

### Gilder's Lament

My glair is prepared,  
The leaf is laid out,  
My agate is polished and smooth.  
The press, it is loaded,  
The edge has been scraped,  
I feel like I'm right in the groove.  
I put on the glair,  
I lay on the gold,  
My confidence reaching its peak.  
I polish the edge,  
Till I see by its shine,  
The edge of perfection I seek.  
I take the book out,  
Fan open the leaves,  
My heart stops still in mid-beat.  
Where has the gold gone,  
I look all around.  
As the leaf flakes onto my feet.  
Oh, where did I err,  
I did everything right,  
But the gold, it just didn't stick.  
I love the gilt edge,  
But the process is such,  
That it leaves me feeling quite sick.

Unknown Gilder ca 17th C

### EDGE DECORATION FOR BOOKS

Any process you wish to learn is something that needs to be made "your own." You can read books, watch demonstrations and take lessons, but if you don't understand how your own approach effects what you are doing, the end results will never be what you seek. This paper will focus mainly on one approach to gilding but this approach is informed by practice and research into the methods used by many others – current and historical. Some of that information will be brought in to illustrate different methods when practical. I would suggest learning one approach and as you gain experience bring in other “tricks” from research into other binders and how they have produced gilt edges. Familiarizing yourself with other approaches can help when things are not going as they might and learning as much as you can about a subject gives you the tools to fashion you own approach and address surprises that may occur. From that gathering of knowledge, adopt a simple routine that is easy to repeat and has the least amount of variables; this will give you the best results.

The techniques given here have altered little over the centuries. Some of the materials change due to availability, location or fashion but the basic techniques remain much the same. After getting some of these techniques “under your belt,” experiment with them. Combine them in ways you haven’t seen before, push the possibilities of the materials or bring in new materials and try them out. What is given here was not learned at the “feet of a master,” – it was gathered from books, many of them in the bibliography below, from videos, from questions, from experimentation and practice. One person can only take this so far and then others have to keep building on it from there; use what you see here, then question it and continue onward.

## MATERIALS

- A stout wooden press or a backing press
- Gilding boards
- Wood plane
- Talc (magnesium silicate hydroxide)
- Cabinet scrapers
- Metal file - single cut
- Sharpening stones
- Sandpaper (220 & 320 grit)
- Bole or Graphite (black lead)
- PVA
- Gelatin
- Starch
- Beeswax
- Japanese paper
- Gilder's tips, gilders' frame or strips of handmade paper
- Gilder's cushion
- Gilders' knife and honing steel
- Pumice
- Gold leaf (or other metal leaf)
- Cotton flannel or batting
- Several wide, flat, soft brushes
- Fine small brush
- Skewing brush
- Release paper or wove text paper
- Agates (flat and dog-tooth)
- A stiff shoe brush (horsehair)
- Varnish Makers & Printers Naphtha
- Gouache, watercolor or acrylic

## ORDER OF PROCESS

1. Trim book
2. Prepare gilding boards
3. Talc book edge
4. Load press and tighten
5. Scrape edge
6. Sand edge
7. Apply paste
8. Apply bole and let dry
9. Brush burnish
10. Burnish 3 or 4 times w/agate
11. Apply first coat of size, let dry
12. Lay out, cut & pick up leaf on frame, tip or paper
13. Apply second coat of size, let dry
14. Apply third coat of size for soft papers
15. Apply slightly more generous coat of size and lay on leaf
16. First opportunity for repair
17. Set leaf with flannel when edge becomes dull
18. Burnish through paper
19. Direct burnish after edge is dry
20. Second opportunity for repair
21. Wax and do final burnish

## EDGE GILDING

Gilding concentrates considerable pressure on the edge of the textblock, which could deform the book. The edges of the textblock can become thinner than the center giving it a cigar shape or cockling the edges, but the harder the paper the less the worry. The gilding process will take only an hour or two, but during that time the pressure on the edge will be intense and concentrated. To avoid harm, place the entire book in a press for a few hours before gilding. Take care, however: prolonged pressure can have a deleterious effect on the paper. Soft paper, which may need more pressure to keep the liquid preparations from seeping in, could be overly compressed, potentially causing the plate marks on prints to become diminished and the bite of letterpress lessened. If the edges have become deformed after gilding you may put the book into a press to even it out again, but beware that pressing the book after gilding may dull a successfully gilt edge. If you feel the book may need pressing, do so before gilding.

Edge gilding takes several forms, solid edge gilding being the most common and the one we will focus on now. Gilding the edge of the unsewn sections is called "rough edge gilding." Gilding "in the rough" pertains to gilding a book with untrimmed or deckled edges after sewing. (See below)

Solid edge gilding may be done "in boards" after the book has been rounded and backed with the boards laced on, or with boards just laid in to protect the shoulders. When gilding, after the book has been rounded and backed it may be difficult to get enough pressure across the spine of the book to adequately gild the very back edge near the spine. If the book is overly rounded, try to

push out some of the round before loading it into the press; that will often give enough pressure for gilding. If the paper proves to be too spongy or the spine not dense enough, it may be best to gild the book after it is rounded but before backing. In this case, care will need to be taken when backing up the shoulders after gilding: a misdirected stroke during backing can cause “starts” to appear in the gilt edge, which disrupts the smoothness of the leaf’s reflection. If the boards are laced, the cords should be pasted down only on the inside of the boards, not in the chiseled grooves on the outside of the boards. This allows for the boards to be slid up and down on the book, parallel to the shoulder.

## TRIMMING

For solid edge gilding, the book has to be trimmed with either a plough or guillotine. When cutting the boards and lacing them on, the height of the boards should be considered in reference to the planned trim-height of the book. If you want a finished board square of, say 2 mm, and you plan to trim only 2 mm off the top of the book then the boards are cut even with the head of the textblock. They are laced on straight across when the boards are held even with the head. With the cords pasted only on the inside, the boards can be slid down until they are 2 mm lower than the pre-trimmed head. When the 2 mm is trimmed off the head of the book (thus even with the lowered boards) and the boards are slid back into place you will find they are 2 mm above the head of the textblock, giving the 2 mm square. The process is the same for the tail of the book. The foredge of the book should be trimmed before rounding and backing. The spine should be carefully pasted when it is flat so that sections won’t start during rounding. If they do, you will have a difficult time scraping and sanding the foredge.

If you are using a plough to trim the head of the book the front board is lowered as described above. The back board is left up to support the textblock while cutting. To avoid cutting into the back board, a cut-against is placed between the back board and the textblock. The cut-against can be a piece of scrap board into which the blade will cut on its final pass. When trimming the tail, simply reverse the set-up and lower the back board. Place a cut-against between the up-raised front board and the textblock. Books are always ploughed from the spine toward the foredge so as not to chip out pieces of paper in the spine area. (Of course, it doesn’t matter when plowing the foredge but in all cases the plough should cut only on the away stroke.) The plough blade should be very sharp and level with the cheeks of the press. If the blade is not level, it can be loosened and pieces of paper or brasses and coppers (used in typesetting) can be placed appropriately to alter the pitch of the blade until it is level.

