

# Invertebrate Paleontology Systematics

## Classification of Invertebrate Taxa for the Laboratory

Fall 2018

The following is an annotated list of the taxa you will be identifying in the Invertebrate Paleontology lab. It is correlated with the groups we are covering in lecture, so you will also find this useful during class. Some taxa are not included because they are rare as specimens or relatively unimportant for paleontological fieldwork. When asked to “identify” a specimen on a lab test or in the field, please give the most specific taxonomic rank and name (e.g., “Class Hexactinellida”). This listing is revised every year – it is *not* the same as last year’s compilation. I’ve inserted spaces below the specific taxa so you can add notes and drawings. I’ve also left the backs of the pages blank so that you can use them for notes as well. Please let me know how you would improve this listing so that it is more helpful. You may use this entire book, the text as well as any notes and diagrams you add *in your own handwriting*, on the lab tests and the final lab-lecture examination.

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*Nomina si nescis, perit et cognitio rerum*

If you do not know the names, the knowledge of these things vanishes  
(Linnaeus)

Kingdom PROTISTA: Prepaleozoic – Recent

A polyphyletic group used for convenience until the higher taxonomy is sorted out. Unicellular eukaryotes by traditional definition.

Phylum HAPTOPHYTA: Triassic - Recent

Class Coccolithophyceae (“Coccolithophorids”): Triassic to Recent

Calcitic skeleton is spherical and made of many small plates (*coccoliths*)  
4-15  $\mu$  in diameter (too small to see with our microscopes); the main  
component of chalk (which is what you’ll see in lab).

Phylum BACILLARIOPHYTA: Cretaceous - Recent

Class Bacillariophyceae (“Diatoms”): Cretaceous - Recent

Skeletons (*frustules*) with two siliceous, overlapping valves.

Phylum FORAMINIFERIDA: Cambrian - Recent

Order Textulariida: Cambrian - Recent  
Agglutinated tests.

Order Fusulinida: Silurian - Permian  
Tests of granular calcite; generally large, spindle-shaped;  
common in Carboniferous and Permian.

Order Miliolida: Late Carboniferous - Recent  
Calcareous, imperforate, porcelainous tests.

Order Rotaliida: Triassic - Recent  
Calcareous, perforate tests; benthic.

Order Globigerinida: Jurassic - Recent  
Calcareous, perforate tests; globular chambers; planktic.

Phylum RADIOLARIA: Cambrian - Recent  
Siliceous tests with globular or capsule-like open framework.

## Kingdom ANIMALIA

### Phylum PORIFERA: Neoproterozoic - Recent.

Solitary or colonial animals having a cellular grade of construction; body bears many pores, canals and chambers, but no mouth or internal organs; calcareous, siliceous or horny (*spongin*) skeletal supports (*spicules*) generally present and sometimes fused.

#### Class Archaeocyatha: Cambrian

Usually two nesting calcitic cones separated by equally spaced septa; inner and outer walls porous; soft parts unknown.

#### Class Hexactinellida: Cambrian - Recent.

Skeleton composed of siliceous spicules that are typically formed at right angles to each other (the *triaxon* type).

Class Demospongiae: Neoproterozoic - Recent.

Skeleton composed of spongin and/or silica and/or calcified tubules (as in the chaetetids); siliceous spicules that do not meet consistently at right angles (no triaxons).

Class Stromatoporoidea: Ordovician - Cretaceous

Laminated calcareous deposits with pillars between the laminae; usually a system of elevations (*mamelons*) and shallow grooves (*astrorhizae*) on the top surface.

Class Calcarea: Cambrian - Recent.

Skeleton composed of calcareous spicules or porous calcareous walls.

Phylum CNIDARIA: Ediacaran - Recent.  
Possess *nematocysts* (“stinging cells”).

Class Hydrozoa: Ediacaran - Recent.

