THE PSEUDOCOELOMATE BODY PLAN:

Phylum Nematoda

- External Features
- Internal Features
- Feeding and the Digestive System
- Other Organ Systems Reproduction and Development
- Some Important Nematode Parasites of Humans

CLASSIFICATION OF THE NEMATODES*

Phylum Nematoda (nem-a-to′dah)
Nematodes, or roundworms. About 16,000 species have been described to date.

Class Secernentea (Phasmidea) (ses-er-nen′te-ah)
Paired glandular or sensory structures called phasmids in the tail region; similar pair of structures (amphids) poorly developed in anterior end; excretory system present; both free-living and parasitic species. *Ascaris*, *Enterobius*, *Rhabditis*, *Turbutrix*, *Necator*, *Wuchereria*. About 5,000 described species.

Class Adenophorea (Aphasmidia) (a-den″o-for′e-ah) Phasmids absent; most free-living, but some parasitic species occur. *Dioctophyme*, *Trichinella*, *Trichuris*. About 3,000 species.

*A recent cladistic analysis using molecular data suggests that many of the morphological similarities among the different nematode groups evolved through convergence, and that one of the two nematode classes (the Secernentea) may have evolved from within the other class (the Adenophorea). If these data are confirmed, the long-accepted classification scheme presented in this table and in the text will be undergoing revision over the next few years.

Characteristics :

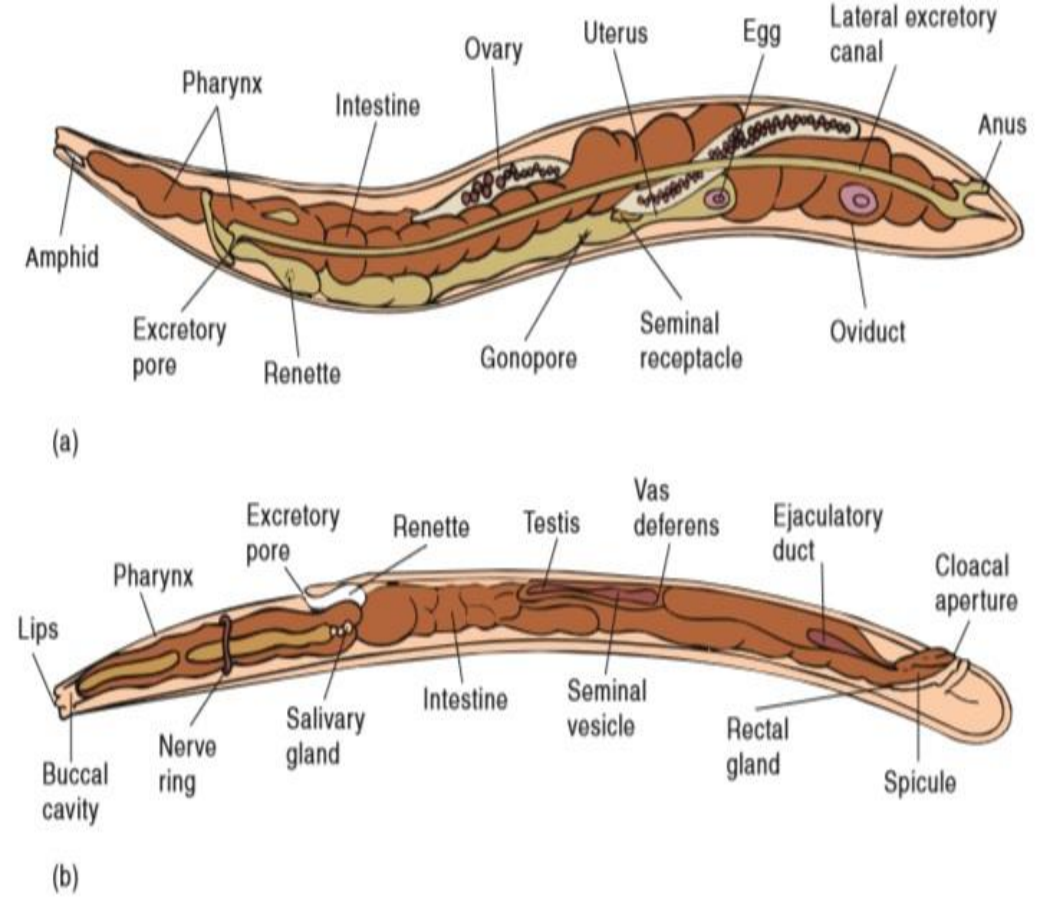
1) Triploblastic, bilateral, vermiform (resembling a worm in shape; long and slender), unsegmented, pseudocoelomate.
2) Body round in cross section and covered by a layered cuticle; molting usually accompanies growth in juveniles.
3) Complete digestive tract; mouth usually surrounded by lips bearing sense organs.
4) Most with unique excretory system comprised of one or two renette cells or a set of collecting tubules.
5) Body wall has only longitudinal muscle

External Features

- ✓ slender, elongate, cylindrical, and tapered at both ends.