If trimming with a guillotine, the blade must be free of nicks or your work will be greatly multiplied later when scraping and sanding. (Both boards are slid back when trimming the head and tail with a guillotine.) Something needs to be placed underneath to support the book’s shoulder as the blade comes down. The support board should be made from a pure consistent pulp like matboard and not contain bits of foreign matter; even conventional binders’ board will damage a guillotine blade. The support board is laid into the shoulder and up against the lower cover board, which has been slid back.

Usually in trimming, the spine is placed along the left-hand guide of the guillotine so the blade moves towards the spine as it descends leftward. If the paper is very soft you may consider

placing the foredge along the guide so the blade moves through the spine first. If that is done, you will have to go to some trouble to ensure the trim is perpendicular to the spine as you won't have the spine for a guide.

You can trim the foredge of a rounded book in a guillotine, but it is needlessly difficult – it is somewhat easier to do so with a plough. For ploughing (or guillotining, if you must) the foredge, the round of the book, has to be removed. If the boards are not laced, take two free boards and hold them tightly against the textblock. Wrap a cord around the book and boards several times and tie it to hold the boards in tight. The boards should be a bit longer than the textblock, so the wrapped cord won't damage the head and tail, and as wide as the final trim of the foredge. The spine of the book should be gently rapped against a flat surface until the foredge is flattened. Then lower it into the press to plough.

If the boards are laced on flat, u-shaped pieces of metal called trindles may be used to keep the foredge flat. Simply open the boards all the way back from the book and place two of them around the laces at either end of the book, across the spine between it and both boards. The trindles will keep the foredge thrown up and flat. In lieu of trindles, long needles (hat pins or doll making needles) can be inserted between the sewing cords or tapes and the textblock, a bit more difficult to do but just as effective.

## PREPARATIONS

Before placing the book into the press, the edge needs to be dusted with talc. Talc (magnesium silicate hydroxide and sometimes called French chalk), keeps the pages from sticking together during the wet processes which follow. Do not use the talc manufactured for babies: it may contain silicone (which will resist the wet preparations) or it may actually be cornstarch (better for the baby, but for us it functions as an adhesive).

Not all papers need to be talced: good mould-made or handmade papers, as well as some of the better printing papers, are fine without and usually only coated paper and Bible or "India" paper actually need it. However, talc does no harm to any paper so it is safer to use talc if you are unsure about your paper. Hold the edge vertically to apply the talc. Flex the edge over one way and dust in the talc with either a soft brush or your fingers; flex the edge the other way and repeat. It can sometimes be difficult to get the talc into the head and tail of the book near the spine. To do this torque the pages over one way or the other, then hold the foredge tightly and torque the pages back in the other direction. This will cause the edge near the spine to curve open giving you the opportunity to dust the talc in. Talc is a very fine particulate and care should be taken not to inhale it while applying and to work in a well-ventilated room. After the talc has been applied, do not bang the book around very much or it will sift out. You don't need a lot of talc to do the job. In fact, with some soft papers you may have to go back after gilding and brush it out. With dark colored paper, as for endsheets, the talc can still be seen unless completely removed, which is difficult. In the event talc is still evident, a white vinyl eraser or a crepe rubber eraser may help.

## GILDING BOARDS

Gilding boards are usually made of beech, oak or other straight grain wood. They are about 1–1.5cm thick along one long edge and taper down to about 0.5cm along the other long edge, which is sometimes rounded. This tapered shape helps focus greater pressure to the bookedge without creasing the textblock. The boards are about 10cm wide and vary in length depending on the size of the book, but 20cm and 30cm boards are a couple of useful lengths to have. If the boards are much longer than needed, the extra length, beyond the bookedge may become gouged and misshapen during the scraping and sanding.

Choose boards just a bit longer than the edge you are gilding. The length of the thicker edge of the boards should be planed to an approximate angle of 70° in relation to the inner surface: this reduces the amount of wood you have to deal with while scraping and sanding. Gilding boards that have become gouged or flattened from use need to be repaired and a small hand plane (either block or bench) will work fine for redressing the angle. A set of gilding boards should have the woodgrain going in the same direction when the two boards are faced together, otherwise one board will work well while the other may chip and tear out as you scrape the edge of the book. The grain direction is determined by observing the pattern of the rays and/or vessels (darker straight lines in the wood) on the face of the board and they way they angle toward the board edge. The larger oval or curved patterns sometimes seen in wood may go with the grain direction or they may not; the rays and vessels are the true indication. You want to plane the board in the direction that the rays and vessels rise to meet the board-edge. Sometimes the grain is parallel to the edge of the board or you may have trouble determining the grain. If so, trail and error will tell you in which direction to plane. Planing in the wrong direction won't cause much damage with just a few passes, just note it and work from the other end. As you work down through the piece, undulations of the grain may cause a change in the direction and the grain direction itself may change as you redress the wood over the years.

Place the wood, with the thick edge up, in the press and plane. (If you notice roughness on the board edge as you plane, then you are going against the grain and simply plane from the other direction.) Note the direction of the wood grain on the inside surface of each board by penciling an arrow so you won't have to go through this again. Place a straightedge along the board to make certain the edge is level from one end to the other.

As bookbinders, we may be unfamiliar with how a wood plane is sharpened. Like the spokeshave and cabinet scraper, it is a tool requisitioned from another craft, although it is sharpened in the same manner as a paring knife. The back of the blade must be flattened on a sharpening stone for a couple of centimeters in from the edge; start with a medium stone and progress towards a very fine stone. When flattened, the back of the blade should have the same even polish from side to side for 1–2cm in from the edge. On the other side a primary bevel should be sharpened to about 25° and a very small secondary bevel to about 30°. A sharpening jig will help maintain the proper angles, especially on tools you don't use constantly. You want to end with an edge that is sharp and has no detectable burr, which is the result of the fresh new metal created when sharpening. A burr may cause the edge to feel sharp but after a little use it will bend over and cease cutting and therefore the burr needs to be removed by continued sharpening. When done, the blade should feel sharp and the edge should disappear by turning it over so the flat backside is

up and holding it towards a light source, like a window: if you can see a glint at the edge then there is a burr or nick which still needs to be addressed.

## LOADING THE PRESS

After the book is talced, the gilding boards should be laid on the book with the grain direction of the wood going in the direction of the scraping and sanding. For gilding the top and bottom edges, this means the grain should run from the spine toward the foredge of the book; for the gilding of the foredge it won't matter as long the grain of both boards run in the same direction and you scrape in that direction.

To gild the top or bottom edge, align the boards (either laced on or temporary ones laid in) to the edge of the textblock. For ease of handling you can wrap the book and boards around the middle with a strip of strong paper and tape to keep the boards aligned while placing into the press. It is important to keep the book edge and boards as even as possible. This will eliminate a lot of work when trying to scrap the edge.

Lay one of the gilding boards and something of equal thickness (possibly another gilding board) on the bench. If needed, place the book and cover boards on them so the edge is aligned to the gilding board. (The other board or object acts as a support to keep the book level so the edge won't torque out of square.) Place another gilding board on top of the book also aligned to the edge. If the book is heavy, or you are having difficulty keeping the sandwich of boards and book together, you can lightly moisten the inside of the gilding boards before you place them. Do this by licking your hand and swiping it onto the inside of the board or licking the board itself (watching for splinters). This will provide you with just enough moisture to grab the book and hold the board to it. A word to be said about the cover boards, if they are part of this sandwich: poor quality boards with a lot of trash and voids in them will dry out more slowly than the textblock during the gilding process. Residual moisture from such boards can ruin the edge as you are burnishing. If the boards are not a very high quality they should be thrown back away from the edge and something like mat board put in their place.

