Introduction to Animals

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Unifying Characteristics

All Animals
> Multicellular Eukaryotes
> Heterotrophic – ingestion
> Reproduce sexually
  → complex development sequences.
> Cells lack cell walls
> Bodies are held together by structural proteins such as collagen
> Nervous tissue and muscle tissue are unique to animals.

Origins of Animals: Fossil evidence

Australia
“Ediacaran” fauna (565-550 mya)

China
Recently described animal embryos.
570 - 575 mya

Figure 26.15a, b

Fig. 25-3, p. 405

Descriptions used to understand animal groupings

I. Invertebrate
Those animals that have no backbone.

II. Vertebrate
Those animals that have a backbone.

Backbone – is for structure & protection of vital nervous tissues.

Vocabulary

I. Symmetry
- Asymmetrical
- Radial
- Bilateral

II. Coelom – a body cavity
- Acoelomate
- Pseudocoelomate
- Coelomate

Coelom is significant because it allows increased complexity of organ systems.

III. Segmentation
Hallmark characteristics e.g.
It has been estimated that at any one time there are a billion, billion individuals on the Earth.

Name means = Jointed legs/appendages

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- Arthropods may have evolved from segmented annelids in the Cambrian period.

When Studying Animals
1) Focus on key features – Hallmark characteristics e.g. Mammals have fur.
2) Digestive system – how does it process food e.g. gastrovascular cavity vs. through gut.
3) Special modes of reproduction e.g. internal vs external fertilization.
4) Degrees of complexity – includes embryological information e.g. Echinoderms are more similar to chordates because of their embryos.
5) Habitat – where do you find such animals e.g. nematodes may be free-living in the soil or parasites.

Arthropods
- Considered to be the most numerous and most successful phylum.
- Name means = Jointed legs/appendages
- It has been estimated that at any one time there are a billion, billion individuals on the Earth.
- Arthropods may have evolved from segmented annelids in the Cambrian period.

Characteristics
- Exoskeleton – An external skeleton that encloses the body like armor, with jointed appendages for flexibility.
- Show bilateral symmetry
- Have a true coelom that allows for body segmentation: 3 parts in insects, consisting of head, abdomen and thorax.
- Gas exchange via gills in aquatic forms or in terrestrial forms book lungs or tracheae.
- An internal body cavity called a hemocoel that bathes internal organs with fluids.
- Well developed sensory organs e.g. compound eyes.

Insecta
- Six legs (3 prs)
- Generally 2 pairs of wings.
- Only invertebrate group that can fly.
- Specialized development called metamorphosis

→ Most abundant and diverse arthropods with over 850,000 species described.

Specializations for Feeding
- Digestive system – how does it process food e.g. gastrovascular cavity vs. through gut.
Crustaceans

Mostly marine arthropods with two pairs of antennae
- Small crustaceans include krill, copepods, and barnacles
- Decapod crustaceans include lobsters, crayfish, crabs and shrimps

Arthropods

Chelicerates

Arthropods without antennae
- Marine chelicerates include the oldest living arthropod lineage (horseshoe crabs)
- All land chelicerates are arachnids, including spiders, scorpions, ticks, and mites

Arachnids

Spiders
Scorpions
Ticks
Mites
Lice
Significance of Arthropods to humans

- Compete with humans for food i.e. pests on crops
- Pollination services
- Silk fabric e.g. moths.
- Vectors of disease such e.g malaria & plague
- Food e.g. crabs and lobsters.
- Pest control e.g. ladybugs
- Can destroy homes e.g. carpenter ants, termites
- Decomposition services
  e.g. isopods, crabs, fly larvae
- Sources of medicine e.g. antibiotics from bull ant
- Used in genetics research e.g. drosophila