

# BIOLOGY 11

## EVOLUTION & CLASSIFICATION OF ANIMALS

Domain Eukarya  
Kingdom Animalia

### Five general characteristics of animals

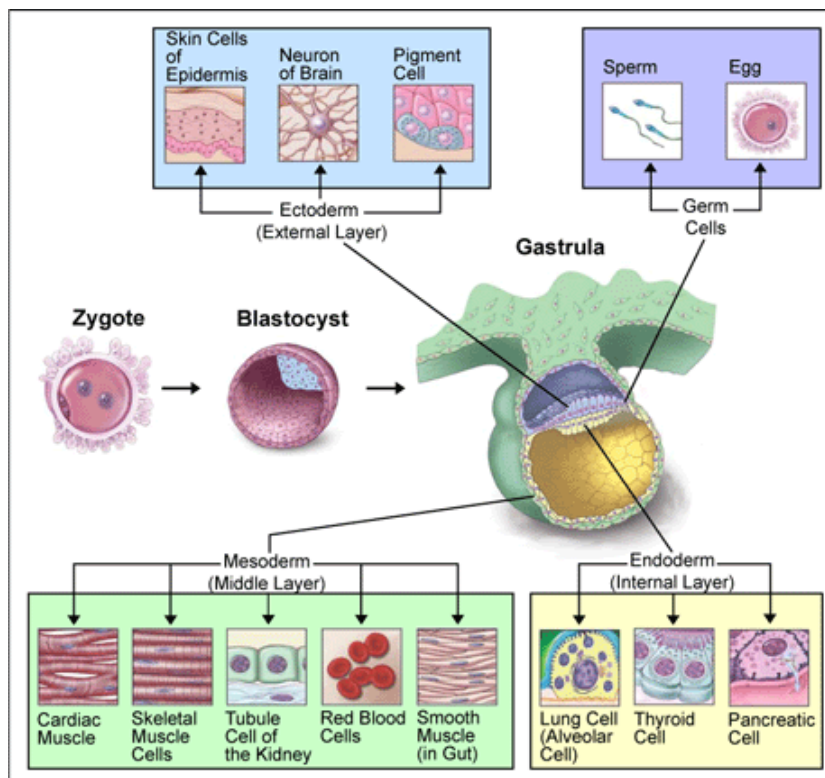
1. Heterotrophic; ingest and digest food
2. Muscle fibers allow for motion or locomotion
3. Multicellular; most have tissues and organs
4. Diploid adult in life cycle
5. Sexual reproduction; embryo has developmental stages

### Criteria for Classification

It is easier to trace evolutionary history of hard-shelled animals because there are good fossil records. Soft-shelled animals are harder to capture fossils of; therefore, their fossil record is much less complete. Because of this, evolutionary biologists use anatomical criteria to determine evolutionary pathways.

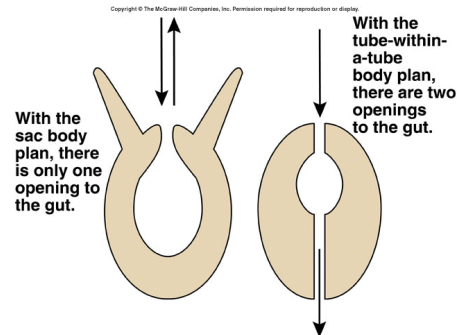
#### 1. Level of Organization

- cell level, tissue level or organ level of organization
- based on the number of germ layers (layers from which other structures are derived) present
  - no tissues → cell level of organization
  - only two germ layers (ectoderm and endoderm) → tissue level of organization
  - three germ layers (ecto-, endo- and mesoderm) → organ level of organization



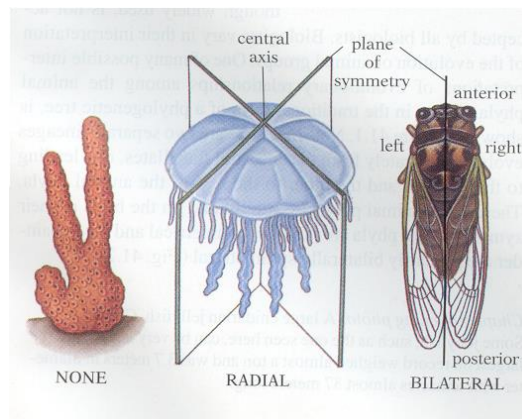
## 2. Type of Body Plan

- Sac Plan
  - incomplete digestive system → only one opening that the animal both brings food in and removes waste through
- Tube-Within-A-Tube Plan
  - complete digestive system → one opening for ingestion and one opening for removal of wastes
  - allows for specialization of parts along the length of the digestive tract (ie: stomach, intestines, etc)



