



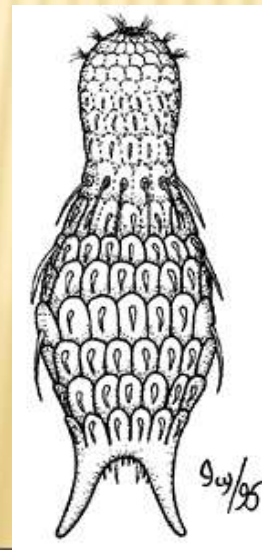
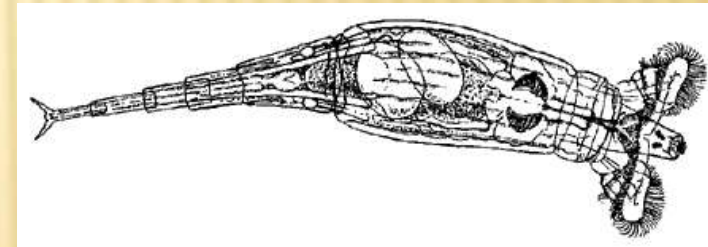
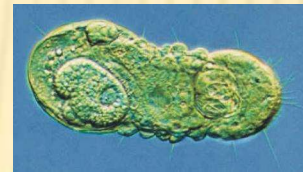
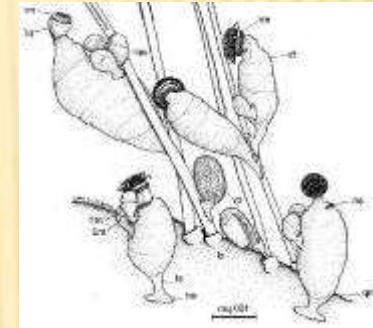
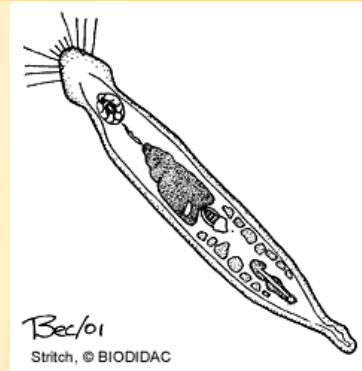
× Biology of animals



by Oldřich Nedvěd, Faculty of Science, USB

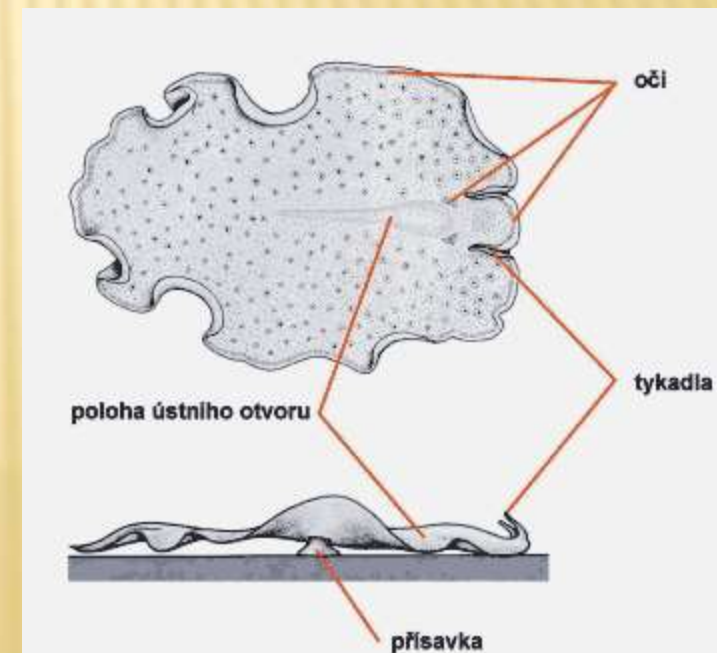
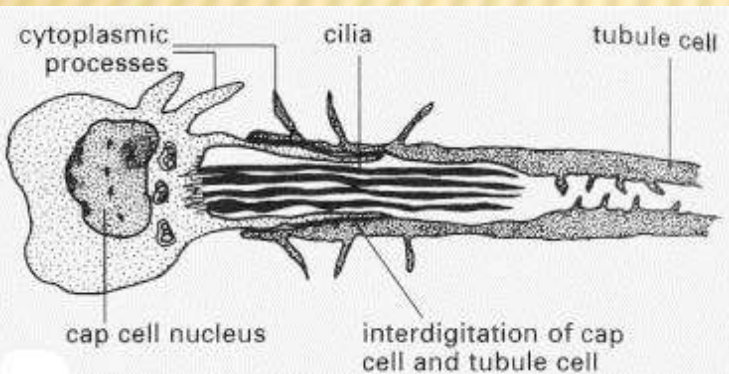
PLATYZOA -

- system
 - × Platyhelminthes
 - × Gnathifera
 - Gnathostomulida
 - Micrognathozoa
 - Cyclophora
 - Syndermata
 - Rotifera
 - Acanthocephala
 - × Gastrotricha



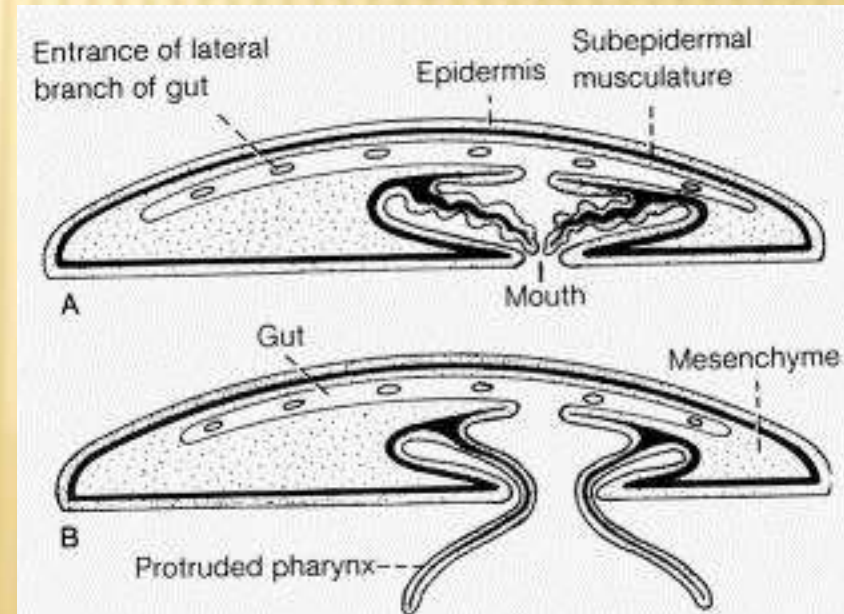
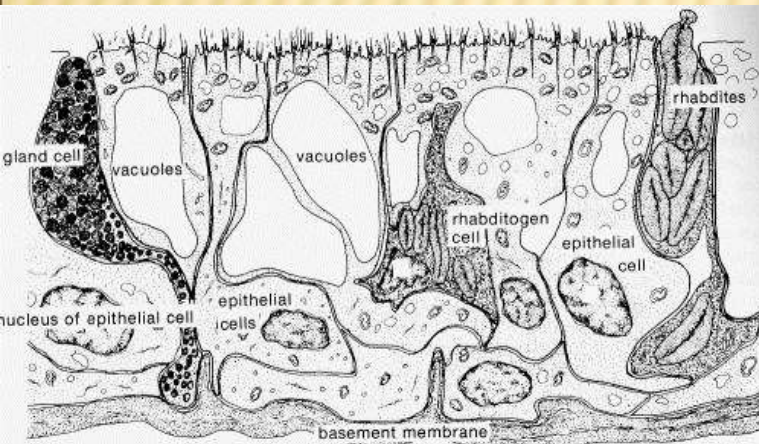
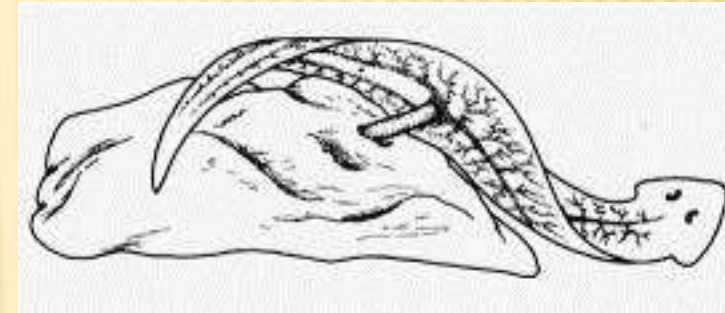
PLATYHELMINTHES - FLATWORMS

- body plan
 - × no body cavity
 - all filled with organs, muscles, and mesenchym
 - × weak cephalisation („head“)
 - easy diffusion
 - × flat
 - easy diffusion
 - × blind branched digestion system
 - × excretion: protonephridia
 - solenocytes



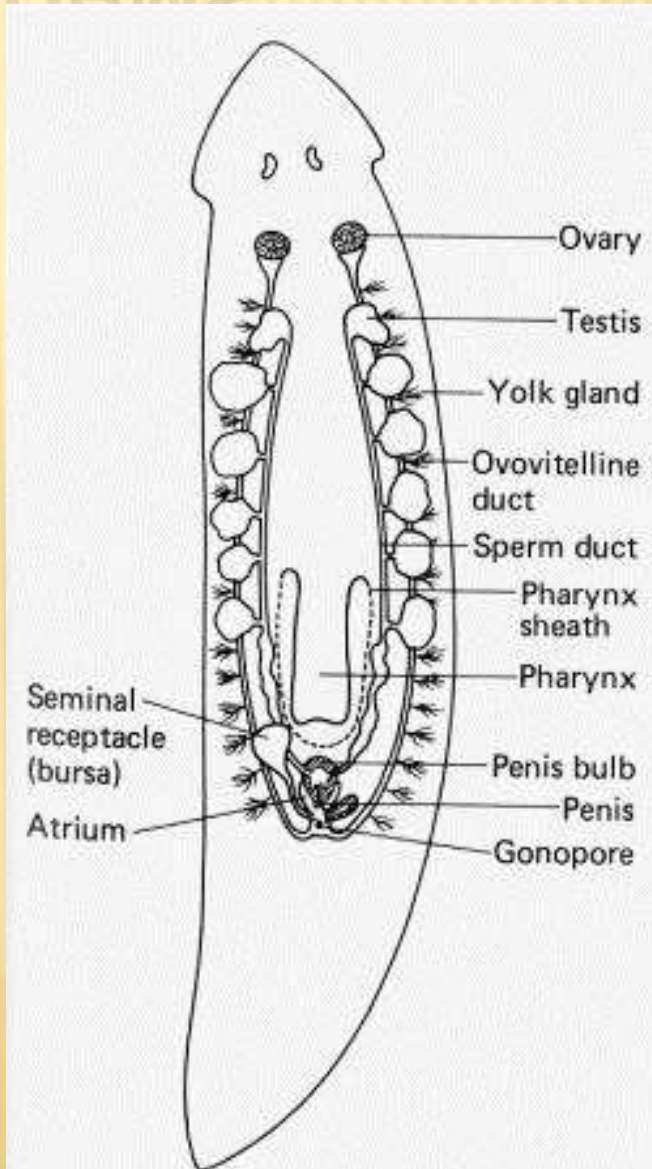
PLATYHELMINTHES - FLATWORMS

- food
 - × predators, parasites, detritophagous
 - × pharynx
 - × branched system
- movement
 - × muscles
 - × mucus
 - rhabdites
 - × ciliated epidermis



PLATYHELMINTHES - FLATWORMS

- reproduction
 - × sexual
 - × simultaneous hermaphrodites
 - vitellaria and germaria
 - × asexual
 - paratomy
 - larvae of parasites



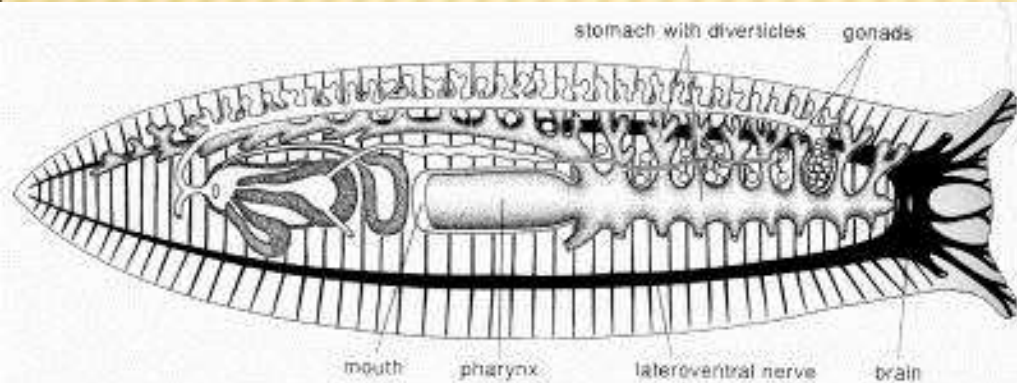
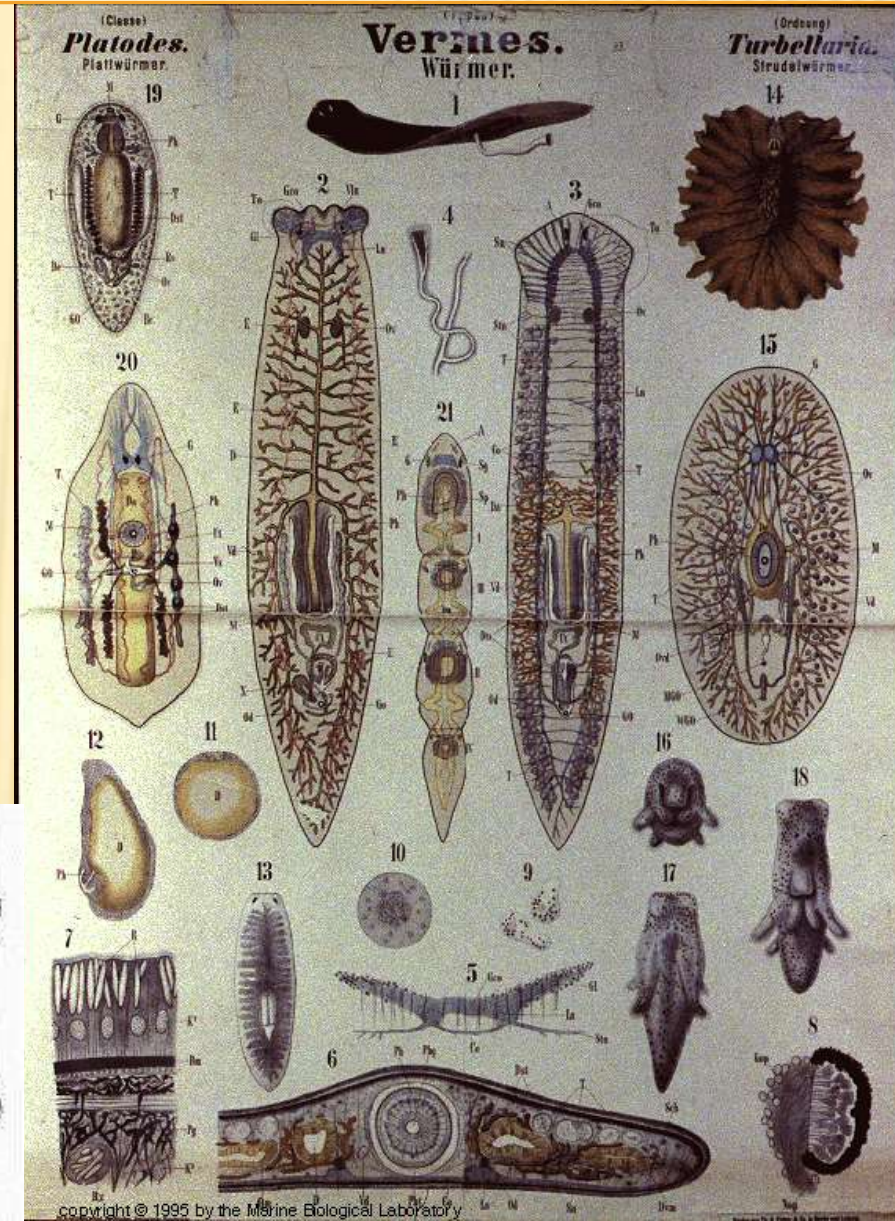
POLYCLADIDA -

