

12/4/03, 10:00

lecturer: Dr. Gwadz

transcriber: Ian Cohen (isc2002)

-Exam update: 9am in PH17 microscope labs. Bring your scopes. 30 multiple choice questions, 4 case histories.

Parasitology 8
Arthropods of Medical Importance

-Dr. Gwadz did not get through all his slides during the lecture. Dr. Despommier said that we are only responsible for what Dr. Gwadz covered in class (thru slide #70).

-What was covered:

-mosquitos (culicidae: page 232)

- a) West Nile Virus
- b) Saint Louis Encephalitis (SLE)
- c) Dengue Fever
- d) Eastern Equine Encephalitis (EEE)
- e) Western Equine Encephalitis (WEE)
- f) LaCrosse Virus
- g) Yellow Fever
- h) Saturday Night Fever

-ticks and mites (acarina: page 254)

-lice (anoplura: page 240)

-bedbugs (cimicidae: page 247)

-stinging insects (hymenoptera: page 250)

-honeybees (*Apis mellifera*)

-wasps

-yellowjackets

-fire ants (*Solenopsis invicta*)

-fleas (siphonaptera: page 244)

-blackflies (simuliidae: page 232)

-horsefly (tabanidae: page 236)

-*Wuchereria bancrofti* (elephantiasis, page 132) (only mentioned briefly)

1) Mosquitos:

-point of information: 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 make love and drink fruit juice (NOT blood)

a) West Nile Virus

- a flavivirus
- transmitted by *Culex pipiens* mosquito
 - C. pipiens* loves stagnant water
 - C. pipiens* larvae hang down perpendicular to water surface
 - aka: northern house mosquito
 - bites humans at night
- can cause deaths in the elderly
- spread from east to west across the US; has stabilized on the east coast
- birds also die from the disease
 - blue jays are particularly susceptible
 - life cycle: bird \leftrightarrow mosquito \rightarrow human

b) Saint Louis Encephalitis (SLE)

- a disease of birds (man is an accidental, dead-end host)
- life cycle: bird \leftrightarrow mosquito \rightarrow human
- it is a reportable disease

c) Dengue Fever

- transmitted by *Aedes aegypti* mosquito (or *Aedes albopictus* in Hawaii)
 - A. albopictus* was imported to Hawaii in used tires from Japan
- 'breakbone fever'
 - high fever, severe headache, backache, arthralgia
- relatively common in Puerto Rico

d) Eastern Equine Encephalitis (EEE)

- common in the eastern US
- the viral progression in hosts is predictable:
 - 1-virus is isolated from mosquitos
 - 2-virus kills horses
 - 3-children can get the virus and die
- therefore: monitor mosquitos in order to monitor the virus

e) Western Equine Encephalitis (WEE)

- not elaborated upon in class

f) LaCrosse Virus

- not elaborated upon in class

g) Yellow Fever (not mentioned in class; see MID)

2) Ticks

a) Lyme disease

- transmitted by *Ixodes scapularis* (deer tick)
- the tick is only present where deer are present
- adult ticks require deer for feeding
- small rodents are reservoirs for the NYMPH form
 - it is the NYMPH (not adult) form that causes human infection
 - nymph is a size of a freckle (small)
- characteristic bullseye rash is often seen at the site of the bite
- problem in the northeast US and Wisconsin/Minnesota border

b) tick paralysis (ascending flaccid paralysis)

- patient is bitten by a tick and paralysis ensues
- death by respiratory failure occurs if the tick is not removed in time
- full recovery by simply removing the tick

c) Rocky Mountain Spotted Fever

- transmitted by the ADULT *Dermacentor* spp.
 - Dermacentor variabilis* (American dog tick) in the eastern US and California
 - Dermacentor andersoni* in the western US
- currently found more in the eastern US than in the Rockies
- Dermacentor* 'quests' on blades of grass, often several seasons in a row, for its next meal

d) tick removal techniques

- for *Dermacentor*: pull up gently if it has just started feeding
- for *Ixodes* (or *Dermacentor* that's been feeding for a while): the tick has penetrated into the skin, so pull up a tent of skin around the tick and work around its mouth parts with a needle to pry the tick off. The key is to get all of the mouth parts, so that the source of infection is eliminated

3) Mites

a) scabies

- caused by female *Sarcoptes scabiei*
- female burrows under skin and lays eggs
- the mite mostly lives in the webbing of the fingers (and sometimes toes)
- a scabies rash on the trunk is not due to the direct infestation of the mites (which are usually present only in the extremities), but to a generalized allergic response
- most people have <100 mites living on them, controlled by immune system
- Norwegian scabies: immunocompromised people can get millions of mites living on them because of lack of immune control
- treatment: ivermectin (kills the mites)

b) chiggers

- immature mites that infest larger rodents and mammals
- usually bite along the belt-line or crotch
- they bite and pump fluid into the wound, but then drop off because don't like the taste of humans (apparently we 'taste like chicken')
- itching doesn't begin until the mite drops off
- treat with topical corticosteroids

4) Lice

a) head lice

- live constantly on the head
- adults lay eggs on the hair shaft
- an immune response can develop (plica polonica)
- rare in the African American population because we have a European variety of bug in this country, that prefers European-textured hair
- treatment: over-the-counter drugs or ivermectin

b) body lice

- lives on the body only to feed
- retreats to clothing to lay eggs
- vectors of typhus

c) crab louse

- lives in pubic, axillary, or eyebrow hair, which have a different texture from head hair
- it is a venereal infection aka – 'butterfly of love'

5) Bedbugs (Cimex spp.)

- have not been shown to cause 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 → this generates the characteristic paired bites
- can also generate hemorrhagic bulli

6) Stinging Insects

a) Fire Ants (Solenopsis invicta)

- a problem in the southern US
- can sting people to death (e.g. - nursing home residents, kids jumping on the ant hills, etc)
- grab on with pincers (ouch!) and then rotate around, stinging (not biting) repeatedly

b) Wasp

- not mentioned much in class

c) Yellowjacket

- has an unbarbed ovipositor (stinger), and can therefore sting many times
- severe allergic reactions can develop

d) Honeybee

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

7) Fleas

- transmit plague
 - there are 6-12 deaths per year in the US from plague
 - rodents (e.g. prairie dog) can carry plague bacillus
- lives mostly on the back of the host → lays eggs → larvae grow and feed on blood → pupa form (quiescent state that can wait until they attach to a new host)

8) Flies

a) Horsefly

- lacerate the skin, inject anticoagulants, and lap up blood

b) Stable fly

- looks like a housefly with a biting apparatus
- lives in grass clippings

c) Black fly

- lives in the Catskills
- associated with fast-running water, especially in the late summer
- a potential worm vector
 - in South America and Africa, transmit *Onchocerca volvulus*, which leads to river blindness

PS - *Wuchereria bancrofti* (the cause of elephantiasis) was mentioned briefly, and spiders weren't mentioned at all