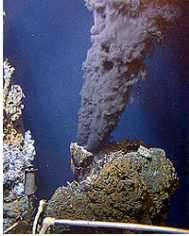




# ORIGINS OF LIFE



- 3.5bya
- NO OXYGEN
- ANAEROBIC METABOLISM
- ORGANIC MATERIALS

- Mutations led to photosynthesis
- Oxygen produced
- Aerobic Respiration (2.5 bya)

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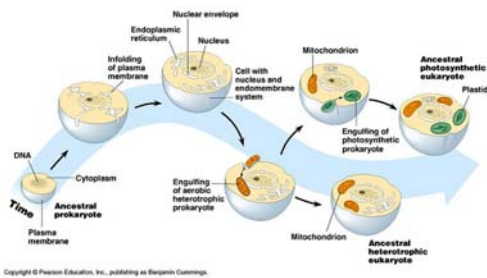
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## Endosymbiont Theory- 1.2bya



Copyright © Pearson Education, Inc., publishing as Benjamin Cummings.

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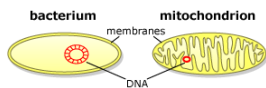
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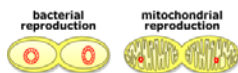
## Endosymbiont Theory

•Membranes



•DNA

•Reproduction




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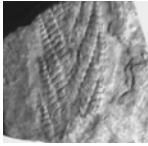
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## Vendian Period 650 to 543 million years ago



### Charnia

- flat leafy body
- ~1 meter long
- similar to sea pens
- related to corals



<http://www.ucmp.berkeley.edu/vendian/critters.html>



### Eoporpita

- long tentacles
- 6cm wide
- related to sea anemones



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## General Characteristics of Animals

- Eukaryotic
- Heterotrophic & Aerobic
- Multicellular (some with tissues & organs)
- Have locomotion (some with muscle fibers)
- Adults are diploid
- Usually reproduce sexually

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## How to Classify Animals

- **Body symmetry**
  - asymmetrical
  - radial
  - Bilateral
- **Gut type** – sac vs. tube
- **Complexity & presence of tissues/organs**
- **Segmentation**
- **Body cavity**
  - acelomates
  - psuedocoelomates
  - coelomates

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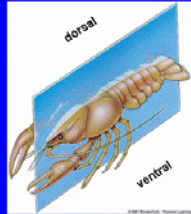
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## Symmetry



Radial



Bilateral

<http://trc.ucdavis.edu/biosci10v/bis10v/week9/symmetry.gif>

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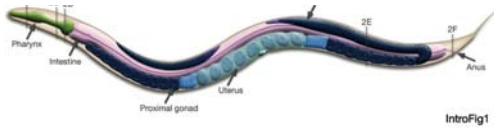
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## Gut Type



Sac – one opening

Tube – two openings



IntroFig1

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## Body Cavity - Coelom



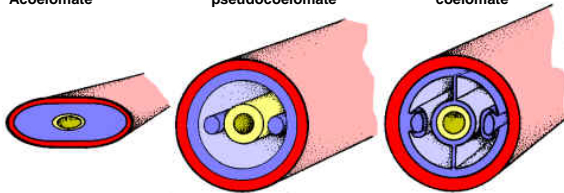
Acoelomate



pseudocoelomate



coelomate



Livingstone © BIODIDAC

9/4/94

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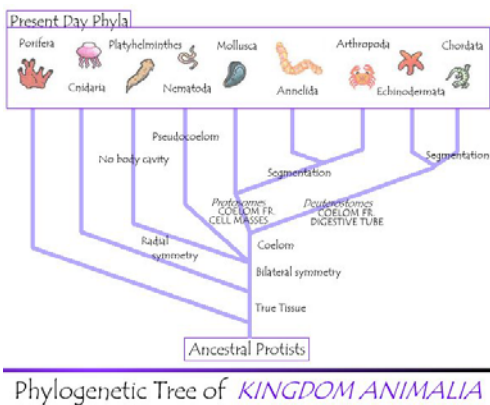
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## More Ways to Classify Animals

- **Habitats** – marine, aquatic, terrestrial
- **Locomotion** – sessile vs. locomotive
- **Feeding behavior** – filters, hunters, grazers, scavengers, parasites
- **Reproductive behavior** – asexual vs. sexual, & dioecious vs. monoecious



### Porifera- Sponges

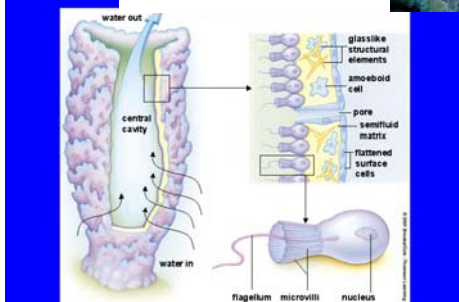
5000 species



- asymmetrical
- no tissues
- no organs systems
- marine habitats
- filter feeders – plankton (diatoms)
- Sexual and asexual reproduction
- "Skeletons" of spongin, silica, calcium carbonate



