

# Invertebrate Zoology (Study Guide for Test)

## Unit 3: Phylums: Platyhelminthes, Nematoda, and Rotifera

### Objective 1: Describe the form and function of flatworms

Students should be able to:

- 1) Describe the characteristics of the following systems for flatworms: muscular, nervous, digestive, excretory, and reproductive for each type of flatworm (Turbellaria, Trematoda, Monogenea, Cestoda).
- 2) Explain the methods of locomotion (movement) for each type of flatworm.
- 3) Describe how feeding occurs for each type of flatworm.

How to study:

a) Read Pages: 283-297

b) Understand vocabulary terms:

-acoelomate: an organism which does not have a digestive cavity. Digestion occurs outside of the body or through filter feeding.

-bilateral symmetry: an organism which can be divided into two equal halves from one direction.

-flame cells: Flame cells remove excess water from a planarians body. The water from flame cells collect in tubules and leaves the body through pores in the body surface.

-proglottid: Detachable sections of a tapeworm. They contain muscles, nerves, flame cells, and male and female organs.

-scolex: A knob-shaped head of a tapeworm. It can contain hooks which help anchor the tapeworm to the host.

-eyespots: sensory cells that can detect the presence or absence of light and chemicals and also movement in water.

-hermaphrodite: An organism which has both male and female gametes (sperm and egg).

-cilia: Short hair like projections which aid in locomotion (movement).

-pharynx: A tube-like, muscular organ which extends out of a planarians mouth. It releases enzymes which begin digesting food outside of the animals' body.

-regeneration: The replacement or regrowth of missing body parts.

-triploblastic: An organism that has three well-defined germ layers.

-parasite: An organism that uses another organism to its benefit while harming the host.

-gastrovascular cavity: Body cavity in certain lower invertebrates that functions in both digestion and circulation and has a single opening serving as both mouth and anus.



Cartoons By Gary Larsen.

Larson, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.

-extracellular digestion: digestion of material outside of the body.

c) Complete, review, and understand the homework assignments on: Assignment 1 Unit 3 Objective 1 and 2.

d) Understand the following notes: Flatworm Notes

e) Know these diagrams: Figure 14-6 Pg 286, Fig 14-7 Pg 287, Fig 14-9 Pg 288

## **Objective 2:** Differentiate the classes of the Phylum Platyhelminthes (Turbellaria, Trematoda, Monogenea, Cestoda)

Students should be able to:

- 1) Identify examples of each class of the phylum Platyhelminthes
- 2) Describe the life cycles and general morphology of each class.

How to study:

a) Read Pages: 288-297

b) Understand vocabulary terms:

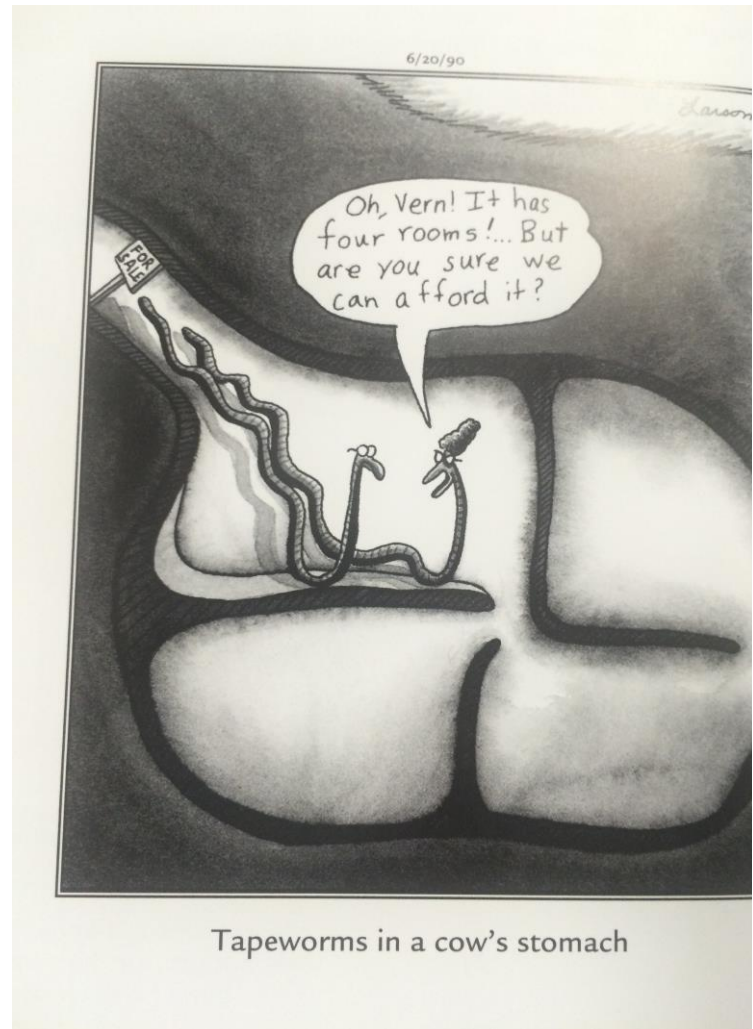
-Class Turbellaria: Free living forms with soft, flattened bodies. Mouth usually on ventral surface and sometimes toward the center of the body. Non-parasitic. Examples include *Dugesia* (planaria), *Microstomum*, *Planocera*.

