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## KASHMIR LAC WITH ITS THREE FORMS OF YELLOW COLOURED INSECTS AND ARIZONA LAC

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Lac insects in India are mostly red coloured but up north in Kashmir the species is yellow coloured. Lac would be *Laksha* in Sanskrit and the word occurs first in *Atharvaveda* Book V, hymn 5, to be dated 1500 B.C. Scientifically this Kashmir lac would be *Kerria fici*. The Aryans at that time were pastoral nomads. They came in contact with the Chinese who used an insect-wax as a styptic drug. The theory was that if wax is adhesive it will also join parts of the flesh torn apart in a wound and can even join fractured bones. This styptic effect would also reveal itself if the wax is taken orally. Scientifically this Chinese was belonged to the insect *Ericerus pela*. This was the crude material. It was treated with boiling water when the insect debris and plant particles were decanted and rejected leaving purified wax as sediment. This wax was the form in which the drug was used. The etymology of the word, lae, has been discussed and shown to be of Chinese origin.

*Key words:* Lac insect, Arizona lac, Kashmir lac.

The word *Laksha*, signifying lac, occurs for the first time in *Atharvaveda* to be dated c. 1500 B.C. There hymn No. 5 in Book V is dedicated to *Laksha*. Lac is the crude expression for the lac insect and its products which are difficult to separate. Within the body of the insect there is a dye, red in many species but yellow in the case of Kashmir lac, scientifically called, *Kerria fici*. Its skin being thin, the insect secretes a layer of resin which is the lac proper. It protects the insect and in effect functions as its cell or house. Lac grows as a parasite on a few host plants from which it is collected and scraped free from vegetable debris. Lac, as still adhering to a twig, be it dry, is called the stick-lac. The scraped lac contains all of what the insect has produced, its body, its colour and its resin or lac proper. The favourite tree of the Kashmir lac insect has been *Khair* (*Acacia catechu*) but even *Butea frondosa* and few other have been mentioned in *Atharvaveda*.

It is rather interesting to know how the Aryans, who had settled up north, came to exploit it. The Aryans at the time were pastoral nomads who however had contacts with the Chinese. An instance of this contact is proved by the fact that the word for rice in Sanskrit appears first in *Atharvaveda* and I (1950) have shown that all words for rice in Sanskrit, Tamil, Telugu, Arabic and Greek are loan-words from Chinese. Then like the word for rice, the word for lac is also Chinese. In China there is a wax insect, *Ericerus pela*. There has been the theory that like cures like. Wax is an adhesive. On this account the Chinese used pelah-wax to treat wounds joining torn skins with each

other and even fractured bones. They also used this wax orally believing it would finally reveal its adhesive effect wherever it was required. Now lac is also a typical adhesive comparable with wax. In fact if originally there was sealing-wax of pure bees wax later on sealing wax mainly contained lac-resin. Here wax and lac were treated as allied if not as identical substances. The Aryans, who knew the lac, here called the Kashmir lac, found it to be the equivalent of the Chinese Pelah-Wax. Now the Chinese did not use the crude Pelah-Wax as such. It was treated with boiling water and the floating insect-debris and vegetable particles were decanted and discarded while the sediment, as purified wax, was recovered as the real drug to be used, was called La-Cha, sediment-lac, La = Wax and Cha = Sediment. Thus the Chinese name Lacha, for a styptic drug, was passed on to the Aryans for lac when it would also serve as such. Evidence supporting such transference of Chinese name to a product found in Kashmir is that if the Chinese drug was called La-Cha, in the Kashmir language, lac is still called Lach. Now La-Cha was Sanskritized as La-Ksha. There are parallel cases where Lakshman = Lachman and Lakshmi = Lachmi. Phonetically considered, *Laksha* would originally be La-Cha, the Chinese wax as styptic drug. It means the syllable Cha = Kasha. The word *Laksha* appears in *Atharvaveda*, Book V, hymn 5. The hymn has been translated first by Griffith (1895), next by Dave (1950) and finally by Vishva Bandhu (1971). All these translators seem to have known only the common species of lac which all contain a red dye. In *Atharvaveda* *Laksha* has two syno-