Measure the thickness of the sandwich, book and gilding boards (at their thickest), then open the press to a distance slightly less than that. Take the book and boards and carefully lower them into the press. (If you can, place one hand underneath the book to prevent it falling through the press should you loose your grip.) If this is difficult to do, and you are not using a press as heavy as a backer, then you may be able to tip the press 90° onto its front edge in order to load the book and boards; this is also how multiples are loaded for gilding. Lower the sandwich until 1 cm or less of the book is above the cheeks of the press and tighten it slightly. Check to see that the book edge, cover boards (if any) and gilding boards are accurately aligned. If not, you can lightly tap the cover boards and gilding boards with a backing hammer while holding the book to bring them into alignment. Take care not to hit the edge of the book. If much realigning is needed, it is best to remove the ensemble and begin again. Tighten the press when satisfied with the placement. If the pages are not tightly held the wet preparations may seep into the paper or the pages may flex during burnishing, causing the leaf to flake off. The press does not have to be tightened to the extreme but the book will need a good stiff pressure.

## SCRAPING AND SANDING

Cabinet scrapers are the backbone of edge preparation. For gilding you will start with an edge that has been guillotined or ploughed but it will still need to be smoothed and sanded. Scrapers can remove a lot of paper quickly and precisely. They can be made from old saw blades or other high quality, thin steel or purchased from sellers of woodworking tools. There are about 10–12cm long and 4–5cm wide. One short edge should be ground until slightly rounded: a flat scraper will work the entire edge of the book, removing more paper and gilding board than necessary and it can be difficult to control. With the scraper you are merely trying to smooth the edge and remove anomalies because the initial trim, with the guillotine or plow, has already created a flat edge. An elliptical scraper will allow you to work only the areas that need it.

Work from spine to foreedge when scraping the top or bottom edge. (The folds at the back of the sections could be chipped out if scraping toward the spine.) Confine the scraping motions only toward the foreedge. Hold the scraper with both hands tilted away from you at an angle of about 55°–65°. You may alter this angle as you work, but it should never be tilted as high as 90°. Working from the spine to the foreedge, scrape the edge in light, short strokes. The scraper should be moving forward as it comes in contact with the edge, at a very low angle, so marks are not created by sudden, abrupt contact with the edge. As you near the foreedge, the stroke of the scraper should be lessened and pulled up, so as not to chip out any of the paper on the foreedge. The edge is scraped until you have a consistent smooth surface – it need not be dead flat, but should not have any obvious dips or raised areas. Scrape until you have a clean edge but don't over scrape as the tool can remove a lot of material.

An application of size (see below), applied before scraping will dampen the edge, allowing easier scraping. If bole is added to the size it is also easier to see where you have scraped. The edge should not be overly saturated; just a light coating of size will do.

Sharpening a scraper is something outside the normal bookbinder's sphere. To start, flatten both sides of the scraper on a sharpening stone, beginning with a medium stone and progressing to a fine stone for 1–2cm in from the working edge. Just as with the plane blade, the polish should be consistent all along the edge. When done, place the scraper in a vise or lying press and work the edge with a fine, single cut metal file drawn at a 90° angle to the flat side of the scraper. Work the edge first in one direction then turn the scraper around so you can work the edge in other direction, thus creating a burr on both sides of the edge. When you have a burr, take the scraper out and hone the edge on a sharpening stone. When you have gotten to the finest stone, go back to both sides and flatten again on the stone: this pushes the burr over onto the edge.

The final step is to turn up the burr or cutting edge of the scraper in a uniform manner. To do this steady the scraper on the bench by laying it on one long edge so the curved cutting edge is perpendicular to the bench. With the other hand, take a smooth steel burnisher or the shank of a good quality screwdriver and run it along the scraper edge holding it parallel to that edge. (Be very careful that the hand holding the steel burnisher is not near the burred edge while doing this, because it will be very sharp.) Starting just over halfway down the edge, run it along the edge gradually working the burr over to a 5° angle. Do this along one side, then the other. Turn the



scraper over and do the same again: it is this burr that does the scraping. The edge will need to be redressed from time to time. To do this, lay the scraper flat on the bench and the steel burnisher flat on the side of the scraper. Keeping everything flat, lightly run the steel over the scraper to turn the burr back to the edge: do this to both sides of the scraper then reset the burr as before. If the scraper still isn't effective you will need to go back to the sharpening stones or possibly the file. Unlike a paring or utility knife you want a pronounced burr on the edge.

After scraping the edge needs to be sanded. For that, use a silicon carbide sandpaper, which will not blacken the edge as some other finely graded papers can. Choose very fine grits like 220 and 320. Always use your fingers to hold the sandpaper, not a sanding block: the block is flat and will not conform to any undulations in the edge, which will cause a lot of undo sanding. The use of your fingers will also allow you to feel if the edge is getting too hot from the friction of sanding. Heat may cause the paper manufacturer's sizing (used to keep printing or writing inks from feathering) in some papers to fuse. Fused paper sizing will produce an edge that will not accept the wet preparations. Starting with the 220-grit, sand in a straight line, parallel to the edge; scratches will be caused if you move the sandpaper across the edge, or at angles to it. You will find these scratches difficult to remove and they may show in the finished edge. If this happens, go back to the scraper and then proceed again with the sanding. Hold the sandpaper between thumb and forefinger of both hands. Place one of your outer fingers against the outer edge of a gilding board to use as a guide: this will help to keep the sandpaper straight. When satisfied that you have an evenly sanded surface, graduate to the 320-grit. Using a soft bristle shoe brush, brush off the edge from time to time while sanding and especially when changing grits. Any dust or grit from a coarser grit paper, left on the surface can cause scratches when using a finer paper. At no point during and after the scraping and sanding should you touch the edge with your hands. Any oils or dirt, which get onto the edge, will affect the wet preparations. After sanding, dust the edge free of any sanding residue.

## GLAIRS AND SIZES

The word glair(e) refers to the white of an egg. There is some inconsistency throughout the literature involving the words glair and size. In this paper, glair will be used only in reference to eggwhite. Size is used when speaking of other gilding adhesives: starch, gelatin, rabbitskin glue, parchment and PVA (polyvinyl acetate). The nature of glair and size functions mainly as an adhesive for the leaf, but it also acts as a filler for the pores in the paper. A more in-depth explanation of filling the paper is discussed later.

Sizes become personal to the gilder – they way the sizes work and the effect the gilder is seeking. A hard size such as eggwhite allows a higher burnish than a softer size such as PVA. Some people have better luck with one size over another and some papers will also react better with one size over another. It is therefore wise to try a few different kinds before settling on one.

According to preference, working methods, the nature of the paper and the environment; the strength of size may vary greatly from one gilder to another. One finds a large variety in the strength of recipes used for gilding in the literature. Contrary to what you may observe in your usual interactions with gold leaf, it actually requires very little size to get it to stick, but one still needs a useful recipe.

Egg glair probably has the longest pedigree and eggwhite has been used as an adhesive with gold for centuries. In bookbinding, it is used for both tooling and gilding – usually, the eggwhite is mixed with vinegar for tooling and with water for gilding. (Vinegar is used in some of the literature on gilding – even noting that one can take glair made for tooling and simply thin it out with water – but it would be best to avoid vinegar due to its acidic nature.)

