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Shellac

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For the minimalist rock trio, see [Shellac \(band\)](#).

Shellac is a resin secreted by the female **lac bug** to form a cocoon, on trees in the forests of **India** and **Thailand**.^[1] It is processed and sold as dry flakes (pictured at right), which are dissolved in **denatured alcohol** to make liquid shellac, which is used as a brush-on colorant, food glaze^[2] and wood finish much like a combination of stain and polyurethane.

Shellac functions as a tough all-natural primer, sanding sealer, tannin-blocker, odor-blocker, stain (pigment), and high-gloss varnish. Shellac was also once used in electrical applications as it possesses good insulation qualities and it seals out moisture.

Because dried shellac is all-natural and hypoallergenic (it can actually be eaten and is often used as a candy and pill coating), it is an excellent product for use around children, chemically-sensitive or allergic individuals, pets, and those concerned about toxins and chemicals in the home.^[*citation needed*] It is also often the only historically-appropriate finish for early 20th-century hardwood floors, and wooden wall and ceiling paneling.

From the time it replaced oil and wax finishes in the 1800s, shellac was the dominant wood finish in the western world until it was replaced by **nitrocellulose lacquer** in the 1920s and 1930s. It remained popular in **the Southern United States** through the 1950s and 1960s. It continues to be a popular **candy** glaze for pill shaped sweets such as **Skittles**.



Some of the many different colors of shellac.



Skittles candy.

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Production

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Shellac is scraped from the bark of the trees where the female lac bug, *Laccifer (Tachardia) lacca Kerr*, Order *Homoptera*, Family *Coccidae*^[3] deposits it to provide a sticky hold on the trunk. This bug or insect is in the same Family as the insect from which **Cochineal** is obtained. The insects suck the sap of the tree and excrete "stick-lac" in an almost non stop manner. The least coloured Shellac is produced when the insects are parasitic upon the kursum tree, (*Schleichera trijuga*). The raw shellac, which contains bark shavings and lac bug parts, is placed in



canvas tubes (much like long socks) and heated over a fire. This causes the shellac to liquefy, and it seeps out of the canvas leaving the bark and bug parts behind. The thick sticky shellac is then dried into a flat sheet and broken up into flakes when dried, or dried into "buttons" (pucks/cakes), and then bagged and sold. The end-user then mixes it with denatured alcohol on-site a few days prior to use in order to dissolve the flakes and make liquid shellac -- liquid shellac has a very limited shelf life (about 1 year), hence it is sold in dry form and then mixed prior to use. This is also why cans of liquid shellac sold in hardware stores are very clearly marked with the production (mixing) date on the top or bottom, so that the consumer can know whether the shellac inside is still good.

The thickness (strength) of shellac is measured by the unit "pound cut", referring to the amount (in pounds) of shellac flakes dissolved in a gallon of denatured alcohol. For example: a 1-lb. cut (said as "one pound cut") of shellac is the strength obtained by dissolving one pound of shellac flakes in a gallon of alcohol. A 5-lb. cut is the strength of five pounds of shellac flakes dissolved in a gallon of alcohol. Most pre-mixed commercial preparations come at a 3-lb. cut. Multiple thin layers of shellac produce a significantly better end result than a few thick layers -- thick layers of shellac do not adhere to the substrate or to each other well, and thus can be peeled off with relative ease; in addition, thick shellac will fill in (and thus ruin) carved designs in wood and other substrates.

Shellac naturally dries to a high-gloss sheen. For applications where a flatter (less shiny) sheen is desired, there is an additive called "Shellac Flat" which can be added after the shellac flakes are dissolved in denatured alcohol, prior to use (see photo at right).

Shellac naturally contains a small amount of wax (3%-5% by volume), which comes from the lac bug. In some preparations, this wax is removed (the resulting product being called "dewaxed shellac"). This is done for applications where the shellac will be coated with something else (such as paint or varnish), so that the topcoat will be able to stick. Waxy (non-dewaxed) shellac appears milky in liquid form, but dries clear.

Colors and availability

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Shellac comes in many warm colors, ranging from a very light blond ("platina") to a very dark brown ("garnet"), with all shades of brown and yellow and orange and red in between. The color is influenced by the sap of the tree the lac bug is living on, as well as the time of harvest. Historically, the most commonly-sold shellac is called "orange shellac", and was used extensively as a combination stain and protectant on wood paneling and cabinetry in the 20th-century (see photo at right).

