

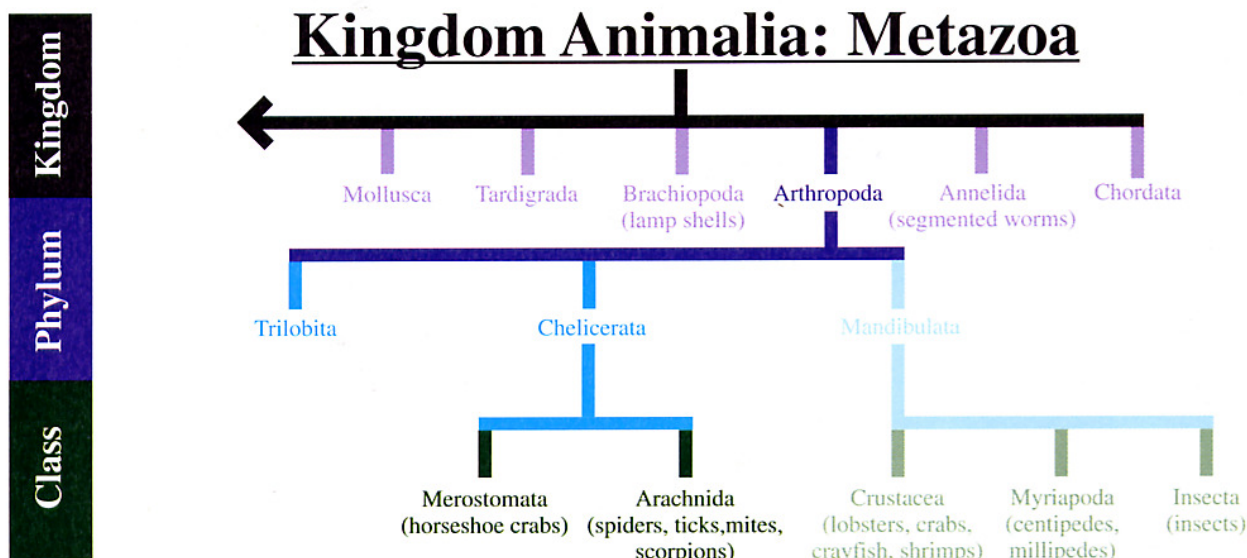
20: *You're Nowhere Without Joints in Your Legs!*

The most successful phylum of animals in terms of their numbers is **Arthropoda**. You can remember the name “arthropod” (meaning “joint” + “feet”) if you know that arthritis attacks your joints and that podiatrists fix your feet. Arthropods have jointed legs that make them more efficient travelers than other animals. Of course higher animals have joints in their legs too, but the arthropods are the lowest animals in which we find this feature, so they get to keep the name.

The arthropods are “successful” in an evolutionary way of thinking. Evolutionists measure success by the abundance and **diversity** of a group of animals. “Abundance” means success in reproducing. If there are many of a particular type of organism, that organism has a high likelihood of survival. “Diversity” means that there is a lot of variety among the animals, so if conditions change, some of those animals will still be likely to survive. Arthropods include millions of species—more than all other species of animals combined. Some species of arthropods, like mosquitoes, are alive in countless numbers. Arthropods are also diverse, living in every environment on Earth: in the ocean, in fresh water, in the soil, in the air, in plants, in animals, in the presence and absence of oxygen, in high and low altitudes, in the desert, in cold and in hot regions.

The important feature of arthropods is their jointed legs. They also have an **exoskeleton**—a hard, outer case—for protection. This stiff structure provides the support for body parts that is necessary for the type of locomotion we see in arthropods. In most of them this exoskeleton is made of a stiff substance called **chitin** [Kĭ-tin]. The body of an arthropod is divided into two or three big sections instead of many segments like the annelids discussed in the last chapter.

One subphylum of arthropods is **Trilobita**, the trilobites. We would like to show you one, but we can't. As far as we know, they're all extinct. We know about them only because the fossil record contains lots of them. Trilobites were marine animals that had three body lobes (which is why they are “tri-lobe-ites” which means “three-lobed dudes”).



A second subphylum of arthropods is **Chelicerata** [kē-LIS-er-AH-tah], the chelicerates. These are animals that have chelicerae. (No joke!) Chelicerae are appendages (like arms) that have a pinch-er at the end of them for grabbing and crushing things, especially poor, unfortunate animals. The chelicerates include the horseshoe crab and the **arachnids**. The arachnids include our friends the scorpions, spiders, daddy-longlegs and ticks.

