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## Parasitology 8

### Arthropods of Medical Importance

Exam Info: 9-12 in PH17 microscope labs.

Bring your scopes and slide boxes. 30 multiple choice questions, 4 case histories. I have done some serious cutting and pasting from last year's lecture; many of the species were eliminated from this year and some were added that are in the 2002 notes.



This last infectious disease lecture is dedicated to my little guy—he may transmit *Toxocara cati* and *Toxoplasmosis* through his pooh, cause granulomas from his scratches, carry and bring fleas (which may or may not carry the plague) into our home but I wouldn't trade him for the world.

#### A) Mosquitos

Only the female mosquito sucks blood. She does so in order to make eggs. Male mosquitos are the 'hippies' of the insect world, as they live only to drink fruit juice (NOT blood) and make love. Therefore only females carry disease.

##### Disease: West Nile Virus

Theory: infected mosquito arrived in U.S. on plane from an unsuspecting Israeli

- spread from east to west across the US; has stabilized on the east coast
- primary host: bird
- incidental host: human, horse
- can cause death in the elderly
- death also occurs in birds (esp. blue jays and crows)

##### Vector: *Culex pipiens mosquito*

- Loves stagnant water, does not have to be clean
- Larvae hang down perpendicular to water surface
- Feed on insect-feeding birds
- Bite humans at night
- Vector for West Nile Virus

#### B) Ticks

Lesson in Persistence: Every morning the female tick climbs a blade of grass, sticks out her arms and waits for an animal to grab onto. As the sun sets, unsuccessful (but not discouraged), she climbs down. Sun rise, sun set. Seasons come and go and she can do this for as long as three years until she finally attaches to an animal. The next challenge is finding a male on that same animal so she can mate, take a blood meal and drop off again to lay her eggs.

##### 1. Disease: Lyme Disease

- Characteristic bullseye lesion often seen at the site of the bite
- Problem in the northeast US and Wisconsin/Minnesota border

##### Vector: *Ixodes scapularis* (deer tick)

- Tick is only present where deer are present
- Adult tick requires deer for feeding
- Small rodents are reservoirs for the nymph form
  - The nymph form causes human disease
  - The nymph is the size of a freckle, small, difficult to find

##### 2. Disease: Rocky Mountain Spotted Fever

- Currently found more in the eastern US than in the Rocky Mt. region

##### Vector: *Dermacentor variabilis* (American dog tick), eastern US and California *Dermacentor andersoni*, western US

- Adult form transmits the disease

##### 3. Disease: Tick paralysis (ascending flaccid paralysis)

- Patient bitten by tick and paralysis ensues
- Caused by components of tick salivary juices (anticoagulant and substance that expands capillaries)
- Death by respiratory failure or cardiac failure if the tick is not removed in time
- Full recovery within 15 minutes of removing the tick

Tick Removal Techniques:

For *Dermacentor*, pull up gently if it has just started feeding. *Ixodes* are more difficult to remove because they have a long feeder: pull up a tent of skin around the tick and work around its mouth parts with a needle to pry off the tick. Make sure to get all the mouth parts. (Whoops! Don't use a match to burn them off like we always did.)

### C) Mites

#### Disease: Scabies

- On webbing of the fingers and toes where mite lives
- Scabies rash on trunk is not due to direct infestation of the mites but to a generalized allergic response

#### Vector: *Sarcoptes scabiei*

- Female lives on skin surface and burrows under skin and lays eggs
- Most people have <100 mites living on them, controlled by the immune system
- Norwegian scabies: immunocompromised can get millions of mites living on them

Treatment: Ivermectin

### D) Lice

Q: What is a nit-picker?

A: Someone whose job is to pick eggs off the hair shaft of people.

#### 1. head lice

- Live on hair, lay eggs on hair shaft, drop to scalp to feed
- Don't carry any diseases but can be irritating
- Immune response can develop (plica polonica, "Polish cap")
- In U.S. rare in African American population because we have a European variety of bug that prefers European-textured hair

Treatment: OTC drugs or ivermectin

#### 2. body lice

- lives on clothing, goes to body for blood meal
- vector of epidemic typhus

#### 3. crab louse

- lives in pubic hair (and sometimes axillary-hair? and eyebrow hair), which have a different texture from head hair
- venereal infection aka "butterfly of love"
- do not get from toilet seats

Treatment: OTC drugs or ivermectin

### E) Bedbugs (Cimex spp.)

- Cause of the recent Bard hall outbreak (according to one of it's residents, not verified)
- have not been shown to carry disease
- live in the wood around beds or in loose wallpaper
- come out at night to feed on blood: starts feeding, stops, moves over and starts again generating the characteristic paired bites
- can also cause hemorrhagic bulli

### F) Stinging Insects

#### 1. fire ants (*Solenopsis invicta*)

- a problem in the southern US
- can sting people (and animals!) to death (e.g. nursing home residents, kids jumping on ant hills)
- attach to skin with pincers and can then rotate entire body around stinging repeatedly and multiple sites

#### 2. yellowjacket

- has an unbarbed ovipositor (stinger) which allows it to sting many times
- severe allergic reactions can develop

#### 3. honeybee

- has a barbed ovipositor (stinger) and disembowels (ouch!) itself upon stinging (as you can imagine, it can only sting once and then dies)
- the stinger is left in the skin and with muscles that continue to pump in the venom
- removed the stinger by sliding a razor along the skin (do NOT use tweezers, which will just squeeze more venom into the sting)

### G) Fleas

#### Disease: plague (*Yersinia pestis*)

- 6-12 deaths per year in the US
- blocks flea's digestive tract

When infected flea jumps on its host (cat, dog, rat) it bites but can't take a regular blood meal because it is blocked up (fiber won't help, I doubt), it regurgitates *Yersinia* into bite site. Because it can't feed here it jumps to the next host and so on infecting many animals. Flea lives on the back of the host, lays eggs, larvae grow and feed on blood, pupa form remains in a quiescent state until they can attach to a new host.

### H) Flies

#### 1. Bot fly (Cuterebridae)

- Lay eggs in dead or dying flesh on live people
- African disease
- Little bumps on skin develop, get bigger, maggots inside wound
- Fly can sense partially soiled clothing (hanging laundry—cloth diapers) and lays eggs on it, eggs hatch and maggots grow into skin

- Hole in skin lets maggot breathe, cover with vasoline, maggot must come out further for air, can then pick out with forceps

NOTE: this last one I was a little confused about so I recommend looking it up.