# Week 9: *Caenorhabditis elegans*

# Reading:

- Read lab manual chapter 9
  - Pages 244-273, 278-280

# Today's Taxa

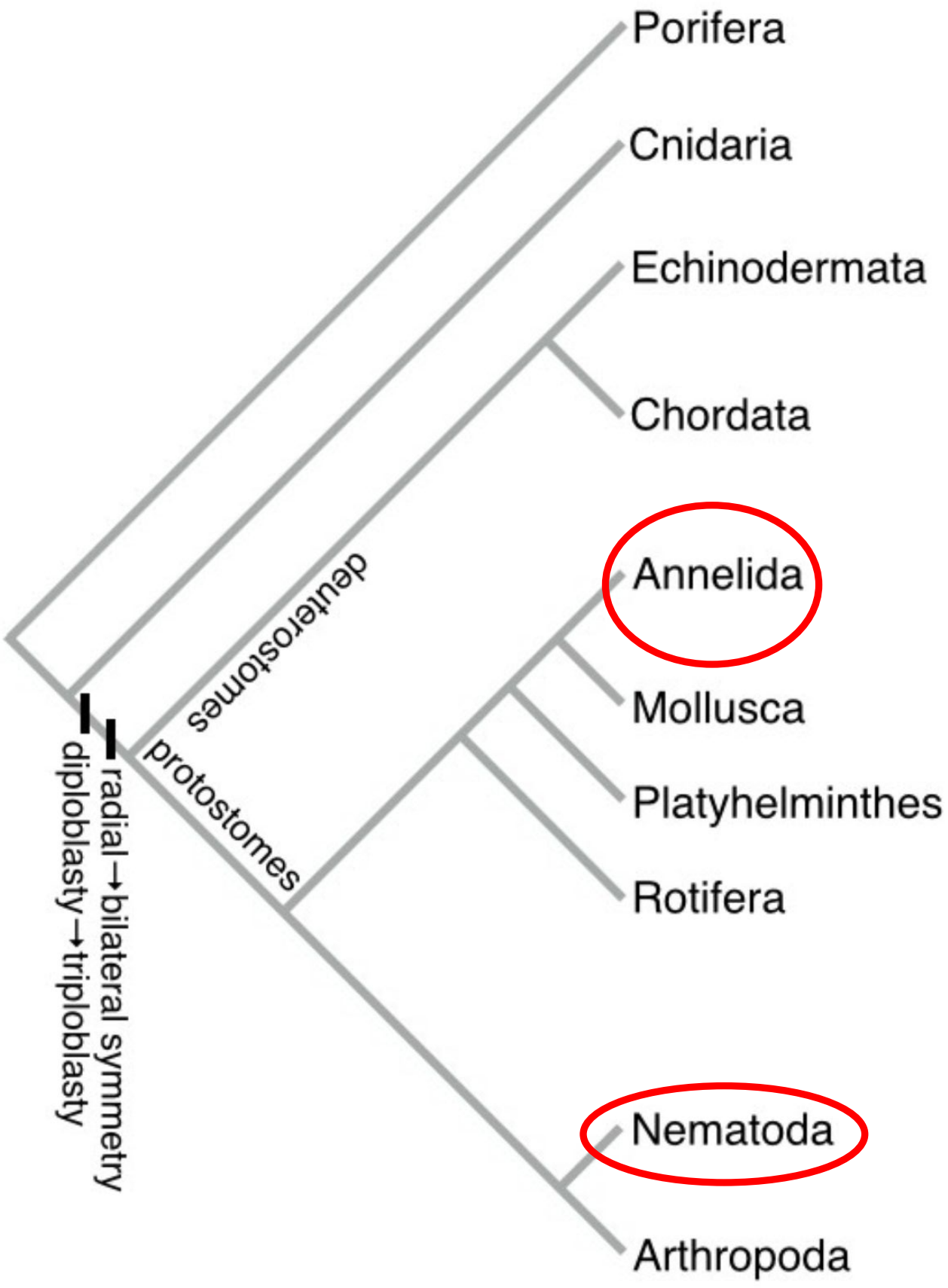
Domain Eukarya  Lineage Opisthokonta

**Phylum Annelida**

**Phylum Nemotoda**

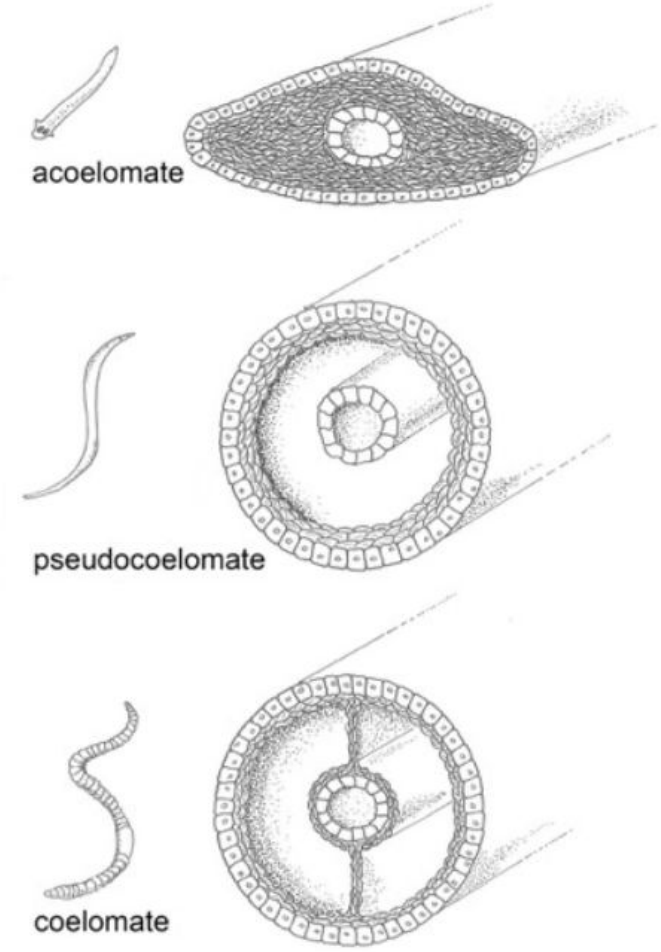
Both:

- Have bilateral symmetry
- Are protostomes
- Are triploblastic
- Have tube-like digestive tract with mouth AND anus
- Have a **body cavity**


Porifera
Cnidaria
Echinodermata
Chordata
Annelida
Mollusca
Platyhelminthes
Rotifera
Nematoda
Arthropoda
deuterostomes
protostomes
radial→bilateral symmetry
diploblasty→triploblasty

# Body cavities

- Coelom = body cavity
- **Acoelomate**: no body cavity (ex. Platyhelminthes)
- **Psuedocoelomate**: cavity is between mesoderm and endoderm (ex. Nemotoda, Rotifera)