Arachnids, which include the spiders and scorpions, represent a single class of the chelicerate arthropods.



Orb weaver



Scorpion



Hunting spider

Exercises:

1. What feature is found in arthropods that allows them to be successful in many different environments?
2. Are spiders arthropods?
3. Were trilobites arthropods?
4. Were trilobites arachnids?
5. In organisms that will be discussed later, there is a bony skeleton that provides structure and support for the organism. What feature performs these functions in the arthropods?

BIOLOGY

21: *Mandibulates*

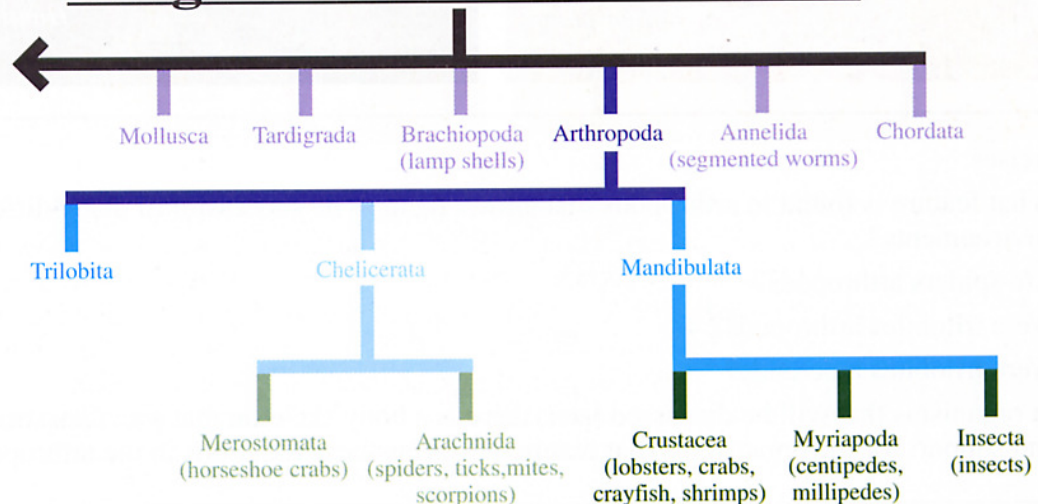
A third (and rather large) subphylum of arthropods is **Mandibulata**, the mandibulates [man-DIB-ū-lāts]. They are so named because they have mandibles, or jaws. They also have **antennae** which are used for sensing, and **maxillae** [max-IL-lē] which, in arthropods, are appendages around the mouth that are used for eating. One class of mandibulates is the **crustaceans**. These are mostly

These are myriapods. A representative of the Chilopoda (centipedes) is on the left and a member of the Diplopoda (millipedes) is on the right.



aquatic animals, meaning that they live in the water. You can learn to recognize some of them by name. They include the following small animals that are mostly **planktonic** (suspended in water): brine shrimp, water fleas, ostracods (also called seed shrimp), and copepods. Among these organisms are several parasites. They attach themselves to animals such as fish and lobsters and take their food from those hosts. Aquatic crustaceans also include barnacles, which are often found in clusters grow-

Kingdom Animalia: Metazoa



ing on any hard surface in the ocean. In order to cut smoothly through the water, ships regularly have to have barnacles scraped from their submerged surfaces.

Two orders of crustaceans built on the same body plan but looking terribly out of place among all these aquatic creatures are the **isopods**, which include sow bugs and pill bugs, and the **amphipods**, which include sand fleas. The order of crustaceans having the most species is the **decapods** (“ten” + “feet”). Among the decapods are shrimps, prawns, crayfish, crabs and lobsters. They don’t really have ten feet, but they do have a whole bunch of appendages (usually nineteen pairs). Unless you are allergic to them, the best thing about decapods is that they taste great!

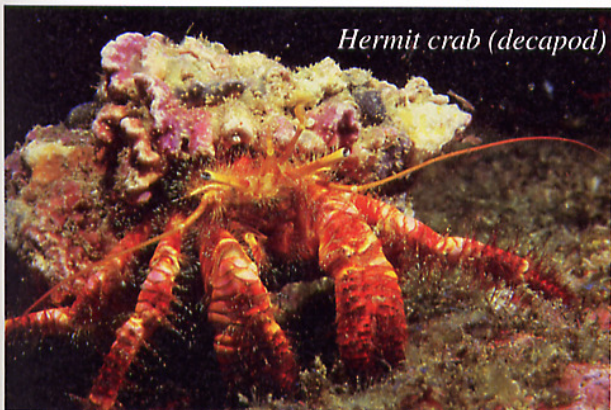
These are crustaceans.



