

BIO 221 Invertebrate Zoology I Spring 2010

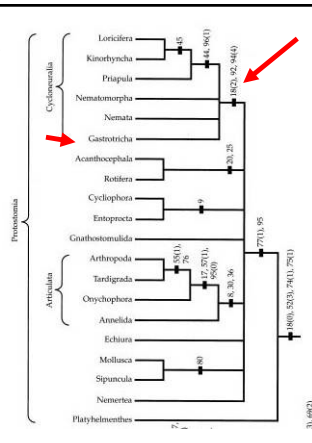
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Northern Arizona University

<http://www4.nau.edu/isopod>

Lecture 19

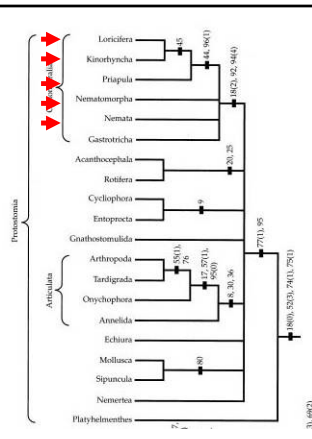
Cycloneuralia Characters

- 18(2): Ambiguous “spiral” cleavage.
- 92: Terminal mouth with radial pharynx.
- 94(4): Brain collar-shaped; with saddle on pharynx.



Pseudo-coelomates (Ecdysozoa):

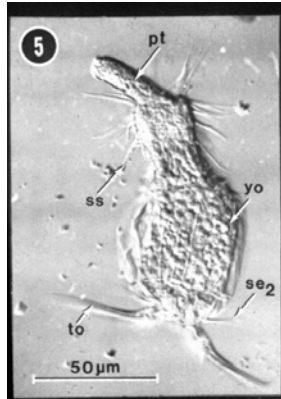
1. Kinorhyncha
2. Loricifera
3. Priapulida (Priapula)
4. Nematomorpha
5. Nemata



Pycnophyes greenlandicus



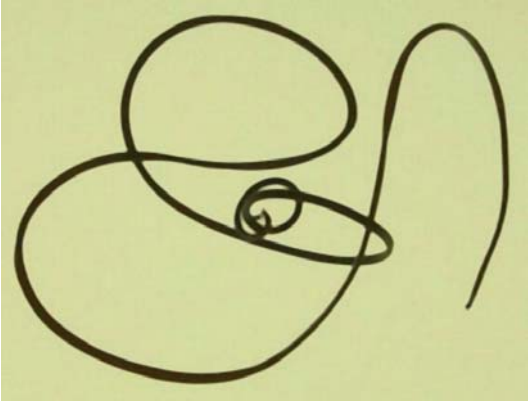
A larval
loriciferan



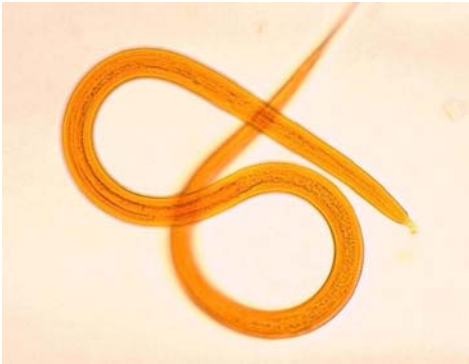
Priapulus caudatus



A horsehair worm



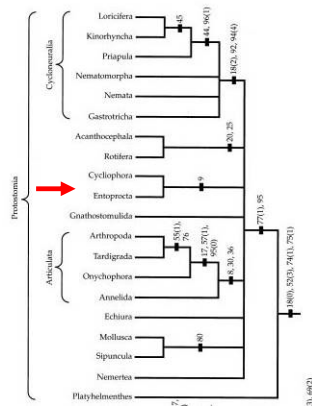
Strongyloides filariform larva



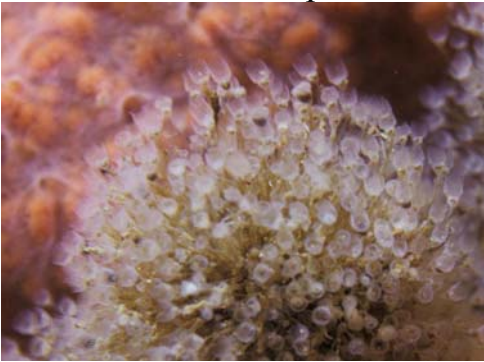
Deuterostome Allies?

Entoprocta
Cycliophora

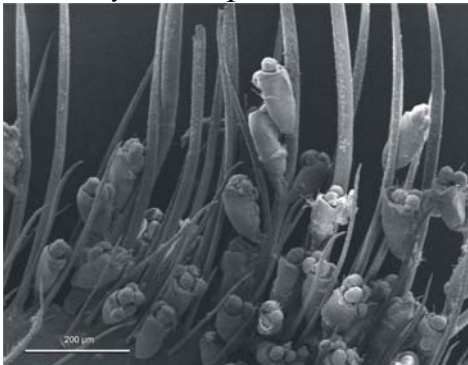
- a. Resemble Lophophorates.
- b. But: #9: Unique mushroom-shaped extensions from basal lamina into epidermis



Barentsia sp.