× large colourful marine flatworms



TRICLADIDA -

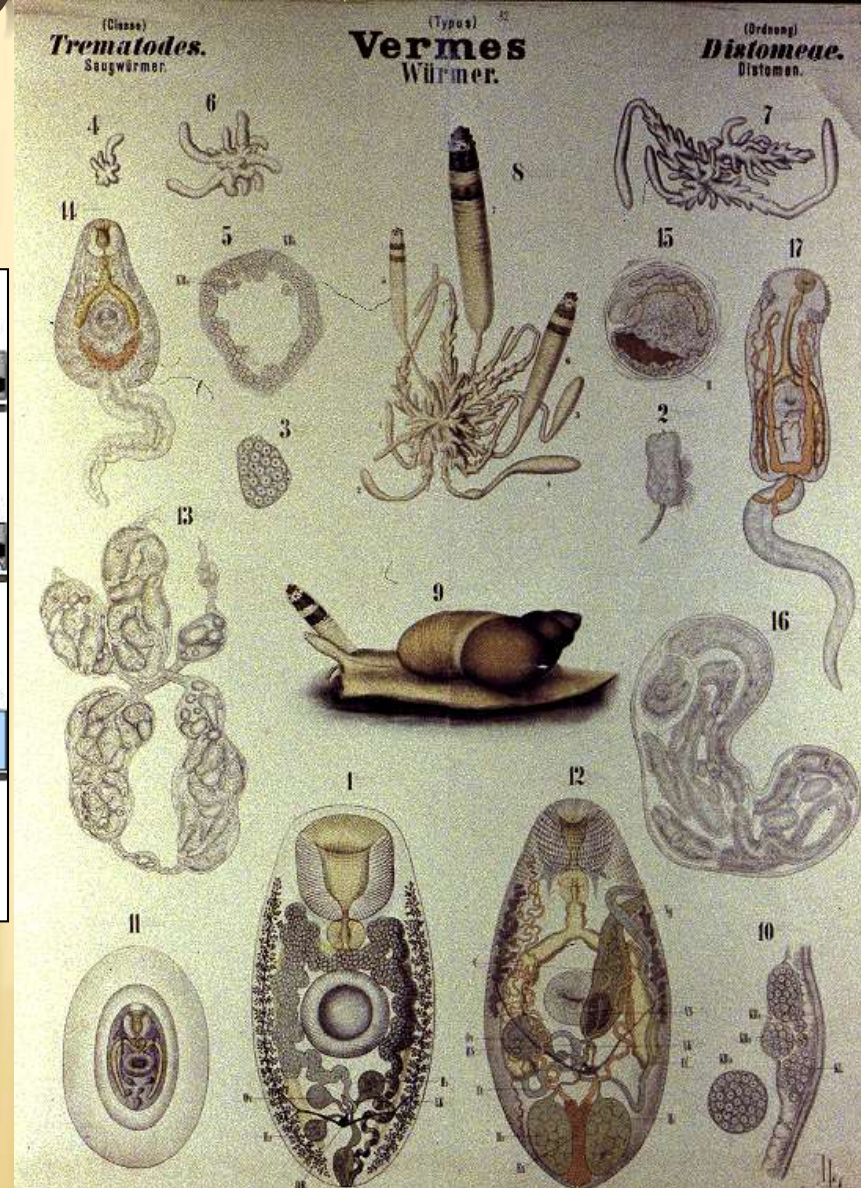
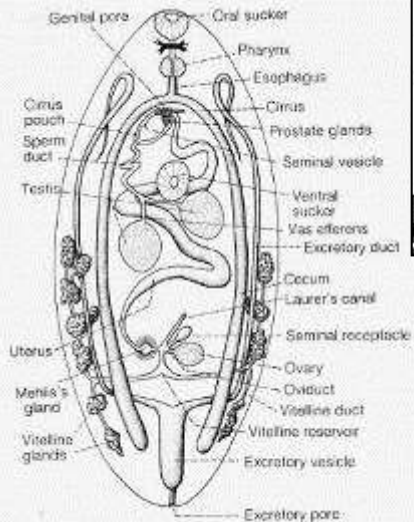
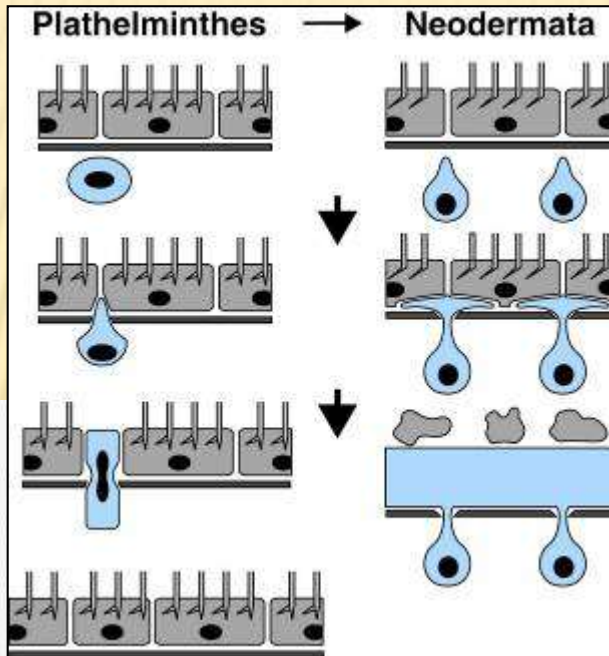
- ✗ turbellarians - planarians
- ✗ predators
- ✗ Marine, freshwater, terrestrial



PLATYHELMINTHES: generalized turbellarian

TREMATODA (DIGENEA)

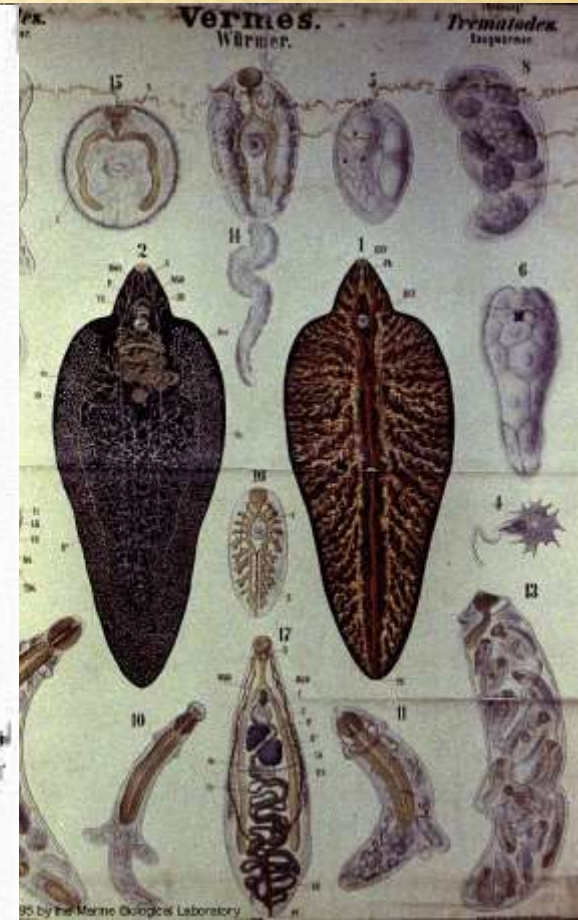
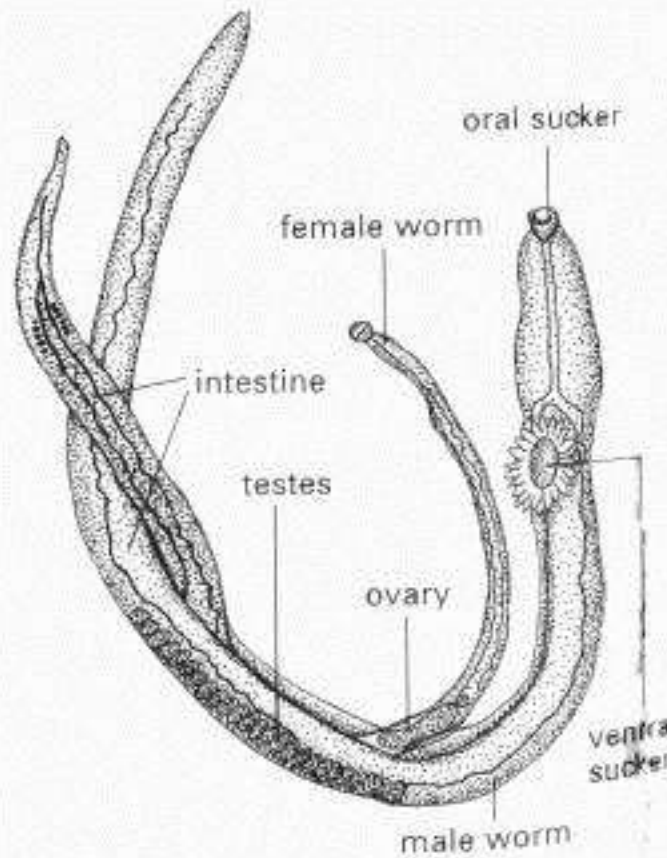
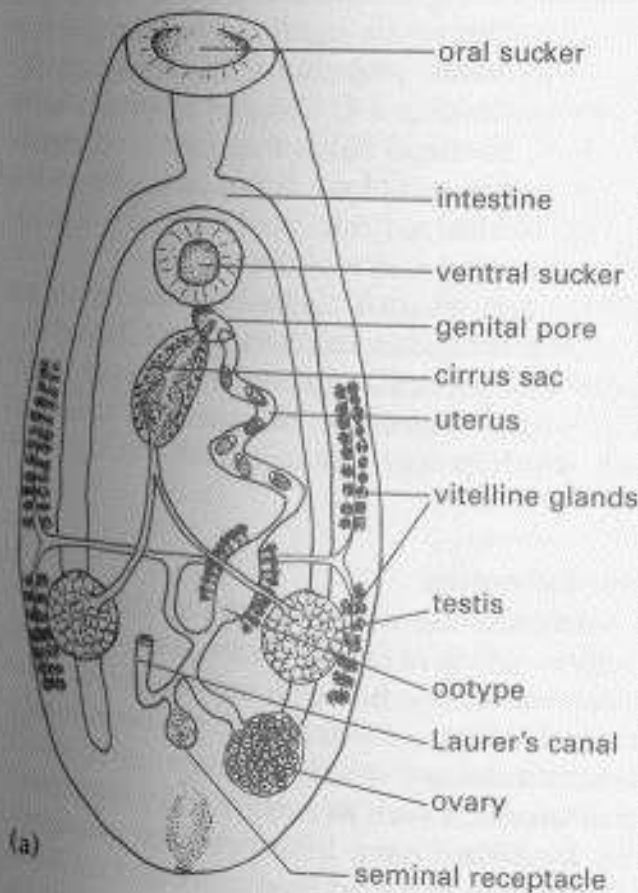
- ✗ new skin
- ✗ suckers: mouth, ventral
- ✗ parasites, 2-3 hosts



TREMATODA (DIGENEA)

× reproduction

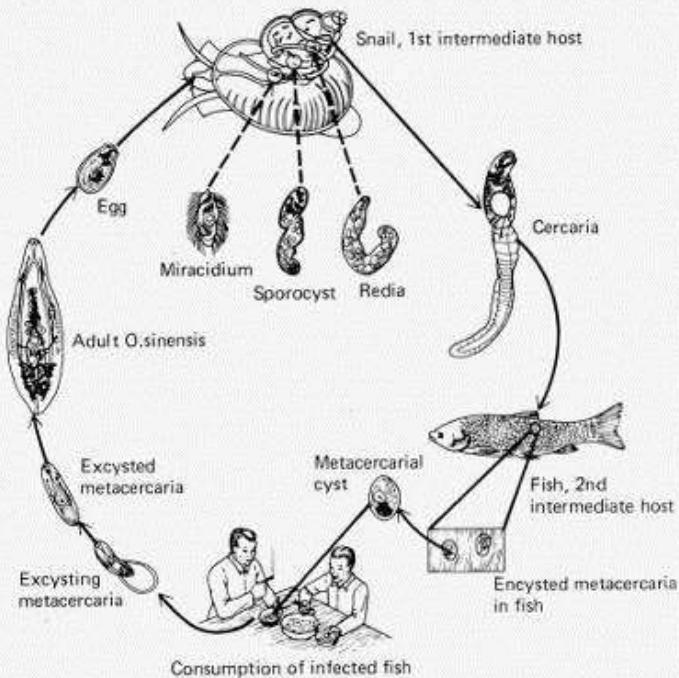
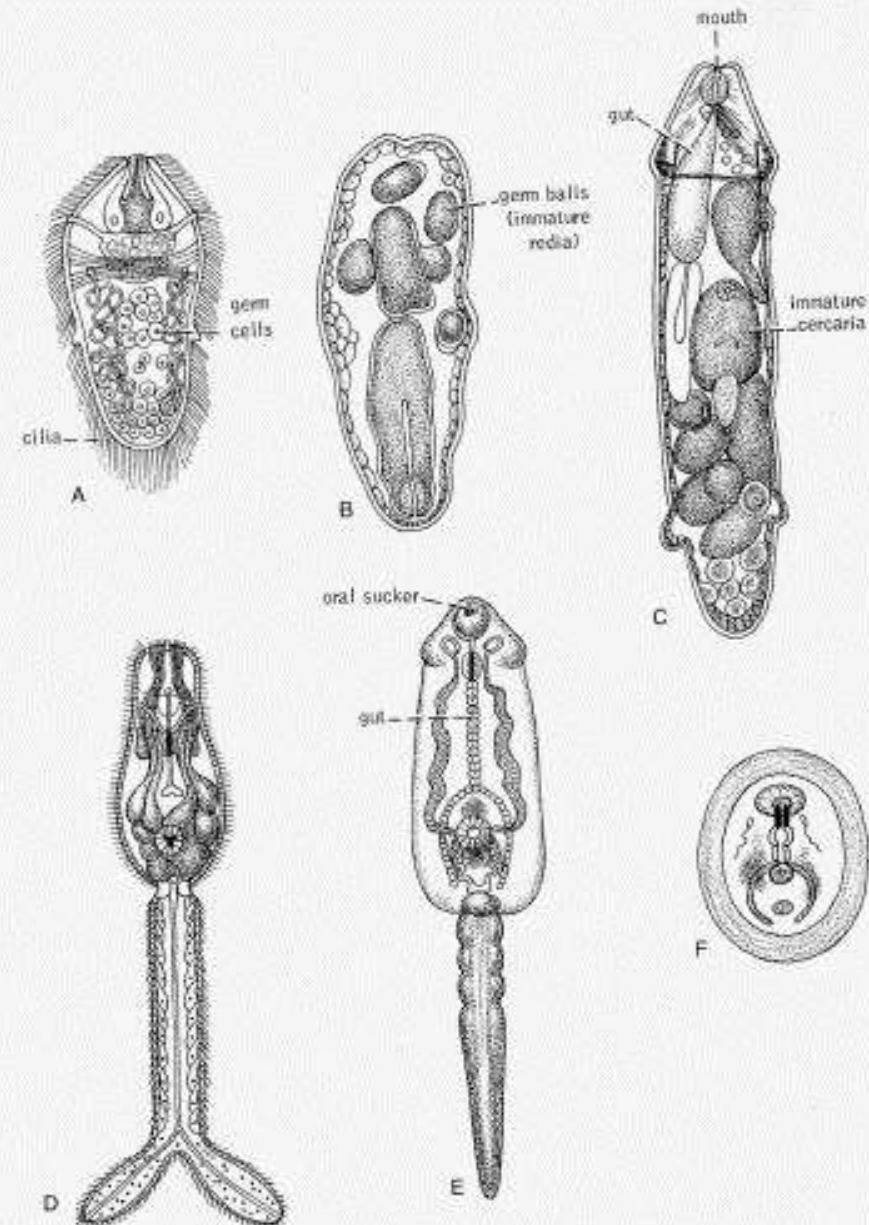
- hermaphrodites
- exceptionally gonochorists - Schistosoma