Shellac was once very common, being available any place paints or varnishes were sold (such as hardware stores). Cheaper, clear, more abrasion- and chemical-resistant items (such as polyurethane) have almost completely replaced it in the world of decorative residential wood finishing (such as for hardwood floors, wooden [wainscoting](#) and plank paneling, and kitchen cabinets). Such things, however, must be applied over a stain if the user wants the wood colored; shellac wasn't applied over a stain, as it was orange/amber in color by itself, and so functioned as a combination stain and protective topcoat. These modern chemicals, while some come closer than others, can never completely replicate the warm, inviting glow that shellac lends to wood. "Wax over shellac" (an application of buffed-on paste wax over several coats of shellac) is often regarded as the most beautiful finish for hardwood floors.^[4]

Shellac flakes are hard-to-find now. Some specialty woodworking shops offer it as a special-order item. There are a few specialty companies dedicated exclusively to it, such as [\[1\]](#) [Zinsser](#) offers a pre-mixed liquid

Knotty pine pickwick paneling and a door and some trim finished with orange shellac, common in the United States in the mid-20th century. Shellac has a very warm glow; this wood was the light cream color of freshly-sawn unfinished pine prior to being shellacked. This wood was not stained before being shellacked; the shellac has an orange color and acts as a combination stain and varnish-like protectant.



A bottle of Shellac Flat, used to reduce the glossiness of shellac.

preparation of waxy (non-dewaxed) shellac, in both "amber" (roughly Waxy Orange) and "clear" (roughly Waxy Platina), which is sold at Lowes and Home Depot.

Properties

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Shellac is a natural [polymer](#) and is chemically similar to synthetic polymers, and thus can be considered a natural form of [plastic](#). It can be turned into a moulding compound when mixed with [wood flour](#) and moulded under heat and pressure methods, so it can also be classified as [thermoplastic](#).

Shellac is [soluble](#) in [alkaline](#) solutions such as [ammonia](#), [sodium borate](#), [sodium carbonate](#), and [sodium hydroxide](#), and also in various [organic solvents](#). When dissolved in [alcohol](#) blends containing ethanol and methanol, shellac yields a coating of superior durability and hardness.

Upon mild hydrolysis Shellac gives a complex mix of aliphatic and alicyclic hydroxy-acids and their polymers which varies in exact composition depending upon the source of the shellac and the season of collection. The major component of the aliphatic component is [aleuritic acid](#), whereas the main alicyclic component is [shellolic acid](#).^[5]



A decorative medal made in France in early 20th century moulded from shellac compound, the same used for phonograph records of the period.

History

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The earliest record of shellac goes back 3000 years, but shellac is known to have been used earlier.^[6] At one point, an entire palace was built out of dried shellac.^[7]

Shellac was in rare use as a dyestuff for as long as there was a trade with the [East Indies](#). Merrifield^[8] cites 1220 for the introduction of shellac as an artist's pigment in Spain. This isn't unreasonable, given that [lapis lazuli](#) as [ultramarine](#) pigment from Afghanistan was already being imported long before this.

In areas where small caskets or [reliquaries](#) were decorated, then a significant number of them were protected with shellac, and from an early period. Painting was done with egg [tempera](#) over [gesso](#). Shellac was also used as an adhesive and sealer over inlay work, such as ivory or abalone inlay.

The use of overall paint or varnish decoration on large pieces of furniture was first popularised in Venice (then later throughout Italy). There are a number of 13th century references to painted or varnished [cassone](#), often dowry cassone which were deliberately impressive as part of dynastic marriages. The definition of varnish is not always clear, but it seems to have been a [spirit varnish](#) based on [gum benjamin](#) or [mastic](#), both traded around the Mediterranean. At some time, shellac began to be used as well. An article from the [Journal of the American Institute of Conservation](#) describes the use of infrared spectroscopy to identify a shellac coating on a 16th century cassone.^[9] This is also the period in history where "varnisher" was identified as a distinct trade, separate from both carpenter and artist.

Another consumer of shellac is sealing wax. Woods' 'The Nature and Treatment of Wax and Shellac Seals'^[10] discusses the various formulations, and the period when shellac started to be added to the previous beeswax recipes.

The "period of widespread introduction" would seem to be around 1550 to 1650, when it moves from being a rarity on highly decorated pieces to being a substance that's described in the standard texts of the day.

Uses

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For a long time in the early- and mid-20th century, orange shellac was used as a one-product finish (combination stain and varnish-like topcoat) on decorative wood paneling used on walls and ceilings in homes (particularly in America). In this application, it lends an extremely warm, inviting, homey glow. In the [American South](#), use of knotty pine plank paneling covered with orange shellac was once as common in new construction as drywall is today. It was also often used on kitchen cabinets and hardwood floors, prior to the advent of polyurethane.

It is the central element of the traditional "[French polish](#)" method of [finishing](#) furniture, and fine [viols](#) and [guitars](#).

