As a furniture conservator, the author keeps many grades of shellac on hand for matching finishes. In the foreground is a dish of sticklac, short sections of twigs encrusted with the secretion of the lac bug. To the left of that is some wool yarn and the lac dye, once commercially important, used to color it. The round disc in the center, partially obscured, is a piece of buttonlac.

Shellac Finishing
A traditional finish still yields outstanding results

by Donald C. Williams

Almost everybody has heard the old wives’ tales about shellac: it's not easy to use, it doesn't look good, it isn't durable, and so on. These notions are easy to refute. Shellac, for starters, is the main ingredient in most contemporary French polishes, arguably the most beautiful finish known. In addition, shellac resists ultraviolet-light degradation better than most unpigmented finishes, and it is tough enough for floors and bowling alleys, two traditional uses. It is more resistant to water-vapor transmission than polishes, oils and many lacquers and oil varnishes, making it a good choice where humidity levels swing widely (see FWW #64, p. 59). Moreover, shellac is an excellent sealer, able to cover waxes, knots and many existing finishes. Shellac dries quickly by evaporation and doesn't need the curing time required by oils and oil-base varnishes. Also, and it's no minor point, damaged shellac finishes are easy to repair because hardened shellac can be redissolved in alcohol.

Shellac is the most widely used finish in the conservation of historic furniture and is also a good choice for finishing contemporary woodwork. It can be used as a finish without needing any other sealers or topcoats. If applied as a sealer only, most other finishes will adhere to the shellac either with a chemical or a mechanical bond, provided the sealer coat is applied thinly enough that it dries matte rather than glossy. Shellac can also be padded over many finishes for spot repairs. A heavy shellac coat over an existing oil-base floor finish, however, would very likely crack because the materials “move” differently. Combining layers of finish that have different solvents and resins is risky, unless common sense, experience and testing tell you otherwise.

The only “secrets” to successful shellac finishing are to mix your own solution using quality shellac flakes, which ensures that the shellac is fresh and will dry properly, and to use an alcohol solvent of sufficient purity. Application methods don't require sophisticated equipment. Any careful beginner can produce a surface of remarkable clarity, depth and luster. In fact, in my opinion, shellac is the most attractive finishing material around.

Before discussing some techniques of shellac finishing, I would like to talk briefly about the history and properties of shellac and the methods of its preparation. This overall picture will go a long way toward explaining the varieties of shellac—both ancient and modern—that you may encounter in the marketplace today.

The shellac trade between the Orient and Europe began in the early 17th century with lac dye—a scarlet by-product of shellac (see photo above)—as an inexpensive substitute for costly cochineal dye. The resin itself did not achieve widespread use in the
West for nearly two centuries. Shellac finishes on furniture became fashionable at the beginning of the 1800s, and their popularity continued unabated until the development of synthetic resins, particularly nitrocellulose lacquers, in the 1920s and 1930s.

Late in the 19th century, aniline dyes replaced lac dye, thus eliminating a large part of lac commerce. Coincidently, new production methods made shellac resin available in great quantity. This led to its increased use in a number of applications, including electrical insulators and gramophone records (most old ’78s are solid shellac). Following the discovery of the first synthetic resin, Bakelite, the importance of shellac as an industrial resin diminished. Nevertheless, it’s important today as a coating for such diverse things as electric motor windings, fruit (shellac wax is what makes supermarket apples shine), candy (M&Ms, for one), pharmaceuticals (time-dissolving capsules), leather and wood.

**Shellac processing and properties**—Lac, the raw material from which shellac is made, is refined from the secretions of the tiny insect *Laccifer laccifer*, which is indigenous to Indochina and India. Lac bugs live on trees, sucking out nutrients from the sap and secreting a protective shell that eventually covers the twigs and branches. When these deposits are abundant, the branches are cut off and the resin is prepared for processing. This raw material, “stick-lac,” is crushed and washed in water to remove twigs, dirt and the lac dye in the insect carcasses.

Sticklac is a complex mixture of several resinous components that fall into two major groups: one soft and the other very hard. The soft resins (along with another natural component, shellac wax) act as a natural plasticizer, giving shellac a great deal of flexibility; the hard resins give shellac its toughness and durability. Shellac can be bought as either a solid or a liquid, which is simply solid shellac dissolved in alcohol by the manufacturer. Solid shellac is available in various grades in three forms: flake shellac, which looks like amber or orange cornflakes; buttonlac, which comes in a variety of diameters and thicknesses; and chlorinated shellac, which looks like amber or orange cornflakes; buttonlac, which comes in a variety of diameters and thicknesses; and chlorinated shellac, which is a coarse powder. None of these forms is appreciably different from the others when used in finishes. What is important is not the form of the shellac, but how it has been processed.