Polyp stage is dominant; some forms make an aragonitic skeleton with irregular passageways throughout; a common modern form is “fire coral”.

Class Scyphozoa: Ediacaran - Recent.

The true medusae or jellyfish.

Order Conulata: Cambrian - Triassic.

Generally four-sided, pyramidal form with fine transverse markings; outer covering flexible and chitinophosphatic.

Class Anthozoa: Ediacaran - Recent.

Polypoid generations only; possess gullet and mesenteries; solitary or colonial.

Subclass Octocorallia: Ediacaran - Recent.

Polyps have eight pinnate tentacles and eight unpaired primary mesenteries; colonial.

Subclass Zoantharia: Cambrian - Recent.

Corals and sea anemones; tentacles simple; six primary mesenterial pairs; solitary or colonial.

Order Tabulata: Cambrian - Permian.

Colonial only; calcitic; strong tabulae; absent or weak septa.

Family Auloporidae: Ordovician - Permian.

Colonial; short, horn-shaped corallites, one growing outward from near the base of another or from the side of a parent; usually cemented to a hard surface.



Family Halysitidae: Ordovician - Silurian.

Colonial; corallites are thin vertical tubes with closely spaced tabulae; corallites are connected longitudinally in such a way that they look like chains in cross-section; “chain corals”.

Family Syringoporidae: Ordovician - Permian.

Colonial; corallites usually single tubes that have grown vertically and parallel; connected only by smaller horizontal tubes; “organ-pipe corals”.

Family Favositidae: Ordovician - Permian.

Colonial; corallites generally polygonal in outline and closely packed; usually large communication pores in walls; “honeycomb corals”.

Order Rugosa: Ordovician - Permian.

Solitary or colonial; insertion of septa in four quadrants; calcitic.

Order Heliolitida: Ordovician - Devonian.

Colonial; calcitic; closely packed corallites usually in two forms: small, numerous tubes and scattered larger tubes; coenosteum often extensive.

Order Scleractinia: Triassic - Recent.

Colonial or solitary; introduction of septa in cycles with regular hexameral symmetry; aragonitic.

Phylum BRACHIOPODA: Cambrian - Recent

Solitary, marine bivalved invertebrates; bilaterally symmetrical about a median plane perpendicular to commissure; shell calcareous or chitinophosphatic; lophophore present.

Subphylum Linguliformea: Cambrian – Recent

Shell chitinophosphatic or calcitic; valves not articulated.

Class Lingulata: Cambrian - Recent

Shell generally of apatite (calcium phosphate) or calcite; anus present.

Order Lingulida: Cambrian - Recent

Shell chitinophosphatic; biconvex; pedicle (when present) emerging posteriorly between the valves.

Order Acrotretida: Cambrian - Devonian

Shell calcitic; dorsal valve convex, cap-shaped; ventral valve is conical with a small pedicle opening.

Subphylum Craniiformea: Cambrian – Recent  
Shell calcitic; valves not articulated; unsupported lophophore.

Class Craniata: Cambrian - Recent  
Shell calcitic; subcircular in outline.

Order Craniida: Ordovician – Recent  
Subcircular calcitic shells cemented to a hard substrate.

Subphylum Rhynchonelliformea: Cambrian – Recent  
Calcitic, usually articulated shells.

Class Strophomenata: Cambrian – Triassic  
Generally concavo-convex shells.

Order Strophomenida: Ordovician - Late Carboniferous  
Generally plano-convex or concavo-convex shell;  
strophic; surface costate; pedicle opening usually absent;  
pseudopunctate.

Order Productida: Devonian – Triassic

Flat or slightly concave dorsal valve, very convex ventral valve; tubular spines on ventral valve.

Class Rhynchonellata: Cambrian – Recent

Biconvex, strophic or astrophic shells articulated by teeth and sockets buttressed with brachiophores (except in some primitive forms not considered here).

