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### Phylum Bryozoa Ehrenberg, 1831\*

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This paper is an invited contribution to the *Zootaxa* series ‘Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness.’ (Zhang 2011). This series pertains to living biodiversity and the species numbers given here are more or less derived from the World Register of Marine Species (WoRMS), for which the two authors of this paper are listed as editors (PEB hands-on editor; DPG advisory editor). Thus circumscribed, Bryozoa includes 3 classes, 4 orders, 187 families, 808 genera and 5869 species [Phylactolaemata 86 species, Stenolaemata 543 species, Gymnolaemata 5240 species (Ctenostomata 319 species, Cheilostomata 4921 species)]. Although all Phylactolaemata and several species of Ctenostomata are freshwater organisms, the full list of bryozoan species is accessible on WoRMS. The WoRMS list must be understood to be provisional, owing to the need for taxonomic revisions of many genera. Nevertheless, even if not all species in the list are accurately attributed to genera, the names represent operational taxonomic units (OTUs) that are indicative of living species diversity as known to date.

The classification given here is interim, especially insofar as knowledge of bryozoan phylogeny is rapidly evolving. That for Phylactolaemata (and some of the species-per-genus estimates) is based on a number of works, especially Wood & Wood (2000), Wood & Okamura (2005), Massard & Geimer (2008) and Hirose & Mawatari (2011). Hirose *et al.* (2008) and Waeschenbach *et al.* (2012) have determined that Phylactolaemata comprises two main clades. One comprises Lophopodidae and Stephanellidae; the other comprises the balance of six other families. Each of these clades should constitute a superfamily but names have not yet been formally established for them. The genera *Gelatinella* and *Hyalinella* nest within *Plumatella* according to Hirose *et al.* (2008) and Waeschenbach *et al.* (2012) and are not separately counted here.

The traditional classification of order Cyclostomata, based on the skeleton and provisionally retained here, is highly problematic. Skeletal characters at ultrastructural, zooidal and colonial levels are all inferred to be homoplasious (Taylor & Weedon 2000). Recent molecular studies have confirmed homoplasy, and further taxon sampling is necessary to resolve several outstanding questions, but three main clades have twice been identified, along with several subclades (Waeschenbach *et al.* 2009, 2012). Formal taxonomy to establish new monophyletic suprafamilial taxa based on the new information has not yet been achieved.

Classification of Ctenostomata is based on a synthesis of data given in d’Hondt (1983), Jebram (1986), Todd (2000) and Waeschenbach *et al.* (2012). The order is monophyletic, but paraphyletic with respect to Cheilostomata, which originated from a ctenostome ancestor in the latest Jurassic (Taylor 1990). Traditional suborders are not retained here.

Classification of Cheilostomata is based on an evolving synthesis compiled by Gordon (2012), presented on the Bryozoa Home Page (Bock 2013) and used in the World Register of Marine Species. Cheilostomata is monophyletic (Waeschenbach *et al.* 2012) or perhaps diphyletic if the ctenostome superfamily Penetrantioidea is indeed ‘cheilostomatous’ (Soule & Soule 1975; Jebram 1992).

## Classification

Phylum **Bryozoa** Ehrenberg, 1831 (3 classes)

Class **Phylactolaemata** Allman, 1856 (1 order)

Order **Plumatellida** Pennak, 1953 (6 families)

Family **Cristatellidae** Allman, 1856 (1 genus, 1 species)

Family **Fredericellidae** Hyatt, 1868 (2 genera, 8 species)

Family **Lophopodidae** Rogick, 1935 (3 genera, 8 species)

Family **Pectinatellidae** Lacourt, 1968 (2 genus, 4 species)

Family **Plumatellidae** Allman, 1856 (6 genera, 64 species)

Family **Stephanellidae** Lacourt, 1968 (1 genus, 1 species)

Class **Stenolaemata** Borg, 1941 (1 order)

Order **Cyclostomata** Busk, 1852 (5 suborders)

Suborder **Tubuliporina** Milne Edwards, 1838 (15 families)

