living and extinct taxa presents a dilemma: choosing between explicitly recognizing paraphyletic taxa or multiplying supraspecific taxa beyond reasonable bounds (Cela-Conde & Altaba, 2002; Altaba, 2009). We favor an evolutionary classification that, being based upon cladistic analysis, does not dismiss evidence and reflects ancestor-descendant relationships. Paraphyletic taxa are indicated in the classification by an exclamation point (!) after the name.

Polyphyletic taxa are avoided in the classification, except in rare instances where the polyphyly is limited to descendants of the same genus, originating at about the same time. For example, the subfamily Lymnocaridiinae is believed to contain more than one tribe derived, in the Miocene, from *Cerastoderma* of the subfamily Cerastodermatinae. In this case, Lymnocaridiinae is also paraphyletic because it does not include *Cerastoderma*, the common ancestor of all its members.

Linnean Ranks and Suffixes for Names above the Family-Group

The present classification utilizes an increased number of Linnean ranks to adequately portray phylogenetic relationships. The number of Linnean ranks reflects a substantial increase in suprageneric taxa described over the past 50 years, and the fact that morphological and molecular phylogenetics have made possible a detailed phylogenetic framework for the Bivalvia. In order to minimize the number of Linnean ranks, we have not ranked the clade Eubivalvia and certain clades in more intensively studied groups, such as the Pectinoidea, Radiolitoidea, and Cardioidea. Those preferring a simpler classification can achieve this by disregarding some of the less familiar ranks, such as subcohort, infrasubcohort, mega-order, hyporder, minorder, epifamily, and series. Such condensation of the classification will hide some phylogenetic relationships, but it might be better suited for some summary and discussion purposes. The present

Linnean synopsis does not show ancestor-descendant relationships, but these are identified in the phylogenetic classification under preparation for the revised Bivalvia *Treatise*.

There is currently no consensus on suffixes for typified names above the family-group. The proposal by Rohdendorf (1977) for general zoology is compared in Table 1 with the classifications of the Bivalvia by Cox and others (1969, 1971), Starobogatov (1984, 1992), Waterhouse (2008), and that used herein.

The suffix *-ia* is commonly used for bivalve subclasses and infra-classes, e.g., Protobranchia, Autobranchia, Pteriomorphia, and Heteroconchia (T. Waller, 1978; Amler, 1999). The suffix *-ata* was used by Blainville (1825, 1827) and by Grobben (1894) for orders (Lamellibranchiata and Autolamellibranchiata, respectively), and by Grobben (1892), Keen (1963), and Pojeta (1978) for subclasses (Protobranchiata, Anomalodesmata, and Lucinata, respectively).

Cohort and subcohort are generally inserted between class-group and ordinal-group names, although cohort has been used below the ordinal level for dinosaurs (e.g., Benton, 2005). The ranks subcohort, megaorder, hyporder, minorder, epifamily, and series have not been used before for the Bivalvia. Megaorder, hyporder, and minorder have been used for tetrapods, although at varying ranks in the case of hyporder and minorder (cf. Novacek, 1986; Sereno, 1986, 1999; E. Gaffney & Meylan, 1988; van Valen, 1994; McKenna & Bell, 1997; Benton, 2005).

Waterhouse (2000, 2001, 2008) suggested using *-idina* for suborders rather than the *-ina* of some earlier authors, because *-ina* is reserved for subtribes by Article 29.2 of the ICZN (1999) *Code*. The subordinal suffix *-oidina*, advocated by Waller in T. Waller and Stanley (2005, p. 8), is presently rejected because *-idina* is more consistent with the *-ida* ordinal ending adopted by Scarlato and Starobogatov (1969, 1979a), Waterhouse (2008), and Bieler, Carter, and Coan (2010). The suffix *-oid*, as in *nuculoid* and *pterioid*, is retained for informal reference to orders, to avoid confusion with informal references to families, such as *nuculids* and *pteriids*.

The rank epifamily, with the suffix *-oidae*, has been used between superfamily and family for reptiles (Bour & Dubois, 1984; de la Fuente, 2003; van der Meijden & others, 2005) and for insects (M. Engel, 2005). The term *series* has been used between superfamily and family for Lepidoptera.

New Taxa

New taxon names are formally proposed in Appendices 1 and 2 (p. 19–27 herein). This excludes rank and/or spelling changes of previously established suprageneric taxa, which will be documented in the Introduction volume to the revised Bivalvia *Treatise*.

CLASSIFICATION FORMAT

The present classification of the Bivalvia differs from previous ones in its uniform priority basis for determining names above the family-group, more consistent use of typified rather than descriptive names above the family-group, and labelling of paraphyletic taxa. Details of the classification format are described below.

Taxon Order

The nominotypical family, subfamily, or tribe is listed first within each superfamily, family, or subfamily, respectively. This is followed

Table 1. Suffixes for taxonomic ranks.

	Cox & others (1969, 1971)	Rohdendorf (1977)	Starobogatov (1984, 1992)	Waterhouse (2008)	Herein
Subclass	---	-ona	-iones	---	-ia
Infraclass	---	-ones	-ioni	---	-ia
Cohort	---	-iformes	-omorphi	---	-omorphi
Subcohort	---	---	---	---	-ioni
Infrasubcohort	---	---	---	---	-idia
Megaorder	---	---	---	---	-ata
Superorder	---	-idea	-iformii	-idia	-iformii
Order	-oida	-ida	-iformes	-ida	-ida
Suborder	-ina	-ina	-oidei	-idina	-idina
Hyporder	---	---	---	---	-oidei
Minorder	---	---	---	---	-oitei
Superfamily*	-acea	---	-oidea	-oidea	-oidea
Epifamily	---	---	---	---	-oidae
Series	---	---	---	---	-itae
Family*	-idae	-idae	-idae	-idae	-idae
Subfamily*	-inae	-inae	-inae	-inae	-inae
Tribe*	---	---	---	---	-ini
Subtribe*	---	---	---	---	-ina

*suffix mandated by the ICZN (1999) *Code*.

by the remaining members of the group in alphabetical order. At higher taxonomic ranks, simpler clades are generally listed before more complex clades.

Paraphyletic Taxa

Paraphyletic taxa are indicated by an exclamation point after the name, e.g., Grade Euprotobranchia!

Extinct Taxa

Extinct taxa are indicated by the symbol • before the name, e.g., •Family Actinodontidae.

Taxonomically Isolated Plesions and Paraphyletic Taxa

Some plesions and some paraphyletic taxa are taxonomically isolated in the sense that they lack membership in one or more expected, immediately higher Linnean ranks, e.g., the family Palaeocarditidae placed within the suborder Cardiidina without an intervening hyporder, minorder, or superfamily. Such isolated plesions and paraphyletic taxa are presently labelled plesions and paraplesions, respectively, to emphasize their deviation from the normal Linnean hierarchy.

Taxon Dates and References

Where two references are given for a taxon, e.g., Glycymerididae Dall, 1908 (Leach in J. Gray, 1847a), the second one indicates the source of date priority. See Bouchet and Rocroi (2010) for documentation.

Informal Descriptive Names

Commonly used descriptive names that are not presently formally adopted but have exact phylogenetic equivalents in the present classification are placed in bold face type after their correlative typified name, e.g., **Eupteriomorphia**, **Foliobranchia**, **Euheterodonta**, **Neoheterodonte**, **Nepiomorphia**, **Palaeotaxodonta**. Commonly used descriptive names that are not presently formally adopted and have no exact phylogenetic equivalent in the present classification (as determined by their original composition) are placed in **bold-face type** and *italics* after their most compatible typified name, e.g., **Palaeoheterodonta**, **Heterodonta**. The taxonomically widely dispersed taxa formerly assigned to the Anomalodesmata are indicated by underlining.

ABSTRACT OF CLASSIFICATION

To more clearly illustrate the major structure of the classification, the following abstract includes only the higher taxonomic ranks and their higher ranking paraplesions. A more detailed abstract, which includes all taxa at or above the rank of superfamily, plus all plesions and paraplesions, is provided in Appendix 3 (p. 27 herein). Symbols: • = extinct; ! = paraphyletic; underlining = former members of Anomalodesmata; ? = taxonomic placement uncertain.

Class Bivalvia Linnaeus, 1758 in 1758–1759

- Grade Euprotobranchia! Nevesskaja, 2009
 - Order Fordillida! Pojeta, 1975
 - Order Tuarangiida MacKinnon, 1982

Clade Eubivalvia Carter, *nov.*

Subclass Protobranchia Pelseneer, 1889 (=Palaeotaxodonta Korobkov, 1954)

Superorder Nuculiformii! Dall, 1889 (=Foliobranchia Ménégaux, 1889)

Order Nuculida! Dall, 1889

Order Solemyida Dall, 1889

Superorder Nuculaniformii Carter, Campbell, & Campbell, 2000

Order Nuculanida Carter, Campbell, & Campbell, 2000

- Order Afghanodesmatida! Carter, *nov.*

Subclass Autobranchia Grobben, 1894

Infraclass Pteriomorphia Beurlen, 1944

Cohort Mytilomorphi! Férussac, 1822 in 1821–1822

Order Mytilida! Férussac, 1822 in 1821–1822

- Order Colpomyida Carter, *nov.*

Cohort Ostreomorphi Férussac, 1822 in 1821–1822

Subcohort Arcioni J. Gray, 1854a

- Order Cyrtodontida! Scarlato & Starobogatov in Nevesskaja & others, 1971

- Suborder Cyrtodontidina! Scarlato & Starobogatov in Nevesskaja & others, 1971

- Suborder Praecardiidina Newell, 1965 (=Nepiomorphia Kříž, 2007)

- Hyporder Praecardioidi Newell, 1965

- Hyporder Antipleuroidei Kříž, 2007

Order Arcida J. Gray, 1854a

Subcohort Ostreioni Férussac, 1822 in 1821–1822

- Megaorder Myalinata H. Paul, 1939

- Order Myalinida H. Paul, 1939

Megaorder Ostreata Férussac, 1822 in 1821–1822

Superorder Ostreiformii Férussac, 1822 in 1821–1822 (=Eupteriomorphia Boss, 1982)

Order Ostreida Férussac, 1822 in 1821–1822

Suborder Ostreidina Férussac, 1822 in 1821–1822

Suborder Malleidina! J. Gray, 1854a

Order Pectinida J. Gray, 1854a

(paraplesion) •Superfamily Leiopectinoidea! Krasilova, 1959

Suborder Pectinidina J. Gray, 1854a

Suborder Anomiidina J. Gray, 1854a

Hyporder Anomioidei J. Gray, 1854a

- (paraplesion) Superfamily Pseudomonotoidea! Newell, 1938

Minorder Anomioitei J. Gray, 1854a

Minorder Dimyoitei Ridewood, 1903

- Hyporder Aviculopectinoidei Starobogatov, 1992

Hyporder Limoidei R. Moore in Moore, Lalicker, & Fischer, 1952

- Hyporder Monotoidei Waterhouse, 2001

Suborder Entoliidina Hautmann, *nov.*

Infraclass Heteroconchia Hertwig, 1895

Cohort Uniomorphi J. Gray, 1854a (=Palaeoheterodonta of authors)

Subcohort Unioni J. Gray, 1854a

(paraplesion) •Superfamily Lyrodesmatoidea! P. Fischer, 1886

Megaorder Unioniata J. Gray, 1854a

Order Trioniida! Dall, 1889

Order Unionida J. Gray, 1854a

Suborder Unionidina J. Gray, 1854a

Suborder Hyriidina Hoeh & others, 2009

- Suborder Silesunionidina! Skawina & Dzik, 2011

Cohort Cardiomorphi Férussac, 1822 in 1821–1822 (=Heterodonta of authors)

Subcohort Carditioni Dall, 1889

- Order Actinodontida! Deschaseaux, 1952

Order Carditida Dall, 1889

Subcohort Cardioni Férussac, 1822 in 1821–1822 (=Euheterodonta Giribet & Distel, 2003)

- Infrasubcohort Lucinidia J. Gray, 1854a
 (paraplesion) •Superfamily Babinkoidea! Horný, 1960
 Order Lucinida J. Gray, 1854a
- Infrasubcohort Cardiida Férussac, 1822 in 1821–1822
 (paraplesion) •Superfamily Grammysioidea! S. A. Miller, 1877
- Megaorder Cardiata Férussac, 1822 in 1821–1822 (=Neoheterodonte! Taylor & others, 2007)
- Superorder Pholadiformii J. Gray, 1854a
 Order Pholadida J. Gray, 1854a
- Superorder Cardiiformii Férussac, 1822 in 1821–1822
- Order Modiomorphida! Newell, 1969c
 - Order Megalodontida Starobogatov, 1992
 - Order Hippuritida Newell, 1965
- Order Cardiida Férussac, 1822 in 1821–1822
 (paraplesion) •Superfamily Kalenteroidea! Marwick, 1953
- Suborder Cardiidina Férussac, 1822 in 1821–1822
 (paraplesion) •Family Palaeocarditidae! Chavan, 1969b
- Hyporder Cardioidei Férussac, 1822 in 1821–1822
- Hyporder Veneroidei J. Gray, 1854a
 Minorder Veneroitei J. Gray, 1854a
 Minorder Dreissenitei R. Moore in Moore, Lalicker, & Fischer, 1952
- Suborder Gastrochaenidina Morretes, 1949
- Suborder Anthracosiidina Silantiev & Carter, 2011
- Suborder Leptonidina Dall, 1889
- Megaorder Poromyata Ridewood, 1903
- Order Poromyida Ridewood, 1903
 - Order Pandorida R. Stewart, 1930
 - Order Pholadomyida! Newell, 1965
 - Order Thraciida Carter, *nov.*
- Megaorder Solenata Dall, 1889
- Order Solenida Dall, 1889
 - Order Hiatellida Carter, *nov.*

DETAILED CLASSIFICATION

- Class Bivalvia Linnaeus, 1758 in 1758–1759
- Grade Euprotobranchia! Neveškaja, 2009
 - Order Fordillida! Pojeta, 1975
 - Superfamily Fordilloidea! Pojeta, 1975
 - Family Fordillidae! Pojeta, 1975
 - Family Camyidae! Hinz-Schallreuter, 2000
 - Order Tuarangiida MacKinnon, 1982
 - Family Tuarangiidae MacKinnon, 1982
- Clade Eubivalvia Carter, *nov.*
- Subclass Protobranchia Pelseneer, 1889 (=Palaeotaxodonta Korobkov, 1954)
- Superorder Nuculiformii! Dall, 1889 (=Foliobranchia Ménégaux, 1889)
- Order Nuculida! Dall, 1889
- Superfamily Nuculoidea! J. Gray, 1824
- Family Nuculidae! J. Gray, 1824
- Subfamily Nuculinae J. Gray, 1824
 - Subfamily Nuculominae! Maxwell, 1988
 - Subfamily Palaeonuculinae! Carter, 2001
 - Family Praenuculidae! McAlester, 1969
 - Subfamily Praenuculinae! McAlester, 1969
 - Subfamily Concavodontidae Sánchez, 1999
- Superfamily Pristiglomoidea Sanders & Allen, 1973
- Family Pristiglomidae Sanders & Allen, 1973
- Order Solemyida Dall, 1889
- Superfamily Solemyoidea! J. Gray, 1840b
- Family Solemyidae J. Gray, 1840b
- Subfamily Solemyinae J. Gray, 1840b
 - Subfamily Janacekiinae! Růžička & Řehoř in Hajkr & others, 1978
 - Family Clinopisthidae! Pojeta, 1988
 - Family Ctenodontidae Wöhrmann, 1893
 - Family Ovatoconchidae! Carter, *nov.*
- Superfamily Manzanelloidea Chronic, 1952
- Family Manzanellidae Chronic, 1952
- Superorder Nuculaniformii Carter, Campbell, & Campbell, 2000

- Order Afghanodesmatida! Carter, *nov.*
 - Superfamily Tironuculoidea Babin in Babin & others, 1982
 - Family Tironuculidae Babin in Babin & others, 1982
 - Subfamily Tironuculinae! Babin in Babin & others, 1982
 - Subfamily Natasiinae Sánchez, 1997
 - Family Nucularciidae Pojeta & Stott, 2007
 - Family Similodontidae! Carter & Pojeta, *nov.*
 - Superfamily Afghanodesmatoidea! Scarlato & Starobogatov, 1979a
 - Family Afghanodesmatidae Scarlato & Starobogatov, 1979a
 - Family Eritropidae! Cope, 2000
- Order Nuculanida Carter, Campbell, & Campbell, 2000
 - Superfamily Malletioidea! H. Adams & A. Adams, 1858 (d'Orbigny, 1846)
 - Family Malletiidae! H. Adams & A. Adams, 1858 (d'Orbigny, 1846)
 - Family Cucullellidae! P. Fischer, 1886
 - Subfamily Cucullellinae P. Fischer, 1886
 - Subfamily Palaeoneilinae! Babin, 1966
 - Family Pseudocyrtodontidae Maillieux, 1939
 - Family Strabidae Prantl & Růžička, 1954
 - Family Tindariidae Verrill & Bush, 1897
 - Subfamily Tindariinae! Verrill & Bush, 1897
 - Subfamily Neilonellinae Schileyko, 1989
 - Superfamily Nuculanoidea H. Adams & A. Adams, 1858 (J. Gray, 1854a)
 - Family Nuculanidae! H. Adams & A. Adams, 1858 (J. Gray, 1854a)
 - Family Isoarciidae Keen, 1969b
 - Family Phaseolidae Scarlato & Starobogatov in Neveškaja & others, 1971
 - Subfamily Phaseolinae Scarlato & Starobogatov in Neveškaja & others, 1971
 - Subfamily Siliculinae! J. A. Allen & Sanders, 1973
 - Family Polidevciidae! Kumpera, Prantl, & Růžička, 1960
 - Family Sareptidae Stoliczka, 1870 in 1870–1871
 - Subfamily Sareptinae! Stoliczka, 1870 in 1870–1871
 - Subfamily Yoldiellinae J. A. Allen & Hannah, 1986
 - Subfamily Yoldiinae Dall, 1908
 - Family Zealedidae Scarlato & Starobogatov, 1979a
 - Subfamily Zealedinae Scarlato & Starobogatov, 1979a
 - Subfamily Parayoldiellinae Filatova & Schileyko, 1984
- Subclass Autobranchia Grobben, 1894
 - Infraclass Pteriomorpha Beurlen, 1944
 - Cohort Mytilomorphi! Férussac, 1822 in 1821–1822
 - Order Mytilida! Férussac, 1822 in 1821–1822
 - Superfamily Modiolopsoidea! P. Fischer, 1886
 - Family Modiolopsidae! P. Fischer, 1886
 - Family Goniophorinidae Sánchez, 2006
 - Superfamily Mytiloidea Rafinesque, 1815
 - Family Mytilidae! Rafinesque, 1815
 - Subfamily Mytilinae Rafinesque, 1815
 - Tribe Mytilini! Rafinesque, 1815
 - Tribe Adulini Scarlato & Starobogatov, 1979b
 - Tribe Aulacomyini Carter, *nov.*
 - Subfamily Arcuatulinae Scarlato & Starobogatov, 1979b
 - Subfamily Bathymodiolinae Kenk & Wilson, 1985
 - Subfamily Lithophaginae H. Adams & A. Adams, 1857 (J. Gray, 1854a)
 - Tribe Lithophagini H. Adams & A. Adams, 1857 (J. Gray, 1854a)
 - Tribe Botulini Scarlato & Starobogatov, 1979b
 - Subfamily Modiolinae! G. Termier & H. Termier, 1950
 - Subfamily Xenomytilinae Squires & Saul, 2006
 - Family Crenellidae J. Gray, 1840b
 - Subfamily Crenellinae J. Gray, 1840b
 - Tribe Crenellini! J. Gray, 1840b
 - Tribe Dacrydiini Ockelmann, 1983
 - Subfamily Musculinae Iredale, 1939
 - Family Septiferidae Scarlato & Starobogatov, 1979b
 - Subfamily Septiferinae! Scarlato & Starobogatov, 1979b
 - Subfamily Limnoperlinae Scarlato & Starobogatov, 1979b
 - Order Colpomyida Carter, *nov.*
 - Superfamily Colpomyoidea Pojeta & Gilbert-Tomlinson, 1977
 - Family Colpomyidae! Pojeta & Gilbert-Tomlinson, 1977
 - Family Evyanidae Carter, Campbell, & Campbell, 2000

