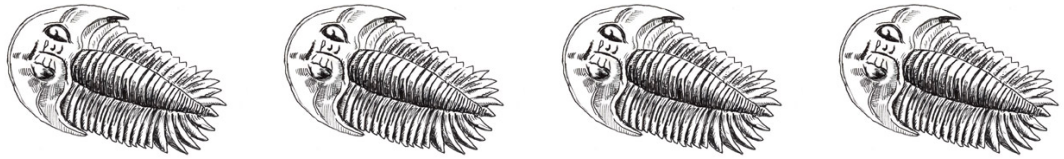
Evolution of Invertebrates

Cambrian fauna:
Trilobites: Trilobites are arthropods. All trilobites had antennae and legs with two branches, one used for locomotion and the other for respiration. Some had compound eyes, like a modern fly. Trilobites were very diverse, living in both shallow and deep waters. **Cambrian to Permian**
Lingulate brachiopods: Brachiopods have a shell made of two valves, which usually differ in shape and size. Brachiopods eat using a lophophore, a set of tentacles covered with tiny hairs. They pull in water and filter out food particles. Lingulate brachiopods are small, have shells made of calcuium phosphate, and live in tubes they dig in sediment. **Cambrian to Holocene, but never very common**
Primitive echinoderms: Echinoderms have 5-fold symmetry like sea stars. They have a specialized system of internal canals that circulates water through the body and services numerous, tiny appendages, called tube feet. They use their tube feet to move around or to capture food. Early echinoderms include helicoplacoids, and eocrinoids. **Cambrian – Ordovician**
Archeocyathids: These are enigmatic creatures that apparently filtered sea water for food, and may be related to sponges. Their skeletons consist of two perforated cones, one inside another. They grew in large clusters, creating reef-like structures. **Cambrian**
Paleozoic fauna:
Rhynchonelliform brachiopods: In the Ordovician new groups of brachipods evolved with thick shells of calcium carbonate. These brachiopods lived on the sea floor, either cemented to rock or lying in soft sediment. They were found in large numbers in many environments in the Paleozoic. Most groups went extinct in the Permian extinction. In modern seas brachiopods are uncommon. **Ordovician to Holocene**
Bryozoans: Bryozoans are tiny creatures that live in colonies. Like brachiopods, bryozoans use a lophophore to eat. Most bryozoans lived attached to a hard surface. Many Paleozoic bryozoans built strong colony skeletons of calcium carbonate and are common fossils. After the Permian, bryozoans become much less important in marine ecosystems. **Ordovician to Holocene**
Crinoids & blastoids: Two groups of Paleozoic echinoderms collected food particles with long tentacles, and looked something like flowers on long stalks. Crinoids appeared in the Cambrian, but were most abundant , living in large groups, in the **late Paleozoic**. Blastoids lived only during the **Late Paleozoic**.
Graptolites: These organisms were colonial, living on long strands, sometimes supported by a floating balloon-like structure. They did not have any mineralized skeleton, and are fossilized only as black films in the rock. **Ordovician to Mississippian**

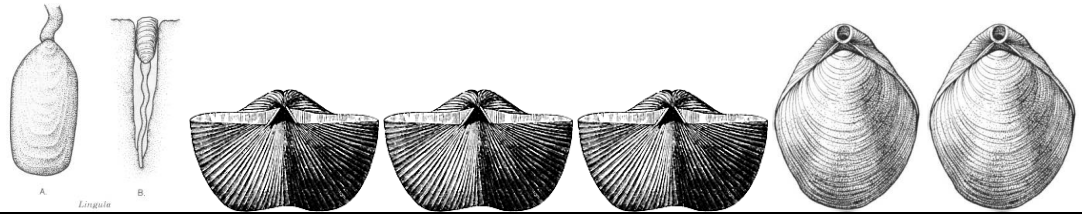
Cephalopods: Cephalopods have heads, tentacles, and swim by shooting water through a tube and jetting around backward. Living cephalopods are squid, octopus and *Nautilus*. All shelled cephalopods have chambers filled with gas that help them float. Paleozoic cephalopods had robust skeletons, either long straight tubes or coiled forms. Mesozoic cephalopods include the ammonites, streamlined coiled forms that ranged in size from less than an inch to several feet across, and squids with an internal skeleton called belemnoids. **Ordovician to Cretaceous**
Stromotoporoids: These mysterious reef-builders are classified as sponges. Their skeletons were calcium carbonate, made of layers with rods in between. They were the dominant reef builders of the Paleozoic; Mesozoic stromatoporoids were different from the Paleozoic forms and may be a different kind of organism. **Ordovician to Cretaceous**
Rugose and Tabulate corals: Corals have stinging cells that fire toxins into prey and tentacles to pull the prey into their mouth. Paleozoic corals form two primary groups: rugose corals which were largely solitary creatures, and tabulate corals which formed mounded colonies. Neither kind of coral formed true reefs. **Ordovician to Permian**
Modern fauna
Bivalves: This group includes clams, mussels, scallops and oysters. Bivalves eat by filtering particles from water. Some bivalves live attached to rocks; some live buried in sand or mud, and some live freely on the bottom. Bivalves evolved in the Cambrian but were minor members of bottom ecosystems until after the Permian extinction. **Cambrian to Holocene**
Gastropods: Most snails are bottom dwellers that either eat algae or are carnivores, hunting bivalves or even fish. Snails evolve in the Cambrian, but became far more abundant in the Mesozoic. **Cambrian to Holocene**
Echinoids: Sea urchins evolve in the Paleozoic, but were not important until the Mesozoic. There are two types of echinoids: those that graze the surface of rocks, eating algae and encrusting organisms, and those that burrow in sand or mud, filtering particles from the sediment. **Ordovician to Holocene**
Crustaceans: All crustaceans have a head with five pairs of appendages, two of which are antennae. Many microscopic crustaceans, like krill and brine shrimp, are members of the marine plankton, an important food source for other animals in the sea. Shrimp, lobsters, crabs, crayfish, and barnacles are crustaceans. Crustaceans evolve early but are not important until the Mesozoic. **Cambrian - Holocene**
Scleractinian coral: Modern corals first appear in the Triassic. Unlike earlier corals, their skeletons are made of aragonite rather than calcite. These corals are almost all colonial, and they build large reefs that are important features in the rock record. **Triassic to Holocene**

