

What's Old Is New: B-72 and the Treatment of Degraded Furniture Finishes

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Abstract

This paper presents a number of case studies in which Paraloid B-72 was used successfully in the treatment of furniture surfaces. The case studies address two general topics: the use of B-72 as a saturating varnish in the treatment of degraded finishes, and the use of B-72 as a binder for the imitation of aged pigmented stains or paints.

Old and degraded finishes on furniture may appear hazy, dull, and opaque. Judicious cleaning of the surface can remove dirt and soil along with waxy and oily accumulations. Even after cleaning, an aged finish may still appear dull and opaque due to light reflection and scattering at the surface as well as in the body of the degraded film. Common remedies for this problem have included the application of film-forming coatings over the degraded finish, reforming the finish with solvents, or a combination of both. While each of these general methods can saturate the degraded finish and restore gloss and transparency, they can also considerably alter the macroscopic surface characteristics of the finish and may not be reversible. The use of B-72 dissolved in a very slow evaporating aromatic solvent and applied by brush in a very thin layer, is presented as an alternative method for the re-saturation of degraded finishes. The ease, controllability, reversibility, and aesthetic qualities of the method are discussed and illustrated.

In addition, two case studies in which B-72 was used as a binder in the re-creation of pigmented stains or paints are briefly presented. In these instances, furniture which was known to have been originally stained or painted had been stripped of its original coatings. For didactic purposes, it had been deemed desirable to replace the coatings so that the pieces could be displayed in a state which reflected the maker's intent. The use of B-72 allowed a convincing appearance to be created with a coating which is easily reversible and unlikely to be mistaken for an original coating in the future.

Use of B-72 as a Saturating Varnish

The Nature of the Problem

An old varnish may appear dull, hazy and opacified for several reasons. The primary causes may be divided into two general categories; the contamination of the varnish (by soil and/or oily, waxy materials), and the physical degradation of the varnish (particularly by abrasion, light and oxidation). This paper will address only the latter causes and the treatments discussed assume that the varnish in question has been satisfactorily cleaned.

Dullness and opacity in a clean but aged varnish is typically due to a combination of fine surface scratches from wear, as well as to the degradation of the film by oxygen and light which may cause microscale surface roughness and very fine fissuring in the body of the varnish. Additionally, macro-scale roughness in the form of crazing, wrinkling, or crawling may result from exposure to combinations of light, heat and humidity.

The optics of finishes and particularly of degraded finishes is quite complex. As an aid to understanding the topic, the following simplified examples are provided. The primary concept to keep in mind is that whenever light passes from one material into another material with a different refractive index, some light will be reflected off of the surface between the two. The greater the difference in

refractive index between the two materials, the more light that will be reflected.

With a newly prepared finish the situation may be represented in highly simplified form as follows (*fig. 1*): Incidental light hits the finish and a certain amount passes directly into it, while a small percentage is reflected coherently and specularly. The higher the refractive index of the film, the higher the percentage of light reflected at the interface and the more brilliant the surface appears. The percentage of light reflected is dependent on the refractive index

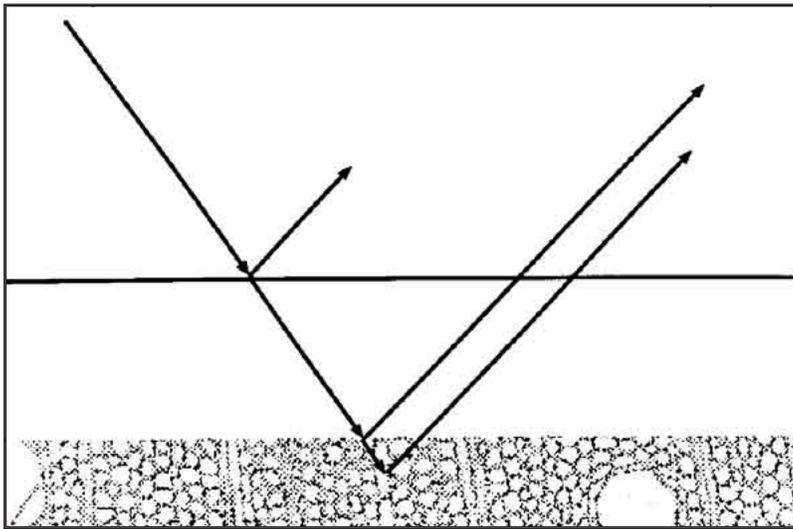


Figure 1. Schematic diagram illustrating the interaction of light with a new or un-degraded finish on wood.