TREMATODA (DIGENEA)

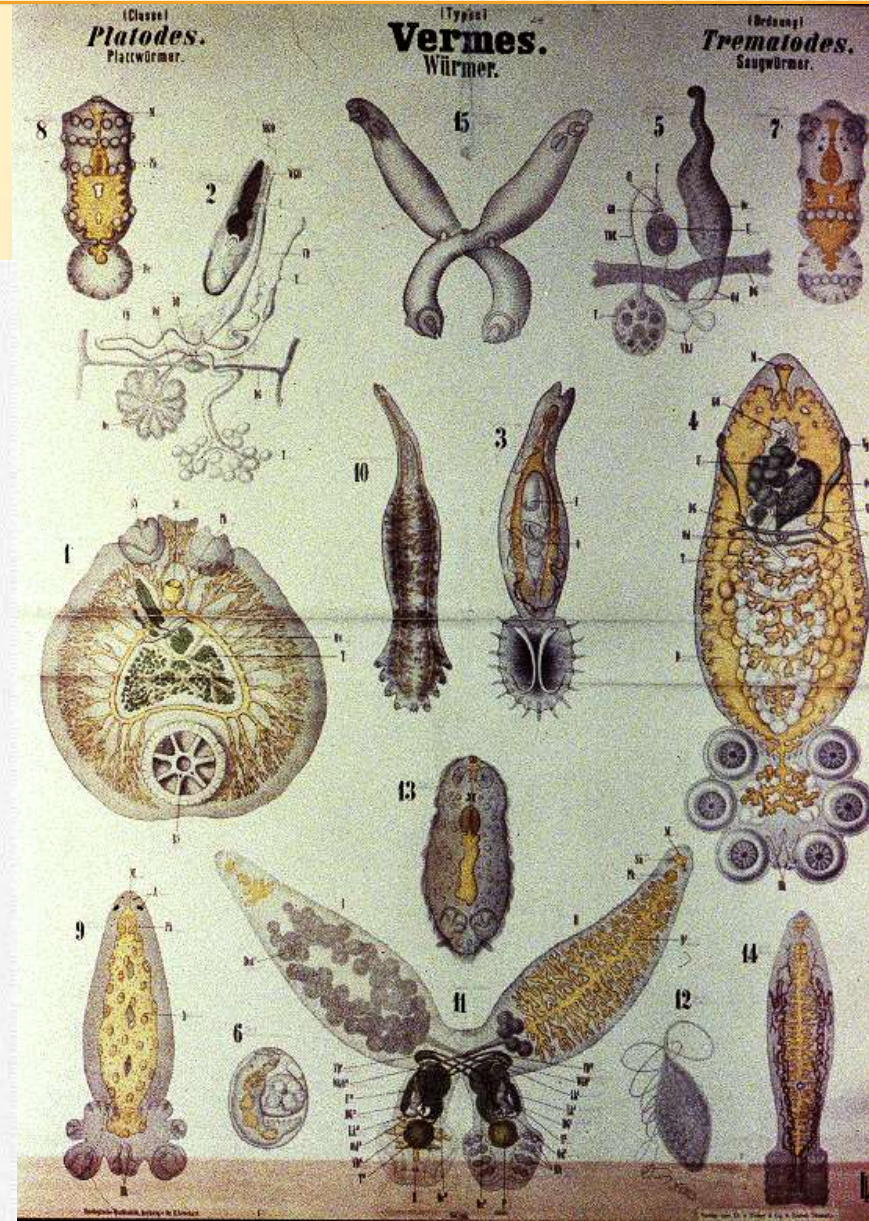
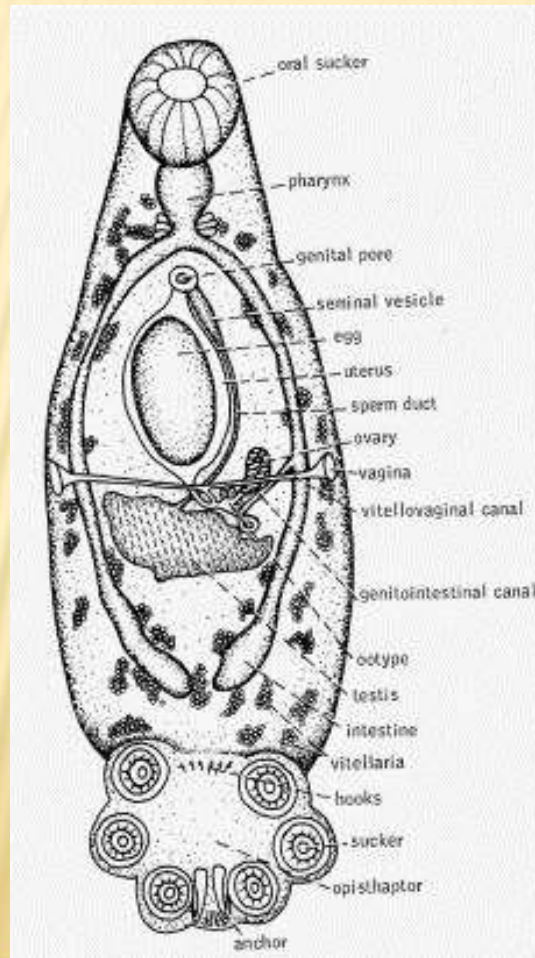
× development

- miracidium
- sporocyst
- redia
- cercaria
- adult



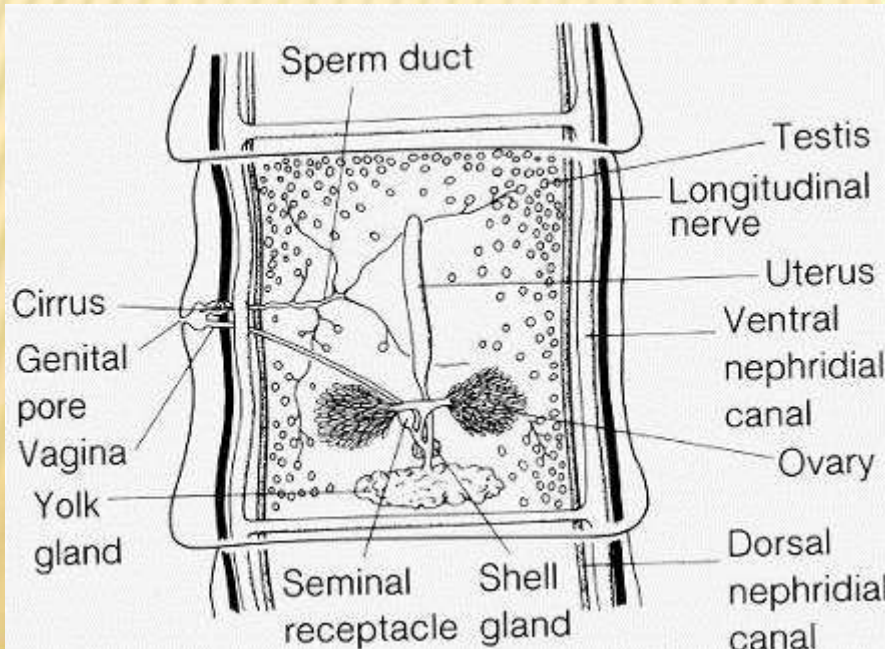
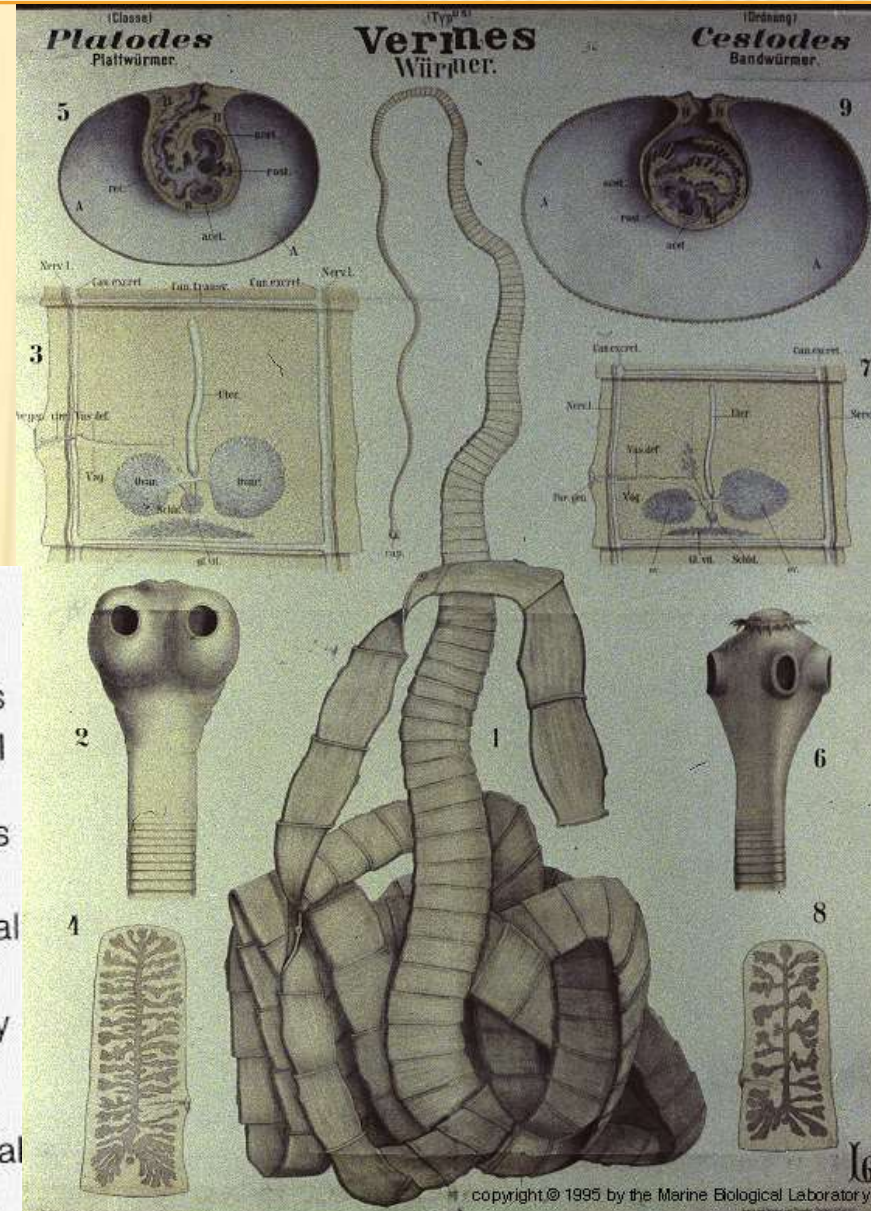
MONOGENEA

- ✗ ectoparasites, one host
- ✗ opisthaptor



CESTODA

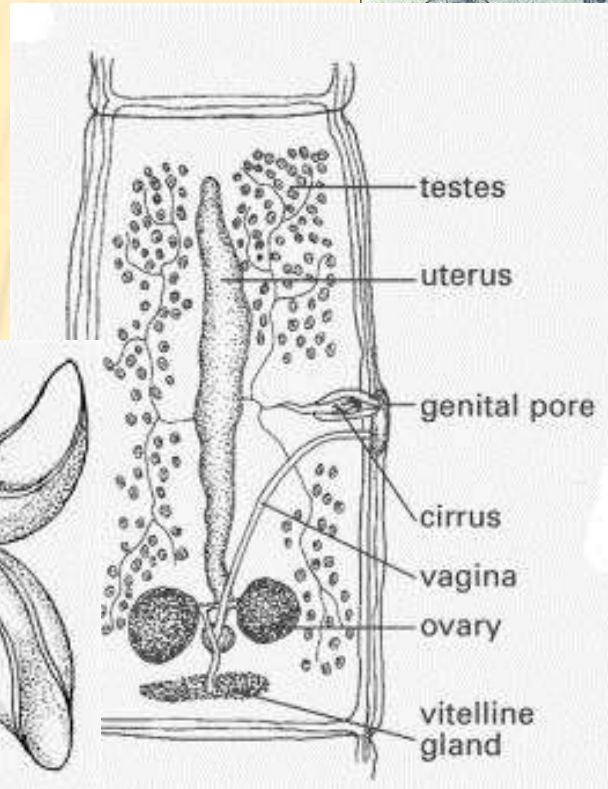
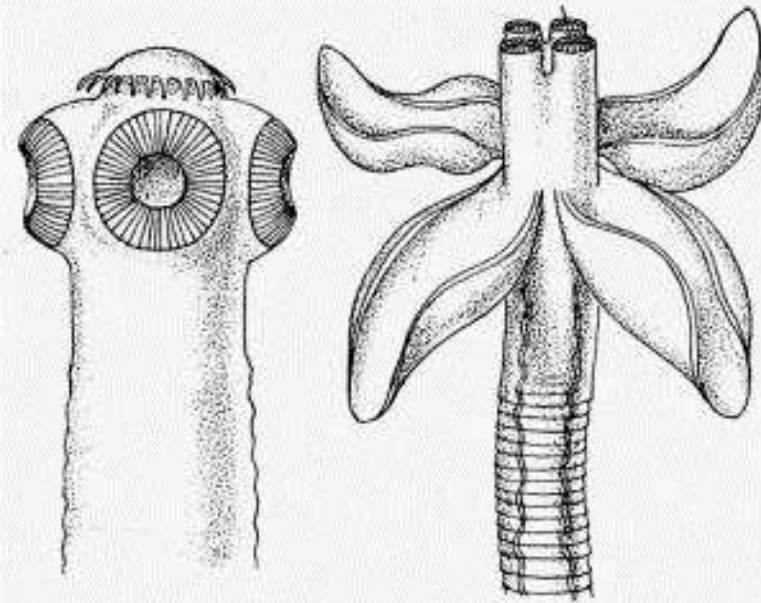
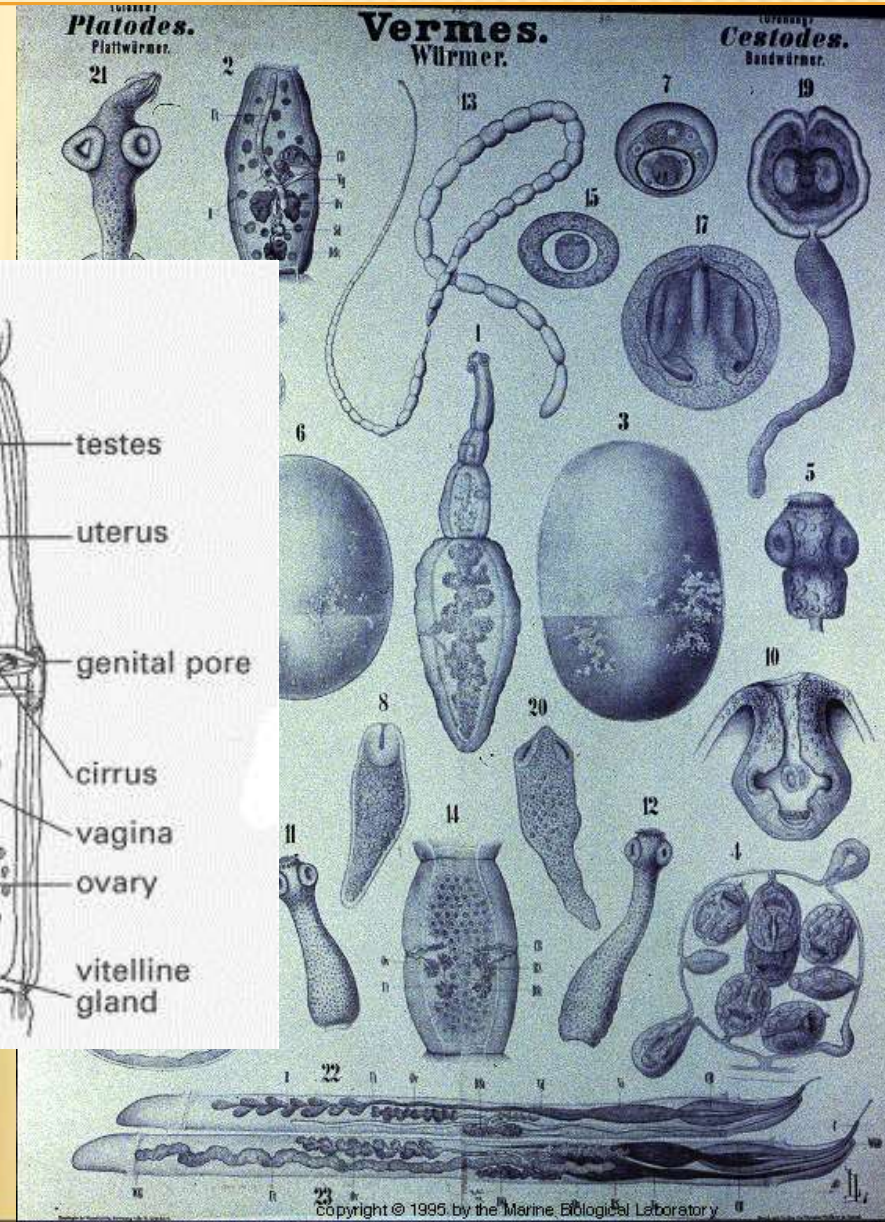
- ✗ parasites
- ★ in tissues and gut
- ✗ no digestion organs