- Cohort Ostreomorphi Férussac, 1822 in 1821–1822
 (plesion) •Family Matheriidae Scarlato & Starobogotov, 1979a
 (plesion) •Family Ischyrodontidae Scarlato & Starobogotov, 1979a
 Subcohort Arcioni! J. Gray, 1854a
- Order Cyrtodontida! Scarlato & Starobogotov in Nevesskaja & others, 1971
 - Suborder Cyrtodontidina! Scarlato & Starobogotov in Nevesskaja & others, 1971
 - Superfamily Cyrtodontoidea! Ulrich in Ulrich & Scofield, 1894
 - Family Cyrtodontidae! Ulrich in Ulrich & Scofield, 1894
 - Subfamily Cyrtodontinae! Ulrich in Ulrich & Scofield, 1894
 - Subfamily Ptychodesmatinae Scarlato & Starobogotov, 1984
 - Superfamily Falcatodontoidea Cope, 1996
 - Family Falcatodontidae Cope, 1996
 - Superfamily Pichlerioidea Scarlato & Starobogotov, 1979a
 - Family Pichleriidae Scarlato & Starobogotov, 1979a
 - Suborder Praecardiidina Newell, 1965 (=Nepiomorphia Kříž, 2007)
 - Hyporder Praecardioidi Newell, 1965
 - Superfamily Praecardiioidea R. Hoernes, 1884
 - Family Praecardiidae! R. Hoernes, 1884
 - Family Buchiolidae Grimm, 1998
 - Superfamily Cardioloidea R. Hoernes, 1884
 - Family Cardiolidae R. Hoernes, 1884
 - Family Slavidae Kříž, 1982
 - Hyporder Antipleuroidei Kříž, 2007
 - Superfamily Dualinoidea Conrath, 1887
 - Family Dualinidae! Conrath, 1887
 - Subfamily Dualininae! Conrath, 1887
 - Subfamily Loxopteriinae Nagel-Myers, Amler, & Becker, 2009
 - Family Praelucinidae Conrath, 1887
 - Family Stolidotidae! Starobogotov, 1977
 - Family Spanilidae Kříž, 2007
- Order Arcida J. Gray, 1854a
- Superfamily Glyptarcoidea Cope, 1996
 - Family Glyptarcidae Cope, 1996
 - Family Pucamyidae Sánchez in Sánchez & Benedetto, 2007
- Superfamily Arcoidea Lamarck, 1809
- Family Arcidae Lamarck, 1809
- Subfamily Arcinae! Lamarck, 1809
 - Subfamily Anadarinae Reinhart, 1935
 - Subfamily Noetiinae R. Stewart, 1930
 - Tribe Noetiini R. Stewart, 1930
 - Tribe Striarcini MacNeil, 1937
 - Tribe Trinacriini MacNeil, 1937
 - Family Catamarcaiidae Cope, 2000
- Family Cucullaeidae! R. Stewart, 1930
- Family Frejidae! Ratter & Cope, 1998
- Family Glycymerididae Dall, 1908 (Leach in J. Gray, 1847a)
- Subfamily Glycymeridinae Dall, 1908 (Leach in J. Gray, 1847a)
 - Subfamily Arcullaeinae! Newell, 1969a
 - Family Parallelodontidae! Dall, 1898
 - Subfamily Parallelodontinae Dall, 1898
 - Subfamily Grammatodontinae! L. Stephenson, 1941
 - Tribe Grammatodontini! L. Stephenson, 1941
 - Tribe Catellini Scarlato & Starobogotov, 1979b
 - Tribe Nemodontini L. Stephenson *ex* MacNeil MS, 1941
- Superfamily Limopsoidea Dall, 1895a
- Family Limopsidae Dall, 1895a
- Superfamily Philobryoidea Félix Bernard, 1897
- Family Philobryidae Félix Bernard, 1897
- Subcohort Ostreioni Férussac, 1822 in 1821–1822
- Megaorder Myalinata H. Paul, 1939
 - Order Myalinida H. Paul, 1939
 - Superfamily Alatoconchoidea H. Termier, Termier, & Lapparent, 1974
 - Family Alatoconchidae H. Termier, Termier, & Lapparent, 1974
 - Family Saikraconchidae Yancey & Ozaki, 1986
 - Superfamily Ambonychioidea! S. A. Miller, 1877
 - Family Ambonychiidae! S. A. Miller, 1877
 - Family Lunulacardiidae P. Fischer, 1887

- Subfamily Lunulacardiinae P. Fischer, 1887
- Subfamily Pterochaeniinae Fang & Ding, 1993
- Family Monopteriidae Newell, 1969b
- Family Mysidiellidae Cox, 1964
- Family Myalinidae! Frech, 1891
- Family Ramonalinidae Yancey, Wilson, & Mione, 2009
- Superfamily Inoceramoidea C. Giebel, 1852
 - Family Inoceramidae C. Giebel, 1852
 - Subfamily Inoceraminae C. Giebel, 1852
 - Subfamily Coloniceraminae Pochialaynen, 1985
 - Subfamily Sachalinoceraminae Zonova, 1984
 - Family Atomodesmatidae! Waterhouse, 1976
 - Subfamily Atomodesmatinae! Waterhouse, 1976
 - Subfamily Malimanininae Waterhouse, 2001
 - Subfamily Permoceraminae! Waterhouse, 2008
 - Family Kolyumiidae V. Kuznetsov, 1973
 - Family Retroceramidae! Koschelkina, 1980
- Superfamily Prokopievskioidea H. Vokes, 1967
 - Family Prokopievskiidae H. Vokes, 1967
 - Subfamily Prokopievskiinae H. Vokes, 1967
 - Subfamily Abiellinae Starobogatov, 1970
 - Subfamily Concinellinae Silantiev, *nov.*
 - Subfamily Kinerkaellinae Scarlato & Starobogatov, 1979a
 - Family Anadontellidae Silantiev, *nov.*
 - Family Naiaditidae Scarlato & Starobogatov, 1979a
- Megaorder Ostreata Férussac, 1822 in 1821–1822 (plesion)
 - Family Myodakryotidae Tunnicliff, 1987
- Superorder Ostreiformii Férussac, 1822 in 1821–1822 (=Eupteriomorphia Boss, 1982)
- Order Ostreida Férussac, 1822 in 1821–1822
 - Suborder Ostreidina Férussac, 1822 in 1821–1822
 - Superfamily Ostreioidea Rafinesque, 1815
 - Family Ostreidae Rafinesque, 1815
 - Subfamily Ostreinae Rafinesque, 1815
 - Tribe Ostreini Rafinesque, 1815
 - Tribe Pustulostreini Harry, 1985
 - Tribe Undulostreini Harry, 1985
 - Subfamily Lophinae Vialov, 1936
 - Tribe Lophini Vialov, 1936
 - Tribe Myrakeenini Harry, 1985
 - Family Arctostreidae Vialov, 1983
 - Subfamily Arctostreinae! Vialov, 1983
 - Subfamily Palaeolophinae! Malchus, 1990
 - ?Family Eligmidae T. Gill, 1871
 - Family Flemingostreidae! Stenzel, 1971
 - Subfamily Flemingostreinae! Stenzel, 1971
 - Tribe Flemingostreini! Stenzel, 1971
 - Tribe Ambigostreini Malchus, 1990
 - Tribe Curvostreini Malchus, 1990
 - Subfamily Crassostreinae Scarlato & Starobogatov, 1979a
 - Tribe Crassostreini Scarlato & Starobogatov, 1979a
 - Tribe Striostreini Harry, 1985
 - Tribe Turkostreini Malchus, 1990
 - Subfamily Liostreinae! Vialov, 1983
 - Family Gryphaeidae! Vialov, 1936
 - Subfamily Gryphaeinae! Vialov, 1936
 - Subfamily Exogyrinae Vialov, 1936
 - Tribe Exogyrini Vialov, 1936
 - Tribe Amphidonteini Vialov, 1983
 - Subfamily Gryphaeostreinae Stenzel, 1971
 - Subfamily Pycnodonteinae Stenzel, 1959
 - Tribe Pycnodonteini Stenzel, 1959
 - Tribe Hyotissini Scarlato & Starobogatov, 1979b
 - Tribe Neopycnodonteini Harry, 1985
- Suborder Malleidina! J. Gray, 1854a (paraplesion)
 - Family Pterineidae! F. Meek, 1864b
- Superfamily Pinnoidea Leach, 1819
 - Family Pinnidae Leach, 1819

- Superfamily Posidonioidea Neumayr, 1891
 - Family Posidoniidae! Neumayr, 1891
 - Family Aulacomyellidae! Ichikawa, 1958
 - Subfamily Aulacomyellinae Ichikawa, 1958
 - Subfamily Bositrinae! Waterhouse, 2008
 - Family Daonellidae Neumayr, 1891
 - Family Halobiidae Kittl, 1912
- Superfamily Pterioidea! J. Gray, 1847b (Goldfuss, 1820)
 - Family Pteriidae J. Gray, 1847b (Goldfuss, 1820)
 - Subfamily Pteriinae! J. Gray, 1847b (Goldfuss, 1820)
 - Subfamily Dattinae M. Healey, 1908
 - Family Bakevelliidae! W. King, 1850
 - ?Family Cassianellidae Ichikawa, 1958
 - ?Family Kochiidae Frech, 1891
 - Family Malleidae Lamarck, 1818
 - Subfamily Malleinae Lamarck, 1818
 - Subfamily Isognomoninae! Woodring, 1925 (J. Fleming, 1828)
 - Subfamily Pulvinitinae L. Stephenson, 1941
 - Family Pergamidiidae Cox, 1964
 - Subfamily Pergamidiinae Cox, 1964
 - ?Subfamily Oretiinae Waterhouse, 2008
 - Family Plicatostylidae Lupper & Packard, 1929
 - Family Vlastidae! Neumayr, 1891
 - Subfamily Vlastinae Neumayr, 1891
 - Subfamily Praeostreinae! Kríž, 1966
- Superfamily Rhombopterioidea! Korobkov in Eberzin, 1960
 - Family Rhombopteriidae! Korobkov in Eberzin, 1960
 - Family Umburridae! P. A. Johnston, 1991
- Order Pectinida J. Gray, 1854a
 - (paraplesion) •Superfamily Leiopectinoidea! Krasilova, 1959
 - Family Leiopectinidae! Krasilova, 1959
 - Suborder Pectinidina J. Gray, 1854a
 - Superfamily Pectinoidea Rafinesque, 1815
 - Epifamily Pectinoidea Rafinesque, 1815
 - Family Pectinidae! Rafinesque, 1815
 - Subfamily Pectininae Rafinesque, 1815
 - Tribe Pectinini Rafinesque, 1815
 - Tribe Aequipectinini! Nordsieck, 1969
 - Tribe Amusiini Ridewood, 1903
 - Tribe Austrochlamydini Jonkers, 2003
 - Tribe Decatopectinini T. Waller, 1986
 - Subfamily Camptonectinae Habe, 1977
 - Subfamily Pallioliinae Korobkov in Eberzin, 1960
 - Tribe Palliolini Korobkov in Eberzin, 1960
 - Tribe Adamussiini Habe, 1977
 - Tribe Eburnepectinini T. Waller, 2006
 - Tribe Mesopeplini T. Waller, 2006
 - Tribe Pseudentoliini T. Waller, 2006
 - Tribe Serripectinini T. Waller, 2006
 - Subfamily Pedinae! Bronn, 1862
 - Tribe Pectinini Bronn, 1862
 - Tribe Chlamydini! Teppner, 1922
 - Tribe Crassadomini T. Waller, 1993
 - Tribe Fortipectinini K. Masuda, 1963
 - Subtribe Fortipectinina K. Masuda, 1963
 - Subtribe Patinopectinina Habe, 1977
 - Tribe Mimachlamydini! T. Waller, 1993
 - Subfamily Pseudopectininae! Kasum-Zade, 2003
 - Subfamily Weylinae Kasum-Zade, 2003
 - Family Pleuronectitidae! Hautmann, *nov.*
 - Family Spondylidae J. Gray, 1826
 - Subfamily Spondylinae J. Gray, 1826
 - Subfamily Spondylopectininae! Kasum-Zade & Romanov, 1987
 - Epifamily Neitheoidea Sobetski, 1960
 - Family Neitheidae Sobetski, 1960
 - Family Tosapectinidae! Trushchelev, 1984
- Suborder Anomiidina J. Gray, 1854a

- Hyporder Anomioidei J. Gray, 1854a
- (plesion) ?Family Saharopteriidae G. Termier & H. Termier in Pareyn, Termier, & Termier, 1972
 - (paraplesion) Superfamily Pseudomonotoidea! Newell, 1938
 - Family Pseudomonotidae! Newell, 1938
- Minorder Anomioitei J. Gray, 1854a
- Superfamily Anomioidea Rafinesque, 1815
 - Family Anomiidae! Rafinesque, 1815
 - Subfamily Anomiinae! Rafinesque, 1815
 - Subfamily Heteranomiinae Scarlato & Starobogatov, 1979a
 - Family Permanomiidae Carter, 1990a
 - Family Placunidae Rafinesque, 1815
- Minorder Dimyoitei Ridewood, 1903
- Superfamily Dimyoidea P. Fischer, 1886
 - Family Dimyidae P. Fischer, 1886
 - Superfamily Plicatuloidea J. Gray, 1854b
 - Family Plicatulidae! J. Gray, 1854b
 - Family Chondrodontidae Freneix, 1960
 - Superfamily Prospodyloidea! Pchelintseva, 1960
 - Family Prospodylidae! Pchelintseva, 1960
 - Subfamily Prospodylinae! Pchelintseva, 1960
 - Subfamily Pegmavalvulinae! Waterhouse, 2008
- Hyporder Aviculopectinoidei! Starobogatov, 1992
- Superfamily Aviculopectinoidea! F. Meek & Hayden, 1865
 - Family Aviculopectinidae! F. Meek & Hayden, 1865
 - Subfamily Aviculopectininae! F. Meek & Hayden, 1865
 - Subfamily Echiniferipectininae Waterhouse, 2008
 - Subfamily Hayasakapectininae! Boyd & Newell, 2000
 - Subfamily Spyridipectininae Waterhouse, 2008
 - Family Deltopectinidae Dickins, 1957
 - Subfamily Deltopectininae! Dickins, 1957
 - Subfamily Cyrtostrinae Newell & Boyd, 1995
 - Subfamily Squamuliferipectininae Waterhouse, 2008
 - Family Limatuliniidae! Waterhouse, 2001
 - Superfamily Chaenocardioidea S. A. Miller, 1889
 - Family Chaenocardiidae! S. A. Miller, 1889
 - Family Streblochondriidae Newell, 1938
 - Subfamily Streblochondriinae Newell, 1938
 - Subfamily Guizhoupectininae M. Astafieva, 1994
 - Subfamily Orbiculopectininae Waterhouse, 2001
 - Tribe Orbiculopectinini Waterhouse, 2001
 - Tribe Eocamptonectini Waterhouse, 2001
 - Subfamily Saturnopectininae D. Campbell, *nov.*
 - Subfamily Streblopteriinae Waterhouse, 2008
 - Superfamily Heteropectinoidea! Beurlen, 1954
 - Family Heteropectinidae! Beurlen, 1954
 - Subfamily Heteropectininae! Beurlen, 1954
 - Subfamily Cassianoidinae Newell & Boyd, 1995
 - Subfamily Etheripectininae! Waterhouse, 1982
 - Subfamily Girtypectininae Waterhouse, 2008
 - Family Annuliconchidae Astafieva, 1995
 - Family Antijaniridae Hautmann, *nov.*
 - Family Hunanopectinidae! Yin Hong-fu, 1985
 - Subfamily Hunanopectininae Yin Hong-fu, 1985
 - Tribe Hunanopectinini Yin Hong-fu, 1985
 - Tribe Furcatiini Waterhouse, 2001
 - Subfamily Asoellinae! Begg & Campbell, 1986
 - Family Limipectinidae Newell & Boyd, 1990
 - Subfamily Limipectininae Newell & Boyd, 1990
 - Subfamily Acanthopectininae Newell & Boyd, 1995
 - Tribe Acanthopectinini Newell & Boyd, 1995
 - Tribe Costatoplicatinini Waterhouse, 2008
 - Tribe Lamnipectinini Waterhouse, 2008
 - Family Ornithopectinidae Hautmann, *nov.*
 - Superfamily Pterinopectinoidea! Newell, 1938
 - Family Pterinopectinidae! Newell, 1938
 - Subfamily Pterinopectininae! Newell, 1938
 - Subfamily Pterinopectinellinae Waterhouse, 2008

