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Ecology & Evolutionary Biology 4274
Lecture Exam #2

Platyhelminthes

October 26, 2011

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. Use the list below to provide an example of a taxon that fulfills all of the criteria for SIX (6) of the following 9 questions. You may NOT use a species more than once. (12 points)

*Paragonimus westermani**Clonorchis sinensis**Schistosoma mansoni**Diphyllbothrium latum**Dactylogyrus vastator**Dicrocoelium dendriticum**Echinococcus granulosus**Fasciolopsis buski**Taenia solium**Schistosoma japonicum**Fasciola hepatica**Austrobilharzia variglandis*

- a. A “liver” fluke that’s not a liver fluke at all _____
- b. Has a hooked free-swimming larva and a neodermis _____
- c. Has a non-hooked free-swimming larva and does not occupy the liver of its definitive host as an adult _____
- d. Has 2 invertebrate intermediate hosts _____
- e. Undergoes polyembryony at some time in its life but does not have a cercarial stage _____
- f. Can have 4 hosts in its life cycle, especially if one is inconveniently small

- g. Has at least 1 sporocyst generation but never encysts on anything _____
- h. Is a member of the Platyhelminthes and has a terrestrial life cycle _____
- i. Is proglottized and polyzoic _____

2. For a disease caused by a parasitic platyhelminth provide the following information: (8 points)

Name the Disease _____

- a. Identify the etiological agent.
 - b. Describe how a person would acquire an infection of the etiological agent.
 - c. Describe how one would go about diagnosing the infection.
 - d. Describe the pathogenicity associated with the disease.
3. Describe a strategy for increasing the chances of transmission between hosts for a species of parasitic platyhelminth. Be certain to identify the parasite. (4 points)

4. Describe THREE (3) of the following five structures; in each case provide an example of a taxon in which you would expect to find the structure (feel free to use illustrations to augment your answer). (12 points)

a. Neodermis Taxon: _____

b. Haptor Taxon: _____

c. Scolex Taxon: _____

d. Acetabulum Taxon: _____

e. Microthrix Taxon: _____

5. Identify the stage that is infective to HUMANS for FIVE (5) of the following 7 parasite species. In each case also identify the portal of entry into the human host. (15 points)

	Infective stage	portal of entry
a. <i>Austrobilharzia variglandis</i>	_____	_____
b. <i>Paragonimus westermani</i>	_____	_____
c. <i>Echinococcus granulosus</i>	_____	_____
d. <i>Diphyllobothrium latum</i>	_____	_____
e. <i>Schistosoma japonicum</i>	_____	_____
f. <i>Clonorchis sinensis</i>	_____	_____
g. <i>Fasciola hepatica</i>	_____	_____

6. For FOUR (4) of the following 6 statements, identify a platyhelminth GENUS that fulfills the criteria listed. (You may NOT use a genus more than once) (8 points)

- Includes species that are pathogenic in fish and lack a miracidial stage

- Includes a species that can use humans as either (or both) intermediate and definitive hosts

- Includes polyzoic heteroxenous species _____
- Includes species that can result in pseudotubercle production in the liver

- Includes species with life-cycles that are completely terrestrial _____
- Includes a species that vectors a deadly bacterium in dogs _____

7. Using the list of hosts below, provide a schematic illustration of FOUR (4) of the following 6 types of life-cycles. In each case identify the species whose life-cycle you have illustrated. You may repeat hosts, but NOT parasite species. (12 points)

HOST OPTIONS: fish, bear, snail, crab, ant, pig, cow, human, copepod, bird

Example: 2 hosts, both of which are vertebrates

pig

human

platyhelminth: *Taenia solium* _____

a. 2 hosts, neither of which is human platyhelminth: _____

b. 3 hosts, none of which are mollusks platyhelminth: _____

c. 3 hosts, one of which is a snail platyhelminth: _____

d. 2 hosts, both of which are vertebrates platyhelminth: _____

e. 2 hosts, one of which is a mollusk platyhelminth: _____

f. 3 hosts, two of which are invertebrates platyhelminth: _____

8. Each of the following statements is INCORRECT in one or more respects. Select (4) of the following 6 statements and REWRITE then so that the information they convey is CORRECT; in each case all taxa listed must remain in the statement (i.e., the statements cannot be corrected by removing host or parasite taxa). (12 points)
- a. Whereas the turbellarians consist of a monophyletic group, the digeneans do not.
 - b. Whereas the oral sucker of polyopisthocotyleans is divided, that of the monopisthocotyleans is not.
 - c. Whereas species of *Echinococcus* and *Gyrodactylus* undergo sequential polyembryony, species of *Clonorchis* undergo simultaneous polyembryony.
 - d. Whereas temnocephalideans are endoparasitic in the kidneys and pericardial chamber of freshwater crustaceans, aspidogastreans are ectoparasitic on the external surfaces of freshwater clams.
 - e. Whereas the monogeneans and polyclads possess a neodermis, the eucestodes do not.
 - f. Whereas redia can produce sporocysts or cercaria, sporocysts cannot produce redia.
9. Which of the platyhelminth species that parasitizes humans do you consider to be easiest to treat? Justify your answer. (3 points).

10. For TWO (2) of the following 3 travelers provide the four pieces of information indicated below. (10 points)

- (i) Identify the platyhelminth species the individual is most likely to have acquired an infection with over the course of his or her adventure.
- (ii) Identify the type of sample you would require to verify your diagnosis.
- (iii) Identify the life cycle stage you would expect to find in that sample.
- (iv) Explain which aspect of the adventure described was most likely to have led to the infection.

a. Oriana, who works for a US seed company, was sent to Kenya to investigate a new potentially very productive variety of rice that had been discovered growing in shallow ponds in a remote rural community. While there she was “treated” to some local delicacies, which included a diversity of raw fish, raw snakes, raw crabs, raw snails...actually raw just about everything! Some weeks after she returned to the US she was horrified to discover blood in her urine.

- (i)
- (ii)
- (iii)
- (iv)

b. This past summer break, Toran was excited to be hired to work on his neighbor’s sheep farm. He spent rather a lot of time herding, feeding, and sheering sheep. But, he also helped with the garden adjacent to the sheep pasture, weeding, and harvesting such vegetables as carrots, lettuce, and potatoes, many of which he enjoyed at the farm yard lunches each noon. Towards the end of the summer, Toran began to experience liver discomfort.

- (i)
- (ii)
- (iii)
- (iv)

c. Who would have thought that Mantala’s trip to visit her pen pal Aiko in Japan would have been such a culinary extravaganza. Over the month she was there, Mantala partook of a traditional Japanese tea ceremony, visited Tokyo’s unbelievably diverse fish market, drove through bamboo forests in the highlands where she and Aiko stopped for some green tea and tasty little raw freshwater crabs. However, a few months after she returned she started to question some of her food choices as she began to experience some difficulty breathing and on more than one occasion she thought she saw blood in her sputum.

- (i)
- (ii)
- (iii)
- (iv)

11. Use your Parasitological expertise to answer ONE (1) of the following questions. (4 points)

a. You have been engaged by sheep farmers in Washington State to advise them about the various strategies they might use to control, or at least reduce, Fascioliasis in their flocks. Describe the options and advice you would provide.

b. You have been invited to appear on the Tyra Banks show to serve as an expert Parasitologist to explain to potential dieters how they could go about infecting themselves with a tapeworm, were they to choose to do so. Apart from obviously discouraging people from pursuing this course, describe the explanation you would provide.