nym, *Silachi* and *Arundhati*. Griffith had interpreted the word Laksha as a vegetable product. Dave was the first to explain it as lac proper, the produce of an insect. In support Dave emphasized the word *Silachi* as signifying red-arsenic. Accordingly Lac taken to be red was also called *Silachi*. Vishva Bandhu however corrected Dave and reinterpreted *Silachi* as “reddish brown”. Now the Kashmir lac shows insects which are mostly yellow coloured but there are also red insects. Stick-lac, with red insects within, would appear “reddish brown”, which is the real significance of *Silachi* according to Vishva Bandhu. Dave is entirely mistaken when he implies that lac in Atharvaveda is red like red arsenic.

There are nine stanzas in the hymn on Laksha and stanzas 6 and 7 begin with lac as “gold-coloured”. The hymn has the word *Arundhati* as a synonym of lac. And this word means “wound-binder” and we have explained that lac came into use, like the Chinese wax, as a styptic drug. Now all the three translations of the hymn by Griffith, Dave and Vishva Bandhu, with their critical appreciation, have been offered by me in 1980. What was really required still was to offer coloured illustrations of the full grown female cell, the wingless male and the young larva just born. This is being undertaken here for the first time to show the quality “gold-coloured” as mentioned in Atharvaveda. Incidentally the cell of the full grown yellow female insect was illustrated before by me in 1929. Nevertheless Fig. 1, here shows even better the “gold-coloured” cell of full grown female lac insect. The insect body within is like a round pill with three projections at the posterior or upper end and a fourth on the anterior. The anterior projection consists of mouth parts and cannot be depicted in Fig. 1. The anal aperture is borne on a tubercle which is surrounded by eight setae used to eject drops of honey-dew, a feature common to most scale insects or coccids to which the lac insect also belongs. The anal projection, with some setae seen side ways, are found on the top of the cell at its extreme left in Fig. 1. In front is a fish like object sufficiently segmented. This is the relic of the first stage crawling larva which secretes a transparent shield of wax as its protection. This remains incorporated even in the full grown female cell. In front of each of the fish shaped object there are two craters or flat holes. The crawling larva has spiracles on each side of the body segment (No. 2). Along with the spiracle there is a chitinous structure. In the adult female the chitinous – structure is elongated into a tubercle and at its bottom lies the spiracle, The long tubercle appears on the surface of the lac cell and its top resembles a crater. On the top of anal tubercle there are tissue cells which secrete soft wax fillaments. These break

easily and dust the surface of the cell so that any honey-dew will not adhere to the lac cell. This results when the spiracular tubercles appear on the top of the lac cell and then secrete wax filaments. This is self-evident in Fig. 1. By the above device saprophytic fungi will not grow on the surface of lac cell for there would be no honey dew. The actual secretion of lac resin by Kashmir lac is pale, like lemon yellow, and is seen as two projections adhering outside the main lac cell. The insect body has a deep gold – coloured fluid, chemically erythrolaccin. This accounts for the gold – coloured appearance of the female cell (Fig. 1.) Scale is provided to indicate the size of the cell.

From such a mother cell the young ones, just born, would have a pale yellow colour which is illustrated in Fig. 2. The scale is given to indicate the size. The anal ring of the larva has 6 setae and nearby two long anal hairs. They both are illustrated in Fig. 2. The second body segment shows, on each side, soft wax. This is associated with the spiracle or breathing opening of the insect body. The dorsal surface of the larval body is covered with wax. As it grows, a regular wax-shield would be formed to protect the delicate insect of the young larva. The letter “C” is the initial of Mr. Chilwaraj, the artist, who kindly drew the picture using camera lucida. All species of lac insects have winged males and also wingless. In the lac I imported from Kashmir and



Fig. 1. Adult female cell of *Kerria fici*, or Kashmir lac. It is gold-coloured. The anal end has 8 setae to expel honey-dew. In front there is a relic of wax shield covering of the crawling larva. The flat holes are producing tufts of soft wax filaments; beneath are the spiracles. Around the cell are at two places with pure exudation of lac resin almost free of pigment.