- **Coelomate**: have a true coelom; cavity is surrounded by mesoderm (ex. Annelida)




9.R.2 Three body forms. Drawings J. Dole

# Phylum Annelida

- Coelom is separated by **septa**
- Closed circulatory system
- Three classes we will learn about:

  - Class ‘Polychaeta’ (marine segmented worms)
  - Class Oligochaeta (earthworms and relatives)
  - Class Hirudinea (leeches)

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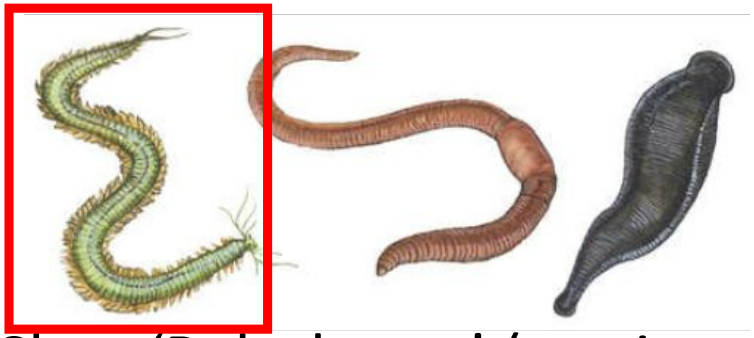

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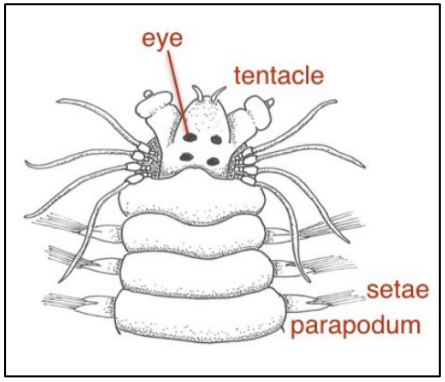
# Class ‘Polychaeta’

- Mostly marine
- Largest class of Annelids
- Some free-living, some sedentary
- Ex: *Nereis*
- **Pygidium**: rear segment
- **Parapodia**: flat structure on each side of body segment
- **Setae/chaetae**: bristles projecting from parapodia; u
  for movement and sometime
  respiration!

