**TO VARNISH A VIOLIN, ONE MAN’S PHILOSPHY** - by Ray Doerr

Like so many other issues associated with violin making I prefer to think of the finishing process as a philosophy as opposed to a science or an art. One thing strikes me as being very odd and that is, most dyed in the wool traditionalists, when it comes down to the actual construction, they are very set in their ways and won't budge one iota. Yet, most use many different types of varnish and many different methods of application. I must admit to the same kind of devious approach. Now I do not believe that there is any one best way above all others. I just want to point out that after all this time wouldn't you believe that there could be some kind of consensus amongst us hardheads?

It took me 60 years to gain my experience in varnish making. As a matter of fact I am still learning. Naturally I have become rather opinionated in that length of time. I would like to share some of my conclusions with the rest of my fellow travelers for whatever reason. In the beginning I did some experimenting with cold cut varnishes as promoted by Ed Heron Allen. Sometime later I discarded the whole idea for producing varnishes that did not age very gracefully. I then researched some old formulations for carriages. These old time varnishes were made with all natural products and the primitive methods of the alchemist. After all I am not a chemist and their crude methods suited me just fine. By trial and error I found that a most durable varnish could be made from a hard copal dissolved in a drying oil of some kind. The problem with hard gum varnishes was that they were too hard and tough to be used on violins. I ended up by tempering these so called deck varnishes by adding some soft gums to the cook.

The biggest problem I had during my formative years was in the procurement of the raw materials. Finally I settled on Gum Kauri for the hot process gum. It came from New Zealand where it originates with the Kauri Pine. It is called a fossil resin because the sap drips to form masses of it in the ground. The Natives dig it to ship all over the world. In the olden days Kauri was much preferred as it processed much easier than other hard gums.

One wishing to experiment with other hard gums might consider Gum Congo, Gum Manila, Gum Pontianak, Gum Zanzibar and others. There are a few dealers who still offer small quantities to violin makers. The most common soft gums are Gum Dammar and Gum Mastic. Dammar is a tender copal from Singapore, Batavia and East India. Mastic is a harvested gum mostly from Greece. Both are soluble in the more common solvents except for a small amount of wax which must be removed for a perfectly clear varnish.

In all oil varnishes the main vehicle is an oil which dries by oxidation on contact with the air. Linseed oil is most often used for the purpose. Other oils more often can prove to be most difficult for the novice. Only refined linseed oil should be used for varnish. If you cannot buy refined on the market then take ordinary raw oil and rectify it yourself.

**To Rectify Raw Linseed Oil**

1st Place one gallon of oil into a two gallon enameled pot.

2nd Add one pint of 3% hydrogen peroxide. Blend and let it stand overnight.

3rd Heat gently to evaporate the water and the excess oxygen.

 Control to avoid boiling over.

4th Raise temperature to 350° F. to cook the solids that remain.

5th Filter the remaining oil. The remaining oil should be free of any contaminants and crystal clear. Store in tightly stoppered bottles away from bright lights.

Most oil varnishes are required to be thinned with a diluent in order to be brushed. A good diluent must be compatible with all the other ingredients. It must dry slow enough to cause good leveling. I have found that #150 solvent combined with a small amount of spirits of turpentine does just that. The #150 solvent is an aromatic hydrocarbon with properties similar to xylene. The procedure for separating the waxes goes something like this:

1st Measure out the turpentine spirits and heat to just below the boiling point, then add the soft gums to dissolve.

2nd Add the cold #150 solvent to chill the cook and to precipitate the waxes.

3rd Let stand overnight then decant and filter.

Another feature of a good oil varnish is in its ability to dry in a reasonable length of time. Oil varnish by nature dries in two stages, 1st by evaporation of the volatiles and 2nd by the oxidation from the air. The 2d stage is greatly enhanced by being exposed to light. Further the drying of linseed oil is always accelerated by certain metals which act as catalysts in the drying act. The metals most often used for the purpose are lead, manganese and cobalt. Other metals are sometimes used such as calcium and zinc but the ones mentioned before are the most reactive. Since these metals are used in only trace amounts they offer no threat to one’s health.

Adding metallic driers to varnish can destroy the long term shelf life. For that reason compound my oil varnish leaving the metallic drier out thus it can be stored for extremely long periods out of contact with the air.

