

Name _____

Medical Parasitology (EEB 3895)
Lecture Exam #1

October 2016

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.

1. Select FIVE (5) of the lettered life-cycle stages *that cause pathology in humans* from among those illustrated in PLATE I at the end of the exam, and identify: the life-cycle stage, the name of the protozoan species, or subspecies if appropriate, to which it belongs, and the site in which that stage causes pathology in its human host. Note, you must select five DIFFERENT species. (10 points)

| Letter (from Plate I) | Life-cycle stage | protozoan species | site in human host |
|--------------------------|------------------|-------------------|--------------------|
| a. _____ | _____ | _____ | _____ |
| b. _____ | _____ | _____ | _____ |
| c. _____ | _____ | _____ | _____ |
| d. _____ | _____ | _____ | _____ |
| e. _____ | _____ | _____ | _____ |

2. Although they belong to the same genus of euglenozoans, the African and South American trypanosomes go about avoiding the immune system of their human host in very different ways. The strategy employed by trypanosomes from one of these continents is much more elaborate than that employed by trypanosomes from the other continent. Identify a species, or subspecies if appropriate, that employs the more elaborate strategy AND describe that strategy. (3 points)

3. For the information provided in parts a. through e. below, identify the parasitic disease from the following list that best matches the information provided. You may use each different disease only once. (5 points)

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

- a. band trophozoites in red blood cells

parasite disease: _____

- b. intermittent fevers that occur with regularity every 48 hrs.

parasite disease: _____

- c. amastigotes in heart musculature of mouse injected with patient blood

parasitic disease: _____

- d. trophozoites with one short recurrent flagellum and four free anterior flagella

parasitic disease: _____

- e. extreme hepatosplenomegaly; wasting

parasitic disease: _____

4. For FOUR (4) of the following, identify a species, or subspecies if appropriate, that best fulfills the criteria listed. You may use each species, or subspecies if appropriate, only once. (8 points)

- a. heteroxenous; found in eastern Africa, zoonotic infection

- b. facultative parasite; monoxenous; more common in those who use soft contacts

- c. heteroxenous; attacks mucocutaneous tissues; zoonotic infection

- d. posterior station; zoonotic infection; without a promastigote stage

- e. stage infective to intermediate host is sporozoite; heteroxenous; one of hosts is an insect

- f. has amastigote stage; has epimastigote stage; has metacyclic trypomastigote stage

5. You are a remote doctor in southeast Asia. You travel to a small village where you encounter the following situation. You have with you your basic field kit, which includes everything required for making and examining microscope slides and thus you have the ability to examine mouth, vaginal, faecal, and blood smears. Every one in ten individuals in the village exhibits bloody diarrhea, cramps, and vomiting; many are also extremely dehydrated. The people of the village are generally self sufficient, and grow their own crops, which they fertilize with night soil. The community is too poor to afford any sort of bed nets. While sanitation is not ideal, the village is fortunate to have an underground spring that provides a non-contaminated source of drinking and washing water. They have a communal herd of cattle and the village is frequented by a diversity of wild mammals at night. Assuming a parasite is responsible for the disease, answer FOUR (4) of the following five questions based on this situation. Write N/A in the cases of questions that do not apply to this situation. (8 points)
- a. How would you go about definitively identifying the etiological agent of the disease present among these people? (Be certain to indicate both the type of sample you would prepare and the parasite species and life-cycle stage and its morphology that you would expect to find)
 - b. What is the prevalence of the infection in the people of the village? Explain your answer.
 - c. Is this an example of a pandemic infection? Explain your answer.
 - d. What is the intensity of infection in the village? Explain your answer.
 - e. After treating the infected individuals, what recommendations would you make to the community to help reduce the chances of re-infection in the future?