CESTODA

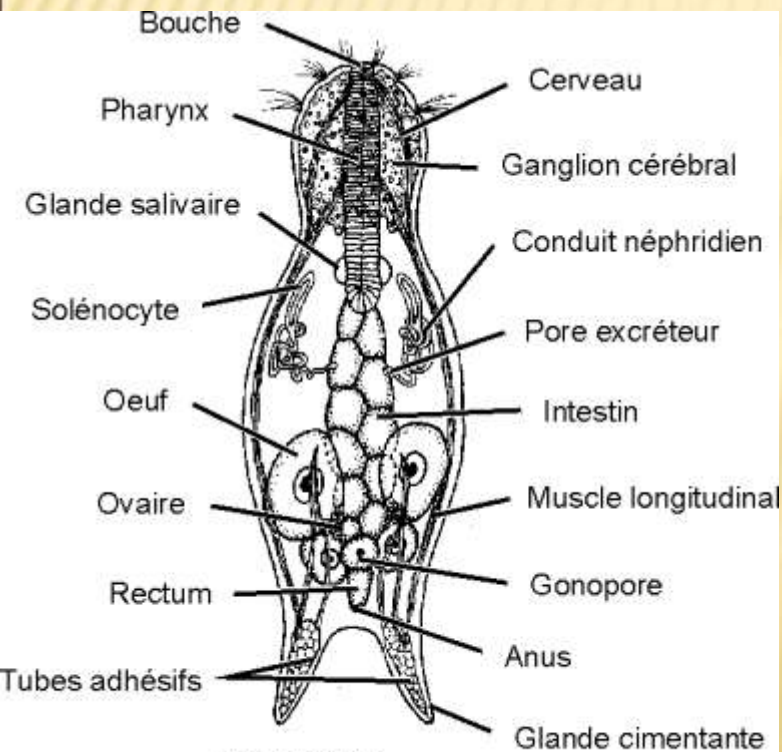
× reproduction

- hermafroditas (proterandry)
- scolex, proglotids

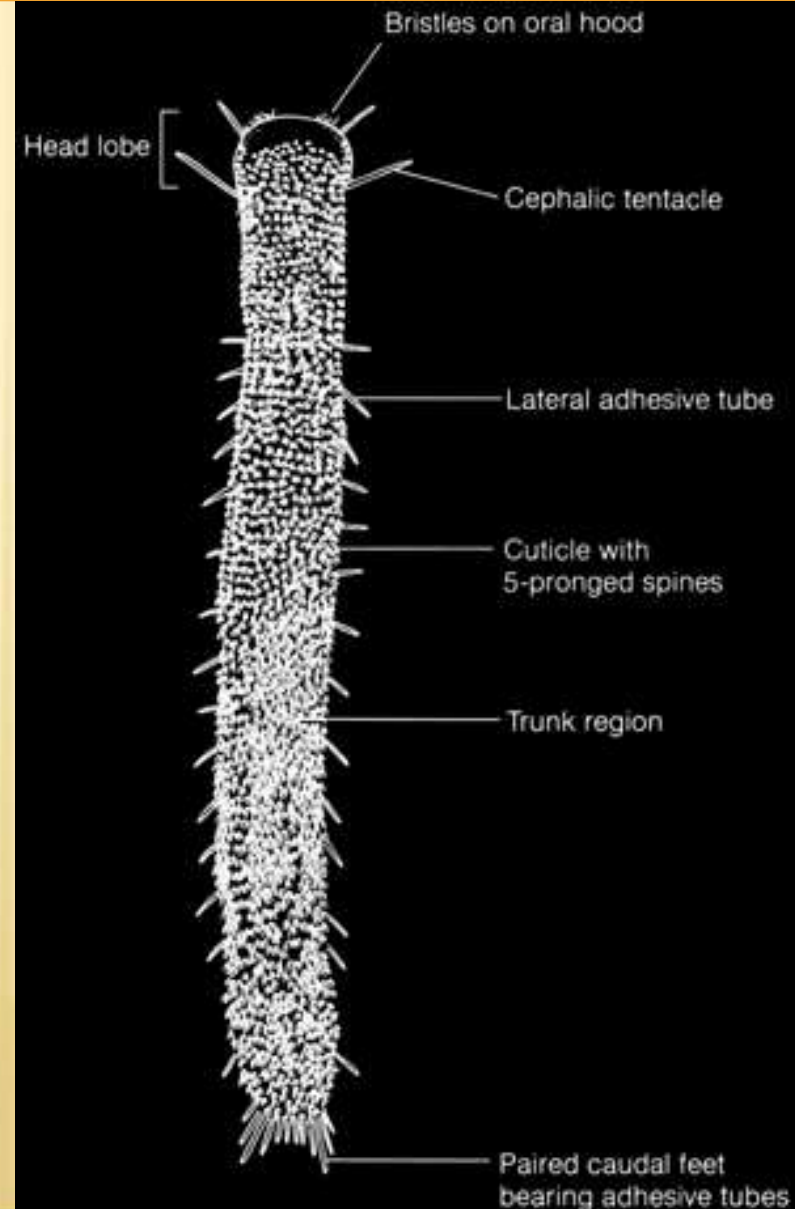


GASTROTRICHA

- body plan
 - ✗ no body cavity or pseudocoel
 - ✗ ciliated epidermis, cuticle
 - ✗ terminal adhesive furca
 - ✗ 0,05 to 4 mm

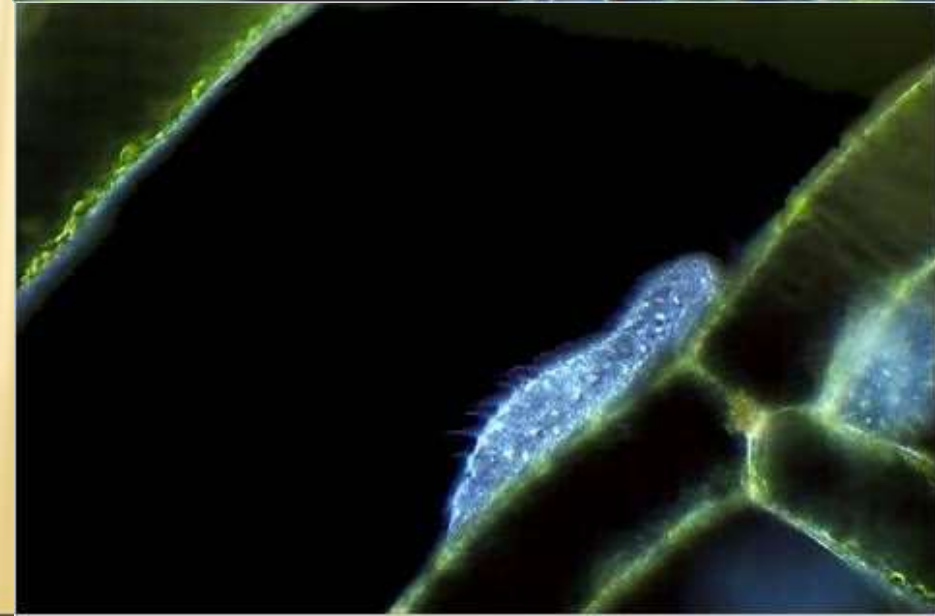


Livingstone, © BIOCIDAC



GASTROTRICHA

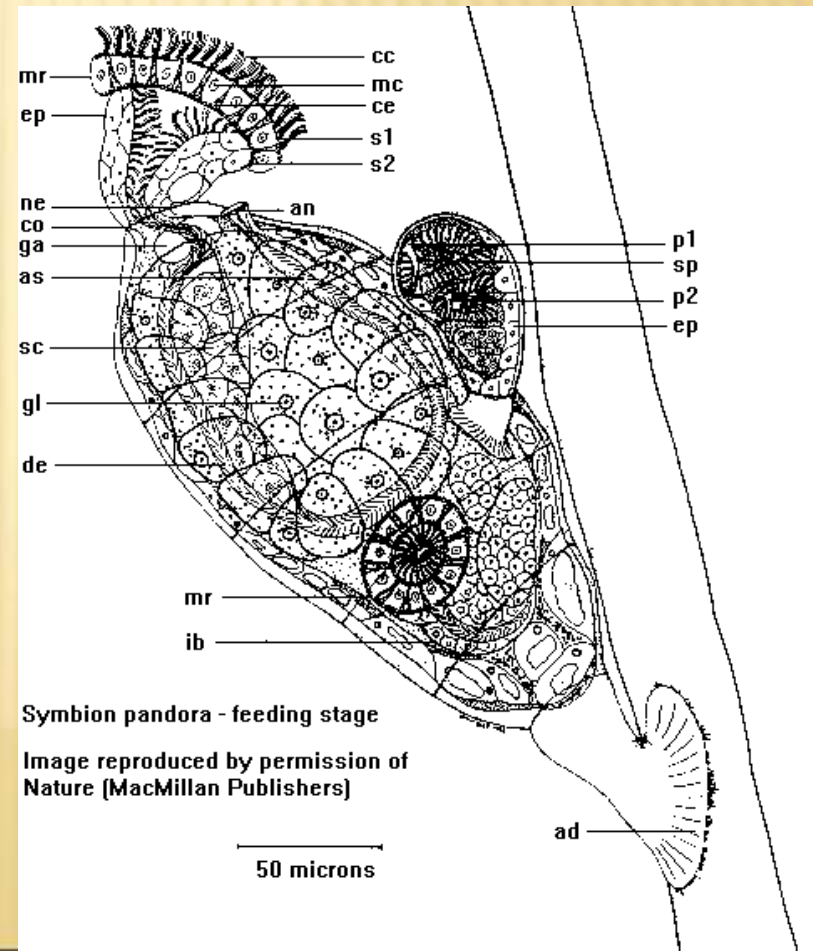
- food
 - × detritophagous (bacteria, moulds, algae)
 - × straight digestive tube
- movement
 - × ciliated skin
- reproduction
 - × parthenogenetic (freshwater)
 - × sequential hermaphrodites (marine)
 - × large eggs



CYCLIOPHORA

× *Symbion pandora*

- described in 1995
- on *Nephrops norvegicus*
- filtrator



Symbion pandora - feeding stage

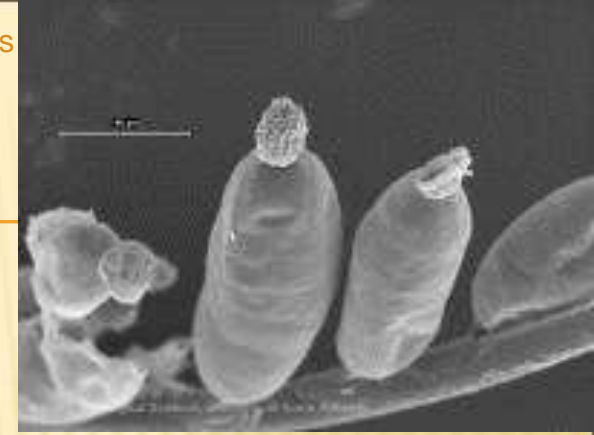
Image reproduced by permission of Nature (MacMillan Publishers)

