Stained Glass Association of America Silent Auction
at the 2014 Annual Summer Conference

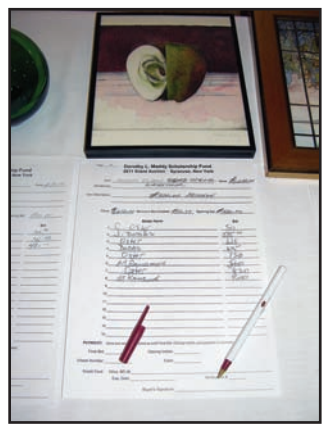
Call for Donations to Benefit the Dorothy L. Maddy Scholarship Fund

The Silent Auction at the SGAA Summer Conference is always a very popular event. Attendees can bid on various items and the competition for favored books, hand-made jewelry and historical items adds excitement to the conference and friendly banter to conversations.

More importantly, 100% of the proceeds for the 2014 Silent Auction will benefit the Dorothy Maddy Scholarship Fund. Over the last few years, the Dorothy Maddy Fund has awarded more than $12,000 in Scholarships to various individuals for attending classes and workshops, as well as an academic scholarship to a student at the University of York in England, and a scholarship to a student at Willowbank School of Restoration Arts in Ontario, Canada to participate in a study on restoration and preservation.

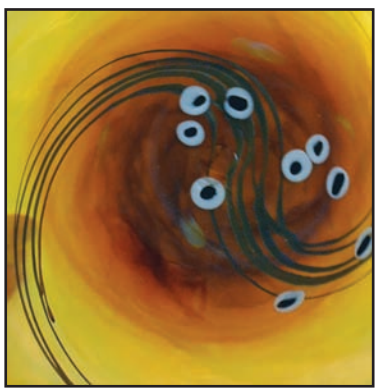
In our ongoing effort to provide scholarships and educational programs, the Stained Glass School is reaching out and asking for your support in the form of donations of items for the 2014 Silent Auction.

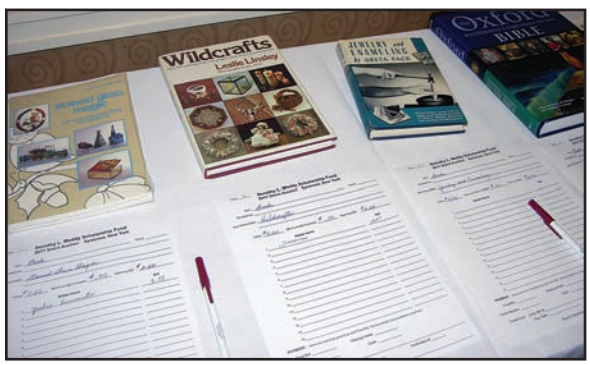
Here Are Some Ideas for Silent Auction Items



Books; Historical Items; Specialty Tools; Blown Glass Vases; Odd Bag of Jewels; Glass Bevels; Gift Certificates for Product; Gift Cards to National Chain Stores (one of our members uses reward points on their Credit Cards to purchase Gift Cards to donate); Classes and Workshops; Museum Passes (Corning, Toledo, Nelson-Atkins, etc.). We are especially seeking anything hand-crafted by our members, readers, and supporters, such as Jewelry, Original Art, Original Color Sketches, Small Panels, Fused Pieces — *these hand-crafted items create serious competitive bidding!*

If you would like to donate, please bring your items to the Conference Registration Table or pre-ship by May 15, 2014, to: SGAA Headquarters, Attn: Silent Auction, 9313 East 63rd Street, Raytown, MO 64133. Contact the SGAA Headquarters at 800.438-9581 or *headquarters@sgaaonline.com* with any questions.





The Dorothy L. Maddy
Scholarship Fund

I would like to introduce you to Dorothy Maddy. It is important that people know who she was and what she did to merit having a Scholarship Fund established in her name by the Stained Glass Association of America.

