1. In a patient with diarrhea, occasionally *Entamoeba histolytica/E. dispar (Entamoeba histolytica complex)* (four-nucleated cysts, no chromatoidal bars) are identified as being present; however, these cells, which are identified as protozoa, are really:

A. Macrophages  
B. Epithelial cells  
C. Eosinophils  
D. Polymorphonuclear leukocytes

2. Parasitic organisms that may be transmitted sexually **do not include**:

A. *Entamoeba histolytica*  
B. *Dientamoeba fragilis*  
C. *Diphyllobothrium latum*  
D. *Trichomonas vaginalis*

3. The use of Neti pot nasal irrigation has been linked to infections caused by:

A. *Naegleria fowleri*  
B. *Entamoeba histolytica*  
C. *Trichomonas vaginalis*  
D. Microsporidia

4. The following organisms have been implicated in waterborne and foodborne outbreaks within the United States. The suspect organisms are:

A. *Entamoeba histolytica, Entamoeba hartmanni*  
B. *Giardia lamblia (G. intestinalis, G. duodenalis), Cryptosporidium spp.*  
C. *Dientamoeba fragilis, Trichomonas vaginalis*  
D. *Pentatrichomonas hominis, Cystoisospora belli*

5. Which specimen is **least likely** to provide recovery of *Trichomonas vaginalis*?

A. Urine  
B. Feces  
C. Urethral discharge  
D. Vaginal discharge

6. An *Entamoeba histolytica* (true pathogen) trophozoite has which of the following characteristics?

A. Compact karyosome in the nucleus, ingested red blood cells (RBCs), and clear pseudopodia  
B. Ingested RBCs, clear pseudopodia, and uneven chromatin on the nuclear membrane  
C. Ingested polymorphonuclear leukocytes (PMNs), and large glycogen vacuoles  
D. Large blot-like karyosome, and ingested PMNs
7. A six-year-old boy with meningitis is seen in the emergency room; he has a history of swimming in a warm-water spring. Motile amebae that measure 10 microns are seen in the CSF and are most likely:

A. Iodamoeba bütschlii trophozoites  
B. Endolimax nana trophozoites  
C. Dientamoeba fragilis trophozoites  
D. Naegleria fowleri trophozoites

8. Suspect amebae from a gum lesion were seen on a Gram stain. Additional routine trichrome staining (used for fecal smears) demonstrated amebae with a single nucleus and ingested PMNs. The correct identification is:

A. Trichomonas tenax  
B. Entamoeba coli  
C. Entamoeba gingivalis  
D. Entamoeba polecki

9. Worldwide the most common parasitic organism identified from stool is:

A. Entamoeba histolytica  
B. Blastocystis spp.  
C. Giardia lamblia (G. intestinalis, G. duodenalis)  
D. Entamoeba coli

10. Charcot-Leyden crystals are occasionally seen in stool specimens, may be associated with an immune response, and are formed from the breakdown products of:

A. Eosinophils  
B. Lymphocytes  
C. Monocytes  
D. Neutrophils

11. Recommended methods for the recovery and identification of Cystoisospora belli are:

A. Gram stain and direct wet mount  
B. Trichrome stain and concentration sediment  
C. Silver stain and direct wet mount  
D. Modified acid-fast stain and concentration sediment

12. Which of the following organisms does not have a cyst form in the life cycle?

A. Balantidium coli  
B. Trichomonas vaginalis  
C. Dientamoeba fragilis  
D. Chilomastix mesnili
13. In a fecal concentration sediment examination, an operculated tapeworm egg that might be seen is:
   A. Dipylidium caninum
   B. Clonorchis sinensis
   C. Diphyllobothrium latum
   D. Paragonimus westermani

14. The ingestion of poorly cooked infected pork can result in an infection with:
   A. Taenia solium and Trichinella spiralis
   B. Taenia saginata and Hymenolepis nana
   C. Trichuris trichiura and Hymenolepis diminuta
   D. Diphyllobothrium latum and Ascaris lumbricoides

15. Visceral larva migrans has been associated with which of the following organisms and diagnostic procedures:
   A. Angiostrongylus and CSF examination
   B. Dracunculus and skin biopsy
   C. Onchocerca and blood smear
   D. Toxocara and serology

16. Which of the following organism/information combinations is incorrect?
   A. Toxoplasma gondii and serology
   B. Cryptosporidium spp. and immunosuppressed patients only
   C. Echinococcus granulosus and hydatid cysts
   D. Strongyloides stercoralis and internal autoinfection