of the varnish and on the angle of incidence of the light, but may be about 4–10% in typical conditions. The light that passes into the body of the film then hits the wood. Here some colors of light are absorbed and the remainder is reflected back to the viewer. The higher the RI of the film, the more transparent the wood will appear and the more depth it will appear to have. This scenario represents a finish which is glossy and transparent.

If the surface of an aged varnish is degraded, then a situation similar to figure 2 may exist. In this case, the incident light reflects off the rough surface at a variety of angles (is scattered), producing an overall hazy appearance. If the deterioration of the film also involves micro-fissuring and/or micro-delamination, the amount of light scattered increases dramatically. Each crack or disruption in the film is in fact two new surfaces, a varnish-to-air surface and another air-to-varnish surface. At each surface, a certain percentage of light will be reflected (as the disruptions in the film approach the size of wavelengths of light, true scattering of the light may occur) and this reflection will occur on the light's path in and

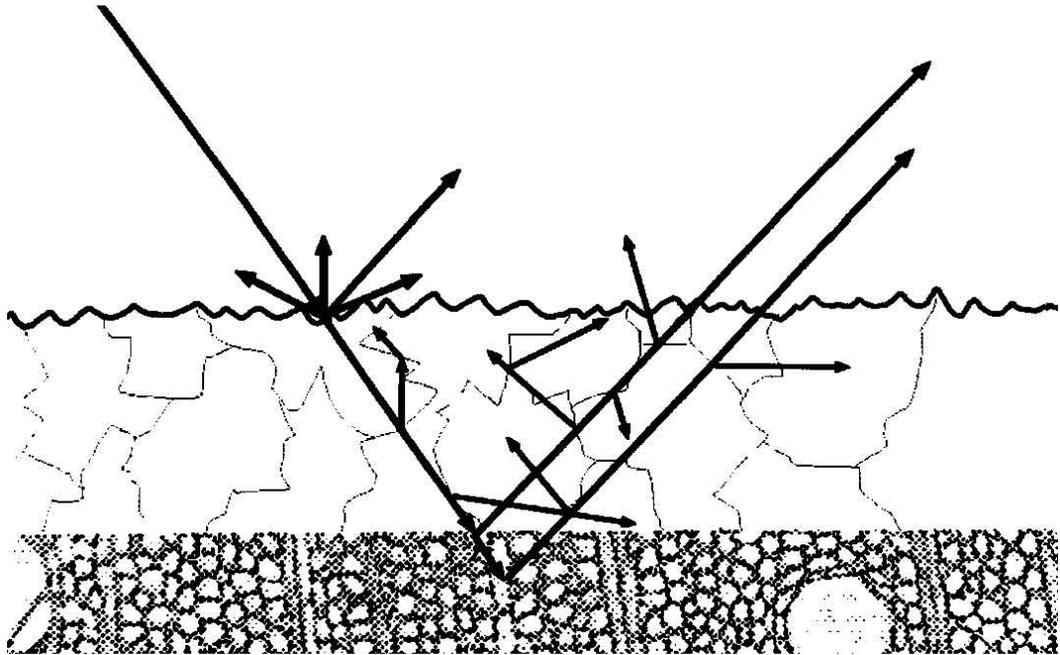


Figure 2. Schematic diagram illustrating the interaction of light with a degraded finish on wood, showing light scattered at the surface of the finish as well as at micro-fissures within the body of the film.

out of the varnish. Ironically, the higher the refractive index of the varnish, the more pronounced the reflection and scattering will be.

