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For

Undergraduate Students (B.Sc. Zoology)

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Vectors and pests: General introduction

Vectors: vectors are those organisms which spread the disease by transmitting pathogens from one host to another host. Vector is always a living organism.

Or

The organism which transmits disease causing pathogens from one host to another is called a vector. **Example:** Mosquito, Tse tse fly, House fly etc.

Pests: the harmful organisms (plants and animals) to human life are called pests. These are harmful for agriculture, food material, cloths and other important household materials such as furniture etc.

Example Rodents, termites, Gundhi bugs, sugarcane leafhoppers etc.

Rodents are mammals of the order Rodentia, which are characterized by a single pair of continuously growing incisors in each of the upper and lower jaws. About 40% of all mammal species are rodents. Well-known rodents include mice, rats, squirrels, prairie dogs, porcupines, beavers, guinea pigs, and hamsters. Most rodents are herbivorous, feeding exclusively on plant material such as seeds, stems, leaves, flowers, and roots. Some are omnivorous and a few are predators. Some rodent species are serious agricultural pests, eating large quantities of food stored by humans.

Mosquitoes: Life cycle, diseases caused and control

Mosquitos are distributed throughout the world. They are nocturnal in habit and found in dark and moist places. The important genus of mosquitoes is Culex, Aedes and Anopheles. The females have specialized mouthparts for piercing while males do not have specialized mouthparts.

Diseases spread by Mosquitoes

Sr. No.	Disease	vectors	Pathogen
1	Malaria	Female anopheles	Plasmodium (Protozoan)
2	Yellow fever	Aedes	Virus
3	Dengue fever	Aedes and Culex	Virus
4	Filariasis (Elephantiasis)	Aedes Culex and Anopheles	Wuchereria
5	Encephalitis	Culex and Aedes	Virus

1. **Malaria:-** Malaria disease is transmitted by female anopheles mosquitoes and caused by a parasitic protozoan Plasmodium. Different species of Plasmodium (P. vivax, P. malaria and P. falciparum) are responsible for different types of malaria. Of these, malignant malaria caused by Plasmodium falciparum is the most serious one and can even be fatal. Plasmodium enters the human body through the bite of infected female Anopheles mosquito. The female Anopheles mosquito is the vector (transmitting agent). The major symptoms of disease are recurring fever, shivering, headache and nausea. The dried and powdered bark of the Cinchona tree are used to make a medicine for malaria.

2. **Yellow fever:-** This disease is transmitted by the Aedes mosquito. It is found only in Africa and South America. Yellow fever is caused by a virus. The major symptoms of this disease are sudden fever, headache, pain in bones, swelling in face and skin becomes dry. After some days of jaundice, hemorrhage and vomiting of blood occurs. Jaundice usually is yellowing the skin and eyes. That's why this disease is termed yellow fever. Controlling the mosquito population and eliminating it may eradicate the disease.

3. **Dengue fever ((break-bone fever)):-** Dengue is caused by a virus and transmitted by a vector culex and Aedes. The disease is characterized by high fever with rashes on the face and intense pain in head, eyes muscles and joints. Only the preventive measures of Dengue can effectively safeguard thousands of people against this disease.

4. **Filariasis (Elephantiasis):-**This disease is caused by a nematode parasite Wuchereria bancrofti and transmitted by Culexaedes and anopheles. The disease is characterized by swelling of limbs and blocked lymphatic systems.