After the initial processing and cleaning of sticklac to remove the lac dye, it is called “seed-lac.” Seedlac looks like dirty maroon beads and can be used in the same manner as refined shellac in finishes, although it should be filtered to remove dirt particles. Seedlac is further refined to become shellac through two main processes: heat refining and solvent extraction.

In heat refining, seedlac can be refined through hand processing or industrial processing. In hand processing, seedlac is placed in cloth filtering tubes near a fire hot enough to slowly melt the resin. As the resin softens and begins to liquify, the cloth tubes are twisted and the molten resin, now called “shell-lac,” is wrung out. (Processing by this method limits the purification to the porosity of the cloth used in the filter tubes.) If the desired end product is flake shellac, the semi-molten material is stretched by hand into large sheets and crushed into flakes when cooled. To make buttonlac, the material is pressed into molds and allowed to cool.

Varnish made from hand-refined shellac will appear cloudy because of the presence of shellac wax, which cannot be removed by this method. Hand-refined shellac is still a cottage industry in India, although it has been superceded almost completely by two industrial refining processes. One of these, **industrial heat refining**, is essentially the same as hand processing, with the exception that refining process today, and it provides an end product that can be fundamentally different. Seedlac is dissolved in methanol and then filtered. The solution is then heated to remove the alcohol, and the remaining shellac is stretched and pressed in rollers. All or part of the natural lac wax can be removed, yielding dewaxed shellac with greater clarity and moisture resistance.

The final refining step is the assignment of grade, or quality, which is based on host tree, time of year the sticklac is harvested, wax content, color, clarity and hardness. Grading is usually done by eye, and there may be minor differences between shellacs of the same grade. There appears to be general agreement that the most prized resins from India are the Kusmi Aghani, coming from the kusum tree during the month of Aghan (late November to early December). The grades of hand-processed shellac range from TN, which is the lowest grade, to Kusmi Superior, which is the highest. TN resin is reddish-brown, tough, with moderate hardness. Kusmi Superior is amber in color, with excellent clarity. Intermediate grades are known as Lemon #1 and Lemon #2. These are available from Wood Finishing Enterprises, 1729 N. 68th St., Wauwatosa, Wis. 53213; (414) 774-1724.

The shellacs found in most woodworking catalogs are supplied by Behlen and rated by color and wax content. The higher the color number, the darker; the higher the wax number, the more wax. The following are the four available Behlen grades: Buttonlac, which varies because it is essentially unrefined; Garnetlac (roughly equivalent to TN), with a color of 30 and a wax content of about 3%; Orange (equivalent to Lemon #1), with a color of 13 and a wax content of 4.5%; Super Blonde (derived from grades such as Kusmi Superior), with a color of 0.8 and virtually no wax. One source for Behlen products is Wood Finishing Supply Co., 1267 Mary Drive, Macedon, N.Y. 14502; (315) 986-4517.

Natural wax particles present in the dried shellac film make it less resistant to water, and they slightly dull the gloss. Super Blonde would be a good choice when gloss and the clarity of the wood surface matters. Orange would be a good choice when power-sanding the surface is anticipated, because waxes act in a manner similar to stearates (dry lubricants added to lacquer sanding sealers), preventing the film from overheating and becoming gummy when sanded. The darker colors of Garnetlac and Buttonlac can be blended with the other shellacs to match old finishes, although I use alcohol-soluble dyes for this purpose so as not to change the properties of the shellac I’m using.

Super Blonde is clarified by filtering it through active carbon; shellacs known as “bleached” have been treated in an alkali bath with chlorine. Such bleaching makes the dry resin unstable and drastically shortens its shelf life—both dry and in solution—and accelerates the degradation of the finish. Despite these shortcomings, bleached shellac made from high-grade resins remains a favorite among French polishers because of its clarity, although its inherent instability makes it unsuitable for any of my needs.