To begin with, I know that you would find it easy to be friends with Dot. She was bright and had a quiet, sparkly personality all her own. When you talked with her, she listened intently to what you had to say. At heart, she was basically a teacher; she always wanted to learn every technical and artistic nuance of stained glass. Her intention was always to pass on what she knew to anyone who might want to learn.

When The Stained Glass School was first established in North Adams, MA, she attended classes from 1977 to 1979. Dot studied the art of stained glass painting with Richard Millard and Albinas Elskus. It was also then that she became a member of the Education Committee of the SGAA. She moved her Tree Top Studio from St. Louis to New Jersey and then to Scottsdale, AZ, in 1980. In Scottsdale, she established her credentials with a steady stream of articles on glass paints and painting that were published in The *Stained Glass* Quarterly, *Glass Art*, *Glass Craft News* and *Professional Stained Glass*.

Dot demonstrated stained glass painting at all of the stained glass shows from 1983 through 1990. During the many hours that she spent teaching, she was ever the attentive and friendly teacher; she was never too busy to answer a question or to demonstrate a different technique. Dorothy became a teacher with a national classroom, holding classes at the major retail dealers throughout the country.

When the SGAA decided that a *Reference and Technical Manual* was needed as a basis of reference for the teacher-certification program, Dot was in charge of the chapters on painting and silk-screening. With the help of experts she selected, Dot was able to put together a lucid and encyclopedic reference chapter; her efforts are still a real service to the stained glass family. When a second edition of the *Reference and Technical Manual* was undertaken two years later, Dot again — as her last major SGAA project — improved and polished all the information to bring forth an even more complete work.

Mindful as she was of the power of teaching to elevate an art, Dot always remained true to her vision of making stained glass painting more accessible to all who desired her help. Dorothy Maddy knew that education will always help the artist create finer work; that is the basic reason for the Dorothy Maddy Scholarship Fund.

Frank L. Reusché

Find out....

...more about the Dorothy L. Maddy Scholarship Fund by visiting stainedglassschool.org or calling 800.438-9581.

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...about other SGAA scholarships at stainedglassschool.org.

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...more about the SGAA's annual silent auction by calling the SGAA Headquarters at 800.438-9881.

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...more about Dorothy L. Maddy's writing and teaching in the article "Silver Staining," which begins on the next page and is reprinted from the Fall 1984 issue of The *Stained Glass* Quarterly.

Silver Staining

by Dorothy L. Maddy, 1984

Silver stain is a product with a process that has intrigued all those who are familiar with its marvelous transparent gold quality. It is unlike glass stainer's paints or transparent enamels in that it penetrates the glass and becomes an integral and permanent part of the chemical structure of the glass. However, much of the origins of this phenomenon are cloaked in mystery.

We do have some idea of when silver stain was first used, but very little seems to be known of how this unusual process was first discovered.

There is evidence that silver stains were used in pottery glazes in ancient Persia and eventually were introduced to Europe by the Spanish Moors;[1] but our concern is with its use on glass, which, in turn, inspired the name for a whole industry. In this case, the fourteenth century is the era of its inception, with a window in York, England, ca. 1306, claiming the honor as the oldest example of "stained" glass.[2,3]

How "stained" glass came to be is indeed a mystery. Once apocryphal story tells of a silver button falling from a glazier's jacket onto a piece of glass. After being heated in the kiln, the glass had turned yellow, thus giving the world its first known piece of truly "stained" glass.[4] (Although this is possible, there is a more practical procedure, as we shall see later.)

Since the action the silver stain has on the glass is a chemical one, we can conjure up enigmatic visions of an alchemist at work in his medieval laboratory. Was this discovery perhaps a happy accident that occurred during his search for gold as the elixir of life? By the fourteenth century, most alchemists had given up, but a few zealots were still pursuing this age-old quest. Was it alchemists in the employ of European kings who, in the hope of saving kingdoms and fortunes, pursued the challenge of changing lesser metals into gold? Silver stain certainly achieves the color of this elusive pursuit!