Family **Annectocymidae** Hayward & Ryland, 1985 (1 genus, 5 species)

Family **Cinctiporidae** Boardman, McKinney & Taylor, 1992 (2 genera, 2 species)

Family **Crisuliporidae** Buge, 1979 (1 genus, 4 species)

Family **Diaperoeciidae** Canu, 1918 (4 genera, 23 species)

Family **Diastoporidae** Gregory, 1899 (11 genera, 51 species)

Family **Fascigeridae** d'Orbigny, 1853 (2 genera, 8 species)

Family **Fron diporidae** Busk, 1859 (4 genera, 15 species)

Family **Hastingsiidae** Borg, 1944 (1 genus, 3 species)

Family **Mecynoeciidae** Canu, 1918 (2 genera, 21 species)

Family **Oncousoeciidae** Canu, 1918 (8 genera, 40 species)

Family **Plagioeciidae** Canu, 1918 (1 genus, 17 species)

Family **Pustuloporidae** Smitt, 1872 (2 genera, 4 species)

Family **Stomatoporidae** Pergens & Meunier, 1886 (6 genera, 16 species)

Family **Terviidae** Canu & Bassler, 1920 (1 genus, 3 species)

Family **Tubuliporidae** Johnston, 1838 (11 genera, 105 species)

Family **Incertae sedis** (5 genera, 10 species)

Suborder **Articulata** Busk, 1859 (1 family)

Family **Crisiidae** Johnston, 1847 (6 genera, 92 species)

Suborder **Cancellata** Gregory, 1896 (4 families)

Family **Crisinidae** d'Orbigny, 1853 (5 genera, 8 species)

Family **Horneridae** Smitt, 1867 (4 genera, 22 species)

Family **Pseudidmoneidae** Borg, 1944 (1 genus, 2 species)

Family **Stigmatoechidae** Brood, 1972 (1 genus, 2 species)

Suborder **Ceriporina** von Hagenow, 1851 (1 family)

Family **Ceriporidae** Busk, 1859 (5 genera, 19 species)

Suborder **Rectangulata** Waters, 1887 (2 families)

Family **Densiporidae** Borg, 1944 (5 genera, 17 species)

Family **Lichenoporidae** Smitt, 1867 (9 genera, 54 species)

Class **Gymnolaemata** Allman, 1856 (2 orders)

Order **Ctenostomata** Busk, 1852 (8 superfamilies)

Superfamily **Benedeniporoidea** Delage & Hérouard, 1897 (2 families)

Family **Benedeniporidae** Delage & Hérouard, 1897 (1 genus, 3 species)

Family **Labio stomellidae** Silén, 1942 (1 genus, 1 species)

