

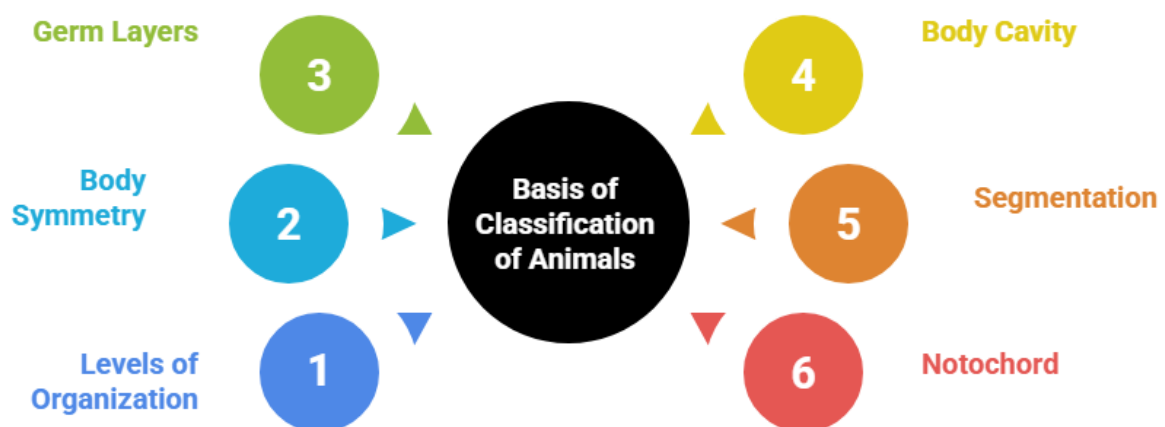
Animal Kingdom

Animal Kingdom

- The Animal Kingdom is **highly diverse**, consisting of organisms with a wide range of:
 - Shapes
 - Structures
 - Levels of complexity
- Over one million animal species have been described so far.
- Due to this vast diversity, there is a need for **systematic classification**.
- Classification helps in:
 - Organizing and understanding animal diversity
 - Assigning a **systematic position** to newly discovered species
 - Establishing relationships among different groups of animals

Basis of Classification

- Despite their external diversity, animals share several key biological features.
- These features form the basis for their classification and include:
 - Levels of organization
 - Body symmetry
 - Number of germ layers (tissue layers)
 - Nature of body cavity (coelom)
 - Segmentation
 - Presence or absence of a notochord



1. Levels of Organization

- All animals are **multicellular**, but the complexity of cell organization varies:

Cellular Level

- Cells are loosely arranged with minimal coordination.
- Example: **Sponges (Phylum Porifera)** – cells function mostly independently.

Tissue Level

- Cells with similar functions form tissues.
- Example: **Coelenterates (Cnidaria)** – show more coordination than sponges.

Organ Level

- Different tissues are organized into organs with specific functions.
- Example: Platyhelminthes (flatworms).

Organ System Level

- Organs work together to form systems (e.g., digestive, circulatory systems).
- Examples: Annelids, Arthropods, Molluscs, Echinoderms, Chordates

Additional Features:

- Incomplete Digestive System: Single opening serving as both mouth and anus (e.g., Platyhelminthes).
- Complete Digestive System: Two separate openings for mouth and anus.
- Open Circulatory System: Blood is not entirely contained in vessels; it bathes organs directly (e.g., Arthropods).
- Closed Circulatory System: Blood circulates through a network of vessels (e.g., Annelids).

2. Symmetry

- Symmetry refers to how the body can be divided into **equal halves**:

Asymmetrical

- No plane divides the body into equal halves.
- Example: Sponges

Radial Symmetry

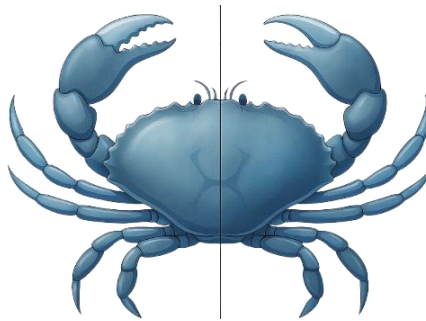
- Any plane passing through the central axis divides the body into identical halves.
- Examples: Coelenterates, Ctenophores, Echinoderms (adult starfish)



Radial symmetry

Bilateral Symmetry

- Only one plane (the sagittal plane) divides the body into left and right mirror images.
- Examples: Annelids, Arthropods, Vertebrates