The Goals of Treatment

The first goal in treating a dull, hazy, and/or opacified varnish is to restore a measure of transparency and gloss, that is to say, to re-saturate the finish. This can be achieved by filling or otherwise eliminating the microscale roughness and disruptions in the varnish film. The process should be controllable, particularly with regard to the degree and quality of gloss imparted to the surface.

The second goal of treatment is to have a minimum of impact on the macroscopic surface characteristics of the varnish. This is particularly true in the case of original finishes. The surface of an original varnish may contain a considerable amount of information about the original appearance of the artifact and the working practices of the craftsman involved. Just as paintings conservators strive to avoid altering the impasto of an oil painting, the surface quality of an old furniture finish should be treated with care and with an eye to preserving the artist's, or in this case the finisher's, intent. In addition, the nature and quality of the wear on an older finish, as well as having a certain aesthetic desirability (particularly in recent years), can preserve evidence of the piece's history and patterns of use.

Third, the treatment should be both stable and reversible. As with any conservation treatment, the materials used should have good aging properties and the treatment should be able to be undone by future conservators.

Fourth, the treatment should not complicate or confuse the results of future scientific analysis of the aged varnish by introducing materials which might be confused with original materials if they are not completely removed prior to analysis.

A fifth goal in treatment is to produce a surface which can safely be waxed. This may not always be necessary, however there are several important advantages if this can be accomplished. First, the treated finish will not be adversely affected if it is waxed in the future by someone who is not familiar with the treatment history of the piece (waxing furniture is a common maintenance procedure and one which may be undertaken without consulting treatment records). This is probably most important for privately-owned works, but may be of importance in many institutional collections as well. Second, the wax layer may add a measure of additional protection to the underlying finish. Third and quite significant, the aesthetic qualities of a finish can be subtly, but significantly, enhanced by a coat of wax. A piece of furniture which has been waxed and buffed will show a subtly modulated gloss; higher gloss in areas of high relief and softer sheen in recessed areas and interstices. This is a natural characteristic of older finishes which have typically been waxed numerous times and selectively burnished by use and one which may be aesthetically desirable.

Common Treatments and Their Shortcomings

Wax

Cold and hot wax treatments are simple, low-impact, reversible, and aesthetically pleasing methods. In some instances, a simple waxing may be all that is necessary to re-saturate a moderately-degraded finish. In many cases however, wax is inadequate to restore satisfactory transparency and gloss to a more severely damaged coating.

Re-forming

The use of solvents to partially dissolve a degraded finish can re-saturate the coating by allowing dissolved finish material to fill disruptions and level degraded surfaces. If skillfully executed, this type of treatment can produce aesthetically excellent results, *i.e.* it can restore transparency and gloss without altering the macroscopic topography of the coating. Such results depend, however, on dissolving the finish just enough to allow it to flow on a micro-scale, but not so much that the surface “melts” and the quality of the old surface is lost. This requires achieving just the right balance of solvent strength, evaporation rate and quantity delivered to the surface. In practice, this kind of treatment can be difficult to control, particularly if the finish degradation includes fissures or disruptions which run through the thickness of the film. Additionally, this method runs the risk of embedding surface dirt into the partially-dissolved finish if the finish has not been thoroughly cleaned.

Re-coating

Traditional techniques of restoring gloss and transparency to degraded finishes often involve adding new, discrete layers of finish. There are many variations within this category of treatment; too many to attempt to catalogue here. They range from the most traditional (*i.e.* abrading the old finish and applying a new

coat of shellac or oil based varnish), to the use of synthetic resins alone, to the use of synthetic resin barrier layers over which traditional finishing materials are applied for their superior aesthetic qualities. Some such treatments may cause direct damage to the old finish, others may not be practically reversible without damage to the old finish, and in general, if a new film of appreciable thickness is applied over an old finish, the subtleties of the patina and surface topography are likely to be obscured.

