

Subject: MEDICAL MICROBIOLOGY
Section: HUMAN PARASITOLOGY & MEDICAL MYCOLOGY
Part: HUMAN PARASITOLOGY
Topic: PARASITOLOGY EXERCISE

1. primitive animals – unicellular eukaryotes (unicellular protists)
2. **a.** asexual reproduction – binary fission (e.g. agent of amebiasis *Entamoeba histolytica*), schizogony/merogony (multiple fission, e.g. agent of malaria *Plasmodium*, agent of cryptosporidiosis *Cryptosporidium hominis*)
b. sexual reproduction (male & female cells are formed) – gamogony/sporogony [e.g. parasites from the group Apicomplexa (*Plasmodium*, *Cryptosporidium*, *Toxoplasma*)]

Toxoplasma gondii

- ✓ Sexual reproduction – only in Felidae (domestic & wild cats)
- ✓ Asexual reproduction – in humans and many other domestic and wild animals

Plasmodium

- ✓ Sexual reproduction – in mosquitoes (*Anopheles*)
- ✓ Asexual reproduction – in humans

3. trophozoite (vegetative form) & cyst (dormant stage); for those intestinal protozoa cyst is infective form (food, water . . .)
4. protozoa are eukaryotes, their cells are similar to human cells, so the drugs used for treatment must be especially selectively toxic and act primarily on protozoan cells
5. humans
6. *Entamoeba dispar* – apathogenic ameba (intestinal tract) which is morphologically identical to *Entamoeba histolytica* (the agent of intestinal and extraintestinal infections)

How we distinguish *E. dispar* from *E. histolytica*

- ✓ Microscopy – RBCs can be seen in the cytoplasm of *E. histolytica* in stool samples of patients with acute infection
- ✓ Immunologic test – detection of Ags
- ✓ Molecular tests – PCR (detection of NA)

7. yes, especially in the wild (water contaminated with feces of wild animals)
8. amebiasis (*Entamoeba histolytica*), giardiasis/lambliasis (*Giardia lamblia*), cryptosporidiosis (*Cryptosporidium*)
9. *Cryptosporidium hominis* & *C. parvum*, *Cystoisospora belli*, *Cyclospora cayetanensis*

10. free-living amebae belong to genera *Acanthamoeba* and *Naegleria* (*Naegleria fowleri*); contact with contaminated water and soil (e.g. swimming in lakes, pools); CNS infection with *Acanthamoeba* occurs in immunocompromised patients, but *Naegleria* infection in immunocompetent young persons
11. rodents, dogs, wild canids; in some parts of the world also humans
12. amastigote or Leishman's body, promastigote or leptomonas, trypomastigote or trypanosoma (epimastigote – not important)
13. CVS: myocarditis, enlargement of the heart - cardiomegaly; GIT: enlargement of the esophagus (megaesophagus), enlargement of the large bowel (megacolon); UGS: enlargement of ureter (megaureter) and urinary bladder (megavesica)
14. micogametocytes & macrogametocytes (immature male and female cells)
15. they have dormant (latent) forms in the liver which are known as hypnozoites
16. *Plasmodium falciparum* (sickle cell anemia & G6PD deficiency - incomplete hereditary X-linked hemolytic disease), *P. vivax* (absence of Duffy Ag on RBC)
17. tachyzoites (acute infection), bradyzoites (chronic/latent infection – form tissue cysts)
18. immunocompromised patients – AIDS, transplant patients
19. scolex (“head”), colum (“neck”), strobila (“body”) formed of proglottids (segments)
20. no; only *Taenia solium* (pig tapeworm) causes cysticercosis in humans
21. *Hymenolepis nana* (dwarf tapeworm of children)
22. *Diphyllobothrium latum* (fish tapeworm)
23. *Strongyloides stercoralis* (belongs to roundworms) in immunocompromised patients (especially those on corticosteroid therapy); severe form of the disease with high fatality rates
24. *Wuchereria bancrofti* (lymphatic filariasis – elephantiasis), *Loa loa* (African Eye Worm), *Onchocerca volvulus* (agent of “river blindness”)

