T. G. I. F.

Fascinating Features and Mysterious Manifestations Of Disease

OLLI @ University of Illinois

Fall Semester 2022

Session 5
Flying, Crawling and Burrowing Critters
(and their diseases)

October 14, 2022

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Plan for the Session

- Mosquitos: *Aedes, Culex, Anopheles*
- Critters of the Plague
- Yellow Fever
- *Larva migrans cutaneous and visceral*
- *Scabies*
- *Dracunculiasis*
- *Elephantiasis*

Plan for the Course

- Session 1: Diseases with a color
- Session 2: Diseases with an odor or a taste
- Session 3: Textures or Sounds of Disease
- Session 4: Diseases with unusual appearance
- Session 5: Flying, crawling & burrowing critters
- Session 6: Forgotten or ignored epidemics
- Session 7:
- Session 8:

} Medical detectives solve mysterious cases

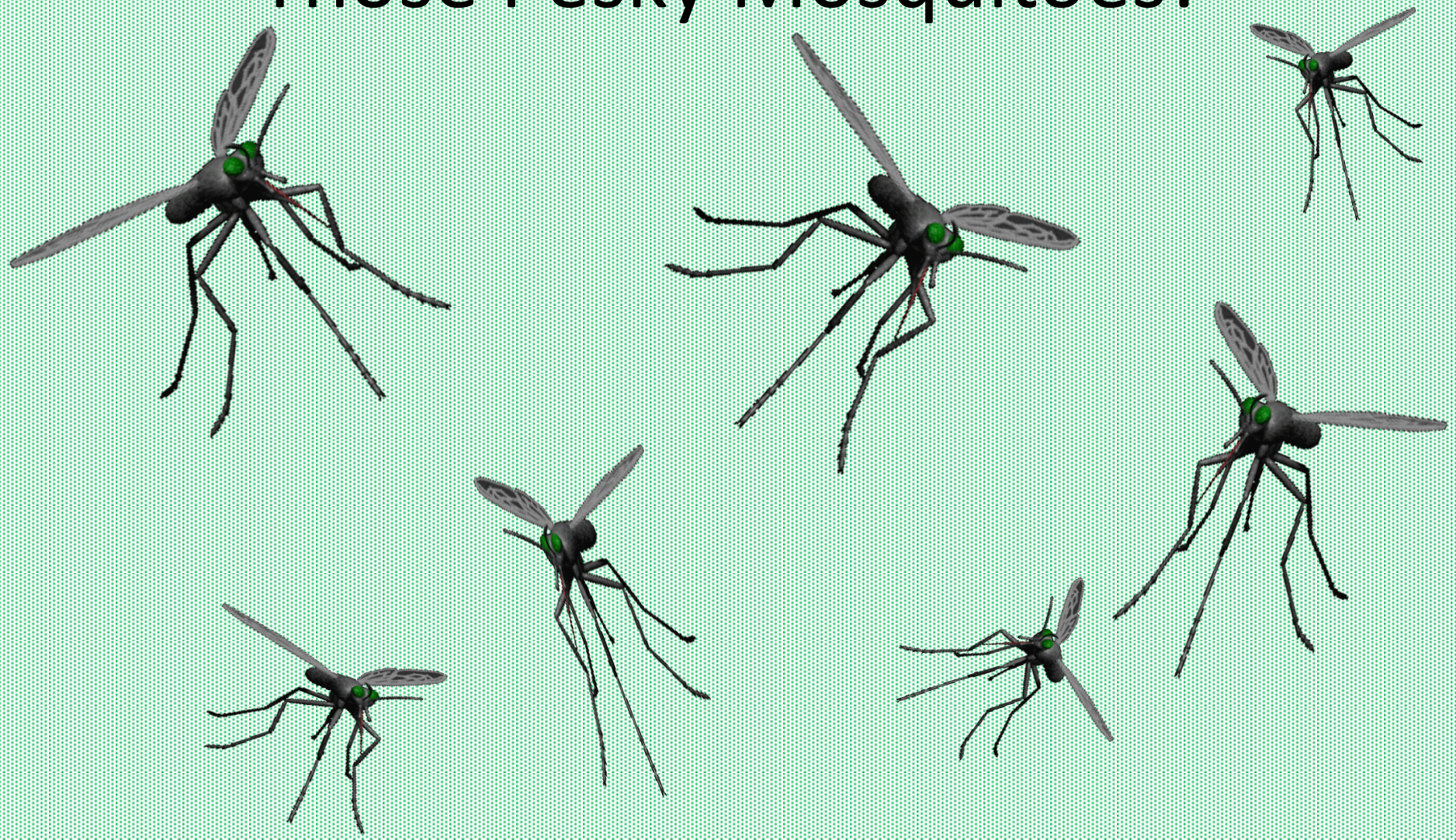
Aedes

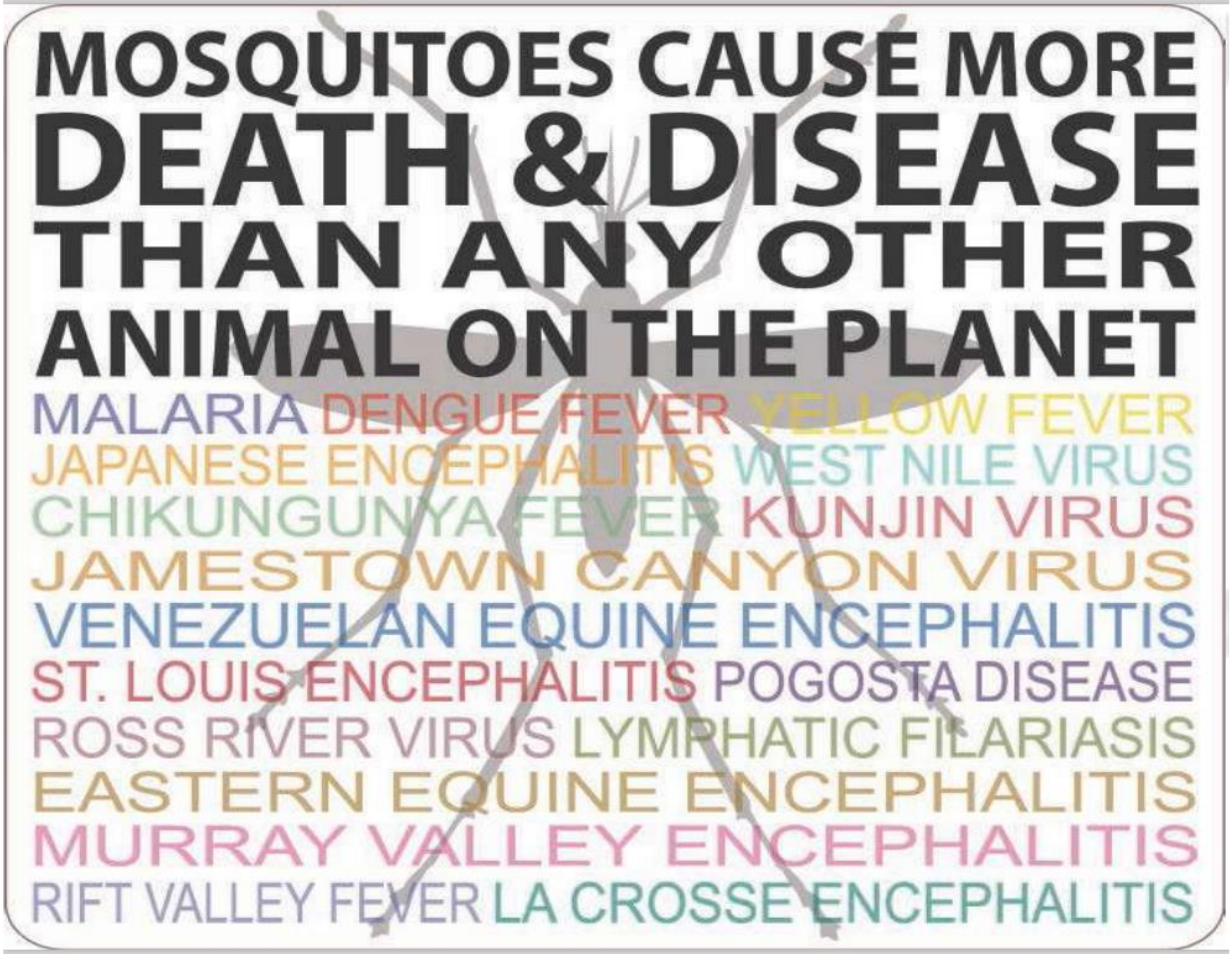
Culex

Anopheles

INSECT VECTORS

Those Pesky Mosquitoes!

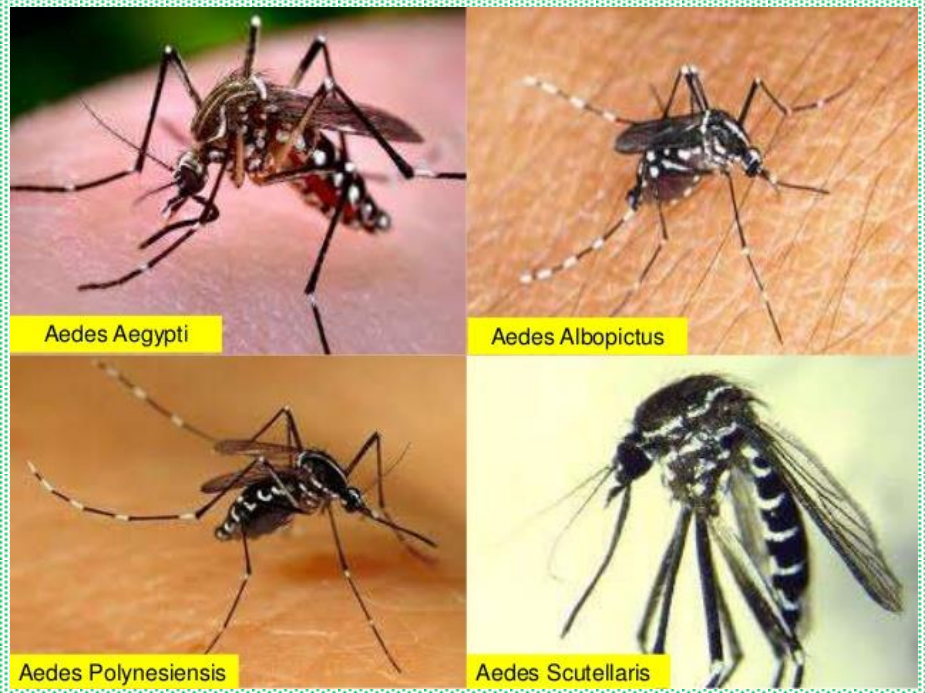


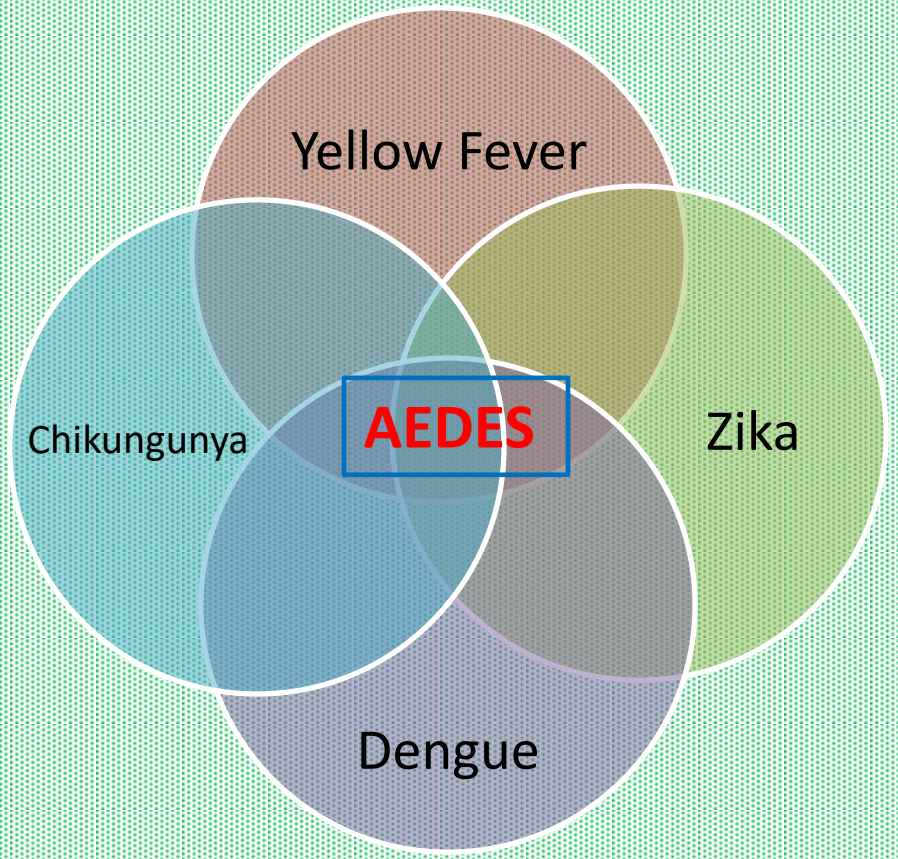

MOSQUITOES CAUSE MORE
DEATH & DISEASE
THAN ANY OTHER
ANIMAL ON THE PLANET
MALARIA
DENGUE FEVER
YELLOW FEVER
JAPANESE ENCEPHALITIS
WEST NILE VIRUS
CHIKUNGUNYA FEVER
KUNJIN VIRUS
JAMESTOWN CANYON VIRUS
VENEZUELAN EQUINE ENCEPHALITIS
ST. LOUIS ENCEPHALITIS
POGOSTA DISEASE
ROSS RIVER VIRUS
LYMPHATIC FILARIASIS
EASTERN EQUINE ENCEPHALITIS
MURRAY VALLEY ENCEPHALITIS
RIFT VALLEY FEVER
LA CROSSE ENCEPHALITIS

