USEFUL INSECTS OR PRODUCTIVE INSECTS

- Insects can be classified into 2 types based on the economic importance
- Useful / beneficial / productive insects.
- This type includes silkworm, honeybee and lac insect.
- Harmful insects: Housefly, Mosquito, bedbug and Head louse.

USEFUL INSECTS

(I) HONEY BEE:

Order Hymenoptera

- Honey bees arc social colonial and beneficial insects.
- They arc cosmopolitan in distribution.

SPECIES

- Apis indica - Indian Honey bee.
- Apis floria - smallest Indian honeybee.
- Apis dorsata- Wild rock honey bee (largest Indian honey bee)
- Culturing of honeybees is called apiculture.

TYPES OF HONEY BEE

- The colny consists of 50,000 Honey bees.
- They are classified into 3 types **queen bee, worker bee, male or drone.**
- In a hive several hexagonal chambers made up of bee's wax are present.

QUEEN BEE

- It is fertile female with reduced wings which developed from fertilised zygote or egg.
- Queen bee is diploid (2n) = 32
- It stores millions of sperms in its spermathecae
- It lays nearly 2000 eggs a day.
- It produces two types of eggs fertilised and unfertilised eggs.
- Queen is useful for reproduction and organisation of the colony.
- The queen lives for about 5 years.
- The larva which feed up on royal jelly will transform into queen bee.

MALES OR DRONES

- Drones are haploid males developed from unfertilized ova by parthenogenesis.
- males have large wings and reduced mouth parts.
- Participate in nuptial flight.
- They are useful for reproduction only (to copulate with the queen).
- Drones live for very short period.

WORKER BEES

- Workers are sterile females developed from fertilised eggs.
- The larva of honey bee which docs not feed on royal jelly develops into worker bee.
- Worker bees play a vital role in maintaining different functions in the colony.
- They live for 2 to 4 months.
- As older workers die, new workers take their place. They are **smallest** among the three groups.

FUNCTIONS

- Collection of pollen grains and nectar from flowers
- Supply food materials to different individuals.
- Construction of bee hive by the secretion of beewax. The **wax glands** are present on **2nd, 3rd, 4th and 5th abdominal segments.**
- Cleaning the bee colony
- Production of honey.
- A sling is present at the posterior part of abdomen by which they attack the enemy and thus protect the colony.
- The collected pollen grains from flowers with the help of pollen brushes and store them in pollen baskets.
- **Pollen baskets** are present on **tibia of 3rd metathoracic legs.**
- **Pollen brushes** arc present on the **tarsus of pro and mesothoracic legs.**
- During breeding season, the queen bee along with some drones fly in the air.
- Among the several males, one male reach the queen bee and participates in copulation. This process is callcd nuptial flight.
- After copulation male dies and the queen bee returns the beehive and liberate the fertilised and unfertilised eggs.

BEE DANCE

- Bee dance is the language of honey bees.
- Honey bees communicate among themselves by dance sequence or **waggling dance and Round dance.**
- Waggling dance of honey bees was 1st discovered by **Karl von Frisch** and he was awarded Nobel prize.
- The dance is a method of communication about the source of food and the distance of' the source of food from the hive and the directions, to the other workers in the colony.

ECONOMIC IMPORTANCE

- Honey bee produce 3 useful substances like honey, bee wax, bee poison.
- Honey is a good nourishing food material.
- It contains sugars like Levulosc, dextrose and maltose.
- Honey is antiseptic substance hence applied on wounds to prevent infection. Honey is also used in making of jellies, jams and cakes.
- Bee wax collected from beehive is used in the manfacture of candles, polishes.
- Bee poison is also used in the treatment of Arthritis, (a bone joint disease)
- Honey bees act as pollinating agents.

Apiculture

- The rearing and management of honey bees is called **apiculture.**
- indica is domesticated and it is reared and made lo construct beehives in wooden boxes in bee forms callcd apiaries.

II) SILK WORM

Bombyx mori **is** callcd **Chinese** silk worm moth mulberry silk worm moth.

Bombyx mori produces the costly silk which has high commercial value.

MORPHOLOGY

- Adull silk worms lead their life activities on mulbcry plants.
- Mouth parts arc of siphoning type.
- Throax has 2 pairs of wings and 3 pairs ol legs.
- Male and females live for a short period of 2 or 3 days.
- Males dies after copulation and females too die after laying eggs.
- The female lays **300-400 eggs** on the upper surface of mulbcry leaves.

