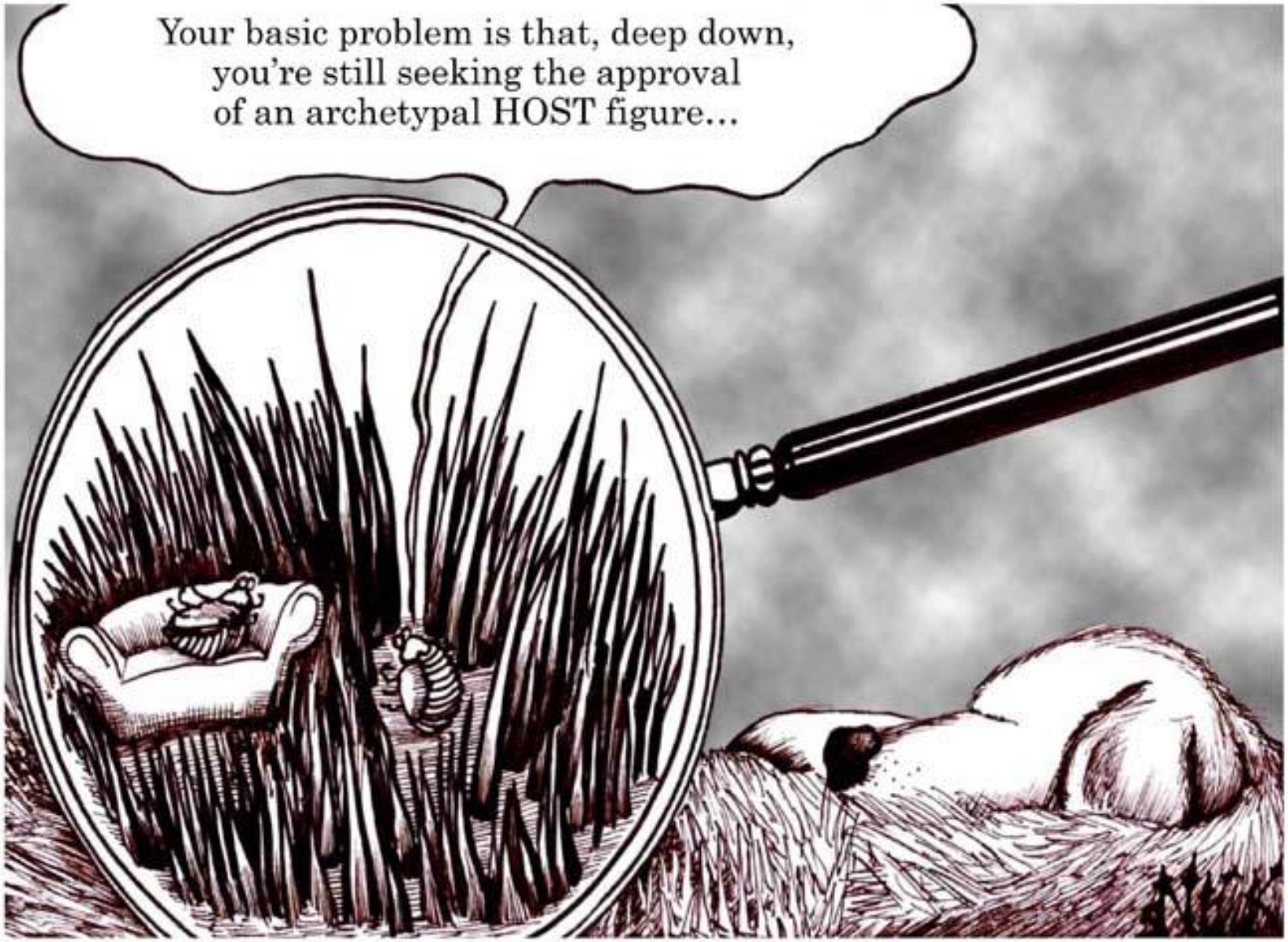
The Parasites of Medical Importance

Chapter 23

Protozoans and Helminths



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

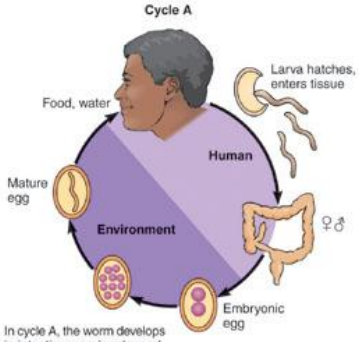
TABLE 23.1

Major Pathogenic Protozoa, Infections, and Primary Sources

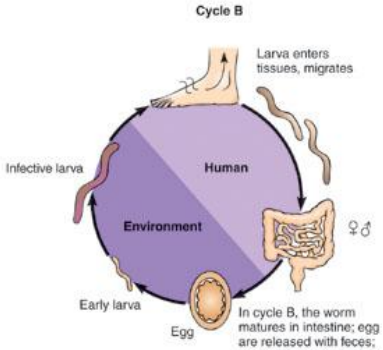
Protozoan/Disease	Reservoir/Source
Ameboid Protozoa	
Amebiasis: *Entamoeba histolytica*	Human/water and food
Brain infection: *Naegleria, Acanthamoeba*	Free-living in water
Ciliated Protozoa	
Balantidiosis: *Balantidium coli*	Zoonotic in pigs
Flagellated Protozoa	
Giardiasis: *Giardia lamblia*	Zoonotic/water and food
Trichomoniasis: *Trichomonas tenax, T. hominis, T. vaginalis*	Human
Hemoflagellates	
Trypanosomiasis: *Trypanosoma brucei, T. cruzi*	Zoonotic/vector-borne
Leishmaniasis: Leishmania donovani, L. tropica, L. brasiliensis	Zoonotic/vector-borne
Apicomplexan Protozoa	
Malaria: *Plasmodium vivax, P. falciparum, P. malariae*	Human/vector-borne
