

Name \_\_\_\_\_

Medical Parasitology (EEB 3895)  
Lecture Exam #1

October 2, 2017

**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 only the number of questions you are required to answer will be graded. Note: for HOST species, the common name is sufficient; for parasite taxa the correct full scientific name is required unless otherwise indicated. Do not use abbreviations for scientific names.**

**I. Answer the subset of parts indicated for each of the following 10 questions.**

1. In terms of diagnosing human infections, identify the type of sample you would take and the stage of the parasite you would expect to find in that sample if the infection is positive for FOUR (4) of the following 6 parasite species (8 points)

| protozoan species                 | type of sample taken | stage of parasite expected |
|-----------------------------------|----------------------|----------------------------|
| <i>Leishmania mexicana</i>        | _____                | _____                      |
| <i>Plasmodium falciparum</i>      | _____                | _____                      |
| <i>Acanthamoeba polyphaga</i>     | _____                | _____                      |
| <i>Trypanosoma b. rhodesiense</i> | _____                | _____                      |
| <i>Trichomonas vaginalis</i>      | _____                | _____                      |
| <i>Naegleria fowleri</i>          | _____                | _____                      |

2. Identify the etiological agent and describe the pathology in the human host associated with FOUR (4) different parasitic diseases from the following list. (12 points)

|                                     |                           |                                  |
|-------------------------------------|---------------------------|----------------------------------|
| Cutaneous Leishmaniasis             | Giardiasis                | Chaga's Disease                  |
| Quartan Malaria                     | Amoebic Dysentery         | South American Sleeping Sickness |
| Trichomoniasis                      | Malignant Tertian Malaria | Acute African Sleeping Sickness  |
| Kala-azar                           | Chiclero's ulcer          | Visceral Leishmaniasis           |
| Primary Amoebic Meningoencephalitis |                           |                                  |

a. Disease: \_\_\_\_\_

Etiological agent: \_\_\_\_\_

Pathology:

b. Disease: \_\_\_\_\_

Etiological agent: \_\_\_\_\_

Pathology:

c. Disease: \_\_\_\_\_

Etiological agent: \_\_\_\_\_

Pathology:

d. Disease: \_\_\_\_\_

Etiological agent: \_\_\_\_\_

Pathology:

3. For FOUR (4) of the following 6 questions, identify a species, or subspecies if appropriate, that best fulfills the criteria listed. You may use each species or subspecies only once. (8 points)
- a. sexually transmitted; non-zoonotic
  - b. most deadly member of its genus; controversy surrounds which of its 2 hosts should be considered the definitive host
  - c. Occurs in the Old World; affects the deep tissues of the body; kinetoplast but lacks a trypomastigote stage
  - d. life-cycle includes trypomastigotes and epimastigotes but not amastigotes; *not* zoonotic
  - e. undergoes sporogony, merogony, and gametogony; results in paroxysms that occur with a periodicity of 24 hrs; is zoonotic
  - f. lacks a cyst stage; trophozoite occurs in the mouth; member of a non-monophyletic phylum
4. It is your first day on the job in the diagnostic lab at the General Hospital. You have been given a number of samples taken from patients in the hospital. Unfortunately, the file associating the samples with the patients and their symptoms has been misplaced. While you are waiting for the back-up file to arrive you want to do your best to match the samples with the patients and their symptoms. Draw lines to match the samples and patient symptoms below. (5 points)

| SAMPLE   | PATIENT SYMPTOMS                                   |
|--|--|
| Blood smear with red blood cells with ring trophozoites and Schüffner's dots | skin lesions on face                               |
| Skin snip with amastigotes   | bloody stool, frequent diarrhea                    |
| Faecal smear with cysts with 4 nuclei; each nucleus with a central endosome  | cardiac weakness, lethargy                         |
| Blood smear with C-shaped trypomastigotes                                    | diarrhea, abdominal discomfort (no blood in stool) |
| Faecal smear with cysts with 4 nuclei & flagellae                            | fevers with 48 hr periodicity                      |



6. For FIVE (5) of the following 8 lettered images from the plate at the end of the exam, indicate whether or not the stage represented in the image is infective to the human host. In each case explain your answer. (10 points)

Image A: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image B: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image C: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image D: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image G: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image H: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image J: Stage shown infective to human? Yes/No (circle one)

Explanation:

Image K: Stage shown infective to human? Yes/No (circle one)

Explanation:

7. Answer FOUR (4) of the following 6 questions regarding transmission of the various parasitic protozoans we have studied. (8 points)

- a. Are mosquitos *required* for completion of the life-cycle of *Leishmania tropica*? Explain your answer.
- b. Would ingestion of red blood cells infected with merozoites by an *Anopheles* mosquito lead to infection of *Plasmodium vivax* in that insect? Explain your answer.
- c. Are beavers *required* for completion of the life-cycle of *Giardia duodenalis*? Explain your answer.
- d. Are insects required for completion of the life-cycle of *Trypanosoma cruzi*? Explain your answer.
- e. Would the unintentional ingestion of water containing trophozoites of *Naegleria* by a person swimming in a warm pond lead to Primary Amoebic Meningoencephalitis? Explain your answer.
- f. Are humans *required* for completion of the life-cycle of *Entamoeba histolytica*? Explain your answer.