**Drawbacks**—Shellac resists water-vapor penetration very well, but water in liquid form presents problems. The most frequently expressed complaint about shellac is the formation of white rings from water condensed on drinking glasses. The severity of the damage is frequently dependent on the amount of wax in the shellac, just as water spots in other finishes are sometimes in the wax polish rather than in the finish itself. Repairing water damage can be easy, particularly with newer finishes (less than 20 years old) that are in good overall condition. Apply alcohol to dissolve the surface, as shown in the photo on the next page, and the
Although shellac may turn white from water or heat, in many cases the damage is easily repaired by redissolving the surface with alcohol. In cases of severe damage, a subsequent coat or two of shellac may be needed to restore the surface. Although shellac may turn white from water or heat, in many cases the damage is easily repaired by redissolving the surface with alcohol. In cases of severe damage, a subsequent coat or two of shellac may be needed to restore the surface.

Dry shellac has an indefinite shelf life if kept cool and dry. If exposed to moisture, the resin may solidify into a block, but this can be broken up and used. If dry shellac has chemically degraded because of improper storage, it will not dissolve in alcohol.

The extreme toxicity of shellac's best solvent, methanol (wood alcohol), prompts me to use ethanol (grain alcohol), the alcohol in liquor, instead. I find that the alcohol generally sold as "shellac thinner" in hardware and paint stores contains contaminants and is useful only as a cleaner for my brushes and the surfaces of objects on which I am working. I don't recommend alcohol sold by finishing supply companies, because I have had more than one bad experience with contamination, which ruins the varnish (one exception to this is Behkol, a Behlen product).

The best bet for making good spirit varnish is to use either reagent alcohol or pure grain alcohol. Reagent-grade alcohol is denatured alcohol sold by chemical companies and is pure enough to be used in laboratories. "Denaturing" of alcohol means contaminating the alcohol so it becomes non-drinkable and therefore exempt from liquor taxes. Generally, reagent alcohol is 95% ethanol and 5% methanol or other toxic additives.

You can buy reagent alcohol if you choose, but grain alcohol is never farther away than the closest liquor store. Just ask for 190-proof grain alcohol, pay the man, go home and mix up some shellac varnish. Be prepared for alcohol in this form to be more expensive, because you are paying liquor taxes. Keep in mind that an open container of any alcohol rapidly absorbs moisture from the air, regardless of how pure it may have been when first bought.

As mentioned earlier, shellac varnish is rated in pound cut. You can mix precise proportions by volume and weight, but I seldom bother. As a furniture conservator, I like to keep a number of grades on hand in concentrated solution. This allows me to blend colors as needed and then immediately dilute the mixture to proper viscosity for the job. To make the concentrated solution, roughly equivalent to a 6-lb. cut, I fill a small glass container with shellac flakes. Then, I fill the container with alcohol and allow it to stand in a cool, dark place for a couple of days. I may speed up the process by occasionally shaking the container vigorously. I increase the alcohol content by one half for powdered shellac and double for buttonlac, because they are both denser than flake.

I keep only a couple of months supply of orange shellacs on hand. While I never use bleached shellac, if you need to use it, mix only what you need for the next couple of weeks, after which, discard it. The minor inconvenience of preparing new solution pale in comparison to the aggravation of using old shellac that won't dry properly.

There are three main techniques of applying shellac finishes: spraying, padding and brushing. I'll discuss the particulars of each in a moment. Regardless of the application method, there are some characteristics of liquid shellac that are beneficial. Alcohol-soluble dyes can be added to shellac, allowing very careful manipulation of the finish color for touching up, shading or controlling overall tone. Because shellac remains soluble in alcohol, mistakes in the application procedure can be corrected easily.

Spraying—I spray shellac when I am using it as a sealer or when I want a surface that can be finished off simply by rubbing with 0000 steel wool. Spraying shellac is much like spraying nitrocellulose lacquer (see FFW #52), so if you spray lacquer, you can spray shellac. I spray a 1½-lb. to 2-lb. cut, which means I dilute one part of my stock solution with three or four parts alcohol. I set the pressure to about 30 lbs., use a moderately wide fan pattern and keep the gun moving constantly.