Orange #1 Silver Stain by Reusché and Company of TWS, Inc.

All of these alchemists were generally sincere investigators who faithfully employed true experimental methods. Further, they are credited with substantially advancing the chemistry of metals and alloys. Perhaps it can then be surmised that they had a hand in our silver stain story. If so, we are indeed in their debt. If not, we are even more mystified as to its beginnings.

Regardless of its origins, it was the first product that truly freed the glass painter from the use of lead lines as a means of separating glass colors. Areas of vivid yellow or golden color could not be isolated within a given piece of clear glass.

We can only contemplate with awe the excitement this discovery must have generated in the glass community. Although the origins are cloaked in mystery, some early procedures for making silver stain are known. Many of these recipes have been recorded,[6] even one that suggests you may start with "any broken articles of hallmarked silver!" Modern methods are a bit more sophisticated and, through the years, some of the ingredients have been altered to produce a more uniform product.

Chemistry

Today's silver stain is made up of several different silver and copper salts, plus a mixture of iron oxides that act as a carrier during the chemical action that takes place when the glass is heated. This carrier also allows the manufacturer to dilute the amount of silver salts in the finished product, making it available in different strengths, ranging from pale yellow to dark amber. As an added, incidental feature, the color of the oxides makes it easier to see where one is staining.

The glass itself is made up of glass formers such as silica, lead, and boron.

These, plus oxygen, form a linkage, or network, within the glass much like an irregular fishnet. The spaces in this network contain ions of sodium and calcium. It is to these areas that the silver ions migrate (as the heat drives the sodium out of the glass) through a process known technically as ionic exchange. In other words, a transfer situation takes place between the silver in the stain and the sodium in the glass. The iron oxide mixture acts as a carrier, or "sump," for the sodium, which is eventually washed off the glass after it has cooled.[7]

Metalizing

As the glass is heated, it can absorb just so much of the silver salts. Therefore, the amount of silver stain applied and the degree of heat can be very significant. Once the glass has absorbed the maximum amount of silver in the ionic transfer mentioned earlier, any excess will remain on the surface and leave an iridescent coating that is referred to as "metalling" or "metalizing."[8] This metalizing also causes the glass to be less transparent than is desirable. A little metalizing is not of much concern, but a heavy coating can be opaque and very unpleasant. It can be avoided by either a lighter application of the silver stain and/or by reducing the degree of temperature during firing in the kiln.

Glass

The composition of the glass used can have a marked effect on its reaction to the stain. It is recorded that some of the glass made in England prior to, and including, the sixteenth century was of a composition that readily stained a very rich yellow.

However, near the end of that century, the use of wood ash in the manufacture of glass was prohibited due to the depletion of the forests. As a substitute for the wood ash, kelp (from seaweed) was sometimes used. This type of glass had a remarkable staining power, resulting in an orange stain which could be deepened to a ruby red with repeated firings.[9] A piece of this glass would be an exciting find, indeed.

In general, though, the best glass for staining would be clear glass of almost any type. The softer glasses, such as antique, semi-antique, and new antique will have a lower temperature requirement (1050°F) than the harder flints or window glass. The latter do very well at 1100°F and work well for initial projects.

If you are working with "float" glass, which constitutes the majority of today's window glass, you may encounter some discrepancies in staining power. Float glass is highly vulnerable to chemically produced effects such as staining. In the manufacturing process, the glass is "floated" on a bed of liquid tin. This is done so that the surface of the glass is bright and shiny without the need of any additional polishing. Some tin remains on the glass, and this side will not stain well if too much tin is retained.