# Porifera



<http://www.oceanresearch.org/education/wonders/sponges.html>

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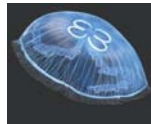
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# Cnidarians



10,000 species



- Radial symmetry
- Simple tissues
- Nervous system
- Sac gut
- All marine



<http://www.oceaninn.com/guides/cnidarians.htm>

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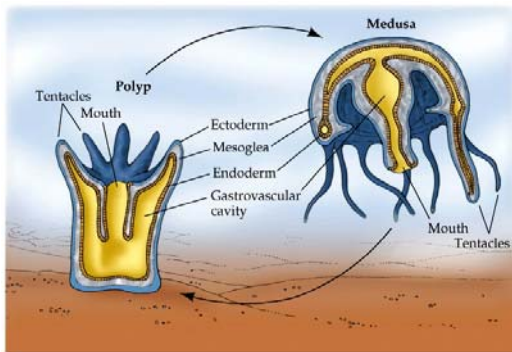
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# Cnidaria



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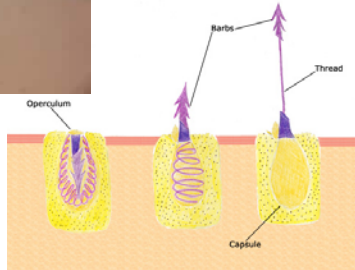
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## Nematocysts



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## Box Jellies



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## Platyhelminthes - Flatworms

25,000 species

- Planaria- turbellaria
- Flukes- trematodes
- Tapeworms- cestodes



<http://home.austarnet.com.au/wormman/wlfluk.htm>

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## Platyhelminthes

- Acoelomates
- Bilateral symmetry
- Organ systems
- “Blind” gut
- Mostly hermaphrodites



<http://www.medicine.mcgill.ca/tropmed/txt/lecture5%20filaria%20and%20schisto.htm>

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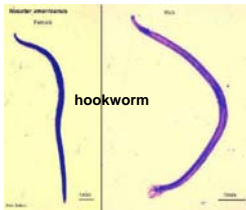
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## Nematoda

80,000 species known

- Non-segmented
- Bilateral symmetry
- Pseudocoelomates
- Tissues & organs
- Hydrostatic skeleton
- Usually dioecious



<http://home.austarnet.com.au/wormman/winema.htm>

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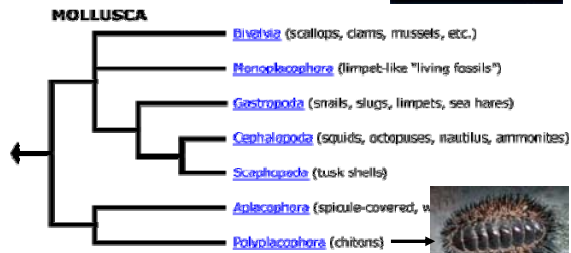
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## Mollusca

110,000 species



<http://www.ucmp.berkeley.edu/taxa/inverts/mollusca/mollusca.php>

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## Mollusca

- Bivalves
- Cephalopods
- Gastropods

**Visceral mass** – contains organs

**Foot** – muscle used for locomotion

**Mantle** – membrane that surrounds the visceral mass

**Shells**



**Radula**

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## Mollusca

- True coelom
- Tube gut with anus
- Bilateral symmetry
- Tissues & organs, organs systems
- Gastropods hermaphrodites
- Cephalopods, bivalves dioecious



[Slugs mating](#)

[octopus mating](#)

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## Annelida

~10,000 species

- Marine worms
- Earthworms
- Leaches

Segmented  
Hydrostatic skeleton




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## Echinodermata

- Radial (5pt) symmetry
- Spiny skin
- Tube feet
- True tube gut
- Carnivores or detritus feeders
- No cephalization
- No heart or brain
- All marine
- Usually reproduce sexually, but can regenerate asexually



[sea cucumber](#)

<http://www.earthlife.net/inverts/echinodermata.html>

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## Chordata

50,000 species



• Amphibians



• Birds



- Reptiles
- Mammals



• Fishes

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## Chordata

- Bilateral symmetry
- Endoskeleton
- True cephalization
- Tube gut
- Complex tissues and organ systems
- Diets and habitats extremely varied
- Sexual reproduction




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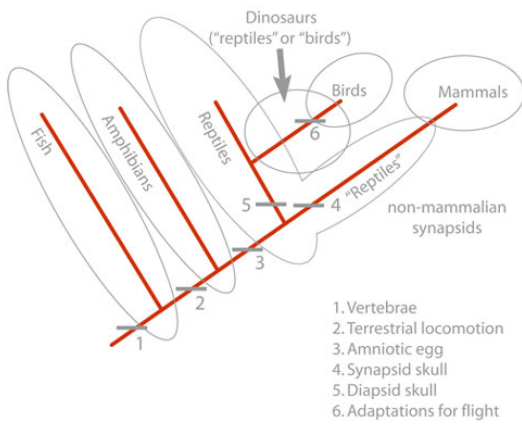
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