- Class Trematoda: Digenetic flukes. Body of adults not covered in cilia. Leaf-like or cylindrical in shape. Usually have oral and ventral suckers, no hooks. Can inhabit a variety of vertebrate hosts. Parasitic. Examples include *Fasciola*, *Clonorchis*, *Schistosoma*.

-Class Monogenea: Monogenetic flukes. Body of adults not covered in cilia, leaf-like or cylindrical in shape. Posterior attachment organ with hooks, suckers, or clamps. Direct development of offspring. Usually have single host. All parasitic.

Mostly on the skin or gills of fish. Examples include *Dactylogyrus*, *Polystoma*, *Gyrodactylus*.

-Class Cestoda: Body of adults not covered in cilia. General form is tape-like; Scolex with suckers and/or hooks. Body divided into series of proglottids. No digestive organs. Parasitic in digestive tract of all classes of vertebrates. Indirect development with two or more hosts. Include tapeworms. Examples include: *Diphyllobothrium*, *Hymenolepis*, *Taenia*.



Cartoons By Gary Larsen.

**Larson, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.**

c) Know these diagrams: Classification of Phylum Platyhelminthes. Pg 289. Fig 14-12 pg 290, Fig 14-19 pg 296.

d) Understand the following notes: Flatworm Notes

e) Complete, review, and understand: Assignment 1 Unit 3 Objective 1 and 2

## **Objective 3: Describe the form and function of the organisms in Phylum Nematoda**

Students should be able to:

- 1) Describe the characteristics of the following systems for Roundworms: muscular, nervous, digestive, and reproductive.
- 2) Explain the methods of locomotion (movement) for roundworms.
- 3) Describe how feeding occurs for free-living and parasitic roundworms.

How to study:

a) Read Pages: Pg 305-308

b) Understand vocabulary terms:

-Pseudocoelmate: A member of the nine phylum, in which the original blastocoel (area of development of a digestion in a blastula) of the embryo persists as a space, or body cavity. Between the enteron and body wall. This cavity lacks the peritoneal lining found in true coelomates. Also known as an incomplete or false digestive cavity.

Parasite: An organism which uses another organism for resources which causes harm to the host.

c) Complete, review, and understand Assignment 2 Unit 3 Objective 3 Inv Zoology.

d) Understand the following notes: Roundworms Notes

e) Know these diagrams: Fig 15-2 pg 307, Characteristics of Pseudocoelomates Phyla Summary pg 306.

## **Objective 4: Describe the form and functions of the organisms in the Phylum Rotifera.**

Students should be able to:

- 1) Explain the different characteristics of Rotifers.
- 2) Explain the various habitats in which they live
- 3) Describe the basic anatomy and size of Rotifers

How to study:

a) Read Pages: 315-318

b) Understand Vocabulary Terms:

-Corona: The ciliated crown on the top of Rotifers.