Re-saturating with synthetic resins

The term “re-saturate” is used here to describe the application of a resin with the intent of filling microscale surface roughness and very fine fissuring in the body of the varnish, but without building an appreciable thickness of resin on the surface. The resin used is dissolved in a solvent which does not affect the old finish, such that the resin can be removed at a later date without damage to the degraded coating. Hans Piena (Piena, 2001) describes a method of re-saturating degraded finishes using Regalrez 1126 (a 100% hydrogenated low molecular-weight hydro-carbon resin). This method is highly effective at restoring transparency and gloss, it is readily reversible over the long term in extremely low polarity solvents, and has a minimum effect on the macroscopic surface features of treated finishes. Perhaps the single most significant limitation of this treatment is that it is not possible to apply wax over the Regalrez without disrupting and dissolving it. As mentioned above, the consequences of this are twofold. First, the treatment may be inadvertently compromised if the piece is waxed by someone unfamiliar with the treatment history of the piece, and second, the aesthetic benefits of waxing and buffing the re-saturated finish are not available as a treatment option.

Re-saturating with B-72 Technique

A technique for treating aged finishes which the author has found to be effective, expeditious, and versatile is to apply a thin re-saturating varnish of B-72 (acrylic copolymer) dissolved in Cyclosol 53, a very slow evaporating, 100% aromatic solvent manufactured by Shell. This technique assumes that the aged finish being treated is not sensitive to 100% aromatic solvents; spot tests should be conducted to ensure that this is the case. The application method shares more in common with traditional methods of varnishing a painting than with traditional methods of varnishing furniture (the method was introduced to the author by paintings conservators Jill Whitten and Rob Proctor of Houston, Texas). The goal is a very thin, very evenly distributed layer of resin which saturates the surface without forming an appreciable film of new material.

To accomplish this, beads of B-72 are dissolved directly into Cyclosol 53 to form a stock solution of 20% (w/v). This stock solution is further diluted with Cyclosol to form working solutions ranging from 5–15% depending upon the specific case. The author prefers to use a broad flat brush, such as the Omega Series 40, to apply the varnish. In contrast to a traditional furniture varnishing brush, these soft bristled brushes are not designed to hold large amounts of varnish. Rather, they are adapted

to quickly and evenly distribute a small amount of material over a large area. It is useful to have two or even three similar brushes on hand during varnish application. As always when varnishing, it is very important to work in a clean and well-ventilated space. Airborne dust should be kept to a minimum and solvent vapors should be efficiently extracted. The use of a respirator with organic vapor cartridges is highly recommended.

First, certain areas of the piece are selected to be varnished at one time. A relatively large area can be worked at once. For instance, on a typical chest of four drawers, one might chose to re-saturate the piece in six “sessions” the top, left side, right side, top two drawers, bottom two drawers, and front (blades, apron, and feet). Each session might require five minutes and the entire operation could be completed easily within an hour.

Once an area is selected, a small amount of varnish is taken up onto the tip of a dry brush. If too much varnish is taken up, the excess can be dabbed out onto paper towels. Working quickly, the varnish is spread at once over the entire surface. Brush strokes should be rapid, changing direction frequently. There is no need to brush only in the direction of the wood grain. In fact, it is preferable to brush in all directions, drawing and spreading the varnish, thinly and evenly over the surface. The surface should never be “flowing” wet. The quantity of varnish applied should be comparable to the amount which would be deposited if one wiped the surface with a solvent wetted cloth. If too much varnish is applied, one can use a dry brush to pick up some of the excess, drying the brush with paper towels as necessary.

Once the entire surface has been wetted and the varnish has been evenly distributed, constant multi-directional brushing should continue until the varnish begins to “drag” noticeably on the brush. This happens as the solvent evaporates and the varnish becomes more viscous. At this point (the so-called “no flow point”)one can either stop brushing and move on to the next area, or continue brushing the surface all the way to dryness. The former will result in a slightly more glossy surface, the latter will yield a slightly matted surface. If one changes to a dry brush at the “no flow point” the degree of matting can be increased. If the result obtained in a given area is not satisfactory, the varnish can be easily and quickly removed with xylenes on cotton swabs or wadding. The area can then be re-varnished almost immediately, making adjustments to achieve the desired result.

