

Animal Diversity

An Overview

Kingdom Animalia = the animals (35+ phyla)

The Nine Most Important Phyla

What is an animal?

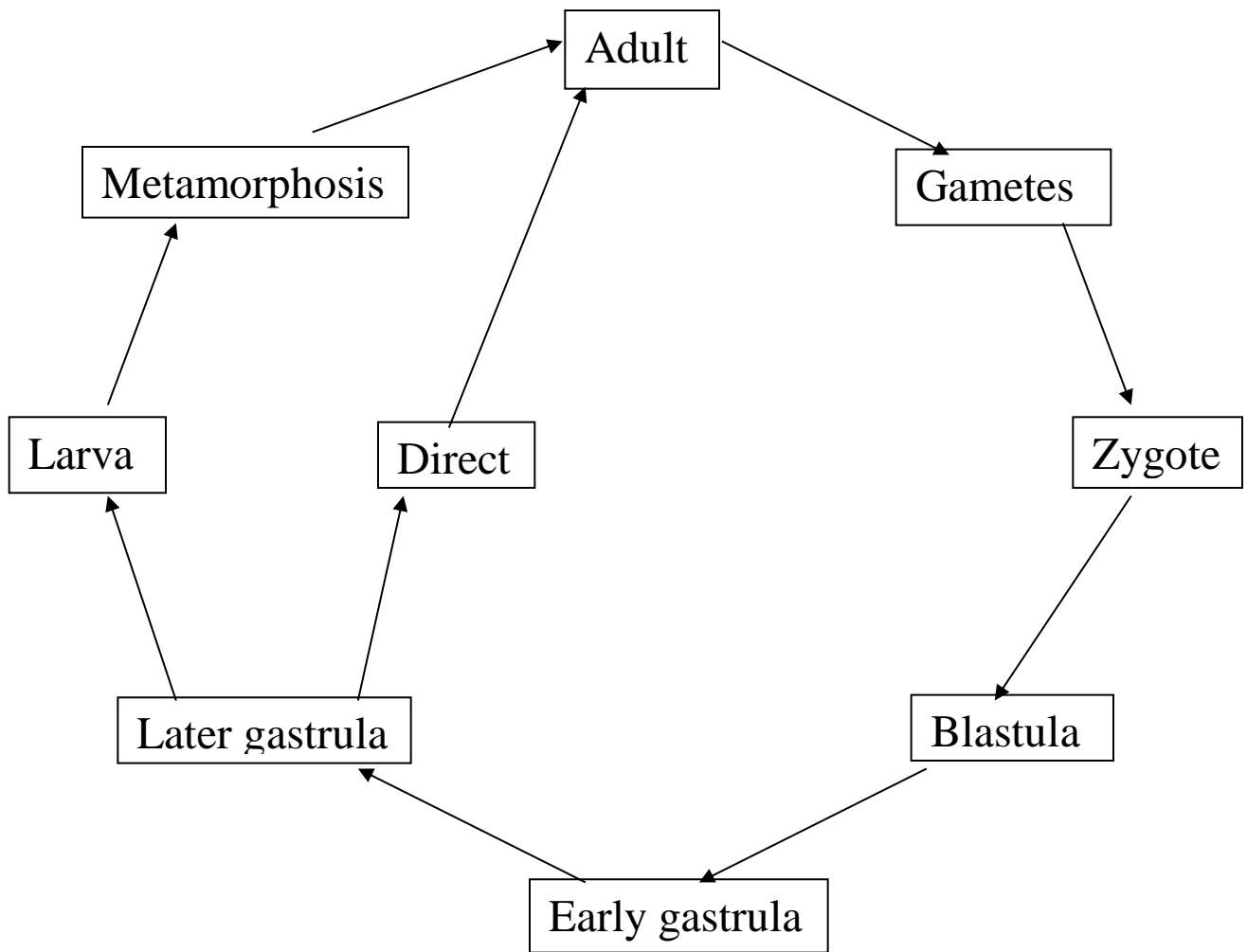
- 1) Eukaryotic (separates from bacteria)
- 2) Multicellular (separates from protists)
- 3) Heterotrophic (separates from plants and some protists)
- 4) Lacks cell walls (separates from plants, algae and fungi)
- 5) Have unique intercellular junctions
- 6) Generally ingest food and digest it internally
- 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: hydras, 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

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