I. Cuticle

- ❖ **Outer, noncellular, collagenous cuticle.**
- ❖ **Continuous with the foregut, hindgut, sense organs, and parts of the female reproductive system.**
- ❖ **May be smooth, or it may contain spines, bristles, papillae, warts, or ridges.**
- ❖ **Three primary layers make up the cuticle: cortex, matrix layer, and basal layer.**
- ❖ **Maintains internal hydrostatic pressure**
- ❖ **Provides mechanical protection.**
- ❖ **Resists digestion by the host.**
- ❖ **The cuticle is usually molted four times during maturation.**



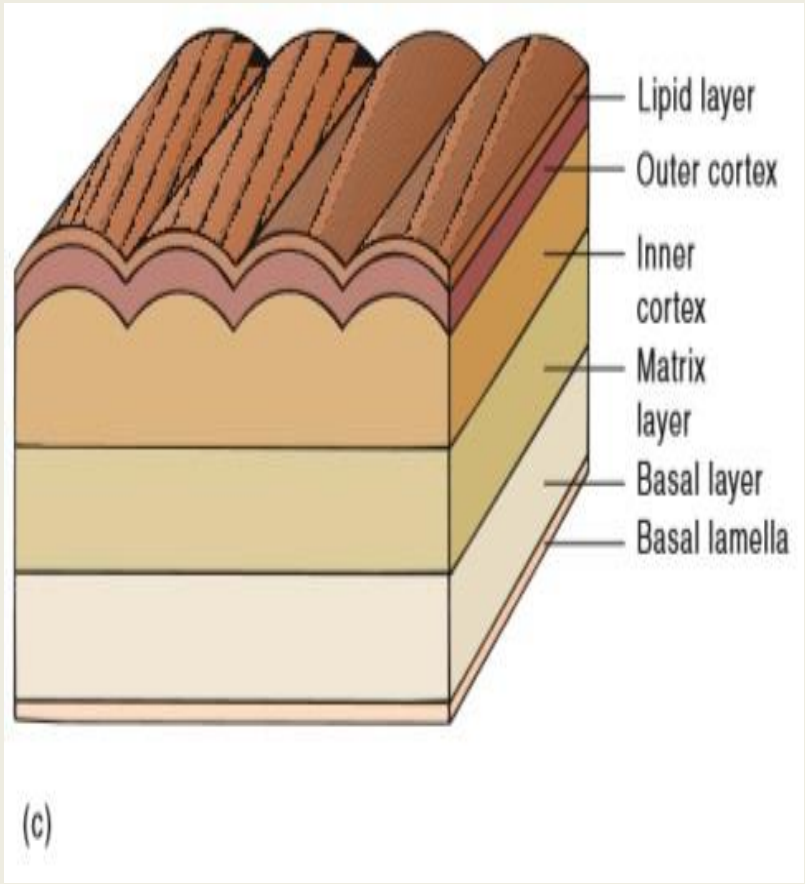


Fig: Phylum Nematoda. Internal anatomical features of an (a) female and (b) male Rhabditis. (c) Section through a nematode cuticle, showing the various layers.

II. Epidermis

- ✓ Beneath the cuticle is the epidermis, or hypodermis, which surrounds the pseudocoelom.
- ✓ The epidermis may be syncytial.
- ✓ Its nuclei are usually in the four epidermal cords (one dorsal, one ventral, and two lateral).
- ✓ The longitudinal muscles are the principal means of locomotion in nematodes.
- ✓ Contraction of longitudinal muscles results in undulatory waves that pass from the anterior to posterior end of the animal.
- ✓ Nematodes lack circular muscles.

III. Sensory organs

Amphids

- Anterior depressions in the cuticle.
- Contain modified cilia.
- Function in chemoreception.

Phasmids

- near the anus.
- function in chemoreception

Ocelli

- Paired ocelli (eyes)
- present in aquatic nematodes

INTERNAL FEATURES

- The nematode pseudocoelom is a spacious, fluid-filled cavity.
- It contains the visceral organs and forms a hydrostatic skeleton.
- All nematodes are round.
- The body muscles contracting against the pseudocoelomic fluid generate an equal outward force in all directions.

FEEDING AND THE DIGESTIVE SYSTEM

- they may be carnivores, herbivores, omnivores, or saprobes (saprotrophs).
- parasitic species feed on blood and tissue fluids of their hosts.
- Nematodes have a complete digestive system.
- Hydrostatic pressure in the pseudocoelom and the pumping action of the pharynx push food through the alimentary canal.