-Dioecious: Two separate sexes (male and female).

Cartoons By Gary Larsen.

**Larson, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.**

-Sexual reproduction: the union of male gametes (sperm) and female gametes (eggs) to produce a diploid organism which has the genetics of both the male and female parent.

-Asexual reproduction: One of many types of reproduction in which the offspring is genetically identical to the parent.

-Parthenogenesis: an asexual reproduction pattern in which all members are female. They produce eggs which develop unfertilized. This is basically cloning the mother. The daughters are genetically identical to the mother.

c) Know these diagrams: Figure 15-18 pg 316; Classification of Phylum Rotifera Pg 318

d) Understand the following notes: Rotifera Notes

e) Complete, review, and understand: Assignment 3 Unit 3 Objective 4 and 5

## **Objective 5: Differentiate the classes of the Phylum Rotifera (Csisonidea, Bdelloidea, and Monogonomonta).**

Students should be able to:

- 1) Explain the characteristics of each class.
- 2) Explain the reproductive strategy for each class.

How to study:

a) Read Pages: Pg 317-318

b) Understand vocabulary terms:

Class Seisonidea. Marine; Elongated form; corona vestigial; sexes similar in size and form; females with pair of ovaries and no vitellaria; a single genus with 2 species; epizoic on the gills of a crustacean (nebalia). Examples include: *Seison*.

Class Bdelloidea: Swimming for creeping forms; anterior end retractile corona usually with pair of trochal discs; males unknown; parthenogenetic; Examples include *Philodina*, *Rotaria*.

Class Monogononta. Swimming for sessile forms; single germoviltellarium; males reduced in size; eggs of three types (amictic, mictic, dormant). Examples include *Asplanchna*, *Epiphanes*.

Vocabulary Terms:

-Dioecious: Two separate sexes (male and female).

-Sexual reproduction: the union of male gametes (sperm) and female gametes (eggs) to produce a diploid organism which has the genetics of both the male and female parent.

-Asexual reproduction: One of many types of reproduction in which the offspring is genetically identical to the parent.

-Parthenogenesis: an asexual reproduction pattern in which all members are female. They produce eggs which develop unfertilized. This is basically cloning the mother. The daughters are genetically identical to the mother.

-Amictic eggs: Amictic eggs are already diploid and can develop only parthenogenetically. Any one of several environmental factors may induce amictic eggs to develop into diploid mictic females what will produce thing-shelled haploid eggs.

-Mictic eggs: Mictic refers to the ability of haploid cells to be fertilized into a diploid embryo. Mictic eggs can develop directly or can become dormant in times of environmental conditions are poor.

Cartoons By Gary Larsen.

**Larson, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.**

c) Know these diagrams: Classification of Phylum Rotifera (Pg 318), Fig 15-19 (Pg 317)

d) Understand the following notes: Rotifer Notes

e) Complete, review, and understand: MBC assignment 3 Unit 3 Objective 4+5

## Objective 6: Explain the characteristics of various parasites found in the Phylum Platyhelminthes

Students should be able to:

- 1) Describe the host(s), life cycle, and general characteristics of each parasite.

How to study:

a) Read Pages: 290-297

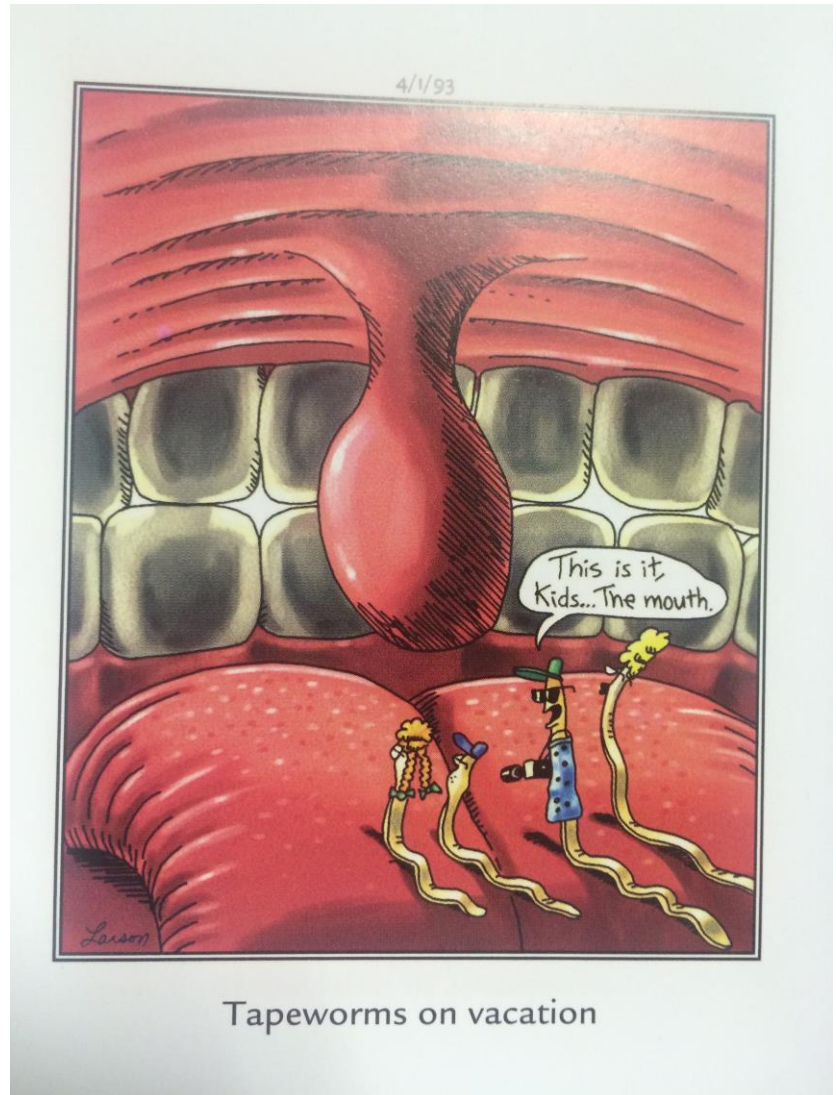
b) Understand the following parasites:

-Liver Fluke in humans (*Clonorchis sinensis*): Hosts include humans, cats, dogs, and pigs. Adult Flukes live in the bile passageways of humans, cats, dogs, or pigs. Eggs are shed into the water with feces. Once the feces and eggs are ingested by snails, the eggs develop into a sporocyst. They travel to the water and swim until they encounter a fish in the family Cyprinidae (minnow family). If the human or animal eats the undercooked fish, they develop into young flukes and complete the cycle. See Fig 14-12.

-Blood Fluke (*Schistosoma*): Hosts include humans. Eggs are released in human feces or urine into the water and hatch as ciliated miracidia. The miracidia are then in contact with a snail and transform into sporocysts. The sporocysts then develop into cercariae and leave the snail into the water. The cercariae can penetrate the skin of a human and infect another human. See Fig 14-13.

-Lung Fluke (*Paragonimus*): Wild carnivores, humans, pigs, and rodents. The infected host coughs up eggs in the sputum. The sputum is swallowed and released in the feces in the water. The zygotes develop in the water into miracidia which then penetrate a snail host. In the snail, the miracidia develop into sporocysts then into cercaria. These cercaria are shed in the water and ingested directly by freshwater crabs which prey on snails. Infection of the host is by eating raw or undercooked crab meat.

-Beef Tapeworm (*Taenia saginata*): Lives in the intestines of humans. They contain proglottids which can reach a length of 10 m or more. Proglottids detach and pass in feces. Gravid proglottids crawl out of feces onto nearby vegetation. There they may be eaten by grazing cattle. A proglottid ruptures as



Cartoons By Gary Larsen.

Larsen, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.

it dries and scatter embryos on soil and grass. Embryos may remain viable on grass for as long as 5 months. Once eaten by the cattle, they develop as cysts in the muscles of the cow. See Fig 14-19. –

-Pork Tapeworm (*Taenia solium*) Pork Tapeworm. They live in the human small intestine whereas juveniles occur in the muscles of pigs. The scolex has both suckers and hooks arranged on its tip the rostellum. The life history of this worm is similar to that of the beef tapeworm, except that people become infected by eating insufficiently cooked pork.

