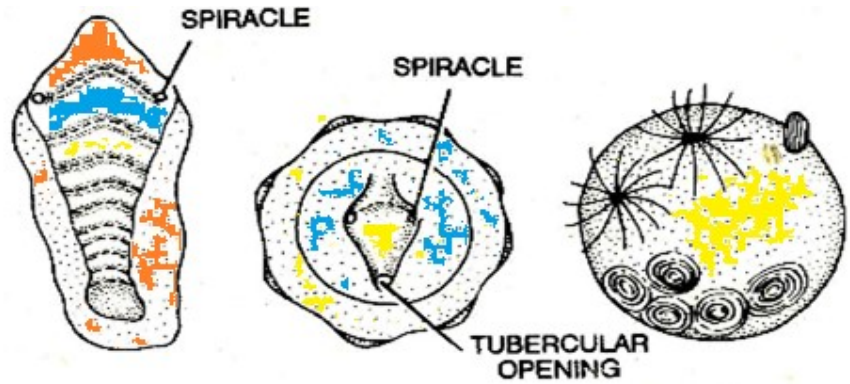
Lac Culture

Lac Insect

- **Lac** or **Shellac** is the resinous secretion **produced** by lac insect as protective covering around its body.
- It belongs to genera **Laccifera** or **Tachardia.**
- **Laccifera lacca** is the common Indian lac insect.
- It lives on the trees of fig family namely kikar, **ber (Zizyphus mauritiana**), **babul (Acacia nilotica), dhak or palas (Butea monosperma), kusum (Schleichera oleosa), katha or khair (Acacia catechu), peepal (Ficus religiosa) and gular (Ficus glomerota).**

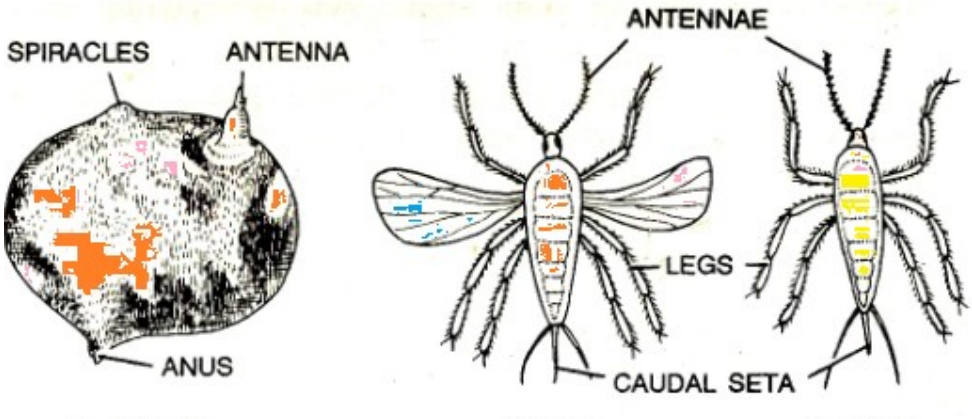


Chambers of male and female lac insects.

- Lac insect feeds upon the sap of its host plant like any other sap sucking insect.
- It is found in India and **Philipine islands**.

1.Male and Female Chambers:

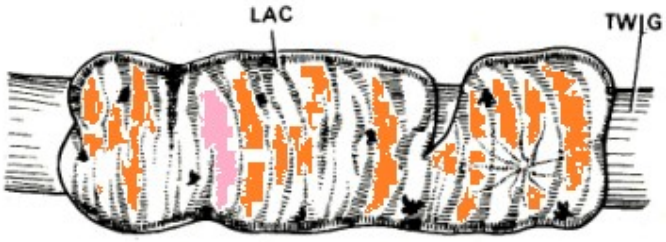
- The adult male and female insects live on the tree twigs enclosed in thick capsules or chambers separately.
- The male chambers are elongated and cigar-shaped. Each **male chamber** has a **branchial aperture** on its anterior part.
- There is an opening in the posterior part of the chamber, which is covered by an **operculum.**
- The male insect can crawl out through this opening.
- The **female chamber** is smaller and rounded.
- It has a **branchial aperture** in its anterior part and a **tubercular** or **anal opening** in the posterior part.
- A ridge extends in the mid-dorsal line of female chamber, which indicates the posterior end of the last larval skin.



Lac insect. A. Female; B. Male; C. Larva.

2.Male and Female Lac Insects:

- The lac insects have a sluggish and almost sedentary life, living inside the chambers.
- Therefore, these have become degenerated, without wings and distinct legs.
- However, the **female** is more degenerated. It has a bag-like body with a small reduced antenna.
- The eyes, legs and wings are lost during metamorphosis.
- **The male lac insect** is red in colour.
- It has an incipient head with **antennae** and eyes.
- The thorax has three pairs of legs and abdomen carries **genital sheath, penis** and a pair of long **caudal setae,** one on either side of genital sheath.
- The wings may be present or absent.
- Because of the absence of mouthparts, the insect is incapable of feeding.



A twig with lac deposition.

3. Life Cycle:

- The male lac insect crawls out of its chamber by pushing open the operculum, reaches the female chamber and fertilises the female through the anal ortubercular opening of female shell.
- The male dies soon after copulation.