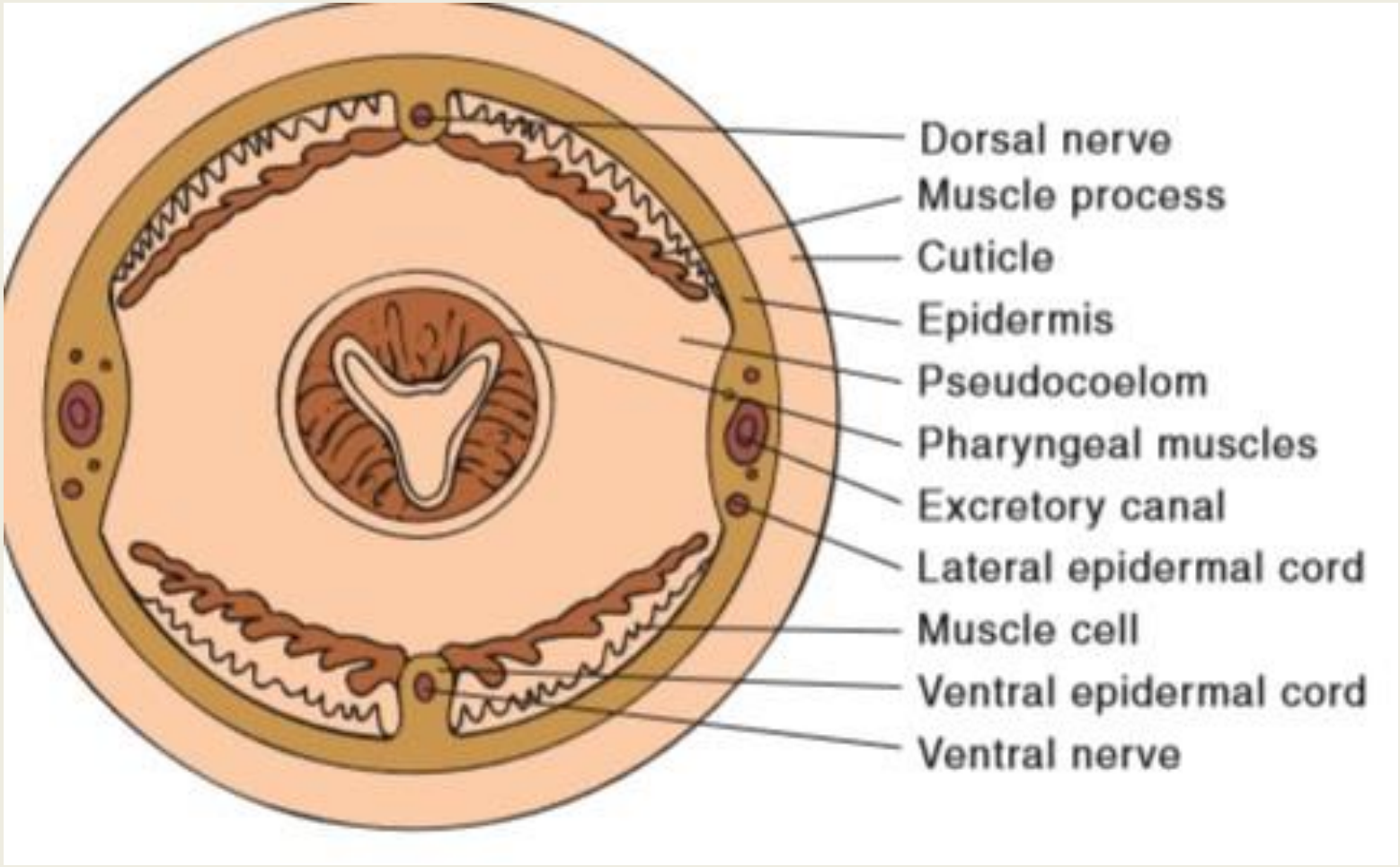


Fig: Cross section through the region of the muscular pharynx of a nematode. The hydrostatic pressure in the pseudocoelom maintains the rounded body shape of a nematode and also collapses the intestine, which helps move food and waste material from the mouth to the anus.

OTHER ORGAN SYSTEMS

two unique systems for Osmoregulation and excretion

Renettes

- ✓ The glandular system in aquatic species.
- ✓ It consists of ventral gland cells, called renettes.
- ✓ Posterior to the pharynx.
- ✓ Each gland absorbs wastes from the pseudocoelom and empties them to the outside through an excretory pore.

Tubular system

- ✓ more advanced system that develops from the renette system.
- ✓ Parasitic nematodes
- ✓ renettes unite to form a large canal.
- ✓ The nervous system consists of an anterior nerve ring.
- ✓ Nerves extend anteriorly and posteriorly; many connect to each other via commissures.
- ✓ Certain neuroendocrine secretions are involved in growth, molting, cuticle formation, and metamorphosis.