Once the varnish in one area has dried to the touch, other areas of the piece can be varnished in a similar manner until the entire piece is finished. The piece should then be left in a well-ventilated space overnight. The slow evaporating solvent will continue to off-gas noticeably for a considerable amount of time, sometimes in excess of 24 hours.

With a minimum of practice, a feel for this method can be developed, allowing the conservator to achieve a well-controlled degree of saturation and gloss. The

final appearance of the surface can be controlled by 1) varying the concentration of the varnish solution, 2) varying the amount of varnish delivered to the surface, 3) varying the amount and quality of brushing after the “no flow point,” and 4) waxing the surface (controlling the amount of wax as well as the degree and quality of buffing).

Advantages

This is an effective and expeditious way of reducing opacity and restoring gloss to aged, degraded varnishes. The long working time provided by Cyclosol 53 allows for a high degree of control by the conservator. The final appearance can be easily varied and adjusted. This method does not alter the macroscopic surface characteristics of the aged varnish. Nor does it introduce any materials which might be confused with original materials and thus complicate future scientific analysis.

The known stability of B-72 resin is an important advantage of this method (Thomson, 1963; Feller 1975; Down *et al*, 1996). The conservator can be quite confident that the re-saturating varnish will not yellow and will remain easily reversible in xylenes into the indefinite future. In practice, the treatment is extremely easy to reverse. This makes it simple and convenient to do sample areas for client approval, and also ensures that future re-treatment or re-interpretation will be possible and practical.

The aromatic solvents used have the advantage of not affecting the large majority of aged furniture finishes, while allowing the saturating varnish to be waxed. Inpainting and toning can be executed, removed, and re-executed over the B-72 layer using mineral spirit-soluble resins if desired.

Disadvantages

The refractive index of B-72 (1.482) is lower than that of most aged finish materials. The ideal re-saturating resin would have a refractive index similar to the finish being treated (the principle is the same in selecting an adhesive for glass; (Tennant,

1984)). As seen in the chart of common traditional finish components at left, B-72 is less desirable in this respect than Regalrez 1094 or other low molecular-weight synthetic resins used in paintings conservation. It will therefore be somewhat less effective at restoring transparency to a degraded and fissured finish than these other resins.

The relatively high molecular weight of B-72 and its resultant viscosity may cause it to conform to microscopically rough surfaces more than low molecular-weight resins (Whitten 1995). In this respect, it may

Information taken from Gettens and Stout, 1942; Horie, 1987; and Weast, 1976

Material	Refractive Index
Beeswax	1.442
B-72	1.482
Cyclohexanones	1.51
Regalrez 1094	1.519
Shellac	1.516;1.52
Colophony	1.525
Dammar	1.515;1.53
Copal	1.545
Mastic	1.536;1.547
Sandarac	1.545
Polymerized Oil	1.48-1.57

be somewhat less effective at restoring gloss to a degraded and fissured finish than these other resins.

Cyclosol 53, as a 100%aromatic solvent, is hazardous to human health and must be used with caution. It is a blend of solvents and the manufacturer (Shell) does not provide exact content description, but the primary component is tri-methyl benzene. The rest of the ingredients seem to be other poly-methyl and ethyl substituted benzenes. The Material Safety Data Sheet and a considerable amount of Internet searching indicates that tri-methyl benzene has not been thoroughly tested for health effects, but it is certainly in a class of compounds that demands careful handling, at least at the level that one would handle toluene. One advantage of the slow-evaporating nature of the solvent is that it releases solvent vapor into the air at a relatively slow rate and is possibly easier to contain with ventilation than xylene or faster-evaporating solvents.

Two Case Studies Discussed Victorian Chest and Dresser

An American dresser and a bedside cabinet dating to the 1870s came in for treatment to the laboratory of Robert Mussey Associates (*fig. 3*). The pieces had a very thick and syrupy (a descriptive, if not technical, term) pigmented overvarnish covering the original finish. As it turned out, the overvarnish was probably a cheap rosin or colophony-based varnish and it was removable with a moderately polar solvent blend which did not dissolve or disrupt the original varnish (*fig. 4*). Once the overvarnish was removed, the original varnish was revealed in virtually



Figure 3. American bedside cabinet ca. 1870, before treatment.