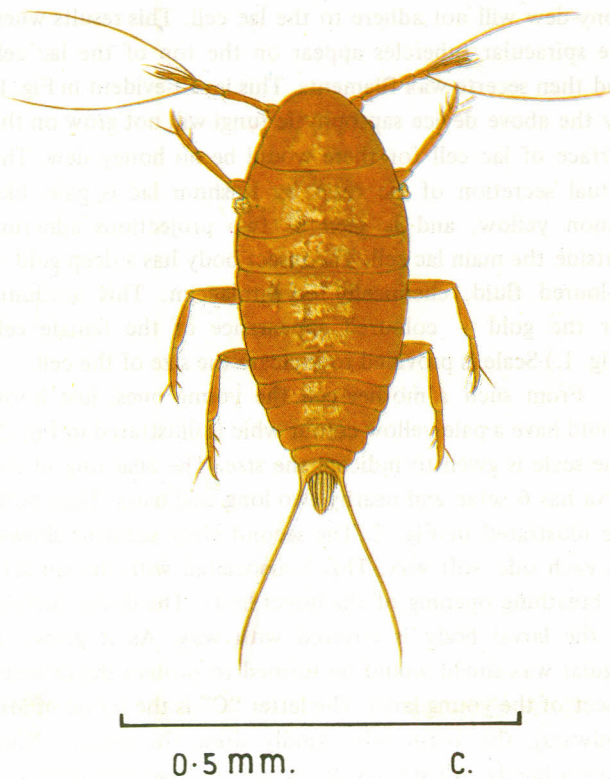


Fig. 2. The crawling larva of a gold coloured mother lac insect.

also cultivated it I got only wingless males as illustrated in Fig. 3. The dark long stripe is the malpighian tube shining through the skin. Other details are obvious. To show the wingless male more clearly Fig. 4, was drawn as characterizing the species *Kerria fici*, the Kashmir lac insect. It differs from the winglers male of *Kerria communis*, growing in Mysore on *Ficus mysorensia*. Usually, among coccids, only females are studied and differentiated. Here the males of *Kerria fici* (Fig. 4) clearly differs morphologically from that of *Kerria communis* (Fig. 5).

Drugs have always been valued more than dyestuffs. Thus lac in *Atharvaveda* mentioned as a styptic drug has had a lasting effect. Lac- dye does not take to cotton or flax and without proper mordant does not dye wool. In ancient times lac, as dye, had little use, so that its original importance as a styptic drug continued to remain up to date. In ignorance of *Atharvaveda* lac being yellow or better stated golden coloured it has also been looked upon as source of a red-dye and thereby importance was ascribed to it as source of a red dye. There was again the theory, namely, that the like makes the like, so that red-dye can increase red blood. Thite (1982; 141) writes "*Laksha*, Lac, is of red colour and its use in the case of wounded person, blood being red, may be said to be based on sym-

