

Non-Chordate Animals

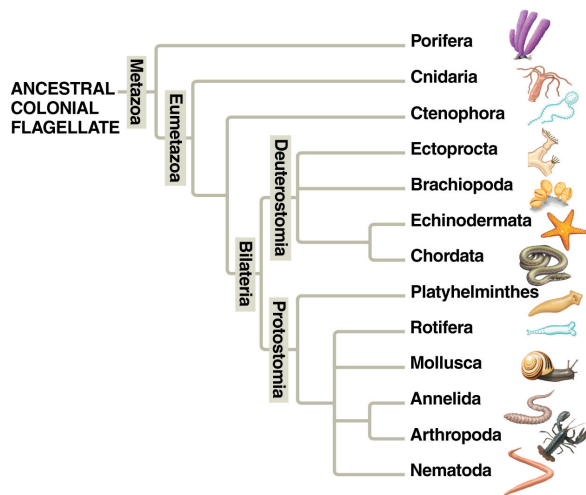
Objectives:

- Be able to identify which of the following body plan types animals exhibit: **no tissues, diploblastic, or triploblastic; radial symmetry or bilateral symmetry; acoelomate, coelomate, or pseudocoelomate.**
- Be able to create and use a **dichotomous key.**
- Be able to identify to which of the major taxonomic groups an animal belongs (all **boldface taxa** listed in the following lab).
- Be able to describe important features of the animal taxa covered in these labs: Nervous System Type & Sensory Systems; How they Move; Reproduction & Life Cycles; How they Feed; How they handle their Nitrogenous Waste; What Structures they use for Gas Exchange; What kind of Circulatory System they have.

Animal Phylogeny

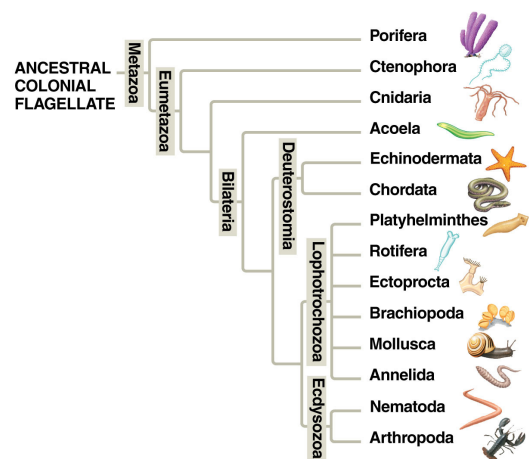
Determining the evolutionary relationships of animals is still very much a work in progress. Below are two competing phylogenies; one based morphological data, and the other based on molecular data.

Morphological Tree



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Molecular Tree

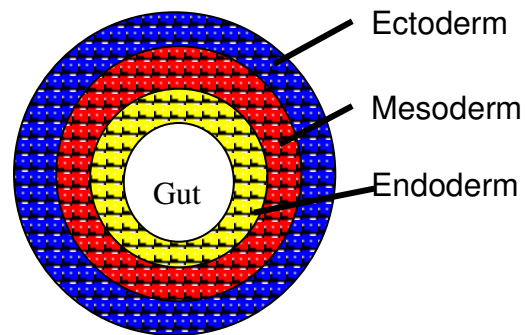
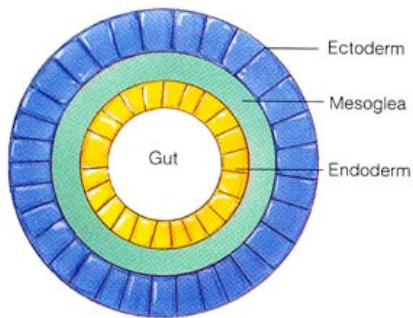


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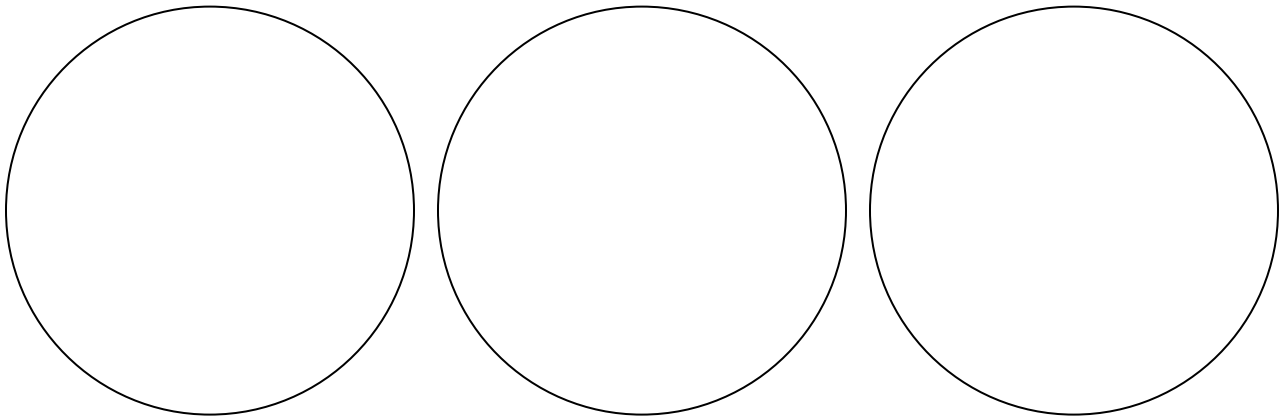
Animal Body Plans