Order Orthida: Cambrian - Permian

Shell biconvex with wide hinge line (*strophic*) and often interareas on valves; sometimes with fold and sulcus.

Order Pentamerida: Cambrian - Devonian

Biconvex shell, generally with a short hinge line (*astrophic*); a well-defined *spondylium* is usually present.

Order Rhynchonellida: Ordovician - Recent

Biconvex, often globose, *astrophic* shell; generally strongly plicate, with fold and sulcus; beak prominent.

Order Atrypida: Ordovician – Devonian

Spiral brachidium; flat or convex ventral valve, highly convex dorsal valve.

Order Spiriferinida: Devonian – Jurassic

Spiral brachidium; biconvex shell, highly strophic; generally costate or plicate, except in the fold and sulcus; punctate; many (but by no means most) with high cardinal areas and coarse plications.

Order Spiriferida: Ordovician - Permian

Spiral brachidium; biconvex shell, highly strophic; generally costate or plicate, except in the fold and sulcus; impunctate.

Order Thecideida: Triassic – Recent

Ventral valve cemented to hard substrate; very small.

Order Athyridida: Ordovician – Jurassic

Spiral brachidium; astrophic; circular pedicle opening.

Order Terebratulida: Devonian - Recent

Biconvex shell; astrophic to somewhat strophic;  
prominent beak, circular pedicle opening; looped  
brachidium.



Phylum BRYOZOA: Ordovician - Recent

Class Stenolaemata: Ordovician - Recent.

Body walls with only one cellular layer (epidermis); frontal walls absent in most; when present, frontal walls are calcified; growth usually parallels long axes of zooids to form tubular zooecia.

Order Trepostomata: Ordovician - Triassic.

Free-walled, typically with robust colonies dotted with maculae; autozooecia usually long, with many basal diaphragms.

Order Fenestrata: Ordovician - Permian.

Free-walled with delicate, usually “lacy” colonies; short autozooecia; usually no diaphragms; hemisepta occasionally present; extrazoooidal skeleton common, usually with many styles.

Order Cyclostomata (Cyclostomatida): Ordovician - Recent.

Free-walled and fixed-walled varieties, circular, terminal apertures; zooecia short; gonozooids in most; includes uniserial, multiserial and sheet-like encrusting as well as erect forms.

Class Gymnolaemata: Ordovician - Recent.

Body walls with two cellular layers (epidermis and peritoneum); frontal walls present, calcified in most, meaning they are entirely fixed-walled.

Order Ctenostomata: Ordovician - Recent.

Uncalcified colonies; kenozooids common; no extrazoidal parts; commonly found as borings or bioimmurations.

Order Cheilostomata: Jurassic - Recent.

Calcified colonies; opercula usually present; extrazoidal parts common; kenozooids and avicularia common.

Phylum HYOLITHA: Cambrian – Permian

Shells are slightly flattened cones; aragonitic; operculum in most; some have paired helens; recent discovery of a lophophore makes them lophophorates.

Phylum MOLLUSCA: Cambrian - Recent.

Subphylum Amphineura: Cambrian - Recent

Class Polyplacophora: Cambrian - Recent

Possess a shell formed of eight overlapping valves; muscular girdle with spicules; foot is broad; head reduced.

Subphylum Cyrtosoma: Cambrian - Recent

Class Monoplacophora: Cambrian - Recent

Univalved, cap-shaped, bilaterally symmetrical shell with little or no spiraling; soft parts pseudosegmented; untorted; exogastric.

### Class Gastropoda: Cambrian - Recent

Generally a spirally coiled, asymmetrical shell; body usually torted, with a distinct head, pair of eyes, radula, and one or two pairs of tentacles; foot is broad; endogastric. The classification is in considerably flux.

#### Subclass Eogastropoda: Cambrian - Recent

Shallow mantle cavity; paired excretory system; simple eye type; primitively, paired and equal ctenidia and other organs; some body asymmetry in later forms. Practically, the eogastropods include the true limpets, euomphalids and platyceratids.