To Make My #42 Clear Violin Oil Varnish, proceed as follows: This varnish is made in two parts in that the soft gums are processed in part #1. The hard gum is processed in part #2. The process requires the use of a ss steel pot with prox. 3 quart capacity. The heating is done by means of a laboratory hot plate inside of a box that vents the noxious fumes to the outdoors or the cooking can be done outside if the neighbors don't object.

Part #1: Ingredients: 25-2920-9

 100 grams Mastic in tears.

 100 grams Dammar, #l grade crushed.

 200 cc New Turpentine Gum Spirits.

 1000 cc #150 solvent.

 50 cc Light Pine Oil.

Procedure:

Add the gums to the pot. Add the turpentine and heat to dissolve the gums. Cool to room temperature under a reflux condenser. Add all of the #150 solvent to precipitate the wax and filter. Add the Pine Oil and store in closed bottles to await part #2

Makes approx. 44 fl oz.

Part #2: Ingredients:

 200 grams Gum Kauri, coarsely crushed.

 400 cc Raw refined Linseed Oil.

 All of part #1.

Procedure:

1st Use the varnish pot and the vented cooker.

2nd Preheat the stove to 400° F. (204°C)

3rd Pour in just enough Kauri to cover bottom of pot.

4th Fuse the Kauri with constant stirring.

5th Keep adding the Kauri in small lots until all is fused.

6th Maintain a temperature to promote active bubbling without frothing.

7th After the gum is thoroughly fused start to add the oil slowly as not to chill the cook. Hold for a clear drop on the chill glass.

8th Continue the heat until temperature approaches 550° F (288°C) and hold for clear drop on the chill glass.

9th Turn the stove off and let the cook cool down naturally to approx 250°F (121°C) at which time part #1 is added slowly while stirring. Avoid chilling the cook too fast.

10th Cover with a reflux condenser and cool to room temp.

11th Pour through a fine tea strainer into the storage bottle. The varnish should be in storage for prox. one year to be at its best.

12th In storage the varnish will become very clear and several shades lighter in color. Now is the time to decant and filter to eliminate the foots. Store in well stoppered bottles preferably in a dark place. The shelf life will be in excess of 25 years as long as there is no contact with the air.

Since application is such an important part of fiddle finishing, I shall now reveal the other formulations that are part of that process:

**To Make #203 Drier Additive**

Ingredients:

9 fl oz Refined Yellow Rosin.

4 oz Napthalene crystals or moth balls.

5.3 grams Calcium Acetate.

8.9 grams Manganese Acetate.

13.3 grams Lead Acetate.

1000 cc Gum Turpentine Spirits.

Procedure:

Melt the Napthalene in the ss pot. Add the acetates one at a time stirring in order to dissolve. Reduce the temperature to about 250° F. Add the rosin and hold until all is dissolved. Hold temperature until the napthalene is driven off. Reduce the temp. to about 230° F. Add the turpentine slowly while stirring and cool to room temperature under a reflux condenser . Makes one quart, store in tightly stoppered bottles.

Use #203 drier additive at the rate of 1/16 teaspoon per one fl oz of #42 Violin Oil Varnish. The varnish will dry to the touch in less than one week.

Preparing the white violin for varnishing is probably the most important feature of the finishing process, so much so that I shall reveal my formulations for the prep coats.

My #147 Stuffer Filler Stain is designed as a first coater. Its main feature is to plug the pores of the wood to prevent sinking of the coats of oil varnish that follow. As an added feature it stains the raw wood a golden yellow.

**#147 Stuffer Filler Stain in Two Parts**

Part #1: To prepare casein from milk:

 Ingredients:

4 oz - Non-fat dry powdered milk from Grocery Store.

24 fl oz - Clean Water. Blend in the milk.

Add 16 fl oz, of 5% distilled white vinegar and stir.

The casein is precipitated as a white curd with all the soluble remaining in solution. Isolate the casein by filtering through a paper coffee filter and rinse two or three times with cold water. The resulting curd is pure casein.

Part #2: To prepare the Gamboge Emulsion:

 Ingredients:

20 fl oz clear Household Ammonia water.

Add 4 teaspoons of powdered Borax. Stir till dissolved.

Add 2 fl oz of denatured Alcohol.

Add 4 oz Gum Gamboge, finely powdered.

Add clean water to the point that the mix has a good brushing consistency.

Footnote.

I received these recipes from Ray in 1994. I just recently found them going through some old papers I have. I might be missing the last page of the letter because the recipe for the #147 Stuffer Filler stain seems to lack directions on how to combine the two parts. If anyone knows the rest of the directions please let me know.

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