Toxoplasmosis: *Toxoplasma gondii*	Zoonotic/vector-borne
Cryptosporidiosis: *Cryptosporidium*	Free-living/water, food
Isosporosis: *Isospora belli*	Dogs, other mammals
Cyclosporiasis: *Cyclospora cayetanensis*	Water/fresh produce

Helminths

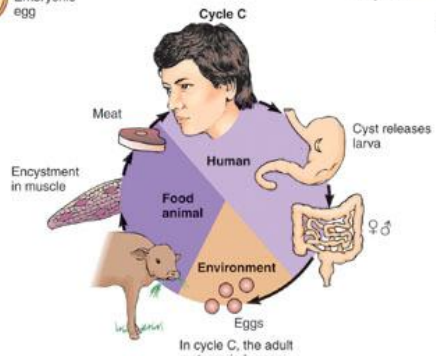
- adults are large, multicellular animals with specialized tissues & organs
- adult worms mate & produce fertilized eggs that hatch into larvae that mature in several stages to adults
- the sexes may separate or hermaphroditic
- adults live in the **definitive host**
- eggs & larvae may develop in the same host, external environment of **intermediate host**
- a **transport host** experiences no parasitic development



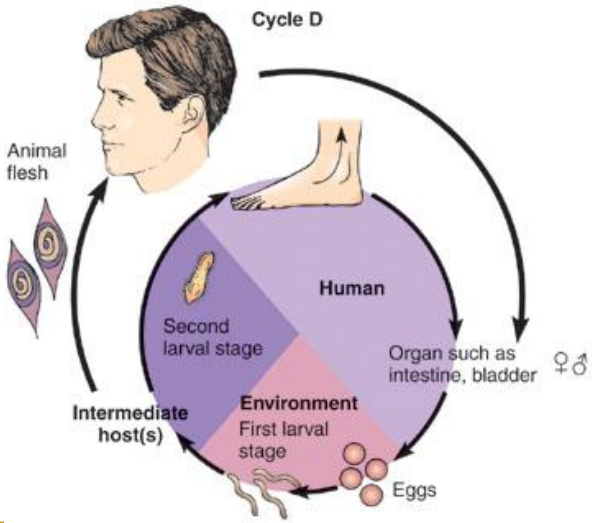
In cycle A, the worm develops in intestine; egg is released with feces into environment; eggs are ingested by new host and hatch in intestine (examples: *Ascaris, Trichuris*).