#### Subclass Orthogastropoda: Cambrian - Recent

Generally deep mantle cavity; a single kidney on the right side of pericardium; eyes with a vitreous body on eyestalks; an unpaired ctenidium; almost always an asymmetric body. Practically, the orthogastropods are most gastropods outside the eogastropods.

Class Cephalopoda: Cambrian - Recent

Large head with well-developed eyes, horny jaws, and many tentacles; head fused to foot; shell (when present) external or internal.

Subclass Nautiloidea: Cambrian - Recent

Orthoconic to planispirally-coiled external shells; simple sutures; septal necks retrochoanitic; cameral deposits common in orthoconic forms.

Subclass Ammonoidea: Devonian - Cretaceous

External shells, usually planispirally coiled; sutures usually complex; septal necks prochoanitic in adult shells; siphuncular deposits very rare; cameral deposits absent; siphuncle almost always small and ventral.

Order Goniatitida: Devonian - Permian

Goniatite sutures (simple saddles and lobes).

Order Ceratitida: Permian - Triassic

Ceratite sutures (simple saddles; lobes divided into secondary saddles and lobes).

Order Ammonitida: Jurassic - Cretaceous

Ammonitic sutures (complex saddles and lobes).

Subclass Coleoidea: Devonian - Recent

Mantle forms body covering; shell internal in most, absent in a few; head has 8 or 10 tentacles.

Order Belemnitida: Triassic - Cretaceous

Thick calcitic shell with bullet-shaped rostrum and reduced phragmocone.

Order Sepiida: Jurassic - Recent

Ten tentacles; phragmocone reduced to many thin walls.

Subphylum Diasoma: Cambrian - Recent

Class Scaphopoda: Carboniferous - Recent

Shell tubular, expanded at one end and open at both; foot conical; no gills present; captaculum as feeding structure.

Class Rostroconchia: Cambrian - Permian

Pseudobivalved shell is continuous, univalved, and shaped roughly like a taco; anterior gape; posterior rostrum (a tubular extension of the shell).



Class Bivalvia (Pelecypoda): Cambrian - Recent

Shell usually (but not always) of two valves hinged dorsally and bilaterally symmetrical about the plane of junction; foot generally hatchet-shaped; head and radula lacking.

Subclass Protobranchia: Cambrian - Recent

Shell equivalved, inequilateral, and aragonitic; most isomyarian, some with large anterior adductor muscle, with posterior adductor reduced or absent; taxodont dentition; siphons often absent; protobranch gills and palp proboscides.

Subclass Pteriomorpha: Ordovician - Recent

Variable shell, calcitic and/or aragonitic, usually with reduced anterior and shell lobes of some type; foot reduced or absent; no siphons; usually filibranch gills.

Order Arcoida: Ordovician - Recent

Isomyarian bivalves with long taxodont dentition.

Order Mytiloida: Ordovician - Recent

Anisomyarian bivalves with dysodont dentition; byssate.

Order Pterioidea: Ordovician - Recent

Anisomyarian or monomyarian; calcitic; usually isodont; byssate or cemented; essentially the scallops and oysters.

Subclass Heterodonta: Ordovician - Recent

Shell variable, usually equivalved, inequilateral, and aragonitic; usually isomyarian; siphons and foot well developed; gills eulamellibranch in most; mostly heterodont, some actinodont, a few taxodont.

Phylum ARTHROPODA: ?Ediacaran, Cambrian - Recent

Subphylum Trilobitomorpha: ?Ediacaran, Cambrian - Permian

Class Trilobita: Cambrian - Permian

Dorsal surface divided longitudinally into axial and pleural lobes; body regions include cephalon, thorax and pygidium; walking legs biramous.

Order Agnostida: Cambrian - Ordovician

Two or three thoracic segments; pleural region of pygidium unsegmented; cephalon and pygidium nearly same size and shape; usually no eyes or facial sutures.