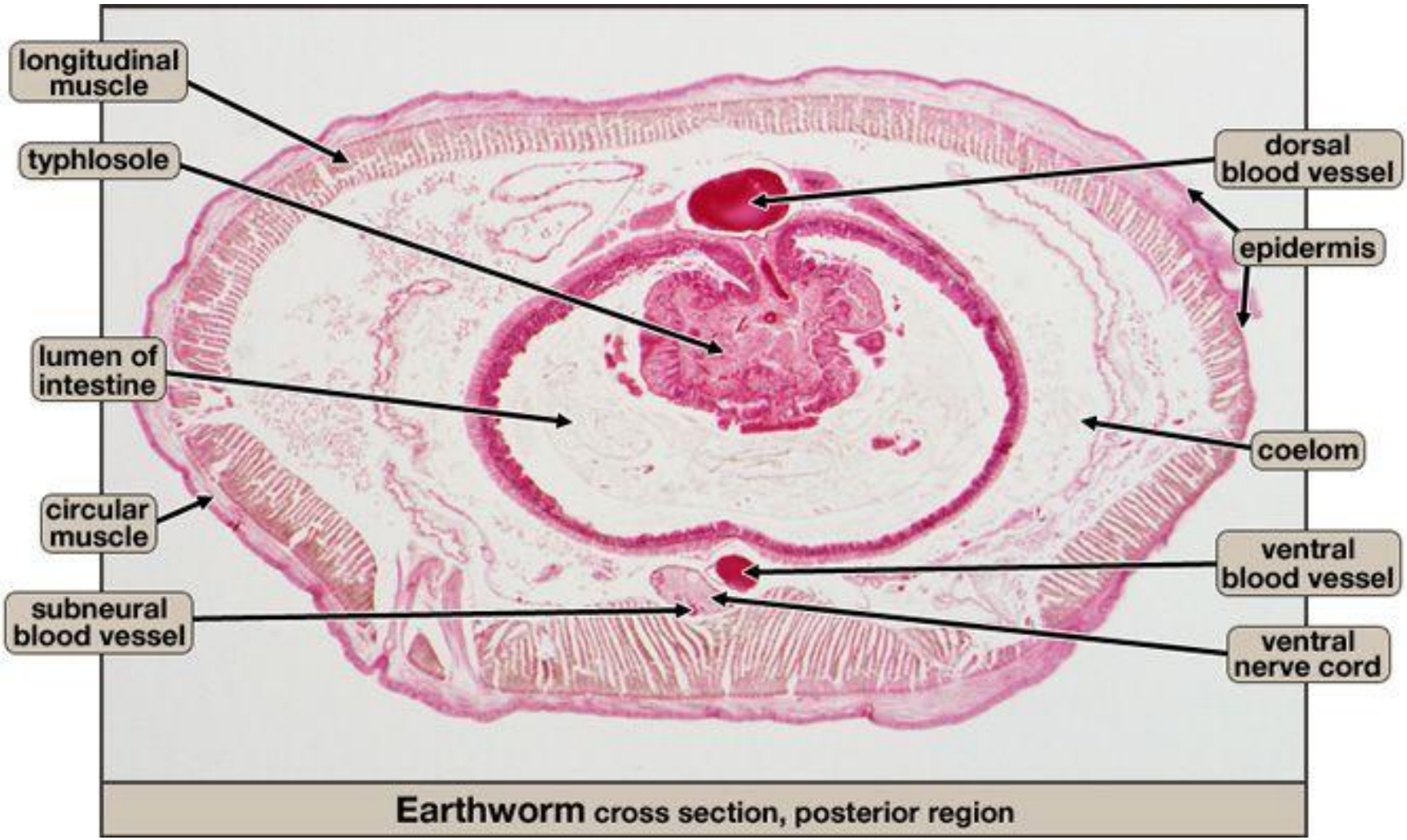




# Class Oligochaeta

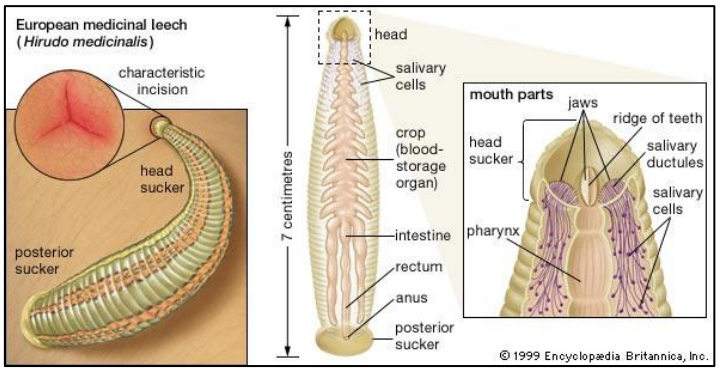
- Earthworms and relatives
- No parapodia
- Few setae
- Hermaphroditic
- Ecologically important