50 microns



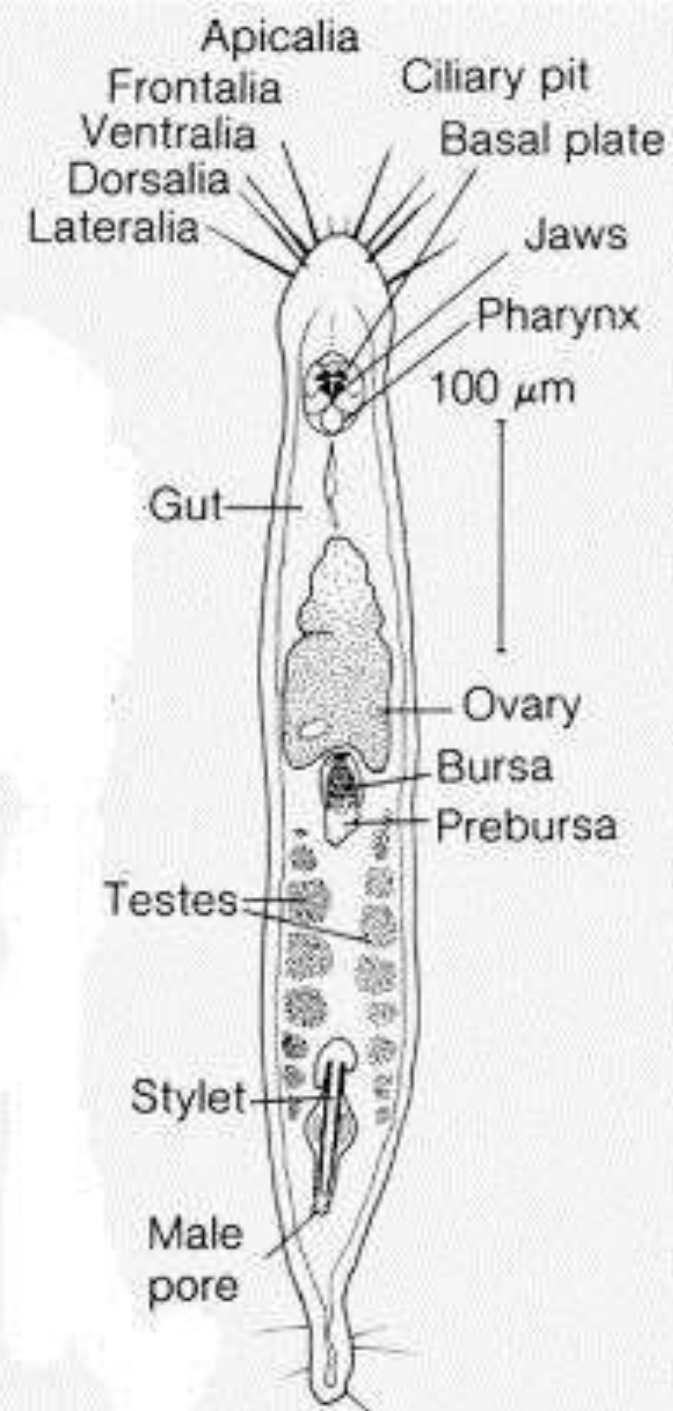
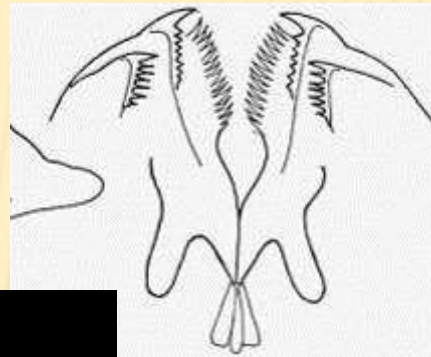
CYCLIOPHORA

× comensals on *Nephrops* and *Homarus*



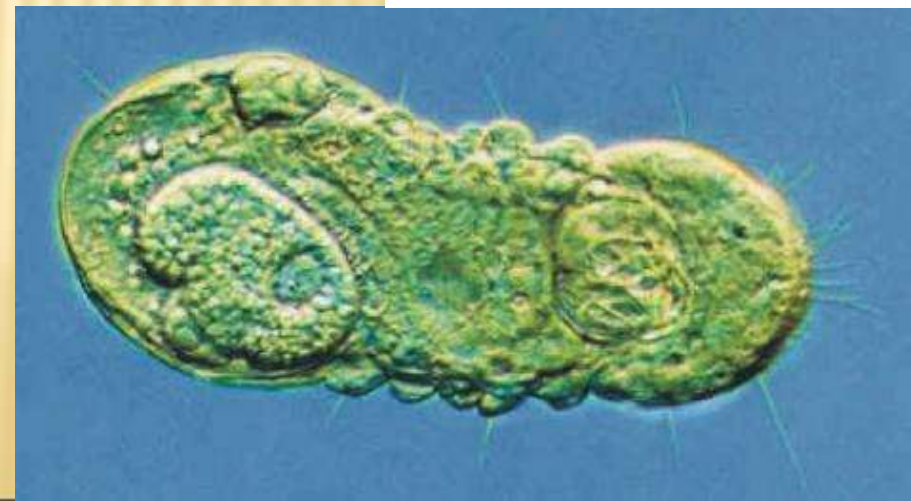
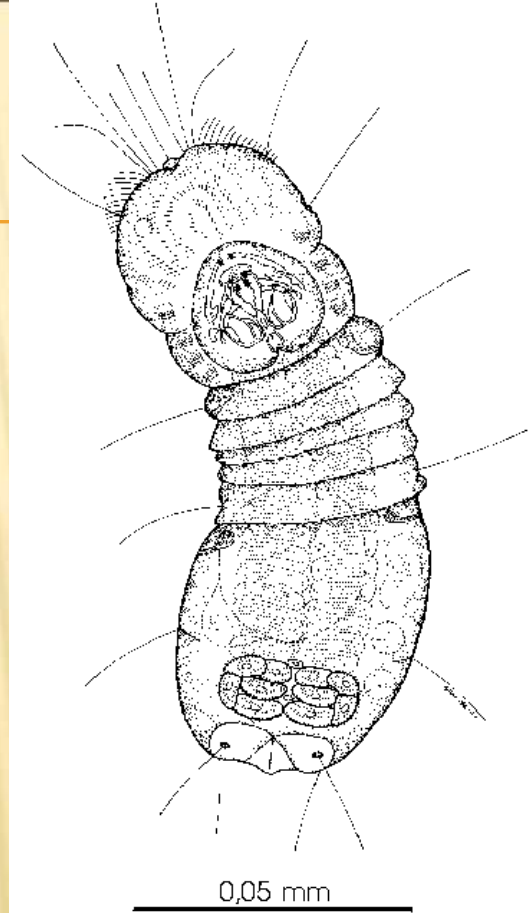
GNATHOSTOMULIDA

- × 0,5 - 4 mm
- × jaws
- × marine, mesopsamon, meiofauna
- × H₂S, low oxygen
- × reproduction
 - ★ hermaphrodites



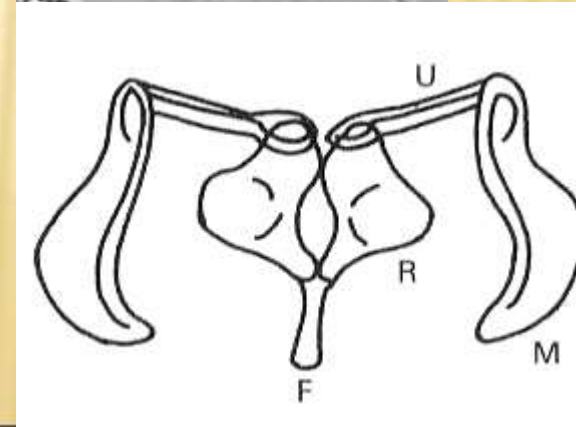
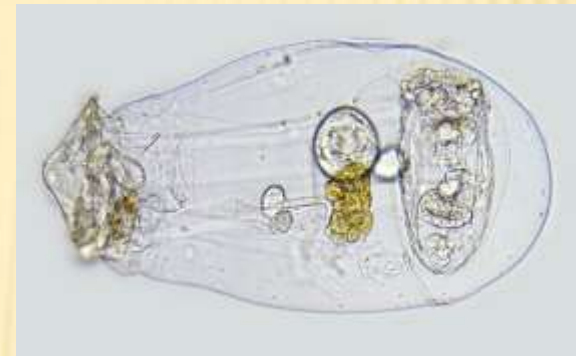
MICROGNATHOZOA

- × *Limnognathia maerski*
 - ★ described in 2000
 - ★ near Greenland
- × 150 micrometers
- × feed on bacteria, diatoms
- × jaws
- × intracellular skeleton



ROTIFERA

- × = Rotatoria
- × (0,04) 0,2-0,5 (2) mm
 - * euthely: up to 1000 cells
- × syncytial skin(Syndermata)
 - * intracellular skeleton
- × ring of cilia
 - * feeding
 - * swimming
- × mastax – stomach with jaws



ROTIFERA

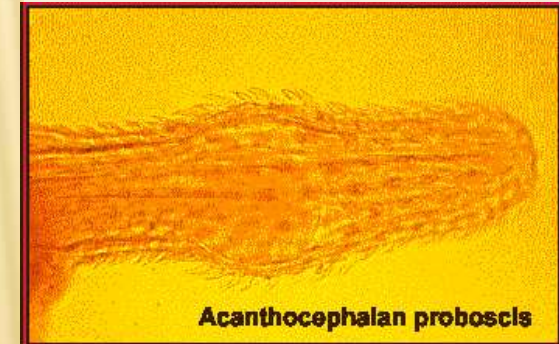
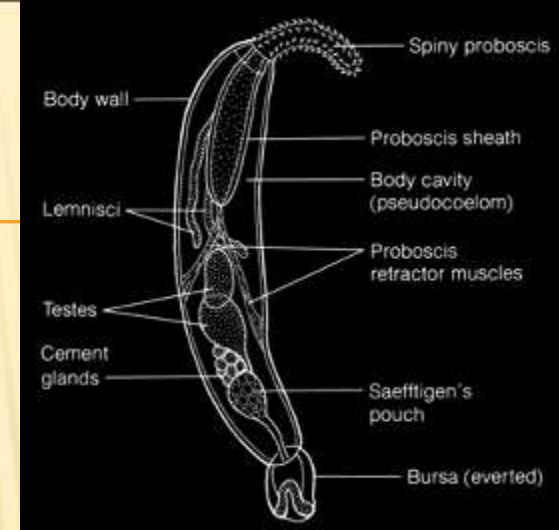
- × marine, freshwater, soil
 - ★ epiphytic, epizootic
 - ★ planctonic and sedentary
- × cryptobiosis
- × reproduction
 - ★ partenogenetic
 - class Bdelloida
 - ★ gonochorists
 - male small, seasonal
 - spermatozoids prosokontic



ACANTHOCEPHALA

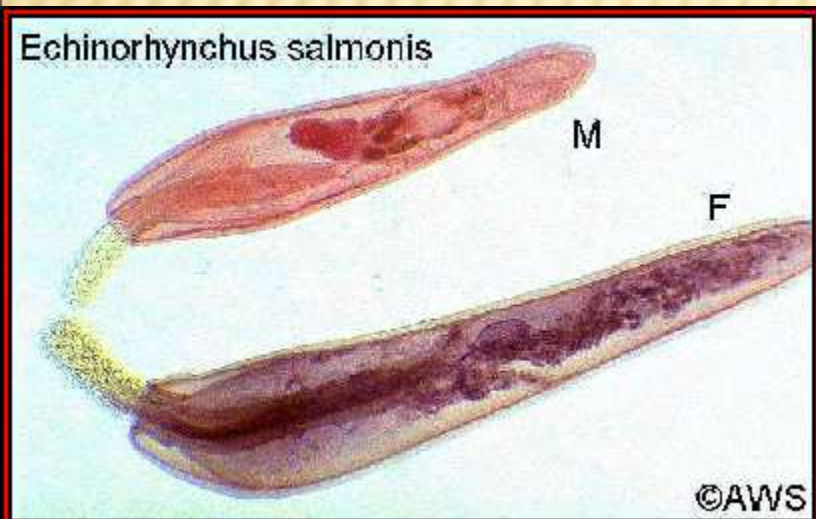
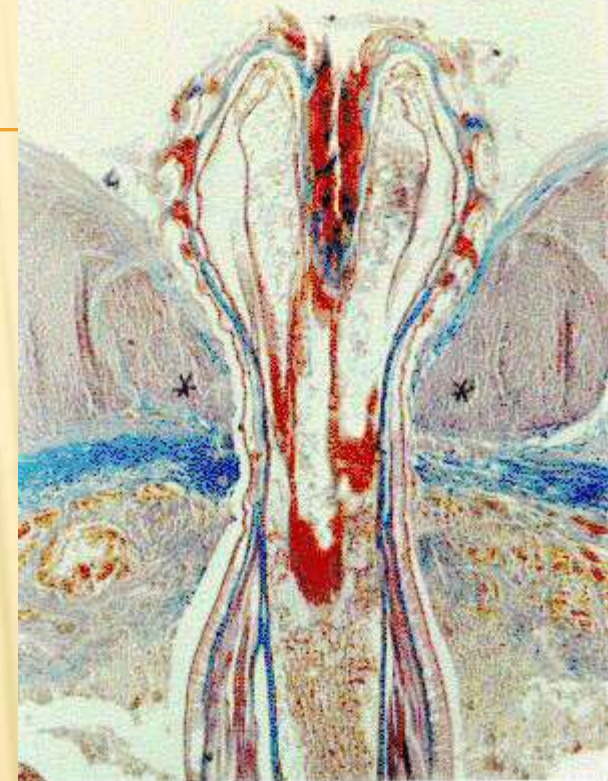
- ✗ thorny-headed worms
- ✗ proboscis with hooks
- ✗ 2 mm - 1 m
- ✗ no digestive organs
- ✗ gut parasites
 - ✗ anaerobic
- ✗ gonochorist
- ✗ many small eggs

- ✗ syncytial skin (Syndermata)
 - ✗ intracellular skeleton
- ✗ pseudocoel
- ✗ spermatozooids prosokonthic



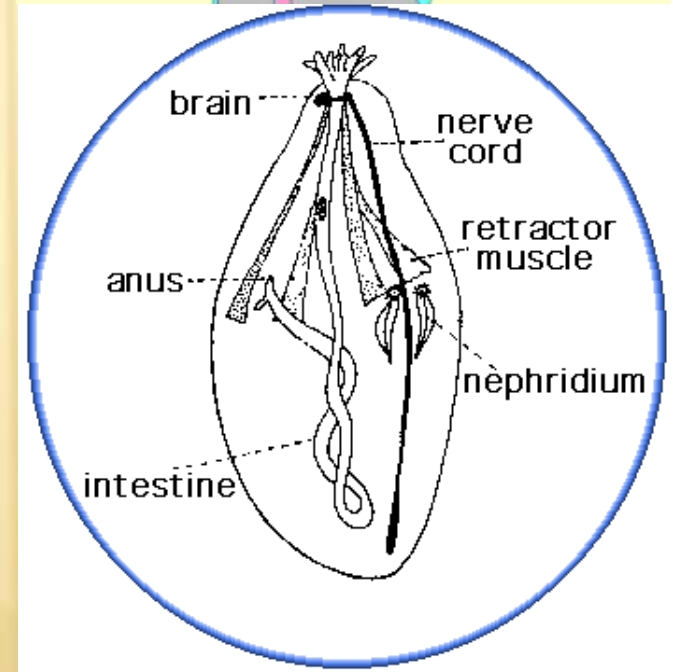
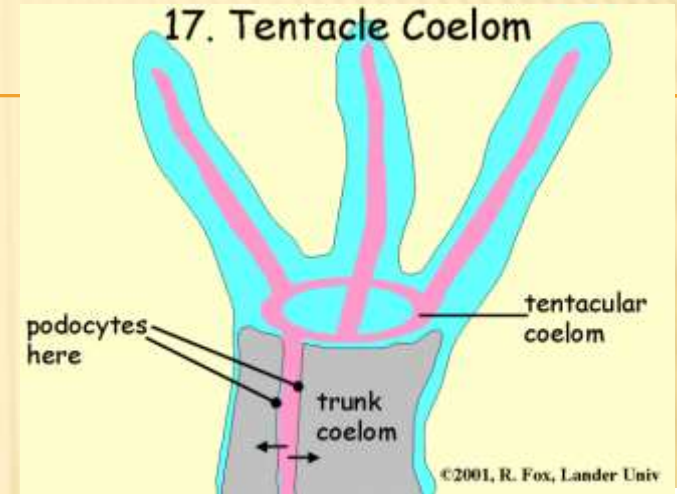
ACANTHOCEPHALA

- ✗ larvae in secondary host
 - ✗ insect larvae, amphipod crustations
 - ✗ alter behaviour