Mosquito-Borne Diseases

- Malaria*
- Dengue fever*
- Yellow fever*
- Japanese Encephalitis
- West Nile virus*
- Chikungunya fever
- Kunjin virus
- Jamestown Canyon virus
- Venezuelan Equine Encephalitis
- St. Louis Encephalitis*
- Pogosta disease
- Ross River virus
- Lymphatic Filariasis
- Eastern Equine Encephalitis
- Murray Valley Encephalitis
- Rift Valley fever
- Lacrosse Encephalitis*

The *Aedes* Vector Superfecta





Culex quinquefasciatus

- American entomologist Thomas Say described C.5-fasciatus which he collected along the Mississippi River, in 1823.
- The name refers to 5 (*quinque*) black, broad, transverse bands (*fasciatus*) on the mosquito's dorsal abdomen.
- Mature *C. quinquefasciatus* females fly at night to lay eggs on nutrient-rich standing water.

Culex quinquefasciatus

- Breed profusely in dirty water like leaky septic tanks, stagnant drains, cesspools, burrow pits, and any polluted water collection.
- One female can lay tens of thousands of eggs.
- Transmits roundworm parasite that causes lymphatic *filariasis*.

Anopheles

Malaria

- Some *Anopheles* species prefers to feed on humans (anthropophily) and some prefer animals such as cattle or birds (zoophily).
- Anthropophilic *Anopheles* are more likely to transmit the malaria parasites from one person to another.
- Most Anopheles mosquitoes are not exclusively anthropophilic or zoophilic, including the primary malaria vector in the western United States, A. freeborni.
- However, the primary malaria vectors in Africa, *A. gambiae* and *A. funestus*, are strongly anthropophilic and, consequently, are two of the most efficient malaria vectors in the world.

Anopheles

Malaria

- After ingestion by a mosquito, malaria parasites must develop within the mosquito before they can infect humans.
- The extrinsic incubation period ranges from 10–21 days, depending on parasite species and temperature.
- If a mosquito does not survive longer than the extrinsic incubation period, then she will not be able to transmit any malaria parasites.

Anopheles

Malaria

- Most *Anopheles* mosquitoes are crepuscular or nocturnal.
- Some feed indoors (endophagic), while others feed outdoors (exophagic), and after feeding, some prefer to rest indoors (endophilic), while others prefer to rest outdoors (exophilic).
- Biting by nocturnal, endophagic Anopheles mosquitoes can be markedly reduced through the use of insecticide-treated bed nets or by having window screens to prevent mosquito entry.
- Endophilic mosquitoes are readily controlled by indoor spraying of residual insecticides, while exophagic/exophilic vectors are best controlled through source reduction (destruction of the breeding sites).

RATS, FLEAS and the PLAGUE

The Deadly Duo

The black roof rat, *Rattus rattus* and the Oriental rat flea, *Xenopsilla cheopis* are blamed for transmission of *Yersinia pestis.*

Rattus rattus

(Ship rat, Roof rat or House rat)

- Typical adult is 5.0 to 7.2 inches long, tail is 5.9 to 8.7 inches, and weighs 2.6 to 8.1 oz.

- Other rodents may be implicated in the plague:
  - Voles
  - Marmots
  - Gerbils
  - Ground squirrels
  - Prairie dogs
  - Chipmunks
  - Rabbits

Xenopsylla Cheopis
(Oriental Rat Flea)

- Body is about ⅒ of an inch long (~ 2.5 mm).
- Flea's mouth has two functions:
  - squirting saliva or partly digested blood into the bite.
  - sucking up blood from the host (transmits pathogens).
- Fleas smell exhaled Carbon Dioxide ($CO_{2)}$ from humans & animals and jump rapidly to feed on the new host.
- Wingless, but can use its legs to jump up to 200 times its own body length (about 20 in).

Xenopsylla Jumping

Viral

YELLOW FEVER

Name and Meaning

- Yellow fever: from the yellow color (jaundice) of the skin caused by liver illness.
- *Fièvre jaune.*
- *Fiebre amarilla, vómito negro.*
- Also called *xekik* (black vomit) by Mayans.

Nature of Infection

- Acute febrile viral disease.
- Bite of **female** *Aedes Aegypti* mosquito.
- RNA Flavivirus (flavi, Latin = yellow)

Transmission

- Infected or carrier mosquito injects the virus into host when biting and sucking blood.

- No person-to-person transmission, not contagious.

Distribution

- Endemic worldwide in tropical and subtropical areas of Africa and South America.
- ~600 million people live in endemic areas.
- **No** natural cases in Asia, only imported cases.
- Requires habitat for *Aedes* mosquitoes.

Morbidity and Mortality

- Fever, headaches, chills, back pain, nausea, loss of appetite start 3-6 days after bite.
- 85% get better in 3-4 days.
- 15% go to 2nd phase with recurring fevers, jaundice, vomit with blood, bleeding eyes & mouth.
- If jaundice, mortality = 20-50%, overall fatality 3-7%.

Prophylaxis/Prevention (1)

- Avoid bites, use repellent.
- Repellent-impregnated clothing, long sleeves.
- Vaccine works after 10 days in 95% of people.
- Immunity last for about 10 years.

Prophylaxis/Prevention (2)

- Vaccination recommended for visitors to an active area. (Locals have some immunity.)
- *Aedes* bites during daylight hours, but insecticide-impregnated mosquito nettings are helpful.
- Vector control: larvicides, insecticides, eliminate breeding areas, larvae-eating fish and copepods.
- *Aedes* also carries dengue and chikungunya.

Treatment

- No cure known, no antiviral effective.
- Hospital care, hydration, pain relief.
- Isolation not required.
- **No** aspirin: interferes with blood clotting.

Yellow Fever in USA (Philadelphia)

- 1793 epidemic struck Philadelphia during summer, with the highest US fatalities .
- Probably brought by refugees and mosquitoes on ships from Saint-Domingue (Haiti).
- ~5K people died, 10% of the total population of 50K.
- The city was the nation's capital, and the national government including President Washington left.
- Philadelphia, Baltimore, NYC and other cities along the East and Gulf coasts had repeated epidemics in the 18th & 19th centuries.

Yellow Fever in USA

- During the 1800's Memphis was a very swampy area and was well known as the filthiest and most foul smelling city on earth.

- Open sewers contributed to the unpleasant odor and they provided breeding grounds for mosquitoes.

Yellow Fever in USA

- In 1878 William Warren, a deckhand, entered Memphis from President's Island; 2 days later he was dead.
- New Orleans verified that Yellow Fever was present, and Warren had come from that city.
- In July, Memphis had a population of 47K, and over 25K evacuated.