17. When performing a concentration for the recovery of schistosome eggs from fresh urine or stool, what solution should be used and why?
   A. Saline; to prevent premature hatching of the eggs
   B. Formalin; to preserve eggs if present
   C. Water; to encourage eggs to float
   D. None of the above

18. The following groups of helminth eggs are listed in size from largest to smallest; which group is correct?
   A. Fasciola hepatica, Clonorchis sinensis, Taenia spp.
   B. Hymenolepis nana, Paragonimus westermani, Fasciolopsis buski
   C. Schistosoma mansoni, Hymenolepis diminuta, Opisthorchis spp.
   D. Ascaris lumbricoides, Schistosoma haematobium, Diphyllobothrium latum

19. Examination of a sputum specimen may reveal infection with:
A. *Trichinella spiralis*, *Paragonimus* spp.
B. *Paragonimus* spp., *Strongyloides stercoralis*
C. *Strongyloides stercoralis*, *Taenia solium*
D. *Taenia solium*, *Cryptosporidium* spp.

20. *Strongyloides stercoralis* rhabditiform (non-infective) larvae are characterized by which of the following?

A. Short buccal capsule and large genital primordium
B. Long buccal capsule and pointed tail
C. Small genital primordium and pointed tail
D. Large genital primordium and notch in tail

21. In infections with *Taenia solium*, the human can serve as the:

A. Definitive host
B. Intermediate host
C. Definitive or intermediate host
D. None of the above

22. The adult tapeworm of *Echinococcus granulosus* can be found in the intestine of the:

A. Dog
B. Cow
C. Sheep
D. Human

23. Molecular panels currently available for the identification of intestinal protozoa are:

A. Complete in terms of recognized pathogens
B. Incomplete in terms of recognized pathogens
C. 100% sensitive and specific for panel organisms
D. Less sensitive than available immunoassays

24. The most appropriate test for the confirmation of infection with *Enterobius vermicularis* is:

A. The routine O&P concentration
B. The routine O&P permanent stained smear
C. The cellulose tape or swab method
D. None of the above

25. The pathogenicity of *Blastocystis* spp. has been clarified; newer information suggests that:

A. The immune capability of the host is totally responsible for symptomatic infections.
B. Most organisms are misidentified as artifacts.
C. Nine subtypes/strains included in the name, some are pathogenic and some nonpathogenic.
D. The number of organisms present determines pathogenicity.
26. **Holding blood too long in EDTA prior to thick and thin blood smear preparation can result in which of the following problems?**

   A. Changes in parasite morphology, poor staining, and diminished organism numbers within a few hours.
   B. Loss of Schüffner’s dots, poor adherence of blood to the slide, and the initiation of the vector life cycle within the tube of blood.
   C. None of the above.
   D. All of the above.

27. **A preliminary test for the presumptive diagnosis of *Cyclospora cayetanensis* is the use of:**

   A. Autofluorescence
   B. The examination of a direct wet mount
   C. An immunoassay
   D. A routine trichrome permanent stain.

28. **Infections with microsporidial spores can be confirmed using:**

   A. Phase contrast microscopy and routine trichrome stains.
   B. Electron microscopy and modified acid-fast stains.
   C. Fluorescence microscopy and hematoxylin stains.
   D. Light microscopy and modified trichrome stains.

29. **Routine thick blood films are characterized by which of the following?**

   A. The visualization of the parasite within the RBCs.
   B. The ability to identify the parasites to the species level.
   C. The necessity to take the RBCs during or prior to staining.
   D. The examination of less blood per field than the routine thin blood film.

30. **“Internal autoinfection” can be seen with which of the following parasites?**

   A. *Cystoisospora belli* and *Strongyloides stercoralis*
   B. *Strongyloides stercoralis* and *Cryptosporidium* spp.
   C. *Cryptosporidium* spp. and *Giardia lamblia* (*G. intestinalis*, *G. duodenalis*)
   D. *Giardia lamblia* (*G. intestinalis*, *G. duodenalis*) and *Cystoisospora belli*

31. **Microsporidial infections cause diarrhea, dissemination from the GI tract to other body sites, and eye infections. Possible routes of infections have been identified as:**

   A. Ingestion and inhalation
   B. Direct contamination from the environment
   C. All of the above
   D. None of the above

32. **Confirmation of a microsporidial infection can be confirmed by seeing:**
A. The oocyst wall.
B. Sporozoites within the spore.
C. Evidence of a polar tubule.
D. Organisms stained with modified acid-fast stains.