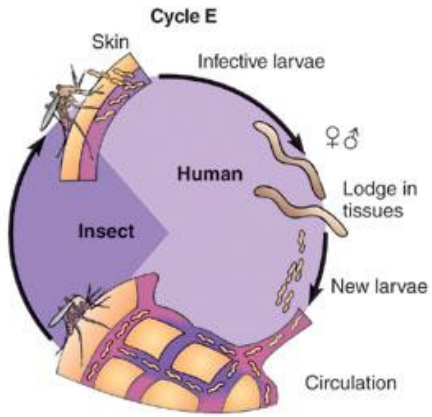
In cycle B, the worm matures in intestine; egg are released with feces; larvae hatch and develo in environment; infection occurs through skin penetration by larvae (example: hookworms).



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*).

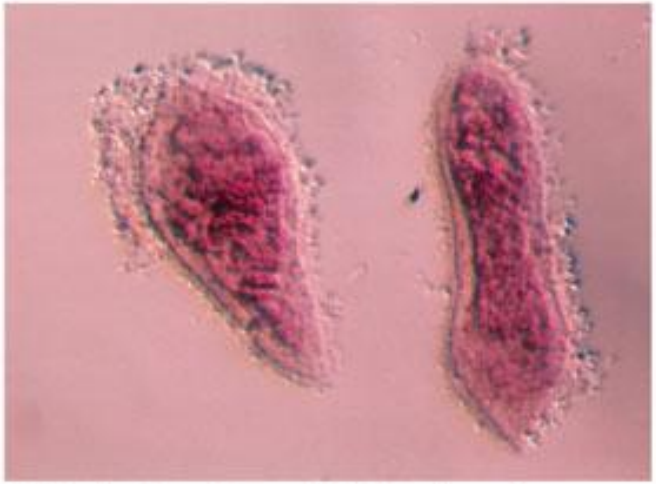


In cycle E, the human is definitive host and carries larval form in blood; insect vector is intermediate host (examples: *Wuchereria* and *Onchocerca*).

Helminths

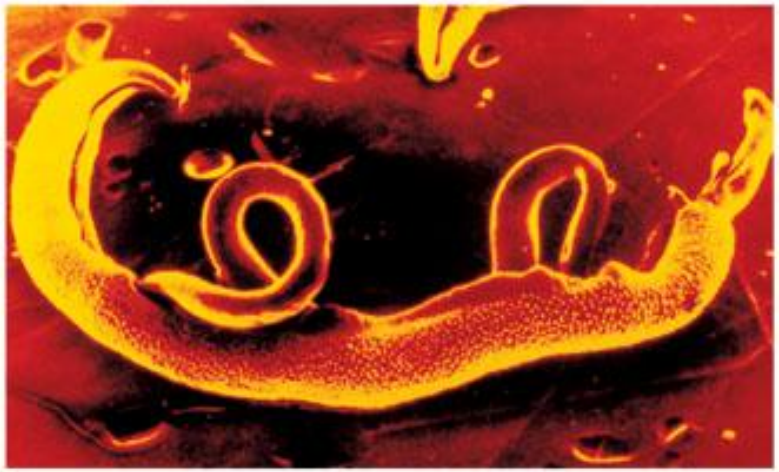
- pathology arises from worms feeding on & migrating through tissues and accumulation of worms & worm products

- 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.

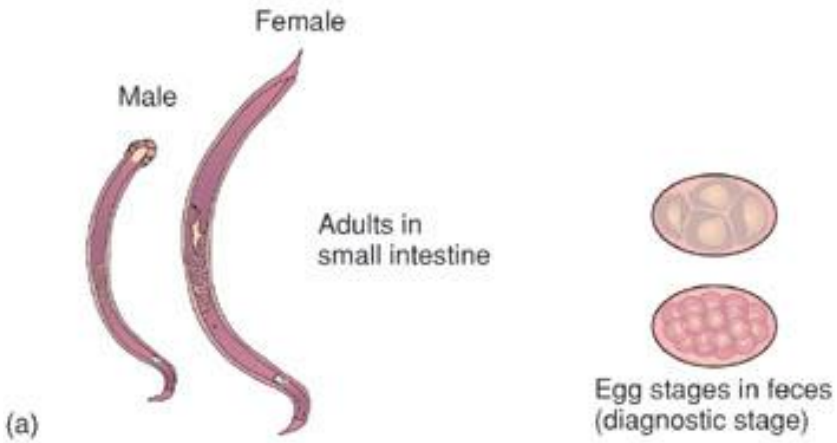


(c) An electron micrograph of normal mating position of adult worms. The male worm holds the female in a groove on his ventral surface.