Yellow Fever in USA

Memphis had 6 major Yellow fever epidemics:

Year	Epidemic #	Cases	Deaths
1828	First	650	150
1855	Second	1,250	220
1867	Third	2,500	550
1873	Fourth	5,000	2000
1878	Fifth	17,000	5000+
1879	Sixth	2,000	600

Ramírez 2021

Looking to the future?

- Asia could become an endemic focus.
- *Aedes* now exists in Asia.
- Eradication not possible w/o vector elimination.
- WHO: 200K cases with 30K mortality/year.

Questions? 1

Bats

ZOONOTIC SPILLOVERS

Zoonoses

- Zoonosis: an infectious disease of humans caused by a pathogen that has jumped from an animal to a human.
- The first infected human transmits the infectious agent to at least one other human, who infects others.
- Of 1,415 pathogens known to infect humans, **61%** are zoonotic, but only diseases involving non-human to human transmission are considered direct zoonoses.

SOME SPILLOVERS

- SARS from **bats** to pangolins (?) to civets.
- MERS from **bats** to camels.
- CoVID-19 from **bats** to pigs.
- EBOLA from **bats** to monkeys to deer.
- NIPAH virus from **bats**, pigs and fruit.
- HENDRA virus from **bats** to horses to humans.
- MARBURG virus from **bats** to monkeys.
- HIV from chimpanzees

Bats in Champaign County

C-U PUBLIC HEALTH DISTRICT

As if the coronavirus and monkeypox weren't enough to worry about, now comes word from local public health officials that a second **Champaign County** bat has tested positive for rabies in recent months.

Thursday's advisory from the C-U Public Health District noted that "people usually know when they've been bitten by a bat, but the bite mark from a bat may be hard to see. If you find yourself in close proximity to a bat and are unsure if you were exposed — for example, you wake up to find a bat in your room — do not kill or release the bat before calling your doctor or local health department to help determine if you could have been exposed to rabies and need preventive treatment.

"If the bat is tested and the results are negative, preventive treatment is unnecessary."

Beware of rabid bats in Champaign County.

September 2, 2022:

- Two bats in Champaign County have tested positive for rabies over the past several months.
- The first case of a rabid bat was reported in May, but, there have been at least 36 cases of rabies reported this year in Illinois.
- Rabid bats have been found in homes in Arlington Hgts., Aurora, LaGrange, & Chicago's south side.
- Most rabid bats found last year were in Cook and Will counties.
- Will set the record with 20 cases of bat rabies.

BATS

- Several species of bat are found in Illinois.
- Big and small brown bats are quite common, even in urban areas.
- They are often in contact with humans, so bats are common transmitters of rabies.
- Bats can also transmit rabies to other mammals like dogs, foxes, skunks, and raccoons.

Cutaneous *Larva migrans*

Visceral *Larva migrans*

Larva currens

LARVA MIGRANS

Cutaneous *Larva migrans* (CLM)

- Meaning: “wandering larvae in skin”.
- Other names:
  - Ground itch
  - Creeping eruption
  - Sandworms
  - Plumber’s itch
- Describes several different parasitic infections.

Cutaneous *Larva migrans* (CLM)

Dermatophytoses

- Do not confuse with "ringworm": a common skin infection caused by a **fungus** (dermatophytoses).
- "Ringworm" because it causes a red and itchy circular rash that can affect anyone.*
- Fungi can live on skin, household surfaces, clothing, towels, and bedding, and can cause diseases that are called *tineas*.

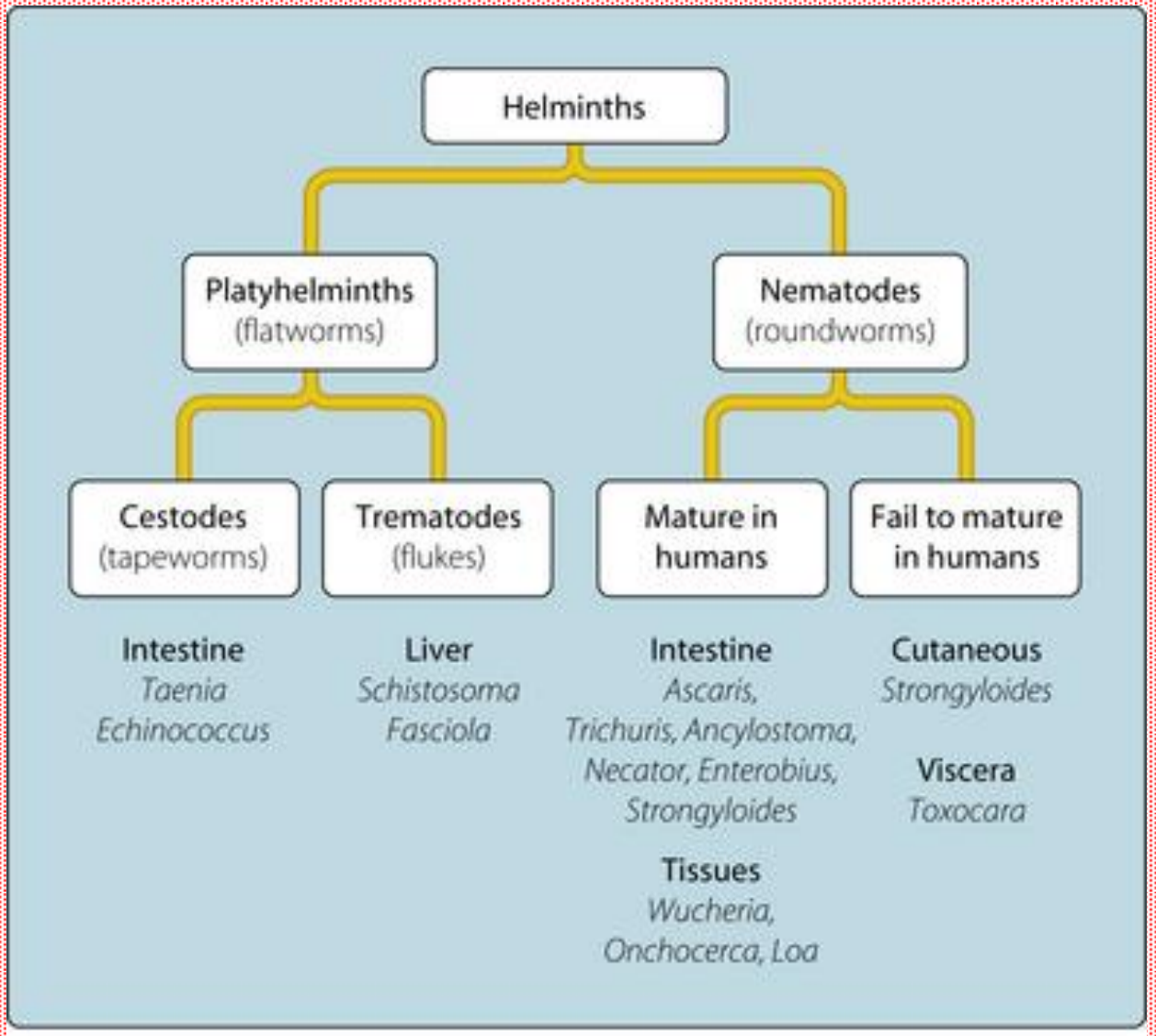
Cutaneous *Larva migrans* (CLM)

