UG CBCS Semester-1
Phylum: Nematoda (Roundworms)

Unsegmented worms, with an elongated body. Primary body cavity Ectoderm represented by a thin sheet of non-cellular hypodermis, secreting an elastic cuticle, made of protein, not chitin, usually moulted four times in the life of the individual. Cilia absent from both external and internal surfaces. A single layer of muscle cells underneath the hypodermis, divided into four quadrants, each muscle cell being elongated in the same direction as the body. Excretory system consisting of two intracellular tubes running in the lateral lines. Nervous system made up of a number of nerve cells rather diffusely arranged but forming a circumpharyngeal ring and a number of longitudinal cords of which the mid dorsal and mid ventral are the most important. Sense organs of the simplest type. Sexes usually separate, gonads continuous with ducts, fertilization internal. Alimentary canal straight and composed of two ectodermal parts, the suctorial fore gut and the hind gut and an endodermal mid gut without glands or muscles. Development direct, larvae only differing slightly from adult.

CLASSIFICATION

Nematodes are classified into the following classes:

Class I: Phasmidia or Secernentea

These are mostly parasitic. Caudal glands are absent. Unicellular, pouch-like sense organs called plasmids are present. The excretory system has paired lateral canals. Eg., *Ascaris*, *Enterobius*

The class Phasmidia is divided into the following orders:

Order 1: Rhabditida

They have smooth and ringed cuticle. There is a posterior lobe at the pharynx. They are free-living and parasitic. Males have copulatory spicules. Eg., *Rhabditis*

Order 2: Strongylida

They are vertebrate parasites devoid of lips. The pharynx has no bulb. They have a well-developed buccal capsule. They possess a true copulatory bursa. For eg., *Strongylus*

Order 3: Oxyurida

They can be small or moderate in size. Males have copulatory spicules. Caudal alae are present. The mouth consists of 3-4 simple lips. For eg., *Oxyuris*

Order 4: Ascaridida

These are oviparous, large stout nematodes living as parasites in the intestine of the vertebrates. The pharynx may or may not contain a posterior bulb. Mouth possess 3 prominent lips. There is no buccal capsule. For eg., *Ascaris*

Order 5: Spirurida

These are thread-like organisms that vary in size from moderate to large. The pharynx is devoid of bulb. The females are larger than males and can be oviparous or viviparous. The mouth contains two prominent lips. For eg., *Spirura*

Order 6: Trichuroida

These are commonly known as whip-worms. They possess a slender pharynx. The mouth is devoid of lips. For eg., *Trichuris*

Order 7: Camallanida

These are oviparous, thread-like organisms. The males have no bursa. The bursa of adult females is degenerated. For eg., *Camallanus*

Class II: Aphasmidia or Adenophorea

They are free-living organisms. The excretory system has no lateral canals. Caudal glands are present. Phasmids are absent. Eg., *Capillaria, Trichinella*

The class Aphasmidia or adenophorea is divided into the following orders:

Order 1: Enoplida

They are mostly marine. The cuticle contains bristles. These are Cyanthiform amphids. For eg., *Anticoma*

Order 2: Dorylaimida

The cuticle is smooth without any bristles. These are mostly terrestrial. The buccal cavity consists of a protrusible spear. It consists of 6-10 labial papillae. For eg., *Trichodoris*

Order 3: Mermithida

The cuticle is smooth. Amphids are reduced. In the larval stage, they live as parasites, whereas, the adult stage is free-living. For eg., *Mermis, Agamermis*

Order 4: Chromedorida

The cuticle is smooth or ringed. The cuticle is devoid of any bristles. There is a posterior bulb at the pharynx. They are free-living or marine. For eg., *Paracanthonchus*

Order 5: Desmoscolecida

The cuticle is ringed with prominent bristles. There are four sensory bristles at the anterior end. They are marine or free-living. For eg., *Desmoscolex*

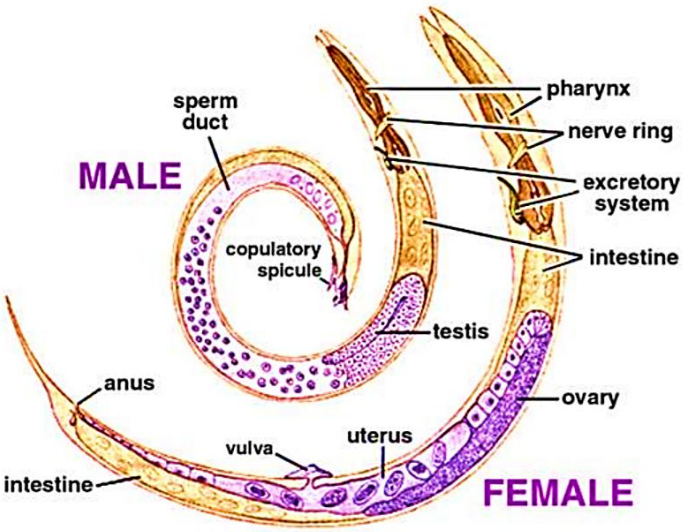
Order 6: Monohysterida

The cuticle is smooth, ringed and contains bristles. They possess circular amphids. They can be marine, freshwater, or terrestrial. For eg., *Monohystera*