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



(a)

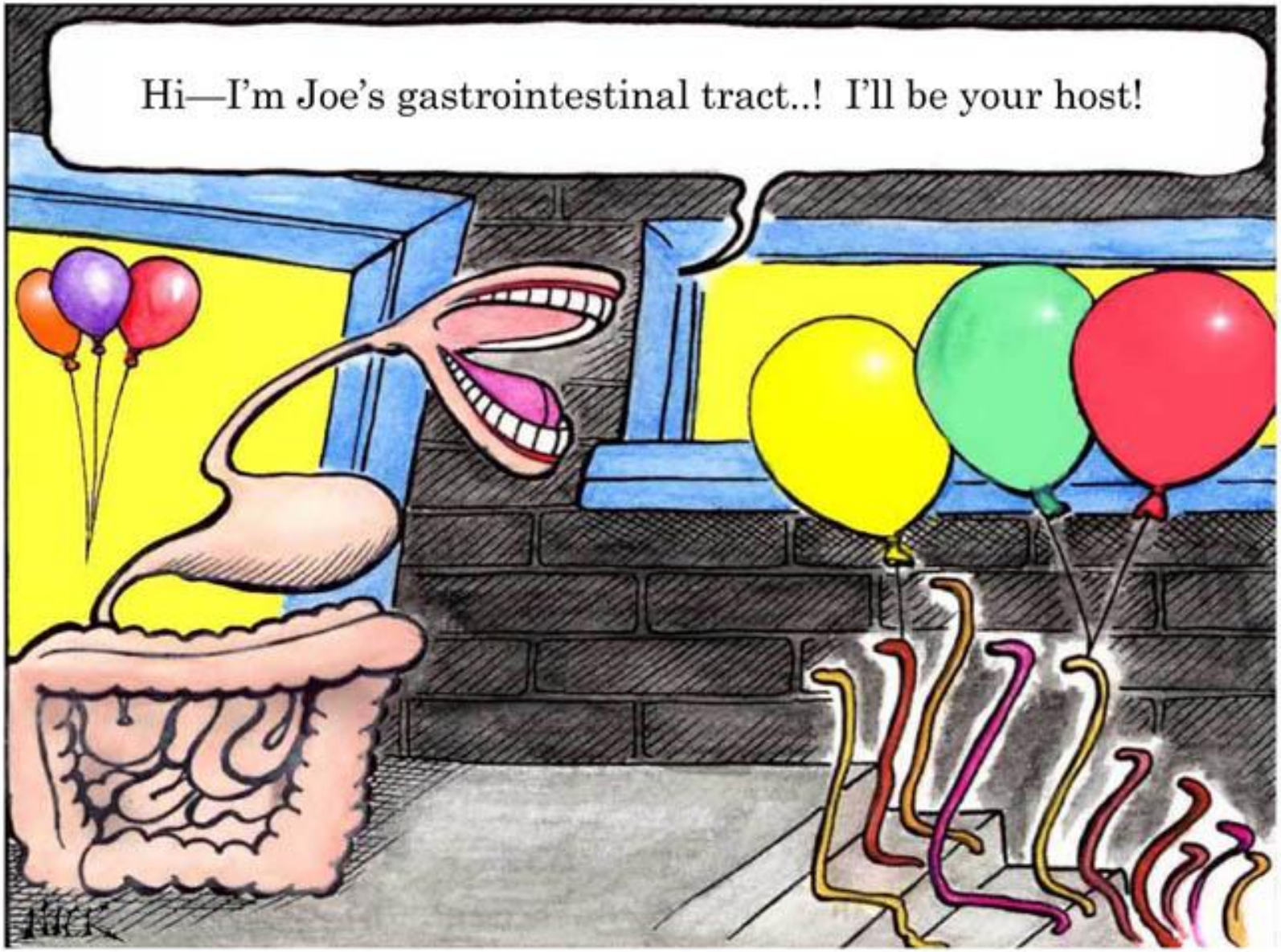
(b)

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*



Great tapeworm parties.