Bilateral Symmetry

3. Germ Layer Organization (Embryonic Layers)

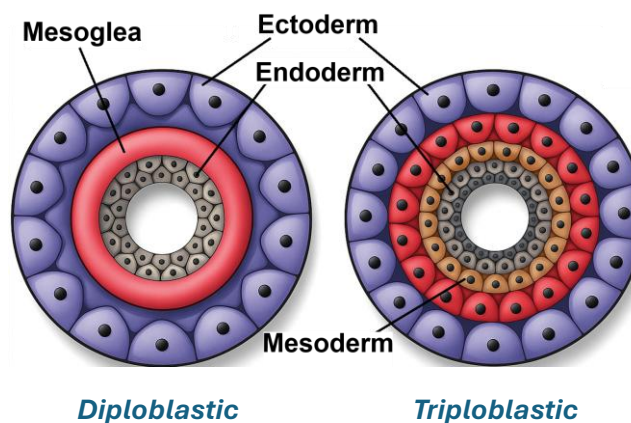
- During embryonic development, animals develop specific tissue layers called **germ layers**:

Diploblastic (Two layers):

- Ectoderm (outer layer)
- Endoderm (inner layer)
- Mesoglea: a non-cellular layer in between
- Example: **Coelenterates**

Triploblastic (Three layers):

- **Ectoderm, Mesoderm, and Endoderm**
- Found in all animals from Platyhelminthes to Chordates



4. Coelom (Body Cavity)

- The **coelom** is a fluid-filled cavity between the body wall and the digestive tract.
- It plays a major role in organ development and movement.

Acoelomates:

- No body cavity present

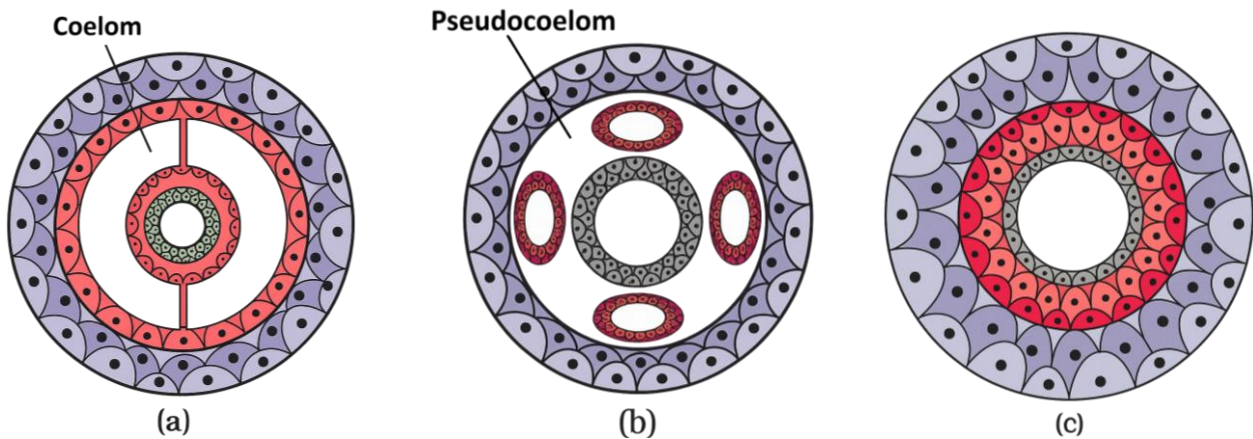
- Example: Platyhelminthes

Pseudocoelomates:

- Body cavity not completely lined by mesoderm; mesoderm is scattered
- Example: Aschelminthes (e.g., roundworms)

Coelomates (Eucoelomates):

- Body cavity lined by mesoderm
- Examples: Annelids, Molluscs, Arthropods, Echinoderms, Hemichordates, Chordates