33. A helminth egg with terminal polar plugs is:
   A. *Ascaris lumbricoides*
   B. *Trichuris trichiura*
   C. Hookworm
   D. *Enterobius vermicularis*

34. An immunocompromised patient continues to have diarrhea after a series of 3 O&P examinations were negative (concentration, permanent stained smears). The most likely organisms that might be responsible for the patient’s continued symptoms are:
   A. *Cryptosporidium* spp. and *Cystoisospora belli*
   B. Microsporida or *Cyclospora cayetanensis*
   C. *Cryptosporidium* spp. and microsporida
   D. *Cystoisospora belli* and *Cyclospora cayetanensis*

35. The early ring stages of *Plasmodium knowlesi* most closely resemble those of:
   A. *Plasmodium vivax*
   B. *Plasmodium ovale*
   C. *Plasmodium malariae*
   D. *Plasmodium falciparum*

36. Humans acquire infections with *Diphyllobothrium latum* adult worms through:
   A. Ingestion of raw infected freshwater crabs
   B. Skin penetration of cercariae
   C. Peeling the coat from uncooked water chestnuts with the teeth; subsequent swallowing
   D. Ingestion of raw infected freshwater fish

37. Humans can serve as both the intermediate and definitive host in infections caused by:
   A. *Hymenolepis nana*
   B. *Ascaris lumbricoides*
   C. *Schistosoma japonicum*
   D. *Enterobius vermicularis*

38. *Babesia* spp. are organisms that have been implicated in disease in immunocompetent and immunosuppressed patients. Morphologically, these parasites resemble:
   A. Microsporidian spores
   B. *Leishmania donovani* amastigotes
   C. *Trypanosome cruzi* trypomastigotes
39. **Toxoplasma gondii** is characterized by:
   
   A. Possible congenital infections, ingestion of infective oocysts, and ingestion of raw meats
   B. Worldwide distribution and possible difficulties with the interpretation of serological results
   C. Both A and B
   D. None of the above

40. Massive hemolysis and central nervous system involvement are more common with:
   
   A. *Plasmodium vivax*
   B. *Plasmodium ovale*
   C. *Plasmodium malariae*
   D. *Plasmodium falciparum*

41. Older developing stages (trophs, schizonts) of *Plasmodium knowlesi* most closely resemble those of:
   
   A. *Plasmodium vivax*
   B. *Plasmodium ovale*
   C. *Plasmodium malariae*
   D. *Plasmodium falciparum*

42. The incorrect match between disease and symptoms is:
   
   A. Enterobiasis – dysentery
   B. Paragonimiasis – hemoptysis
   C. Cryptosporidiosis – watery diarrhea
   D. Toxoplasmosis in compromised host – central nervous system symptoms

43. The formalin-ether (ethyl acetate) concentration procedure for fecal specimens is primarily used to demonstrate:
   
   A. Protozoan trophozoites
   B. Motility of helminth larvae
   C. Formation of amoebic pseudopods
   D. Protozoan cysts and helminth eggs

44. Cysts of *Iodamoeba bütschlii* typically have:
   
   A. A large glycogen vacuole
   B. A heavily vacuolated cytoplasm
   C. Chromatoidal bars with rounded ends
   D. Many ingested bacteria and yeast cells

45. There are relatively few STAT parasitology test requests. The most obvious order would be:
A. Blood films for malaria
B. Culture of amoebic keratitis
C. Ova and parasite examination for giardiasis
D. Baermann’s concentration for strongyloidiasis

46. The microsporidia are organisms (reclassified from protozoa to fungi) that have been implicated in human disease primarily in:

A. Adult patients with congenital immunodeficiencies
B. Patients who have been traveling in the tropics
C. Pediatric patients under the age of 5
D. Immunocompromised patients

47. The incorrect match between organism and characteristic is:

A. *Chilomastix mesnili* (lemon/pear shape) and Shepherd’s crook
B. *Hymenolepis nana* and striated shell
C. *Wuchereria bancrofti* and sheathed microfilariae
D. *Plasmodium malariae* and “band trophozoite”

48. Protozoan cysts were seen in a concentration sediment and tentatively identified as *Entamoeba coli*. However, the organisms were barely visible on the permanent stained smear because:

A. The organisms were actually not present in the concentrate sediment
B. There were too few cysts to allow identification on the stained smear
C. *E. coli* cysts were present but poorly fixed due to their impenetrable cyst wall
D. The concentrate and permanent stained smear were not from the same patient

49. An immunosuppressed man has several episodes of pneumonia, intestinal pain, sepsis with gram-negative rods, and a history of military service in Southeast Asia 20 years earlier. The most likely cause is infection with:

A. *Trypanosoma cruzi*
B. *Strongyloides stercoralis*
C. *Naegleria fowleri*
D. *Paragonimus westermani*

50. When staining *Cystoisospora belli* oocysts with modified acid-fast stains, the important difference between these methods and the acid-fast stains used for acid-fast bacilli (AFB) is:

A. The staining time is much longer with regular AFB acid-fast stains.
B. The decolorizer is weaker than acid alcohol used for AFB decolorizing.
C. A counterstain must be used for the modified methods.
D. The stain is more concentrated when staining for AFB.
51. A 60-year-old Brazilian patient with cardiac irregularities and congestive heart failure suddenly dies. Examination of the myocardium revealed numerous amastigotes, an indication that the cause of death was most likely:

A. Leishmaniasis with *Leishmania donovani*
B. Leishmaniasis with *Leishmania braziliense*
C. Trypanosomiasis with *Trypanosoma gambiense*
D. Trypanosomiasis with *Trypanosoma cruzi*

52. *Plasmodium vivax* and *Plasmodium ovale* are similar because they:

A. Exhibit Schüffner’s dots and have a true relapse in the life cycle
B. Have no malarial pigment and multiple rings
C. Commonly have appliqué forms in the red cells
D. Have true stippling, do not have a relapse stage, and infect old red cells

53. The incorrect match between symptoms and disease is:

A. Dysentery and amebiasis
B. Malabsorption syndrome and giardiasis
C. Cardiac involvement and chronic Chagas’ disease
D. Myalgias and trichuriasis

54. Eye infections with *Acanthamoeba* spp. have most commonly been associated with:

A. Use of soft contact lenses
B. Use of hard contact lenses
C. Use of contaminated lens care solutions
D. Failure to remove lenses while swimming

55. The most common microsporidian infections originate in:

A. The lung
B. The nervous system
C. The gastrointestinal tract
D. Mucocutaneous lesions

56. Organisms and infections that under normal conditions cannot be transmitted in the laboratory are:

A. *Taenia solium* – cysticercosis
B. *Ascaris lumbricoides* – ascariasis
C. *Cryptosporidium* spp. – cryptosporidiosis
D. *Enterobius vermicularis* – pinworm infection

57. Key characteristics of infection with the fifth human malaria, *Plasmodium knowlesi* include:

A. Rapid erythrocytic cycle (24 h), will infect all RBCs, and can cause serious disease
B. Erythrocytic cycle limited to young RBCs and causes a relatively benign disease
C. The possibility of a true relapse from the liver, infection in older RBCs, and causes serious disease
D. Extended life cycle (72 h), will infect all RBCs, and disease is similar to that caused by *Plasmodium ovale*

58. **Two helminth eggs that may resemble one another are:**

   A. *Diphyllobothrium latum* and *Paragonimus westermani*
   B. *Opisthorchis sinensis* and *Fasciolopsis buski*
   C. *Taenia saginata* and *Hymenolepis nana*
   D. *Ascaris lumbricoides* and *Trichostrongylus*

59. **The following organisms are linked with specific, relevant information. The incorrect combination is:**

   A. *Strongyloides stercoralis* – hyperinfection syndrome
   B. *Echinococcus granulosus* – hydatid sand
   C. *Toxoplasma gondii* – serology
   D. *Balantidium coli* – common in the United States

60. **Parasites that should be considered in a nursery school outbreak of diarrhea include:**

   A. *Endolimax nana, Giardia lamblia (G. intestinalis, G. duodenalis),* and *Entamoeba coli*
   B. *Giardia lamblia (G. intestinalis, G. duodenalis),* and *Cryptosporidium spp.*
   C. *Cryptosporidium spp.,* and *Trichomonas vaginalis*
   D. *Pentatrichomonas hominis,* *Dientamoeba fragilis,* and *Endolimax nana*

**CORRECT ANSWERS:**

1. D
2. C
3. A
4. B
5. B
6. A
7. D
8. C
9. B
10. A
11. D
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