- Superfamily **Alcyonidoidea** Johnston, 1838 (6 families)
  - Family **Alcyonidiidae** Johnston, 1838 (3 genera, 66 species)
  - Family **Clavoporidae** Osburn & Soule, 1953 (5 genera, 6 species)
  - Family **Flustrellidridae** Bassler, 1953 (6 genera, 21 species)
  - Family **Lobiancoporidae** Delage & Hérouard, 1897 (1 genus, 4 species)
  - Family **Pachyzoontidae** d'Hondt, 1983 (1 genus, 1 species)
  - Family **Pherusellidae** Osburn & Soule, 1853 (1 genus, 3 species)
- Superfamily **Paludicelloidea** Allman, 1856 (1 family)
  - Family **Paludicellidae** Allman, 1836 (1 genus, 2 species)
  - Family **Panolicellidae** Jebram, 1985 (1 genus, 1 species)
- Superfamily **Arachnidoidea** Hincks, 1880 (4 families)
  - Family **Arachnidiidae** Hincks, 1880 (7 genera, 24 species)
  - Family **Immergentiidae** Silén, 1946 (1 genus, 10 species)
  - Family **Monobryozoontidae** Rémane, 1936 (1 genus, 3 species)
  - Family **Nolellidae** Harmer, 1915 (3 genera, 15 species)
- Superfamily **Victorelloidea** Hincks, 1880 (3 families)
  - Family **Pottsiellidae** Braem, 1940 (1 genus, 1 species)
  - Family **Victorellidae** Hincks, 1880 (4 genera, 10 species)
  - Family **Sundanellidae** Jebram, 1973 (1 genus, 1 species)
- Superfamily **Walkerioidea** Hincks, 1880 (8 families)
  - Family **Aeverrilliidae** Jebram, 1973 (1 genus, 2 species)
  - Family **Bathyalozoontidae** d'Hondt, 1975 (1 genus, 1 species)
  - Family **Farrellidae** d'Hondt, 1983 (1 genus, 1 species)
  - Family **Harmeriellidae** d'Hondt, 1983 (1 genus, 1 species)
  - Family **Hypophorellidae** Prenant & Bobin, 1956 (1 genus, 1 species)
  - Family **Mimosellidae** Hincks, 1977 (2 genera, 9 species)
  - Family **Triticellidae** G. O. Sars, 1874 (2 genera, 12 species)
  - Family **Walkeriidae** Hincks, 1880 (2 genera, 5 species)
- Superfamily **Hislopioidea** Jullien, 1885 (2 families)
  - Family **Haywardozoontidae** d'Hondt, 1983 (1 genus, 2 species)
  - Family **Hislopiidae** Jullien, 1885 (1 genus, 9 species)
- Superfamily **Vesicularioidea** Johnston, 1847 (5 families)
  - Family **Buskiidae** Hincks, 1880 (2 genera, 11 species)
  - Family **Spathiporidae** Pohowsky, 1978 (1 genus, 7 species)
  - Family **Terebriporidae** d'Orbigny, 1847 (1 genus, 10 species)
  - Family **Vesiculariidae** Johnston, 1847 (6 genera, 68 species)
- Superfamily **Penetrantioidea** Silén, 1946 (1 family)
  - Family **Penetrantiidae** Silén, 1946 (1 genus, 8 species)
- Order **Cheilostomata** Busk, 1852 (4 suborders)
  - Suborder **Malacostegina** Levinsen, 1902 (1 superfamily)
    - Superfamily **Membraniporoidea** Busk, 1852 (3 families)
      - Family **Electridae** Stach, 1937 (15 genera, 80 species)
      - Family **Membraniporidae** Busk, 1852 (3 genera, 45 species)
      - Family **Sinoflustridae** Gordon, 2009 (2 genera, 7 species)
  - Suborder **Inovicellina** Jullien, 1888 (1 superfamily)
    - Superfamily **Aeteoidea** Smitt, 1868 (1 family)