Order 7: Araeolaimida

The cuticle is smooth and might or might not contain bristles. The amphids are spiral. They possess labial papillae. For eg., Plectus

Nematodes, eelworms, and other roundworms constitute a large phylum, Nematoda, with some 12,000 recognized species. Scientists estimate that the actual number might approach 100 times that many. Members of this phylum are found everywhere. Nematodes are abundant and diverse in marine and freshwater habitats, and many members of this phylum are parasites of animals and plants.



Many nematodes are microscopic and live in soil. It has been estimated that a spadeful of fertile soil may contain, on the average, a million nematodes. Nematodes are bilaterally symmetrical, unsegmented worms. They are covered by a flexible, thick cuticle, which is molted as they grow. Their muscles constitute a layer beneath the epidermis and extend along the length of the worm, rather than encircling its body. These longitudinal muscles pull both against the cuticle and the pseudocoel, which forms a hydrostatic skeleton. When nematodes move, their bodies whip about from side to side.

Near the mouth of a nematode, at its anterior end, are usually 16 raised, hairlike, sensory organs. The mouth is often equipped with piercing organs called **stylets.** Food passes through the mouth as a result of the sucking action of a muscular chamber called the **pharynx.** After passing through a short corridor into the pharynx, food continues through the other portions of the digestive tract, where it is broken down and then digested. Some of the water with which the food has been mixed is reabsorbed near the end of the digestive tract, and material that has not been digested is eliminated through the anus.

About 50 species of nematodes, including several that are rather common in the United States, regularly parasitize human beings. The most serious common nematode-caused disease in temperate regions is trichinosis, caused by worms of the genus *Trichinella.* These worms live in the small intestine of pigs, where fertilized female worms burrow into the intestinal wall. Once it has penetrated these tissues, each female produces about 1500 live young. The young enter the lymph channels and travel to muscle tissue throughout the body, where they mature and form highly resistant, calcified cysts. Infection in human beings or other animals arises from eating undercooked or raw pork in which the cysts of *Trichinella* are present. If the worms are abundant, a fatal infection can result, but such infections are rare; only about 20 deaths in the United States have been attributed to trichinosis during the past decade.

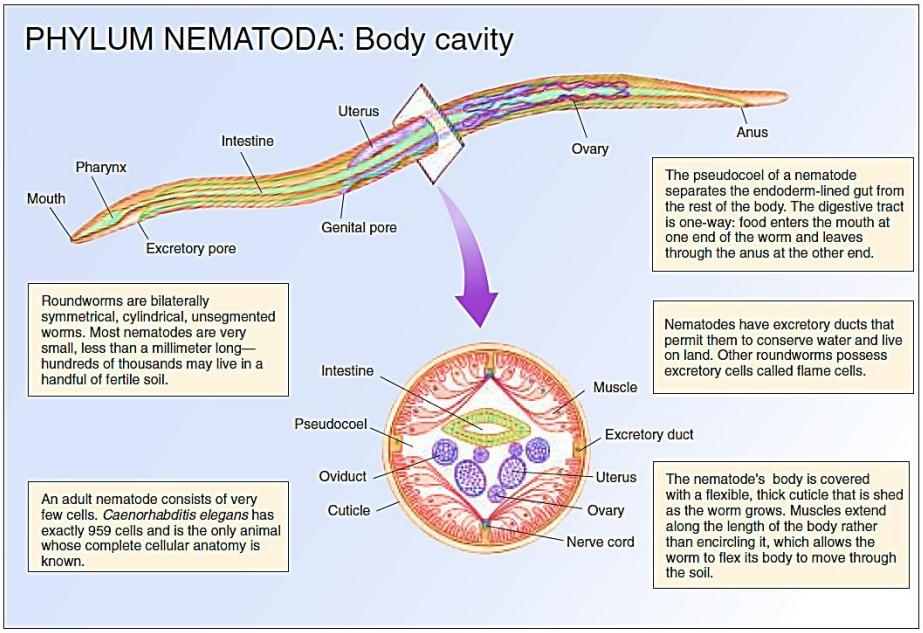


FIGURE 44.20
The evolution of a simple body cavity. The major innovation in body design in roundworms (phylum Nematoda) is a body cavity between the gut and the body wall. This cavity is the pseudocoel. It allows chemicals to circulate throughout the body and prevents organs from being deformed by muscle movements.