M220 Lecture 26

**Arthropod Vectors**

The arachnids have 8 legs and include spiders, ticks and mites.

The insects have 6 legs and include flies, fleas, mosquitoes, bees and lice.

-Arachnid vectors

1. **Tick borne diseases**
   a. Rocky mountain spotted fever-also called Tick-borne typhus is caused by the rickettsial organism *Rickettsia rickettsii*. This is most common in southeastern parts of the U.S. It can lead to death by kidney and heart failure.
   
   b. Q fever-is obtained from the inhalation of tick feces as aerosols in dairy barns or from drinking infected cow milk. This is caused by the rickettsial organism *Coxiella burnetii*. The disease can trigger pneumonia-like symptoms. *Coxiella* can reside within the liver and cause an endocarditis 5 to 10 years later.
   
   c. Colorado tick fever-an arbovirus is transmitted through the bite of a tick. Symptoms include aching muscles of the back and legs, fever, headache, and nausea. There are usually 2 periods of fever. Weakness can last for several weeks.
   
   d. Tularemia-a bacterial infection that can be acquired by a tick (arachnid) bite. Tularemia can also be spread by insects including deerflies and lice. In addition, infection occurs when the bacteria gain entrance through skin abrasions after having come into contact with infected wild animals, mostly rabbits. *Francisella tularensis* is a Gram negative rod that is the cause of this disease. Tularemia starts as a small ulcer and is followed by regional lymph node involvement. It ultimately causes septicemia, abscesses pneumonia and possibly death.
   
   e. Lyme disease- a deer tick bite can transmit the bacterial spirochete *Borrelia burgdorferi*. Initially one notices a target-like rash which is followed by flu-like symptoms within a couple of weeks. Other and more severe complications include an irregular heartbeat, neurological problems and arthritis.
   
   f. Recurrent or relapsing fever- a tick bite transmitting *Borrelia spp.* can cause this disease. Symptoms include fever, jaundice and rose-colored spots. Three or four relapses may occur with each encounter producing shorter and less severe symptoms.
-Insect vectors

1. Lice borne diseases
   a. Epidemic typhus- transmitted when fecal material from lice is rubbed into open wounds. The rickettsial organism *Rickettsia prowazekii* is the etiologic agent. Symptoms include fever, stupor, rash and hemorrhage as the organism invades blood vessel linings.

2. Flea borne diseases
   a. Bubonic plague-rat fleas can transmit the bacterial organism *Yersinia pestis*. *Yersinia* can survive and proliferate inside phagocytic cells. Lymph nodes of the armpit and groin enlarge forming swellings known as buboes. If untreated the mortality rate is between 50 and 75% within a week. The bacteria can be carried to the lungs and transmission can occur through aerosols. Now known as pneumonic plague, death can occur within 3 days if untreated and the mortality rate is near 100%.

3. Fly borne diseases
   a. Tularemia-can be transmitted through the bite of a deer fly.
   b. Leishmaniasis- can be transmitted through the bite of a sand fly.
   c. African sleeping sickness (tyrpanosomiasis) - tsetse fly bite.
   d. Onchocerciasis (River blindness or fever) - black fly bite.

4. Mosquito borne diseases
   a. Malaria-transmitted through the bite of the *Anopheles* mosquito. The etiologic agent is a protozoan called *Plasmodium*. Responsible species include *P. vivax*, *P. malariae* and *P. falciparum*.
   b. West Nile encephalitis- this arbovirus is transmitted through the bite of the *Culex* mosquito.
   c. Dengue fever (breakbone fever) - this arbovirus it transmitted through the bite of the *Aedes* mosquito. Symptoms include fever, rash, severe muscle and joint pain.
   d. Yellow fever- this arbovirus is also transmitted by the bite of the *Aedes* mosquito. The virus is found in the lymph nodes, liver, spleen, kidney and heart. Symptoms include fever, nausea, backache and jaundice. Severe complications include internal hemorrhage.
   e. Elephantiasis-caused by the filarial worm *Wucheria bancrofti*. This is transmitted by the bite from an infected mosquito. 

*End of Lecture Unit 3*