- Subfamily Tesseratiinae Waterhouse, 2008
 - Family Clariidae Gavrilo, 1996
 - Subfamily Clariinae! Gavrilo, 1996
 - Subfamily Chulariinae Waterhouse, 2008
 - Family Natalissimidae! Waterhouse, 2008
 - Subfamily Natalissiminae! Waterhouse, 2008
 - Subfamily Pseudaviculopectininae! Waterhouse, 2008
 - Hyporder Limoidei R. Moore in Moore, Lalicker, & Fischer, 1952
 - Superfamily Limoidea Rafinesque, 1815
 - Family Limidae! Rafinesque, 1815
 - Subfamily Liminae Rafinesque, 1815
 - Subfamily Ctenostreoninae Kasum-Zade, 2003
 - Subfamily Limatulinae! Kasum-Zade, 2003
 - Tribe Limatulini! Kasum-Zade, 2003
 - Tribe Calcicaniculariini Waterhouse, 2008
 - Subfamily Plagiostominae Kasum-Zade, 2003
 - Family Isolimeidae Kasum-Zade, 2003
 - Hyporder Monotoidei Waterhouse, 2001
 - Superfamily Buchioidea! Cox, 1953 (P. Fischer, 1886)
 - Family Buchiidae Cox, 1953 (P. Fischer, 1886)
 - Family Dolponellidae Waterhouse, 2001
 - Family Monotidae! P. Fischer, 1886
 - Subfamily Monotinae P. Fischer, 1886
 - Subfamily Otapiriinae! Waterhouse, 1982
 - Superfamily Eurydesmatoidea! Reed, 1932
 - Family Eurydesmatidae! Reed, 1932
 - Family Manticulidae Waterhouse, 2008
 - Superfamily Oxytomoidea Ichikawa, 1958
 - Family Oxytomidae Ichikawa, 1958
 - Subfamily Oxytominiae! Ichikawa, 1958
 - Subfamily Maccoyellinae Waterhouse, 2008
 - Suborder Entoliidina! Hautmann, *nov.*
 - Superfamily Entolioidea! Teppner, 1922
 - Family Entoliidae Teppner, 1922
 - Subfamily Entoliinae Teppner, 1922
 - Subfamily Palaeoentoliinae! Romanov, 1985
 - Subfamily Syncyclonematinae T. Waller, 1978
 - Family Entolioidesidae Kasum-Zade, 2003
 - Subfamily Entolioidesinae! Kasum-Zade, 2003
 - Subfamily Calvaentoliinae Kasum-Zade, 2003
 - Family Pernopectinidae! Newell, 1938
 - Family Propeamussiidae Abbott, 1954
 - Superfamily Euchondrioidea! Newell, 1938
 - Family Euchondriidae! Newell, 1938
- Infraclass Heteroconchia Hertwig, 1895
 - Cohort Uniomorphi J. Gray, 1854a (= *Palaeoheterodonta* of authors) (plesion)
 - Family Thoraliidae N. Morris, 1980
 - Subcohort Unioni J. Gray, 1854a (paraplesion)
 - Superfamily Lyrodesmatoidea! P. Fischer, 1886
 - Family Lyrodesmatidae! P. Fischer, 1886
 - ?Family Pseudarcidae Scarlato & Starobogatov, 1979a
- Megaorder Unionata J. Gray, 1854a
 - Order Trigoniida! Dall, 1889
 - Superfamily Trigonioidea! Lamarck, 1819
 - Family Trigoniidae! Lamarck, 1819
 - Subfamily Trigoniinae Lamarck, 1819
 - Subfamily Minetrigoniinae T. Kobayashi, 1954
 - Subfamily Nototrigoniinae Skwarko, 1963
 - Subfamily Pleurotrigoniinae van Hoepen, 1929
 - Subfamily Neuquenitrigoniinae H. Lanza, 1993
 - Subfamily Psilotrigoniinae C. Fleming, 1987
 - Family Eoschizodidae Newell & Boyd, 1975
 - Family Groeberellidae Pérez, Reyes, & Damborenea, 1995
 - Family Myophoriidae! Bronn, 1849 in 1848–1849
 - Family Prosogyotrigoniidae T. Kobayashi, 1954
 - Subfamily Prosogyotrigoniinae T. Kobayashi, 1954
 - Subfamily Praegoniinae C. Fleming, 1962

- Family Scaphellinidae Newell & Ciriacks, 1962
 - Family Schizodidae! Newell & Boyd, 1975
 - Subfamily Schizodinae! Newell & Boyd, 1975
 - Subfamily Eoastartinae Newell & Boyd, 1975
 - Subfamily Sinodorinae Pojeta & Zhang, 1984
 - Superfamily Myophorelloidea T. Kobayashi, 1954
 - Epifamily Myophorelloidae T. Kobayashi, 1954
 - Family Myophorellidae T. Kobayashi, 1954
 - Subfamily Myophorellinae T. Kobayashi, 1954
 - Tribe Myophorellini! T. Kobayashi, 1954
 - Tribe Steinmanellini M. Cooper, 1991
 - Subfamily Vaugoniinae T. Kobayashi, 1954
 - Tribe Vaugoniini T. Kobayashi, 1954
 - Tribe Quadratotrigoniini Saveliev, 1958
 - Family Buchotrigoniidae H. Leanza, 1993
 - Subfamily Buchotrigoniinae H. Leanza, 1993
 - Subfamily Syrototrigoniinae Perez & Reyes, 1997
 - Family Laevitrigoniidae Saveliev, 1958
 - Subfamily Laevitrigoniinae Saveliev, 1958
 - Subfamily Frenguelliellinae! Nakano, 1960
 - Epifamily Megatrigonioidae van Hoepen, 1929
 - Series Megatrigoniitae van Hoepen, 1929
 - Family Megatrigoniidae van Hoepen, 1929
 - Subfamily Megatrigoniinae van Hoepen, 1929
 - Tribe Megatrigoniini van Hoepen, 1929
 - Tribe Apiotrigoniini Tashiro, 1979
 - Subtribe Apiotrigoniina Tashiro, 1979
 - Subtribe Heterotrigoniina M. Cooper, 1991
 - Subfamily Pterotrigoniinae van Hoepen, 1929
 - Tribe Pterotrigoniini! van Hoepen, 1929
 - Tribe Scabrototrigoniini M. Cooper, 1989
 - Family Iotrigoniidae Saveliev, 1958
 - Series Rutitrigoniitae van Hoepen, 1929
 - Family Rutitrigoniidae van Hoepen, 1929
- Superfamily Pseudocardinoidea Martinson, 1961
 - Family Pseudocardiniidae Martinson, 1961
 - ?Family Utschamiellidae! C. M. Kolesnikov, 1977
- ?Superfamily Trigonoidoidea Cox, 1952 (or in Unionida?)
 - Family Trigonoididae! Cox, 1952
 - Subfamily Trigonoidinae Cox, 1952
 - Subfamily Peregrinoconchinae! Gu Zhi-wei & others in Ma & others, 1976
 - Family Nakamuranaididae Guo, 1981
 - Family Nippononaiidae Chen Jin-hua, 1987
 - Subfamily Nippononaiinae! Chen Jin-hua, 1987
 - Subfamily Sinonaiinae Chen Jin-hua, 1987
 - Family Plicatounionidae Chen Jin-hua, 1987
 - Family Pseudohyriidae T. Kobayashi, 1968
- Superfamily Trigonodoidea! Modell, 1942
 - Family Trigonodidae! Modell, 1942
 - Family Desertellidae Dechaseaux, 1947
- Order Unionida J. Gray, 1854a
- Suborder Unionidina J. Gray, 1854a
- Superfamily Unionoidea Rafinesque, 1820
- Family Unionidae Rafinesque, 1820
- Subfamily Unioninae Rafinesque, 1820
- Tribe Unionini Rafinesque, 1820
- Tribe Anodontini Rafinesque, 1820
- Subfamily Ambleminae Rafinesque, 1820
- Tribe Amblemini Rafinesque, 1820
- Tribe Lampsilini Ihering, 1901
- Tribe Pleurobemini Hannibal, 1912
- Tribe Quadrulini Ihering, 1901
- Subfamily Gonideinae Ortmann, 1916
- Subfamily Modellnainae Brandt, 1974
- Subfamily Parreysiinae Henderson, 1935
- Subfamily Qiyangiinae Chen Jin-hua, 1983
 - Subfamily Rectidentinae Modell, 1942

- Family Margaritiferidae Henderson, 1929
- Family Sancticarolitidae Simone & Mezzalana, 1997
- Superfamily Mullerioidea Deshayes, 1832a
- Family Mulleriidae Deshayes, 1832a
- Subfamily Mulleriinae Deshayes, 1832a
- Subfamily Leilinae Morretes, 1949
- Subfamily Monocondylaeinae Modell, 1942
- Subfamily Mycetopodinae J. Gray, 1840b
- Family Etheriidae Deshayes, 1832a
- Family Iridinidae Swainson, 1840
- Subfamily Iridininae Swainson, 1840
- Subfamily Aspathariinae Modell, 1942
- ?Superfamily Trigonioideoidea Cox, 1952 (or in Trigoniida, which see)
- Suborder Hyriidina Hoeh & others, 2009
- Superfamily Hyrioidea Swainson, 1840
- Family Hyriidae Swainson, 1840
- Subfamily Hyriinae Swainson, 1840
- Tribe Hyriini Swainson, 1840
- Tribe Castaliini Morretes, 1949
- ?Tribe Cucumerunionini Iredale, 1934
- Tribe Diplodontini Ihering, 1901
- Tribe Hyridellini McMichael & Hiscock, 1958 (Iredale, 1934)
- Subfamily Velesunioninae Iredale, 1934
- Suborder Silesunionidina! Skawina & Dzik, 2011
- Superfamily Silesunionoidea! Skawina & Dzik, 2011
- Family Silesunionidae! Skawina & Dzik, 2011
- Family Unionellidae Skawina & Dzik, 2011
- Cohort Cardiomorphi Férussac, 1822 in 1821–1822 (= *Heterodonta* of authors) (plesion)
- Family Lipanellidae Sánchez, 2005
- Subcohort Carditioni Dall, 1889
- Order Actinodontida! Deschaseaux, 1952
- Superfamily Anodontopsoidea! S. A. Miller, 1889
- Family Anodontopsidae S. A. Miller, 1889
- Family Actinodontidae! Davies, 1933
- Family Baidiostracidae Fang & Cope, 2008
- Family Cycloconchidae! Ulrich in Ulrich & Scofield, 1894
- Subfamily Cycloconchinae! Ulrich in Ulrich & Scofield, 1894
- Subfamily Taselasmodinae Fang & Cope, 2008
- Family Intihuarellidae! Sánchez in Sánchez & Vaccari, 2003
- Family Redoniidae! Babin, 1966
- Superfamily Nyassoidea! S. A. Miller, 1877
- Family Nyassidae! S. A. Miller, 1877
- Superfamily Palaeomuteloidea Lahusen, 1897
- Family Palaeomutelidae Lahusen, 1897
- ?Superfamily Amnigenioidea Khalfin, 1948
- Family Amnigeniidae Khalfin, 1948
- Family Montanariidae! Scarlato & Starobogatov, 1979a
- Family Zadimerodiidae! Guo, 1988
- Superfamily Oriocrassatelloidea Boyd & Newell, 1968
- Family Oriocrassatellidae Boyd & Newell, 1968
- Family Crassatellopsidae! Carter, *nov.*
- Order Carditida Dall, 1889
- (plesion) •?Family Archaeocardiidae Khalfin, 1940
- (paraplesion) •Family Eodonidae! Carter, Campbell, & Campbell, 2000
- Superfamily Crassatelloidea Férussac, 1822 in 1821–1822
- Family Crassatellidae Férussac, 1822 in 1821–1822
- Subfamily Crassatellinae! Férussac, 1822 in 1821–1822
- Subfamily Ptychomyiinae Keen, 1969b
- Subfamily Scambulinae Chavan, 1952a
- ?Family Aenigmoconchidae Betekhtina in Betekhtina & Soukhov, 1968
- Family Astartidae! d'Orbigny, 1844 in 1844–1848 (J. Gray, 1840b)
- Subfamily Astartinae! d'Orbigny, 1844 in 1844–1848 (J. Gray, 1840b)
- Subfamily Astartellinae! Boyd & Newell, 1968
- Subfamily Eriphyliinae Chavan, 1952b
- Subfamily Opinae! Chavan, 1952b
- Subfamily Pinzonellinae Beurlen, 1954
- Subfamily Terraiinae Scarlato & Starobogatov, 1979a

- Subfamily Trigonopinae R. N. Gardner & Campbell, 2002
- Family Cardiniidae Zittel, 1881
- Family Carditidae! Férussac, 1822 in 1821–1822
 - Subfamily Carditinae Férussac, 1822 in 1821–1822
 - Subfamily Carditamerinae! Chavan, 1969b
 - Subfamily Carditesinae! Chavan, 1969b
 - Subfamily Miodomeridinae Chavan, 1969b
 - Subfamily Thecaliinae Dall, 1903
 - Subfamily Venericardiinae Chavan, 1969b
- Family Condyllocardiidae Félix Bernard, 1896
 - Subfamily Condyllocardiinae Félix Bernard, 1896
 - Subfamily Cuninae Chavan, 1969b
- Family Myophoricardiidae Chavan in Cox & Chavan, 1969
- Subcohort Cardioni Férussac, 1822 in 1821–1822 (=Euheterodonta Giribet & Distel, 2003)
 - Infrasubcohort Lucinidia J. Gray, 1854a
 - (paraplesion) •Superfamily Babinkoidea! Horný, 1960
 - Family Babinkidae! Horný, 1960
 - Family Coxiconchiidae Babin, 1977
 - Order Lucinida J. Gray, 1854a
 - Superfamily Lucinoidea! J. Fleming, 1828
 - Family Lucinidae J. Fleming, 1828
 - Subfamily Lucininae J. Fleming, 1828
 - Subfamily Fimbriinae Nicol, 1950 (Stoliczka, 1870 in 1870–1871)
 - Subfamily Ilioniinae! Scarlato & Starobogatov, 1979a
 - Subfamily Milthinae! Chavan, 1969a
 - Subfamily Myrteinae Chavan, 1969a
 - Family Mactromyidae Cox, 1929 (P. Fischer, 1887)
 - Family Paracyclidae! P. A. Johnston, 1993
 - Superfamily Thyasiroidea Dall, 1900 (Dall, 1895a)
 - Family Thyasiridae Dall, 1900 (Dall, 1895a)
 - Subfamily Thyasirinae! Dall, 1900 (Dall, 1895a)
 - Subfamily Axinopsidinae Frank Bernard, 1983
 - Infrasubcohort Cardiida Férussac, 1822 in 1821–1822
 - (paraplesion) •Superfamily Grammysioidea! S. A. Miller, 1877
 - Family Grammysiidae! S. A. Miller, 1877
 - Subfamily Grammysiinae S. A. Miller, 1877
 - Subfamily Cuneamyinae! N. Morris, Dickins, & Astafieva-Urbajtis, 1991
 - Family Sanguinolitidae S. A. Miller, 1877
 - Subfamily Sanguinolitinae! S. A. Miller, 1877
 - Subfamily Alulinae N. Morris, Dickins, & Astafieva-Urbajtis, 1991
 - Subfamily Paleodorinae Carter, *nov.*
 - Subfamily Pholadellinae S. A. Miller, 1877
 - Subfamily Undulomyinae Astafieva-Urbajtis, 1983
- Megaorder Cardiata Férussac, 1822 in 1821–1822 (=Neoheterodonte Taylor & others, 2007)
 - Superorder Cardiiformii Férussac, 1822 in 1821–1822
 - Order Modiomorphida! Newell, 1969c
 - Superfamily Modiomorphoidea! S. A. Miller, 1877
 - Family Modiomorphidae! S. A. Miller, 1877
 - Subfamily Modiomorphinae! S. A. Miller, 1877
 - ?Subfamily Butovicellinae Kříž, 1965
 - Subfamily Healeyinae! Hautmann, 2008
 - Subfamily Joanninae Carter, *nov.*
 - Family Cypricardiinae Ulrich in Ulrich & Scofield, 1894
 - Family Hippopodiumidae Cox in Cox & LaRocque, 1969
 - Family Palaeopharidae Marwick, 1953
 - Family Tusayanidae Scarlato & Starobogatov, 1979a
 - Order Megalodontida! Starobogatov, 1992
 - Superfamily Mecynodontoidea! Haffer, 1959
 - Family Mecynodontidae! Haffer, 1959
 - Family Beichuanidae Liu Xie-zhang & Gu in Hou Hong-fei, Wan, & Xian, 1988
 - Family Congeriomorphidae Saul, 1976
 - ?Family Plethocardiidae Scarlato & Starobogatov, 1979a
 - Family Prosocoelidae! Karczewski, 1992
 - Superfamily Megalodontoidea! J. Morris & Lycett, 1853
 - Family Megalodontidae! J. Morris & Lycett, 1853
 - Family Ceratomyopsidae Cox, 1964
 - Family Dicerocardiidae! Kutassy, 1934