## 3. Type of Symmetry

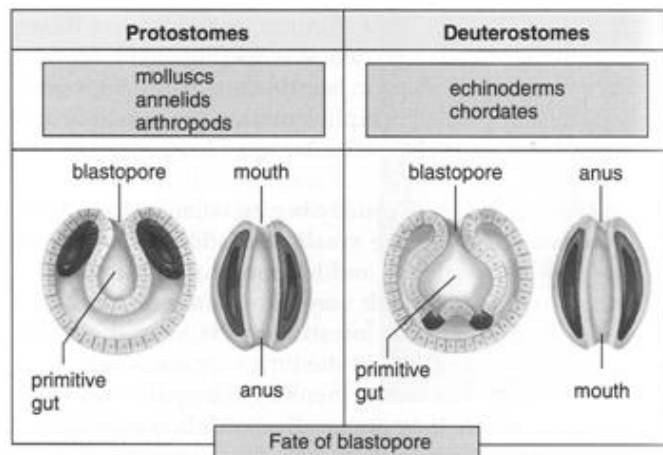
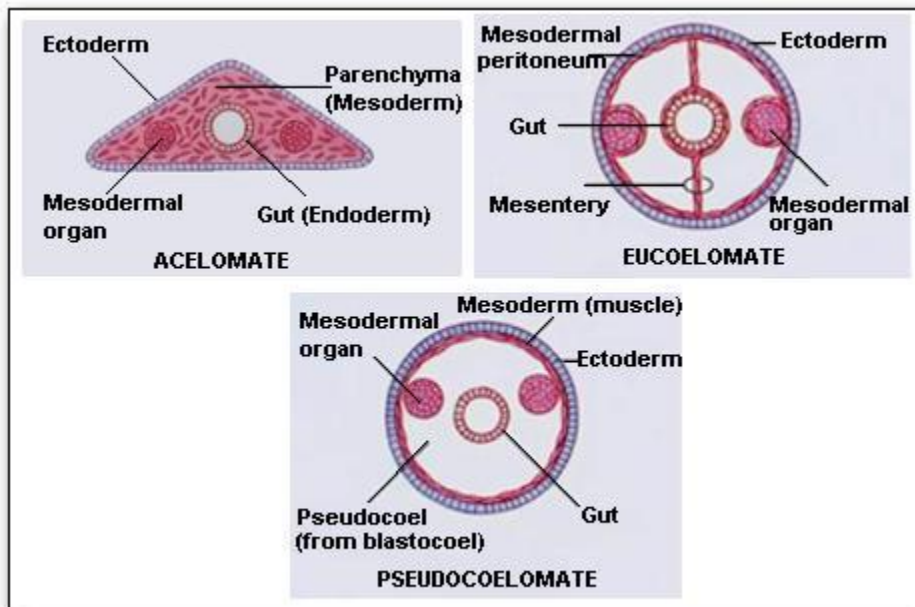
- Asymmetry
  - no symmetry (no balanced distribution of duplicate body parts or shapes)
- Radial Symmetry
  - circular symmetry (like a wheel)
  - get two identical halves whenever the animal is cut longitudinally
  - sometimes sessile (attached to substrate/ground)
- Bilateral Symmetry
  - defined left and right sides
  - only get identical halves when the animal is cut down the center
  - animals tend to be active and move forward
  - associated with cephalization → localization of a brain and specialized sensory organs at anterior (head) end of animal



4. Type of Coelom

- Acoelomates
  - no body cavity
- Pseudoceelomates
  - body cavity incompletely lined by mesoderm
  - cavity develops between the mesoderm and endoderm
- Coelomates
  - body cavity completely lined by mesoderm
  - developing embryo forms a ball with one opening; as the mesoderm layer develops, it creates a second opening opposite the first

	First Embryonic Opening	Second Embryonic Opening
Protostome	Mouth	Anus
Deuterostome	Anus	Mouth



## 5. Segmentation

- the **repetition** of body parts along the length of the animal
- segmentation allows for different body parts to develop for **specific** purposes

