

Medical Parasitology
Fall 2016
Study Guide (final)
EEB 3895- Exam 1

Introduction to parasitism: definition of a parasite; definition of parasitism; terminology associated with types of parasites: ectoparasite vs. endoparasite, facultative vs. obligate parasite; terminology associated with categories of hosts: definitive host, intermediate host, paratenic host, reservoir host; understand concepts of: etiological agent, pathogenicity, epidemiology, etiological agent, epidemic, pandemic, (epizootic); prevalence vs. intensity of infection; monoxenous vs. heteroxenous; understand concept of zoonotic infection, role of reservoir host; distinction between disease names ending in "...iasis" vs. "...osis"; distinction between a parasite with relaxed host specificity vs. a parasite with reservoir hosts. Transmission strategies: the five "F's" (fingers, fomites, food, flies, and fluids), trophic transmission, penetration, injection.

Human body as a home for parasites: Eight major systems of the body of importance to parasites (i.e., circulatory, lymphatic, digestive, muscular, nervous, integumentary, respiratory, urinary & reproductive); associated atria, portals of entry and exit (i.e., without breaching)—ONLY in the context of the parasites we have discussed to date.

Introduction to parasitic protozoa: general features distinguishing protozoans from metazoans (single celled, generation time very small, increase in numbers rapidly within host, host needs to deal with both original and new infections [even without additional exposure], etc.); 2 groups based on site in host (intestinal and atrial vs. blood and tissue dwellers); understand just how small they are! (i.e., most 2–100 μm ; what is a micrometer?).

Note: This exam covers the following 19 species/subspecies of protozoans of medical importance as well as 2 species of note, but of non-medical importance (in parentheses):

Giardia duodenalis, *Naegleria fowleri*, *Acanthamoeba polyphaga*, *Entamoeba histolytica*, (*Entamoeba gingivalis*)
Trichomonas vaginalis, (*Trichomonas tenax*), *Pentatrichomonas hominis*, *Trypanosoma brucei rhodesiense*,
Trypanosoma brucei gambiense, *Trypanosoma cruzi*, *Leishmania tropica*, *Leishmania major*, *Leishmania donovani*,
Leishmania braziliense, *Leishmania mexicana*, *Plasmodium vivax*, *Plasmodium falciparum*, *Plasmodium malariae*,
Plasmodium ovale, and *Plasmodium knowlesi*.

In general, in addition to the information indicated for each major group of parasites below, for each species/subspecies, **if covered in lecture and/or with handouts**, know: higher-level classification, basic morphology of life-cycle stages, stage infective to each host, portal of entry into each host; portal of exit from each host; site(s) occupied in each host, draw life-cycle, which species/subspecies represent zoonotic infections and if so the identify of major reservoir hosts, which are facultative and which are obligate parasites, geographic distribution, importance in terms of number of individuals infected globally; the disease (if any) caused in the human host, diagnosis, treatment (in general), control, prophylaxis. Be certain to use proper scientific notation (i.e., generic and specific epithets should be underlined to indicate italicization; generic epithets should begin with an upper case letter; specific epithets should begin with a lower case letter).

Phylum Retortamonada: flagellates; *Giardia duodenalis*: morphology of trophozoite and cyst, life-cycle, host(s) including reservoirs, site in host, disease caused, describe 3 sources of pathogenicity (i.e., mechanical, production of toxic substances, loss of absorptive area), diagnosis of infection, symptoms, treatment, epidemiology and transmission, prophylaxis.

Phylum "Rhizopoda": amoebae, mode of locomotion (i.e., pseudopods); *Entamoeba histolytica*: morphology of trophozoite and cyst, life-cycle, host(s), site in host (1° & 2° [i.e., ectopic] infection), disease caused, pathogenicity, symptoms, diagnosis of 1° and 2° infection, treatment, epidemiology and transmission, populations most at risk. *Entamoeba gingivalis* morphology, life-cycle stages, site in host, transmission, diagnosis; disease caused? (if any). *Naegleria fowleri*: morphology of trophozoites and cyst, life-cycle, facultative vs. obligate parasite, host(s), site in host, disease caused, pathogenicity, symptoms, diagnosis, treatment, epidemiology and transmission and possible sources of infection, populations most at risk. *Acanthamoeba polyphaga*: morphology of trophozoites and cyst, life-cycle, facultative vs. obligate parasite, host(s), site in host, disease caused, pathogenicity, symptoms, diagnosis, treatment, epidemiology and transmission and possible sources of infection, populations most at risk.