- Family Pachyrismatidae! Scarlato & Starobogatov, 1979a
- Family Wallowaconchidae Yancey & Stanley, 1999
- Order Hippuritida Newell, 1965
 - Superfamily Requienioidea Kutassy, 1934
 - Family Requieniidae Kutassy, 1934
 - Subfamily Requieniinae Kutassy, 1934
 - Subfamily Matheroniinae! R. Scott & others, 2010
 - Family Epidiceratidae! Rengarten, 1950
 - Superfamily Radiolitioidea d'Orbigny, 1847b
 - Family Radiolitidae d'Orbigny, 1847b
 - ?Family Antillocaprinidae Mac Gillavry, 1937
 - Family Caprinidae d'Orbigny, 1847b
 - Subfamily Caprininae d'Orbigny, 1847b
 - Subfamily Caprinuloideinae Damestoy, 1971
 - Family Caprinulidae Yanin, 1990
 - Family Caprotinidae J. Gray, 1848
 - Family Diceratidae! Dall, 1895a
 - Family Hippuritidae J. Gray, 1848
 - Family Ichthyosarcotitidae Douvillé, 1887 (T. Gill, 1871)
 - Family Monopleuridae! Munier-Chalmas, 1873
 - Family Plagioptychidae Douvillé, 1888
 - Family Polyconitidae! Mac Gillavry, 1937
 - ?Family Trechmannellidae Cox, 1934
- Order Cardiida Férussac, 1822 in 1821–1822 (paraplesion)
 - Superfamily Kalenteroidea! Marwick, 1953
 - Family Kalenteridae! Marwick, 1953
 - Subfamily Kalenterinae! Marwick, 1953
 - Subfamily Myoconchinae! Newell, 1957
- Suborder Cardiidina Férussac, 1822 in 1821–1822 (paraplesion)
 - Family Palaeocarditidae! Chavan, 1969b
- Hyporder Cardioidei Férussac, 1822 in 1821–1822
 - Superfamily Cardioidea Lamarck, 1809
 - Family Pterocardiidae Scarlato & Starobogatov, 1979a
 - Subfamily Pterocardiinae Scarlato & Starobogatov, 1979a
 - Subfamily Tulongocardiinae! J. Schneider, 1995
 - Family Cardiidae! Lamarck, 1809
 - Subfamily Lahilliinae Finlay & Marwick, 1937
 - Subfamily Protocardiinae Reuss, 1846 in 1845–1846
 - Clade Neocardiids J. Carter, Hylleberg, & Popov, *nov.*
 - Subfamily Laevicardiinae Keen, 1951
 - Subfamily Pleuriocardiinae J. Schneider, 1995
 - Clade Eucardiids J. Schneider, 1995
 - Subfamily Cardiinae! Lamarck, 1809
 - Tribe Cardiini! Lamarck, 1809
 - Tribe Vepricardiini Kafanov & Starobogatov in Kafanov & Popov, 1977
 - Subfamily Cerastodermatinae! Nordsieck, 1969
 - Tribe Cerastodermatini! Nordsieck, 1969
 - Tribe Chokrakiini S. V. Popov in Neveeskaja, Paramonova, & Popov, 2001
 - Tribe Parvicardiini! Kafanov & Starobogatov in Kafanov & S. V. Popov, 1977
 - Subfamily Clinocardiinae Kafanov, 1975
 - Subfamily Fraginae R. Stewart, 1930
 - Tribe Fragini R. Stewart, 1930
 - Tribe Goniocardiini Scarlato & Starobogatov, 1979a
 - Subfamily Lymnocardiinae! Stoliczka, 1870 in 1870–1871
 - Tribe Lymnocardiini! Stoliczka, 1870 in 1870–1871
 - Tribe Acobaecardiini Paramonova in Neveeskaja & others, 1986
 - Tribe Adacnini! T. Gill, 1871
 - Tribe Arcicardiini Neveeskaja in Neveeskaja & others, 1986
 - Tribe Avicardiini S. V. Popov in Kafanov & S. V. Popov, 1977
 - Tribe Aviculocardiini Paramonova in Neveeskaja, Paramonova, & Popov, 2001
 - Tribe Limnopappiini Schlickum, 1962
 - Tribe Merklinicardiini S. V. Popov in Neveeskaja, Paramonova, & Popov, 2001
 - Tribe Obsoletiformini! Paramonova in Neveeskaja, Paramonova, & Popov, 2001
 - Tribe Pachyadacnini Andreescu, 1975
 - Tribe Paradacnini Eberzin, 1967
 - Tribe Phyllocardiini Neveeskaja in Neveeskaja & others, 1986
 - Tribe Planacardiini Paramonova in Neveeskaja, Paramonova, & Popov, 2001

- Tribe Plicatiformini! Paramonova in Neveeskaja, Paramonova, & Popov, 2001
- Tribe Pontalmyrini! Taktakishvili, 1987
- Tribe Prosodacnini Keen, 1937
- Tribe Pseudocardiini Keen, 1969b
- Subfamily Orthocardiinae J. Schneider, 2002
- Subfamily Profraginae Badve, 1977
- Subfamily Trapezicardiinae Kanjilal & Srinivasan, 2002
- Subfamily Tridacninae Lamarck, 1819
- Superfamily Tellinoidea Blainville, 1814
 - Family Tellinidae Blainville, 1814
 - Family Donacidae J. Fleming, 1828
 - Family Icanotiidae R. Casey, 1961
 - Family Psammobiidae J. Fleming, 1828
 - Family Quenstedtiidae Cox, 1929
 - Family Semelidae Stoliczka, 1870 in 1870–1871 (Latreille, 1825)
 - Subfamily Semelinae! Stoliczka, 1870 in 1870–1871 (Latreille, 1825)
 - Subfamily Erviliinae Dall, 1895b
 - Subfamily Scrobiculariinae H. Adams & A. Adams, 1856
 - Family Solecurtidae d'Orbigny, 1846
 - Family Sowerbyidae Cox, 1929
 - Family Tancrediidae F. Meek, 1864a
 - Family Unicardiopsidae Chavan, 1969c
- Hyporder Veneroidei J. Gray, 1854a
 - Minorder Veneroitei J. Gray, 1854a
 - Superfamily Arcticoidea! R. Newton, 1891 (d'Orbigny, 1844 in 1844–1848)
 - Family Arctididae! R. Newton, 1891 (d'Orbigny, 1844 in 1844–1848)
 - Family Euloxidae J. A. Gardner, 1944
 - Family Pollicidae L. Stephenson, 1953
 - Family Trapezidae Lamy, 1920 (Dall, 1895a)
 - Family Veniellidae Dall, 1895a
 - Superfamily Chamoidea Lamarck, 1809
 - Family Chamidae Lamarck, 1809
 - Superfamily Cyrenoidea J. Gray, 1840b
 - Family Cyrenidae! J. Gray, 1840b
 - Family Cyrenoididae H. Adams & A. Adams, 1857 (J. Gray, 1853)
 - Family Glauconomidae J. Gray, 1853
 - Superfamily Gaimardioidea Hedley, 1916
 - Family Gaimardiidae Hedley, 1916
 - Superfamily Glossoidea J. Gray, 1847b (J. Gray, 1840b)
 - Family Glossidae J. Gray, 1847b (J. Gray, 1840b)
 - Family Kelliellidae P. Fischer, 1887
 - Family Vesicomomyidae Dall & Simpson, 1901
 - Superfamily Hemidonacoidea Scarlato & Starobogatov in Neveeskaja & others, 1971
 - Family Hemidonacidae Scarlato & Starobogatov in Neveeskaja & others, 1971
 - Superfamily Mactroidea Lamarck, 1809
 - Family Mactridae! Lamarck, 1809
 - Subfamily Mactrinae! Lamarck, 1809
 - Subfamily Darininae Signorelli, *nov.*
 - Subfamily Kymatoxinae Stenzel & Krause in Stenzel, Krause, & Twining, 1957
 - Subfamily Lutrariinae J. Gray, 1853
 - Subfamily Tanysiphoninae Scarlato & Starobogatov in Neveeskaja & others, 1971
 - Family Anatinellidae Deshayes in J. Gray, 1853
 - Family Cardiliidae P. Fischer, 1887
 - Family Mesodesmatidae J. Gray, 1840b
 - Subfamily Mesodesmatinae! J. Gray, 1840b
 - Subfamily Davilinae Dall, 1895b
 - Superfamily Ungulinoidea J. Gray, 1854b
 - Family Ungulinidae J. Gray, 1854b
 - Superfamily Veneroidea Rafinesque, 1815
 - Family Isocyprinidae! R. N. Gardner, 2005
 - Family Veneridae! Rafinesque, 1815
 - Subfamily Venerinae Rafinesque, 1815
 - Tribe Venerini Rafinesque, 1815
 - Subtribe Venerina Rafinesque, 1815
 - Subtribe Chionina Frizzell, 1936
 - Tribe Dosiniini Deshayes, 1853
 - Tribe Tapetini! J. Gray, 1851
 - Subfamily Meretricinae J. Gray, 1847b (J. Gray, 1838)

- Tribe Meretricini J. Gray, 1847b (J. Gray, 1838)
 - Subtribe Meretricina! J. Gray, 1847b (J. Gray, 1838)
 - Subtribe Callocardiina! Dall, 1895a
 - Subtribe Clementiina Frizzell, 1936
 - Subtribe Cyclinina Frizzell, 1936
 - Subtribe Gemmina Dall, 1895a
 - Subtribe Petricolina d'Orbigny, 1840
 - Subtribe Samarangiina Keen, 1969c
 - Subtribe Sunettina Stoliczka, 1870 in 1870–1871
 - Subtribe Turtoniina W. Clark, 1855
- ?Tribe Gouldiini R. Stewart, 1930
 - Subtribe Gouldiina! R. Stewart, 1930
 - Subtribe Lioconchina Habe, 1977
- Minorder Dreissenitei R. Moore in Moore, Lalicker, & Fischer, 1952
 - Superfamily Dreissenioidea J. Gray, 1840a
 - Family Dreissenidae J. Gray, 1840a
 - Subfamily Dreisseninae! J. Gray, 1840a
 - Subfamily Dreissenomyinae Babak, 1983
 - Superfamily Sphaerioidea! Deshayes, 1855b (Rafinesque, 1820)
 - Family Sphaeriidae! Deshayes, 1855b (Rafinesque, 1820)
 - Subfamily Sphaeriinae! Deshayes, 1855b (Rafinesque, 1820)
 - Subfamily Euperinae Heard, 1965
 - Subfamily Pisiidiinae J. Gray, 1857
 - ?Family Neomiodontidae R. Casey, 1955
 - Subfamily Neomiodontinae R. Casey, 1955
 - Subfamily Eomiodontinae Hayami, 1965
- Suborder Gastrochaenidina Morretes, 1949
 - Superfamily Gastrochaenoidea J. Gray, 1840b
 - Family Gastrochaenidae J. Gray, 1840b
 - Subfamily Gastrochaeninae J. Gray, 1840b
 - Subfamily Eufistulaninae Carter, *nov.*
 - Subfamily Spengleriinae! Carter, *nov.*
- Suborder Anthracosiidina Silantiev & Carter, 2011
 - Superfamily Anthracosioidea Amalitzky, 1892
 - Family Anthracosiidae Amalitzky, 1892
 - ?Family Ferganoconchidae Martinson, 1961
 - ?Family Shaanxiconchidae Liu Ben-pei in Liu Ben-pei & Li, 1980
 - Superfamily Palaeonodontoidea Modell, 1964
 - Family Palaeonodontidae Modell, 1964
 - Superfamily Prilukielloidea Starobogatov, 1970
 - Family Prilukiellidae Starobogatov, 1970
 - Family Senderzoniellidae Betekhtina, Starobogatov, & Jatsuk, 1987
- Suborder Leptonidina Dall, 1889
 - Superfamily Cyamioidea! G. O. Sars, 1878
 - Family Cyamiidae G. O. Sars, 1878
 - Family Basterotiidae Cossmann in Cossmann & Peyrot, 1909
 - Family Galatheavalvidae Knudsen, 1970
 - Family Sportellidae! Dall, 1899
 - Superfamily Galeommatoidea J. Gray, 1840b
 - Family Galeommatidae J. Gray, 1840b
 - Family Lasaeidae J. Gray, 1842
- Superorder Pholadiformii J. Gray, 1854a
 - Order Pholadida J. Gray, 1854a
 - Superfamily Pholadoidea Lamarck, 1809
 - Family Pholadidae! Lamarck, 1809
 - Subfamily Pholadinae Lamarck, 1809
 - Tribe Pholadini! Lamarck, 1809
 - Tribe Euxinibarneini Zhgenti, 1991
 - Subfamily Jouannetiinae Tryon, 1862b
 - Subfamily Martesiinae U. Grant & Gale, 1931
 - Subfamily Xylophaginae! Purchon, 1941
 - Family Teredinidae Rafinesque, 1815
 - Subfamily Teredininae Rafinesque, 1815
 - Tribe Teredinini Rafinesque, 1815
 - Tribe Bankiini Turner, 1966
 - Subfamily Kuphinae Tryon, 1862b
 - Superfamily Pleuromyoidea! Zittel, 1895
 - Family Pleuromyidae! Zittel, 1895

- Family Ceratomyidae! Arkell, 1934
 - Subfamily Ceratomyinae! Arkell, 1934
 - Subfamily Myopholadinae! Cox, 1964
- Family Vacunellidae! Astafieva-Urbajtis, 1973
- Superfamily Myoidea Lamarck, 1809
 - Family Myidae Lamarck, 1809
 - Subfamily Myinae Lamarck, 1809
 - Subfamily Cryptomyinae Habe, 1977
 - Subfamily Spheniinae! Frank Bernard, 1983
 - Family Corbulidae! Lamarck, 1818
 - Subfamily Corbulinae! Lamarck, 1818
 - Subfamily Caestocorbulinae H. Vokes, 1945
 - Subfamily Caryocorbulinae H. Vokes, 1945
 - Subfamily Erodoinae Winckworth, 1932
 - Subfamily Pachydontinae H. Vokes, 1945
 - Family Pleurodesmatidae Cossmann in Cossmann & Peyrot, 1909
 - Family Raetomyidae R. Newton, 1919
- Megaorder Poromyata Ridewood, 1903
 - Order Poromyida Ridewood, 1903
 - Superfamily Poromyoidea Dall, 1886
 - Family Poromyidae! Dall, 1886
 - Family Cetoconchidae Ridewood, 1903
 - Superfamily Cuspidarioidea Dall, 1886
 - Family Cuspidariidae Dall, 1886
 - Family Halonymphidae Scarlato & Starobogatov, 1983
 - Family Protocuspidariidae! Scarlato & Starobogatov, 1983
 - ?Family Spheniopsidae J. A. Gardner, 1928
 - Superfamily Parilimyzoidea! B. Morton, 1981
 - Family Parilimyzoidea! B. Morton, 1981
 - Superfamily Verticordiioidea! Stoliczka, 1870 in 1870–1871
 - Family Verticordiidae Stoliczka, 1870 in 1870–1871
 - Family Euciroidae Dall, 1895a
 - Family Lyonsiellidae! Dall, 1895a
 - Order Pholadomyida! Newell, 1965
 - Superfamily Pholadomyoidea! W. King, 1844
 - Family Pholadomyidae! W. King, 1844
 - Subfamily Pholadomyinae! W. King, 1844
 - Subfamily Chaenomyinae Waterhouse, 1966
 - Family Arenigomyidae Carter, *nov.*
 - Family Margaritariidae H. Vokes, 1964
 - Family Ucumariidae Sánchez in Sánchez & Vaccari, 2003
 - Order Pandorida R. Stewart, 1930
 - Superfamily Pandoroidea! Rafinesque, 1815
 - Family Pandoridae Rafinesque, 1815
 - Family Laternulidae! Hedley, 1918 (J. Gray, 1840b)
 - Family Lyonsiidae! P. Fischer, 1887
 - Superfamily Clavagelloidea d'Orbigny, 1844 in 1844–1848
 - Family Clavagellidae! d'Orbigny, 1844 in 1844–1848
 - Family Penicillidae J. Gray, 1858
 - Order Thraciida Carter, *nov.*
 - Superfamily Thracioidea! Stoliczka, 1870 in 1870–1871 (Couthouy, 1839)
 - Family Thraciidae! Stoliczka, 1870 in 1870–1871 (Couthouy, 1839)
 - Family Burmesiidae M. Healey, 1908
 - Family Cleidothaeridae Hedley, 1918 (Stoliczka, 1870 in 1870–1871)
 - Family Myochamidae P. P. Carpenter, 1861
 - Family Periplomatidae Dall, 1895a
- Megaorder Solenata Dall, 1889
 - Order Solenida Dall, 1889
 - Superfamily Orthonotoidea! S. A. Miller, 1877
 - Family Orthonotidae! S. A. Miller, 1877
 - Family Konduriidae! Sánchez in Sánchez & Benedetto, 2007
 - Family Prothyridae S. A. Miller, 1889
 - Family Solenomorphidae Cockerell, 1915
 - Subfamily Solenomorphinae Cockerell, 1915
 - Subfamily Promacrinae Scarlato & Starobogatov, 1979a
 - Superfamily Solenoidea Lamarck, 1809
 - Family Solenidae Lamarck, 1809
 - Family Pharidae! H. Adams & A. Adams, 1856

- Subfamily Pharinae! H. Adams & A. Adams, 1856
- Subfamily Cultellinae A. Davies, 1935
- Subfamily Novaculininae Ghosh, 1920
- Subfamily Pharellinae Stoliczka, 1870 in 1870–1871
- Subfamily Rzehakiinae Korobkov, 1954
- Subfamily Siliquinae! Bronn, 1862
- Order Hiatellida Carter, *nov.*
- Superfamily Hiatelloidea J. Gray, 1824
- Family Hiatellidae J. Gray, 1824
- Subfamily Hiatellinae J. Gray, 1824
- Subfamily Panopeinae! Bronn, 1862
- Family Saxicavellidae! P. H. Scott, 1994
- Superfamily Edmondoidea! W. King, 1850
- Family Edmondiidae! W. King, 1850
- Family Pachydomidae! P. Fischer, 1887
- Subfamily Pachydominae! P. Fischer, 1887
- Tribe Pachydomini P. Fischer, 1887
- Tribe Astartilini Waterhouse, 1969
- Tribe Holdhausiellini Beurlen, 1954
- Tribe Plesiocyprinellini Simões & others, 1997
- Subfamily Myoniinae Scarlato & Starobogatov, 1979a

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APPENDIX 1. NEW SUPRAGENERIC TAXA AND UNRANKED CLADE NAMES

Abbreviations: CL, simple crossed lamellar; CCL, complex crossed lamellar; ISP, irregular simple prismatic; RSP, regular simple prismatic.

Afghanodesmatida Carter, herein, *ord. nov.*, *nom. transl. et correct. ex* Afghanodesmatidae Scarlato & Starobogatov (1979a, p. 19, 25). Taxonomic content indicated above.

