Blastocoelomates

General Features
1. A large and heterogeneous group.
   a. Also known as "Aschelminthes" - cavity worms.

b. Nearly any source you consult will have a different arrangement of phyla with different presumed relationships.

Phylogenetic Relationships
a. Probably derived from flatworm lineage.
b. Development resembles that of other protostomes.
c. However, some evidence that certain phyla are related to Arthropods.
Phylogenetic Relationships

There is little doubt that the “blastocoelomates” are polyphyletic.

Flatworm allies:
1. Gnathostomulida
2. Acanthocephala

Acanthocephala appear to be most closely related to Rotifers:
20: Laminar epidermis;
25: Sperm morphology.
Phylogenetic Relationships

Annelid Allies
1. Rotifera
2. Gastrotricha

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

Cycloneuralia

Characters
18(2): Ambiguous “spiral” cleavage.
92: Terminal mouth with radial pharynx.
94(4): Brain collar-shaped; with saddle on pharynx.
A larval loriciferan *Priapulus caudatus*

A horsehair worm *Strongyloides* filariform larva

**Cycloneuralia Characters**

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

**Deuterostome Allies?**

Entoprocta

Cycliophora

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

1. Rotifera - aquatic, small, adaptable feeding apparatus.

**Common Characteristic**

A pseudocoelom.

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

**Pseudocoelom**

1. Allows room for gut, visera.
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:
   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. Varies developed depending on the taxon.
Other Characteristics

4. Cephalization.

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.

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.
  b. Small, 0.2-3 mm.
  c. 100 described species, probably many others that are undescribed.
Phylum Gnathostomulida
General Characteristics:
1. Sensory organs: have ciliary pits, sensory cilia.
3. Blind-ending gut; temporary anus may form.
4. No circulatory, gas exchange system.
5. Protonephridia – excretion.
6. Ciliated epidermis – for locomotion; swim/glide with help of cilia and longitudinal muscle contractions; monociliated cells on epidermis; no cuticle.
7. Feeds with paired jaws in pharynx.
8. Protandric (male later becomes female) or simultaneous hermaphrodites.
9. Little known about their reproduction; internal fertilization, zygotes deposited singly into habitat.
10. Spiral cleavage with direct development (no larval stage).

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.
   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).

b. Few large eggs produced
   1. Direct development, spiral determinate cleavage.

**Phylum Gastrotricha**

2. Sexuality via mutual hypodermic insemination.