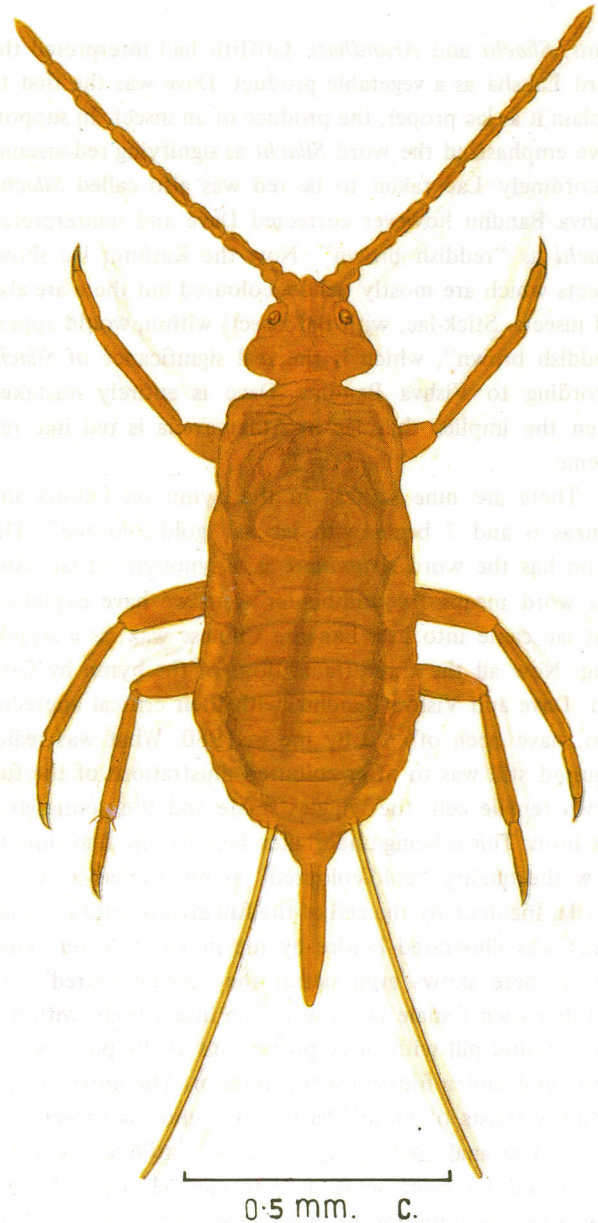
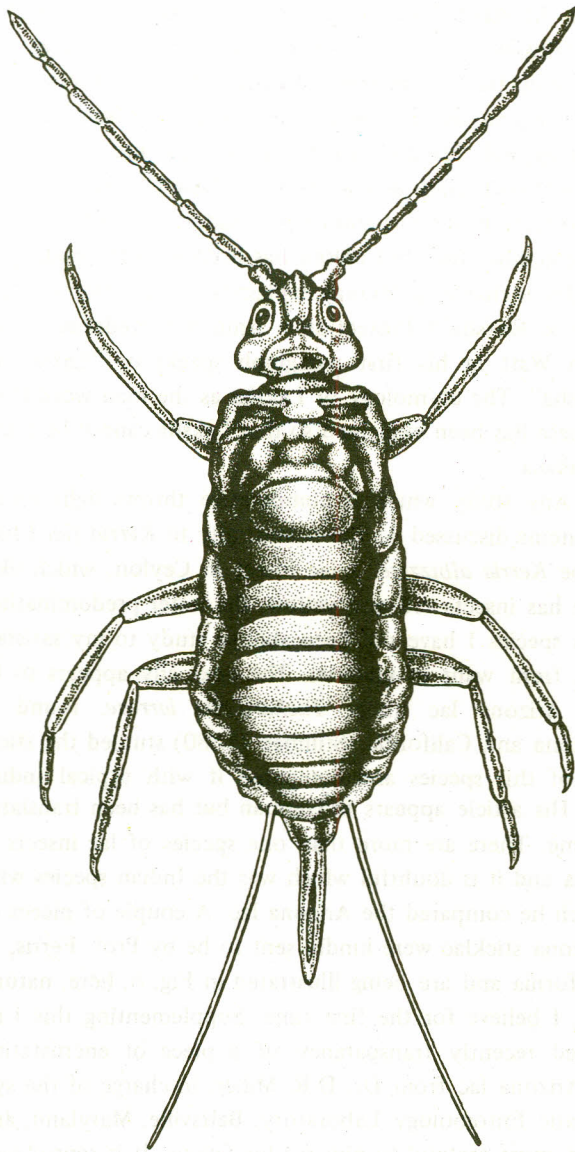


Fig. 3. Wingless male of *Kerria fici*. The brownish streak is probably malpighian tube seen through the skin.

pathetic magic." I should prefer to say based on the theory like-makes-like.