Order Redlichiida: Cambrian

Many thoracic segments, often ending laterally in spines; large, semicircular cephalon; pygidium highly reduced.

Order Phacopida: Ordovician - Devonian

Many thoracic segments; glabella usually with several furrows; pygidium smaller than cephalon.

Subphylum Crustacea: Cambrian - Recent

Two antennal pairs in front of mouth; one pair of mandibles behind mouth; body regions include head, thorax and abdomen, with some fusion.

Class Ostracoda: Cambrian - Recent

Laterally compressed; bivalved calcareous carapace hinged on dorsal margin; head and thorax fused.

Class Malacostraca: Cambrian - Recent

Carapace usually covers head and thorax; biramous first antennae; compound eyes on stalks; head with six segments, thorax with eight, and abdomen with six.

Class Cirripedia: Silurian - Recent

Sessile; attached to substrate with first antennae; body typically surrounded by calcareous plates that are not molted.

Subphylum Hexapoda: Devonian - Recent

Mostly terrestrial; uniramous appendages; well developed head, thorax and abdomen; single pair of antennae and one pair of mandibles in front of mouth; thorax with three segments, each with a pair of walking legs.

Class Insecta: Devonian - Recent

Same definition as Superclass Hexapoda for us. (There are, though, other groups of hexapods, but they are rare fossils).

Subphylum Chelicerata: Cambrian - Recent

Single pair of chelate appendages in front of mouth; antennae and mandibles absent; usually two body regions, sometimes only one.

Class Merostomata: Cambrian - Recent

Prosoma with seven appendage pairs; opisthosoma with covered appendages.

Subclass Eurypterida: Ordovician - Permian

Prosoma flattened and less than one-fourth the length of the opisthosoma; opisthosoma with twelve segments and a telson.

Subclass Xiphosurida: Cambrian - Recent

Prosoma highly convex and at least equal to opisthosoma in length; opisthosoma with ten or fewer segments; telson present.

Class Arachnida: Silurian - Recent

Four pairs of walking legs; multiple eyes; highly fused; includes spiders, ticks, mites, scorpions.

Phylum ECHINODERMATA: Cambrian - Recent

Subphylum Crinozoa: Cambrian - Recent

Globular, tightly sutured thecae with long erect arms, lateral anus and no pores; almost always attached to the substrate with long stem composed of columnals.

Class Crinoidea: Ordovician - Recent

Crinozoa with conical, globular or bowl-shaped theca; arms almost always pinnate; well-developed pentameral symmetry.

Subphylum Blastozoa: Cambrian - Permian

Globular, tightly sutured thecae with erect, unbranched brachioles; several types of thecal pore structures; almost always attached to the substrate with long stem composed of columnals.

Class Blastoidea: Ordovician - Permian

Blastozoans with conical, bud-shaped or globular thecae with four circlets of plates displaying well-developed pentameral symmetry; five ambulacra; distinctive hydrospire system alongside ambulacra.



Class Rhombifera: Ordovician - Devonian

Globular to flattened thecae with four to five circlets of pentameral plates; two to five ambulacra; respiratory rhombs are characteristic of most; all with respiratory openings of some type; short stems.

Subphylum Asterozoa: Ordovician - Recent

Star-shaped with five or more large radial arms bearing ambulacral grooves; mouth central on lower surface; anus (if present) on upper surface.

Class Asteroidea: Ordovician - Recent

Coelomic extensions into radial arms that may number from 5 to 25; anus on upper (aboral) surface; mouth on lower surface (oral).

Class Ophiuroidea: Ordovician - Recent

Central disk and five long, thin, flexible, sometimes branching arms; arms contain numerous articulating small calcitic ossicles that resemble vertebrae; mouth on lower surface; no anus.

