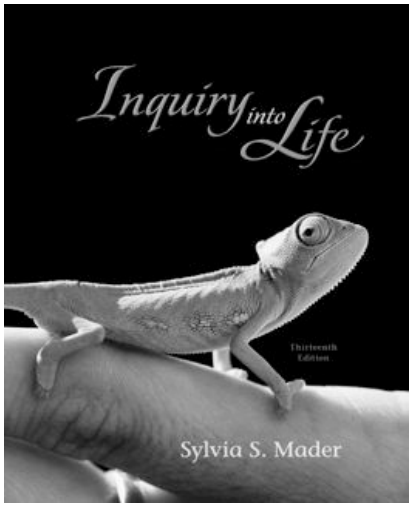


Chapter 30 Animals: Part I

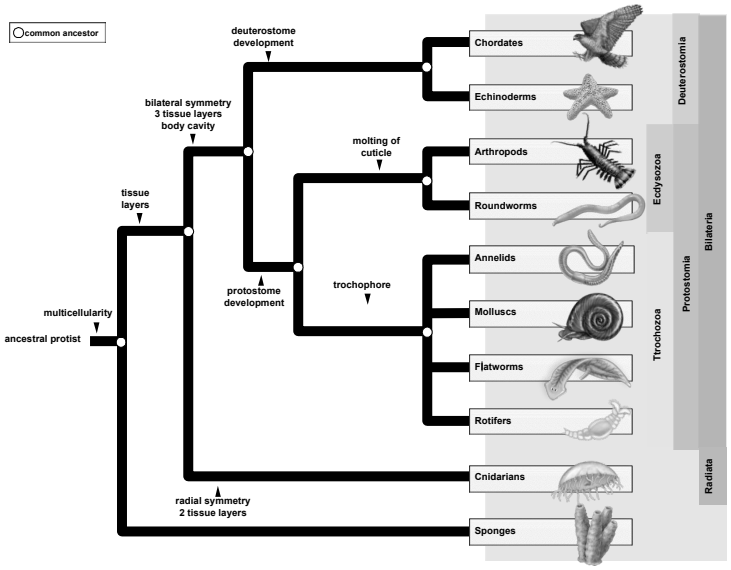
30.1 Evolutionary Trends Among Animals

- Domain Eukarya, kingdom Animalia
- Characteristics of Animals
  - Heterotrophic, acquire food by ingestion
  - Locomotion by means of muscles
  - Multicellular, high degree of cell specialization
  - Adult is diploid
  - Reproduction usually sexual, with embryo undergoing developmental stages

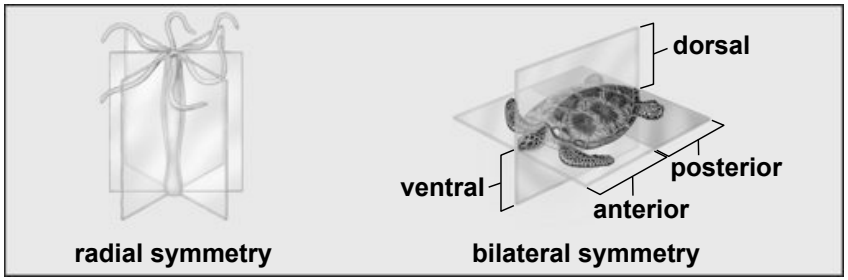
30.1 Evolutionary Trends Among Animals

- **Invertebrates**
  - Lack an endoskeleton of bone or cartilage
  - All but one animal phylum are invertebrates
- **Vertebrates**
  - Have an endoskeleton of bone or cartilage

Evolutionary Tree



30.1 Evolutionary Trends Among Animals



- Type of Symmetry
  - **Asymmetrical**
    - No particular symmetry
  - **Radial Symmetry**
    - Circular organization, can be bisected in any plane to produce mirror images
  - **Bilateral Symmetry**
    - Definite right and left halves; only a cut down the midline will produce mirror images, accompanied by cephali (heads)

30.1 Evolutionary Trends Among Animals

- Level of Organization
  - Cellular
    - No true tissues; sponges
  - Tissue
    - Have ectoderm and endoderm; cnidarians like hydra
  - Organ
    - Have ectoderm, endoderm, and mesoderm; majority of animals