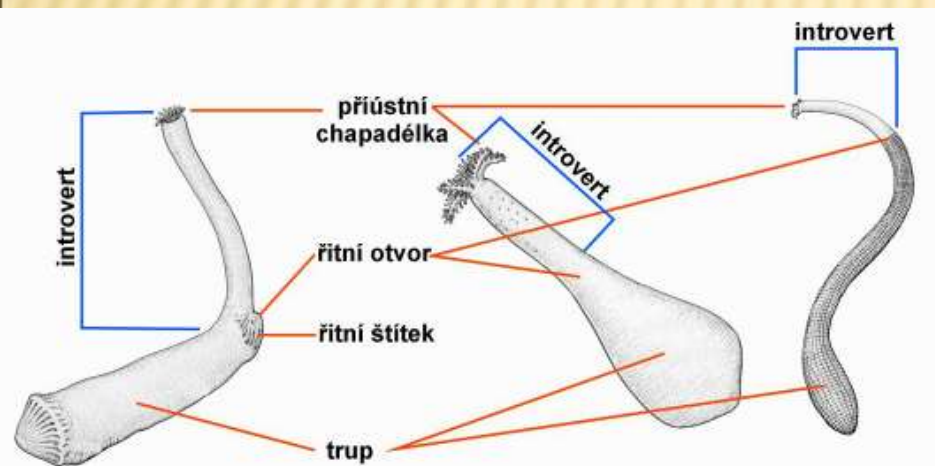
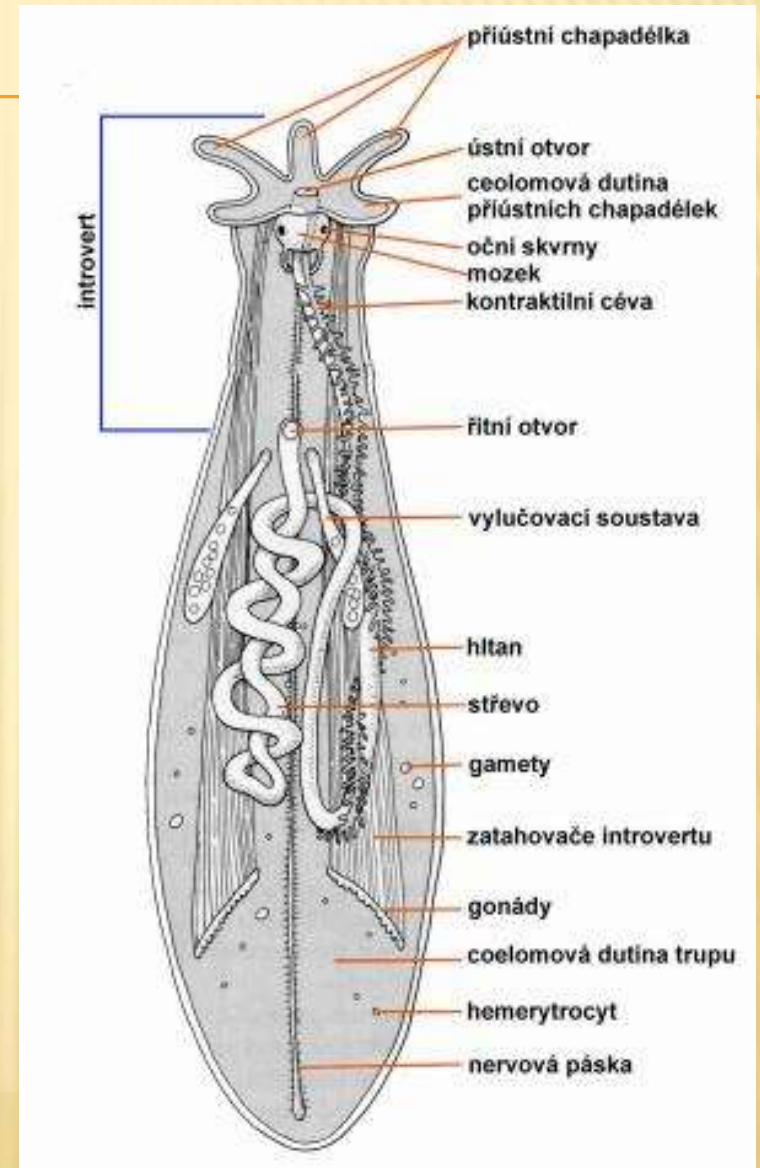
SIPUNCULA

- ✗ peanut worms
- + nonsegmented
- ✗ introvert and body sac
- ✗ hemerythrocytes



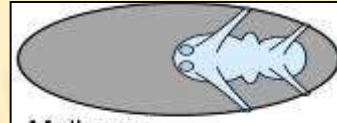
SIPUNCULA

- + digging in mud
- + in rock crevices
- + digesting tube U-shaped
 - × detritophagous
- × reproduction
 - + gonochorists
 - + trochophora larvae

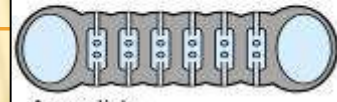


ANNELIDA

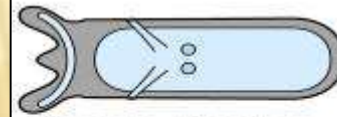
- ✗ body plan
- + coelom
- + segmented



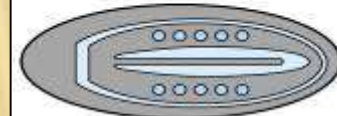
Mollusca



Annelida



Sipuncula, Brachiozoa



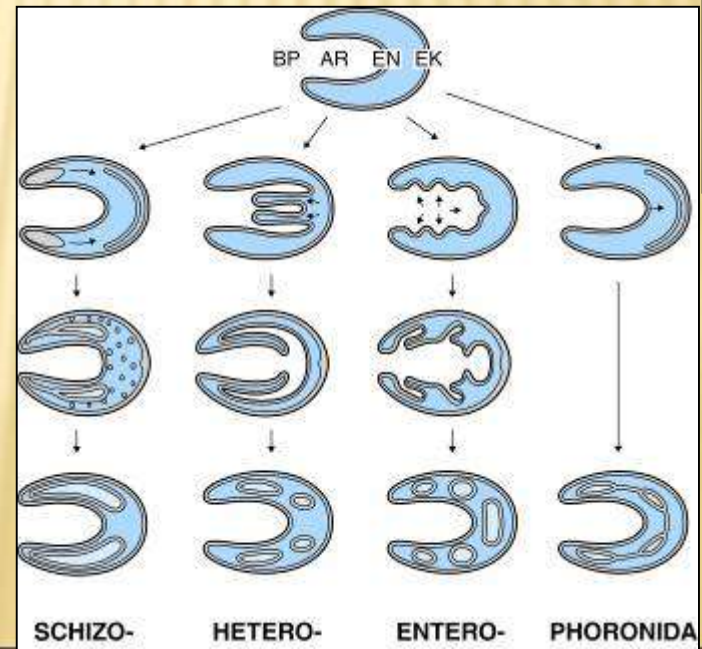
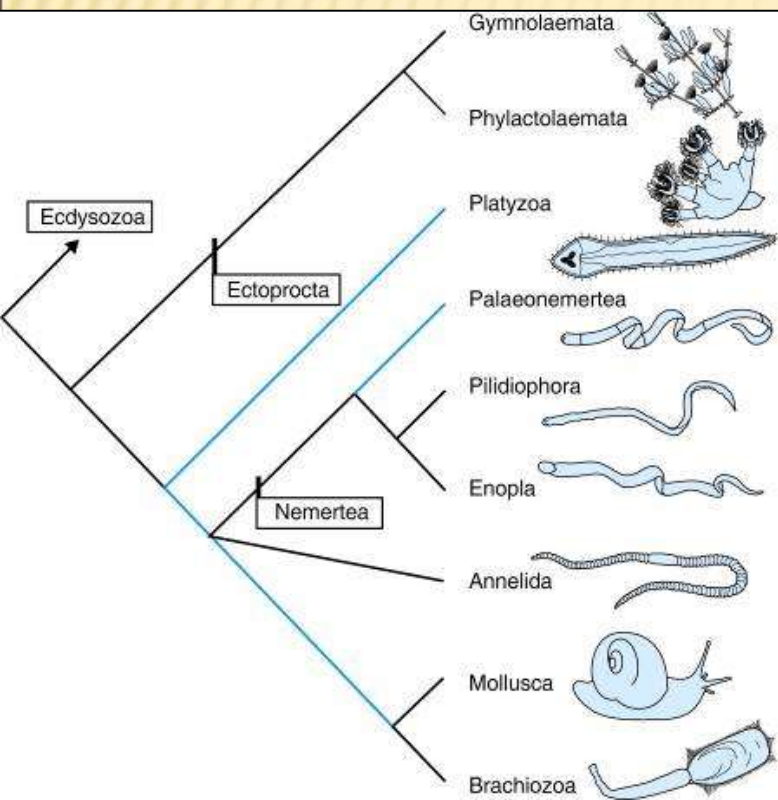
Nemertea



Chaetognatha



Deuterostomia



ANNELIDA



✗ body plan

+ chitinose setae (chaetae)

✗ with scleroprotein

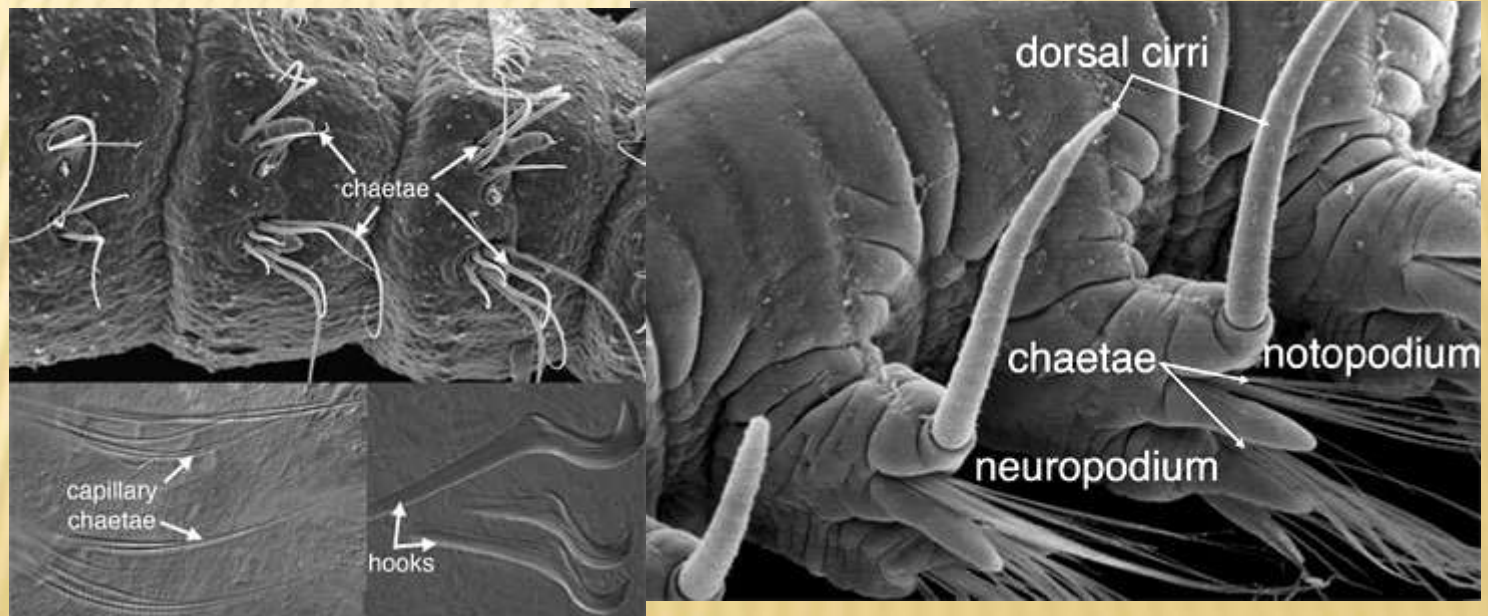
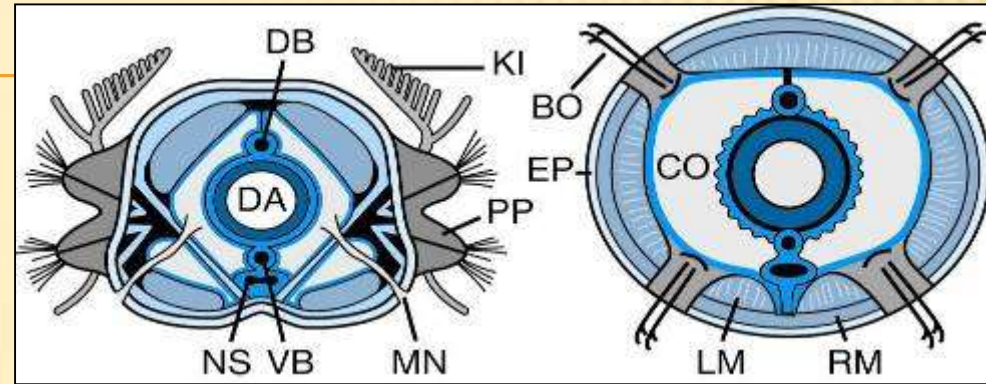
+ multiciliate epidermis, cuticle, mucus