Text adapted from www.ucmp.berkeley.edu

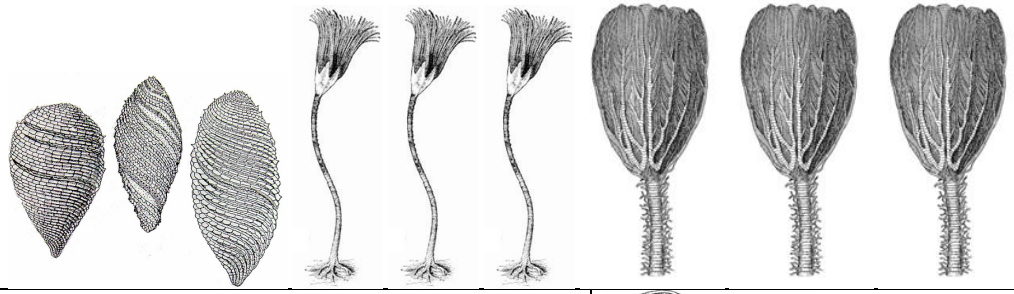
Trilobites



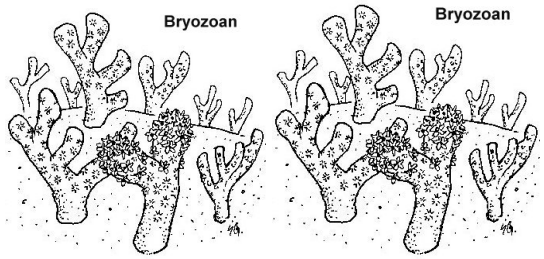
Brachiopods: lingulate, rhynchonelliform



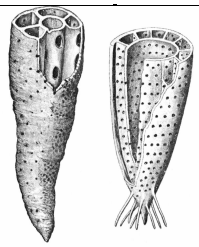
Echinoderms: helicoplacoid, blastoid, crinoid