Diagrammatic sectional view of: (a) Coelomate (b) Pseudocoelomate (c) Acoelomate

5. Segmentation (Metamerism)

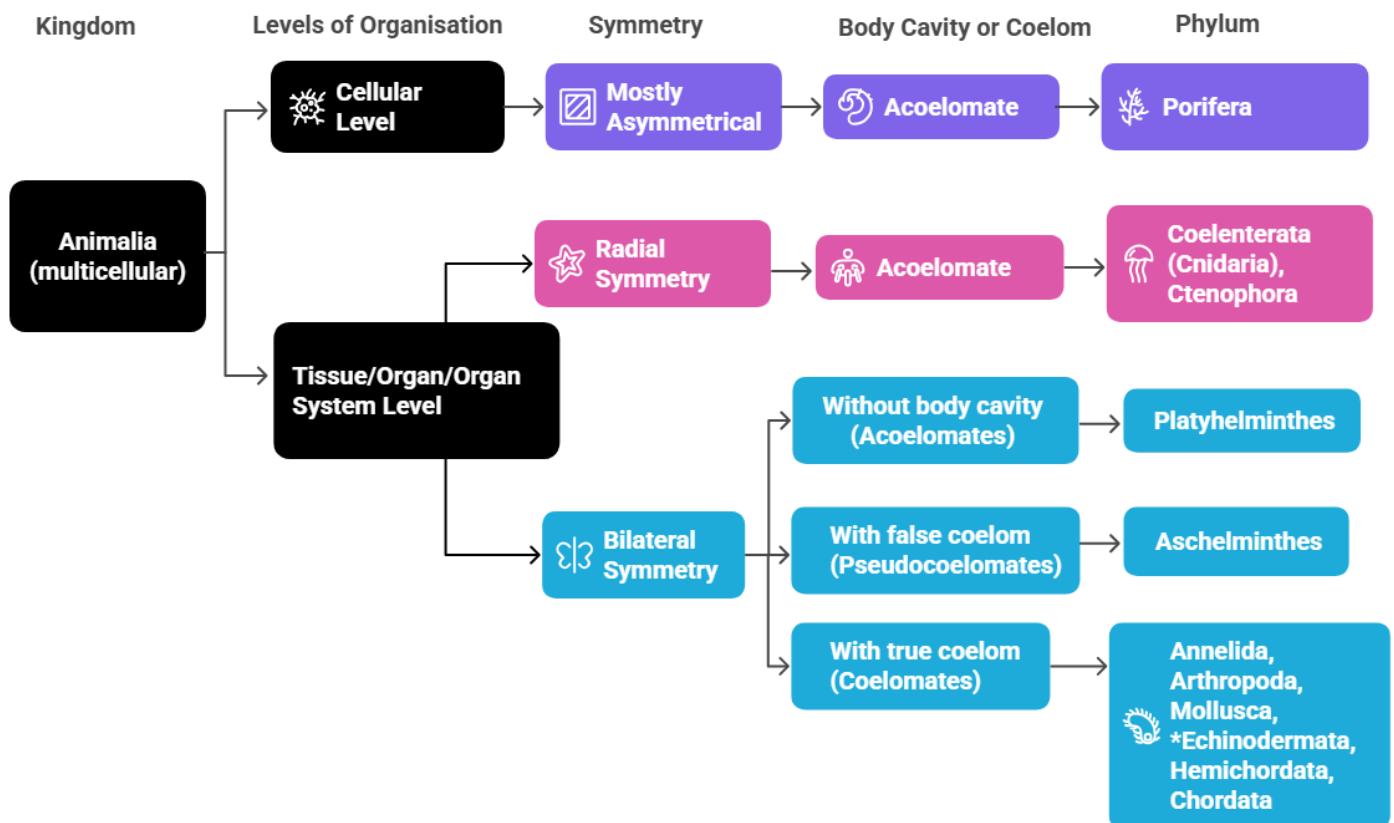
- Some animals show **repetition** of similar body segments both externally and internally:
 - This is known as metameric segmentation or metamerism
 - Each segment may contain elements of various organ systems
 - Example: Earthworm (Annelida)

6. Notochord

- The **notochord** is a rod-like, flexible structure made of mesodermal cells.
- It develops along the dorsal side of the embryo and provides skeletal support.
- Classification based on notochord presence:
 - **Chordates:** Possess notochord (e.g., fishes, amphibians, reptiles, birds, mammals)
 - **Non-chordates:** Lack notochord (e.g., Porifera to Echinodermata)

Classification of Animals (Kingdom Animalia)

- Animalia is a diverse kingdom characterized by multicellular, eukaryotic organisms that are heterotrophic.
- The broad classification of Animalia is based on fundamental features such as:
 1. Body symmetry
 2. Level of organization
 3. Coelom
 4. Germ layers
 5. Segmentation
 6. Notochord presence



**Echinodermata exhibits radial or bilateral symmetry depending on the stage.*

Figure- Broad classification of Kingdom Animalia based on common fundamental features

Major Phyla of Kingdom Animalia

- The major phyla under **Kingdom Animalia**, classified based on the fundamental features, include:
 1. Porifera (Sponges)
 2. Coelenterata (Cnidaria)
 3. Ctenophora (Comb Jellies)



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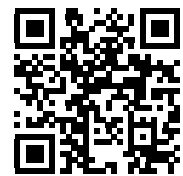


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