# Earthworm cross section



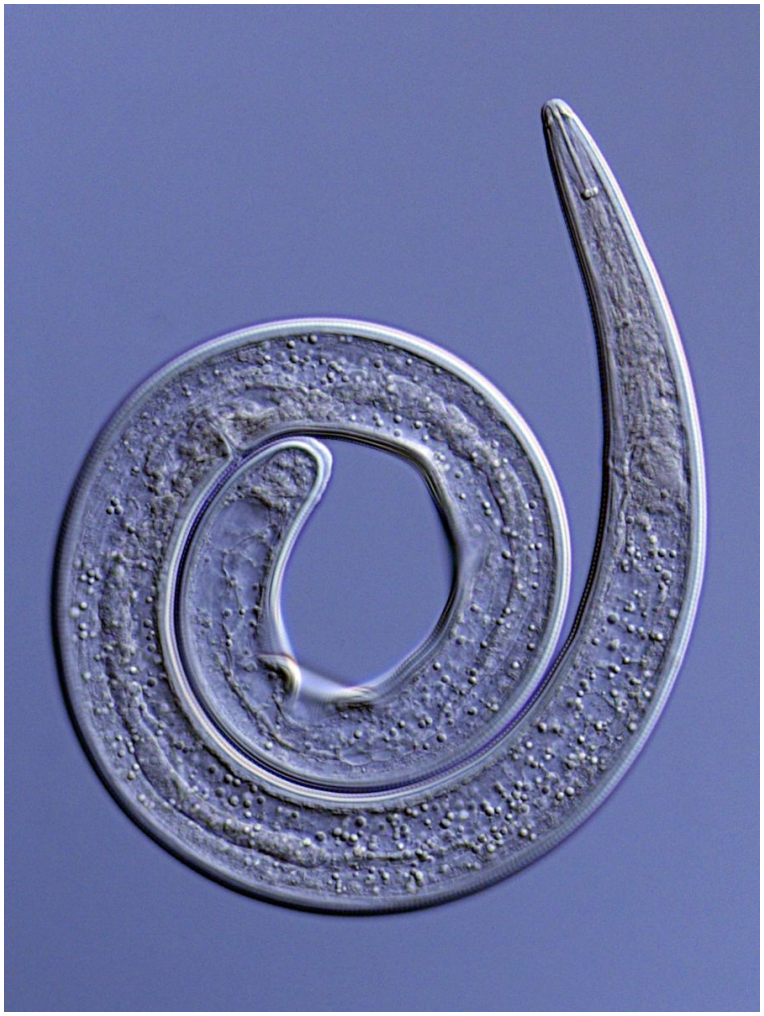
# Class Hirudinea

- Live in marine, freshwater, and terrestrial habitats
- Majority are predatory, not parasitic
- Do not have setae
- Medicinal leech: *Hirudo medicinalis*
- Hirudin: anticoagulant from leeches; used during surgeries