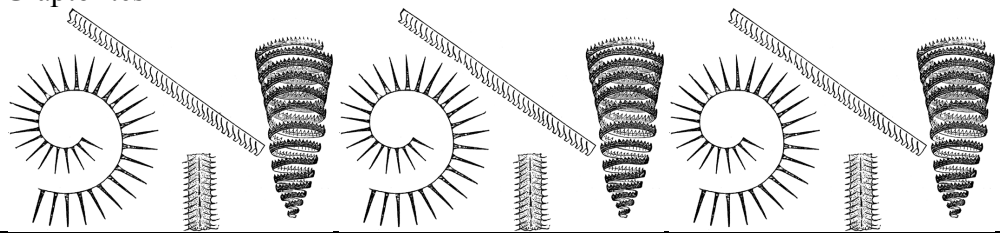
Bryozoans



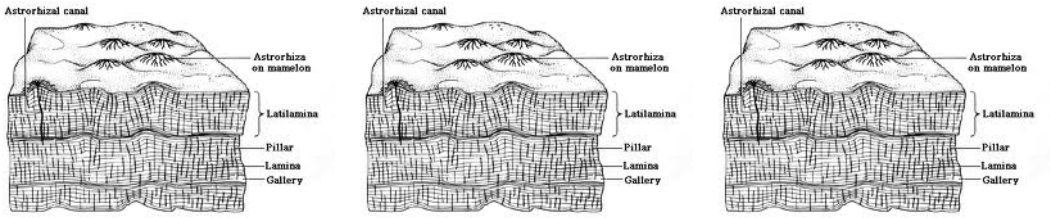
Archeocyathids



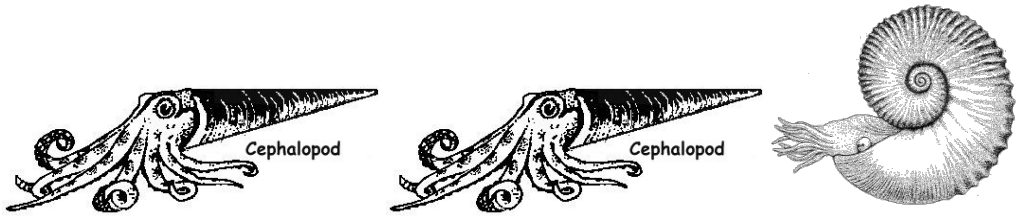
Graptolites



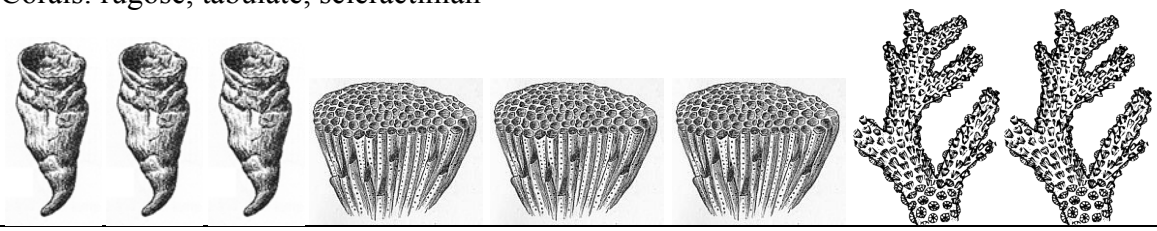
Stromotoporoids



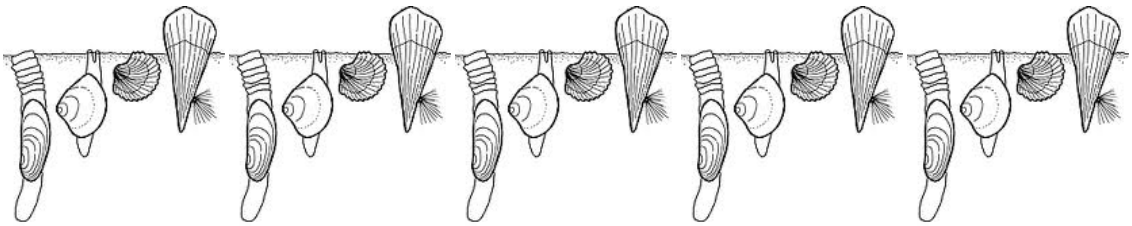
Cephalopods: straight forms, ammonite



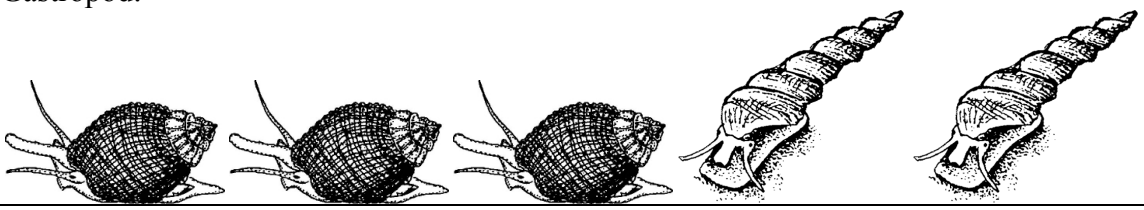
Corals: rugose, tabulate, scleractinian



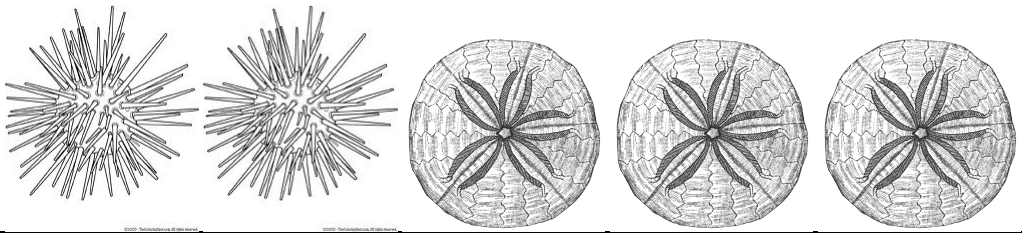
Bivalve:



Gastropod:



Echinoids



Crustaceans