To the white of one large egg, add an equal amount of water (about 60ml) and whisk together well. (When broken in half, an eggshell is roughly equal to half the white contained in the shell, so two times a half shell is a good, simple way measure of the correct amount of water.) Let the mixture stand for several hours and then strain it through a fine mesh fabric, such as silk organza or a commercial paint strainer bag. Egg albumen – in powdered or crystalized form – can be used in place of fresh eggwhite and is easier to store than actual eggs. (Albumen is the white of the egg and albumin is one of the proteins contained within.) Two teaspoons of albumen is equal to the white of one egg. Mix the powder or crystals with 60ml of water and allow it to stand until thoroughly dissolved; that may only take an hour or so for powdered albumen, but crystalized albumen may have to sit overnight. Egg size, as with all sizes, needs to be strained through a very fine cloth before using and it is best to strain every time you begin gilding to remove any solidified material or dirt which may have appeared.

For starch, most commercially available starches – corn, potato, laundry, etc. – will work. You can also get starch from laboratory supply companies, but be aware of the possible inclusion of silicone in the starch. Some companies add silicone to the starch to keep it from packing down during shipping and to make it pour easily, but it will make gilding very difficult.

To prepare the starch, start with 175ml of cold or room temperature water. Pour off a small amount of the water into a saucepan and the rest into a teakettle. Mix a teaspoon (3 grams) of starch into the smaller quantity of water in the saucepan until it is thoroughly mixed. Bring the teakettle to a boil and slowly pour the boiling water into the saucepan, stirring constantly as you do so. Place the saucepan on a stove and continue to stir constantly, being careful not to let the mixture boil, which will cause the starch to thicken too much. Stir only for a few minutes and then take the saucepan off the heat. You can also place the mixture of starch and boiling water on a cup warmer and stir occasionally until it is completely dissolved instead of a saucepan on a stove. Strain the mixture through silk or a paint strainer if a skin forms.

Make parchment size by boiling small scraps of parchment or vellum in water. Start with 14 grams of small scraps in 200ml of cold water and allow the scraps to soak for several hours. Bring the mixture to a boil and simmer for 20 minutes. Strain the liquid through a filter as with the other types of sizes.

To make Gelatin size or rabbitskin size, bring 150ml of water to a boil. Take the water off the boil and stir in one teaspoon (3 grams) of gelatin or rabbitskin until completely dissolved. Let the solution cool a bit before use. You can also mix the adhesive into a beaker of room temperature water and place it on a cup warmer until completely dissolved.

PVA, a material with which many bookbinders are familiar, can also be used as a size. To make the size, mix 1 teaspoon of PVA into 200ml of water, cap it and shake vigorously. The solution can be strained and used immediately. As opposed to the other choices, PVA size has a very long shelf life so it is always ready for use, although the solution is susceptible to the formation of small particles during storage. It is best to strain the solution each time it is taken out for use. PVA does not enjoy the many years of use as a gilding size that the other materials do. The fact that it is a newer bookbinding material – and that its use as a gilding size is newer still – should tell you that there may be many other materials available that could be substituted as a size. The nature of the papers on the market is changing and will continue to do so into the future. None of these gilding sizes have ever been foolproof and as papers change some of them may lose their efficacy. PVA was tried as an experiment, which was successful – there are probably many other materials that would also work if given the chance.

With the exception of the PVA, all of the aforementioned sizes need to be stored in the refrigerator and will last only a short time. Any size you use must be kept covered so that it is free from dust. When using the size, decant off the amount needed and re-cover the rest. Do not put your brush into the larger original batch of size, as that will contaminate it. Whichever size you choose, refrain from making it too thick: it will be more difficult to achieve a good burnishing. The thinner the size you can use, the better, as long as you can still get the leaf to adhere.

Your choice of sizing may be influenced by the nature of the paper you are gilding. Egg white or starch work well on most papers. Gelatin is better on softer papers and PVA works better on medium to hard papers. Parchment size works well on most but due to the more involved preparation it may not be the best choice. A hard, well-sized paper will only require a relatively thin gilding size while papers having very little internal sizing will want a thicker gilding size. The process you use may also alter the strength of the solution needed. For instance, if you use paste or starch as a filler for the edge then a very weak size will hold the leaf. Some gilders will even just use water when applying the leaf but they have filled the paper with an adhesive such as starch or paste beforehand.

In gilding you are trying to create a glass-like surface on the edge of a clump of paper. To do this, there are two things to consider regarding the paper. First – the final layer of size needs to set upon the edge of the pages and not soak into the paper. You are trying to adhere the leaf to the very surface of the page edge. Therefore the less sizing inherent in the paper itself, the more you have to do to keep the gilding size from disappearing into the paper. Secondly – soft, pulpy paper is not rigid enough to stand up to the burnishing in later stages of the gilding process, which may cause the leaf to flake off as you burnish. Add to this the fact that soft pulpy paper soaks up a lot of size and you will see that gilding this type of paper can be difficult. One approach to this problem is with the strength of the size – a heavier size may make the gold stick better, but the burnishing will be dull or streaked. Satisfying the porosity of the paper with a filler helps to create an edge, which then keeps the size from soaking in. It is the combination of scraping, sanding, filling and sizing which gives you the surface for gilding. Regardless of which size you choose, all of the following steps are the same.

## FILLER

This is the base upon which the size is laid. The filler accomplishes two things: it fills the pores of the paper and lends a background color to the gold. The act of filling the pores keeps the size from penetrating too deeply into the paper, which allows the size and the leaf to sit on the surface of the paper. Armenian bole (a reddish, finely ground clay) is most often used for this, especially with gold leaf. Graphite (also called black lead or plumbago), gouache or other similar, finely ground material may also be used, separately or in combination. Sometimes a small amount of graphite is added to bole to give it a deeper red. Gilding with palladium graphite also makes a good background. For added filling you can use paste before applying the colored fill. To do this take a slightly damp sponge or a wad of Japanese paper and work a small amount of paste into the edge. You can, of course, use paste alone as the filler and forego any colored background.

Gold leaf is extremely thin ( $1/225,000$ " thick), so thin that the thickness of the leaf is invisible because gold is thinner than the wavelengths of visible light. Therefore, even though leaf is highly reflective, an underlying color can influence the shade of the gold. The thicker leafs such as palladium, copper, and variegated leaf will also be influenced by the underlying color, but to a lesser degree. For gilding with gold leaf, use a double thick leaf often marked as XX on the package, which is less resistant to breaking when laying on. (The term "double" shouldn't be misunderstood: the leaf isn't actually doubled in thickness it is only about 10%–20% heavier than standard leaf.)

Bole is supplied as a block, cone or powder. If you have a block or cone, use the edge of a knife to scrape some onto a small plate or shallow bowl. If using powdered bole, black lead or gouache, simply put a small amount onto a plate. With a small natural sponge, mix your size with the filler until it is the consistency of cream. Some sizes will mix easier than others but continue until the bole is completely dissolved. Using the sponge, apply an even coat on the bookedge, working from the center outwards on the foredge and from the spine to foredge on the top and bottom. (A note about the care of the brushes and sponges: they should be kept very clean because any particles of size or dirt will mar the edge. They should be cleaned with water only as soap may affect the size.) While the bole is still damp, take a crumpled and wadded up piece of Japanese paper and, with a circular motion, rub the filler into the edge working from one end to the other. Do this until the edge appears dry and you achieve a slight polish on it. Using the shoe brush, brush the edge vigorously, following the direction of the paper; this will improve the polish.