LIFE CYCLE

- Silk worm is **holometabolous** insect.
- The life cycle includes 4 stages, ihey arc Egg larva- Pupa - Adult
- The egg or zygote hatches into larva

LARVA

- The larva is called **caterpillar.**
- The larva is worm like in appearance and it possess **biting and chewing type** of mouth parts.
- Larva is voracious feeder which feeds on **mulberry leaves.**
- Larval life may extend upto 2-3 weeks.
- At the end of larval stage, caterpillar secretes cggcase or cocoon around the body.
- Salivary glands are modified into silk glands in final stage of growth.
- The structure which helps in spinning the silkthread around the body is spinneret . Present on labium.
- Spining of silkthread is from outer to inside.
- The larva with silk thread is called cocoon.
- The silk thread is made of insoluble protein fibroin.
- Scricin binds the fibroin threads.
- Cater pillar moults **4 times.**
- Alter 2-3 weeks time, caterpillar transforms into pupa.

PUPA

- The pupa of silk worm is called **chrysalis.**
- The pupa is inactive and it lives inside the cocoon il is the nonfccding stage.
- The pupa transforms into imago or adult in about 3 weeks.
- Cocoonase enzyme is secreted by imago.

ECONOMIC IMPORTANCE:

- The rearing and management of silk worms is known as **sericulture.**
- In industry there arc 3 types of activities .
- Production of high yielding strains of moths.
- Hatching the larva and rearing the larva in special trays and feeding them with chopped mulberry leaves.
- Extraction of silk from cocoons.
- In sericulture centres, to prevent the metamorphosis of pupa into imago cocoons were collected and kept in hot water to kill the pupa.
- The process of killing the pupae by keeping the cocoons in hot water is callcd **stifling.**
- About 50,000 cocoons are required to produce one kg of silk.
- The process of removal of silk thread ovci the cocoon is called **reeling.**
- China occupies first position in silk production in the world.
- Karnataka occupies first place in India.
- Attacus reccni gives cri silk.
- Anthcrea paphia gives lassar silk.

Ill) LAC INSECT

- Laccifer lacca or Tachardia lacca is the Indian lac insect. /
- It is commonly found in forests of subtropical and tropical countries..
- It is found on trees like Acacia, Ficus . Zi/yphus etc.,
- Mouth parts are of piercing and sucking type.
- They exhibit sexual dimorphism.

MALES

- Males arc small in size and active.
- Body is divisible into head, thorax, abdomen.
- Head possess a pair of antennae, a pair of simple eyes and mouth parts which arc piercing and sucking type.
- Thorax possess 1 pairof membranous wings and 3 pairs of legs.
- Males die after mating and arc short lived

FEMALES

- Females arc larger than males and stationary.
- Divisions of the body are not distinct.
- Legs and wings arc absent in female.
- Female possess **two jointed rostrum** for feeding.

LIFE CYCLE

- Life cycle includes 3 stages. Egg -Nymph-Adult,
- The male insect leaves its lacshell and enters into lacshell of female and copulates with it.
- After copulation male dies.
- Within few days the nymphs hatchout from the eggs.

- Nymphs are wingless with piercing and sucking mouth parts and 3 pairs of legs.
- The nymphs leave the female lacshcll and migrate to new branches of the tree and attaches to them by their proboscis and legs.
- They suck the plant sap through proboscis.
- Lack is a resinous substance secreted by hypodermal glands of skin by nymph and adult female.
- The lac coat of all nymphs unite and form a lac house with small openings on the roof.
- The nymphs carry all the vital activities in the lac house and develop into adult.
- Nymph moults **thrice** and metamorphoses after 6 to 8 weeks of life.
- After metamorphosis males acquire wings and fly out of the lachouse.

ECONOMIC IMPORTANCE

- The raw lac collcctcd directly from branches of trees is callcd - **Stick lac.**
- Purified and commercial lac is called - **Shellac.**
- Lac is used in the manufacture of toys, gramphone records, varnishes, paints, buttons and bangles.
- Lac is used as a sealing material.
- India is the leading country in the production of lac.
- Myanmar stands second in lac production.
- Lac research centre is located at **Namkum** near Ranchi, in **Jharkand.**
- About 50 million kilos of lac is produced in our country every year.