MEDICAL ENTOMOLOGY

ARTHROPODS OF MEDICAL IMPORTANCE

The word arthropoda derived from the Greek words "arthro: joint, and podas: a foot, because all members have jointed limbs.

- The phylum Arthropods has (5) groups or classes of medically important organisms.

1. Crustacaea: has such forms as crayfish, crabs, or copedods which serve as intermediate hosts for Paragonimus, Diphyllobothrium,.

2. Chilopoda: contains centipedes and millipedes, which may cause minor discomfort by their bites or stings and relatively unimportant class.

- 3. Arachnida: includes spiders and scorpions as well as ticks and mites. The bites or stings of scorpions and spiders can cause serious or fatal consequences, especially in small children. Tick and mites transmit a large number of bacterial and rickettsial diseases.

- 4. Insecta: is the most important class and includes mosquitoes which transmit malaria, filariasis, yellow fever, dengue, encephalitis and other diseases. Lice transmit epidemic typhus. A variety of flies are important vectors of several protozoan and filarial diseases. Other insects such as bees, wasps and ants may inflict painful bites or stings, which on occasion may cause death in the allergic individual.

- 5. Pentastomida: they are small group of arthropods, blood-sucking pendoparasites of mammals, birds, reptiles and fishes, e.g. tongue worm that has vermiform annulated body with loss of all appendages and covered with chitin. The adults live in the pulmonary tracts and the larvae and nymphs live in the alimentary tract, viscera and body cavities of their hosts including man.

- ***Class Arachnida***

- Members of this class present diverse sizes and appearances. However, the adult stages always have **four pairs of legs**. Spiders, ticks and mites are common examples of this class that are of some importance.

- **Spiders:**

- Although all spiders can inject venom only the black widow and the brown spider are of medical importance.

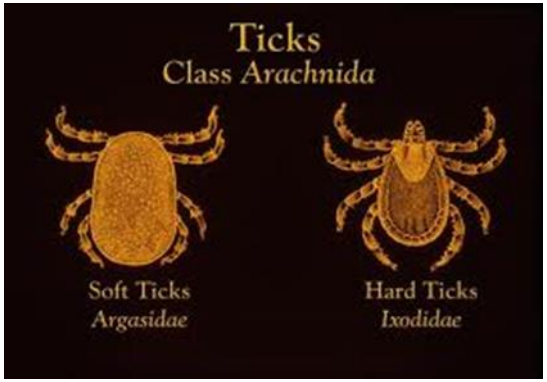
Black widow spider.

Brown spider.

- **B. Ticks:**

- Ticks may transmit bacterial, viral, rickettsial, or protozoan diseases (*T. cruzi*).

. Ticks are classified as hard ticks (head or capitulum can be seen from dorsal view) or soft ticks (head or capitulum cannot be seen from dorsal view). On occasion, hard ticks may induce paralysis, which can be relieved only by removing the tick.



Hard tick & soft tick

- **C. Mites**

Mites of medical importance are mainly those able to produce some type of skin disease. The most important are: *Sarcoptes scabiei*

Sarcoptes scabiei •

- ***Class Insecta***

  All members of the class **Insecta** have three pairs of legs, a head, thorax, and segmented abdomen. Most insects have wings but a few, such as lice and fleas, lack them.

- Effective control of disease caused by arthropods depends upon control of the arthropod. Arthropods may be controlled by destroying habitat that favors breeding, by use of insecticides, by use of screens and repellants. Effective control measures demand a thorough knowledge of the arthropod's life cycle and habits.

- They are of various forms, the numerous species farout numbering those of all other animals" they play an important role in our life economically and medically. The body is divided into 3 regions: head, thorax and abdomen; they have one or two pairs of wings but few are wingless. All are characterized by having a pair of jointed legs and that is the reason why are often called Hexapoda.

- They include mosquitoes, flies, lice, fleas, bugs, wasps, bees, ants, etc. They act as venomous, biological or mechanical vectors and intermediate hosts or parasites on or in their hosts including man. Adult members of this class possess three pairs of legs. They may or may not have wings. Those without wings (ticks and mites) and those with wings (mosquitoes and other flies).

- **A. Fleas:**

Correct identification of precise flea species often requires an entomology specialist. However, they are readily recognized as fleas by

1. Lack of wings.
2. Body profile flattened laterally.
3. Presence of sucking mouthparts.

- Disease agents that fleas transmit to man include ***Pasteurella pestis***, and ***Rickettsia typhi***. Fleas also serve as intermediate hosts for ***D. caninum*** and ***H. diminuta***.

- ***Xenopsylla cheopis:**** The rat flea ,is a vector of the plague bacillus.

- **B. True Bugs**
- Members of this group have sucking mouthparts.

The two bedbugs that , commonly attack man are C. *hempiterns* (tropical-rural) and *C. lectnlorius* (Temperate zone- urban): both lives in human dwellings and feeds on man. Bedbug bites cuase annoyance and skin reactions but do not transmit diseases under natural conditions.

