

Entomology: It is a science that deals with the study of arthropods in general, and incorporates sciences like zoology, biology, parasitology and micro-biology.

Arthropods: “Arthro” means jointed and “Poda” means legs. Arthropods are invertebrate animals with jointed-legs and identified by their particular characteristics.

Medical Entomology: This is a branch of entomology which deals with arthropods which affect the health and well-being of man and vertebrate animals. In other words, medical entomology is the medical science directly concerned with vectors that affect human and animal health..

Mechanical disease transmission: disease agents are carried from one host to another by arthropods simply mechanically carried by the body parts (example wings, hairs, feces, vomitus, etc). In this type of disease transmission no change takes place in the number, form or developmental stages of the organism, but simply deposited in the body, food or drink of the host.

Biological disease transmission: the agent will exhibit changes in form and or number of developmental stages in the arthropod before entry to the host. This includes hereditary (transovarian) and transital transmissions: Propagative, cyclodevelopmental and cyclopropagative.

- **Propagative:** In propagative type of disease transmission only the number of pathogens increases and the developmental stage remain constant. The diseases plague and typhus are good examples of propagative type of disease transmission.

- **Cyclo-developmental:** In this type of disease transmission, only the developmental stage (form) of the disease pathogen is changed (small to big, immature to matured stage, etc.), while the number of the pathogenic organism remains constant. Example Filariasis

- **Cyclo-propagative:** This type of disease transmission is a combination of both propagative and cyclo-developmental; whereby the disease pathogen undertakes a change both in number and developmental form (stage). Example Malaria.

- **Trans ovarian/ Trans-stadial transmission:** It is a type of disease transmission, whereas the causative agent is transmitted to the immature stage (usually to the egg) from the adult insects and / or other arthropods which carry disease pathogens.

Arthropodes

Arthropods are by far the most successful phylum of animals, both in diversity of distribution and in number of species and individuals. They have adapted successfully to life in water, on land and in the air.

Arthropods are found in a great variety of habitats than any other animal group; on top of mountains, at great depths in the ocean and in the icy wilderness of Antarctica. They can survive great extremes of temperature, toxicity, acidity and salinity.

Common identification Characteristics of Arthropods

Arthropods are grouped under the animal kingdom. They are invertebrate animals. Despite the enormous diversity found among them, they all share the following common characteristics:

1. Bilaterally symmetrical body sub-divided into segments.
2. Body covered with exoskeleton which is made up of a tough and rigid substance known as chitin.
3. Jointed appendages are present on some body segments.
4. Body cavity between the alimentary canal and the body wall.
5. Open circulatory system that works by diffusion unlike the arteries and veins in higher animals like humans which are the closed type.
6. Have ventral ladder type of nervous system: These are called ganglia and are situated at different places in the body of the arthropod with a ladder type linkage: message passes from one ganglia to the other and finally to the big ganglia at the head through nerves.
7. Growth by molting, which is controlled by hormones

Classification of Arthropods

Arthropods can commonly be classified into different sub groups as shown in the classification below. The phylum arthropoda is the largest of the animal

phyla. There are numerous classes under it, but about five of these classes are medically important.

Arthropoda

1. Insecta
2. Arachnida
3. Diplopoda
4. Chilopoda
5. Crustacea

Insecta.....classified into **1. Apterygota**

2. Pterygota

Pterygota : classified into :

1. **Dictyoptera** : Cockroach
2. **Hemiptera** : bed bugs and triatominaebugs
3. **Anoplura** : lice
4. **Diptera**
5. **Siphonaptera** : Fleas

While **Diptera** include :

1. **Nematocera** like phlebotomae
2. **Brachycera** like myce fly
3. **Cyclorrhapha** like house fly

The medically important classes are the following

1. **Class Insecta/Hexapoda** : the six leggers)-The insects. The insects (class insecta) are the most abundant species.
2. **Class Chilopoda** - The centipedes (they have one pair of legs per segment)
3. **Class Diplopoda** - The millipedes (they have two pairs of legs per segment).
4. **Class Crustacea** - Cyclops, the sea- food group such as lobsters, crabs, cry fish, etc
5. **Class Arachnida**(the eight leggers) - Spiders, mites, ticks, scorpions etc.

Arthropod Habitats

1. **The soil:** Arthropods may be found on the surface of the soil or under ground (in pebbles, in bolder, in caves, in the sand, in lime stone formations, etc). Examples: ants, termites, beetles, spiders, wasps, mites, scorpions, flies, crickets, cockroaches, moths, fleas.
2. **Water Arthropods** may live in fresh waters (natural or man made), salty waters (Oceans, seas) or hot springs. Examples of water dwellers are: backswimmers, crabs, lobsters, crayfish.
3. **In the ambient air (temporary fliers)** The ambient air although can not be a permanent habitat, some arthropods specially the fliers can be found temporarily. The fliers are fast spreaders of contamination and pollutions. Examples of fliers are: Bees, beetles, mosquitoes, flies, grasshoppers, wasps, butterflies, moths, dragonflies, ants and termites.
4. **On man: Ectoparasites-** these are dangerous groups to health since they feed on human blood. These parasitic arthropods could be obligatory ectoparasites (example louse) or intermittent (on and off: example ticks).
5. **On animals:** Examples lice, ticks, mites, fleas, mosquitoes, ox-warble fly, etc.
6. **On plants:** Examples Beetles, aphids, spiders, gall insects, scale insects, manna insects, lacs etc

Health Effects:

- Arthropods attack man, domestic and wild animals.
- They bite and suck blood.
- They pass infective organisms and may inject toxin to man and animals (mechanically or biologically).
- They cause myiasis (infestation by larva of diptera) on man and animals.
- Annoy and irritate man and animals.
- They cause envenomization by their bite, sting, spines or by their secretions. Envenomization may cause swelling, pain, redness, rash, fever, allergic reactions, blood poisoning, or death in some cases.

- Arthropods parasitize man, animals and plants: for example louse, and ticks on animals, and aphids on plants.
- Cause accidental injury to sense organs: they enter the eyes, ears, mouth or nostrils.
- They cause allergic/asthmatic reactions by their odor, secretions, and by their dead body fragments.
- Crop adulteration is another effect of arthropods due to their droppings of fecula, dead body, egg shells, urine or microorganisms.
- Arthropods cause Entomophobia (fear of insects): nervous disorder, hysterics, hallucination etc.

control methods of arthropods:

1. Personal protection: Physical barriers between a vertebrate and arthropods, chemical barriers that repel arthropods from actual biting; and arthropod toxicants that are applied directly to or with in a vertebrate. E.g. Insecticide treated bed nets are widely used in Ethiopia and sub-Saharan Africa and subtropical countries worldwide for the control of malaria and leishmaniasis.
2. Environmental manipulation: modification of the specific breeding habitat of an arthropod can provide effective control. For example, drainage of marshy areas, destruction of burrow pits and hoof prints for controlling malaria.
3. Barrier zones and quarantines: an area free from certain vectors, either naturally or as a consequence of control programs, may need protection from invasion.
4. Biological control (Bio control): All animal populations, including arthropods affecting man and animals,
5. Local control methods: Even though it is difficult to take control action against arthropods without the fundamental knowledge of entomology and other related sciences,
6. Chemical control methods: Chemical insecticides