

# A study of dermatitis in the lacquerware industry

PREYA KULLAVANIJAYA AND SUWIRAKORN OPHASWONGSE

Institute of Dermatology, 420/7 Rajavithi Road, Bangkok, Thailand

Contact dermatitis from lacquer has been documented. The causative agent is a resin from a lacquer tree that can induce either irritation or sensitization. Thai and Japanese lacquer trees are 2 distinct species but are both members of the Anacardiaceae family. We report 3 cases of contact dermatitis from Thai lacquer resin. Observation and study of the lacquer plantation and working process at the factory were made to elucidate the aetiology of the dermatitis.

**Key words:** lacquer resin; irritant contact dermatitis; allergic contact dermatitis; occupational; Anacardiaceae; urushiol; *Melanorrhoea usitata*; *Toxicodendron*. © Munksgaard, 1997.

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Lacquerware is a traditional handicraft that is famous in Thailand as well as in Japan, China and Vietnam. Examples of lacquerware include souvenirs, jewelry boxes, trays, vases, picture frames, furniture and temple decorations. The beauty of lacquerware has been further developed by applying decorative materials such as mother of pearl, egg shell and gold paint.

The basic structure of lacquerware is a frame, made from woven bamboo, wood, plastic or paper, coated with a lacquer resin. Lacquer-coated articles can last as long as 1000 years (1), as they are so heat and chemical resistant. Dermatitis in the lacquer industry is well-known. There have been many reports of dermatitis from urushiol, found in Japanese lacquer.

A study of occupational dermatitis in the Thai lacquerware industry was made. We report 3 cases of contact dermatitis from Thai lacquer resin.

## Case Reports

### Case no. 1

A 25-year-old woman developed dermatitis on her left wrist from wearing a bangle made of wood coated with lacquer, decorated with an oil painting. Patch testing with scraped particles from her bangle was positive.

### Case no. 2

A 16-year-old craftswoman worked at a Buddha statue factory; her job was painting the statue with lacquer before a gold finish. She developed eczema

on her hands which corresponded to areas in contact with lacquer.

### Case no. 3

A 14-year-old boy developed swelling and dermatitis on his face and exposed areas after using firewood for cooking during his boy-scout training. Logs for firewood had been cut from a tree nearby, which was later identified as a lacquer tree.

Patch tests with 10% lacquer in pet. in all 3 cases gave positive reactions; while 20 controls were negative.

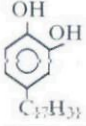
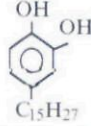
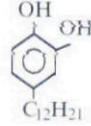
## Factory Visits

In Thailand, the lacquerware industry is localized in the Northern part, mainly Cheingmai province, an old capital and a famously beautiful city. A lacquer factory is not very big. It is mainly run by a family of 20-30 craftsmen. We visited 3 factories. After interviewing the owners and craftsmen, we found that contact dermatitis from lacquer was common. About 80% of the craftsmen developed dermatitis on their hands and uncovered areas at the beginning of their work, but spontaneous improvement occurred within a month. There were a few, about 5%, whose condition did not improve and they had to leave their job due to severe reactions. Patch tests were performed in 7 craftsmen using a 10% dilution of lacquer in pet. The tests showed 1 allergic reaction, 3 irritant reactions and 3 negative reactions. The person with an allergic reaction gave a history of dermatitis on her hands

Table 1. The Anacardiaceae family and cross-reacting plants (3)

|                             |                                                                                        |
|-----------------------------|----------------------------------------------------------------------------------------|
| Genus: <i>Toxicodendron</i> | Related and cross-reacting cultivars<br>African poison ivy – <i>Smodingium argutum</i> |
| poison ivy                  |                                                                                        |
| <i>T. radicans</i>          | Cashew: <i>Anacardium occidentale</i>                                                  |
| <i>T. rydbergii</i>         | Ginkgo: <i>Ginkgo biloba</i><br>Grevillea, e.g., <i>G. robusta</i> Cunn                |
| poison oak                  |                                                                                        |
| <i>T. diversilobum</i>      | Indian marking nut: <i>Semecarpus anacardium</i>                                       |
| <i>T. toxicarium</i>        | Japanese lacquer: <i>Rhus verniciflua</i>                                              |
| poison sumac                |                                                                                        |
| <i>T. vernix</i>            | Mango: <i>Magnifera indica</i>                                                         |

Table 2. Chemical formula of lacquer resin

| Lacquer resin      | Thai                                                                              | Japanese                                                                          | Vietnamese                                                                        |
|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                    | thitsiol                                                                          | urushiol                                                                          | laccol                                                                            |
| chemical formula   | $C_{23}H_{36}O_2$                                                                 | $C_{21}H_{32}O_2$                                                                 | $C_{18}H_{26}O_2$                                                                 |
| MW                 | 344                                                                               | 316                                                                               | 274                                                                               |
| chemical structure |  |  |  |

when in contact with lacquer. She did not have to leave her job because she worked as a supervisor, wherein direct contact with lacquer could be avoided.