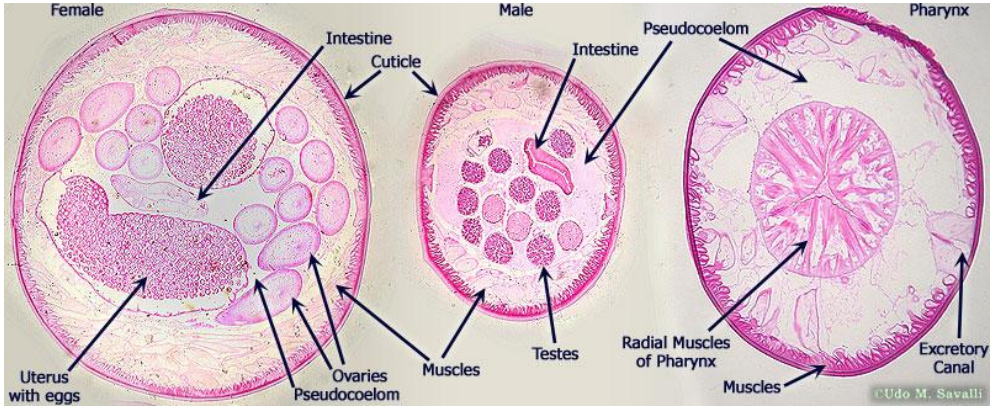

# Phylum Nematoda

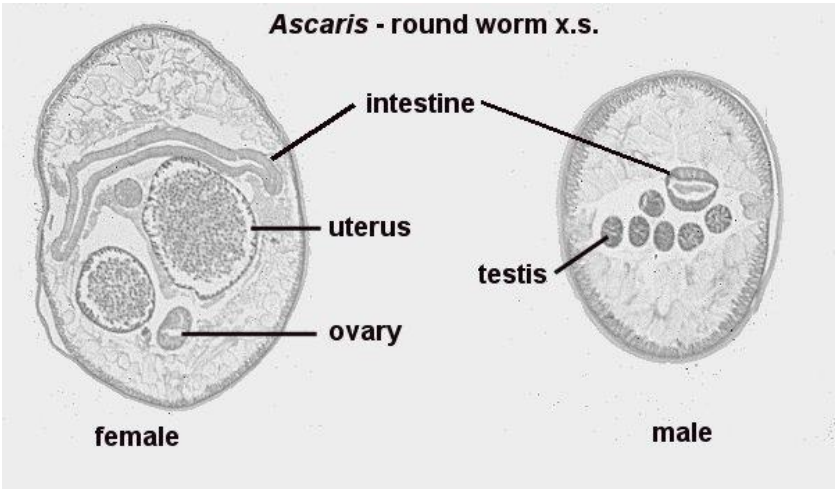
- Free-living + parasitic varieties
- Most have separate male and female sexes
  - Some have hermaphrodites and males
- Many are detritivores
- Ecdysozoa:
  - Grouping of organisms characterized by ecdysis (shedding of exoskeleton)