Diploblastic vs. Triploblastic:

With the exception of sponges, all animals have tissues that derive from embryonic germ layers. Those with tissues are either **diploblastic** or **triploblastic**.



Observe slides of a **sponge**, *Hydra* (a diploblastic cnidarian), and *Lumbriscus* (a triploblastic annelid - an earthworm). Draw your observations below.

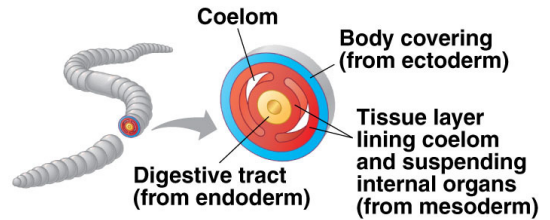


Acoelomate vs. Coelomate vs. Pseudocoelomate:

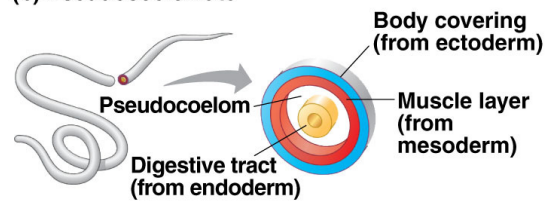
For triploblastic animals, they can be further described by the presence or absence of a **body cavity**. **Acoelomates** lack a body cavity. **Coelomates** have a body cavity lined by **mesoderm**. **Pseudocoelomates** have a body cavity lined by **mesoderm and endoderm**.

Observe sections of a **flatworm** (acoelomate), **roundworm** (pseudocoelomate), and an **earthworm** (coelomate) and draw your observations below.

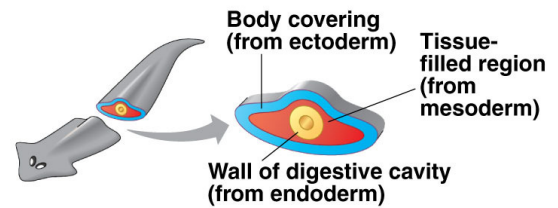
(a) Coelomate



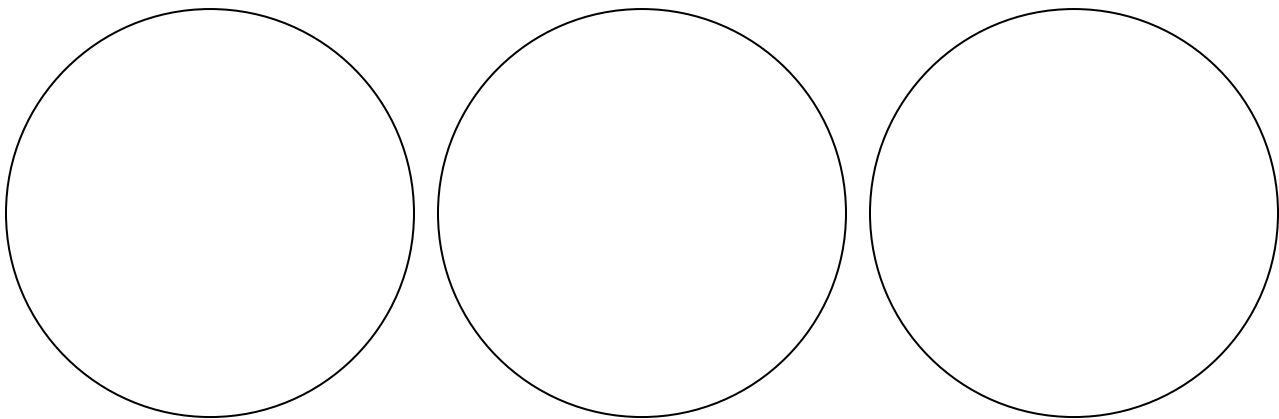
(b) Pseudocoelomate



(c) Acoelomate



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Dichotomous Keys

A Dichotomous Key is a great tool for identifying organisms. A dichotomous key is simply a series of **either/or** questions that eventually lead you to an identification. Below is an example of a dichotomous key for Disney Characters. You will find that creating your own dichotomous key for identifying animals will be extremely useful!