Subphylum Echinozoa: Cambrian - Recent

Globular, flattened or cylindrical echinoderms with skeletons ranging from tightly-sutured tests to simple sclerites; most have no stems, arms or brachioles; usually with well-developed pentameral symmetry.

Class Edrioasteroidea: Cambrian - Permian

Discoidal, globular or cylindrical theca; usually possess five straight to curved radiating ambulacra; mouth central on upper surface; hydropore present; anus usually between ambulacra; often attached to hard substrates by planar or slightly concave lower surface.

Class Echinoidea: Ordovician - Recent

Globular to flattened calcareous test composed of many plates sutured in ambulacral and interambulacral series; mouth on lower surface; jaws and teeth often present.

Phylum HEMICHORDATA: Cambrian - Recent

Class Pterobranchia: Cambrian – Recent

Colonial worm-like filter-feeders that often construct proteinaceous tubes; individuals sometimes connected by stolons.

Subclass Graptolithina: Cambrian – Late Carboniferous

Colonial organisms with one to many branches; zooids usually in linear series and connected by stolons; skeletal parts proteinaceous in composition.

Order Dendroidea: Cambrian - Late Carboniferous

Mostly attached with many stipes and large autothecae, small bithecae and stolothecae; stolons proteinaceous.

Order Graptoloida: Ordovician - Devonian

Planktic graptolites with a single type of theca (equivalent to the autotheca of the dendroids); thecae often changed size and shape in evolutionary series; stolon was composed of soft tissue; one to many stipes.

Phylum ANNELIDA: Cambrian – Recent

Segmented (metameric) worms with circular and longitudinal muscle fibers and usually hair-like structures termed setae or chaetae.

Class Polychaeta: Cambrian - Recent

Commonly called “bristle worms” because of the extensions on each segment of fleshy parapodia with stiff chaetae.

Family Serpulidae: Triassic - Recent.

Sessile polychaetes with calcareous tubes closed by an operculum (which is rarely preserved).

INCERTAE SEDIS (“Uncertain placement”)

Class Tentaculita: Ordovician – Jurassic

Calcareous tube-dwelling organisms; probably related to lophophorates (brachiopods, bryozoans and phoronids).

Order Cornulitida: Ordovician – Late Carboniferous

Straight calcitic tube attached for almost all its length to a hard substrate; usually with ring-like ornamentation.

Order Tentaculitida: Ordovician – Late Carboniferous  
Straight calcitic tube; free-living; often with ring-like  
ornamentation.

Order Microconchida: Ordovician – Jurassic  
Coiled calcitic tube (although sometimes uncoiling)  
attached for at least part of its length to a hard substrate;  
distinguished from serpulids by microstructure,  
practically distinguished by age.

TRACE FOSSILS (“Ichnofossils”) -- Behavioral classification:

**Cubichnia:** resting or hiding traces; *Rusophycus* is an example.

**Repichnia:** locomotion traces; *Diplichnites* is an example.

**Domichnia:** dwelling traces; *Diplocraterion* and *Skolithos* are examples.

**Fodinichnia:** deposit-feeding traces; *Chondrites* and *Zoophycos* are examples.

**Pascichnia:** grazing traces; *Helminthoida* is an example.

**Agrichnia:** farming traces; *Palaeodictyon* is an example.



**Fugichnia:** escape traces; *Lockeia* is an example.

**Praedichnia:** predation traces; *Oichnus* is an example.

# Invertebrate Paleontology Systematics

## Classification of Invertebrate Taxa for the Geology 250 Laboratory (Names and Age Ranges Only)

Kingdom PROTISTA: Prepaleozoic – Recent [A polyphyletic group.]