Anadontellidae Silantiev, herein, *fam. nov.* Type genus, *Anadontella* Betekhtina in Betekhtina, Starobogatov, & Jatsuk, 1987, p. 41. Family diagnosis: members of the superfamily Prokopievskioidea with relatively thin, elongate, subtriangular (*Anthraconauta*-like) or subrectangular, equivalve or slightly inequivalve shells, with an edentulous hinge, distinctly multilayered shells with fine, commarginal growth lines, and no radial microsculpture. Some forms (e.g., *Synjaella*) are strongly tapered posteroventrally and have a sinus-like concavity on the posterior and ventral margins. Ligament opisthodontic, possibly submerged, with single, narrow ligament groove appearing on internal molds, possibly representing secondarily simplified duplivincular ligament. Outer shell layer calcitic irregular simple prismatic or fibrous prismatic, middle and inner shell layers nacreous, except immediately internal to ISP pallial myostracum, where irregular CCL is developed. Nonmarine. Anadontellidae resembles Naiaditidae but differs from Prokopievskiidae in lacking radial microsculpture. At least *Anadontella* differs from some Prokopievskiidae and Naiaditidae in having a distinct sublayer of irregular CCL between the pallial

myostracum and the nacreous inner part of the inner shell layer. Anadontellidae differs from Naiaditidae in having a single, narrow, opisthodontic ligament groove instead of an amphidetic, duplivincular ligament. This family also contains *Soanellina* Betekhtina, 1990, and *Synjaella* Kanev, 1993.

Antijaniridae Hautmann, herein, *fam. nov.* Type genus, *Antijanira* Bittner, 1901, p. 49. Family diagnosis: small shells with well-developed radial ribs occasionally bearing spines; ribs either equal in strength or intercalated in two or more ranks; discs circular to slightly retrocurved, biconvex or with right disc flatter; dorsal margin straight and relatively short; beaks located close to midpoint of dorsal margin; byssal notch well developed; ctenolium not observed; ligament alivincular-areate, with centrally or slightly posteriorly located resilifer; shell with calcitic outer shell layer, regular simple prismatic in right valve and predominantly homogeneous in left valve, plus aragonitic crossed lamellar middle and inner shell layers. Comparisons: the ligament system indicates affinity with taxa presently classified with Aviculopectinoidea or Heteropectinoidea, contrary to Hertlein's (1969, p. 355) placement of the "*Antijanira* group" in Pectinidae. The style of ornamentation in Antijaniridae is not observed in other Triassic Aviculopectinoidea or Heteropectinoidea, except for *Ornithopecten* (Ornithopectinidae), which differs in having a broad right posterior wing and a delicate right anterior auricle. This family also contains *Amphijanira* Bittner, 1901, and *Oxypteria* Waagen, 1907. The affinity of *Oxypteria* to this group was first recognized by Allasinaz (1972, p. 266).

Arenigomyidae Carter, herein, *fam. nov.* Type genus, *Arenigomya* Cope, 1996, p. 1017. Cope (1996, p. 1017) gave the following diagnosis for *Arenigomya*, which is also the present family diagnosis: "Equivalve, edentulous, trapezoidal bivalve with length one-and-a-half times greater than height. Surface with fine concentric undulose ornament, radial striae and anteriorly prominent commarginal rugae. Surface detail of finely granulose ornament. Strong carina runs from posterior side of umbo to postero-ventral margin of valves. Each valve with subumbonal articulation device." This family is monogeneric.

Aulacomiyini Carter, herein, *tribe nov.* Type genus, *Aulacomya* Mörch, 1853 in 1852–1853, p. 53. This new tribe is proposed because Perninae Scarlato & Starobogatov, 1979b, p. 24, is invalid;

its type genus was given without author or date but is inferred from the context to be *Perna* Philipsson in Retzius, 1788. This Perninae is a junior homonym of Pernadae J. Fleming, 1828 (spelling corrected by Zittel, 1895, to Pernidae, the latter based on *Perna* Bruguière, 1789, in Bruguière, Lamarck, & Deshayes, 1789–1832, a junior synonym of *Isognomon* Lightfoot, 1786). Tribe Aulacomyni diagnosis: smooth or radially ribbed, mytiliform members of Mytilinae in which the anterior adductor muscle is present only in the juvenile stage. Other than the type genus, this tribe contains *Ischadium* Jukes-Browne, 1905, *Perna* Philipsson in Retzius, 1788, and *Choromytilus* T. Soot-Ryen, 1952.

Colpomyida Carter, herein, ord. nov., nom. transl. et correct. Carter, herein, ex Colpomyidae Pojeta & Gilbert-Tomlinson, 1977, p. 37. Taxonomic content indicated above.

Concinellinae Silantiev, herein, subfam. nov. Type genus, *Concinella* Betekhtina, 1966, p. 108, 198. Subfamily diagnosis: members of family Prokopievskiidae with thin, subcircular to subtriangular, inequivalve or equivalve, edentulous shells, probably an opisthodontic, possibly submerged ligament with a single, narrow ligament groove appearing on internal molds, possibly representing a secondarily simplified, duplivincular ligament. Ornamentation of regularly imbricated growth lines and fine radial striae. Outer shell layer calcitic irregular simple prismatic; middle and inner shell layers nacreous. Nonmarine. This subfamily is monogeneric.

Crassatellopsidae Carter, herein, fam. nov. Type genus, *Crassatellopsis* Beushausen, 1895, p. 146. The following family diagnosis is modified from the description of *Crassatellopsis* by P. A. Johnston (1993): two cardinal teeth in right valve, one anterior and one central, the latter bordered posteriorly by a narrow shelf; two cardinal teeth in left valve, left cardinal tooth immediately posterior to left pivotal cardinal is slender and directed posteroventrally; right cardinal tooth anterior to right pivotal cardinal tooth is slender and directed anteroventrally; no lateral teeth and no shell marginal teeth. Shell shape similar to *Astarte*, trigonally suboval or subcircular; umbos pointed, prosogyrate; shell margin broadly concave immediately anterior to umbos, convex elsewhere; lunule and escutcheon absent; exterior ornament of commarginal ribs, rugae, and growth lines; ribs generally prominent and regularly spaced in early growth stages, in some cases diminishing gradually throughout ontogeny. Hinge plate narrow or broad. Anterior adductor muscle scar reniform or moderately elongate; posterior adductor muscle scar larger. Anterior pedal retractor scar positioned above and separate from anterior adductor scar; above this scar 2 to possibly 4 subumbonal muscle scars are positioned at the junction of hinge plate and the shell interior, with the dorsalmost of these scars most prominent and usually positioned directly below the left or right principal cardinal tooth or its socket in the opposite valve. Posterior internal radial ridge present immediately anterior to posterior adductor muscle scar. Pallial line continuous, nonsinuate, relatively close to shell margin ventrally. Lamellar sublayer of ligament inserting into opisthodontic, narrow, submarginal fossette, but fibrous sublayer of ligament inserting within a strongly oblique, short resilifer; ligament sublayers separated by indistinct ridge on posterior margin of resilifer. This family is monogeneric.

Darininae Signorelli, herein, subfam. nov. Type genus, *Darina* J. Gray, 1853, p. 42. Subfamily diagnosis: members of Mactridae with thin, fragile, oval to subcircular, elongate, anteriorly and pos-

teriorly gaping shells, nearly median umbos, a rudimentary, external ligament, a large resilium on a ventrally to posteroventrally strongly projecting chondrophore, a subdued posterior umbonal ridge, and hinge dentition that is concentrated on the central part of the hinge. This subfamily also contains *Darcinia* B. Clark & Durham, 1946. Darininae differs from Mactrinae in having a more elongate shell shape, thinner, more pellucid valves, and more medially concentrated hinge dentition. It differs from Kymatoxinae in having a more elongate, more nearly equilateral shell shape, anterior as well as posterior gapes, less prominent sculpture, and stronger anterior lateral teeth. It differs from Lutrariinae in having a more projecting chondrophore and more median umbos.

Entoliidina Hautmann, herein, subord. nov., nom. transl. et correct. M. Hautmann, herein, ex Entoliinae Teppner, 1922, p. 89. A suborder proposed for the superfamilies Euchondrioidea and Entolioidea, as indicated above.

Eubivalvia Carter, herein, unranked clade nov. A descriptive clade name proposed for the subclasses Protobranchia and Autobranchia.

Eufistulaninae Carter, herein, subfam. nov. Type genus, *Eufistulana* Eames, 1951, p. 445. Subfamily diagnosis: obligate tube-dwelling Gastrochaenidae with long, straight-sided tubes; long, largely fused siphons *sensu stricto*; sparse, minute siphonal papillae on incurrent but not excurrent siphonal aperture; anterior pedal retractor muscles passing around visceral mass as they approach the foot; the ventral surface of the foot elongate-ovate in the lateral direction. This subfamily differs from Spengleriinae and Gastrochaeninae in having obligate tube-dwelling life habits in which the tube is very elongate and straight sided, in lacking papillae on the excurrent siphon, and in having a laterally expanded instead of round to anteroposteriorly elongate ventral pedal surface. This family also contains *Kummelia* L. Stephenson, 1937.

Hiatellida Carter, herein, ord. nov., nom. transl. et correct. Carter, herein, ex Hyatelladae J. Gray, 1824, based on *Hyatella*, an incorrect subsequent spelling of *Hiatella* Bosc ex Daudin MS, 1801; =suborder Saxicavoidea Morretes, 1949, p. 47, invalid, based on the junior synonym *Saxicava* Fleuriu de Bellevue, 1802 (= *Hiatella* Bosc ex Daudin MS, 1801). Taxonomic content indicated above.

Joannininae Carter, herein, subfam. nov. Type genus, *Joannina* Waagen, 1907, p. 94. Subfamily diagnosis: edentulous members of Modiomorphidae differing from sister subfamilies Modiomorphinae and Healeyinae in having more dorsally projecting umbos, better defined anterior auricles, a narrower hinge plate, and, with the exception of *Leidapoconcha*, a shorter, more external ligament nymph and growth lines not continuing from a lunule onto the subumbonal hinge plate. This subfamily also contains *Protopis* Kittl, 1904, *Waijiaoella* Stiller & Chen, 2006, *Qingyaniola* Stiller & Chen, 2006, and *Leidapoconcha* Stiller & Chen, 2006.

Neocardiids Carter, Hylleberg, & Popov, herein, unranked clade nov. A descriptive name proposed for the clade of Laevicardiinae + Pleuriocardiinae + “eucardiids” *sensu* J. Schneider (1995, 1998a).

Ornithopectinidae Hautmann, herein, fam. nov. Type genus, *Ornithopecten* Cox, 1962, p. 596. Family diagnosis: discs inequilateral, retrorescent, posteriorly slightly expanded; beaks located well in front of midpoint of dorsal margin; right anterior auricle delicate, with narrow subauricular byssal notch; right posterior wing broad, poorly differentiated but distally pointed; left anterior auricle poorly

differentiated, with indistinct auricular sinus; ornament with radial ribs usually intercalated in different ranks, superimposed by regularly spaced commarginal riblets. Comparisons: Ornithopectinidae differs from the closely related Antijaniridae chiefly in the anteriorly positioned beaks, retrocurved discs, and broad posterior wing. This family is monogeneric.

Ovatoconchidae Carter, herein, fam. nov. Type genus, *Ovatoconcha* Cope, 1996, p. 988. Family diagnosis: members of superfamily Solemyoidea with anteriorly produced shell, as in Ctenodontidae and Solemyidae, but lacking parivincular nymphs and possibly also lacking palaeotaxodont hinge teeth in adult shell. This family is monogeneric.

Paleodorinae Carter, herein, subfam. nov. Type genus, *Paleodora* C. Fleming, 1957, p. 943. Subfamily diagnosis: members of family Sanguinolitidae with elongate, subrectangular, slightly sickle-shaped shell with anterior end short and rounded, posterior end longer; posteroventrally rounded and dorsoposteriorly truncate; ornament of low, commarginal ribs, replaced by fine growth lines on the relatively flat, dorsoposterior area; hinge unknown, possibly lacking distinct teeth; sharply elevated, internal shell lamellae radiating from area below beaks anteroventrally and toward the posterior. This subfamily is monogeneric.

Pleuronectitidae Hautmann, herein, fam. nov. Type genus, *Pleuronectites* Schlotheim, 1820, p. 217. Family diagnosis: discs prorescent, height of valves greater than length, left valve more convex than right; shell exterior smooth or with radial ribs; right anterior auricle with auricular scroll and deep byssal notch; ctenolium present; right posterior auricle obtuse but well delimited, not projecting above hinge margin; auricles of left valve lacking auricular sinuses and dorsally levelling with hinge margin; ligament alivincular-alate, small bourrelets may be present; hinge lacking resilial teeth; shell interior without buttresses; shell with thin, calcitic outer shell layer, divided into radial sectors with irregular foliated to radially irregular spherulitic prismatic to radially fibrous prismatic structure; aragonitic middle and inner shell layers with evidence of linear to slightly branching crossed lamellar structure. Comparisons and comment: Pleuronectitidae differs from other families of Pectinoidea (as defined by the presence of both an alivincular-alate ligament and a ctenolium, thus excluding the Entolioidea) in having prorescent discs, a flat right valve, a well-developed right anterior auricular scroll, and in lacking teeth and internal buttresses. This family tentatively also contains Lower and Middle Triassic *Periclararia* Li Jin-hua & Ding, 1981.

Saturnopectininae D. Campbell, herein, subfam. nov. *Nom. subst.* D. Campbell, herein, *pro* Saturnellinae Astafieva, 1994, p. 12, 16, invalid, based on *Saturnella* Astafieva, 1994, a preoccupied name. Type genus, *Saturnopecten* Astafieva, 2001a, p. 106, 2001b, p. 557, *nom. nov. pro* *Saturnella* Astafieva, 1994, *non* *Saturnella* Hedinger, 1993 [Foraminifera]. Subfamily diagnosis same as for Saturnellinae in Waterhouse (2008, p. 104): “Distinguished by ornament of strong commarginal rugae, radial ornament absent or very faintly developed over body of shell, and stronger over right anterior auricle in some species.” This subfamily also contains *Astafievina* Waterhouse, 2008, and *Montorbicula* Waterhouse, 2008.

Similodontidae Carter & Pojeta, herein, fam. nov. Type genus, *Similodonta* H. Soot-Ryen, 1964, p. 498. Family diagnosis: members of superfamily Tironuculoidea with low hinge angle (65–100°) and only slightly, if at all, anteroventrally expanded shell. Increased

anterior shell gape achieved by orienting ligament axis more nearly perpendicular to the anteroventral shell margins. Anterior hinge teeth convexodont to orthomorphodont and inclined. Posterior hinge teeth convexodont in most genera, to orthomorphodont and inclined. Anterior and posterior tooth rows generally form continuous series below the beaks, but posterior tooth row may overlap anterior tooth row below beaks. Anterior and posterior tooth rows typically nearly equal in length, but the posterior tooth row may be slightly shorter. This family also contains *Australonucula* Sánchez, 1989, *Trigonoconcha* Sánchez, 1999, *Villicumia* Sánchez, 1999, and doubtfully Upper Ordovician *Palaeoconcha* S. A. Miller, 1889.

Spengleriinae Carter, herein, subfam. nov. Type genus, *Spengleria* Tryon, 1862a, p. 472, 485. Subfamily diagnosis: obligate endolithic Gastrochaenidae with short to long, entirely separated siphons *sensu stricto*, and with little or no extension of ctenidia and mantle cavity posterior to shell margins. Beaks slightly to moderately anterior, never far anterior or terminal. Numerous, minute siphonal papillae surround each siphonal aperture. Anterior pedal retractor muscles pass around visceral mass as they approach the sole of the foot; ventral surface of foot nearly circular to elongate-ovate in anteroposterior direction. This subfamily differs from Gastrochaeninae in having siphons *sensu stricto* that are entirely separated, and by having little or no extension of the ctenidia and mantle cavity posterior to the shell margins. It differs from Eufistulaninae in having entirely separated siphons *sensu stricto*, and in having obligate endolithic instead of obligate tube dwelling habits. This family also contains *Gastrochaenopsis* Chavan, 1952c, and *Spenglerichaena* Carter, *gen. nov.*

Thraciida Carter, herein, ord. nov., mom. transl. et correct. Carter, herein, *ex* subfamily Thraciinae Stoliczka, 1870 in 1870–1871, p. 59, 62. Taxonomic content indicated above.

APPENDIX 2. NEW GENERA AND SPECIES

Superfamily Gastrochaenoidea J. Gray, 1840b

Family Gastrochaenidae J. Gray, 1840b

Subfamily Gastrochaeninae J. Gray, 1840b

Stenoconcha Carter, herein, *gen. nov.*

Figure 1

Type species.—*Gastrochaena lacera* Belokry, 1991, p. 10.

Discussion.—The genus *Stenoconcha* is presently proposed for Middle Eocene *Gastrochaena lacera* Belokry, 1991 (p. 10, pl. 1, 1–3, fig. 1a, 2), from the Dnepropetrovsk region of Ukraine. The name *Stenoconcha* derives from the Greek *stenos* for narrow, and from a variation of *cheniskos* for the upturned prow of a boat, as in *Gastrochaena*. The new genus name is feminine. The name *Stenoconcha* reflects the extremely small pedal gape and boatlike shape of the united valves. In addition to *Stenoconcha lacera*, this genus includes Upper Jurassic *Gastrochaena zitteli* Boehm, 1883, from Stramberk, Czech Republic, and Jurassic *Gastrochaena valfinensis* de Loriol, 1888, in de Loriol & Bourgeat, 1886–1888, from Valfin, eastern France (possibly a juvenile of *Stenoconcha zitteli*).