8. For FOUR (4) of the following 6 life-cycle stages, indicate in what kind of host animal and where in that animal you would expect to find the stage indicated (be as specific as possible, but common names for hosts are fine) (8 points)

a. Epimastigotes of *Trypanosoma brucei rhodesiense*

host: \_\_\_\_\_ site in host: \_\_\_\_\_

b. Sporogony in *Plasmodium ovale*

host: \_\_\_\_\_ site in host: \_\_\_\_\_

c. Trophozoites of *Giardia duodenalis* in females

host: \_\_\_\_\_ site in host: \_\_\_\_\_

d. Microgametocytes of *Plasmodium falciparum*

host: \_\_\_\_\_ site in host: \_\_\_\_\_

e. Promastigotes of *Leishmania tropica*

host: \_\_\_\_\_ site in host: \_\_\_\_\_

f. Hypnozoites of *Plasmodium vivax*

host: \_\_\_\_\_ site in host: \_\_\_\_\_

9. Each of the following statements is INCORRECT in one or more respects. Select FOUR (4) of the following 6 statements and REWRITE them so that the information they convey is CORRECT; in each case any species and/or genera listed must remain in the statement (i.e., the statements cannot be corrected by removing taxa). (8 points)

- a. Whereas trophozoites of *Trichomonas vaginalis* occur in the small intestine of their vertebrate host, those of *Giardia duodenalis* occur in the large intestine of their host.
- b. Whereas cysts are the diagnostic stage of infection for species of *Entamoeba*, *Trypanosoma*, *Plasmodium*, and *Giardia*, that is not the case for species of *Leishmania* or *Trichomonas*.
- c. Whereas the kinetoplast in trypomastigotes is located at the anterior end of the cell, that of promastigotes is located immediately anterior to the nucleus at the middle of the cell.

- d. Whereas species of *Trypanosoma* and *Naegleria* undergo both sexual and asexual reproduction, that is not the case for species of *Plasmodium*.
- e. Whereas mosquitos serve as intermediate hosts for *Trypanosoma* subspecies, sandflies serve as intermediate hosts for *Plasmodium* species.
- f. Whereas all members of the Euglenozoa are parasitic, that is not the case for the Apicomplexa.

**II. Answer FOUR (4) of the following 6 questions based on the images provided in the plate at the end of the exam. Use the associated letters to refer to the images if required. (8 points)**

1. a. Identify 2 images that illustrate members of the same *genus*, but not *species*, of parasite.  
  
b. To what *genus* do the parasites you have selected belong?
2. a. What type of sample would you take in order to diagnose the parasite shown in D?  
  
b. To what Phylum does this parasite belong?
3. a. Identify 2 images that illustrate the same species of parasite.  
  
b. Identify that species.
4. a. Where in the body would you expect to find the specimen illustrated in E?  
  
b. Where in the body would you expect to find the specimen illustrated in C?
5. a. Identify 2 images that illustrate parasites that belong to the same *phylum* but different *genera*.  
  
b. In each case identify the *genus* illustrated.



6. a. Identify 2 images that illustrate parasites that occur at some time in their life in the blood of their vertebrate host.
- b. In each case identify the parasite the image could represent.

**III. Complete 21 of the 26 blank cells in the following table. You may not use the same species (or subspecies) twice. (21 points)**

| <b>Protozoan species (subspecies)</b> | <b>Monoxenous or Heteroxenous</b> | <b>Stage infective to definitive host (be specific)</b> | <b>one of reservoir hosts if zoonotic (common name will suffice); enter N/A if not applicable</b> | <b>Facultative or obligate parasite in humans</b> | <b>invertebrate host (be specific); enter N/A if not applicable</b> |
|---------------------------------------|-----------------------------------|---|---|---|---|
|                                       | Monoxenous                        | Trophozoite or cyst                                     |   | facultative                                       |   |
| <i>Trypanosoma cruzi</i>              | Heteroxenous                      |   |   | obligate  |   |
|                                       |                                   |   |   |   | Tse-tse fly ( <i>Glossina</i> )                                     |
|                                       |                                   | promastigote  | N/A   | obligate  |   |
| <i>Giardia duodenalis</i>             | Monoxenous                        |   |   |   | N/A   |
|                                       |                                   | flagellated or amoeboid trophozoite                     |   | facultative                                       | N/A   |
|                                       | Monoxenous                        | cyst  |   | obligate  |   |
|                                       | Heteroxenous                      |   | N/A   |   | <i>Anopheles</i> mosquito   |

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BONUS QUESTION: What parasite species is the subject of the following poem by Sharyn McCartney?

The dog's crushed mien, ears underslung, brow  
low, as if he anticipates a cuffing, so mortified  
by his unbidden inner turmoil, intestines bubbling.  
He refuses his meat, corkscrews his torso, nose to ass,  
as if to ask, Why? What does this mean? Or simply  
to snap away the itching chigger of ignition. But  
the root's too deep, the inbound cysts redoubling  
in subdermal subterfuge, his bowel's womb warmth.  
Poor sad thing. Empathy won't cheer him, but I do  
know how it feels, pain without meaning. Nowhere  
to look but within. Whatever the cause, the impurity's  
source, he took it in, bad river water, morsel of carrion,  
just as we all ingest delusion, denial, self-deceit,  
the insalubrities that corrupt our gut and send us lurching,  
chest-clutched, to the nausea of defeat, unmasked,  
that demon in the mirror who points a digit and laughs.