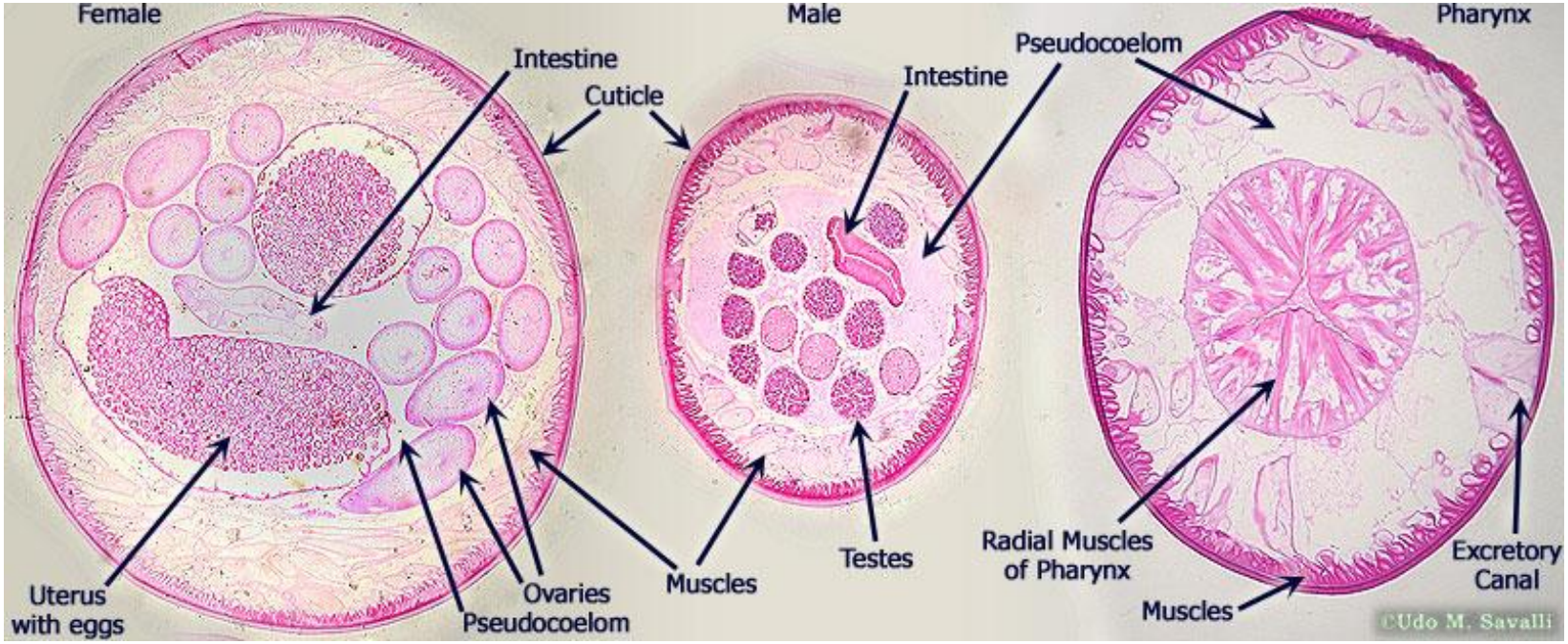


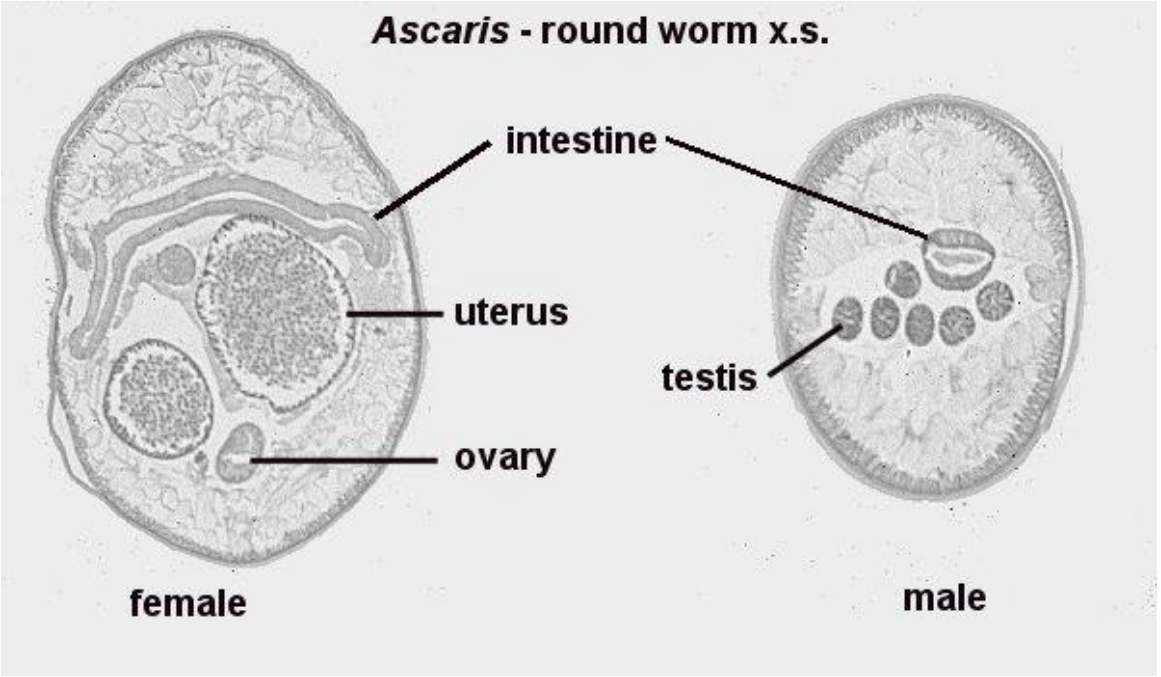
# *Ascaris*

- Intestinal parasites of mammals
- How are they spread?



Female
Male
Pharynx
Intestine
Cuticle
Intestine
Pseudocoelom
Uterus
with eggs
Ovaries
Pseudocoelom
Muscles
Testes
Radial Muscles
of Pharynx
Muscles
Excretory
Canal
©Udo M. Savalli


*Ascaris* - round worm x.s.
intestine
uterus
ovary
testis
female
male

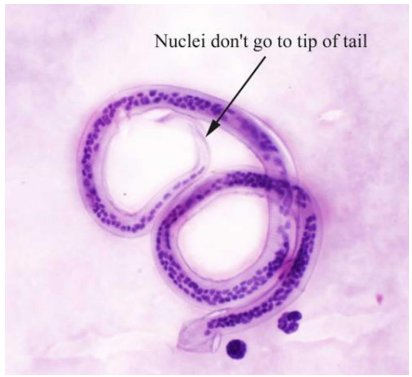
# Other Nematodes (not on exam)

- ***Necator americanus***
  - Hookworms

https://www.pbs.org/wgbh/nova/article/how-a-worm-gave-the-south-a-bad-name/

- ***Enterobius vermicularis***
  - Pinworms

- **Filaria worms**
  - Cause elephantiasis




- ***Trichinella spiralis***
  - Trichina worms
  - Cause trichinosis
  - Spread to humans via larvae in uncooked pork

# Time for an experiment!

# *C. elegans* on drugs

# *C. elegans* on drugs

- *Homo sapiens* and *C. elegans* share a common ancestor
- This ancestor would have:
  - Been triploblastic
  - Had tube-like digestive tract
  - Had a head-end and tail-end
  - Had a central nervous system
- We know the effects of certain drugs on humans
  - Alcohol: slows down
  - Caffeine: speeds up
- Will these drugs have a similar effect on *C. elegans*?
- If so, it is likely that these drugs would have had the same effect on our common ancestor?