## BURNISHING

Allow the edge to dry completely, then burnish by brushing the surface again with the shoe brush. After brush burnishing, polish the edge with a stone burnisher. The stone is usually agate or bloodstone, agate being the most common. This will consolidate the paper fibers, which were swollen by the liquid filler. There are two types of burnishers: a flat burnisher and a dog-tooth. The dog-tooth is pointed like a canine tooth and bent to about 90°. It is used primarily on the foredge, but some gilders also use it on the top and bottom edges. The flat burnisher can be either fully flat or slightly convex. The convex burnisher doesn't cover as much area at a time as the flat, but it is easier to maneuver around the spine and foredge and is less likely to dig into the bookedge, as it doesn't have sharp corners. You can also apply more pressure as the point of

contact is smaller. Both flat burnishers and dog-tooth burnishers have wooden handles between 20 and 30 centimeters long and, in both cases, the stone itself is fitted into a metal ferrule on the end of the handle. The handles of the flat or convex burnisher end in a broader, rounded shape that you can place into your shoulder for more pressure; the dog-tooth is never used with extreme pressure because its shape makes it more prone to breaking, so it usually comes to a blunt end. The agates need to be clean, polished and very shiny in order to get a good burnish. As they are stone, it is advisable to keep them covered with a protective “sock” when not in use. You may be able to find a jeweler who can polish out any nicks in the agate that may arise or, in lieu of a jeweler, you can make a paste from tin oxide and water. Put some of the paste on the backside of a piece of leather and rub the stone in a circular motion until it is free of nicks. You can use a cloth or leather-polishing wheel to facilitate the process if you have the capacity and skill. The agates used by calligraphers are too small and delicate for use in gilding edges.

It is the flat burnisher we will use most. The burnisher must be cleaned before being used on the edge of a book. Any grease or dirt that gets onto the edge can keep the gold from adhering. Take a scrap piece of leather and apply some tin oxide to the suede side. Use this to clean and polish the burnisher each time you use it. Another method is to use VM&P (Varnish Makers and Printers) Naphtha and a rag or paper towel to degrease and clean the burnisher. As with the talc, use ventilation when using VM&P Naphtha.

Assuming you are right-handed, hold the flat burnisher in the right hand with the first two or three fingers around the front of the burnisher and thumb and other finger(s) in the back. Crook the first finger of the left hand behind the agate with the thumb over the first fingers of the right hand. This will give you the greatest control over the burnisher. (If left-handed simply reverse the order.) If you are using a metal backer, or any press with metal jaws, tape some binders’ board over the metal so the burnisher won’t be ruined if you slip and hit the press. Approach the book from the side of the press and starting at the spine, gently and slowly move the burnisher across the edge completely from side to side until you get to the foreedge. At the spine and foreedge there is not as much support for the paper so ease up on the pressure as you work those areas. If you feel the burnisher grab or see any streaking the edge may not be dry enough to burnish yet so hold up. Burnishing lengthwise is not advised – if there is any grit on the edge you may not notice it until you have long scratches on the edge and stopping and starting is more difficult to do without showing marks. When burnishing across you avoid the stopping and starting, and any scratches are limited to a smaller area. Burnish completely three to five times from end to end with a slight increase in pressure each time.

After the filler has been put on the book and thoroughly burnished, the edge needs several coats of plain size. With a flat, soft-bristle, natural hair, brush apply a thin coat of size beginning at the spine and working towards the foreedge. Decrease the pressure on the brush as you near the end so it doesn’t pool at the edge. It is best to use a brush which, when depressed upon the edge, will spread out to cover the entire width in one stroke. Any of the liquids, bole or plain size are best applied in one continuous stroke although, as this can be difficult, a small amount of back and forth may be needed. Keep in mind that when you apply a wet coat you are activating the underlying coats, which are already dried: it is possible to pull up some of the previous coatings by working back and forth too much. When putting down new coats try to be rapid, exact and cover completely. You will usually apply two or three coats of plain size before laying on the leaf.

Allow each coat to dry completely before applying the next – two coats for better sized paper and three for softer ones.

After you have put on the first coat, you will notice that the glistening character of the fresh coat will become dull fairly soon. It is after the coat has become completely dull and you see no trace of moisture that you apply the next coat. You can judge how the size is filling by the speed with which it becomes dull after each application: if the edge goes dull quite rapidly, then you need more coats, although you should consider the humidity and temperature in your workshop. If the temperature is low and the humidity is low then the sizing will dry quite quickly even if the edge is well filled. The warmer or more humid your shop is, the slower it will dry; this too can give a false sense that your edge is ready. It is only experience that will help you determine how many coats to put on although, as stated before, 2 or 3 coats will usually do it.

### HANDLING THE LEAF

While the size is drying, the leaf can be prepared for laying on. For this you need a gilder's cushion, gilder's knife, pumice, leaf and a means to pick up the leaf. The cushion is a wooden board covered with vegetable-tanned leather, which is stretched over some padding. The padding can be anything – sheets of paper, felt, leather or other material to build up and cushion the leather while giving a good firm surface. The cushion should be about 5mm thick; if it is too thick and spongy the leaf may break when cutting it. The leather is dampened and stretched over the board and cushion material with the reverse suede (or the flesh side of a skin) facing up. It is then tacked or stapled to the edge of the board and allowed to dry. The cushion is dusted with a small amount of pumice powder, which gets rid of any grease. Spread the powder over the entire surface of the cushion using the gilder's knife. The cushion is then held vertically, away from your work area and the knife is used to slap excess powder off the cushion. (Excess pumice might be transferred to the edge when gilding and ruin the result.)

The gilder's knife is a blade about 25 cm in length, sharpened along one edge and coming to a point at its tip. The backbone of the knife is usually flat and somewhat thicker, giving the blade some strength and rigidity; the knife is sharpened just as a knife would be for normal binding purposes. After sharpening, drag the blade across a piece of binders' board. Doing this will take the razor sharpness off the knife – you don't want to cut your new gilders' cushion. The knife needs to be kept free of grease. When the cushion is freshly pumiced, the sides of the knife can be wiped on the cushion to clean any grease off the blade. From this point forward, do not touch the cushion or the knife blade with your fingers. Any grease on these surfaces will interfere with cutting and handling the leaf.

Next, the leaf is cut to size. Metal leaf comes in books of twenty-five leaves, 20 books to a pack. The size of the leaf varies from 8 cm x 8 cm to 12 cm x 12 cm, depending upon the type of leaf and the manufacturer. It comes either as loose leaves or lightly adhered to a carrier sheet, called patent leaf. Patent leaf is for use in outdoor gilding and should not be used for edge gilding: the paper holding the leaf will interfere with the gilding size. Loose leaf is the norm for edge gilding. Handling the leaf requires some practice and patience. The slightest breeze or sudden movement can cause the leaf to fly off the cushion and become damaged, making it useless for gilding.