- Family **Aeteidae** Smitt, 1868 (2 genera, 15 species)
- Suborder **Scrupariina** Silén, 1941 (1 superfamily)
- Superfamily **Scruparioidea** Gray, 1848 (3 families)
- Family **Eucrateidae** Johnston, 1847 (1 genus, 1 species)
- Family **Leiosalpingidae** d'Hondt & Gordon (2 genera, 3 species)
- Family **Scrupariidae** Gray, 1848 (2 genera, 4 species)
- Suborder **Neocheilostomina** d'Hondt, 1985 (23 superfamilies)
- Superfamily **Calloporoidea** Norman, 1903 (12 families)
- Family **Antroporidae** Vigneaux, 1949 (4 genera, 19 species)
- Family **Bryopastoridae** d'Hondt & Gordon, 1999 (2 genera, 5 species)
- Family **Calloporidae** Norman, 1903 (38 genera, 271 species)
- Family **Chaperiidae** Jullien, 1888 (10 genera, 70 species)
- Family **Cupuladriidae** Lagaij, 1952 (2 genera, 35 species)
- Family **Doryporellidae** Grischenko, Taylor & Mawatari, 2004 (2 genera, 5 species)
- Family **Farciminariidae** Busk, 1852 (4 genera, 25 species)
- Family **Foveolariidae** Gordon & Winston *in* Winston, 2005 (3 genera, 8 species)
- Family **Heliodomidae** Vigneaux, 1949 (2 genera, 6 species)
- Family **Hiantoporidae** Gregory, 1893 (2 genera, 8 species)
- Family **Quadricellariidae** Gordon, 1984 (3 genera, 11 species)
- Family **Tendridae** Vigneaux, 1949 (2 genera, 3 species)
- Family **Incertae sedis** (5 genera, 14 species)
- Superfamily **Buguloidea** Gray, 1848 (7 families)
- Family **Beaniidae** Canu & Bassler, 1927 (3 genera, 72 species)
- Family **Bugulidae** Gray, 1848 (31 genera, 262 species)
- Family **Candidae** d'Orbigny, 1851 (23 genera, 255 species)
- Family **Epistomiidae** Gregory, 1893 (2 genera, 5 species)
- Family **Euoplozoidae** Harmer, 1926 (1 genus, 1 species)
- Family **Jubellidae** Reverter-Gil & Fernández-Pulpeiro, 2001 (1 genus, 1 species)
- Family **Rhabdozoidae** MacGillivray, 1887 (1 genus, 2 species)
- Superfamily **Incertae sedis** (1 family)
- Family **Mourellinidae** Reverter-Gil, Souto & Fernández-Pulpeiro, 2011 (1 genus, 2 species)
- Superfamily **Microporoidea** Gray, 1848 (16 families)
- Family **Alysiidiidae** Levinsen, 1909 (2 genera, 3 species)
- Family **Aspidostomatidae** Jullien, 1888 (4 genera, 11 species)
- Family **Calescharidae** Bock & Cook, 1998 (3 genera, 6 species)
- Family **Chlidoniiidae** Busk, 1884 (1 genus, 2 species)
- Family **Macroporidae** Uttley, 1949 (1 genus, 12 species)
- Family **Microporidae** Gray, 1848 (13 genera, 54 species)
- Family **Monoporellidae** Hincks, 1882 (1 genus, 11 species)
- Family **Lunulariidae** Levinsen, 1909 (1 genus, 2 species)
- Family **Onychocellidae** Jullien, 1882 (6 genera, 30 species)
- Family **Otionellidae** Bock & Cook, 1998 (3 genera, 15 species)
- Family **Poricellariidae** Harmer, 1926 (1 genus, 1 species)
- Family **Pyrisinellidae** Di Martino & Taylor, 2012 (2 genera, 2 species)
- Family **Selenariidae** Busk, 1852 (2 genera, 19 species)
- Family **Setosellidae** Levinsen, 1909 (1 genus, 5 species)