Figure 4. During treatment, with overvarnish removed from right side.



Figure 5. The right side door has been saturated with B-72 varnish.

much more effective. Figure 5 shows the lower door on the right side coated. The saturation and clarity returned, and there was generally a substantial improvement in appearance. After cleaning and re-saturating (as well as filling and inpainting) both pieces, the author noted that the gloss appeared unnaturally even across the finished surfaces. The recesses and molding coves were nearly as glossy as the flat and raised surfaces. This resulted in a finish which appeared discordant with the overall age and condition of the pieces. The pieces were then waxed and buffed and this brought a modulation to the gloss of the piece which subtly but significantly improved its appearance (*fig. 6*).

the same condition it was in when the overvarnish was applied, probably 75 or more years before. The finish was somewhat dull and had all of the marks and scars of use and abuse, but it also preserved much of the evidence of the surface as it had been prepared in the factory where it was produced. The thickness of the original finish was essentially unchanged. The overall level of gloss of the original finish could be gauged by observing several well-protected areas. The degree to which the pores of the wood had been filled by the original finisher was plainly evident, as were the traces of the finisher's brushstrokes. All in all, the original finish had been remarkably well preserved (in fact, the poor quality overvarnish had probably contributed to its preservation by protecting it from abrasion, oxygen and light for a great many years). The newly-recovered surface did, however, appear somewhat dull and hazy. It may well have been this condition which prompted the re-varnishing of the piece in the first place.

An unsuccessful attempt was made to re-saturate the finish with wax. In this case, simple waxing was not enough. A thin saturating varnish of 8–10% B-72 in Cyclosol 53 proved



Figure 6. American bedside cabinet ca 1870, after treatment.

It should be stated that the taste for a modulated gloss is clearly a matter of aesthetic judgement. It has more to do with the appearance one expects of an old but well-cared-for piece of furniture than it does with a faithful recreation of the original appearance (the author is not aware of any specific evidence that these pieces or ones like them were, or were not, waxed as part of their original finishing program). In this regard, tastes may change or an alternative interpretation may be desired in the future. Since it is so easily reversible however, the use of the B-72 saturating varnish allows for unrestricted re-interpretation of the pieces in the future. For example, all saturating varnish and wax could be easily removed with xylenes and the piece could be presented “as is,” with what one might call an “ethnographic” or “archaeological” aesthetic. At the other extreme, all the wax could be removed with an aliphatic solvent and filling and inpainting could be carried out fully and extensively in order to convey as much as possible the original appearance of the piece.

Massachusetts Fall Front Desk

A coastal Massachusetts fall front desk (*fig. 7*) with an old, badly-degraded, but probably not original, finish came in for treatment to the laboratory of Robert Mussey Associates. The finish was badly crazed, fissured and very dirty, especially on the top. It was hazy overall and had lost much of its transparency. The client was a small historical society which had limited resources to commit to the conservation treatment of the desk. Visible and ultra-violet examination of the finish suggested that the upper layer was an aged oil-resin varnish. However, due to budget constraints, no finish analysis could be conducted to determine more precisely the number and nature of finish layers present, or the nature of the original finish. Given these conditions, it was decided to simply attempt to clean and re-saturate the existing varnish in accord with the goals of treatment as outlined above.



Figure 7. Coastal Massachusetts desk before treatment showing dirty, hazy surface (detail).