Shellac was used from mid-19th century to produce small moulded goods like picture frames, boxes, toilet articles, jewelry, inkwells and even dental plates. Although advancement in [plastics](#) have rendered shellac obsolete as a moulding compound, it remains popular for a number of other uses. In [dental technology](#), it is still occasionally used in the production of custom impression trays and (partial) denture production.

It is used by many [cyclists](#) as a protective and decorative coating for their [handlebar](#) tape.^[11] Shellac is used as a hard-drying adhesive for tubular cycle tires, particularly for track racing^{[12][13]}

Orange shellac is also the preferred adhesive for reattaching [ink sacs](#) when restoring vintage [fountain pens](#).^[14]

Until the advent of [vinyl](#) around the 1940's, phonograph records were pressed from shellac compounds. This use was common until the 1950s, and continued into the 1970s in some non-Western countries.

Sheets of [Braille](#) were coated with shellac to help protect them from [wear](#) due to being read by hand.

Shellac is used as a binder in [Indian ink](#).

Shellac was historically used as a protective coating on paintings.

Shellac is edible and it is used as a [glazing agent](#) on pills (see [excipients](#)) and candies in the form of [pharmaceutical glaze](#) (alternatively, *confectioner's glaze*). Because of its alkaline properties, shellac-coated pills may be used for a timed enteric or colonic release.^[15] It is also used to replace the natural wax of the [apple](#), which is removed during the cleaning process.^[16] When used for this purpose, it has the [food additive E number](#) E904. This coating may not be considered as [vegetarian](#) as it may, and probably does, contain crushed insects. In the tablet manufacture trade, it is sometimes referred to as "beetlejuice" for this reason.

Because it is compatible with most other finishes, shellac is also used as a barrier or primer coat on [wood](#) to prevent the bleeding of [resin](#) or [pigments](#) into the final finish, or to prevent [wood stain](#) from blotching.

Shellac is an odor and stain blocker and so is often used as the base of "solves all problems" primers. Although its durability against abrasives and many common solvents is not very good, shellac provides an excellent barrier against water vapor penetration. Shellac based primers are an effective sealant to control odors associated with fire damage.

Shellac was once used for fixing [inductor](#), motor, generator and [transformer](#) windings, where it was applied directly to single layer windings as an alcoholic solution in much the same manner as it is applied to timber. For multilayer windings, the whole coil was submerged in the shellac solution and then removed, drained and placed in a warm place to allow the alcohol to evaporate, the shellac then holds the turns in place, provides extra insulation and prevents movement and vibration, reducing buzz and hum. In motors and generators it also provides a medium for transfer of forces generated by magnetic attraction and repulsion from the windings to the rotor or [armature](#). In more recent times synthetic resins, such as Glyptol, ([Glyptal](#)), have been substituted for the shellac. Some applications use shellac mixed with other natural or synthetic resins, such as [pine resin](#) or Phenol-Formaldehyde Resin, of which [Bakelite](#) is the best known, for electrical use. Mixed with other resins, [Barium Sulfate](#), [Calcium Carbonate](#), [Zinc Sulfide](#), [Aluminum Oxide](#) and/or Copper(II) Carbonate, ([Malachite](#)), shellac forms a component of *Heat Cured Capping Cement* used to fasten the caps or bases to the bulbs of electric lamps.

As a natural resin, shellac has similarities to other natural resins such as [Myrrh](#) and [Frankincense](#).

Trivia

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- It takes about 100,000 lac bugs to make 1 lb. of shellac flakes.^[17]
- Shellac is UV-resistant, and does not darken as it ages (though the wood under it may do so on its own, as in the case of pine).^[18]
- Shellac scratches less easily than lacquer, and damaged areas can easily be touched-up with another coat of shellac (unlike with polyurethane) because the new coat melts itself into the existing coat(s).

Gallery

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Blonde shellac flakes.



Dewaxed Bona (L) and Waxy #1 Orange (R) shellac flakes. The latter -- orange shellac -- is the traditional shellac used for decades to finish wooden wall paneling and kitchen cabinets.



Closeup of Waxy #1 Orange (L) and Dewaxed Bona (R) shellac flakes. The former -- orange shellac -- is the traditional shellac used for decades to finish wooden wall paneling and kitchen cabinets.



"Quick and dirty" example of a pine board coated with 1-5 coats of Dewaxed Dark shellac (a darker version of traditional orange shellac).

See also

[\[edit\]](#)

- [Bakelite](#)
- [Zein](#)

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External links

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- [Shellac.net](#) ↗
- [DIYinfo.org's Shellac Wiki](#) ↗ - Practical information on everything to do with shellac
- [Reactive Pyrolysis-Gas Chromatography of Shellac](#) ↗

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