If you have any window glass that creates an inconsistent or stubborn staining situation, you can test it using a shortwave ultraviolet light. This is the same type used to determine the presence of phosphorescent minerals in rocks. Your local rock shop can help you here. When you shine this light on the glass in a dark or semi-dark room, you will see an opaque milky glow on the tin side. You would then stain on the opposite side. Incidentally, this situation can also be true when firing transparent ruby or carmine enamels on float glass, since they contain amounts of gold, which are also affected by the tin on the glass. Either the ruby or carmine color will fire to an orange-brown color on the tin side.

Silver stain can also be effective on various kinds of lightly tinted glass; even a mix of colors can be achieved on some types, e.g. silver stain on blue glass produces a green area. However, this is not consistent from one color or one sheet of glass to the next. All glass should be tested first. This is a hard rule to follow, for it takes time. But, be assured, it is a rule that will save both time and frustration.

Flashed glass stains best on the base-glass side, although this is not a hard-and-fast rule, either. Each side can offer different effects, and it is worth testing to be aware of the difference. Stain applied on the base side of flashed glass offers even more opportunities for interesting color changes.

Regardless of the type of glass used, before staining — or doing any glass painting for that matter — the edges of the glass should be stoned to avoid ruining your brushes as well as your fingers. (Those razor-sharp edges can ruin a brush with one stroke.) The glass should then be cleaned thoroughly.

Stains

There are several silver stain mixtures from which to choose, and all are sold in powdered form.[10] They are identified as: Yellow Stain #3, Orange Stain #1, Orange Stain #2, Orange Intense Stain, Amber Stain. These vary in depth of color and price, in the order given above, with the lightest and, therefore, the least expensive at the top. The widest ranges of intensity are possible with the Orange Intense Stain and the Amber Stain. Of the two, Orange Intense is cheaper and offers an excellent depth of color for most purposes, and it works very well on float glass. Its color range can be lightened by thinning it and/or using a lighter application. However, even the Yellow Stain #3, which contains the least amount of silver, and, therefore, costs the least, can be intensified with the addition of certain materials (as discussed in a later section).

Whichever stains you decide to use, a few ounces will last a good while. They keep indefinitely, and a little goes

a long way. It helps to store them in dark glass jars with tight lids. Dust and dirt are enemies of all glass paints.

Tools

You will need a ground glass palette made by lightly sandblasting a ¼" thick piece of plate glass. This palette should be used exclusively for stains. One that is 10x10" is usually sufficient, unless you are planning on using a very large amount. However, this is rarely the case. Silver stain is best used for highlighting, accenting, and dramatizing small-to-medium-size areas. After all, if it's a large area, a piece of yellow glass would possibly be more appropriate.

A stainless steel palette knife is necessary since the stain will corrode any other metal. A plastic one is even better, since the stain can be allowed to dry on this as well as on the palette. You will then not be washing your expensive material down the drain. If you keep these covered and clean, you need only to reconstitute the dried stain with the water the next time.

If you do other glass painting, it is advisable that you have a separate blender and brushes for silver stain. Ingredients in the stain are very corrosive to ALL painting tools containing metal. These should always be cleaned carefully soon after use. In spite of a good cleaning, it is important that these brushes not be used for other glass paints, as they can contaminate each other, no matter how clean they may seem.

If you stain only occasionally or are just beginning, it is not necessary to invest in an expensive badger blender for staining. The blending of stains does not require the finesse that is necessary when matting. You may want one eventually; the 2" size is usually adequate, depending on your individual requirements. In the meantime, an inexpensive "sumi" brush will also do a fairly good job. This is a wide, flat, bamboo-handled brush with white hairs, and is found in most art supply stores. It is available in several widths, and, again, the 2" size is recommended. Cut the tapered tips off just a bit so they are very even. Remember: It is advisable not to use your good badger matting blender for staining!

You will also need a few applicator brushes of various sizes. These can be any soft watercolor or tracing brushes. Of course, they, too, should be used exclusively for silver stain. Tape a piece of yellow plastic tape on all your silver staining tools for easy identification. Some stiff-bristle highlighting brushes, a small wooden stick, and cotton swabs will complete your tool requirements for basic staining.