6. Identify FOUR (4) of the five phyla of protozoans that include parasitic species and indicate the letter of a life-cycle stage from Plate I at the end of the exam that represents a member of each of the phyla you have chosen. (8 points)

a. Phylum _____ Letter (Plate I) _____

b. Phylum _____ Letter (Plate I) _____

c. Phylum _____ Letter (Plate I) _____

d. Phylum _____ Letter (Plate I) _____

7. Answer FOUR (4) of the following questions with respect to the life-cycles of the various parasitic protozoans we have studied. (8 points)

a. Are tse-tse flies *required* for completion of the life-cycle of *Leishmania mexicana*? Explain your answer.

b. Are humans *required* for completion of the life-cycle of *Trypanosoma cruzi*? Explain your answer.

c. Are *Anopheles* mosquitoes *required* for completion of the life-cycle of *Plasmodium vivax*? Explain your answer.

d. Are humans *required* for completion of the life-cycle of *Naegleria fowleri*? Explain your answer.

e. Are sandflies *required* for completion of the life-cycle of *Entamoeba histolytica*? Explain your answer.

f. Are humans *required* for completion of the life-cycle of *Plasmodium knowlesi*. Explain your answer.

8. Although Medical Parasitology courses often, at least initially, risk heightening, rather than alleviating, fears about parasite infections, in truth, knowledge is power. For FOUR (4) of the following parasite taxa, describe one step that a person traveling to a parasite-endemic area could take to substantially REDUCE the chances of his or her acquiring an infection. (8 points)

a. *Giardia duodenalis*

b. *Plasmodium falciparum*

c. *Naegleria fowleri*

d. *Acanthamoeba polyphaga*

e. *Entamoeba histolytica*

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

a. Microgametes of *Plasmodium falciparum*

host: _____ site in host: _____

b. Epimastigotes of *Trypanosoma brucei gambiense*

host: _____ site in host: _____

c. Oocysts of *Plasmodium vivax*

host: _____ site in host: _____

d. Hypnozoites of *Plasmodium falciparum*

host: _____ site in host: _____

e. Trophozoites of *Entamoeba gingivalis*

host: _____ site in host: _____

10. Describe the pathology associated with TWO (2) of the following, parasitic diseases. (6 points)

a. Malignant Tertian Malaria

b. Primary Amoebic Meningoencephalitis

c. Acute African Sleeping Sickness

11. Each of the following statements is INCORRECT in one or more respects. Select FOUR (4) of the following 5 statements and REWRITE them so that the information they are attempting to convey is CORRECT; in each case all species and/or genera listed must remain in the statement (i.e., the statements cannot be corrected by removing taxa). (8 points)

a. Whereas gametocytes of *Plasmodium* species are produced in the insect host, the gametes are produced in the vertebrate host.

b. Whereas the infections of *Entamoeba histolytica* and *Pentatrichomonas hominis* can be effectively diagnosed by looking for cysts in a faecal smear, that is not the case for infections of *Giardia duodenalis*.

c. Whereas members of the Aconoidasida possess an apical complex, members of the Conoidasida do not.

d. The two asexual reproductive phases exhibited by members of the phylum Apicomplexa are sporogony and gametogony.

e. Whereas the life cycles of *Trypanosoma brucei gambiense* and *Leishmania donovani* include amastigotes, the life cycle of *Trypanosoma cruzi* does not.

12. Complete 20 of the 25 blank cells in the following table. (20 points)

| Protozoan species (subspecies) | Stage infective to human host | Intermediate host (be as specific as possible); enter N/A if not applicable | Site (or one of sites) in definitive host (be specific) | Reservoir host if zoonotic species (common name will suffice); enter N/A if not applicable | Mode of transmission to vertebrate host |
|---------------------------------------|-------------------------------|---|---|--|--|
| | trophozoite | N/A | mouth | | Kissing, etc. |
| | | N/A | vagina | | Sexual intercourse |
| <i>Entamoeba histolytica</i> | cyst | N/A | | | |
| <i>Plasmodium vivax</i> | | | | N/A | |
| | trophozoite or cyst | | | N/A | Contaminated contact lens cleaning fluid |
| | | | cardiac musculature | | bite hole |
| <i>Leishmania tropica</i> | | | reticuloepithelial cells of skin | N/A | |
| <i>Trypanosoma brucei rhodesiense</i> | metacyclic trypomastigote | | Blood (and some tissue) fluids | | |

BONUS QUESTION: Did any of the poems we discussed in class this past Wednesday focus on a species of *Leishmania*? If so, which species was the focus of the poem?