Filariiae are **roundworms** which infect many people in rural **tropical regions**. Their larvae are microscopic and are known as **microfilariae**. **All filariiae are transmitted by arthropods.**

- ✓ *Wuchereria bancrofti* – adults live in lymphatic vessels; transmitted by mosquitoes; lab dg: microfilariae in wet and stained (Giemsa) *blood* preps – blood samples are collecting during the night, serology, PCR; Africa, South America, Asia
- ✓ *Loa loa* – adults live in subcutaneous tissue; transmitted by *Chrysops* sp. (tabanids) lab dg: microfilariae in wet and stained (Giemsa) *blood* preps – blood samples are collecting during the day, serology; Africa
- ✓ *Onchocerca volvulus* – adults live in subcutaneous nodules; transmitted by *Simulium* sp. (blackflies); lab dg: microfilariae in wet and stained (Giemsa) preps of *skin snips*, serology, PCR; Africa, South America

25. snails

26. blood flukes (*Schistosoma mansoni*, *S. haematobium*), liver flukes (*Fasciola hepatica*, *Clonorchis sinensis*), lung flukes (*Paragonimus westermani*), intestinal flukes (*Fasciolopsis buski*)

27. from left: *Sarcoptes scabiei* (itch mite; agent of scabies - itch), *Demodex folliculorum* (follicle mite, agent of demodicosis), *Phthirus pubis* (pubic louse), Siphonaptera (fleas)

Human lice

- ✓ *Pediculus capitis* (head louse) – not vector
- ✓ *Pediculus humanus* (= *P. corporis*; *P. humanus corporis*) (body louse) – vector !!!
- ✓ *Phthirus pubis* (pubic louse) – not vector

Which diseases are transmitted by *Pediculus corporis*

- ✓ Epidemic or louse-borne typhus – *Rickettsia prowazekii* (small obligately intracellular gram-negative coccobacillus; an extracellular dormant form remains infectious in louse feces for months or longer; the infection is initiated when organisms in louse feces are scratched into the bite wound)
- ✓ Trench fever ['5-day (quintana) fever'] – *Bartonella quintana* (the infection is initiated when organisms in louse feces are scratched into the bite wound)
- ✓ Epidemic or louse-borne relapsing fever – *Borrelia recurrentis* (spirochete)

What is the difference between endemic and epidemic relapsing fever

Relapsing fevers are characterized clinically by recurrent periods of fever and spirochaetaemia.

Endemic or tick-borne relapsing fever is a zoonosis caused by several *Borrelia* species, including *B. duttoni*, *B. hermsii*, *B. parkeri* and *B. turicatae*, and is transmitted to man by soft-bodied *Ornithodoros* ticks. The natural hosts for these organisms include rodents and other small mammals on which the ticks normally feed. The disease occurs worldwide, reflecting the distribution of the tick vector.

Epidemic or louse-borne relapsing fever is caused by *B. recurrentis*, an obligate human pathogen transmitted from person to person by the body louse, *Pediculus humanus*. The incidence is influenced by socio-economic factors such as lack of personal hygiene, and, historically, increases during periods of war, famine and other social upheaval. The disease still occurs in central and eastern Africa and in the South American Andes.

The spirochaetes causing the two forms of relapsing fever differ in their mode of growth in the arthropod vector, and this influences the way in which human infection is initiated.

- *B. recurrentis* grows in the haemolymph of the louse but does not invade tissues. As a result the louse faeces are not infectious, and the human infection occurs when bacteria released from crushed lice gain entry to tissues through damaged or intact skin, or mucous membranes.
- Spirochaetes causing tickborne relapsing fever invade all the tissues of the tick, including the salivary glands, genitalia and excretory system. Infection occurs when saliva or excrement is released during feeding.