Before opening the book of leaf for the first time, lightly grasp it by the spine edge and gently roll it up into a tube about 2–3 cm in diameter. Unroll it, turn it over, and do the same from the other side. This will help to loosen the leaf from the pages of the book so they can be removed more easily. Lay the book down on the left side of the cushion if you are right handed, or the reverse if you are left handed. Open the first page by placing the forefinger of your left hand in the upper foredge corner of the book. Lightly press down and pull the corner of the paper toward you. This will cause the first layer of paper to rise up so you can get your knife underneath it. If your fingers are too dry, apply a very small amount of moisture to your finger with your tongue – this will give some grab. Alternately, you can slide the knife underneath the foredge of the book and turn it up so as to fan the pages. Grab the empty upper pages with the thumb of your left hand. Curl them back and gently let the other pages fall to the cushion, supported by the knife. It is a useful practice to crease back the lower foredge corner of the empty pages so you know where to start the next time you go to open the book.

Using only the knife, lay the upper pages of the book open, exposing the leaf. Don't touch the inside of the pages with your fingers. Holding the knife flat, gently tap the cushion just in front of the foredge of the book until the leaf is folded over in half by the puffs of air. If you tap too hard you may disrupt the leaf underneath the next page. If you find that you are constantly disrupting the underlying leaves, lift the spine of the book upward, thus causing the foredge to flatten out. This will help to prevent air currents from going underneath.

Lay the knife alongside the folded edge of the leaf and gently blow the folded half over and onto the knife blade. The result is that your knife is now underneath the center of the leaf. Twist the knife a quarter turn to the right, gently lift the knife and carry the gold to the other end of the cushion. As you begin to lower the leaf, drag it and, at the same time, rotate the knife underneath and away from the leaf. This will leave the leaf on the cushion, slightly rumped and the knife free. Lean over the leaf, purse your lips and blow a gentle puff into the center of the leaf. The rumped leaf will flatten out and is then ready to cut. (If you find an errant corner of leaf folded under itself, simply tap the knife near that corner until it is folded back then give another gentle puff.)

You may lay out as many leaves as your cushion can hold, but don't lay out more than you will need for the gilding at hand as the gold is easily disturbed. Follow the same procedure for successive leaves, but before you give the final puff to settle each leaf, hold your knife between the new leaf and the preceding leaf like a fence – this will keep your breath from disturbing the leaf already laid out. To cut the leaf, rest the knife on its heel, poised so that the length of the blade covers the leaf. Pivot the knife down at its heel and cut the leaf with a gentle back and forth "sawing" action. Pick the knife straight up and make your next cut. Some gilders prefer to draw the knife completely across and off the leaf before picking it up. Either way, if the knife has any grease on it the leaf will be pulled and ruined for gilding.

If it is taking more than one back and forth motion to cut the leaf, or if the leaf is tearing instead of cutting, the knife needs to be honed or sharpened again. Each time you hone, drag the flat of the knife across a section of the pumiced cushion that has no leaf on it. If you wish, keep a piece of scrap leather with pumice on the suede side and use it to wipe the knife down after honing.

When you have cut the leaf, place a small box (the top of a gold leaf box works well for this) over it so as not to disturb the leaf while you set up for laying it on.

## TOOLS FOR LAYING ON

There are several tools you can use to get the leaf from the cushion to the book edge: gilder's frames, gilder's tips and even pieces of paper. Personal preference will be the determining factor. The gilders' frame looks something like a wooden "U," the corners of which are square. A second bar bridges from one upright to the other, about 2–3cm above the bottom bar. The space between the uprights is around 12cm, as is the distance from the upper crossbar to the top. Between the uprights is stretched a fine, thin piece of silk organza which is glued along the uprights and the two bottom bars. At the top, the edge of the organza is doubled back on itself to present a firm straight edge with no loose strands of silk to get in the way. There is a removable piece of wood, which is placed at the top between the uprights. This acts as a tensioner to keep the silk taut. The frame is good for laying on full sheets of leaf and as such is often used in production situations. Other advantages are that you can easily see through it to the book edge for placement and, if the leaf is reluctant to come off, you can blow through to aid in its' release.

Another way to transfer the leaf is with a gilder's tip. The tip is made with hair from a squirrel's tail sandwiched between two pieces of thin card stock. They are made as singles or doubles. The double, having more hair than the single, is used to pick up heavier metals such as silver and palladium; for gold leaf the single is all that is necessary. If you were thinking of using other metals for gilding, the double would be the best choice as they are only a bit more expensive than the single and can be used for all types of leaf.

A third method for laying on is simply to use paper. Scrap pieces of any good quality paper will work and if the paper has a bit of tooth, so much the better (very smooth paper will attract the leaf too much after it has been used a few times). Cut the paper to a size slightly wider than the leaf, maybe 12 cm wide and 7–8 cm deep. The advantage of paper is the low cost. You can set up as many of these as needed instead of having to purchase multiple tips or frames, however, the frame is still the best tool to lay on full sheets of leaf and the tip is excellent for patching.

To load the frame, the silk is dragged across the hair or face to pick up a tiny amount of grease. Likewise with the tip (the hairs of it) are greased in the same manner, as is the paper. Either tool is laid over the cut leaf and gently pressed down onto it leaving about 2–3 mm of leaf exposed beyond the working edge. This will enable you to sight the leaf as you lay it on and will help the tool to avoid the sizing on the book edge. Simple pressure is all that is necessary with the frame or tip, but with paper it helps to gently rub the backside of the paper where it is lying over the leaf to get it to adhere. The paper is also better for gilding the foredge because the paper can be slightly curved to follow the curve of the foredge. The tip and the frame, being more rigid, require more skill to release the leaf in the arc necessary to follow the foredge curve.

One thing to note when "greasing" the tools: in the wintertime there is more static in the air and rubbing the tool on your hair or face can charge the tool with static. The static will cause the leaf to fly up to the tool as you are positioning it for pick-up. In this case, the leaf will be misaligned on the tool and most likely wrinkled or torn. To avoid this, breathe on the tool after greasing with



an open mouth (haaaah). The slight moisture will dissipate the charge and then you are ready to pick up the leaf.

Any of the tools for laying on need to be kept clean. A build up of grease can make the leaf difficult to release from the tool and cause it to tear. With paper, just throw it away when it becomes too greasy; if you do very little gilding, you can simply start with new pieces each time. The tip or the frame need to be cleaned using VM&P Naphtha and a cotton ball. In a well-ventilated area, saturate the cotton ball with the naphtha and rub through the tip hairs or the frame's silk while the tool is lying flat on clean, white paper. The naphtha is a good degreaser and will dry quickly. Whichever tool you choose to use, you should have enough of them to load up the whole amount of leaf needed for covering the edge: if three pieces of leaf are needed to cover the edge, then three of the tools are needed. You can pick up each piece of leaf as you apply them, one after the other, but it is better to have the tools already loaded before laying on any of the leaf if you are new to gilding.