Note: This article assumes that you have had some exposure to glass painting and kiln firing, although it is not a necessity in order to do silver staining; but, for information not covered in this article, you may want to refer to *Stained Glass Painting*, by Anita & Seymour Isenberg and Richard Millard or *The Art of Painting on Glass*, by Albinas Elskus. *[Editor's Note:* The Art of Painting on Glass, *by Albinas Elskus, is available through the SGAA Headquarters; visit* stainedglass.org *or call 800.438-9581.]*

Mixing

Now you are ready to mix your stain. Place about one level tablespoon (about ½ oz.) of stain on the ground glass palette. The composition of the stain is such that gum arabic is not needed. In fact, if you should add some, it would make it almost impossible to remove the stain when outlining or highlighting. Just add water and mix thoroughly with the palette knife.

The manufacture of stains is now so refined that it is rarely necessary to grind the mixture with a muller. It usually has a nice, soft, smooth feel to it very soon after mixing with the palette knife. Continue mixing until you are sure it is very smooth, adding small amounts of water as you go.

You will want to add more water as you saturate your brush with the stain. A mixture with the consistency of thin cream will get you started. Brush this onto the glass, laying on as much as desired. The thickness of the mixture applied depends on the effect or intensity you wish to achieve. If the application is too thin or too watery, it will barely stain the glass, no matter what temperature is used in the firing.

If it is too thick, it will be difficult to blend and highlight, and will probably cause metalizing even at a low temperature. You will need to practice and test several pieces to become familiar with the ideal consistency for the desired results. The stain can be brushed on without blending; it is better if blended (at least a bit), unless you want the variation in color that the original brushstrokes will create.

The blending can be handled in the same manner as that of matting with glass stainer's paints. That is, it can be blended smoothly, resulting in a very even coloration after firing. Unlike matting, it is not necessary to worry if a few surface brush strokes remain; they will rarely show in the finished piece. You can also blend by shading from dark to light with very dramatic color changes. Stop blending before the stain is too dry. (Do not try to touch up with additional stain once the original application is dry. If the error is considerable, you are better off wiping it off and redoing that area.) Any highlighting or cleanup is easier if the stain is still damp. But, if it is too wet, disturbing it will negate the blending. In this case, let it dry a bit until just damp. If it is too dry, it will be difficult to remove. A damp, but not wet, cotton swab is a good cleanup tool. It is also helpful to use the warmth of your breath to soften the stain. Breathing on small areas at a time will make it more workable.

The same type of highlighting brushes and tools used for matting are also used for silver stain, although, again, it is recommended that you have a separate set

for staining. Be very sure you have cleaned off any stray spots of stain from the glass, as these will make a yellow mark in unwanted areas.

Usually you will be applying stain to the glass on the reverse side of any tracing and matting. This need not always be the case, but silver stain should never be applied over another paint. Knowing that it actually stains into the glass, you can now understand that any other paint would cause an interface. The chemical transfer could not take place, and you would end up with a mess, since the iron oxide carrier would fuse with the base paint.

If you are working with enamels, this rule also holds true. But you can obtain some excellent results by using transparent enamels over the stain after the stain has been fired. Some of the ruby or carmine colors, for instance, painted over a stained area, will produce a lovely peach glow.

It is also possible to mix any of the silver stains with an oil medium. You would add Squeegee Oil #175 to the powdered stain, mixing on the palette to make a paste. Turpentine is then added to dilute this mixture to the proper consistency for application. Painting Medium #270 can also be used. This medium is thinner, as it already has turpentine as a base. Either of these oil mixtures will give a nice, even flow, although it's a bit more difficult to blend for tonal effect. It becomes a matter of personal preference whether you use oil or water. You should try more than one and become familiar with their features. When using any of the mixtures, be sure to clean your brushes carefully after use.