### Forest Visit

There are no lacquer tree plantations. The tree grows naturally in the forest in the north and northeast of Thailand. Workmen recognize it and collect the resin to sell it to the factory. Natural lacquer or resin is a colourless, viscous material which turns black when oxidized in air. Characteristic black stains, the so-called "black spot" sign found in *Toxicodendron* species (2), are seen on the trunk of the tree where resin is exuded. Lacquer resin is composed of 60–65 monomeric compounds, which can induce skin irritation and sensitization in passers-by, workmen who collect the resin and craftsmen in the factory (3). Once the resin is dry or hardened, the monomers are polymerized and rarely induce dermatitis. Contact dermatitis from the plant occurs mainly during the blossom season, when flowers and pollens diffuse into the air.

The lacquer tree belongs to the family Anacardiaceae (3), this family including many species, some of which are useful in handicrafts, delicatessen and the furniture industry (Table 1). The botanical

name of the Thai lacquer tree is *Melanorrhoea usitata*. It is a big tree with a straight trunk, 15–20 m in height, 80–150 cm in circumference, and with 1.8 cm thick bark (Fig. 1). The leaf is simple, 15 cm long, oval with a pointed end, similar to a mango leaf; the tree has 3 to 5-lobed leaves at the end of each branch as in *Toxicodendron*. The flower is a cluster of small white petals. The fruit is a small green berry with 5 petals on the top.

Lacquer resin is collected by a deep cut in the tree trunk, leaving the sap to drain into a container, similar to rubber latex collection. It has been determined that Japanese lacquer contains urushiol, while Thai lacquer contains thitsiol and Vietnamese lacquer laccol. All have similar chemical structures (Table 2). Thai lacquer is thicker and darker. The advantages of Thai lacquer are its smooth surface, long-lastingness and greater stability to heat, humidity, chemicals and fire. Its disadvantages are its slow drying and its too dark colour, which makes it difficult to vary its shade (1).

### Patch Testing

Patch tests with lacquer leaf as is, lacquer bark as is, 1% and 10% lacquer resin in pet. were negative

Fig. 1. Thai lacquer tree (*Melanorrhoea usitata*)

in 20 controls. The 3 cases showed a positive reaction to the lacquer leaf and 10% resin. We concluded that 10% lacquer resin was suitable for patch testing and corresponded to the lacquer leaf reaction.

### Treatment

For craftsmen whose reactions are mild and localized, topical corticosteroids are helpful. Systemic corticosteroids are necessary for acute and severe reactions, which are mostly from contact with the plant. Workmen in the forest have discovered that an effective medicine can be made from an extract of boiled teak leaf, which they use for bathing when severe allergic reactions occur (1).

### Prevention

Spontaneous hyposensitization can occur (4–6). For a sensitized person, avoiding direct contact with unhardened resin and fumes during the process of resin purification, and staying away from the plant especially during the blossom season, are recommended.

### Discussion

The Japanese lacquer tree has been recommended for landscape planting in Britain (7). The Thai lacquer tree is a different proposition, as it is very broad and tall and not suitable for landscape planting. Kawai et al. (6) found that among 232 Japanese lacquer craftsmen, 55% showed hyposensitization and 13% showed desensitization a few weeks after working. Cross-sensitization among plants in the family Anacardiaceae has been reported (8, 9). Reginella et al. (5) described how workers at a cashew nut shell oil processing plant developed hyposensitization to urushiol within 1 month of working. Dermatitis of the face induced by burning logs from lacquer trees has been reported (7). Lacquer, despite being a strong sensitizer, may cause spontaneous hyposensitization

that helps prevent a serious occupational skin problem.

### Conclusions

3 cases of lacquer dermatitis are reported. Factory and forest visits were made to study the lacquer plantation and the working process at the factory. Thai and Japanese lacquer trees both belong to the Anacardiaceae family. They have similar basic molecules but contain different compounds. Both can induce skin irritation and sensitization. An open patch test with lacquer resin, as is, and closed patch tests with lacquer resin 10% pet. and fresh leaf are suitable and recommended for definitive diagnosis.

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### Address:

Preya Kullavanijaya  
Institute of Dermatology  
420/7 Rajavithi Road  
Bangkok 10400  
Thailand

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