- Family **Steginoporellidae** Hincks, 1884 (3 genera, 38 species)
- Family **Thalamoporellidae** Levinsen, 1902 (6 genera, 65 species)
- Superfamily **Cellarioidea** Fleming, 1828 (2 families)
- Family **Cellariidae** Fleming, 1828 (16 genera, 106 species)
- Family **Membranicellariidae** Levinsen, 1902 (2 genera, 2 species)
- Superfamily **Flustroidea** Fleming, 1828 (1 family)
- Family **Flustridae** Fleming, 1828 (15 genera, 80 species)
- Superfamily **Hipbothoidea** Busk, 1859 (5 families)
- Family **Chorizoporidae** Vigneaux, 1949 (2 genera, 9 species)
- Family **Hipbothoidae** Busk, 1859 (7 genera, 65 species)
- Family **Haplopomidae** Gordon *in* De Blauwe, 2009 (1 genus, 7 species)
- Family **Pasytheidae** Davis, 1934 (6 genera, 11 species)
- Family **Trypostegidae** Gordon, Tilbrook & Winston *in* Winston, 2005 (1 genus, 8 species)
- Superfamily **Cribrilinoidea** Hincks, 1879 (3 families)
- Family **Cribrilinidae** Hincks, 1879 (26 genera, 151 species)
- Family **Euthyroididae** Levinsen, 1909 (1 genus, 3 species)
- Family **Polliciporidae** Moyano, 2000 (1 genus, 1 species)
- Superfamily **Bifaxarioidea** Busk, 1884 (2 families)
- Family **Bifaxariidae** Busk, 1884 (6 genera, 46 species)
- Family **Mixtopeltidae** Gordon, 1994 (1 genus, 1 species)
- Superfamily **Catenicelloidea** Busk, 1852 (4 families)
- Family **Catenicellidae** Busk, 1852 (20 genera, 85 species)
- Family **Eurystomellidae** Levinsen, 1909 (4 genera, 13 species)
- Family **Petalostegidae** Gordon, 1984 (2 genera, 11 species)
- Family **Savignyellidae** Levinsen, 1909 (2 genera, 2 species)
- Superfamily **Arachnopusioidea** Jullien, 1888 (2 families)
- Family **Arachnopusiidae** Jullien, 1888 (5 genera, 43 species)
- Family **Exechonellidae** Harmer, 1957 (4 genera, 20 species)
- Superfamily **Adeonoidea** Busk, 1884 (2 families)
- Family **Adeonidae** Busk, 1884 (10 genera, 106 species)
- Family **Inversiulidae** Vigneaux, 1949 (1 genus, 4 species)
- Superfamily **Pseudolepralioidea** Silén, 1942 (1 family)
- Family **Pseudolepraliidae** Silén, 1942 (1 genus, 1 species)
- Superfamily **Lepralielloidea** Vigneaux, 1949 (8 families)
- Family **Bryocryptellidae** Vigneaux, 1949 (9 genera, 64 species)
- Family **Dhondtiscidae** Gordon, 1989 (1 genus, 2 species)
- Family **Hincksiporidae** Powell, 1968 (1 genus, 4 species)
- Family **Lepraliellidae** Vigneaux, 1949 (7 genera, 106 species)
- Family **Metrarabdotosidae** Vigneaux, 1949 (3 genera, 8 species)
- Family **Romancheinidae** Jullien, 1888 (21 genera, 123 species)
- Family **Sclerodomidae** Levinsen, 1909 (4 genera, 27 species)
- Family **Tessaradomidae** Jullien & Calvet, 1903 (1 genus, 3 species)
- Family **Umbonulidae** Canu, 1904 (7 genera, 33 species)
- Superfamily **Chlidiopsoidea** Harmer, 1957 (1 family)
- Family **Chlidiopsoidea** Harmer, 1957 (1 genus, 1 species)
- Superfamily **Smittinoidea** Levinsen, 1909 (4 families)