### LAYING ON

Use the shoe brush to vigorously shine the edge and remove any dust, then apply the final coat of size, a thin layer of size a bit larger than the width of the leaf you are laying on. After applying the size, pick up the first, loaded gilding tool and hold it over the edge as flat as possible and in very close proximity (2–3 mm) to the edge. The 3mm of leaf showing on the tool should be over the edge and onto the gilding board opposite you so you can be sure the edge is completely covered with that piece of leaf. The leading edge of the tool is slowly lowered until the free edge of the leaf comes in contact with size. (You can hear a "kiss" as the leaf releases from the tool if the room is quiet.) Apply size to the next area running it up to – but not onto – the previous leaf. Pick up another loaded tool and proceed in the same manner, overlapping the previous leaf by 2 mm. Do this until the edge is covered. If you see any breaks at this time you can transfer appropriate size pieces of leaf to the missing areas. Breathe on the area with an open mouth to activate the size and lay on the repair. Further repairs will be covered later.

### SETTING AND BURNISHING

Outside of getting the leaf on flat, setting and burnishing is probably the most important aspect of gilding. After the leaf is laid on, it will appear shiny where there is excess moisture underneath. When the shininess disappears (5–15 minutes), it is time to set the edge. This is done with a soft, padded cloth; a piece of cotton flannel or cotton batting works well. Do not use cotton balls – the loose fibers can catch on the gilding boards or the book boards (if gilt in boards) and these fibers can interfere with setting and burnishing the leaf. Start in a small area at one end and, using the flannel, lightly press down on the edge and pick straight up. If moisture travels through the leaf and dulls the edge, wait – the edge is not dry enough to proceed. Test again and, when you are sure the edge is dry enough, do this across its entirety, working from spine to foredge. As you do so, draw the flannel lightly across the palm of your hand in between pressings to remove any moisture that may be transmitted through the gold and onto the flannel. Do this three to four times, gently increasing the pressure.

The next step in setting the edge is to burnish through paper. After setting with the cotton, give the edge some time to dry before burnishing through paper. You want to burnish through paper when the edge still has some residual moisture but is not too damp. Depending on the conditions in your shop, this can vary from immediately after setting with the cotton to around fifteen minutes. To determine when to burnish, breathe on the edge with an open mouth. This will create a fog on the edge, which should disappear in 2–3 seconds. Burnishing at this time without paper will rub the leaf off the edge.

To burnish through paper, cut a piece of smooth, wove paper wider and longer than the edge. (Don't use laid papers or papers with watermarks, as the pattern will imprint on the edge.) Using beeswax, swipe one side of the paper a few times: the wax will ease the movement of the burnisher across the edge. Gently blow on the edge to remove any dust or grit that may have landed on the edge, as it will mar the edge when burnishing. Lay the paper, waxed side up, on the edge and lightly burnish in a discreet area. Lift the paper and check to make sure the edge is dry enough to proceed. You will see the edge dull from burnishing through paper but the leaf should not come up or rub off on the paper. Historically, some gilders would stop after this process, leaving the edge consistently dull; it is known as an antique edge.

Some binders use dry-mount release paper for this procedure. Release paper is coated with silicone and is hard and smooth, a very good surface, and no wax is needed. Its only disadvantage is that rubbing the burnisher across it can cause the paper to become statically charged and if the leaf was not set well with the cotton, it may pull off. Baker's parchment can also be used, but only if it is very smooth – it, too, can become statically charged. (But then, on a very dry, cool day, plain paper can as well.)

Hold the paper tightly against the edge by placing your thumb on the side nearest you and your first two or three fingers on the other side. If the paper shifts while burnishing, the leaf may be rubbed off. Start at one end and move the burnisher across the edge, lightly and smoothly. As you progress along the edge move the hand, holding the paper, along with the burnisher: this will help keep the burnisher from gliding off the edge as you go. Be careful not to slide the paper while doing this. Burnish through the paper four or five times. (At this point, the purpose of the burnishing is to make certain the leaf is in good contact overall the edge. Doing it several times will ensure that happens.) You may increase pressure, but don't use much. During this initial setting through paper, you may also burnish lengthwise to the edge, two to three times to insure a good adhesion but with gentle pressure. This is one of only two times you can use the burnisher lengthwise along the edge of the book. Burnishing lengthwise without paper may result in starts and stops unless you move the burnisher the entire length without stopping, which is difficult to do, as long strokes are harder to control.

Give the edge more time to dry – about 30 minutes depending upon shop conditions. To test, breathe on the edge again and the fog should disappear instantly. If not, you will need to wait a bit longer. Another method, sometimes used before burnishing, is to lightly tap the edge with the agate burnisher. If the edge is dry enough, it will give a faint "ping." There is a danger, however, that this method may dent the edge if hit too hard; the breath test is the safest.

When dry enough, brush the edge with a skewing brush (a soft, full brush to remove leaf skewings, used only for this purpose). After that, very lightly burnish the bare edge, 2–3 times with the agate. (The number of times insures complete coverage with the burnisher.) The next step is to wax the edge and burnish to luster. The wax is used to help the burnisher glide across the edge without damage, so that pressure can be increased with the burnisher to deepen the luster. Take a piece of beeswax in one hand and lightly stroke it with the thumb of the other hand. Rub that thumb and forefinger together to further lighten the amount and transfer the wax to the edge by lightly rubbing. (Sometimes a soft cloth or leather is used for this, which is fine, but it should be discarded at the end of the day because wax embedded in the cloth or leather will harden and can scratch the edge the next time it is used.) It is safer to use the hands, but be careful to apply the wax in very thin coats otherwise you will create a film on the edge. Burnish with a bit more force than previously used. Apply more wax and increase the pressure. Place the rounded end of the burnisher into your shoulder or pectoral muscle for added pressure. When using the burnisher in this manner, it is best to hold the burnisher by placing both hands on either side of the agate to steady it while you press with your upper body. Holding it in the manner, described above, will be more difficult to control, due to the increased pressure. If the burnisher is held at the correct angle, a considerable amount of pressure can be applied and a brilliant luster achieved. In all direct burnishing, it is best to hold the agate nearly perpendicular to the edge. This pushes the leaf down as opposed to holding the agate at an angle and pushing the leaf ahead of the agate. Generally the edge is burnished 2–3 times, waxing in between each; too much burnishing on soft papers and at a low angle can cause the gold to flake off.

When the edge is satisfactory, place one hand underneath the book and loosen the press. Take the book and gilding boards out as a unit and lay them on their side on the bench. Hinge the top board away from the edge as opposed to lifting it straight up, otherwise the gold on the edge might be damaged if the board has become attached to the paper. Turn the book and remaining board over and do the same on the other side. You will find the pages are stuck together from the sizing and pressure. Holding the book flat and a few inches off the bench, slap the book against the bench. The resulting shock will loosen the pages. If all pages are not completely loosened, fan the edge in both directions.

## REPAIRS

There will be times when repairs need to be made to the edge during the gilding process. There are several ways to do this. While laying on, if you notice a hole in the leaf or the leaf splits, charge a gilders' tip with grease and pick up a piece of leaf larger than the break. Breathe on the spot with an open mouth to reactivate the size and lay the leaf on. Go ahead and set the edge and burnish through paper as you normally would. When it is dry, gently brush any excess leaf away with the skewing brush. At this point you can treat the edge as you would normally, by direct burnishing, waxing and burnishing. Repairs made in this manner may be invisible in the finished edge.

If that repair doesn't take, or you find other areas needing repair later on, there is a different method. Take a very fine brush and apply a small amount of sizing to the area of loss. Immediately lay the repair leaf on top of the area and push down hard with a piece of flannel. This will set the repair and you should be able to go on with the rest of the process without

waiting. The key consideration with repairs is to keep them from showing in the finished edge. Repairs made prior to direct burnishing are less likely to show up.