-Fish Tapeworm (*Diphyllobothrium latum*): Adult tapeworm found in the intestine of humans, dogs, cats and other mammals. The immature stages of the parasite develop in crustaceans and fish. Fish tapeworm can occur anywhere where raw fish is eaten. In the US, infection is most common in the Great Lakes region.

-Dog Tapeworm (*Dipylidium caninum* or *Chinococcus granulosis*): Causes hydatidosis (cysts in the liver) in humans. Can develop in canines, humans, monkeys, sheep, reindeer, and cattle. The cysts which develop grow slowly. The cysts can bud off and contain thousands of scolices. Each scolex will produce a new worm when eaten by a canine.

c) Know these diagrams: Fig 14-12, Fig 14-13, 14-19

d) Understand the following notes: Flatworm Notes

e) Complete, review, and understand: Assignment 4

## **Objective 7: Explain the characteristics of various parasites found in the Phylum Nematoda**

Students should be able to:

1) Describe the host(s), life cycle, and general characteristics of each parasite.

How to study:

a) Read Pages: 308-312

b) Understand vocabulary terms:

-*Ascaris lumbricoides* (The large roundworm of Humans): Female *Ascaris* may lay 200,000 eggs a day which are passed out in the host's feces. Embryos develop infective juveniles within 2 weeks.

Infection occurs when eggs are ingested with uncooked vegetables or when children put soiled fingers or toys in their mouths. The host swallows the eggs. The eggs hatch into tiny juveniles which burrow through the intestinal wall into veins. Once in the blood they travel to the lungs then to the trachea. They then can be coughed up and swallowed then travel to the stomach and mature about 2 months after the eggs were ingested. The parasite is rarely fatal unless there is heavy infestation. Infection rates tend to be highest in children, and males tend to be more heavily infected than females.

-Hookworms: Named so because the anterior ends curve dorsally, suggesting a hook. These worms can reach up to 11 mm long. They have large plates in their mouths which cut into the intestinal all where they suck blood and pump it through their intestines. It is partially digested and absorbs the nutrients. They can be a source of anemia in patients. This disease can result in retarded mental and physical growth and a general loss in energy for children. Eggs pass through the feces and juveniles hatch in the soil. They live on the bacteria. When human skin comes in contact with infected soil,

infective juveniles burrow through the skin to the blood and reach the lungs and finally the intestine similar to *Ascaris*.

-Trichina Worm: Can cause trichinosis. Adult worms burrow in the mucosa of the small intestine where females produce living young. Juveniles penetrate blood vessels and are carried throughout the body, where they may be found in almost any tissue or body space. Eventually they penetrate skeletal muscle cells. Juveniles cause astonishing redirection of gene expression in their host cell, which loses its striations and becomes a nurse cell that nourishes the worm. When raw or poorly cooked meat containing encysted juveniles is swallowed, the worms are liberated into the intestine where they mature. These worms can infect a wide variety of mammals in addition to humans, including pigs, rats, cats, and dogs.

-Pinworms (*Enterobius vermicularis*): Common parasites in the United States. The parasites live in the large intestine and cecum. Females, up to about 12 mm in length, migrate to the anal region at night and lay their eggs. Scratching the resultant itch contaminates hands and bedclothes. Eggs develop rapidly and become infective within 6 hours at body temperature. When they are swallowed they hatch in the duodenum, and the worms mature in the large intestine.

