

XXIV. *Natural History of the Insect which produces the Gum Lacca.* By Mr. James Kerr, of Patna; communicated by Sir Joseph Banks, P. R. S.

Read May 24, 1781.

C O C C U S L A C C A.

Head and trunk.

THE head and trunk form one uniform, oval, compressed, red body, of the shape and magnitude of a very small louse, consisting of twelve transverse rings. The back is carinate; the belly flat; the antennæ half the length of the body, filiform, truncated, and diverging, sending off two, often three, delicate, diverging hairs, longer than the antennæ. The mouth and eyes could not be seen with the naked eye.

Tail.

The tail is a little white point, sending off two horizontal hairs as long as the body.

Feet.

It has three pair of limbs, half the length of the insect.

I have often observed the birth of these insects, but never could see any with wings; nor could I find any distinction of sexes, nor observe their connubial rites: nature and analogy seem to point out a deficiency in my observations, possibly
 I owing

owing to the minuteness of the object, and want of proper glasses.

Change.

This insect is described in that state in which it falls forth from the womb of the parent in the months of November and December. They traverse the branches of the trees upon which they were produced for some time, and then fix themselves upon the succulent extremities of the young branches. By the middle of January they are all fixed in their proper situations, they appear as plump as before, but shew no other marks of life. The limbs, antennæ, and setæ of the tail are no longer to be seen. Around their edges they are environed with a spissid subpellucid liquid, which seems to glue them to the branch: it is the gradual accumulation of this liquid, which forms a compleat cell for each insect, and is what is called Gum Lacca. About the middle of March the cells are completely formed, and the insect is in appearance an oval, smooth, red bag, without life, about the size of a small cucanical insect, emarginated at the obtuse end, full of a beautiful red liquid. In October and November we find about twenty or thirty oval eggs, or rather young grubs, within the red fluid of the mother. When this fluid is all expended, the young insects pierce a hole through the back of their mother, and walk off one by one, leaving their exuvizæ behind, which is that white membranous substance found in the empty cells of the Stick Lac.

Mr. KERR's History of the

The insects are the inhabitants of four trees.

1. *Ficus Religiosa*, LINNÆI. In Hindostan, Pipul. Banyan Tree.
2. *Ficus Indica*, LINNÆI. In Hindostan, Bhur. Banyan Tree.
3. *Plaso Hortus Malabarici*. By the natives, Prafo.
4. *Rhamnus Jujuba*, LINNÆI. In Hindostanick, Beyr.

The insects generally fix themselves so close together, and in such numbers, that I imagine only one in six can have room to complet her cell: the others die, and are eat up by various insects. The extreme branches appear as if they were covered with a red dust, and their sap is so much exhausted, that they wither and produce no fruit, the leaves drop off, or turn to a dirty black colour. These insects are transplanted by birds: if they perch upon these branches, they must carry off a number of the insects upon their feet to the next tree they rest upon. It is worth observing, that these fig trees when wounded drop a milky juice, which instantly coagulates into a viscid ropey substance, which, hardened in the open air, is similar to the cell of the *Coccus Lacca*. The natives boil this milk with oils into a bird-lime, which will catch peacocks or the largest birds.

A red medicinal gum is procured by incision from the Plaso Tree, so similar to the Gum Lacca that it may readily be taken for the same substance.

substance. Hence it is probable, that those insects have little trouble in animalizing the sap of these trees in the formation of their cells. The Gum Lacca is rarely seen upon the *Rhamnus Jujuba*; and it is inferior to what is found upon the other trees. The Gum Lacca of this country is principally found upon the uncultivated mountains on both sides the Ganges, where bountiful nature has produced it in such abundance, that was the consumption ten times greater the markets might be supplied by this minute insect. The only trouble in procuring the Lac is in breaking down the branches, and carrying them to market. The present price in Dacca is about twelve shillings the hundred pounds weight, although it is brought from the distant country of Assam. The best Lac is of a deep red colour. If it is pale, and pierced at top, the value diminishes, because the insects have left their cells, and consequently they can be of no use as a dye or colour, but probably they are better for varnishes.

This insect and its cell has gone under the various names of Gum Lacca, Lack, Loc Tree. In Bengal, La; and by the English it is distinguished into four kinds.

1st. Stick Lac, which is the natural state from which all the others are formed.

2. Seed Lac is the cells separated from the sticks.

3d. Lump

3d. Lump Lac is Seed Lac liquified by fire, and formed into cakes.

4th. Shell lac is the cells liquified, strained, and formed into thin transparent laminæ in the following manner. Separate the cells from the branches, break them into small pieces, throw them into a tub of water for one day, wash off the red water and dry the cells, and with them fill a cylindrical tube of cotton cloth, two feet long, and one or two inches in diameter; tie both ends, turn the bag above a charcoal fire; as the Lac liquifies twist the bag, and when a sufficient quantity has transfused the pores of the cloth, lay it upon a smooth junk of the Plantain tree (*Musa Paradisiaca*, LINNÆI), and with a strip of the Plantain leaf draw it into a thin lamella; take it off while flexible, for in a minute it will be hard and brittle. The value of Shell Lac is according to its transparency.

Use to the natives.

This is one of the most useful insects yet discovered.

Ornaments for the ladies.

The natives consume a great quantity of Shell Lac in making ornamental rings, painted and gilded in various tastes, to decorate the arms of the ladies; and it is formed into beads, spiral and linked chains for necklaces, and other female ornaments.

Sealing wax.

Take a stick, and heat one end of it upon a charcoal fire; put upon it a few leaves of the Shell Lac softened above the fire; keep alternately heating and adding more Shell Lac, until
you

you have got a mass of three or four pounds of liquified Shell Lac upon the end of your stick*. Knead this upon a wetted board with three ounces of levigated cinnabar, form it into cylindrical pieces; and, to give them a polish, rub them while hot with a cotton cloth.

Japanning. Take a lump of Shell Lac, prepared in the manner of sealing-wax, with whatever colour you please, fix it upon the end of a stick, heat the polished wood over a charcoal fire, and rub it over with the half-melted Lac, and polish, by rubbing it even with a piece of folded Plantain leaf held in the hand; heating the lacquer, and adding more Lac as occasion requires. Their figures are formed by Lac, charged with various colours in the same manner.

Varnish. In ornamenting their images and religious houses, &c. they make use of very thin beat lead, which they cover with various varnishes, made of Lac charged with colours. The preparation of them is kept a secret. The leaf of lead is laid upon a smooth iron heated by fire below, while they spread the varnish upon it.

Grindstones. Take of river sand three parts, of Seed Lac washed one part, mix them over the fire in a pot, and form the mass into the shape of a grindstone, having a square hole in the center, fix it on an axis with liquified Lac, heat the stone moderately, and by turning the axis it may easily be formed into an exact orbicular shape. Polish-

* In this manner Lump Lac is formed from Seed Lac.

ing grindstones are made only of such sand as will pass easily through fine muslin, in the proportion of two parts sand to one of Lac. This sand is found at Ragimaul. It is composed of small angular crystalline particles, tinged red with iron, two parts to one of black magnetic sand.

The stone-cutters, instead of sand, use the powder of a very hard granite called Corune.

These grindstones cut very fast. When they want to increase their power they throw sand upon them, or let them occasionally touch the edge of a vitrified brick. The same composition is formed upon sticks, for cutting stones, shells, &c. by the hand.

Painting.

Take one gallon of the red liquid from the first washing for Shell Lac, strain it through a cloth, and let it boil for a short time, then add half an ounce of soap earth (fossil alkali); boil an hour more, and add three ounces of powdered load (bark of a tree); boil a short time, let it stand all night, and strain next day. Evaporate three quarts of milk, without cream, to two quarts, upon a slow fire, curdle it with four milk, and let it stand for a day or two; then mix it with the red liquid above mentioned; strain them through a cloth, add to the mixture one ounce and an half of allum, and the juice of eight or ten lemons: mix the whole, and throw it into a cloth-bag strainer. The blood of the insect forms a coagulum with the caseous part of the milk, and remains in the bag, while a limpid acid
water

water drains from it. The coagulum is dried in the shade, and is used as a red colour in painting and colouring.

Dying.

Take one gallon of the red liquid prepared as before without milk, to which add three ounces of allum. Boil three or four ounces of tamarinds in a gallon of water, and strain the liquor. Mix equal parts of the red liquid and tamarind water over a brisk fire. In this mixture dip and wring the silk alternately until it has received a proper quantity of the dye. To increase the colour, increase the proportion of the red liquid, and let the silk boil a few minutes in the mixture. To make the silk hold the colour, they boil a handful of the bark called Load in water, strain the decoction, and add cold water to it; dip the dried silk into this liquor several times, and then dry it. Cotton cloths are dyed in this manner; but the dye is not so lasting as in silk.

Spanish wool. The Lac colour is preserved by the natives upon flakes of cotton dipped repeatedly into a strong solution of the Lac Insect in water, and then dried.

Use to the Europeans. See European authors.

Explanation of the figures.

- a* The Coccus Lacca at its birth, } natural size.
b Ditto, big with young, }
γ The embryo before birth inclosed in its membrane, } magni-
δ The Coccus, with two hairs from each antenna, } fied.
ε Ditto, with three hairs from each antenna, }