There are a couple of problems in spraying shellac that can be
avoided easily. First, don't apply shellac heavily, or you will get drips and runs. Shellac doesn't always set as fast as lacquer, so don't always assume that similar applications will dry the same as lacquer. If the gun is too far away from the surface, the pressure too low or the material flow inadequate, the result will be an uneven surface called 'orange peeling.' If the gun is too close to the surface or the pressure too high, you can get runs and possibly pinholing, which is the result of the sprayed shellac being agitated so much that it froths and air bubbles get trapped in the film as it dries. Shellac, like any other solvent-release finish, can blush if the finish is applied when the humidity is too high or when there is too much moisture in the solution or on the surface. Finally, take special care to clean out the gun frequently. Shellac reacts with metal, a reaction that makes the shellac turn dark and interferes with its drying. My gun is aluminum, which is less reactive than steel. If I'm spraying shellac on a daily basis, I disassemble and soak the gun in alcohol every couple of days. I'd clean a steel gun every day. If you spray infrequently, the gun should be cleaned thoroughly after each use.

I smooth the surface as necessary between coats with sandpaper, pumice or 0000 steel wool. If the shellac is dewaxed, use steel wool; sandpaper may overheat the surface, although this is not likely if you are sanding by hand. Steel wool is not a bad idea on waxed shellac either, as the wax may clog very fine paper. The shellac dust from smoothing can be left in the pores of the wood as a filler. The introduction of alcohol with new coats will dissolve the dust and lead to a smoother surface.

Padding—Applying shellac with a cloth is known as padding, or more popularly as French polishing. This process, the application of a great many very thin coats, was covered in FWW #58, so I won't give a long exposition on my technique, but instead I'll give you a quick review of the build-up process.

French polishing is possible because shellac is a solvent-release finish with excellent adhesion qualities. As the polishing rubber is moving over the surface, several things are happening simultaneously. First, shellac is being deposited on the surface. Second, the solvent in the shellac is softening the layers below, allowing some of the shellac already down to be pushed around from high areas to low areas, filling the grain. Starting with a 1/2-lb. cut, the amount of resin in the varnish is decreased by adding alcohol—not shellac—as the varnish is consumed. Eventually, the surface coating is simply being moved around by the solvent and the abrasion of the fabric (or pumice), resulting in the familiar mirror-like smoothness.

Parts of a piece that cannot be easily padded, such as intricate carving, certain table pedestals, etc., may be sprayed or brushed thinly as described below. A final treatment using steel wool and wax, buffing hard enough to produce heat, will get the finish close to the high gloss of the French-polished areas. If carved areas are adjacent to padded areas, do all brushing first, then pad, overlapping onto the brushed parts to blend the two.

Brushing—The best brush for shellac is a very fine artists' brush, the kind usually employed in watercolor painting. The bristles should be flat and moderately soft: golden nylon, badger or red sable. Artists' brushes come in a variety of sizes up to 2 in., which is as big as you'll ever need. New brushes should be thoroughly washed in mild soap and water to get out any dirt, oil or loose bristles. Brushes should be cleaned with solvent after use.

The importance of the shellac cut cannot be overstated. Many people make the mistake of applying a couple of heavy coats of shellac followed by laborious rubbing out after drying. Although I have seen finishers use up to a 5-lb. cut with success, my own experience suggests that anything heavier than a 2-lb. cut can lead to an uneven, streaky finish. I use a 1-lb. cut for most brushing, so my stock solution is cut 5:1 with alcohol. The light cut allows for excellent flow-out of the shellac, providing a smooth, glossy finish. Admittedly, the buildup of finish can seem slow, but the coats can be applied in rapid sequence. Besides, the objective is to produce a beautiful finish, not a thick one. Have enough shellac in the brush so it'll flow well, but not so much that it drips. Determine an application pattern and stick to it. Aim to cover all the surface evenly without having to go back over areas where shellac has already been applied. Unlike oil varnishes, where you can rebrush the wet surface to even it out, all this will accomplish with shellac is the pulling back up of the semi-wet finish. This produces a lumpy, ribbed surface. If the brush is worked too vigorously and froth builds up, pinholing may result.

When you've come to the end of the application pattern, test the beginning point with your fingertip (first clean any tacky shellac off your finger). If the shellac at the beginning point is stiff (slightly tacky) or dry to the touch, begin again and apply a complete new coat. Repeat this process until the starting point is too tacky to apply more finish. I can generally apply six or eight successive coats on large objects. Allow the final application to dry overnight, then rub the surface down. You may choose to leave this as a final rubbed finish, or you may apply another coat or two of shellac without rubbing to achieve a finish of high gloss. Two coats of paste wax completes the job.

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Further reading

Try large libraries for these out-of-print books:


Shellac (referred to as the "Blue Book") by M. Russell. Angelo Brothers, Calcutta, India; 1965.

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