First, aqueous cleaning methods were used to remove soil and oily, waxy materials from the surface. In this case, tri-ammonium citrate solutions were found to be effective. After cleaning, the finish remained quite dull and hazy. Again, an application of wax was not enough to bring back an acceptable level of gloss and saturation. Several tests were conducted to see if B-72 in Cyclosol 53 could be an effective saturating varnish on this piece. Different areas of the case were brushed out with different concentrations of varnish and using different brushing methods. These areas were evaluated with the client and a test area was selected which yielded a pleasing balance of saturation, transparency and gloss. The test areas which were not selected were cleaned up with xylene on cotton wadding. The selected test area, on the left



Figure 8. Coastal Massachusetts desk after treatment with B-72 re-saturating varnish and wax (detail).

side of the case, was left for reference as other sections of the case were varnished using the selected mixture of 15% B-72 in Cyclosol 53. The interior of the desk was not as badly degraded and could be successfully saturated with lower concentrations. When the entire desk had been treated except for the left case side, the reference test area was also removed and the side was re-saturated as a whole. The saturating varnish was allowed to dry overnight, and then waxed with paste wax and buffed. Along with minor inpainting and filling, this treatment produced an attractive appearance which retained the aged

“patina” of the old finish (without the look of a reformed, abraded or padded surface) while returning a measure of gloss and transparency (*fig. 8*). This is also a remarkably expeditious method and the client historical society seemed very happy with the relatively low cost of the treatment.

The Use of B-72 as a Binder for Reproducing Lost Paints and Stains

The ability of B-72 coatings to be waxed has been found to be very useful in several cases where lost paints and stains were to be reproduced. Two such cases are briefly presented below.

18th-Century Portsmouth, New Hampshire Chair

Figure 9 shows an early 18th-century Portsmouth, New Hampshire chair which came into the studio completely stripped of all paint and varnish (how it came to this state, one shudders to guess). There was evidence that it had originally been painted red with earth pigments and some cross-section analysis had been done in the conservation laboratory of the owning institution. It was considered an important enough piece that the donor and curator wanted to put it on display in the galleries and they wanted to show it as it “should look.” This, of

course, could mean a lot of different things. It could mean, “like it looked when it was new.” It could mean, “like it looked ten, twenty, or a hundred years after it was made.” Or it could mean, “like it might have appeared right before it was stripped.” There are many judgements to be made in a case like this. These are curatorial decisions to be based on the information that the curator wants to present in the context of the specific exhibition situation. For the conservator then, the goal is to present a convincing appearance based on the curator’s desires, but also to do it:

- in a way that will never be mistaken for original
- in a way that will be easily reversible
- in a way which will not interfere or complicate any more advanced analytical work which might be done in the future.

In this case the donor and institution wanted to present the appearance of an aged and patinated original red paint. The author chose to formulate a base paint/stain using powdered pigments and B-72 in Cyclosol 53. This gave a long working time so that the application technique was prob-



Figure 9. Portsmouth chair, before treatment, with virtually all original paint stripped.



Figure 10. Portsmouth chair (detail), after treatment with B-72 based paint and wax based patination.

ably similar to that of the original oil-based paint. The working properties, brush strokes, evenness, and flow were quite controllable and the slightly grainy appearance of the hand-mixed paint was, one hopes, reasonably authentic. In this case a rather lean mixture was used (about 10% B-72). The result was fairly matte and could be conveniently abraded back with steel wool and burlap to give the appearance of wear. Then 4–5 different mixtures of gray to brown to black powdered pigment in paste wax were applied. These layers were brushed on, stippled on, wiped, layered, rubbed, blended, melted with hot air, etc. to add “layers of age and soil” to the surface. The appearance seemed appropriate and in line with the clients’ desires (*fig. 10*).

This method fulfills our goals as conservators. It will not fool any one. Aside from its appearance under close visual inspection, it is dead black under ultraviolet illumination. Spot test-cleaning with xylene will go straight to the wood in seconds. It is in fact, completely removable in xylene without affecting the remaining traces of original evidence. If and when the next curator decides to display this chair closer to its original appearance, the current treatment can be com-

pletely removed very quickly and easily. This high degree of reversibility is also a big advantage, as mentioned before, because it makes it so easy to do a series of sample areas (with varying proportions of solvent, resin and pigment) and then simply wipe them up and do them again. If one subsequently makes a blunder in the layering of the pigmented waxes, it is simple to remove the offending layers with aliphatic solvents and start over without affecting the B-72 based stain layer. In general, the author found the working process to be quite convenient and controllable and the results to be aesthetically satisfying.