- Family **Bitectiporidae** MacGillivray, 1895 (13 genera, 148 species)  
 Family **Smittinidae** Levinsen, 1909 (18 genera, 336 species)  
 Family **Lanceoporidae** Harmer, 1957 (4 genera, 86 species)  
 Family **Watersporidae** Vigneaux, 1949 (5 genera, 18 species)  
 Superfamily **Schizoporelloidea** Jullien, 1883 (32 families)  
 Family **Acoraniidae** López-Fé, 2006 (1 genus, 1 species)  
 Family **Actisecidae** Harmer, 1957 (1 genus, 2 species)  
 Family **Buffonellodidae** Gordon & d'Hondt, 1997 (7 genera, 33 species)  
 Family **Calwelliidae** MacGillivray, 1887 (7 genera, 15 species)  
 Family **Cheiloporinidae** Bassler, 1936 (5 genera, 17 species)  
 Family **Cryptosulidae** Vigneaux, 1949 (2 genera, 6 species)  
 Family **Cyclicoporidae** Hincks, 1884 (1 genus, 1 species)  
 Family **Echinovadomidae** Tilbrook, Hayward & Gordon, 2001 (1 genus, 3 species)  
 Family **Eminoeciidae** Hayward & Thorpe, 1988 (3 genera, 8 species)  
 Family **Escharinidae** Tilbrook, 2006 (9 genera, 66 species)  
 Family **Gigantoporidae** Bassler, 1935 (6 genera, 26 species)  
 Family **Hippaliosinidae** Winston, 2005 (1 genus, 12 species)  
 Family **Hippopodinidae** Levinsen, 1909 (4 genera, 17 species)  
 Family **Jaculinidae** Zabala, 1986 (1 genus, 4 species)  
 Family **Lacernidae** Jullien, 1888 (10 genera, 34 species)  
 Family **Margarettidae** Harmer, 1957 (1 genus, 12 species)  
 Family **Mawatariidae** Gordon 1990 (1 genus, 2 species)  
 Family **Microporellidae** Hincks, 1879 (8 genera, 172 species)  
 Family **Myriaporidae** Gray, 1841 (3 genera, 13 species)  
 Family **Pacificincolidae** Lu, 1999 (2 genera, 4 species)  
 Family **Petraliellidae** Harmer, 1957 (6 genera, 57 species)  
 Family **Petraliidae** Levinsen, 1909 (1 genus, 3 species)  
 Family **Phoceanidae** Vigneaux, 1949 (2 genera, 4 species)  
 Family **Phoriopnniidae** Gordon & d'Hondt, 1997 (3 genera, 5 species)  
 Family **Porinidae** d'Orbigny, 1852 (4 genera, 16 species)  
 Family **Robertsonidridae** Rosso, Sciuto & Sinagra, 2010 (2 genera, 8 species)  
 Family **Romancheinidae** Jullien, 1888 (20 genera, 143 species)  
 Family **Schizoporellidae** Jullien, 1883 (4 genera, 107 species)  
 Family **Stomachetosellidae** Canu & Bassler, 1917 (7 genera, 23 species)  
 Family **Tetraplariidae** Harmer, 1957 (1 genus, 13 species)  
 Family **Teuchoporidae** Neviani, 1895 (3 genera, 17 species)  
 Family **Vicidae** Gordon, 1988 (2 genera, 2 species)  
 Superfamily **Urceoliporoidea** Bassler, 1936 (1 family)  
 Family **Urceoliporidae** Bassler, 1936 (2 genera, 3 species)  
 Superfamily **Didymoselloidea** Brown, 1952 (1 family)  
 Family **Didymosellidae** Brown, 1952 (2 genera, 7 species)  
 Superfamily **Euthyriselloidea** Bassler, 1953 (1 family)  
 Family **Euthyrisellidae** Bassler, 1953 (5 genera, 6 species)  
 Superfamily **Siphonicytaroidea** Harmer, 1957 (1 family)  
 Family **Siphonicytaridae** Harmer, 1957 (1 genus, 12 species)  
 Superfamily **Mamilloporoidea** Canu & Bassler, 1927 (4 families)

- Family **Ascosiidae** Jullien, 1883 (2 genera, 5 species)
- Family **Cleidochasmatidae** Cheetham & Sandberg, 1964 (7 genera, 28 species)
- Family **Crepidacanthidae** Levinsen, 1909 (1 genus, 14 species)
- Family **Mamilloporidae** Canu & Bassler, 1927 (2 genera, 6 species)
- Superfamily **Celleporoidea** Johnston, 1838 (5 families)
- Family **Celleporidae** Johnston, 1838 (20 genera, 246 species)
- Family **Colatooeciidae** Winston, 2005 (3 genera, 19 species)
- Family **Hippoporidridae** Vigneaux, 1949 (5 genera, 31 species)
- Family **Phidoloporidae** Gabb & Horn, 1862 (22 genera, 324 species)
- Family **Torquatellidae** Tilbrook, 2006 (1 genus, 3 species)
- Superfamily **Conescharellinoidea** Levinsen, 1909 (4 families)
- Family **Batoporidae** Neviani, 1900 (3 genera, 11 species)
- Family **Conescharellinidae** Levinsen, 1909 (6 genera, 91 species)
- Family **Lekythoporidae** Levinsen, 1909 (8 genera, 23 species)
- Family **Orbituliporidae** Canu & Bassler, 1923 (1 genus, 1 species)

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