# *C. elegans* on drugs

- Watch "*C. elegans* experiment with Robyn" video to see experimental process
- Access data through "Analysis of *C. elegans* on drugs lab report" assignment, and complete lab report assignment
- Watch "Stats lecture with Shaun: Confidence Intervals" for stats help

# Earthworm Dissection

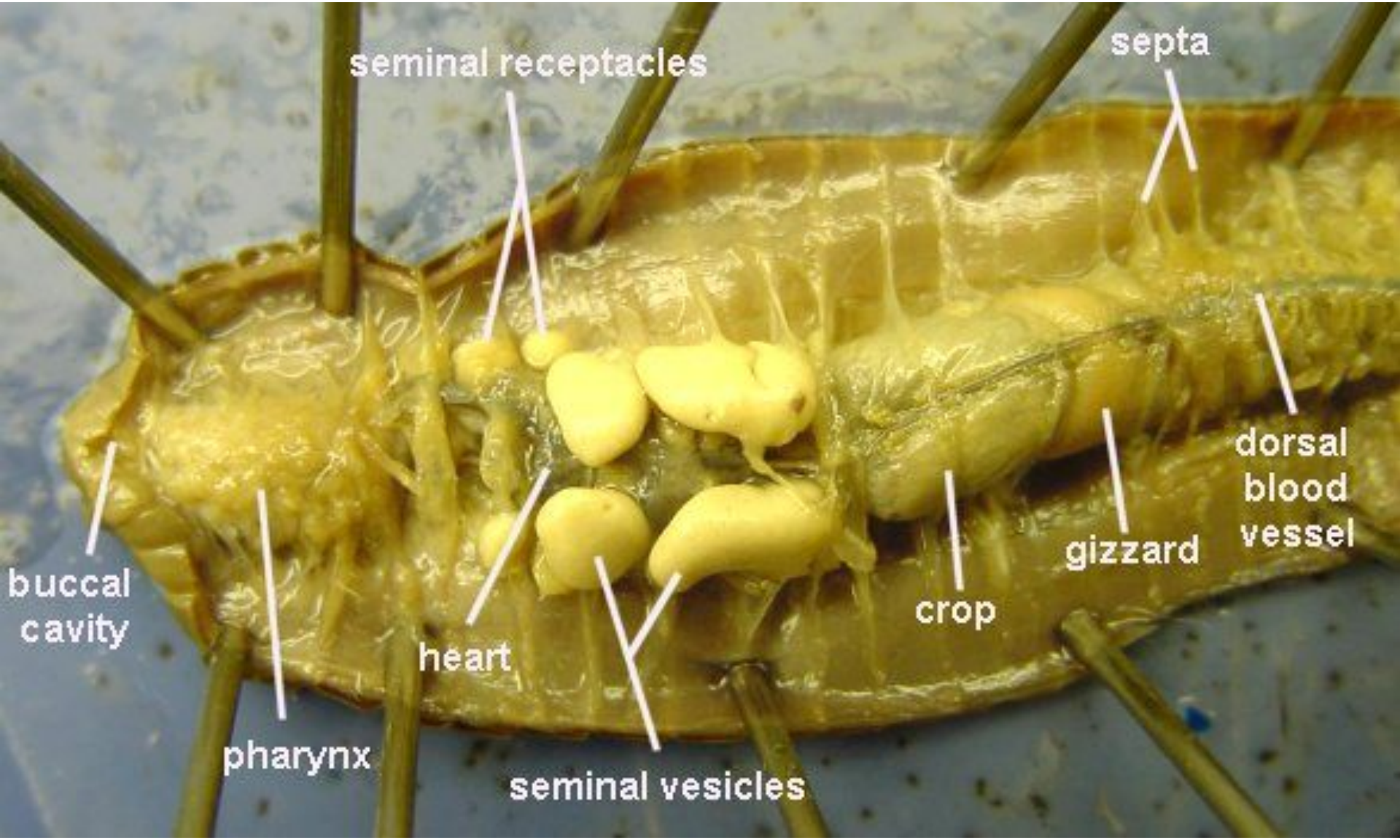
Watch Videos on Canvas

# Dissection rules

- If you are within a foot of the dissection, you must be wearing goggles.
- Dissection waste MUST be disposed of properly:
  - Used gloves in green bucket
  - Contaminated paper towels in red bucket
  - Earthworm waste goes in **white bucket**
  - Liquid waste goes in **other white bucket** (read labels!)
  - NO PINS in waste buckets