Dermatophytoses (Tineas)

Tineas are named according to their location:

- Foot: *Tinea pedis* (athlete's foot)
- *Groin: Tinea cruris* (jock itch)
- Scalp: *Tinea capitis*
- Beard*: Tinea barbae*
- Body*: Tinea corporis*
- Hands*: Tinea mannus*
- Toenails/fingernails: *Onichomycosis*

Parasitic Worms



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Cutaneous *Larva migrans* (CLM)

- Skin disease in humans, caused by the larvae of nematode parasites of the hookworm family.
- The parasites live in the intestines of dogs, cats, and wild animals who shed eggs into soil or sand.
- A filariform larva about 600 µm long (0.024 in.) penetrates the skin of the human foot.

Cutaneous *Larva migrans* (CLM)

Prevention

- Wear shoes.
- Wear clothing that covers thigh & buttocks.
- Do not sit or lie in contaminated areas.
- If sitting or lying, use a barrier.
- Look out for animals.
- Consider the time of year.
- CLM spikes in the rainy season.

Treatment

- CLM is self-limiting.
- Can resolve in 4-8 weeks.
- Topical/oral *thiabendazole 98%.*
- Oral *albendazole*.
- Oral *ivermectin*

2-3 days, cures almost 100%

- Topical freezing agents, like *liquid nitrogen.*
- *CO_2 laser*

Thiabendazole not available in USA

Cutaneous *Larva migrans* (CLM)

- Some zoonotic hookworms can infect humans, but do not develop in the intestine and instead infect extra-intestinal sites like the skin.

- CLM has been associated with *Ancylostoma caninum*, *A. braziliense*, and *Uncinaria stenocephala,* which are all hookworms of dogs and cats.

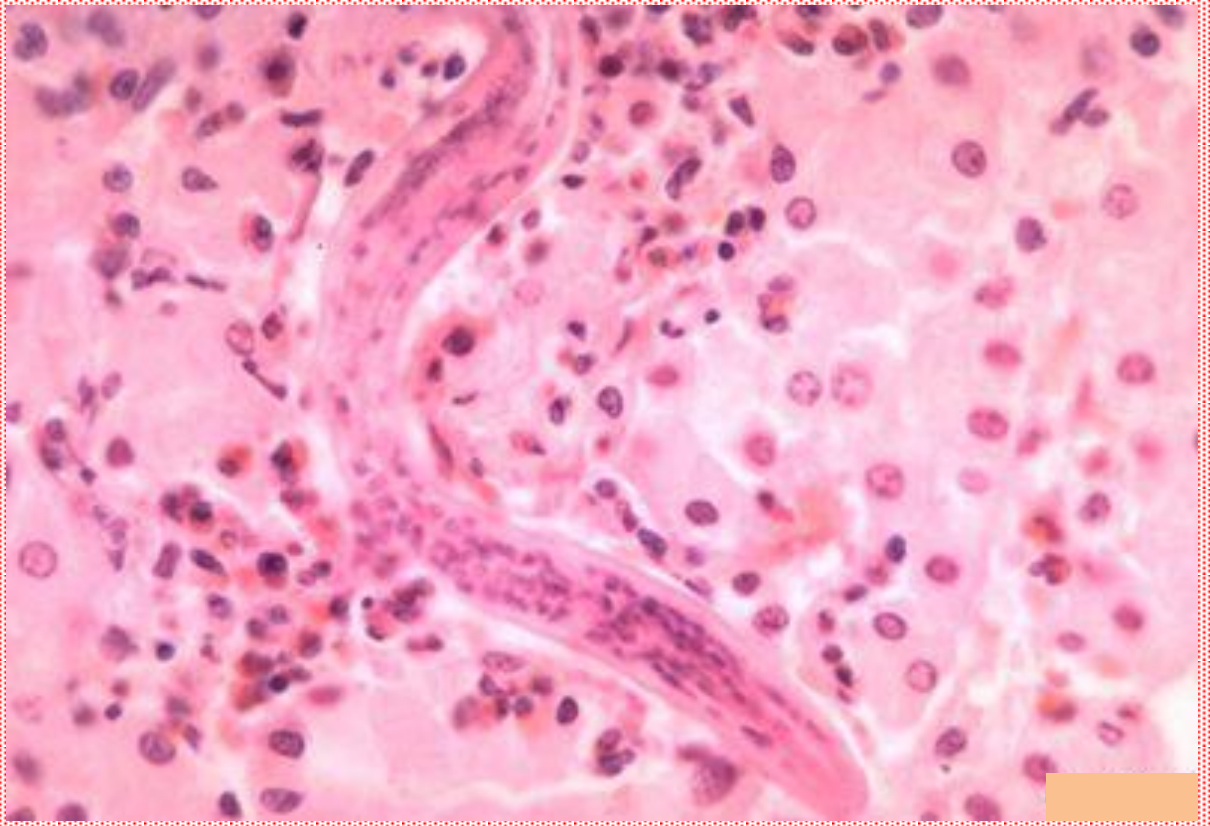
- *Bunostomum phlebotomum*, a cattle hookworm, is also capable of causing short-lived CLM in humans.

Cutaneous *Larva migrans* (CLM

- Signs appear 1-5 days after infection, sometimes longer.
- Red, twisting, snakelike lesions that grow and can move up to 2 centimeters in a day.
- Itchiness, stinging discomfort, occasionally pain and swelling.
- Lesions on the hands, feet, thighs, and buttocks.

Cutaneous *Larva migrans* (CLM)

- Migrating larvae cause intensely pruritic and erythematous serpiginous tracks in the upper dermis, which may occasionally become bullous.
- (Translation: intensely reddened, itchy, snaking tracks in the skin, occasionally blistering.)
- These tracks may spread up to a few centimeters daily, and secondary infections can develop following excessive scratching.



VISCERAL LARVA MIGRANS (VLM)

Visceral *Larva migrans* (VLM)

- A usually mild condition caused by a parasitic roundworm called Toxocara that lives in dogs and cats.
- It usually affects children who play in dirt or sand contaminated with pet poop.

Prevention includes routine veterinary pet care, disposal of pet feces right away and frequent washing of hands.

Visceral *Larva migrans* (VLM)

- Around one in 10 people in the U.S. have been infected with Toxocara at some point, and about 2% of dogs and 5% of cats in the U.S. have Toxocara in their intestines.

