Phylum Nematoda
aka the roundworms

Enterobius vermicularis
Dracunculus medinensis
Trichinella spiralis

Soil nematodes
Caenorhabditis elegans

Triploblastic
Mesoglea
Porifera
Cnidaria
Ctenophora
Platyhelminthes
Annelida
Pseudocoelomates
Acoelomate
Coelomate
Vermiform, unsegmented, round

Ecdysozoa ...or the molting animals

Extremely abundant
1 million/m² in marine and terrestrial soil
4 out of 5 animals found are nematodes

Marine, freshwater, terrestrial, parasitic
20,000 species described between 4-50 times more yet undescribed

Why is this phylum so under-described?

Eutely
- number of cells in an organ are constant
- total number of cells

In other Pseudocoelomates... and in Coelomates

General Body Plan

few mm - massive (9m)
- anterior mouth, posterior anus
- continuous digestive tract
- cuticle with no external cilia
External Structures

Cuticle
- non-cellular
- with spines, bristles, papillae, or warts
- maintains hydrostatic pressure
- mechanical protection
- resists digestion by the host

⇒ reason for molting

However, made out of collagen...

... NOT chitin!

Chitin monomer

Arthropod exoskeleton

Uses in human life

Microscopic Structure

Dorsal nerve cord
Muscle cells
Epidermis
Intestine
Excretory canal
Cuticle
Ventral nerve cord
Pseudocoel
**Body wall detail**

- Protoplasmic Extension of nerve cell
- Contractile muscle element
- Nerve cord

**Feeding and Digestion**

- Complete digestive tract
- Pharynx = pump
- Intestine
- Variety of different food preferences: Predators, Parasites, Saprophytes

**Excretion/Circulation**

- Renettes: Excrete nitrogenous waste/salts
- Form canals
- No true circulatory system
Nervous System

- Anterior nerve ring = surrounding pharynx
- Dorsal/ventral nerve cord
- Lateral nerve cord

Sensory structures

- Amphids - chemoreceptors
- Phasmids - chemoreceptors near the anus
- Ocelli - eyespots, pharynx

Reproduction

- Diecious
- Sexual Dimorphism
  - Males: one testis, bursa
  - Females: pair of ovaries-oviducts - uterus
  - 100-100,000 eggs develop
  - Ovoviviparous - give birth to "larvae" hatched from egg

No true larval stage
Parasitic Nematodes

*Ascaris lumbricoides* - giant intestinal roundworm (35cm) - transmitted through feces - egg ingestion-hatching-travel to lung -trachea-swallowed (adults in GIT) ⇒ competition for food

*Wuchereria bancrofti* - elephantiasis ⇒ block the lymphatic system

*Myrmeconema neotropicum* - hastral ant ⇒ affect hosts to complete lifecycle ⇒ affect behavior

Nematode “Victims”

Fungus using constricting ring = hypha curves around and fuses, 3-celled ring, nematode moves through, ring cells inflate, cells germinate, penetrate and digest nematode body

Beneficial Nematodes

Nutrient cycling - break down organic matter in soil - feed on fungi and soil bacteria but also aid in their dispersal

Pest control - biological control of pests such as borers, grubs, thrips, beetles - “ambush” and “cruising” strategies - penetrate body-release bacteria

Research model - Caenorhabditis elegans - constant cell numbers, transparent, easy maintenance, high fecundity
Nematode Fun Facts

Also called threadworms

Most microscopic

Exception: Placentonema gigantissima
- placenta of sperm whale, 9m, 32 ovaries

May shut down metabolism

Contribute between 1-15% zoobenthic biomass in lakes

Oldest documentation = 2700 B.C
(Emperor’s classic of internal medicine)