Dichotomous Key for Disney Characters:

1. Does the character have ears?
 - a. Yes: Go to 2
 - b. No: **Donald Duck**
2. Are ears **Round** or **Long**?
 - a. Round: Go to 3
 - b. Long: Go to 4
3. Does Character Wear a Bow?
 - a. Yes: **Minnie Mouse**
 - b. No: **Mickey Mouse**
4. Does Character Wear a Hat?
 - a. Yes: **Goofy**
 - b. No: **Pluto**



Identifying Major Taxonomic Groups

You should be able to identify which of the major taxonomic groups listed below an animal belongs to. You should also be able to describe important features of these animals: Nervous System Type & Sensory Systems; How they Move; Reproduction & Life Cycles; How they Feed; How they handle their Nitrogenous Waste; What Structures they use for Gas Exchange; What kind of Circulatory System they have. This type of information can be found in **your textbook**, and the **supplementary materials posted on blackboard**.

The Taxa:

Animals With No True Tissues:

Phylum Porifera: The sponges

- Class Calcarea** Spicules composed of calcium carbonate.
Class Hexactinellida Spicules composed of silica.
Class Demospongiae Spicules composed of silica or spongin fibers or both.

Diploblastic Animals with Radial Symmetry

Phylum Ctenophora The comb jellies.

Phylum Cnidaria

- Class Hydrozoa** The hydrozoans, colonial or solitary coelenterates with the polyp as the predominant form.
Class Scyphozoa The jelly fish, characterized by the mobile, floating medusoid form.
Class Cubozoa The cubomedusae jellyfish, characterized by a cuboid swimming bell, with four tentacle clusters
Class Anthozoa The anemones, corals, sea pens, etc., polypoid forms often with supporting skeletons.

Triploblastic Animals with Bilateral Symmetry

Acoelomates

- Phylum Platyhelminthes** The flatworms.
- Class Turbellaria** The free-living flatworms.
Class Cestoda (Cestoidea) The tapeworms.
Class Monogenea Monogenetic flatworms.
Class Trematoda
 Subclass Digenea The flukes.

Pseudocoelomates

- Phylum Nematoda** Roundworms
Phylum Rotifera Rotifers

Coelomates

- Phylum Annelida** The segmented worms.

Class Polychaeta Polychaete worms

Class Clitellata

Subclass Oligochaeta Earthworms

Subclass Hirudinea Leeches

Phylum Onychophora (velvet worms or walking worms; a closely related group)

Phylum Tardigrada (water bears; a closely related group)

Phylum Arthropoda

Subphylum Trilobitomorpha - trilobites (extinct)

Subphylum Chelicerata

Class Merostomata - Horseshoe crab

Class Pycnogonida - Sea "spiders"

Class Arachnida - Spiders; Scorpions; Ticks & Mites (& others)

Subphylum Mandibulata

Class Myriapoda

Order Chilopoda - Centipedes

Order Diplopoda - Millipedes

Class Insecta

Order Siphonaptera - Fleas

Order Neuroptera - Lacewings

Order Coleoptera - Beetles

Order Hymenoptera - Wasps; Bees; and Ants

Order Isoptera - Termites

Order Homoptera - Cicadas & others

Order Trichoptera - Caddisflies

Order Lepidoptera - Moths & Butterflies

Order Orthoptera - Grasshoppers; Crickets & Locusts

Order Hemiptera - True Bugs

Order Diptera - Flies

Class Crustacea

Subclass Malacostraca

Order Stomatopoda - Mantis shrimp

Order Isopoda

Order Amphipoda - Scuds

Order Decapoda - Shrimps; Lobsters; & Crabs

Subclass Branchiopoda

Order Anostraca - Brine shrimp (Sea Monkeys)

Order Cladocera - Water fleas (e.g. *Daphnia*)

Subclass Ostracoda - Seed shrimp

Subclass Copepoda

Subclass Cirripedia - Barnacles

Phylum Mollusca

Class Polyplacophora	Chitons
Class Scaphopoda	Tusk Shells
Class Bivalvia	
Class Gastropoda	Limpets, Snails & Slugs
Class Cephalopoda	Octopus, Nautilus, Squid, and Cuttlefish

Phylum Echinodermata**Sub-Phylum Asterozoa**

Class Stelleroidea	Sea stars & Brittle Stars
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Sub-Phylum Echinozoa

Class Echinoidea	Sea Urchins
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Class Holothuroidea	Sea Cucumbers
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Sub-Phylum Crinozoa

Class Crinoidea	Sea Lilies & Feather Stars
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Notes: