

6 SUB-KINGDOM: EUMETAZOA (BILATERIA-EUCOELOMATA-PROTOSTOME) EARTHWORM x.s. (15x)

Eucelomate (u-SEAL-ah-mate) animals have a "true body space" or coelom lined with mesoderm. The coelom is important because organs located in this space are supported by threads. This makes them much more flexible than would be the case without such support. This group contains animals that form the mouth from the first in-folding of the blastula and those that form the anus first. This distinction marks a huge split in animal evolution.

Protostomes, the "mouth first" animals, include mollusks

(clams, squid, and snails), Annelid worms (earthworms, sandworms and leeches), and arthropods (trilobites, spiders, crabs, and insects).

Earthworms are protostomes. The earthworm body plan is the reverse of that in animals like fish, reptiles, and mammals. The central nerve cord (NC) is on the bottom and the major blood vessel (BV) runs down the back. The longitudinal muscles allow side-to-side movement, as in the nematodes and the bands of circular muscles permit a coordinated slinking movement.

7 SUB-KINGDOM: EUMETAZOA (BILATERIA-EUCOELOMATA-DEUTEROSTOMATA) STARFISH - Left (100x) / Right (75x)

The Deuterostomes ("mouth second") include echinoderms (starfish and sea urchins), chaetognaths (arrow worms), hemichordates (acorn worms), and chordates (fish, amphibians, reptiles, birds, and mammals). These creatures form the anus first when the blastula folds inward.

At the left the infolding, or blastopore (P), is visible as a tube leading into the hollow ball of cells. These are embryonic starfish. On the right are starfish embryos at a later stage. *By comparing the two images, can you note that the digestive tract has formed as a tube beginning at the anus?*

8 SUB-KINGDOM: EUMETAZOA (BILATERIA-EUCOELOMATA-DEUTEROSTOMATA) AMMOCOETES LARVA (2.5x)

Ammocoetes is the larval form of the eel-like lamprey. It represents the Phylum Chordata which includes vertebrates, such as fish, amphibians, reptiles, birds, and mammals. All chordates have a flexible support rod called the notochord (N) and a hollow, dorsal nerve cord

(C) above the notochord. Chordates also have a mouth cavity with gill slits (G) and a tail. Of course, some of these characteristics are found only in the larvae and are modified or lost as the organism matures.

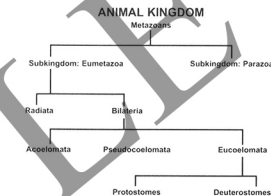
THE ANIMAL KINGDOM A CELLULAR VIEW

INTRODUCTION

With advances in our understanding of biology, the original two kingdoms of living things, animals and plants, have now been joined by three new kingdoms: Monera, Protista, and Fungi. By definition, all animals are multicellular organisms. They are also **heterotrophs** (het-ero-TROFS) because they do not make their own food as the plants do. Animal cells have a true nucleus, lack cell walls and develop from the fertilization of different-sized gametes (egg and sperm cells). After fertilization and cell divisions, all animals form a **blastula** (BLAS-too-luh) or hollow ball of cells. In most, this hollow ball develops further into a **gastrula** (GAS-true-luh) by folding into itself at one end to form the digestive tract.

The thirty-three subdivisions in the animal kingdom, known as phyla, contain individuals ranging in size from the recently-discovered and microscopic placozoans through the multitude of insect forms to the largest members of the animal world. Over 90% of all animals are invertebrates.

As you examine the images in this set, consult the outline of animal classification at the right. Animals evolved from the single-celled, animal-like protists called protozoans or "first animals." Animals are referred to as metazoans or "second animals." Virtually all of the animals have groups of cells performing the same job, organized as tissues. In turn, these tissues work together in organs in all of the animals except sponges. The organization of the embryonic tissue layers



(endoderm, mesoderm, and ectoderm) further helps classify the animals based on the construction of the **coelom** (SEE-lum) or body cavity. A flatworm is an example of an animal without a coelom, while those with a pseudocoelom have a body cavity not lined with mesoderm. Rotifers and nematodes are in this group. All other animals have a body cavity lined with mesoderm.

A final characteristic important in animal classification is based on the fate of the opening that forms when the blastula folds in.

The magnification given, for example, Slide 1 (750x), means that the microscope was set at that power when the photograph was taken.