Phylum HAPTOPHYTA: Triassic - Recent

Class Coccolithophyceae (“Coccolithophorids”): Triassic to Recent

Phylum BACILLARIOPHYTA: Cretaceous - Recent

Class Bacillariophyceae (“Diatoms”): Cretaceous - Recent

Phylum FORAMINIFERIDA: Cambrian - Recent

Order Textulariida: Cambrian - Recent

Order Fusulinida: Silurian - Permian

Order Miliolida: Late Carboniferous - Recent

Order Rotaliida: Triassic – Recent

Order Globigerinida: Jurassic – Recent

Phylum RADIOLARIA: Cambrian - Recent

Kingdom ANIMALIA

Phylum PORIFERA: Neoproterozoic - Recent.

Class Archaeocyatha: Cambrian

Class Hexactinellida: Cambrian - Recent.

Class Calcarea: Cambrian - Recent.

Class Demospongiae: Neoproterozoic - Recent.

Class Stromatoporoidea: Ordovician - Cretaceous

Phylum CNIDARIA: Ediacaran - Recent.

Class Hydrozoa: Ediacaran - Recent.

Class Scyphozoa: Ediacaran - Recent.

Order Conulata: Cambrian - Triassic.

Class Anthozoa: Ediacaran - Recent.

Subclass Octocorallia: Ediacaran - Recent.

Subclass Zoantharia: Cambrian - Recent.

Order Tabulata: Cambrian - Permian.

Family Auloporidae: Ordovician - Permian.

Family Halysitidae: Ordovician - Silurian.

Family Syringoporidae: Ordovician - Permian.

Family Favositidae: Ordovician - Permian.

Order Rugosa: Ordovician - Permian.

Order Heliolitida: Ordovician - Devonian.

Order Scleractinia: Triassic - Recent.

Phylum BRACHIOPODA: Cambrian - Recent

Subphylum Linguliformea: Cambrian – Recent

Class Lingulata: Cambrian - Recent

Order Lingulida: Cambrian - Recent

Order Acrotretida: Cambrian - Devonian

- Subphylum Craniiformea: Cambrian – Recent
  - Class Craniata: Cambrian - Recent
    - Order Craniida: Ordovician – Recent
- Subphylum Rhynchonelliformea: Cambrian – Recent
  - Class Strophomenata: Cambrian – Triassic
    - Order Strophomenida: Ordovician - Late Carboniferous
    - Order Productida: Devonian – Triassic
  - Class Rhynchonellata: Cambrian – Recent
    - Order Orthida: Cambrian - Permian
    - Order Pentamerida: Cambrian - Devonian
    - Order Rhynchonellida: Ordovician - Recent
    - Order Atrypida: Ordovician – Devonian
    - Order Spiriferinida: Devonian – Jurassic
    - Order Spiriferida: Ordovician - Permian
    - Order Thecidea: Triassic – Recent
    - Order Athyridida: Ordovician – Jurassic
    - Order Terebratulida: Devonian – Recent
- Phylum BRYOZOA: Ordovician - Recent
  - Class Stenolaemata: Ordovician - Recent.
    - Order Trepostomata: Ordovician - Triassic.
    - Order Fenestrata: Ordovician - Permian.
    - Order Cyclostomata (Cyclostomatida): Ordovician - Recent.
  - Class Gymnolaemata: Ordovician - Recent.
    - Order Ctenostomata: Ordovician - Recent.
    - Order Cheilostomata: Jurassic - Recent.
- Phylum HYOLITHA: Cambrian – Permian
- Phylum MOLLUSCA: Cambrian - Recent.
  - Subphylum Amphineura: Cambrian - Recent
    - Class Polyplacophora: Cambrian - Recent
  - Subphylum Cyrtosoma: Cambrian - Recent
    - Class Monoplacophora: Cambrian - Recent
    - Class Gastropoda: Cambrian - Recent
      - Subclass Eogastropoda: Cambrian - Recent
      - Subclass Orthogastropoda: Cambrian - Recent
    - Class Cephalopoda: Cambrian - Recent
      - Subclass Nautiloidea: Cambrian - Recent
      - Subclass Ammonoidea: Devonian - Cretaceous
        - Order Goniatitida: Devonian - Permian
        - Order Ceratitida: Permian - Triassic
        - Order Ammonitida: Jurassic - Cretaceous
      - Subclass Coleoidea: Devonian - Recent
        - Order Belemnitida: Jurassic - Cretaceous
        - Order Sepiida: Jurassic - Recent
  - Subphylum Diasoma: Cambrian - Recent
    - Class Scaphopoda: Carboniferous - Recent
    - Class Rostroconchia: Cambrian - Permian
    - Class Bivalvia (Pelecypoda): Cambrian - Recent
      - Subclass Protobranchia: Cambrian - Recent