- Most people never develop symptoms or don't know they've been infected.

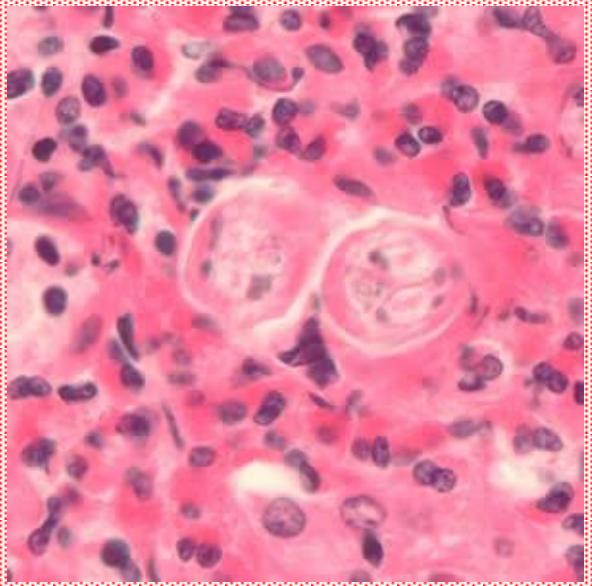
- Tococara roundworms:
  - *Toxocara canis* found in dogs.
  - *Toxocara cati* found in cats.
  - *Ascaris suum* found in pigs.
  - *Baylisascaris procyonis* found in raccoons.*

Visceral *Larva migrans* (VLM)

- *Toxocara* larvae burrow out of the intestines and into organs in the chest and abdomen, and rarely to the eyes, brain and spinal cord.
- The body responds to a *Toxocara* infection by producing extra immune cells.
- The increase in blood flow and immune cells in the affected area causes inflammation, which produces the symptoms.

Visceral *Larva migrans* (VLM)

- The infection usually goes away on its own.
- Long-term complications are rare.
- If they happen, they might include:
  - Inflammation of the heart (myocarditis).
  - Pneumonia.
  - Scarring of lung tissue (pulmonary fibrosis).
  - Inflammation of the liver (hepatitis)



Sarcoptic mange

SCABIES

Scabies

Sarcoptic mange

- Infestation of the skin caused by the human itch mite (*Sarcoptes scabiei var. hominis*).
- The microscopic, 8-legged mite, burrows into the upper layer of the skin where it lives and lays its eggs.
- The most common symptoms of scabies are intense itching (mostly at night) and a pimple-like skin rash.

Scabies

Sarcoptic mange

- It occurs worldwide and affects people of all races and social classes.
- The mite is spread by direct, prolonged, skin-to-skin contact with a person who has scabies.
- Spreads rapidly under crowded conditions where close body contact is frequent, like in nursing homes, extended-care facilities, and prisons.

Scabies

Sarcoptic mange

- The first time a person gets scabies they usually have no symptoms for 4-8 weeks, but they can still spread scabies during this time.
- Examination and treatment is also recommended for sexual contacts and household members who have had prolonged direct skin-to-skin contact with the infested person in the preceding month.
- All persons should be treated at the same time to prevent re-infestation.

Scabies

Sarcoptic mange

- Bedding, clothing, and towels used anytime during the 3 days before treatment should be decontaminated by
  - Washing in hot water (122°F/50°C) **and**
  - Drying in a hot dryer.
  - Dry-cleaning **or**
  - Sealing in a plastic bag for at least 72 hours.

- Scabies mites generally do not survive more than 2 to 3 days away from human skin.

- Insecticides or fumigant sprays are not recommended.

Scabies

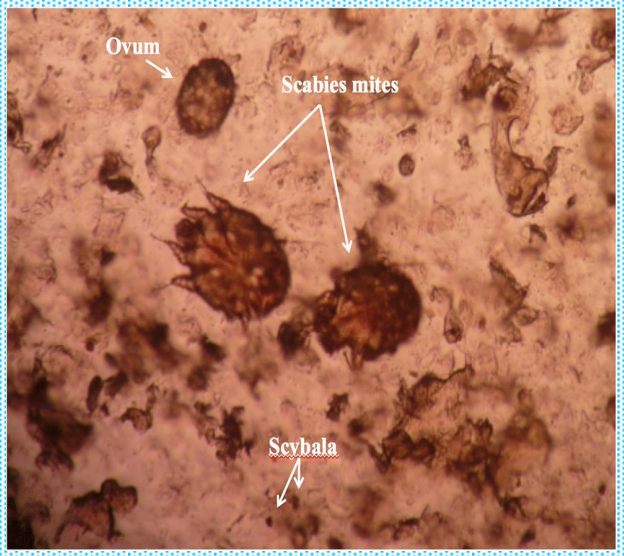
Sarcoptic mange

- Diagnosis of scabies is made upon the usual appearance and distribution of the rash and the skin burrows.

- The diagnosis should be confirmed by identifying, under a microscope, the mite or mite eggs or fecal matter (*scybala*).

Scabies

Sarcoptic mange



- Products used to treat scabies are called scabicides and they are available only by prescription, there are no OTC scabicides.
- The symptoms of scabies are due to an allergic reaction to mites and their feces (*scybala*), so itching still may continue for several weeks after treatment.
- If itching is still present more than 4 weeks after treatment or if new burrows or pimple-like rash lesions continue to appear, retreatment may be necessary.

Scabies

Sarcoptic mange

- More than 200K cases/year in US
- Humans are the source of infestation; animals do not spread human scabies.
- The CDC have warned people never to use scabies treatments that the manufacturers intended for use in domestic or farm animals.

Questions ? 2

DRACUNCULUS MEDINENSIS

Dracunculiasis

- Caused by a nematode, the **female** guinea worm *Dracunculus medinensis.*
- From Latin: *Dracunculus*: small dragon,
  medinensis: from Medina.
- As of 2016, the infection was confined to Chad, Ethiopia, Mali, and South Sudan.
- It is a Neglected Tropical Disease (NTD)

Neglected Tropical Diseases (NTD's)

- NTD's are a set of 20 infections that mainly impact impoverished communities in tropical regions and disproportionately affect women and children.
- Found in 149 countries and more than a **B**illion individuals, NTD's affect more people than malaria, tuberculosis, and HIV combined.
- NTD's result in approximately 57 million years of life lost when the premature death and disability they cause are taken into consideration.

Dracunculiasis

- Humans get infected by drinking contaminated water that contains tiny crustaceans (copepods or water fleas) with larvae of the parasite in their gut.
- Larvae are released in the person's stomach, penetrate the mucosa, mature, and mate.
- About 1 yr. later, the adult **female** worm (0.06 inches in diameter and up to 3 feet long) migrates and partially emerges through the human's skin, usually of the legs.
- 1,000's of larvae are released when the affected body part is immersed in water and they are ingested by the crustaceans.

