**Other Flagellated Protistans.**

➔ One of my favorites!

Family Monocercomonadidae

➔ *Histomonas meleagridis* – Causes BLACKHEAD in chickens, turkeys, and other GALLIFORMES
  - Host: Birds of the order Galliformes. From what we know, only a few species are parasites of birds. Most are parasites of insects.
  - Has a very cool life-cycle.

Chicken (Bird)----- infected with *H. meleagridis*

-can be a carrier and not show infection.

-the protistans can be found in the lumen of the cecum of the bird.

-NEMATODES of the genus *Heterakis* living in the cecum, feed on bacteria and other material in the cecum.

-Nematodes ingest the *Histomonas*, the flagellates proliferate in the intestinal cells, break out into the hemocoel and infect cells in the germinal area of the nematode ovary.

-*Histomonas meleagridis* then can penetrate the oocytes of the developing eggs, and when the egg is formed with a shell, can be deposited and move into the external environment.

-These protistans can also infect the male reproductive tract of male nematodes and can probably be transmitted to the female during transfer of sperm from male to female.

-Eggs pass out, with the *Histomonas* in the egg. The eggs have been shown to be infective for at least two years buried in soil. The cycle is completed when the egg is re-ingested by a galliform bird, the egg hatches, and the *Histomonas* is released into the cecum of the host. Earthworms can pull the egg into its gut and get eaten by the galliform bird.

**Phylum Microsporidia –**

- ➔ -Recent molecular evidence shows that the Microsporidians are actually derived from the Phylum Cnidaria, so the phylum designation here is only a place holder for the time being.

**Family Nosemidae** – microsporidian parasites of bees and other insects.

- ➔ *Encephalitozoon cuniculi, E. bienuesi* – microsporidians that occurs in vertebrates – including humans and can cause epidemics in areas that have birds defecating in the water that is consumed. Immunocomp. Problems!

MYXOZOA – Have the same structure as the CNIDOCYTES of the cnidarians!

**Family Myxobolidae** -can be big problems in fish hatcheries.

-causes "WHIRLING DISEASE" (various species of ***Myxobolous***) infect salmonids at high numbers in fish culture. See references by HOFFMAN and page 180. Book. JJ drawing.

## MESOZOA

Two groups that parasitize marine invertebrates, mostly in cephalopod mollusks.

-no circulatory system

-no digestive system

-no nervous system

-no excretory system

Classification:

Phylum Mesozoa

Class Dicyemida – infect kidneys (renal cells) of cephalopods

Class Orthonectida – infect Echinoderms, Nemerteans, Annelida, Turbellaria, Mollusca

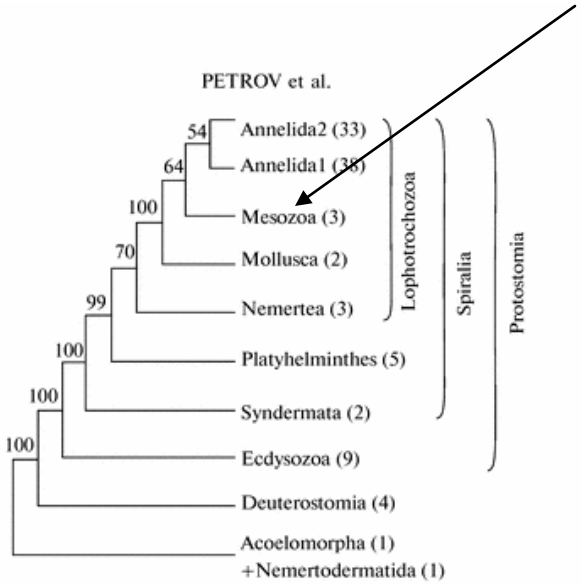


**Fig. 1.** A schematic representation of Bayes phylogenetic tree of main groups of bilaterally symmetrical animals. The analyzed set included 101 sequences of 18 + 28S rRNA genes (4564 nucleotide positions), 71 of them belonged to Annelida groups and related species (Sipuncula, Echiura, and Pogonophora). The numbers on the branches represent the statistical support, % of posterior probability. The parenthetical numbers indicate the number of sequences.

