Medical Parasitology
Fall 2016
Study Guide
EEB 3895-Exam 3

PHYLUM NEMATODA: range of habitats; distinctive features of the phylum: body cavity and gut present, outermost layer a protective, non-living cuticle, constantly renewed (implications for habitats and survival?), produced by hypodermis below, dioecious, generalized nematode life-cycle (i.e., egg, J1, J2, J3, J4, adult), number of juvenile stages, event that allows for growth. Soil Transmitted Helminth Diseases (STHD)- what does this mean? In general, how would/could you go about controlling such diseases? Know the six WHO neglected tropical diseases caused by nematodes.

BASIC INFO: For each of the parasite species covered in detail below know: etiological agent of what disease, basic geographic distribution, monoxenous or heteroxenous, type(s) of intermediate host if relevant, zoonotic or not, identity of reservoir host(s) if relevant, life-cycle stage that is zoonotic (if relevant), portal of entry and exit into each host, mode of transmission and stage of parasite entering each host (i.e., infective stage) and exiting each host, method of diagnosis (e.g., type of sample, diagnostic stage), sites occupied by each stage within the human host and associated pathogenicity caused in those sites, know which species can be deadly and why, symptoms of infection, prevention. Know which are categorized as STHD's. See more detail below.

***Ascaris*:** In addition to the BASIC INFO above, disease caused, etiological agent(s) of disease (i.e., *Ascaris lumbricoides* and *Ascaris suum*), normal host(s), general features, including size, zoonotic? Geographic distribution, re global prevalence, two explanations for high prevalence, details of life-cycle, stage infective to humans (and pigs), sites occupied in host by juveniles and adults, symptoms, pathogenesis of juveniles, pathogenesis of adults, diagnosis, what happens in case of single sex infections? McDonald College Parasitology Institute *Ascaris suum* rental dispute incident.

***Toxocara* and *Baylisascaris*:** In addition to the BASIC INFO above, disease caused, etiological agent of disease (i.e., *Toxocara canis*, *Baylisascaris procionis*), normal host(s), zoonotic? Stage infective to humans, site occupied in humans, symptoms, pathogenicity in humans, diagnosis, how humans acquire infection, prevention of infection.

Hookworms (human): In addition to the BASIC INFO above, disease caused, etiological agents of disease (i.e., *Ancylostoma duodenale* and *Necator americanus*), common name and its derivation, general and distinguishing features (e.g., buccal capsule teeth/plates, copulatory bursa), distinguishing features of 2 species that normally infect humans as adults (i.e., plates vs. teeth), details of life-cycle, symptoms and pathologenesis associated with 3 stages of infection in humans (i.e., penetration, migration in lungs, intestinal infection), infective stage and how infection is contracted by humans, sites occupied, life-cycle stages infecting those sites, pathogenesis caused at each site, symptoms, relationship between pathogenicity and intensity of infection, diagnosis, prevention of infection.

Hookworms (dog): In addition to the BASIC INFO above, 2 zoonotic species normally found in dogs (i.e., *Ancylostoma caninum* and *Ancylostoma braziliense*), disease caused in humans, stage infective to humans, site occupied in humans, symptoms, pathogenicity in humans, diagnosis, how humans acquire infection, prevention of human infection.

Filarial worms: In addition to the BASIC INFO above, 3 species of consequence to humans (i.e., *Onchocerca volvulus*, *Loa loa*, *Wuchereria bancrofti*), derivation of name "filarial worms"; for all 3 species: disease caused, generalized life-cycle (what is a microfilaria?), typical intermediate hosts, typical definitive hosts, site(s) normally inhabited by adults (and other life-cycle stages if relevant) in definitive hosts, relationship with *Wolbachia*, diagnosis, symptoms, pathogenesis, and basic geographic distribution. *Onchocerca volvulus*: What is River Blindness? Why/how does blindness result? How long does it take to manifest? Role of ivermectin in global eradication. *Loa loa*: derivation of common name. *Wuchereria bancrofti*: details of life-cycle, periodicity of microfilaria and importance in diagnosis and prevention, pathogenesis (details of acute and obstructive phases).