Generic diagnosis and description.—Members of Gastrochaeninae with a greatly posteriorly elongated, small- to medium-sized shell (9.5–38 mm long), with far anterior but not terminal beaks, a very small, anteriorly restricted pedal gape (comprising less than 12% of shell length), and pedal gape margins oriented at a high angle (over 60°) relative to the hinge axis. The shell's posterior is narrowly ovate

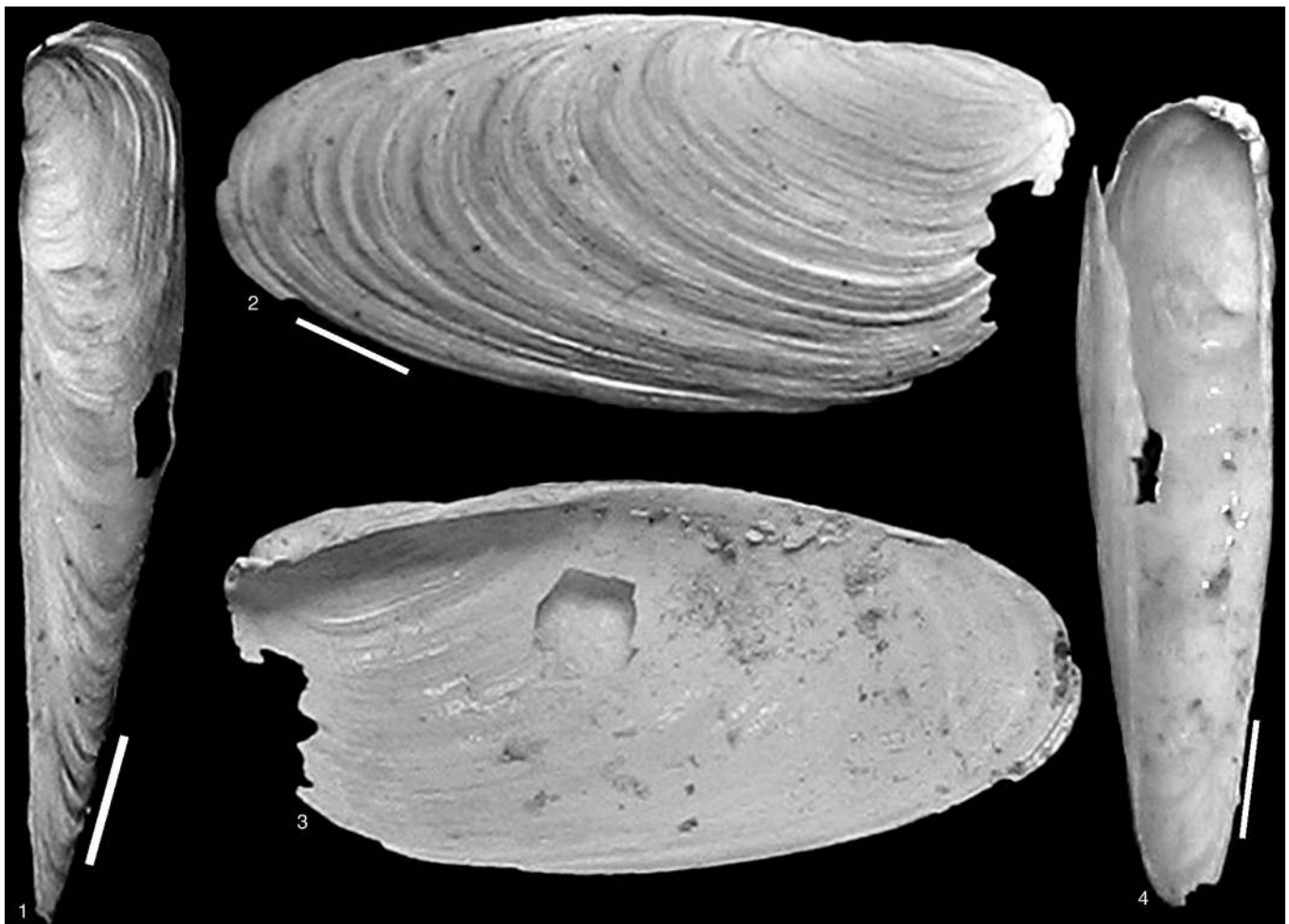


Figure 1. *Stenochaena lacera* (Belokryz, 1991) (new combination), holotype, right valve, Geologic Museum of Krivorozh'ye Mining Institute, Bv=148/74; middle Eocene, Dnepropetrovsk region, Ukraine; 1–4, dorsal view perpendicular to dorsal hinge, lateral exterior view, lateral interior view, and ventral view perpendicular to subumbonal hinge, respectively; scale bars = 1 mm (new).

and ornamented with regularly spaced, erect, commarginal lamellae (*Stenochaena zitteli*) or irregularly spaced growth lines (*Stenochaena lacera*). There are no mineralized periostracal spikes or spines cemented to the shell. The boring's shell chamber is subcylindrical, tapering far anteriorly and far posteriorly to conform with the shell's shape. The anterior half of the siphonal boring appears like a slightly narrower extension of the shell chamber, without a strong constriction in boring width at the base of the siphons. The posterior half of the siphonal boring is divided into incurrent and excurrent areas that diverge at an angle of 20°–25°. The hinge is thin, edentulous, and lacks myophores. Posterior to the beaks, the hinge is slightly convex and nearly parallel with the ventral shell margin; anterior to the beaks, it is very short, dorsally slightly deflected, and laterally strongly deflected (about 60°) from the subumbonal hinge axis. This lateral deflection frames a distinct, triangular opening between the dorsoanterior shell margins. The ligament is opisthodontic and parivincular, with very thin, not strongly dorsally projecting nymphs. The anterior adductor muscle scar is positioned immediately adjacent to the deflected dorsoanterior shell margin. Other muscle scars are not visible, despite excellent preservation of the aragonitic shells.

Comparisons.—No other member of Gastrochaenidae approaches *Stenochaena* in its combination of a very anteriorly restricted, high-angle pedal gape and greatly posteriorly extended, nearly cylindrical shell shape.

Distribution.—*Stenochaena* is known only from the Upper Jurassic and Middle Eocene of Europe.

Ecology.—Specimens of *Stenochaena lacera* from Belokryz (1991) came from borings in the dome-shaped coral *Astraeopora sphaeroidalis* (Mich.). Belokryz speculated that juveniles of this species bored through living coral tissue. Although this cannot be certain, the borings are sometimes partially overgrown by coral, indicating close proximity to living coral tissue at the time of settlement. Calcareous laminae are sometimes present in the anterior of the boring's shell chamber, indicating that the bivalves sometimes bored in a posterior direction to keep pace with coral growth.

Boehm's (1883) specimen of *Stenochaena zitteli* came from an Upper Jurassic limestone at Stramberk, Czech Republic (Boehm, 1883, p. 495, pl. 53, 6–7). Boehm indicated that his specimen occupied a calcareous tube that is anteriorly thin walled and posteriorly rather thick walled. This putative tube is probably the calcareous lining of



Figure 2. *Spenglerichaena apertissima* (Deshayes, 1855a) (new combination), holotype, paired valves, British Museum (Natural History), 1978086, Hugh Cuming collection; Recent, Isle of Panay, Philippines; 1–3, right lateral exterior view, left lateral interior view, and ventral view perpendicular to subumbonal hinge, respectively; scale bars = 5 mm (new).

a boring, thickened posteriorly to conform with the shell's shape, as in modern endolithic gastrochaenids. The British Museum has in its collections an upper Tithonian, Upper Jurassic specimen of *S. zitteli*, also from Stramberk (British Museum Geology Department L23855), with impressions of a coral substratum on the exterior of its boring cast.

Superfamily Gastrochaenoidea J. Gray, 1840b

Family Gastrochaenidae J. Gray, 1840b

Subfamily Spengleriinae Carter, herein, subfam. nov.

***Spenglerichaena* Carter, herein, gen. nov.**

Figure 2

Type species.—*Gastrochaena apertissima* Deshayes, 1855a, p. 326.

Discussion.—The genus *Spenglerichaena* is presently proposed for Recent, Indo-Pacific *Gastrochaena apertissima* Deshayes, 1855a, the type species. The name derives from *Spengleria* and *Gastrochaena*, in recognition of anatomical similarities with *Spengleria* and shell similarities, especially the lack of a raised posterior triangular area, with *Gastrochaena*. The new genus name is feminine.

Generic diagnosis and description.—Members of Spengleriinae with anteriorly strongly laterally inflated shells, moderately anterior umbos, completely divided, relatively long siphons *sensu stricto*, little or no extension of the ctenidia and posterior mantle cavity posterior to the shell margins, no raised, posterior triangular area, and no distinct umbonal-posteroventral sulcus. The shell posterior has

irregular, commarginal growth lamellae and a thin, nonmineralized periostracum. The ctenidia are nonplicate, the pedal probing organ is spatulate, and the calcareous boring linings lack an annular septum and spiny baffles at the base of the siphonal boring.

Comparisons.—*Spenglerichaena* resembles *Spengleria* in its completely separated siphons *sensu stricto* and anterior pedal retractor muscles that pass around the visceral mass as they approach the foot. However, *Spenglerichaena* lacks the raised posterior triangular area, aragonitic periostracal spikes, distinct umbonal-posteroventral sulcus, pointed calcareous baffles in the boring lining at the base of the siphons, plicate ctenidia, and more medially positioned umbos of *Spengleria*. Its nonplicate ctenidia, spatulate pedal probing organ, lack of a raised, posterior triangular area, and lack of mineralized periostracal spines are more typical of *Gastrochaena* and *Rocellaria*, but in those genera, the siphons *sensu stricto* and *sensu lato* are largely fused, and the ctenidia and mantle cavity are extended at least slightly into the siphonal part of the boring, posterior to the shell margins. *Spenglerichaena* differs from *Gastrochaenopsis* in having a wider, longer pedal gape, no raised posterior triangular area, and greater lateral inflation of the shell.

Distribution.—Borings similar to those made by *Spenglerichaena* are known from the Lutetian, Middle Eocene near Verona, Italy, but the associated shells are unknown (Savazzi, 1980). *Spenglerichaena* is therefore definitely known only from the Recent tropical Indo-West Pacific Region.

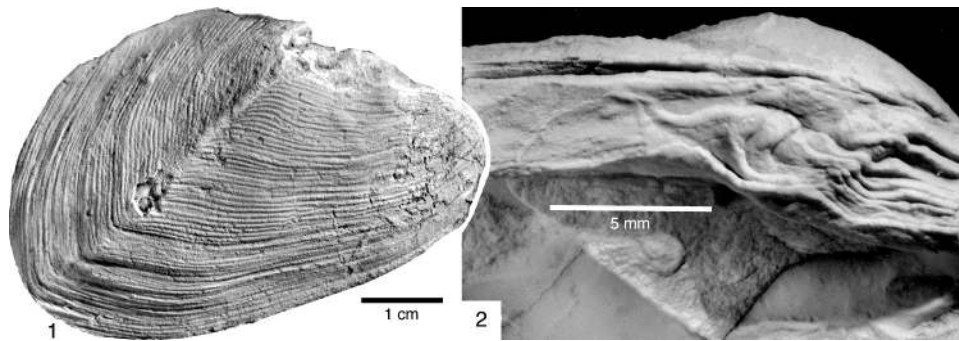


Figure 3. *Goniomorpha hamiltonensis* (J. Hall & Whitfield, 1869) (new combination), Middle Devonian, Marcellus (?) Formation, Hamilton Group, central New York State; 1, exterior of broken, calcite-replaced right valve (Yale Peabody Museum 10276); 2, subumbonal hinge of calcite-replaced left valve (Yale Peabody Museum 10060), from north of Morrisville, New York, showing parivincular ligament insertion area (upper left) and crude subumbonal dentition crossed by prominent growth lines (new).

Ecology.—*Spenglerichaena* bores primarily into thicker coral substrata that are less subject to breakage.

Superfamily Modiomorphoidea S. A. Miller, 1877

Family Modiomorphidae S. A. Miller, 1877

Subfamily Modiomorphinae S. A. Miller, 1877

***Goniomorpha* Carter, herein, gen. nov.**

Figure 3

Type species.—*Goniophora hamiltonensis* J. Hall & Whitfield, 1869, p. 36.

Discussion.—The genus *Goniomorpha* is presently proposed for sharply carinate, posteriorly obliquely truncate, subumbonally irregularly dentate modiomorphids formerly classified as *Megalodon* J. de C. Sowerby, 1827, in James Sowerby, 1812–1845, or *Goniophora* J. Phillips, 1848. The type species is presently designated as Middle Devonian *Goniophora hamiltonensis* J. Hall & Whitfield, 1869. The name *Goniomorpha* derives from *Gonio-* (from *Goniophora* Phillips, 1848) and *morpha* (from *Modiomorpha* J. Hall & Whitfield, 1869). Johnston (1993, p. 76) was aware that “*Goniophora*” *hamiltonensis* is “almost certainly not congeneric” with *Goniophora* J. Phillips, 1848, and he pointed out that it differs from true *Goniophora* in having a depressed, striated lunule, the growth lines of which continue onto the subumbonal hinge plate, as in *Modiomorpha concentrica* (Conrad, 1838) (see J. Hall, 1884 in 1883–1884, pl. 43, 18–19; Bailey, 1983, fig. 47; Carter, 1990a, fig. 50A). Carter (1990a, p. 266) indicated that “*Goniophora*” *hamiltonensis* belongs in Modiomorphidae, noting that it is microstructurally similar to *M. concentrica*, and Johnston (1993) also assigned “*Goniophora*” *hamiltonensis* to Modiomorphidae.

True *Goniophora* is a mecnodontid based on upper Silurian *Goniophora cymbaeformis* Sowerby in Murchison, 1839. This mecnodontid resembles *Goniomorpha* in having an equivalve, strongly inequilateral, posteriorly elongate shell with simple, commarginal ornament, and a sharp, angular carina extending from the beak to the posteroventral shell margin. However, it differs from *Goniomorpha* in having prominent anterior and posterior internal ridges (Johnston, 1993, p. 74–76; Liljedahl, 1994, p. 74, fig. 52I). The hinge and ligament of *Goniophora cymbaeformis* are unknown, but other species of this genus differ from *Goniomorpha* in having a narrower hinge plate, largely restricted to the subumbonal area, with finer, more regularly shaped cardinal teeth, an opisthodic, parivincular ligament with shorter, more external nymphs, no strong

growth lines on the subumbonal hinge plate, and no deeply impressed lunule (Liljedahl, 1994, p. 74).

Goniomorpha hamiltonensis was described and illustrated by J. Hall (1885, p. 296, pl. 43, 8–15, 17–21), Carter and Tevesz (1978), Carter (1990a, p. 266–268, fig. 50), Carter, Lutz, and Tevesz (1990, p. 391), and Johnston (1993, p. 76). Other species presently included in *Goniomorpha* lack posterior lateral teeth, and they all have at least one, weakly to strongly developed, irregular but more or less triangular cardinal tooth in the left valve. A second, weaker cardinal tooth may be present posterior to the principal cardinal tooth in the left valve, e.g., in Lower Devonian *Goniomorpha stuartzi* (Beushausen, 1895) (see Maillieux, 1937, p. 136), or a large, rounded cardinal tooth may be present in the right valve, anterior to the right, principal cardinal socket, as in Lower Devonian *Goniomorpha cognata* (Drevermann, 1902) (see Drevermann, 1902, p. 88, pl. 10, 15–16).

Carter (1990a, p. 266) incorrectly indicated that “*Goniophora*” *hamiltonensis* has a very weak left posterior lateral tooth overlapping a weak right posterior lateral tooth. This was based on a misinterpretation of a shallow flexure near the base of the posterior hinge plate in an isolated left valve. Subsequent sections through united valves from the Hamilton Group near Morrisville, New York, along with the observations by C. F. Römer (1844) and Maillieux (1937), indicate a lack of lateral hinge teeth in this genus.

Generic diagnosis and description.—*Goniomorpha* encompasses members of subfamily Modiomorphinae with a sharply defined, umbonal-posteroventral carina, an angular, rostrate posterior, and no posterior lateral hinge teeth. Like other Modiomorphinae, the shell is equivalve, posteriorly elongate, and strongly inequilateral, with low umbos, a deeply impressed, growth-lined lunule with growth lines extending from the lunule onto a wide, subumbonal hinge plate, a weakly or more strongly developed, irregular, more or less triangular, left cardinal tooth, a flat, wide, posterior hinge plate, and slightly submerged, elongate, parivincular ligament nymphs. In some species, a second, smaller, more posterior, left cardinal tooth is also present, or a rounded cardinal tooth is present in front of the principal cardinal socket in the right valve. The adductors are heteromyarian, the anterior one deeply impressed and positioned just below the hinge, and bounded posteriorly by a low, umbonal ridge or buttress. The posterior adductor muscle scar is more shallowly impressed. The anterior pedal retractor scar is separated from

the anterior adductor scar, but the posterior pedal retractor scar is partially confluent with the posterior adductor scar. The pallial line is unknown for the type species, but it was probably integripalliate, judging from other members of Modiomorphinae. The shell mineralogy and microstructure resemble *Modiomorpha concentrica*, except that mineralized periostracal spikes are fused to the shell's exterior anteriorly (see Carter, 1990a, p. 268).

Comparisons.—*Goniomorpha* resembles *Modiomorpha* in having a crudely shaped cardinal tooth in the left valve, but *Goniomorpha* has a more sharply defined posterior carina, a more sharply truncate posterior, a more variable subumbonal dentition, and no posterior lateral teeth. A posterior lateral tooth is variably developed in *Modiomorpha* (see Carter, 1990a, p. 266).

Distribution.—*Goniomorpha* includes most of the Lower Devonian species assigned by Maillieux (1937) to *Goniophora*, e.g., *Goniophora bipartita* (F. Römer, 1844), *G. dorlodoti* Asselberghs, 1913, *G. trapezoidalis* Kayser, 1885, *G. schuerdi* Beushausen, 1895, *G. stuerzi* Beushausen, 1895, *G. praecedens* Drevermann, 1902, *G. cognata* Drevermann, 1902, *G. rhenana* Beushausen, 1895, *G. stainieri* Maillieux, 1937, *G. kaisini* Maillieux, 1937, and *G. atrebatensis* Leriche, 1912. It also contains most, if not all, of the New York Middle and Upper Devonian species placed by Hall (1885, p. 293–306) in *Goniophora*, e.g., *Goniophora acuta* (Hall & Whitfield, 1869), *G. rugosa* (Conrad, 1841), *G. truncata* Hall, 1883 in 1883–1884, *G. glaucus* (Hall & Whitfield, 1869), *G. ida* (Hall & Whitfield, 1869), *G. carinata* (Conrad, 1841), *G. trigona* Hall, 1885, and *G. chemungensis* (Vanuxem, 1842).