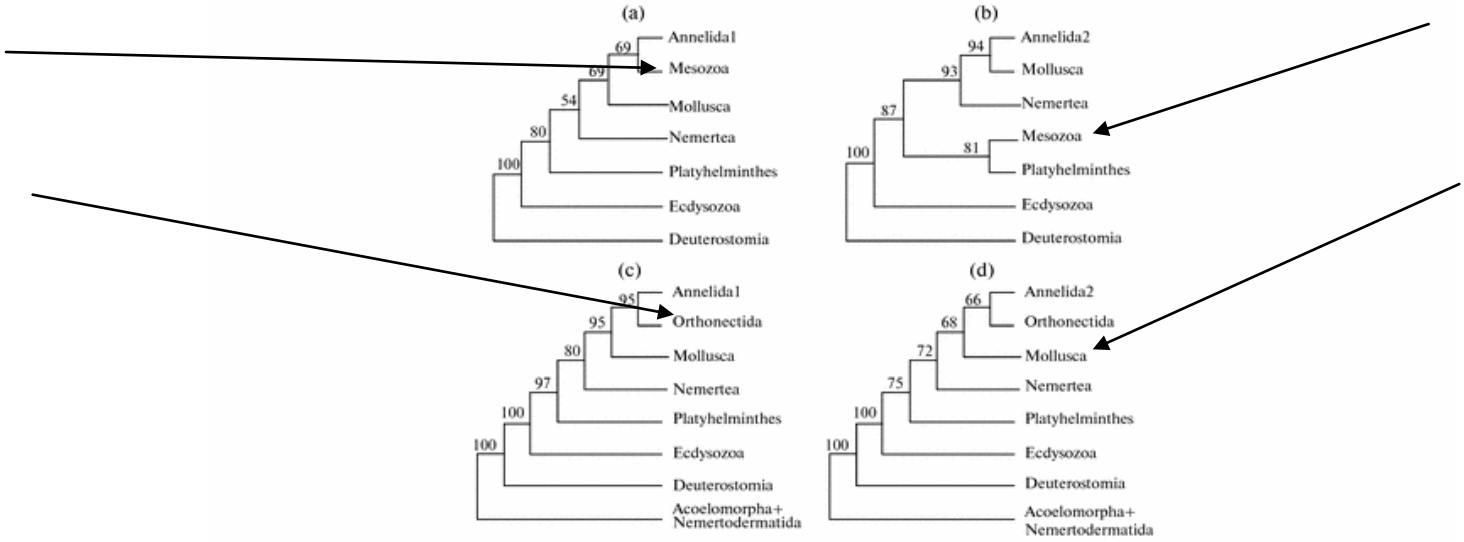


**Fig. 2.** Schematic representation of the Bayes phylogenetic tree of main groups of bilaterally symmetrical animals. The analyzed set included various numbers of 18 + 28S rRNA gene sequences (4564 nucleotide positions). In the (a) and (b) panels Mesozoa are represented by two groups (Orthonectida and Dicyemida); in (c) and (d) Mesozoa are represented only by Orthonectida. Numbers on branches represent the statistical support, % of posterior probability.

Moscow University Biological Sciences Bulletin. 2010. 65: 176-169.

**With reference to the phylogenetic position of the Mesozoa.**

➔ -The Orthonectida and the Dicyemida are shown in the trees above as sister taxa to the annelids in 4 of 5 potential trees developed via an analysis of rRNA genes (18s and 28s rRNA).

➔ It is clear that these are not ”degenerate” metazoans, and are simply offshoots of the precursors that gave rise to the annelids after the initial divergence of the Annelid Mesozoan ancestor from the Mollusca.

➔ The idea that a group of organisms is “degenerate” stems from a view of evolution that has been roundly discredited and falsified. This is the idea of “**Orthogenesis**” that organisms have an internal drive toward some end or in a particular direction; The proponents of this - then ignoring selection as the driving force in the evolution of organisms. This is what is termed **Teleological** thinking.

➔ **-** The concept of devolution or degenerate evolution as regress from progress relates to the ancient ideas that either life came into being through special creation or that humans are the ultimate product or goal of evolution.