Dracunculiasis

- After mating, the female worm continues to mature with an enlarging gravid uterus and migrates in search of a site suitable for discharge of her larvae.
- Clinical symptoms occur as the worm prepares to emerge.
- Patients often complain of prodromal symptoms including rashes, gastrointestinal symptoms, weakness and fever.
- As the worm emerges, a large, indurated erythematous papule with a vesicular center is formed

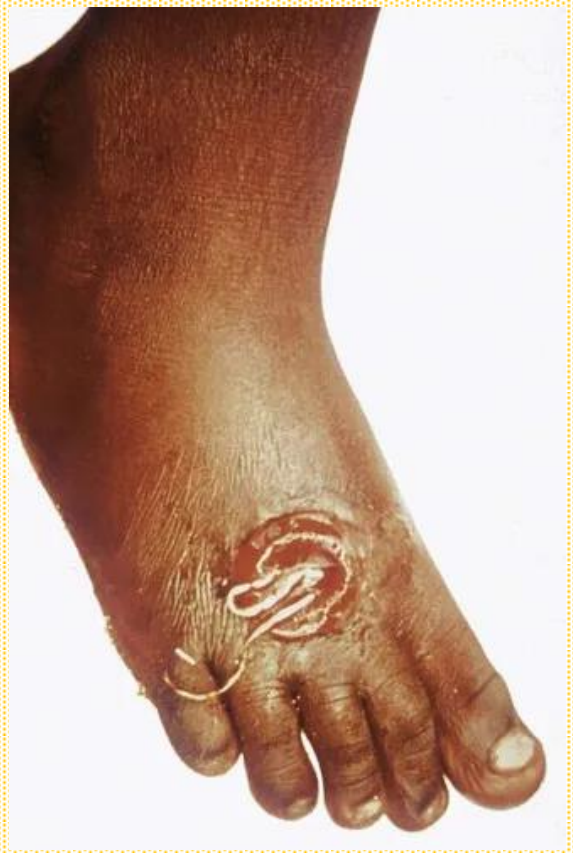
Dracunculiasis

- Over the next few days this develops into a painful, pruritic blister, which the patient immerses in water for relief.
- The larvae are discharged and complete the cycle by infecting other Cyclops copepods.
- The site of the blister tends to ulcerate and secondary bacterial infection may occur, including tetanus.
- Migrating adult worms may penetrate and perish in other tissues, including the spinal cord, peritoneal cavity, pancreas, pericardium and lung, causing focal inflammatory symptoms.

Dracunculiasis

(Symptoms)

- When the worm reaches the subcutaneous tissue, it causes a stinging papule that may be accompanied by urticaria, nausea, vomiting, diarrhea, and dyspnea.
- The lesion vesiculates, ruptures, and forms a painful ulcer in which a portion of the worm is visible.
- Larvae can be identified by microscopic examination of the discharge fluid.



Dracunculiasis

Treatment

- Emerging worms are encouraged to discharge their uterine contents by immersion of the affected part in water.
- The tip of the worm emerges and can be gently and gradually wound onto a matchstick, a few centimeters each day, until the entire worm has been removed.

- The process can take several days as female worms may exceed 3 ft. in length.
- Surgical intervention is often required in the management of disease caused by ectopic worms.

Dracunculiasis

Treatment

- Metronidazole or mebendazole orally divided into 3 doses for 10 days decreases local inflammation.
- Although the drugs do not kill the worm, they facilitate its removal.
- Topical corticosteroids shorten the time to complete healing while topical antibiotics decrease the risk of secondary bacterial infection.

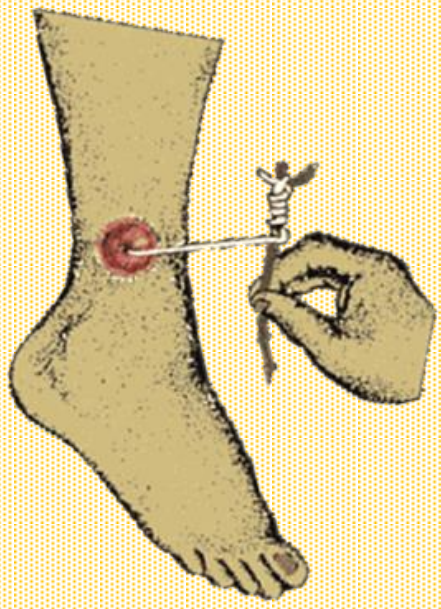
Dracunculiasis

Prevention

- Dracunculiasis can be prevented by boiling or chlorinating drinking water or passing the water through a cloth sieve before consumption.
- A highly successful program for the global eradication of guinea worm, has resulted in a dramatic fall in the incidence of infection in recent years.
- Eradication is dependent on behavior modification and education.

Dracunculiasis

- Some say the symbol of medicine, was inspired by the removal of a Dracunculus medinensis worm:



Wuchereria bancrofti

Lymphatic Filariasis

ELEPHANTIASIS

Elephantiasis

- Not all elephantiasis is *lymphatic filariasis*, but all *lympathic filariasis* produces elephantiasis.

- In most areas, the lymphatic damage associated with elephantiasis can be caused by:
  - Certain STD's (e.g., lymphogranuloma venereum).
  - Tuberculosis.
  - Leishmaniasis.
  - Repeated streptococcal infections.
  - Leprosy.
  - Environmental factors like exposure to certain minerals.
  - In some cases, no cause can be identified (idiopathic).

Elephantiasis

- Caused by parasitic *filaria* roundworms, it spreads person-to-person through mosquitoes.
- It's more common in tropical and subtropical areas of the world, including Africa and SE Asia, and it's an NTD.
- It's estimated that 120M people in Africa and SE Asia are affected.

Elephantiasis

- The parasitic worms that cause it are:
  - Wuchereria bancrofti (90% of cases)
  - Brugia malayi
  - Brugia timori

- The worms are spread by mosquitoes and affect the lymphatic system which is responsible for removing waste and toxins.

- When it is blocked, this leads to a backup of lymphatic fluid, which causes swelling.

Elephantiasis

- Mosquitoes that transmit filariae:
  - *Culex quinquefasciatus* (urban areas in tropical countries)
  - *Culex pipiens* (Temperate countries)
  - *Aedes (several species)*
  - *Anopheles* (the malaria mosquito)
  - *Mansonia titillans*

- The infection is transferred by a mosquito during feeding sessions on humans.

- In the process, parasitic larvae are introduced to the lymph ducts, and mature on the lymph nodes.

- On reaching adulthood, filaria is about 1-4 inches long.

Elephantiasis

- The main symptom is gross enlargement and swelling of parts of the body due to the accumulation of fluid.
- Arms, legs, and genitals are the areas most often affected, and may swell to several times their normal size resembling the thick, round appearance of an elephant's leg.
- The skin of the affected areas usually develops a dry, thickened, pebbly appearance and may become ulcerated, pitted and darkened (*hyperkeratosis*).
- Fever, chills, and a general malaise may be present.