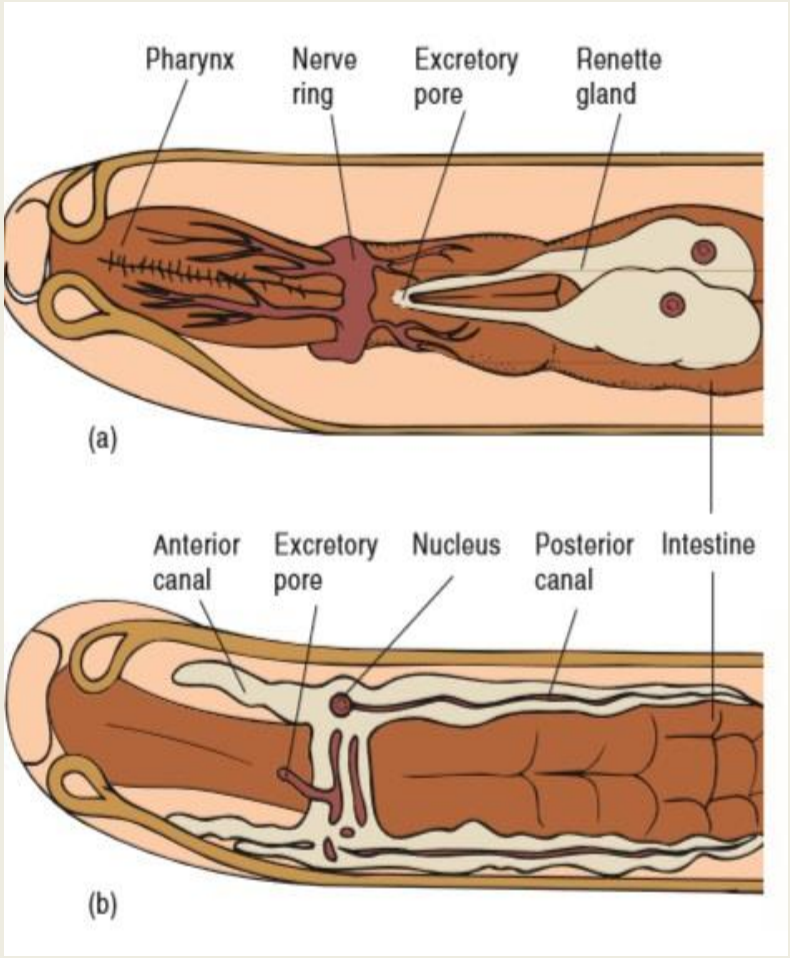


Fig: Nematode Excretory Systems. (a) Glandular, as in Rhabditis. (b) Tubular, as in *Ascaris.*

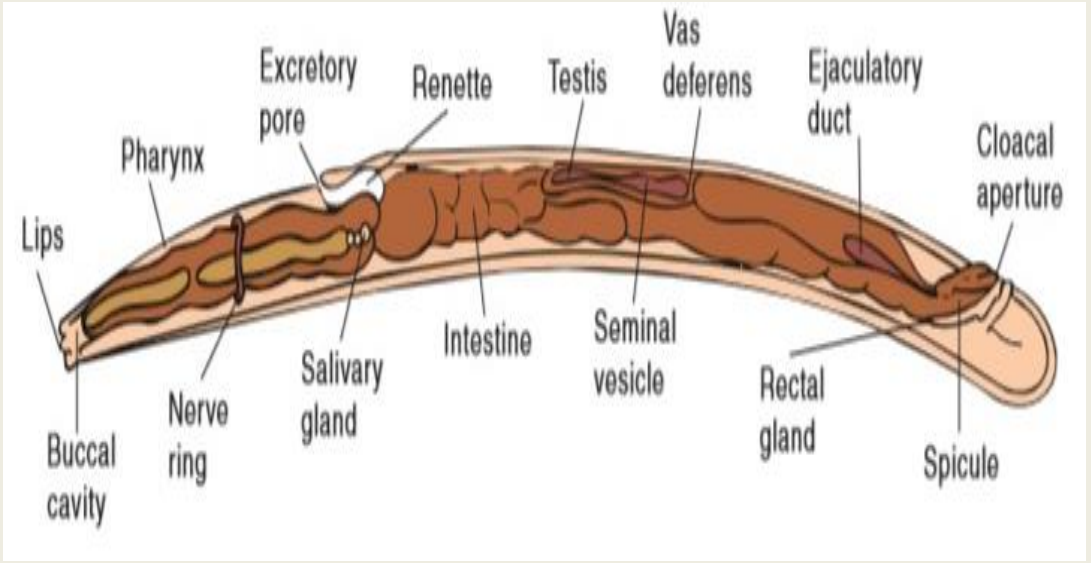


Fig: Phylum Nematoda. Internal anatomical features of a male Rhabditis.