- Subclass Pteriomorpha: Ordovician - Recent
  - Order Arcoida: Ordovician - Recent
  - Order Mytiloida: Ordovician - Recent
  - Order Pterioidea: Ordovician - Recent
- Subclass Heterodonta: Ordovician - Recent
- Phylum ARTHROPODA: ?Ediacaran, Cambrian - Recent
  - Subphylum Trilobitomorpha: ?Ediacaran, Cambrian - Permian
    - Class Trilobita: Cambrian - Permian
      - Order Agnostida: Cambrian - Ordovician
      - Order Redlichiida: Cambrian
      - Order Phacopida: Ordovician - Devonian
  - Subphylum Crustacea: Cambrian - Recent
    - Class Ostracoda: Cambrian - Recent
    - Class Malacostraca: Cambrian - Recent
    - Class Cirripedia: Silurian - Recent
  - Subphylum Hexapoda: Devonian - Recent
    - Class Insecta: Devonian - Recent
  - Subphylum Chelicerata: Cambrian - Recent
    - Class Merostomata: Cambrian - Recent
      - Subclass Eurypterida: Ordovician - Permian
      - Subclass Xiphosurida: Cambrian - Recent
    - Class Arachnida: Silurian - Recent
- Phylum ECHINODERMATA: Cambrian - Recent
  - Subphylum Crinozoa: Cambrian - Recent
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    - Class Blastoidea: Ordovician - Permian
    - Class Rhombifera: Ordovician - Devonian
  - Subphylum Asterozoa: Ordovician - Recent
    - Class Asteroidea: Ordovician - Recent
    - Class Ophiuroidea: Ordovician - Recent
  - Subphylum Echinozoa: Cambrian - Recent
    - Class Edrioasteroidea: Cambrian - Permian
    - Class Echinoidea: Ordovician - Recent
- Phylum HEMICHORDATA: Cambrian – Recent
  - Class Pterobranchia: Cambrian - Recent
    - Subclass Graptolithina: Cambrian – Late Carboniferous
      - Order Dendroida: Cambrian - Late Carboniferous
      - Order Graptoloida: Ordovician – Devonian
- Phylum ANNELIDA: Cambrian – Recent
  - Class Polychaeta: Cambrian - Recent
    - Family Serpulidae: Triassic - Recent.
- INCERTAE SEDIS (“Uncertain placement”)
  - Class Tentaculita: Ordovician – Jurassic
    - Order Cornulitida: Ordovician – Late Carboniferous
    - Order Tentaculitida: Ordovician – Late Carboniferous
    - Order Microconchida: Ordovician – Jurassic

TRACE FOSSILS (“Ichnofossils”) -- Behavioral classification:

**Cubichnia:** resting or hiding traces; *Rusophycus* is an example.

**Repichnia:** locomotion traces; *Diplichnites* is an example.

**Domichnia:** dwelling traces; *Diplocraterion* and *Skolithos* are examples.

**Fodinichnia:** deposit-feeding traces; *Chondrites* and *Zoophycos* are examples.

**Pascichnia:** grazing traces; *Helminthoida* is an example.

**Agrichnia:** farming traces; *Palaeodictyon* is an example.

**Fugichnia:** escape traces; *Lockeia* is an example.

**Praedichnia:** predation traces; *Oichnus* is an example.