➔ The latter belief is related to anthropocentrism, the idea that human existence is the point of all universal existence. Such thinking can lead on to the idea that species evolve because they "need to" in order to adapt to environmental changes. Biologists refer to this **misconception as teleology**, ***the idea of intrinsic finality that things are "supposed" to be and behave a certain way, and naturally tend to act that way to pursue their own good.***

➔ From a biological viewpoint, in contrast, if species evolve it is not a reaction to necessity, but rather that the population contains variations with traits that favor their natural selection. This view is supported by the fossil record which demonstrates that roughly ninety-nine percent of all species that ever lived are now extinct.

**PHYLUM PLATYHELMINTHES**

1. DORSOVENTRALLY FLATTENED
2. USUALLY WITH LIMITED DIGESTIVE SYSTEM – usually a blind sac. Rarely have an anus.
   Cestodes have no digestive system
3. <1MM TO >60 METERS IN LENGTH
4. ACOELOMATE
5. BILATERALLY SYMMETRICAL
6. CILIATED EPITHELIAL TISSUE – Except in adult Cestoda and Digenea
7. CEPHALIZED – WITH WELL-DEVELOPED NERVOUS SYSTEM NERVOUS SYSTEM – ladder type
8. OSMOREGULATORY SYSTEM – FLAME CELLS ALSO CALLED PROTONEPHRIDIA.
   a. Arranged into a system of ducts with dorso ventral orientation.
   b. Variable kinds of flame cells that participate in osmoregulation.

Phylogenetic relationships among the Plathyhelminthes.

Classification of the Platyhelminthes – emphasizing only those we will study in our course. Look at the book for a more complete classification, but note this is not a classification that was developed from intense study, but instead was taken from several sources.

Phylum Platyleminthes – with characters as noted above.

Class Trematoda

- Posterior adhesive organ modified into a muscular sucker.
- -Adults usually with an anterior oral sucker and a muscular pharynx posterior to the oral sucker.

Subclass Aspidobothrea

- Specialized microvilli and microtubules in neodermis.
- Posterior sucker compartmentalized

Order Aspidobothriiformes

Subclass Digenea

- First larval stage – Cilia Covered Miracidium
- Life cycle with sporocyst generation(s) and Cercaria

- Gut development paedomorphic (possession of characters in adult that were manifested in the developing young)

O. Paramphistomiformes

O. Echinostomatiformes

O. Hemiuriformes

O. Strigeiformes

O. Opisthorchiformes

O. Plagiorchiformes

Class Monogenoidea

Contains several groups that are not phylogenetically their closest relatives. There is no RULE that says a classification NEEDS to be based on monophyly. But it does not seem to be logical not to construct

**O. Dactylogyridae**

**O. Gyrodactylidae**

**O. Polystomatidea**

O. Mazocraeidea

O. Diclybothriidea

O. Chimaericolidea

**Class Cestoidea (I like Class CESTODA) but to make the classification work we will use CESTOIDEA as the class name here)**

No intestine, cercomer paedomorphic, oral sucker and pharynx either vestigial or non-existent.

Larval cercomer with varying numbers of hooks.

**Sublcass Cestodaria**

**O. Cyrocotylidea**

**O. Amphilinidea**

**Subclass Cestoda**

**O. Pseudophyllidea**

**O. Caryophyllidea**

**O. Spathebothriidea**

**O. Cyclophyllidea**

**O. Proteocephalata**

**O. Rhinobothriidea**

**O. Tetraphyllidea**

**O. Trypanorhyncha**

**Turbellaria** – a large group that should not be included with the flatworms based on both the morphology of the transitory stomach and digestive system that comes in to play and then is resorbed when the food is digested.

Many turbellarians are parasitic to various degrees of molluscs and crustaceans.

Common turbellarians like *Syndesmis* and *Syndisyrinx* spp. occur in and on sea urchins. Check the paper on the species of *Syndisyrinx* from urchins in the Caribbean – this was done by one of my great friends Lynn Hertel, who loved the sea and parasites.

Class Trematoda – classification follows the book, but this is not a phylogenetically based classification as the Aspidobothreans are actually sister taxa to the Trematoda. See page 207.

Subclass Aspidobothrea (also know as Aspidogastrea)

Parasitic in and on molluscs, turtles, ratfish, and others

Subclass Digenea (the digenetic trematodes).

Structures.

Life cycle – general.

Various species.