- The female secretes more resin forming a large sized chamber.
- Thus the secretion by females mainly contributes to lac.
- **Oviposition** takes place into a space inside the female chamber made by the contraction of the body of female.
- This space is called **incubating chamber.**
- Each female lays 200-300 eggs.
- The eggs hatch into red coloured larvae.
- These crawl out of the female's incubating chamber.
- The mass emergence of larvae is called **swarming.**
- Each larva is boat-shaped in appearance and is about 1/2 mm in length.
- Its head bears paired **antennae** and the **ocelli.**
- The mouthparts are of **piercing** and **sucking** type with maxillae and mandibles together forming the sucking tube or proboscis.
- Its thorax is three segmented and each throacic segment carries a pair of **walking legs.** The abdomen bears a pair of long **caudal setae.**

4.Attachment of Larvae to New Shoots:

- The larvae on emergence crawl on the twigs of any one of the host trees mentioned earlier and settle down on the undersurface of new shoots.
- These prefer young succulent shoots.
- These force their proboscis through the bark and insert it into the phloem tissue and start feeding.
- Here, these metamorphose into the adult insects and by secreting lac enclose themselves into the chambers.

5.Secretion of Lac :

- The secretion forms a shining layer over their bodies in the beginning but hardens and becomes opaque later on.
- The secretion is produced by the cutaneous glands of the skin and is deposited around three openings **: the two branchial apertures** at the anterior end and **anal opening** at the posterior end.
- The secretion is in the form of waxy filaments which have a woolly white appearance.
- On coming in contact with air, these join to form a continuous covering.
- Further, lac secretion continues inside this coating, so that lac deposition adds to the thickness of the coating.
- With growth of larva and addition of lac the adjacent chambers of different larvae coalesce

with one another forming a more or less continuous encrustation.

Lac Cultivation

- In order to obtain lac, lac insects are cultured and the technique of lac production is known as the **lac culture.**
- It involves proper care and regular pruning of the host plants, propagation of insects, and collection and processing of lac.
- For the purpose of propagation the older branches containing crusts are tied with new branches and this method is called **inoculation.**
- When new crusts are formed, the old twigs are removed (approximately 20-30 cm long) and this is known as harvesting.
- After inoculation, lac insects come out of the old crusts.
- At this stage they are known as **nymphs.**
- The nymphs hatch out from eggs laid by the females in the old crutsts.
- The coming out of nymph from the old crusts is known as swarming.
- Some of the nymphs become winged or wingless male and others become female.
- These nymphs explore new branches.
- The thousands of nymphs settle side by side and the resinous secretion builds up around them and completely encases them.
- The nymphs undergo several moults.
- Most of them develop into females and some into males.
- The females remain in small cavities in the resinous mass from which they never come out.

Extraction of Lac

- The largest yield of lac and dye are obtained by harvesting the infested twigs while females are still living.
- The harvesting is done twice a year in June and November.
- The encrusted twigs are pruned and lac scrapped from them.
- This is known as **stick lac.** It is grounded and sieved.
- The resulting granular lac is called seed lac, and the fine particles the dust lac.
- The seed lac is washed, melted, spread out in a thin layer, and dried thus forming the shellac of commerce.
- The dust lac is used for making toys, shellac is used in the preparation of varnishes, paints and polishes, in making gramophone records, buttons and pots, and in filling ornaments like bangles and bracelets.

- It is also used as insulating material.
- Lac insects are highly useful to man.
- They yield lac, the utility of which is discussed above.
- Besides this, a red dye is obtained from the body of female insects.
- The dye is used by women to colour the soles of their feet, skin and wool.
- Lac insects are also used for curing lung and stomach troubles.

Damages Caused to Lac Crop

1. Lac crop is reported to be damaged by squirrels, rats, and monkeys.
2. Certain insects also attack lac insects.
3. **Parasites:** Eight species of chalcidoids live as parasites in the body of lac insects. These deposit their eggs into the body of insects through their anal opening.
4. **Predators:** Eublemma amabilis and Holcocerea pulverea are the two lepidopteran predators that damage about 35% of the lac cells. Their females lay eggs on or near the encrustation. The larvae that hatch out bore through the lac deposit and feed on lac insects.

Precautions to be taken during Lac Culture

1. Lac intended to be used as brood should be cut at or near the swarming period, never more than one week before.
2. Lac to be used as brood must be healthy and resistant to the parasite and predator's attack.
3. Lac used as brood should be removed after a maximum period of 3 weeks from the date of swarming.
4. All brood lac after use and the lac cut from the tree should be scrapped from the sticks to destroy larvae and pupae of predators of parasites.
5. Lac should not be stored after cutting. It should be treated as soon as possible.
6. Fumigation and water immersion immediately after cutting are also helpful in the disinfection of lac insects.

Economic Importance of Lac or Shellac

- Lac is used in the preparation of sealing wax (shellac), paints, varnish, in the manufacture of photographic materials, electrical goods.
- Lac is also used in the preparation of bracelets, buttons, toys and in filling hollow gold ornaments.
- Lac is also utilized in confectionary trade and in artificial leather and pottery.
- Gramophone industry used to consume 30-40% of the annual production in the preparation of records.

Cultivation of Lac in India

- India has monopoly in the production of lac.
- It is about 75% of the world's total output.
- Approximately 40 lakh ponds of lac is produced. Bihar, M.P. and West Bengal are major lac producing states in India.
- Thailand is major competitor of India as it shares 25% of the total export.
- India exports about 1,80,000 kg of lac.
- The use of lac is being gradually replaced by plastic.

1. Economic Importance of Lac Insects

- Lac insect produces resinous secretion to form a protective covering around its body.
- The secretion on coming in contact with air hardens and is used for preparing commercial shellac or lac.

2. Economic Importance of Termites

- Termites feed on dead wood and form tunnels.
- These cause colossal damage to wood in all its various forms like wooden building structures, wooden logs, wooden furniture, wooden articles containing cellulose like paper.
- These may also burrow in forest trees and agriculture crop.
- Termites cause damage to fruit trees like mangoes, apple, coconut and cultivated crops of sugarcane, cotton, potato, wheat, tea and coffee.
- Sometimes they cause damage to buildings and railway yards by making tunnels below there.