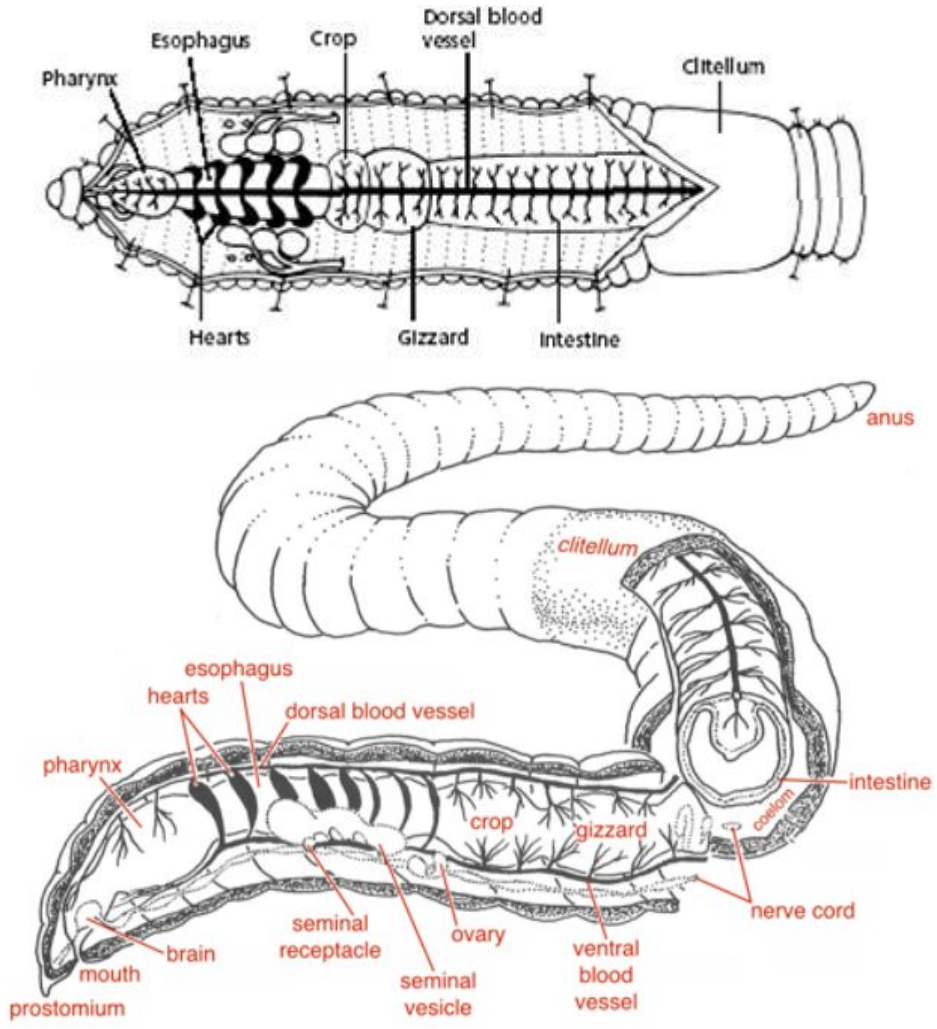
- Clean up:
  - Borrowed tools must be **rinsed**, dried, and returned
  - Trays must be rinsed and returned to shelf, **staggered**.

**Failure to follow this rules will result in loss of participation points (possibly for the entire class)**


seminal receptacles
septa
dorsal blood vessel
gizzard
crop
heart
seminal vesicles
pharynx
buccal cavity

# Earthworm dissection

- Know:
  - **Mouth**
  - **Brain**
  - **Pharynx**
  - **Hearts**
  - **Dorsal blood vessel**
  - **Seminal receptacle**
  - **Seminal vesicle**
  - **Crop**
  - **Gizzard**
  - **Intestine**
  - **Anus**




9.F.2 Earthworm. Redrawn from Dolphin

# Chapter 9 specimens

- Earthworm dissection
- Earthworm cross section
- *Nereis* external anatomy
- Leech observation
- Sedentary polychaete observation
- Female and male *Ascaris* cross section

# Thanks for watching!