- **The cone -nose bug:**
- The cone-nose bugs are variously called assassin bugs, kissing bugs, triatomes, reduviids, etc. The designation cone-nose refers to the small pointed head; the term kissing bug, because of its habit of biting individuals on the face, particularly around the lips. It is likely that the part of body which is exposed during sleep becomes the preferential bite site.
- The cone-nose defecates while feeding and the protozoan *Trypanosoma cruzi*, may be transferred to a new host when the bloody fluid feces containing the infective trypanosomes are rubbed or scratched into the wound.

Kissing bug

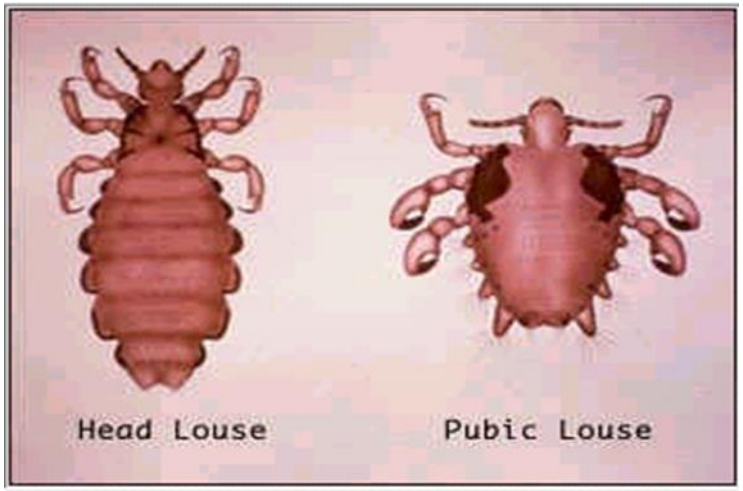
- **C. Lice *(pediculosis):***

Lice are usually quite host specific. Consequently human lousiness is dependent upon transfer from one person to other persons. If man gets non- human lice on himself, it is a very transient and unimportant condition. As a group, lice are wingless, flattened dorso-ventrally, and have hooks or claws on their feet.

- Study the following demonstrations of two different types of lice, which are important infesting man.

- ***Pediculus humanus.***

There are two varieties of this lice; one (capitis) lives in the head and the other (corporis) on the body (and clothes). They are important because they can transmit typhus fever, relapsing fever, and trench fever.



- ***D. Diptera***

- From a medical viewpoint, the Diptera (tow wings) are **the most important order of insects**. This group is important both from the standpoint of being causal agents of disease (annoying bites, larval forms burrowing into the skin, etc.), and as vectors of disease (malaria, filariasis, yellow fever, leishmaniasis, etc.).

- The following important groups of diptera that transmit human pathogens.

- ***Glossina* spp.**

The group is important as vectors of both human and
in Africa. (*T. rhodesiense,* and *T. gambiense.*) Com
the tsetse fly.

- It is yellow, brown to black, narrow bodied fly
onion-shaped proboscis, horizontal at rest, adap
sucking blood.

- *Glossina.*

- ***Phlebotomus:***

- Several species are important as vectors of ***Leish*** the world. They can also transmit virus (Sand fly fever) small 3mm, long, much hairy (moth like) flies. Have insect

- ***Simulium:***

Important both in the New World and Africa as vectors of ***Onchocerca***. Simmlium spp. (black fly), they are small, robust, and hump backed. Short mouth parts are adapted to a blood sucking habit only in the female.

- ***Anopheles* mosquitoes**

Transmit plasmodia the causative agent of human and animal malaria. Also several type of encephalitis, and filarial worms (*W.bancrofti* and *Brugia*).

Anopheles **mosquitoes** •

- ***Aedes.***

This genus is better known as the vector of yellow fever and dengue. The species *A. aegypti* is very important in the New World as a yellow fever vector.

- *A. aegypti*

• MYIASIS:

- It is defined as the invasion of organs and tissue of man or animal by fly larvae (dipterous). They may feed upon the living, necrotic, dead tissues or ingested food as in the case of intestinal myiasis.

- Myiasis may be obligatory (the fly larvae live on a live host, part of their life cycle). However, in facultative myaisis larvae are normally free living, after attacking, but under certain condition they may invade living hosts.

- The majority of the species that responsible for myiasis in human belongs to the three major genera, these are: ***Oestrus, Dermatobia*** and ***Gasterophilus.***

- Types of human myiasis which are based on their affects on different parts, organs or tissue of the body.

- *Dermal or cutaneous myasis, *Nasopharangeal myasis, *Auricular myasis, *Opthalmic myasis, *Intestinal myasis, *Urogenital myasis and *Wound myasis

- As would be expected, most cases occur in persons living in environments where flies are abundant and poor personal hygiene and sanitation.