Early 19th-Century Portsmouth Chest of Drawers

A similar treatment was carried out on an early 19th-century Portsmouth chest of drawers, owned by a private collector. In this case, historical sources were consulted and substantial analytical work was carried out to determine that the birch top and case of the piece had originally been “mahoganized” with an oil-bound pigmented stain. The stain had been virtually entirely stripped away at some point in the past, and survived only as traces in protected areas. As with the previous example, a curatorial decision was made to replace the now-missing stain in order to present the piece in a manner consistent with the maker’s intent. Figure 11 shows several test areas of mahoganizing stain prepared with B-72, Cyclosol 53, and powdered pigments. In contrast to the previous example, the client’s final desired appearance for this chest

was considerably closer to the “original appearance.” Thus, less patinating and toning were carried out using pigmented waxes over the base stain. Again, the client was able to view the test areas and make a curatorial decision (based on the



Figure 11. Portsmouth chest with sample areas prepared using B-72 based “mahoganizing stain.” Sample areas can be prepared and removed easily and quickly until the desired color, density, and gloss are achieved.

physical, technical and textual evidence) regarding the color, gloss and density of the reproduction stain. The final result (*fig. 12*) restored the appropriate color and contrast relationships to the piece in an ethical and aesthetically appropriate manner.

Conclusions

Paraloid B-72, when used with a very slow-evaporating 100% aromatic solvent such as Cyclosol 53, can be a useful and desirable resin for re-saturating degraded furniture finishes as well as for formulating ethical and aesthetically pleasing reproduction paints and stains. When applied in the

manner described, a thin re-saturating varnish of B-72 can restore transparency and gloss to a dull, hazy and opacified finish while having a minimum impact on the macroscopic surface characteristics or patina of the old, degraded varnish. The treatment is stable, reversible and, with practice, quite controllable. It is unlikely to complicate or confuse the results of future scientific analysis. In addition, B-72 re-saturating varnishes can be safely waxed which has both practical and aesthetic benefits.

Reproduction paints and stains formulated with B-72 and Cyclosol 53 have good working properties and can produce aesthetically desirable results. These coatings are easily reversible, clearly distinguishable by simple means from original coatings, and should not complicate or confuse future scientific analysis.

These uses for B-72 and Cyclosol 53 also have their limitations and hazards. The refractive index of B-72 resin is lower than would be ideal for most applications. Likewise, the molecular weight of the polymer is higher than ideal. Furthermore, 100% aromatic solvents such as Cyclosol 53 must be handled with care due to the health risks posed by their use.

The observations and opinions presented in this paper are based primarily on the limited personal experience and knowledge of the author. Further study could clarify and expand on this work. Detailed technical investigations into the microscale features of degraded finishes and the optical effects of re-saturating varnishes could be extremely useful in guiding the further development of treatment methods. Similarly, detailed technical investigations into the aging characteristics of these treatments could confirm or deny the author’s assumptions



Figure 12. Portsmouth Chest after treatment, with appropriate color and value relationships restored.

regarding their stability and reversibility as well as their “non-complicating nature” in relation to future scientific analysis. In addition, alternative resins or resin combinations could be investigated which might combine the benefits of resistance to waxing with low molecular weight and high refractive index.

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Materials

Paraloid® B-72 (formerly called Acryloid® B-72) a copolymer of ethyl methacrylate and methyl acrylate. Rohm and Haas Co., Philadelphia, PA. 19105

Cyclosol 53 (formerly called Cyclosol 100) slow drying aromatic solvent blend, including trimethyl benzene. Guard-All Chemical Co., P.O. Box 445, Norwalk, CT 06856, 203 838-5515; (To obtain product literature from manufacturer: Shell, 3200 Southwest Fwy., Suite 1230, Houston, TX 77027, 800 457-2866). Available from Conservator’s Emporium 100 Standing Rock Cir., Reno, NV 89511, (775)852-0404, Fax (775)852-3737.

Omega Series 40 Varnishing Brushes. Available from Peregrine Brushes & Tools, 41 N Center, PO Box 200, Wellsville, UT 84339, (435)245-5830.

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