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Ecology & Evolutionary Biology 4274
Lecture Exam #3

Nematoda, Misc. phyla, Arthropoda, ecology and evolution

December 10, 2014

Read through the exam once before you begin. Read the questions CAREFULLY; be certain to provide all of the information requested. In instances in which you are asked to answer only a SUBSET of the questions, if you answer more questions than indicated, your answers will be graded in order, and you will be graded only on the number of questions you are required to answer. Note: for HOST species, the common name is sufficient; for parasite taxa the correct full scientific name is required.

1. Identify the site in/on the human host that you would find the ADULT stage of **FOUR (4)** of the following 6 parasite species. (8 points)

a. *Onchocerca volvulus* _____

b. *Demodex folliculorum* _____

c. *Dracunculus medinensis* _____

d. *Pediculus humanus humanus* _____

e. *Ancylostoma duodenale* _____

f. *Sarcoptes scabiei* _____

2. For **TWO (2)** of the following potential food items, identify and describe the parasite infection that can be avoided by properly (i.e., thoroughly!) cooking the food item. (4 points)

a. Pork roast

b. Cod fillets

c. Goat liver or frogs legs

3. Answer **TEN (10)** of the following 14 questions. (20 points)

- a. Identify a phylum that is parasitic as a larva and free-living as an adult.
- b. The Etiological agent of whirling disease belongs to what phylum?
- c. Identify a species that is associated with 3 different host species over the course of its life.
- d. Identify a genus that substitutes itself for the tongue of its host.
- e. Identify the family to which hookworms belong.
- f. Identify the phylum to which leeches belong.
- g. Identify a phylum that includes proboscis-bearing gut-less worms.
- h. Identify an order that includes species with genal combs.
- i. Identify the family to which chiggers belong.
- j. Identify a species that uses freshwater copepods as intermediate hosts.
- k. Identify a genus of soft ticks.
- l. Identify a class whose members are characterized by their possession of a stichosome.
- m. The nauplius larva is characteristic of both parasitic and free-living members of what subphylum?
- n. Because of her living situation, Little Orphan Annie is likely to have contracted what species of nematode above all others?

4. Describe how you would diagnose infections of **FOUR (4)** of the following 6 taxa in/on their vertebrate host. Be certain to indicate the life cycle stage that would be key to your diagnosis. (8 points)
- a. *Dirofilaria immitis*

 - b. *Necator americanus*

 - c. *Trichuris trichiura*

 - d. *Demodex folliculorum*

 - e. *Enterobius vermicularis*

 - f. *Ascaris lumbricoides*
5. Elizor has become interested in the conservation of endangered species. He creates a pond and introduces crayfish, mayflies, dragonflies, and amphipods. He seeds the pond with unionid clam adults, but he is completely unsuccessful at getting these adults to successfully produce a new generation of adult clams. Why has Elizor been unsuccessful in establishing these clams in his pond? (3 points)

6. In **FOUR (4)** of the following 6 cases describe a scenario in which the host indicated might acquire an infection of the parasite indicated. Be certain to indicate the life-cycle stage involved in acquisition of the infection by the host indicated. (8 points)

a. Human with *Trichinella spiralis*

b. Mosquito with *Wuchereria bancrofti*

c. Dog with *Ctenocephalides canis*

d. Human with *Toxocara canis*

e. Crab with *Sacculina*

f. Human with *Ancylostoma caninum*

7. Describe how **TWO (2)** of the following 3 ecological concepts apply to parasite systems. (6 points)

a. The crowding effect.

b. The negative binomial distribution

c. The “ghost of competition past”

8. Identify **TWO (2)** zoonotic species of nematodes and/or arthropods and in each case describe conditions in which infections could successfully occur between natural animal hosts and humans. (6 points)

a. _____

b. _____

9. Samatoa had a wonderful time on her cruise! The ocean liner stopped at a diversity of ports throughout Central and South America, some of which were quite rural. She was able to spend several days in each port. She has just noticed that she has returned with a “companion.” She can see it wiggling its leg-less body around inside a sizeable hole in her arm. Answer **FIVE (5)** of the following 7 questions regarding her “companion.” (10 points)
- a. Is Samatoa likely to die from this parasite infection? Explain your answer.

 - b. To what hexapod order does the parasite inhabiting the hole in her arm belong?

 - c. Are all species that belong to that order parasitic at some stage in their life?

 - d. What general name is given to this type of infection?

 - e. Samatoa couldn't resist going into the water at several of the ports. Could she have prevented her infection had she stayed on land? Explain your answer.

 - f. Should she worry about transmitting the infection to other members of her family? Explain your answer.

 - g. Assuming she allows her “companion” to fully develop, what stage will ultimately “emerge” from her arm?

10. Answer **ONE (1)** of the following 2 questions. (3 points)

- a. Describe various control strategies for controlling intensity of infection of the copepod *Lepeophtheirus* in captive salmon

- b. Describe the five “F”s as they relate to parasite transmission strategies.

11. Each of the following statements is **INCORRECT** in one or more respects. Select **THREE (3)** of the following 5 statements and **REWRITE** them so that the information conveyed is **CORRECT**. (6 points)

- a. One of the most conspicuous trends seen in the evolution of parasitic copepods involves an increased emphasis on appendages and segmentation.

- b. Whereas visceral Pentastomiasis involves human infections with adult stages, nasopharyngeal Pentastomiasis involves human infections with larval stages.

- c. Fish lice, body lice, whale lice, pubic lice and head lice are all members of the class Arachnida.

- d. While mites represent a monophyletic group within ticks, ticks do NOT represent a monophyletic group without mites.

- e. Manter’s rule states that the ancestors of present day parasites were the parasites of the ancestors of present day hosts.

12. Complete **EIGHTEEN (18)** of the 23 blank cells in the following table of parasites. If you determine that a particular cell does not apply, write N/A as your answer for that cell. Note: each row must represent a **DIFFERENT** parasite species (18 points).

Disease	Etiological Agent	Host experiencing disease (common name is fine)	Portal of entry into host experiencing disease (write N/A in cases of ectoparasites)	Does phylum to which parasite species belongs also include free-living species? (YES/NO)
cutaneous larval migrans				
	<i>Sarcoptes scabiei</i>		skin	YES
visceral larval migrans				
heartworm disease				
	<i>Pediculus humanis capitus</i>		N/A	
	<i>Trichinella spiralis</i>			
tick paralysis	<i>Dermacentor</i> spp.		N/A	

 Bonus: Given your now substantial knowledge of parasites, do you think my orange t-shirt would make a popular holiday gift item? Justify your answer.