Paleoecology.—*Goniomorpha hamiltonensis* occurs in the Middle Devonian Hamilton Group of central New York State in clay-rich sandstones also containing a high diversity of other marine invertebrates, especially the bivalves *Ptychopteria* (Pterineidae), rare pectinoids, and the gastropods *Palaeozyglopleura* and *Bembexia*. *Goniomorpha hamiltonensis* is not usually found in large concentrations. The strongly and sharply truncate, elongate posterior and lack of a distinct byssal notch suggest a shallow infaunal life habit, with the shell's posterior end at or just above the sediment-water interface. The species is never associated with abundant nucleoids and muddy, fine grained sediments, suggesting suspension feeding habits and low tolerance of resuspended, muddy substrata.

Superfamily Ostreoidea Rafinesque, 1815

Family Arctostreidae Vialov, 1983

Subfamily Palaeolophinae Malchus, 1990

Nacrolopha Carter & Malchus, herein, *gen. nov.*

Figure 4

Type species.—*Nacrolopha carolae* Carter & Malchus, herein, *gen. et sp. nov.*

The new genus *Nacrolopha* is presently proposed for the new species, Carnian, Upper Triassic *Nacrolopha carolae* Carter & Malchus (Fig. 4), with the holotype of the latter being a well-preserved left valve from Alpe di Specie, Cassiano Formation (alt. 1900–2000 m), Italy (UNC 13497b). The holotype was described and illustrated as an unknown genus and species by Carter (1990a, p. 217–220, fig. 32). The genus name derives from the nacreous microstructure and *Lopha*-like shape of the type species. The species is dedicated to Carol Elizabeth Via Carter. The holotype, which has been sectioned for microstructural analysis, is deposited in the paleontological col-

lection of the Yale University Peabody Museum of Natural History, New Haven, Connecticut.

Generic and species diagnosis.—*Nacrolopha* is characterized by a posteriorly instead of posterodorsally positioned posterior adductor scar, a posterior pedal retractor scar that is partially confluent with the posterior adductor scar, a minute, anterior adductor scar, and a nacroprismatic left valve that lacks foliated structure, structural chambering, and chalky deposits. This diagnosis applies to the genus and to its type species.

Generic and species description.—The following description of *N. carolae* is based on left valve UNC 13497b. The beak is prosogyrate in the juvenile stage and orthogyrate in the adult stage. The hinge is slightly arched and smooth except for 9 shallow pits (possible preparation artifacts) posterior and ventral to the cardinal area. There are no chomata. The ventral and lateral internal shell margins vary from nearly smooth to slightly radially costate. The exterior has about 25 coarse, radial costae immediately adjacent to the attachment area; these increase to about 30 at the shell margins through intercalation and branching, but mostly through intercalation. A pallial line is not visible, but this could be covered by an attached brachiopod and adherent sediment. The posterior adductor muscle scar (5.1 × 3.5 mm) is ovate, higher than wide, and much larger than the anterior adductor muscle scar (1.4 × 0.8 mm); both scars are positioned near their respective shell margins, and both are elevated by a shelly buttress, that supporting the anterior adductor being more prominent by virtue of its position on a more steeply inclined shell surface. The posterior pedal retractor scar measures 1.2 × 1.0 mm, and its center is 40% from the ventral shell margin toward the dorsal end of the shell. The ligament insertion area is acutely triangular and alivincular-arcuate, with the fibrous attachment area distinctly impressed below narrow, distinct, anterior and posterior bourrelets. The “incipient” crura that Carter (1990a, p. 219) described for this specimen are actually the flanks of the alivincular-arcuate ligament (Hautmann, 2004, 2006). The ligament insertion area is covered by a very thin aragonitic ligostracum of nearly vertical irregular simple prisms (ISP) and steeply dipping fibrous prisms. The underlying hinge is nacreous. The outer shell layer is very thin and varies from ISP to regular simple prismatic to homogeneous mosaic, with prisms 6–10 μm wide. The middle shell layer is nacreous and closely approaches the shell margins. Where marginal radial folds are present, the nacreous laminae are strongly reflected outward. The adductor myostracum is finely ISP. The inner shell layer is aragonitic and mostly coarsely textured ISP, with minor nacreous lenticular sublayers.

Comparisons.—*Nacrolopha carolae* differs from all other presently known members of Palaeolophinae in having nacre, an anterior adductor muscle scar, and a posterior pedal retractor scar. Because these features are internal, the composition of the genus is poorly known. *Palaeolopha montiscaprilis* (Klipstein, 1843) (Klipstein, 1843, p. 247, pl. 16,5) appears externally similar to *N. carolae* (see also Wöhrmann, 1889, p. 200, pl. 6, 1–3), but illustrations of that species do not show an anterior adductor or posterior pedal retractor muscle scar. Possible congeners of *Nacrolopha* include certain other species assigned by Malchus (1990) to *Palaeolopha*, such as Carnian, Upper Triassic *Palaeolopha mediocostata* (Wöhrmann, 1889), and *Palaeolopha calceiformis* (Broili, 1904). However, these species are unknown both microstructurally and in the details of their muscle scars.

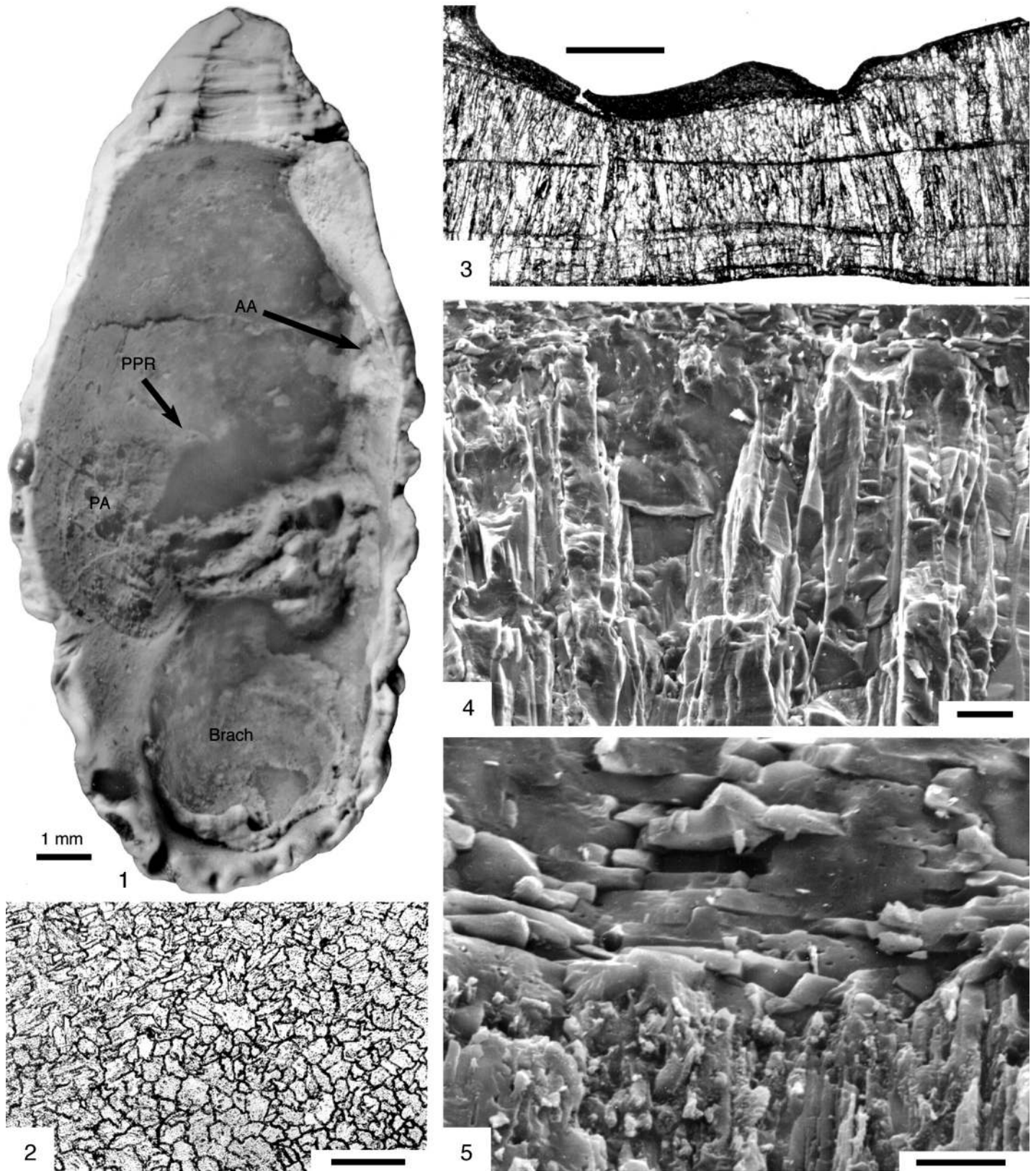


Figure 4. *Nacrolopha carolae* Carter & Malchus, *gen. et sp. nov.*, holotype, left valve, University of North Carolina 13497b; Carnian, Upper Triassic, Cassiano Formation, Alpe di Specie, altitude 1900–2000 m, Dolomitic Alps, northeast of Cortina d'Ampezzo, Italy; 1, interior of left valve, showing alivincular-arcuate ligament insertion area, muscle scars for posterior adductor (PA), anterior adductor (AA, supported by a slight buttress), and posterior (Continued on facing page.)

The presence of ISP and homogeneous mosaic structure in the outer shell layer of the left valve of *N. carolae* resembles some Triassic bakevelliids and gryphaeids, e.g., the Middle Triassic bakevelliid *Hoernesia socialis* (Schlotheim, 1823 in 1822–1823) (Carter, 1990b, p. 337) and the Upper Triassic gryphaeid *Gryphaea nevadensis* McRoberts, 1992 (McRoberts & Carter, 1994). Some Jurassic gryphaeids retained homogeneous mosaic structure in their outer shell layer, typically between an RSP outermost sublayer and the foliated middle shell layer, e.g., in Jurassic *Gryphaea arcuata* (Lamarck, 1801) and in *Praexogyra hebridica* (Forbes, 1851) (Carter, 1990c, p. 356–359).

The dorsally rounded posterior adductor muscle scar in *N. carolae* resembles Gryphaeidae and differs from the dorsally flattened or concave posterior adductor scar in Ostreidae (Harry, 1985).

Nacrolopha carolae resembles Norian–Rhaetian, Upper Triassic *Umbrostrea emamii* Hautmann, 2001b, from the Nayband Formation of Iran, in having some calcitic RSP in its outer shell layer and nacre in its inner shell layers. However, *U. emamii* differs in having a regularly to irregularly foliated instead of nacreous middle shell layer. In *U. emamii*, the outer layer of the right valve is RSP to slightly ISP, whereas that of the left valve is coarsely ISP (Hautmann, 2001b, pl. 7; 2006). Structural chambers are lacking in the foliated layer. *Umbrostrea* lacks an adult anterior adductor muscle scar and adult posterior pedal retractor muscle scars (Hautmann, 2001b).

Distribution.—*Nacrolopha carolae* is presently known only from the Carnian, Upper Triassic, Cassiano Formation at Alpe di Specie, Italy.

APPENDIX 3. CLASSIFICATION ABOVE FAMILY RANK

The following abstract includes all taxa at or above the rank of superfamily (superfamilies are listed in alphabetical order), plus all plesions and paraplesions. Taxa above the rank of order are highlighted with bold face type. Symbols: • = extinct; ! = paraphyletic.

Class Bivalvia Linnaeus, 1758 in 1758–1759

•Grade Euprotobranchia! Neveeskaja, 2009

- Order Fordillida! Pojeta, 1975: •Superfamily Fordilloidea! Pojeta, 1975
- Order Tuarangiida MacKinnon, 1982

Clade Eubivalvia Carter, *nov.*

Subclass Protobranchia Plesenceer, 1889 (=Palaeotaxodonta Korobkov, 1954)

Superorder Nuculiformii! Dall, 1889 (=Foliobranchia Ménégaux, 1889)

- Order Nuculida! Dall, 1889: Superfamily Nuculoidea! J. Gray, 1824; Superfamily Pristiglomoidea Sanders & Allen, 1973
- Order Solemyida Dall, 1889: Superfamily Manzanelloidea Chronic, 1952; Superfamily Solemyoidea! J. Gray, 1840b

Superorder Nuculaniformii Carter, Campbell, & Campbell, 2000

- Order Afghanodesmatida! Carter, *nov.*: •Superfamily Afghanodesmatoidea! Scarlato & Starobogatov, 1979a; •Superfamily Tironuculoidea Babin in Babin & others, 1982
- Order Nuculanida Carter, Campbell, & Campbell, 2000: Superfamily Malletioidea! H. Adams & A. Adams, 1858 (d'Orbigny, 1846); Superfamily Nuculanoidea H. Adams & A. Adams, 1858 (J. Gray, 1854a)

Subclass Autobranchia Grobden, 1894

Infraclass Pteriomorphia Beurlen, 1944

Cohort Mytilomorphi! Férussac, 1822 in 1821–1822

- Order Mytilida! Férussac, 1822 in 1821–1822: •Superfamily Modiolopsoidae! P. Fischer, 1886; Superfamily Mytiloidea Rafinesque, 1815
- Order Colpomyida Carter, *nov.*: •Superfamily Colpomyoidea Pojeta & Gilbert-Tomlinson, 1977

Cohort Ostreomorphi Férussac, 1822 in 1821–1822

- (plesion) •Family Matheriidae Scarlato & Starobogatov, 1979a
- (plesion) •Family Ischyrodontidae Scarlato & Starobogatov, 1979a

Subcohort Arcioni! J. Gray, 1854a

- Order Cyrtodontida! Scarlato & Starobogatov in Neveeskaja & others, 1971
- Suborder Cyrtodontidina! Scarlato & Starobogatov in Neveeskaja & others, 1971: •Superfamily Cyrtodontoidea! Ulrich in Ulrich & Scofield, 1894; •Superfamily Falcatodontoidea Cope, 1996; •Superfamily Pichlerioidea Scarlato & Starobogatov, 1979a
- Suborder Praecardiidina Newell, 1965 (=Nepiomorphia Kříž, 2007)
- Hyporder Praecardioidae Newell, 1965: •Superfamily Cardioloidea R. Hoernes, 1884; •Superfamily Praecardioidae R. Hoernes, 1884

Figure 4 (continued from facing page).

pedal retractor (*PPR*); a brachiopod (*Brach*) is cemented to shell's interior; 2, horizontal acetate peel through aragonitic ISP inner shell layer also visible in view 3, scale bar = 100 μ m; 3, anterior-posterior, vertical acetate peel showing nacreous middle shell layer (above, darker layer) and the underlying aragonitic ISP inner shell layer, scale bar = 0.5 mm; 4, SEM, vertical fracture through nacreous middle shell layer (barely visible at extreme top of figure) and the aragonitic ISP inner shell layer, scale bar = 25 μ m; 5, vertical fracture through the nacreous middle shell layer and aragonitic ISP adductor myostracum, scale bar = 5 μ m; calcitic outer shell layer does not appear in any of these figures (new).

•Hyporder Antipleuroidei Křřž, 2007: •Superfamily Dualinoidea Conrath, 1887
 Order Arcida J. Gray, 1854a: Superfamily Arcoidea Lamarck, 1809; •Superfamily Glyptarcoidea Cope, 1996; Superfamily
 Limopsoidea Dall, 1895a; Superfamily Philobryoidea Félix Bernard, 1897

Subcohort Ostreioni Férussac, 1822 in 1821–1822

•**Megaorder Myalinata H. Paul, 1939**

•Order Myalinida H. Paul, 1939: •Superfamily Alatoconchoidea H. Termier, Termier, & Lapparent, 1974; •Superfamily Ambonychioidea!
 S. A. Miller, 1877; •Superfamily Inoceramoidea C. Giebel, 1852; •Superfamily Prokopievskioidea H. Vokes, 1967

Megaorder Ostreata Férussac, 1822 in 1821–1822

(plesion) •Family Myodakryotidae Tunnicliff, 1987

Superorder Ostreiformii Férussac, 1822 in 1821–1822 (=Eupteriomorphia Boss, 1982)

Order Ostreida Férussac, 1822 in 1821–1822

Suborder Ostreidina Férussac, 1822 in 1821–1822: Superfamily Ostreioidea Rafinesque, 1815

Suborder Malleidina! J. Gray, 1854a

(paraplesion) •Family Pterineidae! F. Meek, 1864b

Superfamily Pinnoidea Leach, 1819; •Superfamily Posidonioidea Neumayr, 1891; Superfamily Pterioidea! J. Gray, 1847b
 (Goldfuss, 1820); •Superfamily Rhombopterioidea! Korobkov in Eberzin, 1960

Order Pectinida J. Gray, 1854a

(paraplesion) •Superfamily Leiopectinoidea! Krasilova, 1959

Suborder Pectinidina J. Gray, 1854a: Superfamily Pectinoidea Rafinesque, 1815

Suborder Anomiidina J. Gray, 1854a

Hyporder Anomioidei J. Gray, 1854a

•(plesion) ?Family Saharopteriidae G. Termier & H. Termier in Pareyn, Termier, & Termier, 1972

•(paraplesion) Superfamily Pseudomonotoidea! Newell, 1938

Minorder Anomioitei J. Gray, 1854a: Superfamily Anomioidea Rafinesque, 1815

Minorder Dimyoitei Ridewood, 1903: Superfamily Dimyoidea P. Fischer, 1886; Superfamily Plicatuloidea J. Gray,
 1854b; •Superfamily Prospondyloidea! Pchelintseva, 1960

•Hyporder Aviculopectinoidei! Starobogatov, 1992: •Superfamily Aviculopectinoidea! F. Meek & Hayden, 1865;

•Superfamily Chaenocardioidea S. A. Miller, 1889; •Superfamily Heteropectinoidea! Beurlen, 1954; •Superfamily
 Pterinopectinoidea! Newell, 1938

Hyporder Limoidei R. Moore in Moore, Lalicker, & Fischer, 1952: Superfamily Limoidea Rafinesque, 1815

•Hyporder Monotoidei Waterhouse, 2001: •Superfamily Buchioidea! Cox, 1953 (P. Fischer, 1886); •Superfamily
 Eurydesmatoidea! Reed, 1932; •Superfamily Oxytomoidea Ichikawa, 1958