+ 1 mm to 3 m



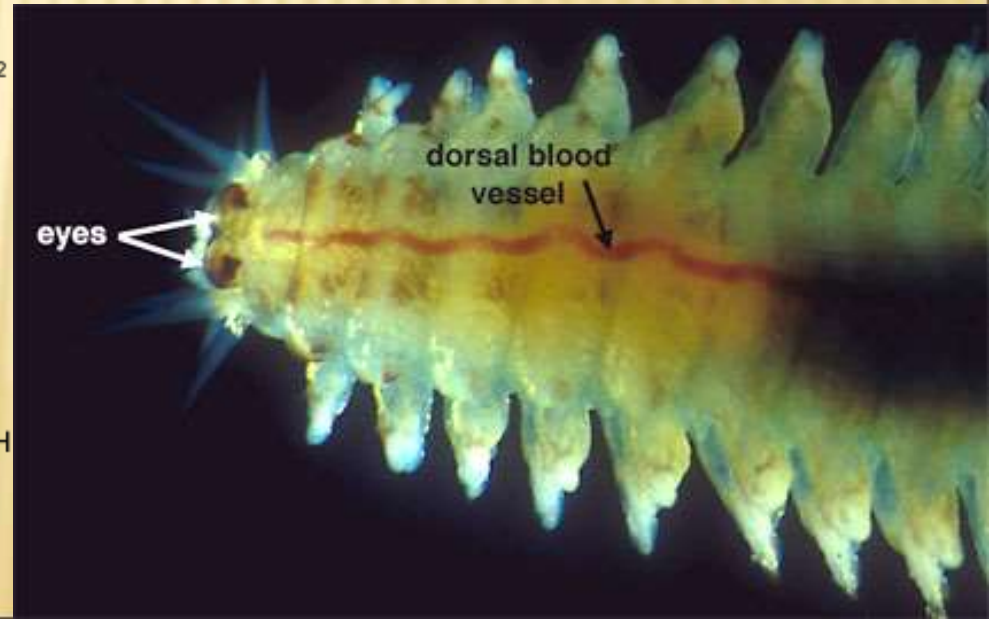
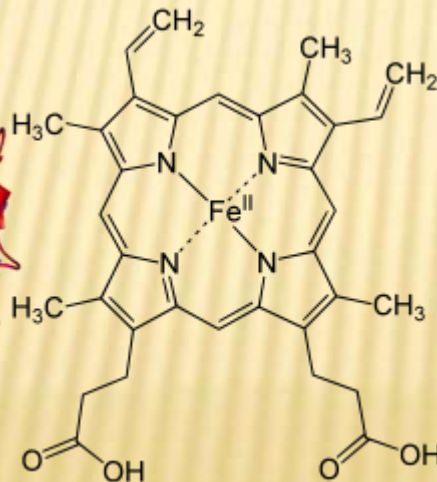
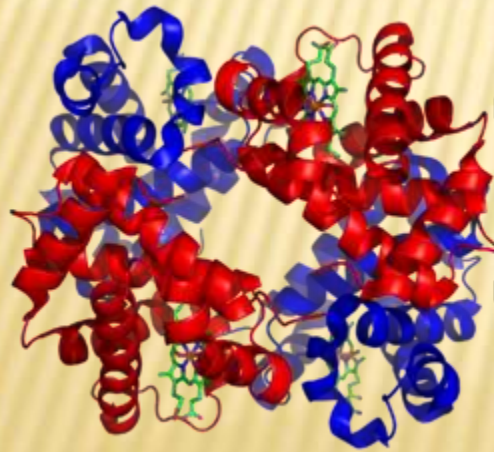
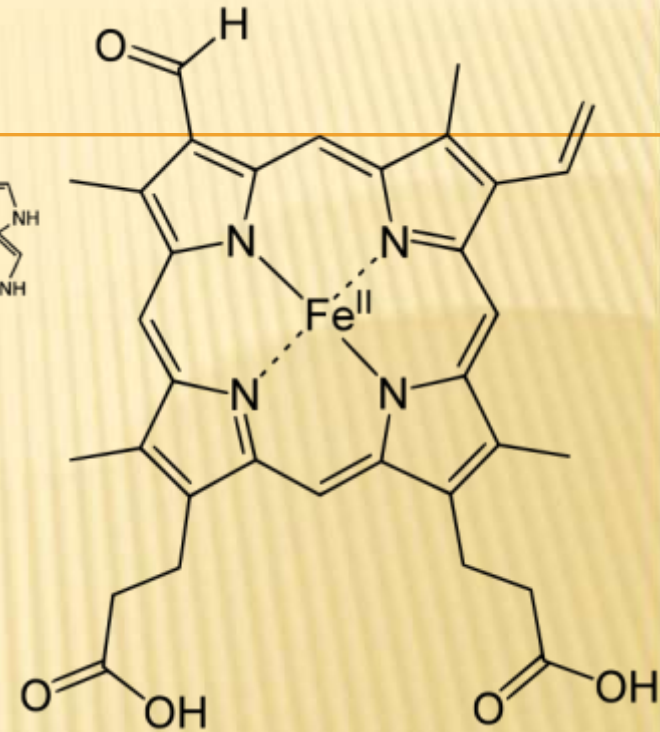
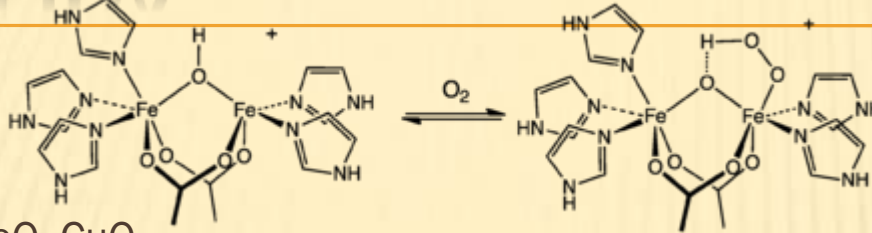
ANNELIDA

- + parapodia
- × muscles
- × setae
- × gills



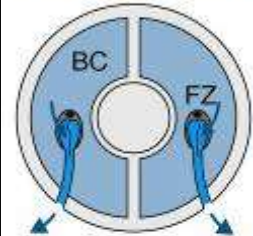
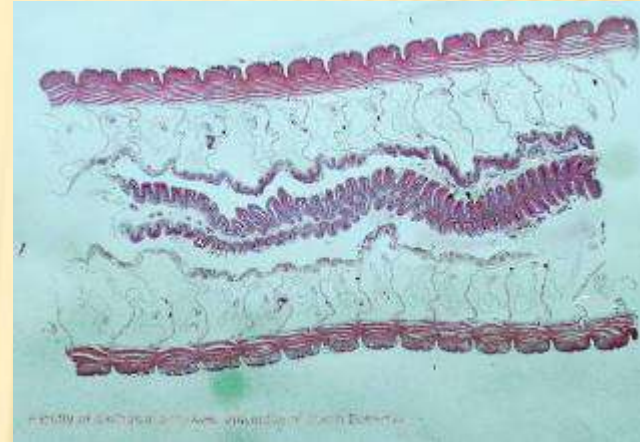
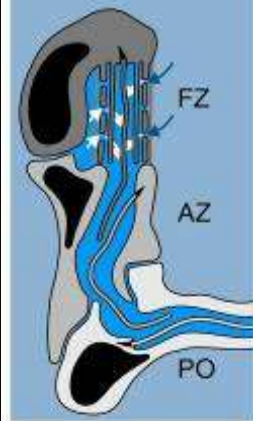
ANNELIDA

- ✗ feeding
 - + jaws
 - ✗ chitin, FeO, CuO
 - + straight gut
- ✗ circulatory system
 - + close
 - + hemoglobin, erythrocrurin and chlorocruorin



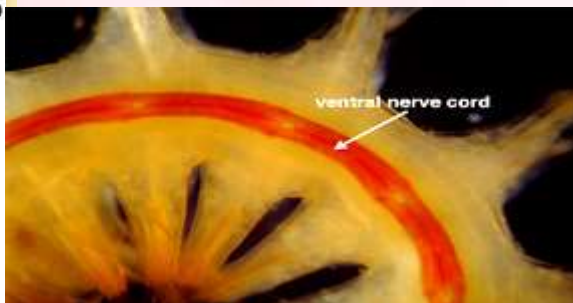
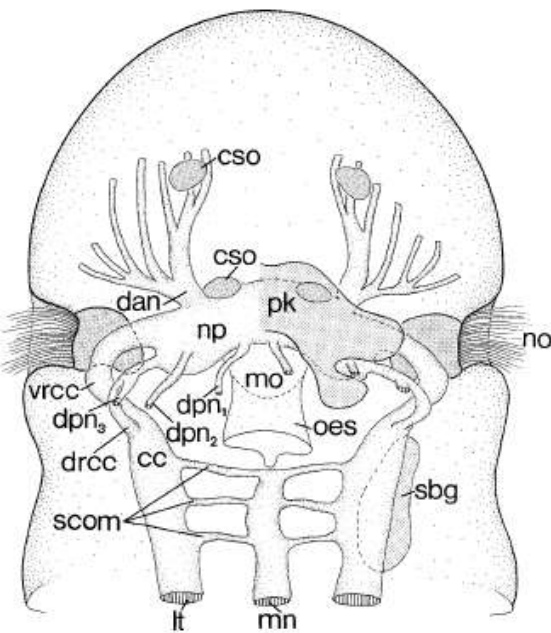
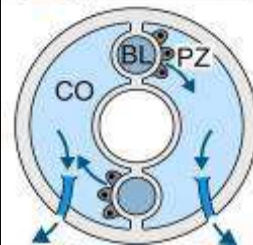
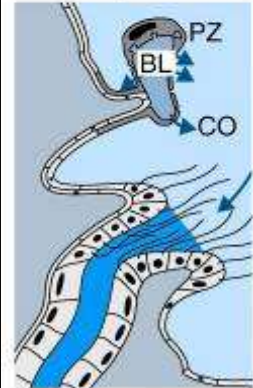
ANNELIDA

- ✘ excretory system
 - + protonefridia
 - + metanefridia
- ✘ nervous system
 - + ladder



Protonefridium

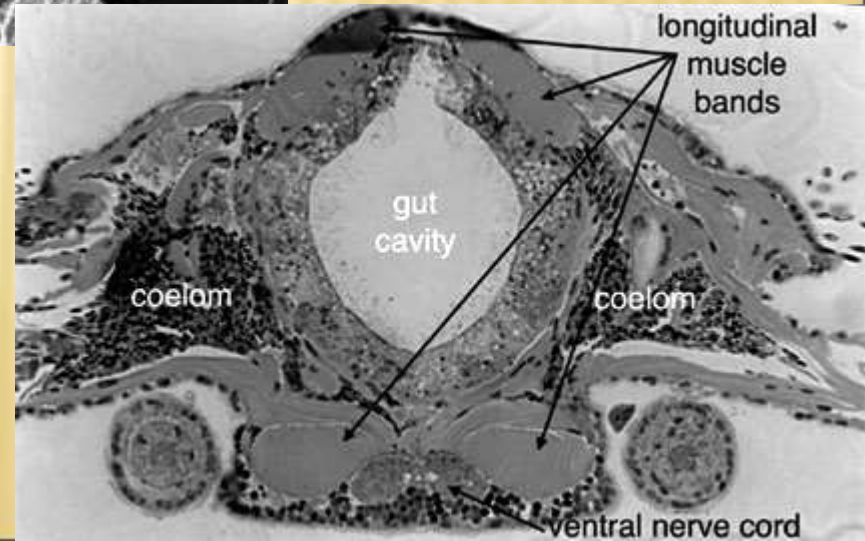
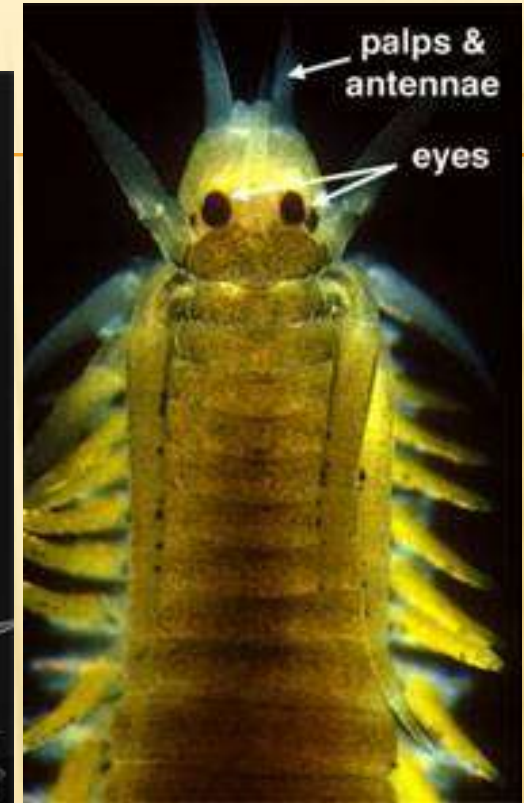
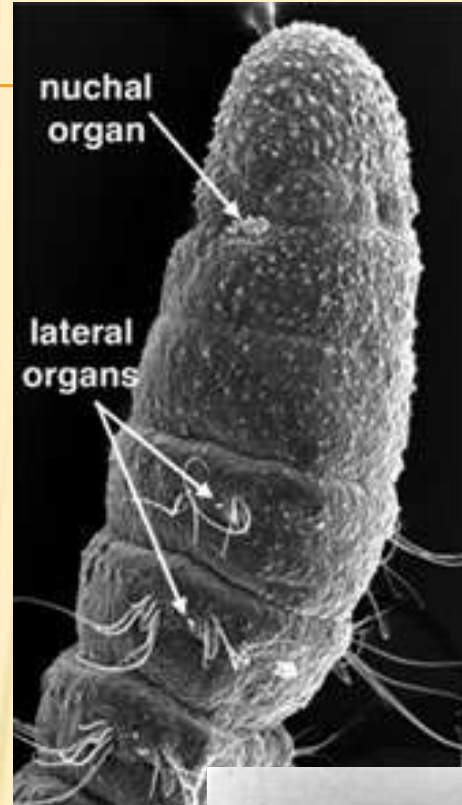
Metanefridium



ANNELIDA

✗ food

- + filtrators
- + detritophagous
- + predators
- + blood sucking



ANNELIDA

× reproduction

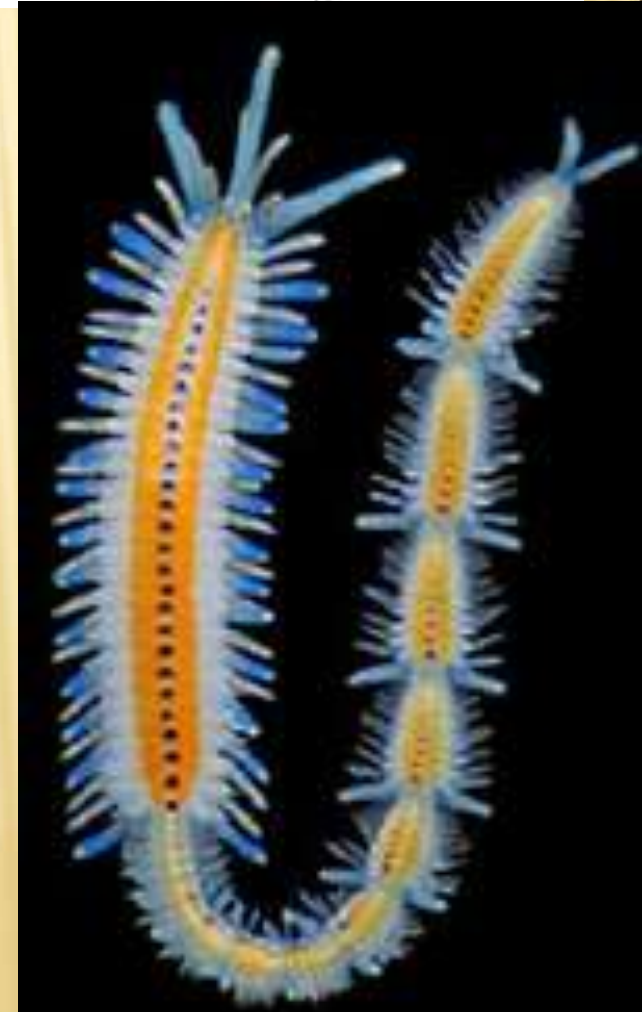
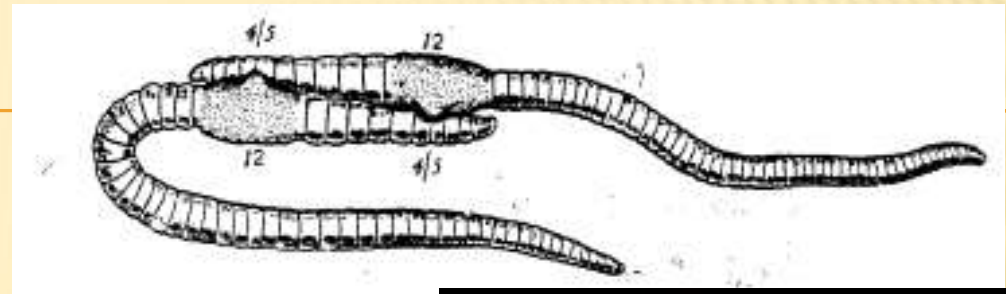
+ sexual

× gonochorists, hermaphrodites

× outer fertilisation

+ schizotomy

+ epitoky



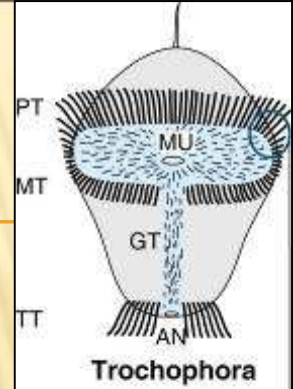
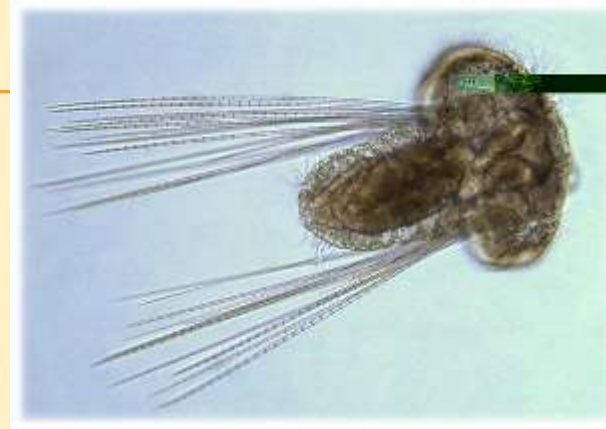
ANNELIDA