Vadya Bhagwan Dash (1978;139) writes, "lac is the best drug for healing fractures of bones" which harmonizes with what *Atharvaveda* maintains. Altogether it appears both resins were used red as adhesive or as styptic. Lac was used for both reasons as adhesive or as styptic and later as a red dye to increase blood supply. As silk fabric became more popular, the red lac dye underwent a parallel career. Sir George Watt (1903; 1053) offers much information on the history of lac as dyestuff. He writes "Lac yields two products, a dye and a resin. At first these were confused but ultimately recognized. In the *Periplus*, written about 80





0.5mm. C.

Fig. 4. Wingless male of *K. fici* in pen and ink drawing to show its characteristic features.

A.D., Lakkas Chromatinos, or lac dye, is mentioned as conveyed from India to Aduli on the African coast of the Red Sea. Aelian 250 A.D. describes lac as produced in India from insects and employed as a red dye." There are more references to lac by travellers from 1510 onwards which being relatively recent do not interest us here. That lac was imported in the West, about 80 A.D., is worth noticing. In other articles on alchemy I have maintained that Pre-Islamic sailors brought Chinese silk to the Alexandrian market. The history of such trade, before Christ, is little known. I am therefore able to quote from a 'News Letter' published, in

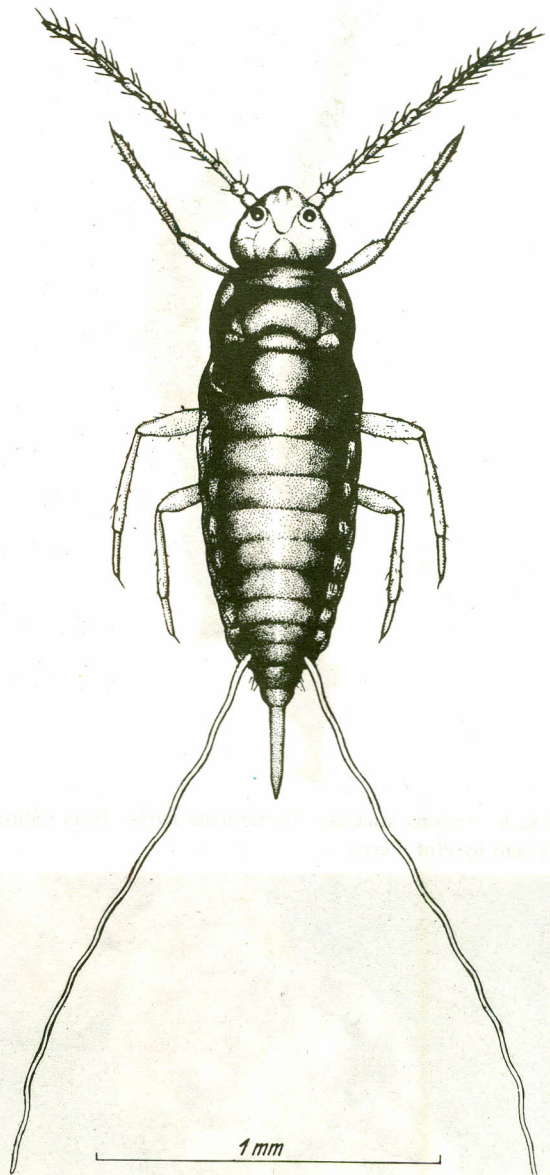


Fig. 5. Wingless male of *K. Communis* from Mysore to show its difference from the male of *K. fici* (Fig. 4).

1986, by the enterprising publishing house, Messrs Motilal Banarsidas of Delhi:

"It appears that about 3rd cent BC, there was a part in Tamil Nadu the southern part of India. The port belonged to the ancient Pandya Kingdom and was situated at the mouth of the Vaigai River at Alangankulam in Ramnad District. Dr. R. Nagaswamy director of archeology considers the site was near Rameswaram. It had extensive contact with Imperial Rome. Roman coins have — been found during excavations and altogether it seems contact with — Imperial Rome was established in the first cent. B.C.". Finally there is reference to lac in "Stockholm Papyrus "composed at Alexandria and dated C. 300 A.D.