30.2 Introducing the Invertebrates

- **Sponges**
  - Saclike body with many pores
  - Multicellular, but lack organized tissues
  - Filter feeders
  - Asexual and sexual reproduction

30.2 Introducing the Invertebrates

- **Cnidarians**
  - True tissues with two germ layers
  - Tubular or bell-shaped animals with radial symmetry
  - All aquatic, mostly marine
  - Body is two layered sac with gastrovascular cavity
  - Includes corals, anemones, jellyfish, and hydras

30.3 The Trochozoa

- **Trochophores** include
  - **Flatworms** (e.g., planaria, tapeworms)
  - **Rotifers**
  - **Molluscs** (e.g., clams, snails, squids)
  - **Annelids** (e.g., earthworms, leeches)
- Either have trochophore larvae (free swimming with cilia) or an ancestor had them
- Bilaterally symmetrical at least in some stage of their development
- As embryos, they have three germ layers
- As adults, they have the organ level of organization

30.3 The Trochozoa

- **Flatworms**
  - Incomplete digestive tract and only one opening, the mouth
    - Have simple muscular, excretory, reproductive, nervous and digestive systems
    - Lack respiratory and circulatory systems
  - Free-living planarians
  - Parasitic flukes and tapeworms

30.3 The Trochozoa

- **Rotifers**
  - Microscopic (0.1 - 3 mm)
  - Corona – crown of cilia on head
  - Primarily freshwater

30.3 The Trochozoa

- **Molluscs**
  - Second most numerous animal phylum
    - >100,000 species
  - Includes slugs, snails, conchs, clams, squid, and octopuses
  - True body cavity (**coelom**)
  - Complete digestive tract

30.3 The Trochozoa

- **Molluscs**
  - Unique characteristics of molluscs
    - Three distinct parts:
      - Visceral mass: includes most organs
      - Foot: muscular portion used for locomotion
      - Mantle: covering that almost encloses visceral mass
        - Mantle may secrete a shell

30.3 The Trochozoa

- **Gastropods**
  - Sea slugs, conchs, and snails
- **Cephalopods**
  - Squid, octopus, nautilus
  - Octopuses thought to be among the most intelligent invertebrates

30.3 The Trochozoa

- **Bivalves**
  - Clams, oysters, scallops, mussels
  - Two-part shells secreted by mantle
  - Filter-feeders: water enters through incurrent siphon

30.3 The Trochozoa

- **Annelids**
  - Includes earthworms and leeches
  - Only trochozoan with segmentation and a well-developed coelom
  - Specialization of digestive tract
  - Closed circulatory system
  - Brain with nerve cord connecting ganglia in each segment

30.4 The Ecdysozoa

- **Ecdysozoans** periodically undergo ecdysis (**molting**)
- Includes
  - **Roundworms** (nematodes)
    - Can cause parasitic diseases (e.g., trichinosis, elephantitis)
  - **Arthropods**
    - **Crustaceans**
    - **Insects**
    - **Arachnids**

30.4 The Ecdysozoa

- **Arthropods**
  - Over 1 million species have been described
  - Over 30 million may exist (mostly insects)
  - Success dependent on:
    1. Rigid but **jointed exoskeleton**
    2. Segmentation
    3. Well-developed nervous system
    4. Variety of respiratory organs
    5. Reduced competition through metamorphosis

30.4 The Ecdysozoa

- **Crustaceans**
  - Barnacles, shrimps, lobsters, and crabs, crayfish, sowbugs
  - Named for their hard shells
  - Head usually bears a pair of compound eyes and five pairs of appendages
    - First two pairs are antennae – sensory
    - Other three pairs are feeding mouthparts

30.4 The Ecdysozoa

- **Insects**
  - Three body regions
    - **Head**
      - Sensory antennae, compound and simple eyes
      - Mouthparts are adapted to each insect's way of life
    - **Thorax**
      - **6 legs** (3 pairs) and the wings (0-2 pairs)
    - **Abdomen**
      - Contains most internal organs

30.4 The Ecdysozoa

- **Arachnids**
  - Scorpions, spiders, ticks, and mites
  - Cephalothorax
    - **8 walking legs** (4 pairs)
  - Abdomen contains internal organs
  - Scorpions
    - Oldest terrestrial arthropods
    - Abdomen ends with a venomous stinger