Invertebrate Paleontology Systematics

Classification of Invertebrate Taxa for the Geology 250 Laboratory
Fall 2017

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.

Table of Contents

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 μ 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, porcelaneous 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; extrazooidal 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 extrazooidal parts; commonly found as borings or bioimmurations.

Order Cheilostomata: Jurassic - Recent.

Calcified colonies; opercula usually present; extrazooidal 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 Dendroida: 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 Thecideida: 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
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Class Trilobita: Cambrian - Permian
Order Agnostida: Cambrian - Ordovician
Order Redlichiida: Cambrian
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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
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Class Asteroidea: Ordovician - Recent
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Class Edrioasteroidea: Cambrian - Permian
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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.