What is Medical Entomology?

- What topics are in this discipline?
- What causative agents are vectored by insects?
- What are the major hexapod orders and families?

Become an expert on one arthropod-related disease

- Choices:
  - dengue fever (Meagan)
  - yellow fever (Thomas)
  - West Nile virus (Matt)
  - African trypanosomiasis (Paul)
  - Lyme disease (Cayley)
  - filariasis (Christian)
  - Chagas’ disease (Ross)
  - Rocky mount spotted fever (Chace)
  - bubonic plague (Ariel)
  - filariasis (Christian)
  - Typhus (Maddy)
  - African trypanosomiasis (Paul)
  - Japanese encephalitis (Hunter)
  - bubonic plague (Ariel)
  - Onchocerciasis (river blind.) (WILL)
  - Lyme disease (Cayley)

Think about:
- What insects transmit the disease?
- What adaptations do they possess, if any, that make them efficient transmitters of disease?
- What kind of organism is the pathogen?
- What are symptoms of the disease?

Psocodea (parasitic: AKA Phthiraptera)

- Paraneopterans
- 4 suborders
- Anoplura – sucking lice (l)
- Chewing lice: Amblycera (c), Ischnocera (r)

Hemiptera: 2 families of s.O. Heteroptera

- Paraneopterans
- Cimicidae: bedbugs
- Reduviidae: kissing bugs and assassin bugs

Diptera: 2 suborders: “Nematocera” and s.O. Brachycera (*families to know)

- Culicidae: mosquitoes*
- Simulidae: black flies*
- Ceratopogonidae: no-see-ums
- Psychodidae: sand flies
- Tabanidae: horse and deer flies*
- Glossinidae: tsetse flies
- Muscidae: house flies, stable flies, horn flies*
- Oestridae: bot flies
- Hippoboscidae: louse flies and keds
Nematocera characteristics
- 6 flagellomeres, slender
- 3-5 segmented max. palp

Ceratopogonidae

Culicidae

Brachycera characteristics
- 5 flagellomeres, thick
- 1-2 segmented max. palp

Psychodidae

Psychodidae

Simuliidae

Simuliidae

Hippoboscidae: louse flies

Tabanidae: deer and horse flies

Glossinidae: tsetse

Muscidae: house flies

Hymenoptera: ants, bees, & wasps
- Forewings larger than hind; held together by small hooks
- Constriction between the first 2 segments of abdomen
- Mandibulate mouthparts
- Usually large eyes

Envenomation Symptoms
- Insect venom causes local pain, redness, and swelling in people who are not allergic.

Imported Fire Ant Solenopsis invicta

Class Arachnida
- Scorpions (Order Scorpionida) and Spiders (Order Araneae)
- Order Acari – mites and ticks
What is an arbovirus?

- A large group of RNA viruses spread mainly by blood-sucking insects
- United by ecology only
- Birds often arbovirus source for mosquitoes, which then spread it

Generalized arbovirus disease cycle

Some variations in arbovirus disease cycles

Western Equine Encephalitis

St. Louis Encephalitis Virus Transmission Cycle

Western Equine Encephalitis (WEE)
WEE interseasonal maintenance

- Infected vectors
  - *A. melaninon* eggs
- Infected hosts
  - Rabbits, birds, other vertebrates
  - Migratory birds

Incidence of California encephalitis in USA
Yearly cycle of disease follows vector prevalence

West Nile virus transmission cycle

Birds 🐦 → Human 🤸‍♂️ → Mosquito 🦟 → Birds 🐦}

Dengue, 2008


West Nile virus transmission cycle

Birds 🐦 → Mosquito 🦟 → Incidental host 🐱 → Mosquito 🦟 → Birds 🐦