

Name _____

EEB 4274
Lecture Exam #1

September 2014

Protozoa

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 on 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.

1. For each of the following species identify one life-cycle stage that is **infective** to the vertebrate host. (10 points)

a. *Plasmodium ovale* _____

b. *Eimeria steidae* _____

c. *Trypanosoma cruzi* _____

d. *Giardia duodenalis* _____

e. *Sarcocystis suihominis* _____

2. You are the director of a facility that rears infection-free mice for use in experimental research. During a routine inspection you were *horrified* to discover that a number of the mice in your facility are infected with *Toxoplasma gondii*. From among the three scenarios presented below (i) identify the one that is *most* likely to be the cause of the infection and (ii) describe in detail how that infection is likely to have occurred. (4 points)
- One of the technicians has a pet canary and she often brings it to the lab on weekends when feeding and watering the mice.
 - One evening when one of the technicians was leaving he accidentally let a stray cat into the facility when the door failed to close behind him.
 - Your attempt to affordably supplement the diet of the mice by adding mealworms to their feed was perhaps not such a good idea.

3. For **FOUR (4)** of the following, identify a taxon that fulfills the criteria listed. (8 points)
- A **subclass** that exhibits sporogony and gametogony but lacks schizogony (i.e., merogony)
 - The **phylum** to which the etiological agent of Primary amoebic meningoencephalitis belongs
 - The **class** that includes species with gigantic mitochondria
 - The **genus** to which the etiological agent of Nantucket fever belongs
 - A **phylum** in which all species are *parasitic*
 - A **species** of Parabasalia that resides in the human mouth
4. In your role as Curator of Parasitology in charge of public education, you have been assigned the task of developing an exhibit that illustrates **zoonotic protozoan infections** from as many different parasite phyla as possible. Your boss (who is not a Parasitologist), in an attempt to assist with your exhibit, has provided you with the following list of protozoan phyla. In the blanks provided: (i) Indicate whether the phylum is appropriate for your exhibit (Yes/No). (ii) In the cases of phyla that are appropriate, identify a zoonotic species. (iii) Identify an animal you would need to include in your exhibit to illustrate a typical reservoir host of the species you have chosen. (15 points)

	Includes zoonotic Taxa? (Yes/No)	example zoonotic protozoan species	reservoir host
a. Apicomplexa	_____	_____	_____
b. Microsporidia	_____	_____	_____
c. Retortamonada	_____	_____	_____
d. Dinoflagellata	_____	_____	_____
e. Ciliophora	_____	_____	_____
f. Euglenozoa	_____	_____	_____

7. A diagnostic Parasitology lab has been sent a sample of faeces taken from an outdoor latrine at a scout camp as some of the children at the camp were exhibiting diarrhea and abdominal pain (cramps). Since it had been in place for essentially the entire summer it is likely that both kids and a diversity of other animals had been making good use of the “facility”. The faecal sample contained the following 4 different oocyst morphologies. In each case identify a **genus** of parasitic protozoans to which the oocyst may belong. (5 points total).

a. 2 sporocysts each with 2 sporozoites _____

b. 4 sporozoites but no sporocysts _____

c. 4 sporocysts each with 2 sporozoites _____

d. 2 sporocysts each with 4 sporozoites _____

e. Identify a species in one of the above genera that could have been responsible for the symptoms the children were exhibiting.

8. Answer ONE (1) of the following 2 questions. (4 points)

a. Describe the pathology associated with an infection of *Giardia duodenalis*.

b. Using labeled diagrams distinguish between syzygy in a cephaline gregarine and an acephaline gregarine. Be sure to indicate which illustration is of which group. (4 points)

9. It is your first day on the job in the diagnostic lab at the Hotel Dieu 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 banana-shaped gametocytes	skin lesions on face
Skin snip with amastigotes	bloody stool, frequent diarrhea
Faecal smear containing 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 oocysts	fevers with 48 hr periodicity

10. Assuming you do *not* have access to immunodiagnostic or molecular methods, describe how would you go about diagnosing an infection in the host taxon indicated for FOUR (4) of the following species of parasitic protozoans. Be sure to identify both the type of sample you would collect and the stage of the parasite you would expect to find in that sample. [remember that you must *not* kill the host in the process of your diagnosis.] (8 points)

- a. *Tritrichomonas foetus* in cows
- b. *Plasmodium falciparum* in humans
- c. *Entamoeba histolytica* in humans
- d. *Trypanosoma cruzi* in humans
- e. *Monocystis lumbrici* in earthworms
- f. *Leishmania tropica* in humans
- g. *Eimeria steidae* in rabbits

11. Compare and contrast (i.e., provide similarities and differences between) THREE (3) of the following pairs of terms. (9 points)

a. definitive host vs. intermediate host

b. monoxenous vs. heteroxenous

c. obligate vs. facultative parasite

d. prevalence vs. intensity of infection

e. predator vs. parasite

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

Protozoan species (subspecies)	Definitive host (common name will suffice)	Intermediate host (common name will suffice); enter N/A if not applicable	Site in/on definitive host (be specific)	Example of continent/country in which infection occurs	One stage infective to invertebrate host; enter N/A if not applicable
<i>Trypanosoma brucei brucei</i>	ruminants	tse-tse fly	Blood (and some tissue) fluids	Africa	metacyclic (short stumpy trypomastigote)
<i>Plasmodium falciparum</i>	mosquito	human	liver/circulatory system	Africa	gametocytes
<i>Eimeria tenella</i>	chicken	N/A	intestinal epithelium	North America	N/A
<i>Balantidium coli</i>	human	N/A	large intestine	Philippines; southeast Asia	N/A
<i>Leishmania donovani</i>	human	sandfly	liver, etc.	Africa	amastigotes
<i>Acanthamoeba polyphaga</i>	human	N/A	eye	North America	N/A
<i>Trichomonas vaginalis</i>	human	N/A	vagina	North America	N/A
<i>Toxoplasma gondii</i>	cat	human	Intestinal and extra-intestinal sites	North America	N/A
<i>Ichthyophthirius multifiliis</i>	fish	N/A	gills/skin	North America	N/A

BONUS QUESTION: The cover of your textbook (i.e., the 9th Edition of Roberts, Janovy and Nadler) includes illustrations of life cycle stages of what species of parasitic protozoan?