✘ development

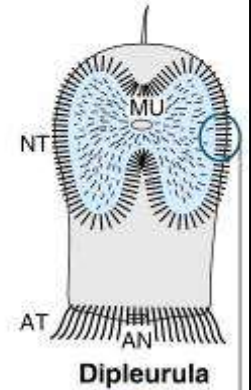
+ spiral cleavage

+ larva trochophora

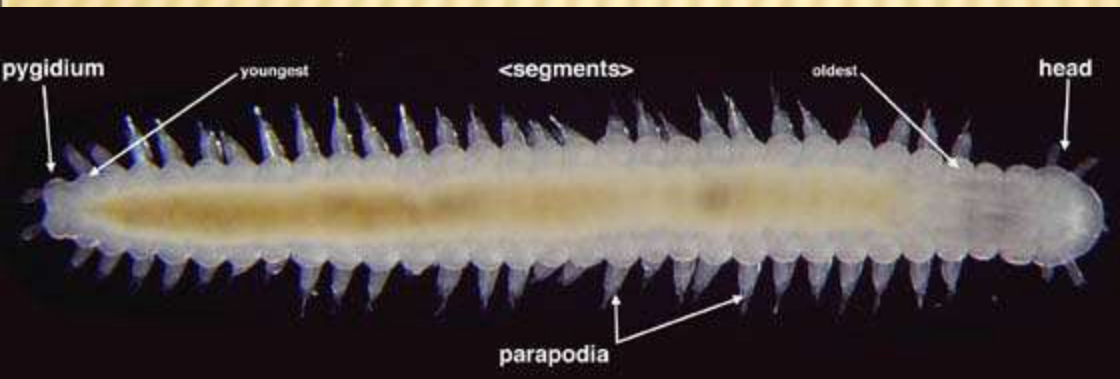
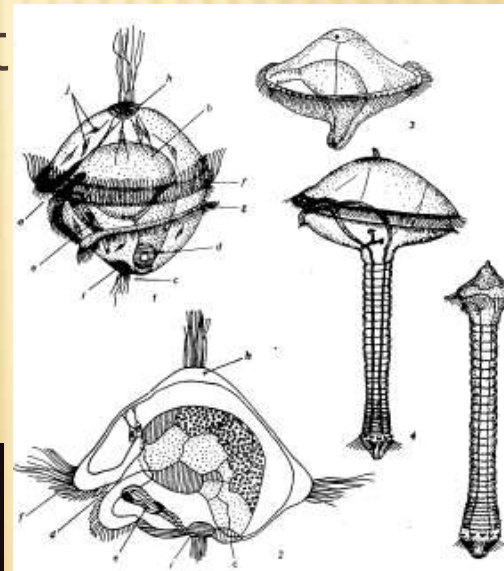
+ Clitellata – direct development



Trochophora



Dipleurula



ANNELIDA

+ Scolecida

- × benthic, digging
- × detritophagous
- × small parapodia



+ Aciculata

- × free living
- × predatory
- × parapodia with acicula
- × jaws
- × *Nereis*, *Aphrodita*, *Eunice*



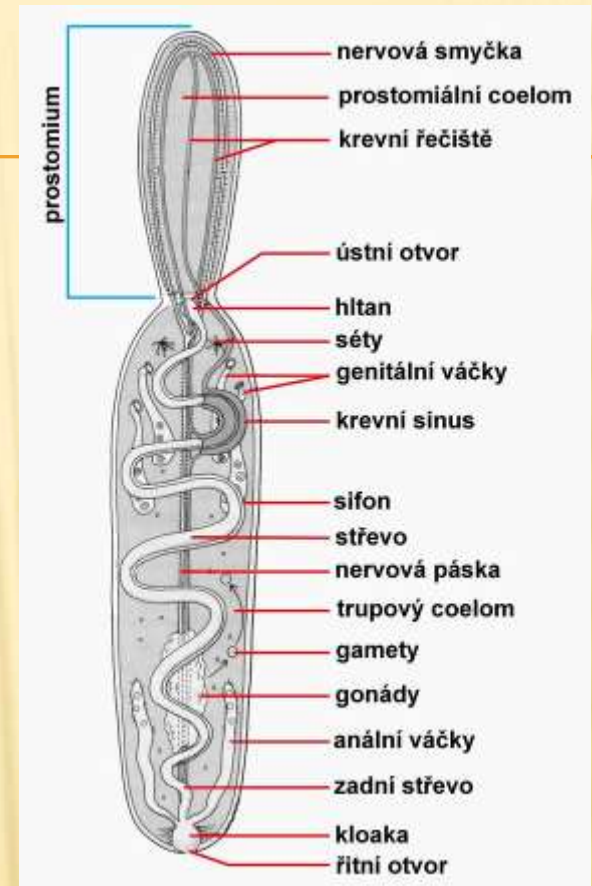
+ Canalipalpata

- × large palpi
- × sedentary
- × filtrators



ECHIURA

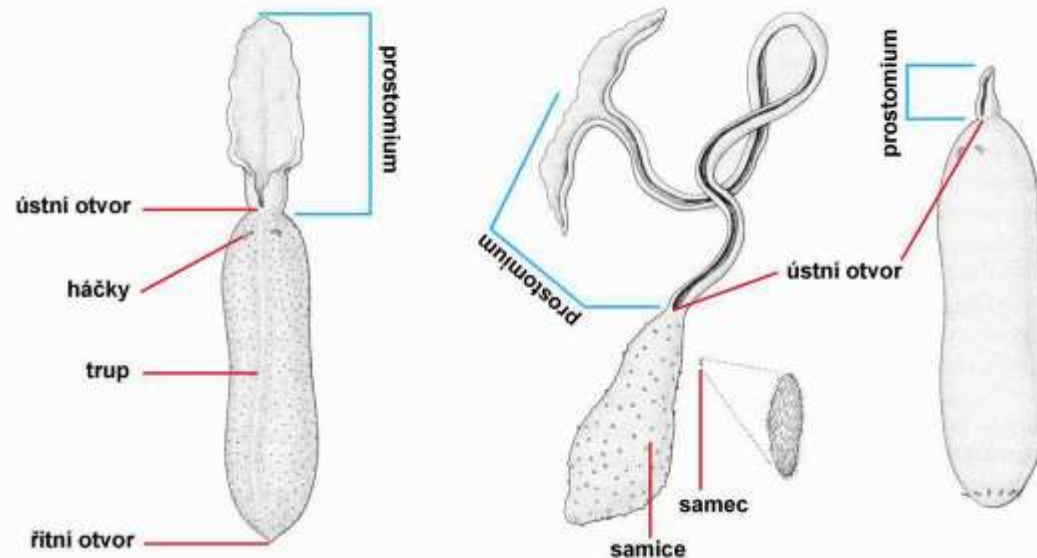
- spoon worms
- non-segmented
 - trochophora
 - proboscis
 - chitinous hooks
 - in mud, rock crevices
 - male may be dwarfic



Thalassema sp.

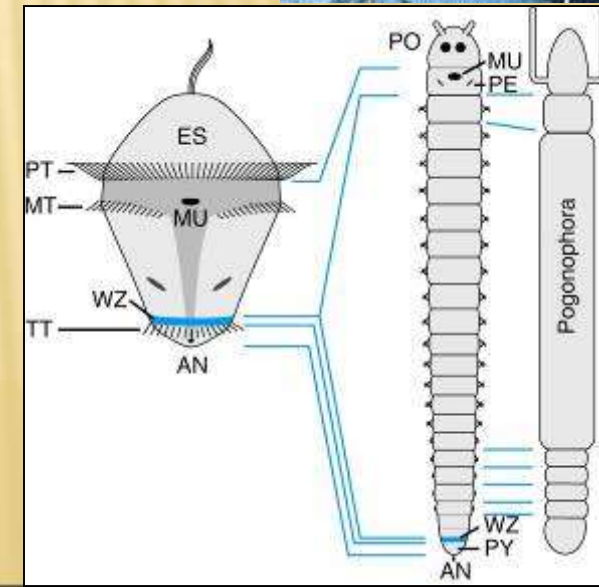
Bonellia viridis

Urechis sp.



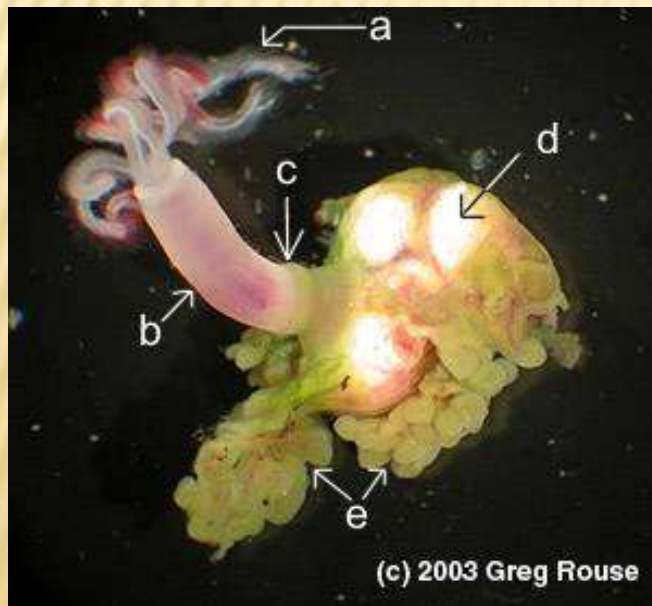
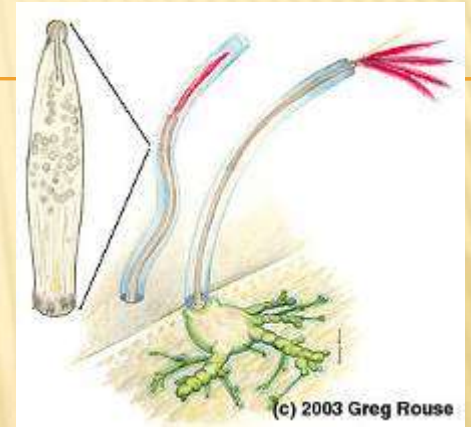
POGONOPHORA

- + deep sea, discovered 1900
 - × three-segmented body
 - × no digestive system
 - × 1964 entire individual – segmented
 - × trochophora
- + in 1977 worms near black smokers
 - × (hot springs, 300 °C)
 - × minerals, sulphur...
 - × hemoglobin
 - × symbiotic bacteria



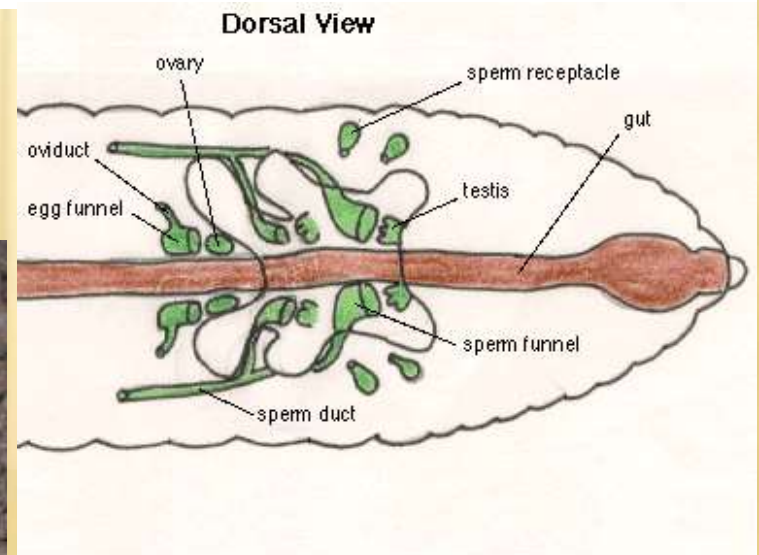
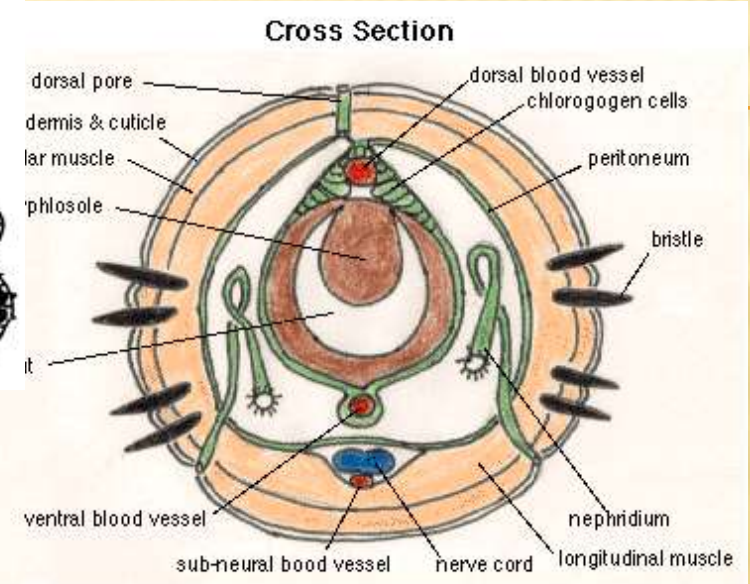
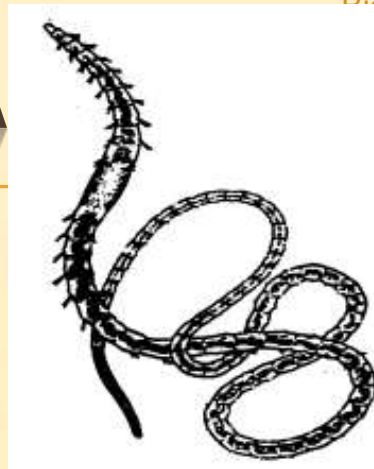
POGONOPHORA

- × 2004 discovered *Osedax frankpressi*, *Osedax rubiplumus*
- × in California on whale bones
- × female non-segmented, without chetae
- × males dwarfic



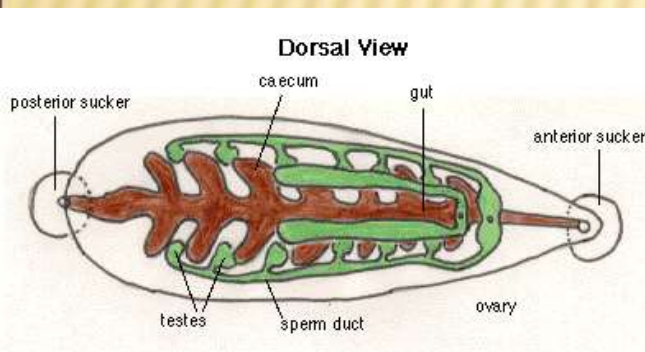
OLIGOCHAETA

- + segmented
- + without head
- + without parapodia
- + few chetae
- + hermaphrodites
 - × clitellum
 - × cocoon
- + freshwater, soil



HIRUDINEA

- + predatory
- + parasitic (blood sucking)
 - × hirudin
- + marine, freshwater, terrestrial
- + without chetae
- + hermaphrodites, penis



DO YOU LIKE

worms

