

Sponges are the Most Ancient Animals

- No true symmetry
- No true tissue
- Sessile = *filter feeders...dont actually move*
- Have differentiated cells
- Not tissue because cells don't work together doing just one function

Individual Choanoflagellate = almost identical to the protists

Some Features Common to Animals

Chemoorganoheterotrophs: all animals obtain energy and carbon by ingesting other organisms

Multicellular: All animals are multicellular

No cell walls: no animal cells contain cell walls

Active Movement: Every sessile and sedentary animals possess active movement

Embryonic Development: All animals have a developmental precursor (embryonic/larval...) stage

Tissues: *all animals except sponges* have differentiated tissues

Sexual Reproduction: *most animals* reproduce sexually

Cambrian Explosion

Leading to the Cambrian Explosion

Oxygen Levels
--> Slowly accumulating in atmosphere

Predator/prey interactions
--> Force for evolution. Force for change
--> Only those with certain traits survive

Changes in expression of *Master regulator genes* that control the body plan of an embryo during development

Hox Genes
--> Transcription Factors
--> When expressed, they will lead to the expression of tons of other genes
----> Lead to things like limbs

Variation in Body-Plan

1. Bilateral Symmetry

2. 3-tissue layers

3. Body Cavity

Also, first predator/prey adaptations arose; caused an influx in evolution

Animals Evolved 700mya

Unique parts of molecules to animals = chemical evidence 700mya

First animal fossils 560mya

1st Animal: Porifera **Metazoa**
(sponges)
--No true tissues

2nd Animals: Cnidarians **Eumetazoa**

Specialized Tissue and Radial Symmetry Evolved

CNIDARIANS

Jellyfish

2 Layers of Tissue

1. *Ectoderm*

2. *Endoderm*

- Have muscle and nervous tissue

- Endoderm: Gastrovascular cavity, No circulatory System

- Not a dense pack of cells

- Nidano cists --> Stinging Cells

- Some are sessile

---> Usual just floating, not moving towards anything

- Symmetry evolved (radial symmetry)



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Body Plan - Bilateral Symmetry

Bilaterally symmetric organisms have left and right sides that are superficially mirror images of each other

Evolution of the anterior end (head end)...Not same as bottom (feet)

--> advantage for predator because you can just go get it

Three Germ Layers

Tissues are groups of cells that are similar and function

Increased complexity

--> during embryonic development

Ectoderm

- Outside of embryo
- Skin and nervous system
- Outer Brain
- Cornea and lens of eye
- Sensory receptors

Mesoderm

- Skeletal System
- Muscular System
- Excretory System
- Organs
- Reproductive system (except germ cells)
- Lining of Body Cavity

Endoderm

- Epithelial lining of digestive tract
- Liver
- Epithelial lining of respiratory system
- Glands

Arthropods-Most Successful Animal Group

Most Successful

- Most number of animals
- Most diverse body plans
- Jointed *exoskeleton* (armor can move)
- Jointed appendages

Examples of Arthropods

- Mosquito
- Dragonfly
- Scorpion
- Lobster
- Shrimp

Others

- most animals have the same body parts, just in different numbers, slightly different locations, and of different sizes

Just different number of building blocks --> master regulator genes trigger number of blocks per part

- The key to different body types is changing where, if, and when *master regulator genes* are expressed in the embryo

HOX GENES

The changing of number of hox genes can be done in a lab.

Body Plan - Body Cavity

Acoelomates

- The beginning of cephalization
- 3 layers of solid tissue and a digestive tube
- Nervous system is starting

Bilaterians Increase Cephalization Levels

Radial= no cephalization

--> Equal distribution of nervous system

Increase of Cephalization

--> Concentrations of nervous system to head

Pseudocoelomates

- Pseudo because no mesoderm on outside and inside
- > Body cavity is present for waste removal
- Increase in flexibility and movement
- Hydrostatic Skeleton

Coelomates

The coelom is lined on both sides by mesoderm derived tissue

- Allow organs to be independent of outside body
- > like the folds and movement of the intestines separate from the skin
- Also have Segmentation (like worms)
- > vertebrae, 6 pack...



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