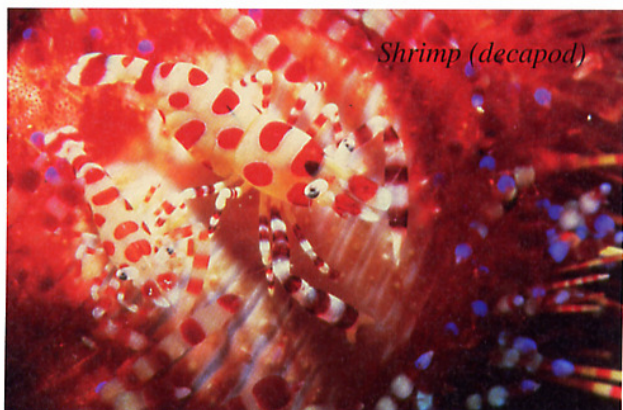
Sow bug (isopod)



Lobster (decapod)



Hermit crab (decapod)



Shrimp (decapod)

Also among the mandibulates are **Myriapoda**, the myriapods [MIR-i-ah-podz]. “Myriapods” is a common name for organisms in several classes. These are arthropods with lots of legs and body segments. They include centipedes, millipedes, and the less well-known pauropods and symphyla [SIM-fi-lah]. Centipedes are **predators**, living on slugs, grubs, and other soft-bodied animals. Some larger centipedes can even eat snakes and small mammals. Centipedes (meaning “one hundred feet,” which isn’t accurate, by the way) have one pair of legs per body segment; those legs stick out from their bodies and can move quickly. (It’s important to be quick if you have to kill things for a living.) Their first pair of appendages has special claws with poison glands; these claws can be used to kill prey.

BIOLOGY

Millipedes (meaning “one thousand feet,” also not accurate), on the other hand, have two pairs of legs per body segment. Millipedes move slowly, on legs that are tucked underneath them. Can you guess what they eat? Right—things that are already dead! If they had to eat living things, slow-moving millipedes would starve. Dead things can’t run fast, so they make good food for millipedes.

You might have heard of symphyla if you keep a greenhouse. These are pesky greenhouse dwellers.

The final class of arthropods is **Insecta**, the insects, also called **hexapods** (finally, a name that’s accurate—they actually have “six feet”). Insect bodies are divided into **head**, **thorax** and **abdomen**. The head contains **antennae**, **compound eyes**, eye-like **ocelli** [ō-SEL-lī], and a **mouth** made up of perhaps six parts that move. The thorax is the part of the body that is mainly responsible for the insect’s locomotion. It bears the insect’s three pairs of legs (usually having six segments each) and sometimes two pairs of **wings**.

Insects are considered to be highly evolved because they have advanced circulatory, respiratory, nervous, excretory, muscular, digestive and reproductive systems. Space does not permit the mentioning of a large portion of the insect types, because there are so many, but the Table shows a few you should get to know—or may already know. Insects are the world’s most numerous animals, with species numbering in the millions, many of which scientists have never described.

The following are insects (hexapods).



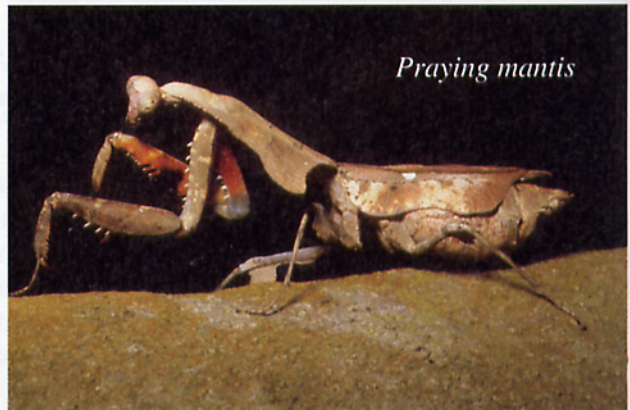
Grasshopper



Katydid



Walking stick



Praying mantis