Suborder Entoliidina! Hautmann, *nov.*: Superfamily Entolioidea! Teppner, 1922; •Superfamily Euchondrioidea! Newell, 1938

Infraclass Heteroconchia Hertwig, 1895

Cohort Uniomorphi J. Gray, 1854a (=Palaeoheterodonta of authors)

(plesion) •Family Thoraliidae N. Morris, 1980

Subcohort Unioni J. Gray, 1854a

(paraplesion) •Superfamily Lyrodesmatoidea! P. Fischer, 1886

Megaorder Unionata J. Gray, 1854a

Order Trioniida! Dall, 1889: •Superfamily Myophorelloidea T. Kobayashi, 1954; •Superfamily Pseudocardinoidea Martinson,
 1961; Superfamily Trigonioidea! Lamarck, 1819; •?Superfamily Trigonioidea Cox, 1952 (or in Unionida?); •Superfamily
 Trigonodoidea! Modell, 1942

Order Unionida J. Gray, 1854a

Suborder Unionidina J. Gray, 1854a: Superfamily Mullerioidea Deshayes, 1832a; •?Superfamily Trigonioidea Cox, 1952
 (or in Trioniida?); Superfamily Unionoidea Rafinesque, 1820

Suborder Hyriidina Hoeh & others, 2009: Superfamily Hyrioidea Swainson, 1840

•Suborder Silesunionidina! Skawina & Dzik, 2011: •Superfamily Silesunionoidea! Skawina & Dzik, 2011

Cohort Cardiomorphi Férussac, 1822 in 1821–1822 (=Heterodonta of authors)

(plesion) •Family Lipanellidae Sánchez, 2005

Subcohort Carditioni Dall, 1889

•Order Actinodontida! Deschaseaux, 1952: •?Superfamily Amnigenioidea Khalfin, 1948; •Superfamily Anodontopsoidea! S. A.
 Miller, 1889; •Superfamily Nyassoidea! S. A. Miller, 1877; •Superfamily Oriocrassatelloidea Boyd & Newell, 1968; •Superfamily
 Palaeomuteloidea Lahusen, 1897

Order Carditida Dall, 1889

(plesion) •?Family Archaeocardiidae Khalfin, 1940

(paraplesion) •Family Eodonidae! Carter, Campbell, & Campbell, 2000

Superfamily Crassatelloidea Férussac, 1822 in 1821–1822

Subcohort Cardioni Férussac, 1822 in 1821–1822 (=Euheterodonta Giribet & Distel, 2003)

Infrasubcohort Lucinidia J. Gray, 1854a

(paraplesion) •Superfamily Babinkoidea! Horný, 1960

Order Lucinida J. Gray, 1854a: Superfamily Lucinoidea! J. Fleming, 1828; Superfamily Thyasiroidea Dall, 1900 (Dall, 1895a)

Infrasubcohort Cardiida Férussac, 1822 in 1821–1822

(paraplesion) •Superfamily Grammysioidea! S. A. Miller, 1877

Megaorder Cardiata Férussac, 1822 in 1821–1822 (=Neoheterodonte Taylor & others, 2007)

Superorder Cardiiformii Férussac, 1822 in 1821–1822

•Order Modiomorphida! Newell, 1969c: •Superfamily Modiomorphoidea! S. A. Miller, 1877

•Order Megalodontida! Starobogatov, 1992: •Superfamily Mecynodontoidea! Haffer, 1959; •Superfamily Megalodontoidea! J. Morris & Lycett, 1853

•Order Hippuritida Newell, 1965: •Superfamily Radiolitoidea d'Orbigny, 1847b; •Superfamily Requiemoidea Kutassy, 1934

Order Cardiida Férussac, 1822 in 1821–1822

(paraplesion) •Superfamily Kalenteroidea! Marwick, 1953

Suborder Cardiidina Férussac, 1822 in 1821–1822

(paraplesion) •Family Palaeocarditidae! Chavan, 1969b

Hyporder Cardioidei Férussac, 1822 in 1821–1822: Superfamily Cardioidea Lamarck, 1809; Superfamily Tellinoidea Blainville, 1814

Hyporder Veneroidei J. Gray, 1854a

Minorder Veneroitei J. Gray, 1854a: Superfamily Arcticoidea! R. Newton, 1891 (d'Orbigny, 1844 in 1844–1848); Superfamily Chamoidea Lamarck, 1809; Superfamily Cyrenoidea J. Gray, 1840b; Superfamily Gaimardioidea Hedley, 1916; Superfamily Glossoidea J. Gray, 1847b (J. Gray, 1840b); Superfamily Hemidonacoidea Scarlato & Starobogatov in Neveškaja & others, 1971; Superfamily Mactroidea Lamarck, 1809; Superfamily Ungulinoidea J. Gray, 1854b; Superfamily Veneroidea Rafinesque, 1815

Minorder Dreissenitei R. Moore in Moore, Lalicker, & Fischer, 1952: Superfamily Dreissenioidea J. Gray, 1840a; Superfamily Sphaerioidea! Deshayes, 1855b (Rafinesque, 1820)

Suborder Gastrochaenidina Morretes, 1949: Superfamily Gastrochaenoidea J. Gray, 1840b

•Suborder Anthracosiidina Silantiev & Carter, 2011: •Superfamily Anthracosioidea Amalitzky, 1892; •Superfamily Palaeonodontoidea Modell, 1964; •Superfamily Prilukielloidea Starobogatov, 1970

Suborder Leptonidina Dall, 1889: Superfamily Cyamioidea! G. O. Sars, 1878; Superfamily Galeommatoidea J. Gray, 1840b

Superorder Pholadiformii J. Gray, 1854a

Order Pholadida J. Gray, 1854a: Superfamily Myoidea Lamarck, 1809; Superfamily Pholadoidea Lamarck, 1809;

•Superfamily Pleuromyoidea! Zittel, 1895

Megaorder Poromyata Ridewood, 1903

Order Poromyida Ridewood, 1903: Superfamily Cuspidarioidea Dall, 1886; Superfamily Parilimyioidea! B. Morton, 1981; Superfamily Poromyoidea Dall, 1886; Superfamily Verticordioidea! Stoliczka, 1870 in 1870–1871

Order Pholadomyida! Newell, 1965: Superfamily Pholadomyoidea! W. King, 1844

Order Pandorida R. Stewart, 1930: Superfamily Clavagelloidea d'Orbigny, 1844 in 1844–1847; Superfamily Pandoroidea! Rafinesque, 1815

Order Thraciida Carter, *nov.*: Superfamily Thracioidea! Stoliczka, 1870 in 1870–1871 (Couthouy, 1839)

Megaorder Solenata Dall, 1889.

Order Solenida Dall, 1889: •Superfamily Orthonotoidea! S. A. Miller, 1877; Superfamily Solenoidea Lamarck, 1809

Order Hiatellida Carter, *nov.*: •Superfamily Edmondoidea! W. King, 1850; Superfamily Hiatelloidea J. Gray, 1824

APPENDIX 4. AUTHOR ADDRESSES

Cristian R. Altaba, Laboratori de Sistemàtica Humana, Universitat de les Illes Balears, 07122 Palma, Balearic Islands, Spain, cristianr.altaba@uib.cat
Laurie C. Anderson, South Dakota School of Mines and Technology, 501 East Saint Joseph Street, Rapid City, South Dakota 57701-3901, USA,

Laurie.Anderson@sdsmt.edu

Rafael Araujo, Museo Nacional de Ciencias Naturales, José Gutiérrez Abascal 2, 28006, Madrid, Spain, mcnra2f@mncn.csic.es

Alexander S. Biakov, Chief of Laboratory of Stratigraphy and Tectonics, North-East Interdisciplinary Scientific Research Institute (NEISRI), Far East Branch, Russian Academy of Sciences, Portovaya Street, 16, 685000, Magadan, Russia, abiakov@mail.ru

Arthur E. Bogan, Research Laboratory, North Carolina State Museum of Natural Sciences, Mail Service Center 1626, Raleigh, North Carolina 27699-1626, USA, arthur.bogan@ncdenr.gov

David C. Campbell, Paleontological Research Institution, 1259 Trumansburg Road, Ithaca, New York 14850, USA, pleuronaia@gmail.com

Matthew Campbell, Department of Biology, Charleston Southern University, 9200 University Boulevard, Charleston, South Carolina 29406, USA, mrcampbell2008@gmail.com

- Joseph G. Carter, Department of Geological Sciences, University of North Carolina, Chapel Hill, North Carolina 27599-3315, USA, clams@email.unc.edu
- Chen Jin-hua, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, 210008, Peoples Republic of China, jhchen@nigpas.ac.cn
- John C. W. Cope, Department of Geology, National Museum of Wales, Cardiff CF10 3NP, UK, john.cope@museumwales.ac.uk
- Graciela Delvene, Instituto Geológico y Minero de España, C/ Ríos Rosas, 23 28003, Madrid, Spain, g.delvene@igme.es
- Henk H. Dijkstra, Department of Marine Zoology, Netherlands Centre for Biodiversity (NCB Naturalis), P.O. Box 9517, 2300 Leiden, The Netherlands, H.H.Dijkstra@uva.nl or h.h.dijkstra@planet.nl
- Fang Zong-jie, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, People's Republic of China, zifang@nigpas.ac.cn
- Ronald N. Gardner, 19B Cheam St, Dallington, Christchurch 8061, New Zealand, ronaldgardner@aol.com
- Vera A. Gavrilova, Russian Geological Research Institute (VSEGEI), Sredniy pr, 74, 199106, St. Petersburg, Russia, Vera_Gavrilova@vsegei.ru
- Irina A. Goncharova, Mollusk Laboratory, Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997, Russia, iringonch@gmail.com
- Peter J. Harries, Department of Geology, University of South Florida, SCA 528, Tampa, Florida, 22620, USA, pjharries@gmail.com or harries@usf.edu
- Joseph H. Hartman, Department of Geology and Geological Engineering, University of North Dakota, 81 Cornell Street Stop 8358, Grand Forks, North Dakota 58202, USA, Joseph.hartman@engr.und.edu
- Michael Hautmann, Wissenschaftlicher Mitarbeiter, Paläontologisches Institut und Museum, Karl-Schmidt-Strasse 4, CH-8006, Zürich, Switzerland, michael.hautmann@pim.uzh.ch
- Walter R. Hoeh, Department of Biological Sciences, Kent State University, Kent, Ohio, 44242, USA, whoeh@kent.edu
- Jorgen Hylleberg, Institute of Biology, Bygning 1135, Ole Worms alle 1, 8000 Aarhus C, Denmark, hylleberg@biology.au.dk
- Jiang Bao-yu, Department of Earth Sciences, Nanjing University, 22 Hankou Road, 210093, Nanjing, People's Republic of China, byjiang@nju.edu.cn
- Paul Johnston, Department of Earth Sciences, Mount Royal University, 4825 Mount Royal Gate SW, Calgary, Alberta, Canada T3E 6K6, pajohnston@mtroyal.ca
- Lisa Kirkendale, University of Wollongong, Shoalhaven Marine and Freshwater Centre, West Nowra, 2541, New South Wales, Australia, lisak@uow.edu.au
- Karl Kleemann, Centre for Earth Sciences, University of Vienna, Althanstrasse 14, A1090 Vienna, Austria, Karl.Kleemann@univie.ac.at
- Jens Koppka, Paléontologie A16, République et Canton du Jura, Office de la Culture, Section d'Archéologie et Paléontologie, Hôtel des Halles, Case postale 64, CH-2900 Porrentruy 2, Switzerland, jens.koppka@palaeojura.ch
- Jiří Kriz, Czech Geological Survey, Department of Sedimentary Formations, Lower Palaeozoic Section, Klárov 3, Praha 011, 118 21, Czech Republic, jiri.kriz@geology.cz, silubiv@seznam.cz
- Deusana Machado, Departamento de Ciências Naturais, ECB, CCBS, Universidade do Rio de Janeiro, Av. Pasteur, 428, Urca, Rio de Janeiro, Brazil, deusana@gmail.com
- Nikolaus Malchus, Institut Català de Paleontologia (ICP), C/Escola Industrial, 23-08201-Sabadell, Catalunya, Spain, n.malchus@gmx.net or nikolaus.malchus@icp.cat
- Ana Márquez-Aliaga, Instituto Cavanilles de Biodiversidad y Biología Evolutiva and Departamento de Geología, Universitat de València, Dr. Moliner 50, E-46100, Burjassot, Valencia, Spain, ana.marquez@uv.es
- Jean-Pierre Masse, Laboratoire de Géologie des Systèmes et des Réservoirs Carbonatés, Université de Provence, 13331, Marseilles Cedex 03, France, Jean-Pierre.Masse@up.univ-mrs.fr or jpmasse@newsup.univ-mrs.fr
- Christopher A. McRoberts, Department of Geology, State University of New York at Cortland, P.O. Box 2000, Cortland, New York, 13045, USA, Christopher.McRoberts@cortland.edu
- Peter U. Middelfart, Malacology, Australian Museum, 6 College Street, Sydney 2010, Australia, Peter.Middelfart@austmus.gov.au
- Simon Mitchell, Department of Geography and Geology, The University of the West Indies at Mona, Jamaica, simon.mitchell@uwimona.edu.jm
- Lidiya A. Nevesskaja (deceased), Paleontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, Moscow, 117997, Russia
- Sacit Özer, Dokuz Eylül University, Engineering Faculty, Geological Engineering Department, 35160, Buca Campus, Izmir, Turkey, sacit.ozet@deu.edu.tr
- John Pojeta, Jr., Department of Paleobiology, Museum of Natural History, P.O. Box 37012, NHB MRC 121, Smithsonian Institution, Washington, D.C, 20013-7012, USA, pojetaj@si.edu
- Inga V. Polubotko, Russian Geological Research Institute (VSEGEI), Sredniy pr. 74, 199106, St. Petersburg, Russia, contact person: Vera A. Gavrilova, Vera_Gavrilova@vsegei.ru
- Jose Maria Pons, Departament de Geologia, Universitat Autònoma de Barcelona, 08193, Bellaterra, Spain, josepmaria.pons@uab.es or josepmaria.pons@uab.cat
- Sergey Popov, Mollusk Laboratory, Palaeontological Institute, Russian Academy of Sciences, Profsoyuznaya ul. 123, 117997, Moscow, Russia, serg.pop@mail.ru
- Teresa Sánchez (deceased), Centro de Investigaciones en Ciencias de la Tierra, Universidad Nacional de Córdoba y Consejo Nacional de Investigaciones Científicas y Técnicas, Av. Vélez Sársfeld 299, 5000 Córdoba, Argentina
- André F. Sartori, Division of Invertebrates, Department of Zoology, Field Museum of Natural History, 1400 S. Lake Shore Drive, Chicago, Illinois, 60605-2496, USA, andrefsartori@gatesscholar.org
- Robert W. Scott, Precision Stratigraphy Associates, 149 West Ridge Road, Cleveland, Oklahoma, 74020, USA, and University of Tulsa, 800 S. Tucker Dr., Tulsa, Oklahoma 74104, USA, rwsconfig@cimtel.net
- Irina I. Sey, Russian Geological Research Institute (VSEGEI), 74 Sredniy pr, 74, 199106, St. Petersburg, Russia, contact person: Vera A. Gavrilova, Vera_Gavrilova@vsegei.ru
- Javier H. Signorelli, Centro Nacional Patagónico (CENPAT) Biología y Manejo de Recursos Acuáticos, Bvd. Brown 2915 (U9120ACD) Puerto Madryn, Argentina, jsignorelli@cenpat.edu.ar
- Vladimir V. Silantiev, Department of Geological Sciences, Kazan Federal University, 18 Kremlyovskaya St., Kazan, 420008, Russia, Vladimir.Silantiev@ksu.ru or vsilant@gmail.com
- Peter W. Skelton, Department of Earth and Environmental Sciences, Open University, Walton Hall, Milton Keynes, MK7 6AA, UK, P.W.Skelton@open.ac.uk
- Thomas Steuber, The Petroleum Institute, Abu Dhabi, United Arab Emirates, tsteuber@pi.ac.ae
- J. Bruce Waterhouse, 25 Avon St, Oamaru, New Zealand, perma@xnet.co.nz
- G. Lynn Wingard, U.S. Geological Survey, 926A National Center, Reston, Virginia, 20192, USA, lwingard@usgs.gov
- Thomas Yancey, Department of Geology and Geophysics, MS 3115, Texas A & M University, College Station, Texas, 77843, USA, tyancey@geos.tamu.edu

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- text, viii + 180 p., with p. [i]–viii + [1]–83 (and pl. 1–95) by Bruguière, and with p. 83–180 by Bory de Saint-Vincent. Vol. 1, p. 83 indicates: “Le travail de Bruguière qui se termine ici, n’est que l’extrait du bel ouvrage de O. F. Müller, intitulé *Animalcula Infusoria, fluviatila, et maritima*, publié en 1786 par Othon Frabricius” [note signed Bory de Saint-Vincent and dated Paris, 1er août 1824]. One source indicates that pages 85–131 and pl. 96–189 [actually 96–107, 107A–107C, 108–189] lack author’s statement, but were published by Bruguière [?] in 1792. Volumes 2 and 3 are paginated continuously: vol. 2, vii + 256–594 p., vol. 3, [595]–1150, [2] pages. Vol. 2, 19 ptie., *Vers Testacées, à Coquilles Bivalves*, includes pl. 190–286 [actually 190–202, 204, 204–286], by Lamarck [?], published An VI (1797), with pl. 203 misnumbered 204. Vol. 3, 21 ptie., *Mollusques Testacés*, includes pl. 287–390, by Lamarck, published 1816. Volume 4, 23 ptie., *Mollusques et Polypes Divers*, by Lamarck, 4 p., 100 pl., published 1824, includes pl. 391–431, 431 bis, 431 bis*, 432–488 (and text, 16 p.). Publisher varies: Vol. 1 by Panckoucke, Paris; Vol. 2 and 3 by H. Agasse, Paris; Vol. 4 by Mme. Veuve Agasse, Paris. Vol. 4 is also cited as Lamarck, Jean Baptiste Pierre Antoine de Monet de, Jean Guillaume Bruguière, and Bory de Saint-Vincent, 1816.
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