Firing

The kiln shelf should be prepared with a 1⁄16" – 1⁄8" layer of clean whiting. The best whiting I have found is Pfizer's Vicron 15-15, but there are also others that will do a good job. The finer the powder, the better. Whiting is relatively inexpensive and available at most paint stores. Sift the whiting on as evenly as possible. Holding the glass by the edges, carefully set your stained pieces on the whiting. If you gently press it a bit, as you set it down, it will flatten out the whiting.

I have recently also had excellent results using some of the new kiln washes developed for fusing glass.[11] These eliminate the need for whiting when firing glass paints and do not leave any residue on the paint when fired face

After firing, the glass initally looks very much the same as it did before firing. This is because the iron oxides do not burn off but must be washed off after the glass is fired. This piece was painted and stained at the SGAA Stained Glass School's recent Stained Glass 101 Workshop *for beginning stained glass painters.*

This is the same head as shown on the previous page after the iron oxides are washed off.

down. It is brushed on the kiln shelves as a liquid and needs to be redone only if it chips or becomes contaminated with any paints or stain.

You may choose to fire your stain at the same time as the tracing and/or matting. If so, fire the stain-side of the glass face down on the kiln shelf. The tracing-side should be fired up. You will need to fire this to about 1250°F to correctly fuse the trace and matting paints. If you are using this method, do not put the stain on too heavily or you could get some metalizing due to the higher temperature. Also, when firing the stain face down, you definitely should use whiting, since it must be replaced after each firing or the next piece of glass will pick up some of the stain residue.

If you prefer to fire your tracing and matting alone, then the silver stain can be fired face up in the second firing at 1050°F – 1100°F. It will depend on your kiln and the type of glass you are using. As mentioned earlier, as a rule, the softer glasses will take the stain more quickly. Float glass will probably require 1100°F. Each kiln has a personality of its own, and you need to become acquainted with it. Like people, it can change with time, so it should be checked occasionally using cones. A small #020 cone will bend at 1231°F, and it makes a good check point for setting your pyrometer.

Regardless of the final temperature, the glass must be heated slowly. During the preliminary warm-up, the kiln must be vented sufficiently to provide a slow rise in temperature and avoid a reducing atmosphere. That is, there needs to be an adequate exchange of air in the kiln. Prop the door up, or open, at least 1" (or more if a very large kiln), turn the controls to low, and fire until the pyrometer reads about 600°F. This could take between one half-hour and two hours, depending on the size of the kiln and the amount of glass being fired. In any case, it should not be rushed. Now, close the door or lid, turn the control to high, and heat to about 1050°F. Turn the kiln off and vent the kiln until it reaches 1000°F (no less, or you will be in the annealing range). Close the door or lid and let it cool completely; again, no peeking.

If your kiln does not have an automatic shut-off, a small timer is a wise investment to remind you when the kiln needs attention. It is easy to get distracted during firing times. Now for the fun part — although it is at this stage that many beginners feel they have failed. When the glass is cooled and removed from the kiln, it will look the same as when it went in. The iron oxides do not burn off. They must be washed off, either with a damp sponge or at the sink under running water. Rubing with the sponge will remove any stubborn spots. Dry the glass, and hold it up to the light. If you've done your job well, it should be a beautiful transparent yellow or golden color. Don't worry if you have some light metalizing on the surface. This will show only in reflected light, and a minimal amount is not objectionable. If there is enough metalizing to reduce the transparency to a great degree, you will probably elect to redo the piece. Now that you know how, you

won't mind (and it will be good practice). Remember to use a thinner application of the stain or a lower kiln temperature. The glass has just not been able to absorb all of the silver that was available to it.

It is important to mention that, since you are aiming at a high level of transparency, you must be attentive to retaining a good deal of this quality when matting on the front side with the glass stainer's paints. Use strong highlights, especially in these areas, or your staining efforts will be less effective.