***Dracunculus medinensis*:** In addition to the BASIC INFO above, ONLY aquatic nematode of medical importance, how is infection acquired? mode of exit from definitive host, intermediate host and its relationship to control, factors that contribute to this species being almost eradicated globally; possible relationship to the medical caduseus.

***Trichuris trichiura*:** In addition to the BASIC INFO above, common name and relationship to distinctive aspect of morphology, what is rectal prolapse?

***Trichinella spiralis*:** In addition to the BASIC INFO above, understand that monoxenous and zoonotic (not heteroxenous!), details of life-cycle (understand that exceptional because vertebrate serves essentially as definitive and intermediate host), understand urban trichinosis (i.e., domestic variation of life-cycle) and hosts involved, understand

sylvatic trichinosis (i.e., wild variation of life-cycle) and hosts involved, mode of transmission to *any* host, specific cells parasitized within host by adults (i.e., intracellular in small intestine) and pre-J1-nurse cells- what are they? How are they formed? 3 phases of pathogenesis associated with disease (i.e., by adult females, migration pre-J1s, pre-J1s in muscle cells).

PHYLUM ARTHROPODA: distinguishing features: exoskeleton, articulated appendages (most diverse of animal phyla).

Arachnids (taxa with four pairs of legs as adults)
Parasitic mites: three parasitic groups feed on lymph and other fluids (NOT blood)-thus not so important as vectors.

***Demodex folliculorum*:** common name, zoonotic? (if so, reservoir hosts) site in/on host, stage(s) found in/on host, monoxenous or heteroxenous, do they need to leave the host to complete development? Pathogenesis? Prevalence? Transmission? Distribution?

***Sarcoptes scabei*:** common name of disease caused, zoonotic? (if so, reservoir hosts), site in/on host, stage(s) found in/on host, monoxenous or heteroxenous, do they need to leave the host to complete development? Pathogenesis and its source? Transmission? Distribution?

Chiggers: common name, zoonotic? (if so, reservoir hosts), site in/on host, stage(s) found in/on host, monoxenous or heteroxenous? do they need to leave the host to complete development? Pathogenesis and its source? Transmission? Distribution?

Ticks: basic life-cycle (i.e., egg, larva, nymph, adult), all species are parasitic at some point in life (one, two and three-host ticks), essentially just a less "hairy" group of mites, feed on blood therefore important as vectors. Diseases caused by ticks themselves (i.e., anemia, dermatosis, otoacariasis, tick paralysis); diseases caused by organisms vectored by ticks (i.e., viruses, rickettsia and spirochaetes, examples of diseases caused by each).

Hexapods (taxa with three pairs of legs as adults)
Sucking lice: adaptations for parasitism (tarsal claws, ability to detect ADP & ATP and thus blood vessel for feeding, dorso/ventrally flattened), basic life-cycle (i.e., egg, 3 nymphal stages, adult), monoxenous or heteroxenous, are any zoonotic? *Pediculus humanus humanus*: common name of disease, site(s) on host, pathogenicity, temperature sensitivity and how that relates to transmission, ideal situations for transmission, importance as vectors of bacterial and viral diseases. *Pediculus humanus capitus*: site(s) on host, pathogenicity, temperature sensitivity and how that relates to transmission, ideal situations for transmission, why is the "Louse buster" so effective? *Phthirius pubis*: common name of disease and derivation of that name, site(s) on host, vector of viral or bacterial diseases? Useful indicator of Sexually Transmitted Diseases.

Fleas: basic features: all species parasitic only as adults (where are they as larvae and pupae?), laterally flattened, incredible jumpers, piercing and sucking mouthparts, feed on blood, have preferred hosts, but not that host specific, importance as vectors of disease.

Human Parasites and Climate Change
Parasite species of greatest concern/relevance in that context, and aspect of biology of those species in particular that makes especially responsive to climate change (and increase in temperature and humidity in particular), rather than, e.g., STHDs? Effect of increase in temperature on: insect metabolism (why?) and time to complete life-cycle and associated potential impact on transmission of parasitic diseases, spatial and altitudinal distributions of diseases; will distributions expand, or shift, or both?