The Parasites of Medical Importance

Chapter 23

Protozoans and Helminths
Your basic problem is that, deep down, you're still seeking the approval of an archetypal HOST figure...

Parasite psychology.
Parasitology

- the study of eucaryotic parasites, protozoa and helminths
- cause 20% of all infectious diseases
- less prevalent in industrialized countries
Protozoa

- single-celled, animal-like microbes, having some form of motility
- life cycles vary
  - most propagate by simple asexual cell division of the active feeding cell (trophozoite)
  - many undergo formation of a cyst
  - others have a complex life cycle that includes asexual & sexual phases
<table>
<thead>
<tr>
<th>Protozoan/Disease</th>
<th>Reservoir/Source</th>
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<tbody>
<tr>
<td>Ameboid Protozoa</td>
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<tr>
<td>Amebiasis: <em>Entamoeba histolytica</em></td>
<td>Human/water and food</td>
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<td>Brain infection: <em>Naegleria, Acanthamoeba</em></td>
<td>Free-living in water</td>
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<tr>
<td>Ciliated Protozoa</td>
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<tr>
<td>Balantidiosis: <em>Balantidium coli</em></td>
<td>Zoonotic in pigs</td>
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<td>Flagellated Protozoa</td>
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<tr>
<td>Giardiasis: <em>Giardia lamblia</em></td>
<td>Zoonotic/water and food</td>
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<tr>
<td>Trichomoniasis: <em>Trichomonas tenax,</em></td>
<td>Human</td>
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<tr>
<td><em>T. hominis,</em> <em>T. vaginalis</em></td>
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<td>Hemoflagellates</td>
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<td>Trypanosomiasis: <em>Trypanosoma brucei,</em></td>
<td>Zoonotic/vector-borne</td>
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<td><em>T. cruzi</em></td>
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<td>Leishmaniasis: <em>Leishmania donovani,</em></td>
<td>Zoonotic/vector-borne</td>
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<td><em>L. tropica,</em> <em>L. brasiliensis</em></td>
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<tr>
<td>Apicomplexan Protozoa</td>
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<tr>
<td>Malaria: <em>Plasmodium vivax,</em></td>
<td>Human/vector-borne</td>
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<td><em>P. falciparum,</em> <em>P. malariae</em></td>
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<tr>
<td>Toxoplasmosis: <em>Toxoplasma gondii</em></td>
<td>Zoonotic/vector-borne</td>
</tr>
<tr>
<td>Cryptosporidiosis: <em>Cryptosporidium</em></td>
<td>Free-living/water, food</td>
</tr>
<tr>
<td>Isosporosis: <em>Isospora belli</em></td>
<td>Dogs, other mammals</td>
</tr>
<tr>
<td>Cyclosporiasis: <em>Cyclospora cayetanensis</em></td>
<td>Water/fresh produce</td>
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</tbody>
</table>
Helminths

- adults are large, multicellular animals with specialized tissues & organs
- adult worms mate & produce fertilized eggs that hatch into larvae that mature in several stages to adults
- the sexes may separate or hermaphroditic
- adults live in the **definitive host**
- eggs & larvae may develop in the same host, external environment of **intermediate host**
- a **transport host** experiences no parasitic development
In cycle A, the worm develops in intestines; egg is released with feces into environment; eggs are ingested by new host and hatch in intestine (examples: Ascari, Trichinella).

In cycle B, the worm matures in intestine; eggs are released with feces; larvae hatch and develop in environment; infection occurs through skin penetration by larvae (example: hookworms).

In cycle C, the adult matures in human intestine; eggs are released into environment; eggs are eaten by grazing animals; larval forms encyst in tissue; humans eating animal flesh are infected (example: Taenia).

In cycle D, eggs are released from human; humans are infected through ingestion or direct penetration by larval phase (examples: Opisthorchis and Schistosoma).

In cycle E, the human is definitive host and carries larval form in blood; insect vector is intermediate host (examples: Wuchereria and Onchocerca).
Helminths

- Pathology arises from worms feeding on & migrating through tissues and accumulation of worms & worm products.

- Antihelminthic drugs paralyze their muscles, causing them to be shed or interfere with metabolism, killing them.
(a) The miracidium phase, which infects the snail.

(b) The cercaria phase, which is released by snails and burrows into the human host.

(c) An electron micrograph of normal mating position of adult worms. The male worm holds the female in a groove on his ventral surface.
Nematodes - roundworms

- Filamentous with protective cuticles, circular muscles, a complete digestive tract, & separate sexes
- *Ascaris lumbricoides*
- *Trichuris trichiura*
- *Enterobius vermicularis* –pinworm
- Hookworms
- *Strongyloides stercoralis*
- *Trichinella spiralis*
- Filarial worms
Hookworms

- Female
- Male
- Adults in small intestine
- Egg stages in feces (diagnostic stage)
Trematodes or flukes

- flatworms with ovoid leaflike bodies
- have digestive, excretory, neuromuscular, & reproductive systems
- lack circulatory & respiratory systems
- animals such as snails or fish are usually the intermediate hosts & humans are the definitive hosts
Cestodes-Tapeworms

- flatworms
- long, very thin, ribbonlike bodies composed of sacs (proglottids) & a scolex that grips the intestine
- each proglottid is an independent unit adapted to absorbing food & making & releasing eggs
- Taenia saginata
- Taenia solium
Hi—I’m Joe’s gastrointestinal tract..! I’ll be your host!

Great tapeworm parties.