Fig. 6. Arizona stick-lac, *Tachardiella larreae*, from California. Kindly sent by Prof. Ferris.

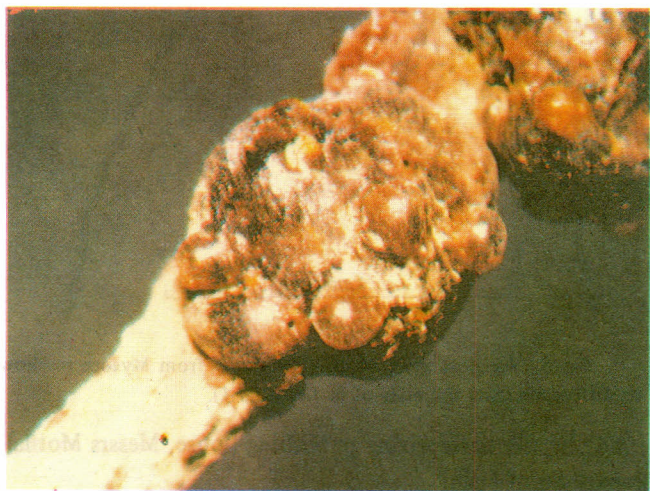


Fig. 7. *Tachardiella larreae* lac-encrustation, enlarged from a transparency kindly sent by Dr. D.R. Miller, Entomological Laboratory, Beltsville, Md. (USA).

Stillman (1924; 155) writes as follows: "In the Stockholm Papyrus it is stated that those that do not give fast colours are of no value. Such are the coccus from Galatia, the colour from Achaia called Lacca". It may be mentioned that lac dye takes to wool which has been mordanted properly but practically without mordant silk can be dyed with lac. Apparently lac dye was used in Rome for dyeing wool without any mordant, hence a critical reference

to it. As mentioned above with the popularity of silk the exploitation of lac dye became a reality. The etymologists now tried to interpret Laksha as name. Assuming it to be a real Sanskrit word they equated Raksha-Laksha, it being well known that R can mutate into L. Now a Sanskrit dictionary as that of V.V. Bhide translates Raksha as Protection, then as amulet but also as lac. Here we have to remember that red colour has been used to produce as amulet or charm which may explain the connection of ideas such as Raksha = Protection = Amulet = Redness = Lac. Even Watt in his first paragraph speaks of "Laksha or Raksha". The etymology of Laksha as the loan word from Chinese has been explained so that Laksha cannot be taken to raksha.

Any study which is comparative throws light on all the items discussed. As the nearest ally to *Kerria fici* I find to be *Kerria albizziae*, a lac insect in Ceylon, which likewise has insects red and yellow, the latter predominating. This species I have not been able to study to my satisfaction from want of material. The next ally appears to be the Arizona lac insect *Tachardiella larreae*, found in Arizona and California. Stillman (1880) studied the stick-lac of this species and compared it with typical Indian lac. His article appears in German but has been translated by me. There are more than one species of lac insects in India and it is doubtful which was the Indian species with which he compared the Arizona lac. A couple of pieces of Arizona sticklac were kindly sent to be by Prof. Ferris, of California and are being illustrated in Fig. 6, here, natural size, I believe for the first time. Supplementing this I received recently transparency of a piece of encrustation of Arizona lac from Dr. D.R. Miller, in charge of the systematic Entomology Laboratory, Beltsville, Maryland, and I am most grateful to him for his favour. It is reproduced here somewhat enlarged, as Fig. 7. According to Stillman, the resin or lac proper is yellow but the insects are reddish, the colour being a beautiful red dyestuff. He also observed that Arizona lac, when burnt, "possessed a peculiar sweet smell." Now the lac mentioned in *Atharvaveda* A.V. 5. 5.7, is also stated to be "odorous", These short notes should enable others to make a more detailed comparative study which the subject deserves.

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