BISHOP MUSEUM
Art Conservation Handout

LACQUER

Understanding Asian Lacquer

In order to care for your lacquerware, it is helpful to understand what it is and how it is made. Lacquer has been produced since prehistoric times in Asia, and used-- much as paint and varnish are used in the West-- to protect and decorate a wide variety of objects: furniture, household items of all kinds, musical instruments, weapons, and even buildings. The chemistry and application of lacquer distinguish it from paint, however, and involve building up layers of lacquer, which can be embedded with precious materials, or carved.

During the 1700's, many pieces of European furniture were japanned or "lacquered" using Western shellac to simulate Asian lacquer, for which there was a high demand. These pieces are valued in their own right, but it should be understood that they are intrinsically different from Asian lacquer, and gave rise to the generic use of the term "lacquer", to refer to any applied coating.

The raw material

The raw material-- urushi, in Japanese, is collected as a milky sap from trees, much as rubber is tapped. The plant is in the family which includes sumac, poison ivy and poison oak, mango and cashew; the raw lacquer is a skin irritant, to which workers must develop a tolerance. After collection, the sap is stirred, heated and filtered, and stored for later use. The lacquer is graded according to the season it was collected, the age of the tree and so forth; different grades of lacquer are appropriate for specific tasks.

Lacquer does not cure in the same way as other natural resins such as shellac, mastic or dammar. Unlike lacquer, these other natural resins are dissolved in a solvent, and when the mixture is applied as a coating, the resin hardens into a solid film as the solvent evaporates. Lacquer, on the other hand, hardens as the result of a complex internal chemical reaction, and, uniquely, does so only in the presence of high humidity. The resulting material is polymerized (like a plastic), and is very hard and durable, and resistant to water, acids, scratches and heat. These properties of lacquer caused it to be used initially as a protective coating-- making leather into arrow-proof armor, for example. Lacquerware in good condition has been recovered from archaeological excavations and even underwater sites.

Production of lacquer objects

The production of lacquered objects is a painstaking process which involves many steps, and often a series of craftsmen. The fabrication of the substructure to which the lacquer is applied may fall to one artisan, the preparation of the ground layers to another, and the final decoration to yet another. Individual pieces of fine lacquerware can take years to produce. Because of its value, laquerware was at one time restricted to certain classes or ranks in China, Japan and Korea, and its production was regulated by the state.

Objects are not made of solid lacquer; the liquid lacquer must be brushed onto a substructure which determines the shape of the object. Xrays tell us that substructures were fabricated with varying amounts of care even though, to a large extent, the life of the lacquerware depends on the substructure's stability. The form can be made of wood, bamboo, cane, textile, leather, metal-- or any lightweight material. Generally, the substructure is constructed of seasoned wood, with any seams or holes filled with grout, the corners often reinforced with fabric, and rims and feet sometimes made of metal wire. The substructure may be primed with ground layers (urushi mixed with clay) until it is smooth and without any flaws which would disrupt the lacquer coating.

The lacquer is applied to the substructure in very thin layers, and after each layer cures in a humid, dust-free cabinet for a day or longer, it is then polished and another layer is applied; an object may have only a few or more than a hundred layers, progressing to a very refined final lacquer surface. The lacquer may be used in a transparent state, as a "varnish" over bare wood, or it may be opaque and colored by the addition of mineral pigments. Cinnabar and iron oxide were used to make red and black lacquers, orpiment for yellow lacquer. Until the development of synthetic colors, white, blue and green were not used, as these natural pigments are unstable in lacquer. Oils and other ingredients were added as dictated by various recipes; these are sometimes blamed for a lacquer which peels, lacks a uniform color, or performs poorly in some other way.

In a technique called dry lacquer, used to make religious statues, fabric saturated with lacquer is molded or modelled-- somewhat like papier mache -- over a wood or clay core. Once the latter is removed, the resulting sculpture is hollow, with perhaps a wood frame or armature added for strength.

Decoration of lacquer

Utilitarian objects were generally monochrome and left undecorated, although there are examples where layers of alternating colors were used, so that with wear, the black layer would gradually reveal a red underlayer, or vice versa. Alternating layers of colors were sometimes also used in lacquer that was to be carved, so that the angled incisions reveal the multi-colored striations, confirming the number of layers. The finest of these Chinese lacquers required many layers to create such depth, and were sometimes so deeply carved that sections of the design have a tendency to separate from the substructure. Cheap imitations consist of a few coats of lacquer applied to previously carved wood or molded rubber.