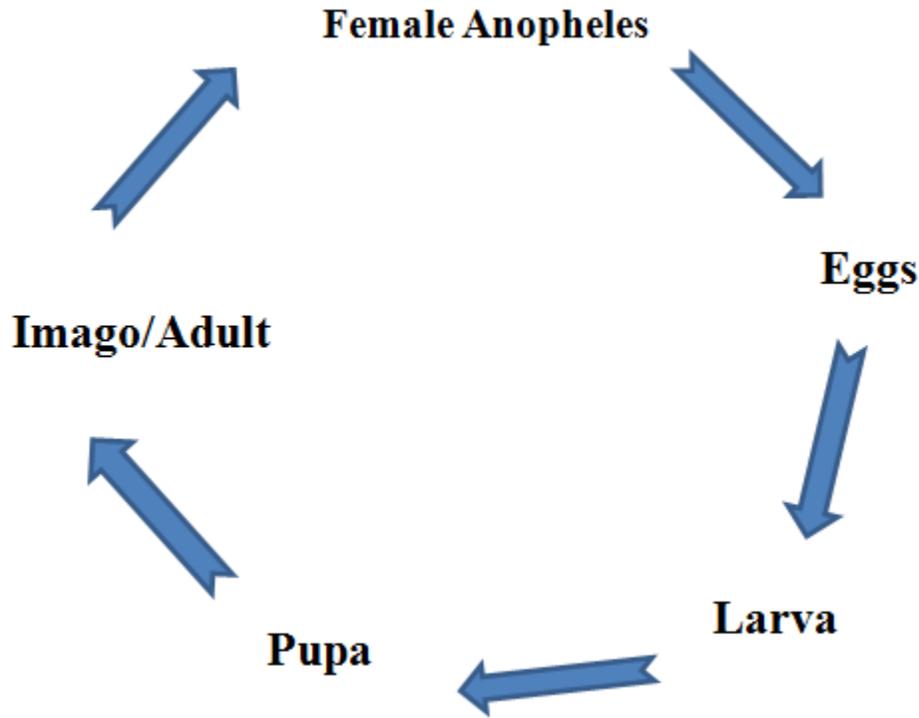
5. **Encephalitis:-** Encephalitis is caused by a virus and transmitted by Culex and Aedes. The symptoms of this disease are high fever, headache, laziness and inflammation of the brain.

Mosquito: Life cycle

Systematic position:

Phylum	-	Arthropoda
Class	-	Insecta
Order	-	Diptera
Genus	-	Anopheles/Culex/Aedes

Male and females are separate. They breed throughout the year in warm and humid places. The female anopheles lays 40 - 100 eggs in stagnant water. The eggs are laid on the surface of the water. The Culex female laid about 300 eggs. After 2-3 days, eggs hatch in larvae. They are aquatic creatures called wrigglers. The abdomen of larvae is provided with a tubular siphon for air breathing. Larvae live 2-3 weeks and after that pupa are produced. The Pupa stage lives for 2-7 days during this time major changes occur which converts pupa into adult mosquitoes. The adult mosquito is called Imago. Imago starts a new life cycle after some time.



Life cycle of Anopheles

Mosquitoes: Prevention and control-

There are various methods to control the mosquitoes in the environment. They are-

1. Elimination of breeding grounds
2. Destruction of larva and Pupa
3. Destruction of adult mosquitoes
4. Protection from mosquito bites.

1. **Elimination of breeding grounds:-** The larvae of mosquitoes develop in stagnant water. So the elimination of breeding ground (stagnant water) is the major method of controlling mosquitoes.

2. **Destruction of larva and pupa :-**The water surface is sprayed by kerosene oil and petroleum reduces the oxygen content in water so larvae die due to lack of oxygen. Larvivorous fishes like Gambusia should be released in water to control the mosquito

larvae. Because this fish feeds upon the mosquito larvae and pupae. Some chemicals like DDT (Dichloro diphenyl trichloroethane), BHC (Benzene hexa chloride) are used to kill the larvae. Dragon fly also feeds on the larva of mosquitoes.

3. Destruction of adult mosquitoes:- The adult mosquitoes are destroyed by using DDT chemical and sulfur dioxide fumes.

4. Protection from mosquito bites:- Houses should be mosquitoes free. Mosquito nets should be used while sleeping. The exposed parts of the body should be protected by mosquito repellents creams like odomos and indolone.