Elephantiasis

- Although legs, arms and external genitalia (men & women) are most often involved, elephantiasis can affect any area of the body.
- Treatment of elephantiasis always involves treating the underlying condition.
- Lymphatic *filariasis* should be treated in the early stages with good compression therapy and garments to prevent elephantiasis.

The MORGELLONS

The Morgellons

Sir Thomas Browne, 1674:

“Hairs which have most amused me have not been in the face or head, but on the back, and not in men but children, as I long ago observed in that endemial distemper of little children in Languedoc, called the Morgellons, wherein they critically break out with harsh hairs on their backs, which takes off the unquiet symptoms of the disease, and delivers them from coughs and convulsions.” .

Morgellons

- Disease of unknown pathology characterized by sensations of crawling, biting and stinging, disfiguring lesions, and unusual fibers coming out of the skin.
- The associated intense itching and sores can severely interfere with a person's quality of life.
- Some patients look ill with neurological symptoms, which include confusion, difficulty walking and controlling their feet (foot drop), and sagging mouth when speaking.

The Morgellons

- Main feature is patients' belief that parasites or fibers are emerging from their skin, and crawling on or stinging it.

- Some Medical providers diagnose the condition as a delusional infestation and treat it with antidepressants, antipsychotic drugs, cognitive behavioral therapy and counseling.

- Others think the symptoms are related to an infectious process in skin cells; further study is needed.

The Morgellons
Symptoms

Skin itching and burning., with thread-like fibers stuck in the skin or coming out of it, and sensation of something crawling under the skin (for**m**ication).	Sores that appear suddenly, heal slowly and leave hyperpigmented scars.	Hair loss, tooth loss.
Joint and muscle pain with extreme fatigue.	Nervous system problems.	Sleep problems, short-term memory loss, depressed moods.

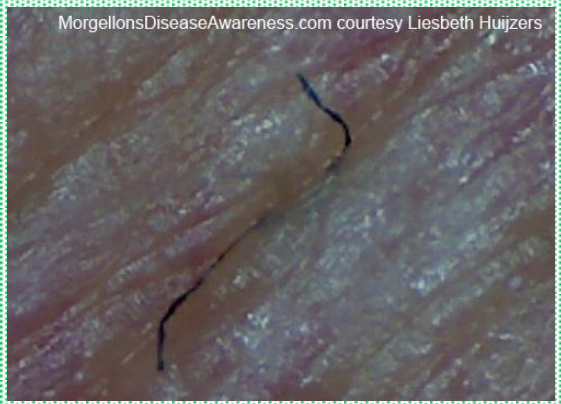
The Morgellons

- A study done by the CDC in 2012, found that this dermatopathy isn't caused by an infection or parasites.
- The study showed that most of the fibers in the skin sores could be explained by repeated itching and contamination by fabric fibers rather than fibers emerging from the skin.
- The CDC study noted that 70% of the condition is seen in middle-aged (40-60 years) white women.
- Its symptoms are very similar to those of a mental illness involving false beliefs about infestation by parasites (delusional infestation).

The Morgellons

- Patients experiment with different treatments and compare notes:
  - Freezing
  - Insecticides
  - Dewormers for cattle, horses, dogs
  - A liquid-nitrogen compound
  - Root beer poured over head, face, and limbs.

- A patient showed up in the ER with blood gushing from his ear, screaming because he could feel **them** tearing him up inside.



The Morgellons

- Patients bring the threads and flecks and fuzz in Ziplock bags, Tupperware containers or matchboxes to the doctor's office.
- Dermatologists have coined the term "Ziplock sign" to describe patients with the condition.
- Known in Japan as "cotton-erupting disease".
- By the mid-2000's, self-identified patients named themselves *Morgies* and rallied against doctors who diagnosed them with "delusions of parasitosis (DOP)".
- 90% of patients are (+) for Lyme disease.

The Morgellons

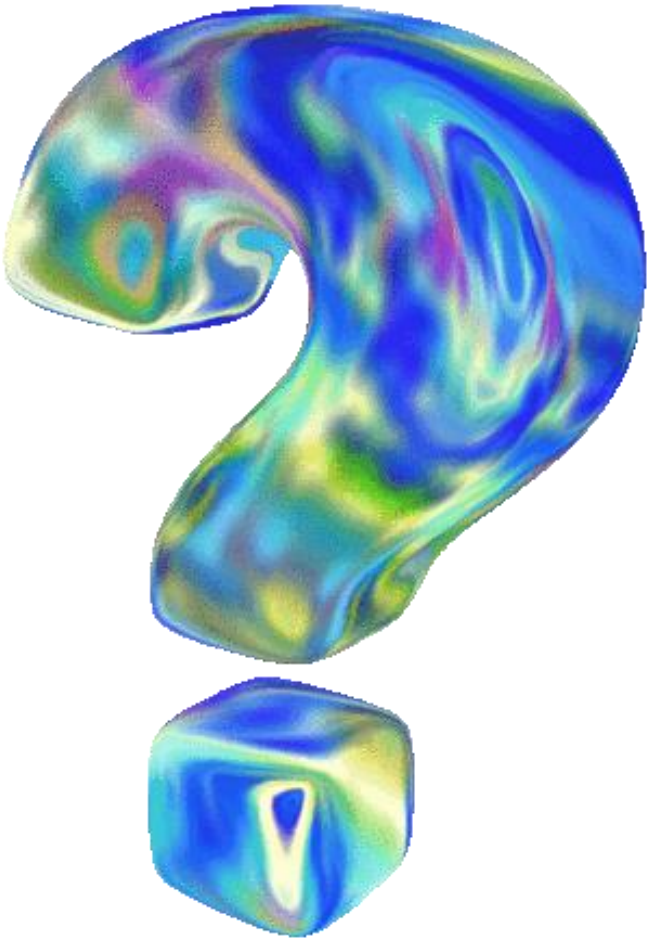
So, what is It?

- Chronic manifestation of Lyme disease
- Skin infection
- Delusional parasitosis
- Ringworm/Dermatophytosis
- “Socially transmitted Internet disease”
- Cystic acne
- Mass psychogenic illness
- Spider mite infestation
- Conspiracy theories
- Atypical form of Parkinson’s or ALS

The Morgellons

- It is a self-designated disease, not a medically diagnosed disease.
- It is a multi-system, multi-symptom condition.
- Patients probably have overlap or 2 or more conditions that confound the diagnoses.
- The Morgellons Research Foundation (MRF) notes 14,000 families suffer from Morgellons.

Last Questions ? 3



Recap of Session 5

- Mosquitos: *Aedes, Culex, Anopheles*
- Critters of the Plague: Rats & Fleas
- Yellow Fever
- *Larva migrans cutaneous and visceral*
- *Scabies*
- *Dracunculiasis*
- *Elephantiasis:* Lymphatic *filariasis*
- *The Morgellons:* Disease or Delusion?


Thank
You !