

Original and Selected Papers.

LAO DYE.

BY E. D. SHUTTLEWORTH.

Although all are familiar with the purplish powder sold in our shops as lac dye, but few are acquainted with its history and application. It is generally supposed to bear some relation to shellac, and to be used as a red dye in a manner not generally understood by those not actually engaged in the operations of the dye-house. This seeming want of information is our apology for introducing a subject upon which we have little to offer which can, with a due sense of propriety, be termed original.

The substances known in commerce as *seed lac* and *shellac*, bear so close a relation to lac dye, that in giving a history of one, we must necessarily include that of them all. They are all derived from a common source—a substance known as *stick lac*, which we have never seen in this country, but which is sometimes found in other markets. We are not acquainted with any authority which describes with accuracy the manner in which stick lac is produced. By some it is said to be an exudation from certain trees; others maintain that it is secreted by an insect. This point we cannot determine, but, from the nature of the trees upon which it is found, we incline to the opinion that the resinous portion is of vegetable origin, while the coloring matter is certainly the production of the animal kingdom.

Stick lac is found as an incrustation upon the branches of certain trees—*Ficus Indica*, the banyan tree, *F. religiosa*, *Croton Lacciferum*, *Butea frondosa*, and *Rhamnus jujuba*, growing, principally in the eastern part of India, and, more particularly, in the districts of Bengal, Assam, Siam, and Pegu; a supply is also said to be obtained from the Malabar coast. The incrustation varies from a line to a quarter of an inch in thickness, but, occasionally it takes the form of a knotty excrescence, like that seen on plum trees, in this country. At first sight the lac appears to be devoid of regular structure, but closer investigation reveals the existence of numbers of small pores, or cells, which are as regularly distributed as in the honeycomb, although arranged somewhat differently. The incrustation of lac is, in fact, a structure of a similar nature with that formed by the bee, and answers a similar purpose, being used for the storing of provision, as well as for the protection of an infant colony.

The lac insect, *coccus lacca* or *c. fens*, is one of the genus to which the cochineal and Kermes insects belong. It is described by

Ure as being about the size of a louse, red, round, flat, with twelve abdominal circles, and six claws. The male insect is about twice this size, and is providently furnished with wings, as the fecundation of five thousand females depends upon his efforts. The female, previous to depositing her eggs, attaches herself to the twig on which the young brood is to be brought forth, and, by puncturing the bark, surrounds herself with the milky juice which exudes therefrom. This secretion is to serve the double purpose of providing nourishment and shelter for the young, which, in due time, issue from the eggs under the mother, and take possession of the cells provided for their reception, where, previous to full development, they elaborate the coloring matter which constitutes the tinctorial principle of lac dye. The usual number of the brood is between twenty and thirty, but many colonies of these exist upon the same branch; indeed, the name *laksha*, which signifies one hundred thousand, and is applied by the Hindoos to the habitations of these insects, would lead us to infer that the progeny is numerous.

The incrustated twigs, which constitute the stick lac of commerce, are collected by the natives before the brood has made its escape, as, at this time, the coloring matter is present in greatest quantity, probably from the presence of the bodies of the insects. The twigs are finally dried in the sun, and are then ready for exportation, or further manipulation, with a view to [the purification of the resin, and the separation of the coloring matter. The following analysis, made by Dr. John, will give an idea of the composition of this crude lac:

An odorus common Resin.....	80
Resin insoluble in ether.....	20
Coloring matter, analagous to cochineal.....	4.50
Bitter balsamic matter.....	3.00
Pure yellow extract.....	4.50
Laccic acid.....	4.75
Fatty matter, like wax.....	3.00
Skin of the insects and coloring matter.....	2.50
Salts.....	1.25
Earthis.....	0.75
Loss.....	4.75
	120.00

The extraction of the coloring matter is rudely effected by removing the stems and other woody matter from stick lac, coarsely pulverizing the resin, and subjecting it to the action of water, by which the greater portion of the coloring matter is dissolved. The watery solution is evaporated nearly to dryness, and the pulp is formed into cakes of about two inches square, and half an inch thick, which are, usually, stamped with the

initials of the manufacturer's name, and, finally, dried in the sun. These cakes constitute lac dye as it comes into the hands of the drug grinders.

Before proceeding further, it may be necessary to mention that the washed lac of the previous operation is dried, and then takes the form familiarly known as *seed lac*. If a further purification is required, the seed lac is placed in coarse bags of about four feet long, and six inches in circumference; one of these bags is held by two men, who suspend it, for some short time, over a charcoal fire, until the lac is liquid enough to pass through the pores of the canvas. The bag is then twisted by the men at each end, and dragged over the smooth surface of a plain-tain tree, which causes the resin to assume the form of the thin plates known as *shellac*.

To return to lac dye we have said that the processes used for the extraction of the coloring matter were crude, and capable of improvement. This is obvious from an examination of the cakes, which rarely contain half their weight of coloring matter. We are not aware of any exact analysis having been published, but Tomlinson gives the composition as coloring matter 50, resin 25, and alumina, sulphate of lime, carbonate of lime and sand, 22 per cent. An attempt was made by Mr. Stephens, a surgeon of India, to precipitate the coloring matter by means of alum, and it is said that the lake produced, of which a quantity was forwarded to England, produced very fine colors.

We are not acquainted with any method for the estimation of lac dye, except the trial of a weighed sample by means of the color produced on a given weight of wool, and its comparison with the results of previous experiments. This is the method we always employ, and [in the absence of one more exact, it answers a good purpose. Another plan which lately suggested itself for the determination of the coloring matter, consists in the treatment of, say, 100 grains of the dye, in very fine powder, with hydrochloric acid, followed by water, until all soluble matters are dissolved. The residue, when dried, should not exceed 50 grains. It will be necessary to have the dye in fine powder, from the fact that the contained resinous matter might shield the particles of coloring matter from the action of the acid. This hint might prove useful to drug grinders, who almost invariably grind too coarse, making an article difficult of solution.

The coloring principle of lac is but slightly soluble in water. When used for dyeing it is always necessary to employ an acid for solution. Various acids and mixtures have been tried, but hydrochloric has been found to give the best results. Three parts of hydrochloric acid sp. gr. 1.15 diluted with