Lacquer can be decorated by laying pieces of mother-of-pearl, metal cut-outs, tortoise shell and many other materials in the lacquer; layers of lacquer might be applied over them, and the surface polished back down to reveal the decoration. The Japanese achieved brilliant effects with the use of metal powders, a technique known as makie, or sprinkled picture. Here selected grades of powdered and flattened metal are dusted or painstakingly positioned onto the wet lacquer, to create background effects, or a detailed composition. Entire surfaces are sometimes gilded in this way, and tend to be easily scratched and abraded.

Lacquer is also used as a feature of Coromandel screens; here the wood substructure is coated with a heavy layer of white chalk, and then the entire surface is lacquered. Shapes are cut into the lacquer surface to reveal the white layer, which is then painted using a variety of colors.

Care and preservation of lacquer

If you are fortunate enough to own lacquerware, you have probably wondered how to take care of it. In an Asian household, objects like scrolls and lacquerware spend more of their time in storage than on display. Traditionally, valuable pieces of lacquer and scrolls are protected in textile wrappers and placed in custom-made paulownia wood boxes. The box serves a number of functions: it keeps the item from exposure to light, acts to protect it from structural damage, and buffers any changes in humidity.

Although lacquer is prized for its durable nature, it can be scratched with, for example, Western silverware, with which it was not meant to be used. Because the substructure is usually so lightweight, placing heavy items in or on lacquerware can result in structural damage. Careless handling may result in fractures, chips and cracks to the lacquer layer, which then expose the substructure, and may lead to more problems. It is a good idea to have such areas attended to before the situation worsens. A Western conservator would use a synthetic resin to reattach lifting pieces and secure edges, and then fill and inpaint losses with other synthetic materials; the Asian technique is to repair and restore lacquer with urushi.

Cracking and lifting of the lacquer layer is more often due to changes in humidity which cause the wooden substrate to expand or shrink, thus causing the lacquer (which is barely affected by humidity, and therefore does not expand or shrink along with the wood) to crack and lose adherence to the substrate. For this reason, cracks most often appear along seams and joins, and usually in the direction of the grain of the underlying wood. Lacquer, therefore, requires constant humidity levels, with no sharp rises or falls. In Hawai'i, you may have fairly constant RH (relative humidity) in your home, but if you attempt to import a piece of lacquerware from Asia, or send a piece on to the Mainland or elsewhere, where it may encounter a very different climate, you will have to take special precautions or risk damaging the piece severely. Lacquer which is travelling should be sent in secure crates and provided with plenty of packing materials to absorb shocks, but also to buffer changes in RH. Silica gel and Artsorb can also be used to maintain a constant RH. When the piece arrives at its destination, it should be left in its packing for as long as possible to allow it to acclimatize to its new environment, and only slowly exposed to the new conditions. Lacquerware is bound to suffer in environments where central heating is used, as this drives RH down. Museums are very careful to provide stable RH for lacquerware, and many do not lend out lacquer, even to other museums, for fear of exposing it to trauma.

All lacquerware must be kept out of strong light. Some black lacquer pieces, for example, eventually turn a mottled brown when exposed to light; they also lose their sheen and become dull as the lacquer surface is degraded by the light. Lacquer damaged by light loses its durability-- it lacks its normal resistance to water and other solvents, and may even be etched with fingerprints if handled. The appearance of pieces like this can sometimes be improved with the application of a coat of good quality paste wax (containing carnuba); the wax saturates the lacquer and restores depth and shine, and will offer some protection to the surface. However, wax should only be applied if necessary, and not to pieces which are in good condition. Lacquerware should not be cleaned by prolonged immersion in water, as the substructure may react by moving and causing the lacquer to crack. Do not use commercial products such as Pledge® or Endust®, or lemon oil on lacquer or on fine furniture. These products contain silicones, oils and solvents which are not beneficial, and it is difficult to predict how lacquer and other finishes may react to some of the "secret" additives in these products. Do keep lacquer dust free, however-- dust allows for mold growth and insect activity. It is safe to use a slightly damp,

soft cloth to clean lacquer and to remove dust. Take care to use a cloth which will not catch on exposed edges and chips.

Lacquer-- or the wood substructure in lacquerware, is susceptible to insect damage, a common problem in Hawai'i. If you notice holes (about the size of a pinhole, with clean edges), insect wings, and a sand-like material (frass) on or under your piece, you probably have an infestation. Check your piece carefully from time to time for these signs; don't dust away the evidence before you have a chance to examine it. Generally, we recommend freezing as an effective, non-toxic method of killing insects in wood, however, lacquer may be damaged by a freeze cycle. Therefore, it is probably safer to have the lacquer fumigated. If you know of someone who is having their house tented, ask them if you can include your piece; otherwise contract with a reputable firm to have the piece placed in a chamber for fumigation with Vikane®. Never spray a pesticide directly on lacquer-- the chemicals could damage the surface.

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