Additives

Once you have achieved a certain level of control with both the flexibility and dependability of your staining, you are now ready to try to manipulate the colors.

I have never found that it was overproductive to try to intensify the color by subsequent firings, since the outcome is so dependent on the type of glass used. You can, however, reapply the stain and re-fire; here again, metalizing can be a problem unless careful control is exercised. Rather, I would recommend using a stronger stain, such as Amber Stain, for the initial application.

Sodium sulphate can also be used to intensify the color of the basic stain. For instance, if you use Yellow Stain #3, you can raise the color level to some degree of Orange Intense. This has limits, of course, depending on the glass used, the level of application of the stain, and the kiln temperature.

Sodium sulphate is sold in powder form and can be purchased at a chemical supply house. Try to buy a small quantity, as you do not use much at a time. The amount you use will depend on the color change for which you are striving. However, if you use too much, the stain mixture will adhere very tightly to the glass, and it will be extremely difficult to highlight or clean up your lines.

Begin with a teaspoon of silver stain powder on your palette, and add a light sprinkling of the sodium sulphate powder (10 percent by weight). This should be enough to intensify your stain but not too much to find it adhering too tightly to the glass. Mix this together, add the water, and mix well. The sodium sulphate is gritty, so you will need to mull it a bit. Then, apply as usual.

Even more intense color changes are possible with the use of copper sulphate. This is one of the same chemicals used for antiquing solder when copper foiling. A 2:1 ratio of silver stain to copper sulphate will raise the color level considerably, but you may want to adjust this to your own requirements. Grind the copper sulphate, granules on the ground glass palette with a glass muller until fine. Add the silver stain to the ground copper sulphate and then add the water. Continue mulling for a smooth mixture. It is best to apply this thinly and then blend.

These additives are mentioned as something to have fun with. They can save you money but can also be unpredictable. If you do a considerable amount of staining, you would want to have a wide-enough selection of the stains on hand to meet your needs.

New Developments

An increased fascination with silver stains has precipitated a renewed interest in the development of new stains.[12] The modern-day "alchemists" are searching for new mediums of expression to enrich and enlarge the palette of the glass painter. A few stains of interest were developed by the author.

Those experienced with silver staining already know the options this medium offers as well as the joy of working with its magic. For the newcomer, these opportunities await. They will learn what others before them already know: the more you work with stains, the more enchanted you are likely to become with this exciting and enigmatic process. Unlike the alchemists of the middle ages, hopefully you will find some essence of your "elixir of life."

Notes:

1 W.A. Weyl, *Coloured Glasses* (England, 1951, 1959).

2 Philip Nelson, *Ancient Painted Glass in England, 1170-1500* (London, 1913), cites the 1306 Peter de Dene Window at York Minster.

3 Charles Winston, *Memoirs Illustrative of the Art of Glass Painting* (London, 1865), cites the 1326 Heraldic Window, North Aisle of the Nave at York Cathedral.

4 Maurice Drake, *A History of English Glass Painting* (London, 1912). St. James of Ulm, the patron saint of glaziers, is often mentioned as the owner of the silver button; but he was not born until 1407 or 1411.

5 Will Durant, "The Age of Faith," *The Story of Civilization, IV* (New York, 1950).

6 Walter Gidde, *The Booke of Sundry Draught* (London, 1615), and *The Manner, Howe to Anneile, or Paint in Glas* (London, 1616).

7 E.W. Twining, *Painting and Firing Stained Glass* (London, 1938)

8 Discussions with Frank Reusche, L. Reusche & Co. Newark, New Jersey.

9 Noel Heaton, "The Use of Silver Stain," *Stained Glass Magazine* 44 (1949).

10 Available from Reusche & Co.

11 Snyders Glass Separator or Bullseyes' Shelf Primer.

12 Norman Temme, "A New Flesh Stain," *Stained Glass Magazine,* 78 (Winter 1983-84), 4.