

Vector-Borne Diseases

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Selected Insect-borne diseases

Since vector-borne disease include both insects (especially mosquitoes) and arachnids (ticks and mites), it is more appropriate to collectively refer to these diseases as **arthropod borne** diseases (sometimes abbreviated as **arbo** -- for example, an arbovirus is an arthropod borne virus). Among the true insect-borne diseases, we begin this section with a disease spread by the black fly, and then survey the wide range of mosquito borne diseases.

1. Onchocerciasis (river blindness)

Agent: *Onchocerca volvulus* (nematode, or roundworm)

Reservoir: Mostly humans

Transmission: Bite of infected female black fly (genus *Simulium*), biological vector

Symptoms: Chronic, nonfatal (incubation 1 year or more), intense itching, impaired vision

A. mosquito-borne

2. Human Malaria

Agent: A parasitic protozoan in the *Plasmodium* genus

Reservoir: Mostly humans and infected mosquitoes

Transmission: *Anopheles* mosquitoes

Symptoms: Fever, chills, sweats, CNS effects (headache, delirium, coma)

3. Filariasis

Agent: *Wuchereria* or *Brugia* genus (nematodes, or roundworms)

Reservoir: Humans

Transmission: Mosquitoes (*Aedes*, *Anopheles*, or *Culex*) The mosquito carries the microscopic larval stage of the worm

Symptoms: Asymptomatic; fever, asthma, elephantiasis in chronic cases (enlarged limbs)

4. Yellow Fever: One of the few immunizations required for travel in endemic areas

Agent: Yellow fever virus (a flavivirus)

Reservoir: Humans (sometimes monkeys) and mosquitoes

Transmission: *Aedes* species mosquitoes

Symptoms: Sudden onset of fever, jaundice, headache, backache, vomiting, diarrhea

5. Dengue Fever (also called breakbone fever)

Agent: Dengue virus

Reservoir: Human, infected mosquitoes

Transmission: *Aedes* species mosquitoes

Symptoms: Headache, joint and muscle pain, rash, with low case fatality rate

6. Arthropod-borne viral encephalitis

Agents: Eastern equine encephalitis, Western equine encephalitis, California encephalitis, West Nile virus, etc.

Reservoir: Unknown for most agents (possibly birds, rodents, bats, reptiles) found in more temperate areas (e.g., North America)

Transmission: *Culex* species mosquitoes, possibly *Aedes* and others

Symptoms: Often asymptomatic, inflammation of brain, spinal cord, meninges, headache, fever, convulsions, paralysis, coma

Selected Arachnid-borne diseases

A. Tick-borne

1. Rocky mountain spotted fever

Agent: *Rickettsia rickettsii*

Reservoir: Dogs, rodents, other animals

Transmission: Bite of infected ticks (various species), tick must be attached 4-6 hours

Symptoms: Maculopapular rash (bumpy spots), fever, headache, malaise, chills, rash, death

2. Tularemia: Discovered in Tulare County, California

Agent: *Francisella tularensis* (related to plague bacteria)

Reservoir: Wild animals (rabbits, muskrats, squirrels), this disease is sometimes known as "rabbit fever"

Transmission: Bite of deer flies or wood ticks, handling or ingestion of infected animals

Symptoms: Typically: swollen lymph nodes, gastroenteritis, untreated, it can be fatal

3. Colorado tick fever

Agent: Colorado tick fever virus

Reservoir: Small animals (squirrels, chipmunks, porcupine)

Transmission: Infected ticks: *Dermacentor andersoni*

Symptoms: Similar to Dengue fever (joint and muscle pain)

4. Q fever

Agent: *Coxiella burnetii* (rickettsia)

Reservoir: Ticks, various wild and domestic animals

Transmission: Raw milk from infected cows, or direct contact

Symptoms: Typically: chills, headache

5. Relapsing fever

Agent: *Borrelia recurrentis* (spirochete)

Reservoir: Louse-borne: human
Tick-borne: rodents

Transmission: Lice or tick bites

Symptoms: Gets its name from a fever that disappears and reappears, fever also

B. Mite-borne

6. Scrub typhus (also known as mite-borne typhus)

Agent: *Rickettsia tsutsugamushi*

Reservoir: Infected larval mites (chiggers), wild rodents

Transmission: Mite bites

Symptoms: Skin ulcer at site of bite, maculopapular rash, headache

7. Scabies (sarcoptic itch, acariases)

Agent: *Sarcoptes scabiei* (a mite)

Reservoir: Humans

Transmission: Skin to skin, mites can burrow into skin in < 3 minutes

Symptoms: Itching, lesions

Selected Zoonoses

1. **Zoonoses:** diseases and infections transmitted between vertebrate animals and humans

2. Plague:

Agent: *Yersinia pestis*

Reservoir: Wild rodents and infected fleas (especially squirrels)

Transmission: Bubonic plague is spread by flea bite (especially *Xenopsylla cheopis*)
Pneumonic plague is spread person to person (respiratory route)

Symptoms: Swollen lymph nodes, fever, pneumonia

3. Murine typhus fever (also called endemic typhus or flea-borne typhus):

Agent: Mainly *Rickettsia typhi*

Reservoir: Rodents, fleas

Transmission: Bite or feces of rat flea (*Xenopsylla cheopis*)

Symptoms: Headache, chills, fever with low case fatality rate

4. Leptospirosis:

Agent: *Leptospira interrogans* (a spirochete)

Reservoir: Farm animals and pets; usually rats and other rodents

Transmission: Contact of skin with water, soil or vegetation contamination by urine

Symptoms: May be asymptomatic, fever, headache, chills, malaise, vomiting

5. Psittacosis: found worldwide but very often unrecognized

Agent: *Chlamydia psittaci*

Reservoir: Birds (pigeons, parrots, parakeets, turkeys, ducks)

Transmission: Airborne (inhaling dried droppings), person to person is rare, incubation 4-15 days (usually about 10 days)

Symptoms: Varies (fever, headache, chills, sometimes cough)

6. Rabies:

Agent: Rabies virus

Reservoir: 1. skunks 2. bats and raccoons
 3. foxes 4. dogs, cats, cattle

Transmission: Mainly animal bites, or licks on wounds; rarely: scratches, airborne, person to person

Symptoms: Incubation period: 2-8 weeks; fever, paralysis; untreated, almost always fatal