Symbion pandora



Most Successful:

1. Rotifera - aquatic, small, adaptable feeding apparatus.
2. Nematoda (Nemata)- parasitic, generalized body shape, feeding apparatus.



Common Characteristic

A pseudocoelom.

- a. A fluid filled body cavity without mesenteries.
- b. Position of viscera maintained by hydrostatic pressure.



Pseudocoelom

1. Allows room for gut, viscera.
2. Allows area for gamete maturation.
3. Is under pressure
 - a. Implications of this will be seen shortly.



Pseudocoelom

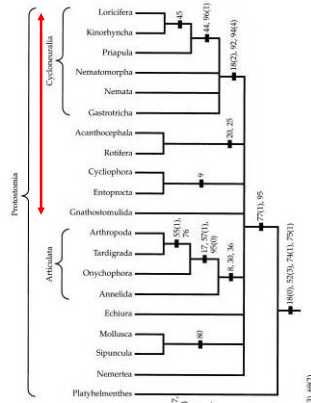
The size of pseudocoel is quite variable:

1. In fact, existence of pseudocoel in some groups was an artifact of certain staining procedures



Phylogenetic Relationships

2. We'll still consider them here but bear in mind that this represents about the best example of a polyphyletic group there is.



Other Characteristics

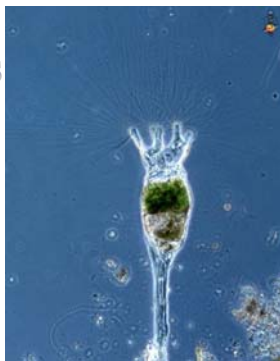
a. Small size

- 1. possess reduced circulatory system
- a. internal transport via pseudocoelom.



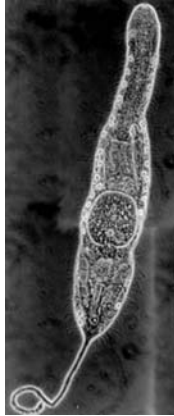
Other Characteristics

- 2. Reduced excretory system:
 - a. Small size permits reliance on diffusion for elimination of waste.



Other Characteristics

- b. Occasionally have protonephridia
- c. also may have solenocytes
- 1. Specialized cells like flame cells but with only 1 flagellum.



Other Characteristics

- b. Bodies are elongated, unsegmented, with an external cuticle.
- 1. They must molt to grow.
- 2. Cuticle assists in locomotion, especially in nematodes.



Other Characteristics

- 3. External ciliation:
 - a. Variously developed depending on the taxon.



Other Characteristics



4. Cephalization.



Other Characteristics

- c. Complete gut
- 1. usually simple.
- 2. with mouth an anus.



Other Characteristics

- d. Eutely
- 2. Results in fixed number of cells within a species.
- 3. Useful in developmental biology in determining fate maps.



Other Characteristics

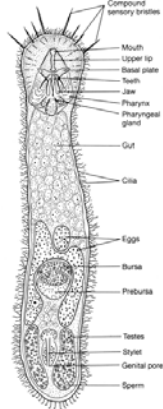
- e. Development:
- 2. Spiral, determinate cleavage.
- 3. Persistent blastopore, that becomes mouth.



Phylum Gnathostomulida

General Characters

- 1. Relatively recently discovered (1956).
- a. Interstitial, in anoxic black sand, may attain high densities.



Phylum Gnathostomulida

- b. Small, 0.2-3 mm.
- c. 100 described species, probably many others that are undescribed.

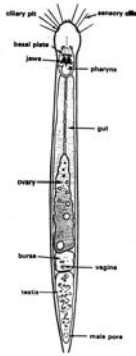


Gnathostomula armata

Phylum Gnathostomulida

General Characteristics:

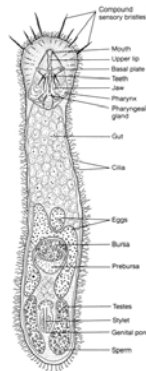
1. Sensory organs: have ciliary pits, sensory cilia.
2. nervous system: anterior cerebral ganglion, buccal ganglion, longitudinal cords in pairs.



Phylum Gnathostomulida

General Characteristics:

3. Blind-ending gut; temporary anus may form.
4. No circulatory, gas exchange system
5. Protonephridia – excretion.



Phylum Gnathostomulida

General Characteristics:

6. Ciliated epidermis – for locomotion; swim/glide with help of cilia and longitudinal muscle contractions; monociliated cells on epidermis; no cuticle.