Phylum Parabasalia: general features of parasitic taxa (i.e., anterior flagella, recurrent flagellum, undulating membrane, axostyle, etc), life-cycle stages (i.e., trophs only); 3 species in humans, their morphology, life-cycle, site occupied in host, transmission, disease caused (if any), pathogenicity (if any), diagnosis, treatment (if necessary), prophylaxis.

Phylum Euglenozoa-Class Kinetoplasta: general features (all heteroxenous) with both vertebrate and invertebrate (primarily insect) hosts. What is a kinetoplast? Where is it found? **Order Trypanosomatida:** 4 major body forms seen in species of the 2 genera of medical importance in the order (i.e., trypomastigote, epimastigote, amastigote, and promastigote), be able to illustrate and label basic parts (kinetoplast, flagellum, free flagellum, undulating membrane, nucleus) of each, know which form(s) are intracellular and which extracellular and which is/are found in which species (and subspecies if relevant) of the order, definitive vs. intermediate hosts; *Trypanosoma*—named for which body form? Distinguish between Salivarian (i.e., anterior) and Stercorian (i.e., posterior) station species of *Trypanosoma* (what are the criteria?) *Trypanosoma brucei* complex: for the 2 subspecies that parasitize humans know: life-cycle, morphology of body forms, hosts (intermediate, definitive and reservoirs if relevant), site occupied within hosts, disease caused, pathogenicity, diagnosis of infection, treatment, approximate geographic distribution, transmission, prophylaxis. Be able to illustrate (i.e., draw and label) the complete life-cycle of *T. b. rhodesiense* (including role of reservoir hosts); describe method employed (i.e., variable antigen types [VAT] system) employed by parasites to avoid host immune system and why it is so effective. Control of trypanosomes: eliminate flies, drugs, eliminate reservoirs, problems with vaccine development. *Trypanosoma cruzi*: life-cycle, morphology of body forms, hosts (intermediate, definitive and reservoirs if relevant), site occupied within hosts, disease caused, pathogenicity (acute and chronic phases of Chagas' disease), diagnosis of infection, treatment, approximate geographic distribution, transmission, prophylaxis. *Leishmania*: general features of members of the genus (e.g., NO trypomastigotes, etc.); be able to illustrate life-cycle of *L. tropica* as exemplar for 5 species of medical importance. For all 5 species know: hosts (intermediate [New World vs. Old World], definitive, and reservoirs if relevant), site occupied within hosts, disease caused, pathogenicity (including post kala-azar for *L. donovani*), diagnosis of infection, treatment, approximate geographic distribution, transmission, prophylaxis.

Phylum Apicomplexa: general features; 3 distinct reproductive processes found among apicomplexans (i.e., merogony/schizogony, sporogony, gametogony), which represent sexual and which represent asexual modes of reproduction, initial life-cycle stages and products resulting from each process; understand how 3 reproductive processes (and their associated life-cycle stages) relate to one another in a generalized life-cycle (illustrate).

Class Aconoidasida: Distinctive features of *Plasmodium* species in general: heteroxenous and all species have a vertebrate and mosquito of the genus *Anopheles* as the invertebrate host; which is definitive and which intermediate host?, sporozoites are naked and never exist outside of a host. Collectively most important parasite globally, approximately how many infected, die, annually, etc.; be able to illustrate life-cycle of *P. vivax*; understand relationships among gametogony, sporogony, and several phases of merogony (recognize that life-cycles of all 5 species of *Plasmodium* of concern to humans are similar). Distinguish among the phenomena of paroxysm, relapse, and recrudescence—what are they? What causes each? In what species do they occur? For 5 species that parasitize humans (i.e., *Plasmodium vivax*, *Plasmodium falciparum*, *Plasmodium malariae*, *Plasmodium ovale*, and *Plasmodium knowlesi*) know: approximately how prevalent globally, disease caused, periodicity of paroxysms, distinguishing features (e.g., Schuffner's dots, banana-shaped gametocytes, band troph, etc.), which ones are zoonotic and if so what are reservoir hosts; describe 2 main sources of pathogenicity; treatment; control.