Animal Diversity
An Overview

Kingdom Animalia = the animals (35+ phyla)

The Nine Most Important Phyla

What is an animal?
1) Eukaryotic (separates from bacteria)
2) Multicellular (separates from protists)
3) Heterotrophic (separates from plants and some protists)
4) Lacks cell walls (separates from plants, algae and fungi)
5) Have unique intercellular junctions
6) Generally ingest food and digest it internally
7) Are principally diploid
8) Have a unique life cycle (embryonic stages)

Typical Animal Life Cycle:
1) Gametogenesis (gametes)
2) Fertilization (zygote)
3) Blastula
4) Gastrula
5) Embryo (late gastrula)
6) Larval stage???
7) Metamorphosis???

Direct vs. Indirect Development

Some animals the embryo resembles the adult, others the embryo must undergo radical changes.
Animal Origins:
Colonial vs. True Multicellular Organisms

**Phylum Porifera**: the sponges
- 5000 species
- Regenerate, reproduce sexually and asexually
- Radial symmetry
- Generally sessile
- Cellular level
- Filter feeders
- General structure
  a. Epidermis
  b. Amoebocytes
  c. Choanocytes
**Phylum Cnidaria:** hydoras, jellies, sea anemones and corals
- Radially symmetrical
- Carnivorous
- Alternation of generations (two body forms)
  a. Polyp (hydra)
  b. Medusa (jellyfish)
- Some use both, one or the other
- Tentacles
- Gastrovascular cavity
- Stinging cells called *cnidocytes*
- Tissue level
- General structure

The Bilateral Animals
**Phylum Platyhelminthes:** the flatworms
- Ribbon-like
- Incomplete digestive system
- Nervous system, muscular system, excretory system
- Three major groups
  1) Free-living flatworms (planarians)
  2) Flukes
  3) Tapeworms
- General structure

**Phylum Nematoda:** roundworms
- 90,000 species
- Great numbers
- Some parasitic
- Complete digestive tract
**Phylum Mollusca**: snails, slugs, oysters, clams, squids
- 150,000 species
- Hard shelled
- Muscular foot
- Mantle
- Radula
- True coelom
- Circulatory system
- Three major groups
  1) Gastropods (snails and slugs)
  2) Bivalves (clams, scallops, oysters)
  3) Cephalopods (squid and octopuses)

**Phylum Annelida**: segmented worms
- First true segmentation
- Earthworms and leeches
- 15,000 species

**Phylum Arthropoda**: arthropods
- Largest phylum to ever have existed
- Jointed legs
- Exoskeleton
- Molting
- Very diverse group
  1) Arachnids
  2) Crustaceans
  3) Horseshoe crabs
  4) Millipedes and centipedes
  5) Insects
**Phylum Echinodermata**: sea stars, sea urchins, sand dollars
- Endoskeleton
- Water vascular system
- Regeneration

**Phylum Chordata**: the chordates

**Invertebrates**
- Tunicates and lancelets

**Vertebrates**
- Agnathans
- Fishes
- Amphibians
- Reptiles
- Birds
- Mammals

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**Animals: Form and Function**

**Concepts of Animal Structure and Function**

**Structure fits function: Adaptation**

**Animal Organization:**
1. Cellular
2. Tissue
3. Organ
4. System
5. Organismal
Types of Animal Tissues:
1. Epithelial
   - Polarity (basement membrane)
   - Mucous membranes
   - Squamous, cuboidal, columnar
   - Simple vs. stratified
2. Connective
   - Loose connective
   - Dense connective
   - Cartilage
   - Blood and bone
3. Muscle
   - Skeletal, smooth and cardiac
4. Nervous
   - Neurons and neuroglial cells

Body Systems:
1. Digestive
2. Respiratory
3. Cardiovascular
4. Lymphatic/Immune
5. Excretory
6. Endocrine
7. Reproductive
8. Nervous
9. Muscular
10. Skeletal
11. Integumentary

Structural Adaptation and Homeostasis
Adaptations to Environment (tissues and fluids)
Homeostasis

1) Regulate and respond to internal and external environments, respectively
2) Constant state
3) Imbalance in homeostasis is “disease”
4) Negative feedback