Phylum Gnathostomulida

General Characteristics:

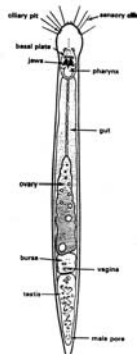
- 7. Feeds with paired jaws in pharynx.
- 8. Protandric (male later becomes female) or simultaneous hermaphrodites.



Phylum Gnathostomulida

General Characteristics:

- 9. Little known about their reproduction; internal fertilization, zygotes deposited singly into habitat.
- 10. spiral cleavage with direct development (no larval stage)



Phylum Gnathostomulida

What sets gnathostomulids apart from others?

Muscular pharynx with complex jaw for grazing; scrape food items off sand grains.



Phylum Gnathostomulida

3. Other notes

- a. Their lack of cuticle and monociliated cells suggests similarity to turbellarians; cross-striated muscles are like cnidarians.



Phylum Gastrotricha

General Characteristics

- 1. Triploblastic, bilaterally symmetrical, unsegmented animals.
- 2. Microscopic
 - a. 400-500 spp
 - b. marine, freshwater, primarily interstitial.



Phylum Gastrotricha

Body Form:

- a. Elongate, ventrally flattened, lobelike head w/sensory tufts.
- b. Adhesive tubes on posterior, produce attachment, detachment secretions.



Phylum Gastrotricha

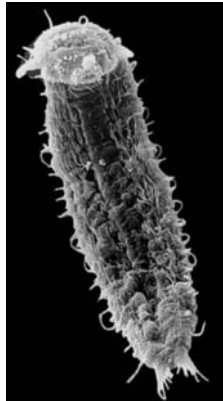
c. Reduced coelom,
mesenchyme-like
material creates nearly
acoelomate condition.

d. Cuticle well-
developed, often with
scales, spines (hence the
name).



Phylum Gastrotricha

1. Also partly syncitial
2. with ventral,
monociliated cells -
linked to flatworms.



Phylum Gastrotricha

e. Muscular pharynx,
complete gut.

f. Excretion,
osmoregulation via
protonephridia

g. No circulation,
respiratory structures -
small in size.

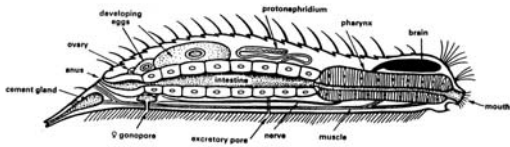


Phylum Gastrotricha

4. Reproduction:

a. Mostly hermaphroditic.

1. Males are rare (may be produced only intermittently).



Phylum Gastrotricha

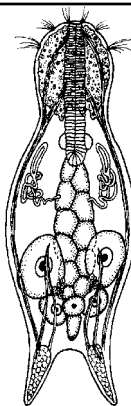
2. Sexuality via mutual hypodermic insemination.



Phylum Gastrotricha

b. Few large eggs produced

1. Direct development, spiral determinate cleavage.



Phylum Rotifera

General Characteristics:

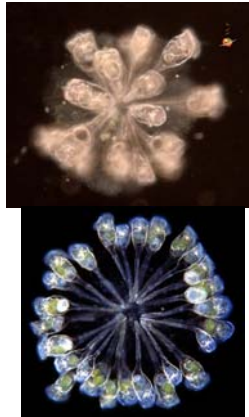
- 1. Triploblastic, bilaterally symmetrical, unsegmented animals.
 - a. Although may appear superficially segmented.



Phylum Rotifera

General Characteristics:

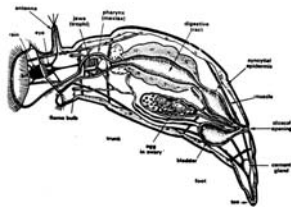
- 2. Common, abundant marine and freshwater species (1800+ spp).
 - a. Mostly microscopic.
 - b. Identified by van Leeuwenhook as "wheel animalcules."



Phylum Rotifera

General Characteristics:

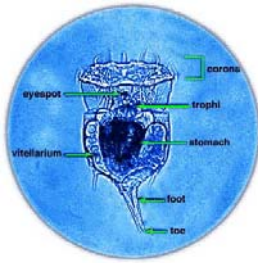
- c. Solitary, some colonial, parasitic.



Phylum Rotifera

Body form:

- a. Three recognizable regions:
 1. Head - feeding apparatus.
 2. Trunk - internal organs.
 3. Foot - attachment, toes with adhesive glands.



Phylum Rotifera

Head:

1. Conspicuous anterior end - ciliated corona.
 - a. Also known as *trochus*; trochal disks in derived forms.
 - b. generates current of water into mouth.



Phylum Rotifera

2. Other feeding structures:

- a. Muscular pharynx – *mastax*.
- b. Variable in structure depending on habitat, food.



Phylum Rotifera

Mastax trophi:

c. 7 hardened elements –
trophi.

1. Redundant structures can facilitate adaptive radiation.
2. Structures must be able to function, even as intermediates.



