

Comparative Anatomy

an introduction

Comparative Anatomy

- To survive, ALL animals perform the same essential tasks:
 - **Response** & movement
 - **feeding & digestion**
 - **respiration & circulation**
 - excretion & **reproduction**.



- Evolution
 - Body systems that perform the essential tasks of life have taken many different forms in different phyla.
 - More complicated systems are not necessarily better than simpler ones.
 - We will see the basic evolutionary trends in each body system, using examples from a variety of animals.

Nervous Systems

A comparison of
vertebrates and invertebrates

The system for Response

- Nerve cells – the functional unit of any nervous system
- Nervous tissue gives animals the ability to
 - sense the environment
 - move
 - react to stimuli
 - generate and control all behavior of the organism.



The Basics

Nerve nets: the simplest system

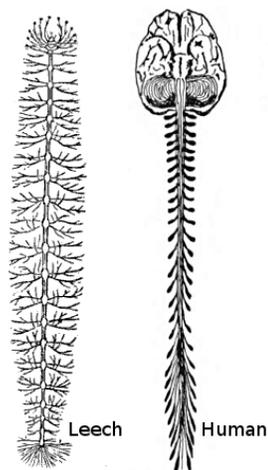


In cnidarians: hydras, jellyfish, sea anemones, corals



3 Trends in Evolution: Adding Complexity

- Centralization
 - nerve cells are concentrated in ganglia
- Cephalization
 - concentration of nervous tissue at one end of the body (the “head”)
- Specialization
 - Sense organs are present



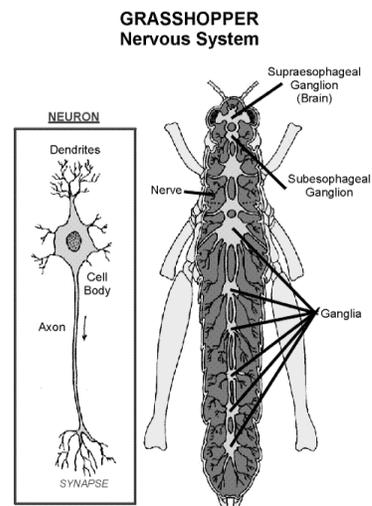
Example: Flatworm

- Centralization
 - Ganglia in head
- Specialization
 - eye spots detect presence or absence of light.



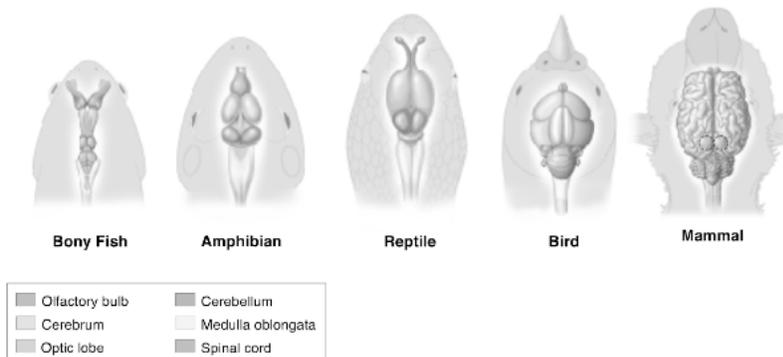
Example: Grasshopper

- Centralization
 - Ganglia along body
- Cephalization
 - “brain” in head
- Specialization
 - eyes that detect motion and color and form images
 - Tympana sense sound.



Vertebrates: even more complexity

- High degree of Cephalization & Specialization
- Vertebrates have a more complex brain with distinct regions, each with a different function



Brain

- **Cerebrum** – thinking
 - Size & complexity increases from fish to mammals
 - Folds increase surface area
- **Cerebellum** – movement & balance
 - Also increases from fishes to mammals
 - Most developed in birds & mammals