-Filarial worms: The worms live in the lymphatic system, and females are as long as 10 cm. Females release live young, tiny microfilariae into the blood and lymphatic system. As they feed, mosquitoes ingest microfilariae, which develop inside the mosquitoes to the infective stage. They escape from the mosquito when it is feeding again on a human and penetrate the wound made by the mosquito bite. Filarial worms include elephantiasis, *onchocerciasis*, and dog heartworm. See Fig 15-10 (Pg 312)

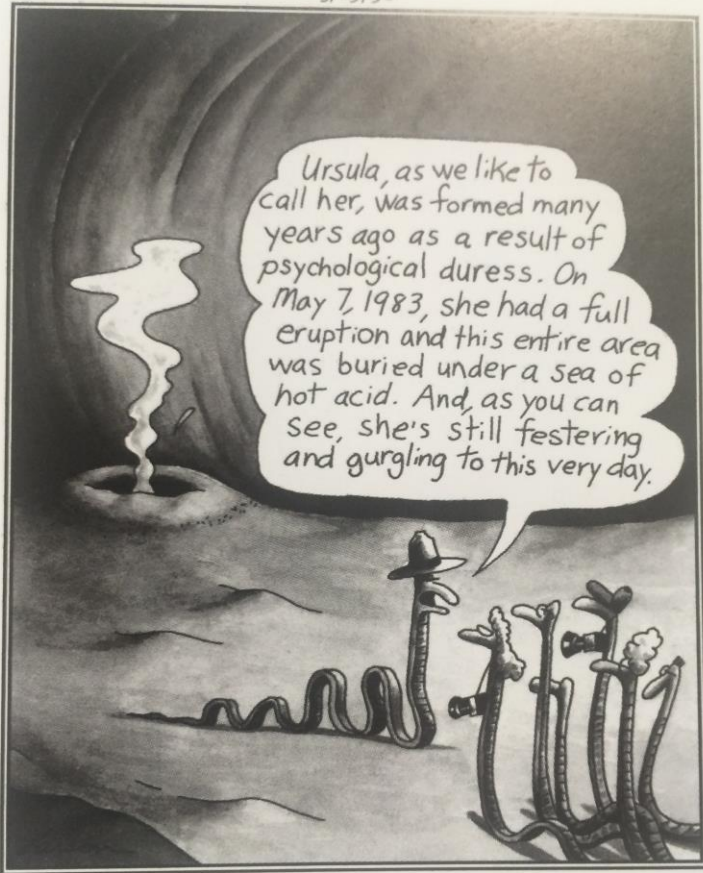


c) Know these diagrams: Figure 15-7 pg 311; Fig 15-10 Pg 312

d) Understand the following notes: Roundworm Notes

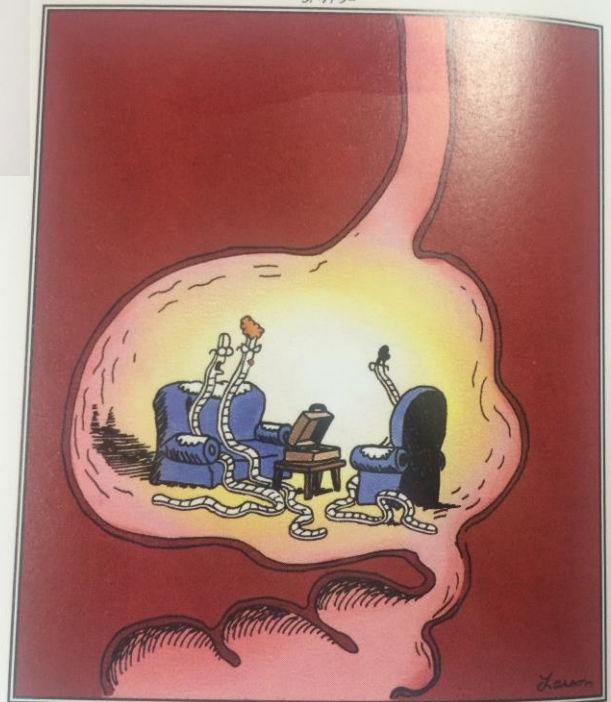
e) Complete, review, and understand: Assignment 4 Unit 3 Objectives 6 7 and 8

3/29/90



Tapeworms visiting a stomach park

3/17/92



"Well, I'm not sure we can afford stomach insurance—right now we're trying to put the kids through the small intestine."

Cartoons By Gary Larsen.

Larsen, Gary. *The Complete Far Side*. Kansas City, Mo.: Andrews McMeel Pub., 2003. Print.