### GILDING A ROUNDED FOREEDGE

With a rounded book, the foreedge presents special considerations. Scraping and sanding, as well as the application of the wet preparations and leaf are all more difficult. However, none of this is impossible and the solid result can be quite pleasing.

If you don't need to have the foreedge solid it can be thrust-out flat allowing you to work it the same as with the top and bottom. There are several ways to do this. One early method was to jog the spine flat. While holding it so long pins, such as a modern day hatpins, were threaded across the spine between the sewing supports and the textblock. This would hold the spine flat while loading the book into the press. Another method is the use of trindles. (These are pieces of thin, flat metal with a slot running down the center.) They are used when the book is in boards. The spine is jogged flat and the boards are allowed to drop back. The trindles are threaded between the boards and the spine with the legs of the trindle on either side of the laced supports. This keeps the spine flat while loading the press. If the book is not in boards it can be jogged flat with two boards placed on front and back. A cord or length of strong paper wrapped several times around the package from head to tail will hold it flat. It is best for the two boards to be longer than the textblock so the cord or paper doesn't mar the top and bottom edge. A foreedge gilt in this manner is not solid; you will see a barely detectable, stair-step of white and gilt when it resumes its rounded shape.

For a solid edge, the book is placed between boards and lowered into the press. Not all books can be scraped when rounded. Some paper is too soft and pulpy to support its mass along this part of the edge so the scraper may stutter. Scraping this kind of paper may result in a herringbone pattern along the edge near the front and back of the book. You can think of it as the force of the press traveling across the width of the book through the valley of the foreedge. The upper sides of the edge have much less support. If so, sanding is the only recourse. For other papers, scraping needs to be done with shaped scrapers. Cabinet scrapers are made from a good quality metal, so they are hard but can be cut and shaped. A rectangular scraper may be cut into several long wedge shaped pieces with a hacksaw. These wedge shapes may be, for instance, 20 mm at one end tapered to 10 mm at the other, and 25 mm at one end tapered to 15 mm at the other. Both ends can be ground into rounded shapes of differing diameters so you can work with books of different thicknesses and radii. There are also some convex scrapers on the market. They are steel circles with projecting rounds of differing diameters coming off the circumference. In either case you need to have shaped scrapers that can get into edges of different radii. As you don't use a flat scraper to do the top or bottom edge, because it works the whole edge with each pass, you should use a rounded scraper with a radius slightly less than that of the foreedge itself. This allows you to focus the scraper on certain areas of the edge as opposed to the whole edge at once. After selecting the scraper, keep it close to 90° while in use – tipping the scraper too far forward will bring more of its width into play. That will have you working with the sides of the scraper more than the point and therefore more difficult to aim; also, as before, don't over scrape. With foreedges there may be a tendency to scrape more in the middle of the edge than the ends causing a scooped out look. Only do as much as needed to clean the edge.

Alternately, you can sand instead of scrape. This can be very taxing if the spine was not well-pasted and the edge well-trimmed with a sharp blade. You will need to sand anyway, even if scraped. Some people use wine corks wrapped with sandpaper, some use wooden dowels. Dowels may be too hard: try wrapping a dowel with a layer or two of flannel or leather to soften it. If the dowel is too hard, it will hit only the high places where the softer material will allow the sandpaper match the surface of the edge better. Just remember that use of a sanding block will lessen your feel for how hot the edge is getting from sanding.

When it is time to lay on the bole and size, use caution to avoid it pooling in the center of the edge. Lay it on in thin layers and note that the center may not dry out as quickly as the upper edges. There are many ways to approach the laying on of leaf onto concave edges. Some gilders take a piece of leaf wide enough to go across the entire width of the edge, as the leaf releases from the tool, they push the tool forward and upward so the leaf drapes down into the recess. This requires deftness and timing. Some use paper for laying on but curve the paper by drawing it over the edge of the bench. This way the paper takes on the shape of the edge so the leaf is apt to drop more uniformly. Historically some have used a device resembling two pairs of dividers connected at the top by a rod. Each leg of a divider is linked to the same leg of the other divider by a piece of thread: the leaf is picked up by the threads on either side of it, when the legs are closed up a bit the leaf droops between them. It can be adjusted to give a droop equal to the edge. Another, and perhaps easier way is to lay the leaf on in halves, first from one side and then the other so that they overlap in the center. This may require double the number of tools for laying on as there may not be time to lay on and reload anew.

In regards to the flat edges, the same timing, methods for judging dryness, and setting with flannel apply. There is a difference when it comes to burnishing. One can burnish across the edge with a slightly convex shaped, flat burnisher as you would on the top and bottom edges. Don't use a completely flat burnisher, as it will be very hard to control. The more common method is with the dogtooth burnisher. This also differs from the flat edges in that burnishing with the dogtooth is done along rather than across the edge. Working across the edge can be a disadvantage to the upper sides of the edge, especially with a flat burnisher. As they lack the support of a flat edge, the pages can be more easily disrupted by the burnisher coming down onto the pages as it moves into the curve of the edge. When working a burnisher along the edge, you are pushing against the support of the gilding boards. This is less likely to damage the paper. A flat burnisher can't work this way, so the dogtooth is used. The nature of its curved surface allows it to match any curve of the fore-edge. It is held in the same manner as a pencil and gently worked lengthwise from one end to the other on its heel. If worked in short strokes there may be the tendency to leave marks, especially as you apply more pressure. Pressure is increased as with the other edges, but you probably won't be able to exert as much as you can on the flat using your shoulder to push. When burnished, the book may be removed from the press and opened as usual.

## DOUBLE GILDING

When gilding, you overlap the leaf to be certain of complete coverage. You may also have the occasional repair. These can show up as darker, denser areas of gilt, which may be acceptable depending on the nature of the book you are gilding. Runs of inexpensive bindings traditionally

have one layer of leaf and, even though there may be no repairs, the somewhat noticeable area of overlap is considered normal. There will be times, however, when you would like the edge to be consistently dense. A fine binding with a noticeable overlap can make the whole work seem less than desirable. Too many repairs, no matter how successful, can look like leopard spots. A second layer of leaf will usually take care of the situation. The best time to do this is after you have set the first layer of leaf through paper. At that point in the process, you can see what you have in terms of overlaps and repairs. Some papers seem to take one layer very well and obviate the need for more leaf.

To add another layer of leaf you need to apply another coat of size. The sizes we use are all water based. Water laid onto the gilt edge will bead up (which is one of the reasons we gild books – to keep moisture out of the textblock). The addition of alcohol will break the water tension and allow the solution to spread. Take a small amount of size and add alcohol (either isopropanol or ethanol) in a ratio of approximately 10%–15% alcohol to size. Upon adding the alcohol, you will notice a reaction as it mixes with the water in the size. Mix thoroughly until the visible reaction ceases. While spreading the size, if you see it beading up, simply add a bit more alcohol to the size. The size might not spread as smoothly as it did when you laid on the first layer of leaf but, as long as it completely covers the edge, it will work fine. The addition of too much alcohol in some sizes – such as egg and starch – can cause a chemical change, which will create clumps, making it useless. Because of this, decant a small amount of size and mix a little alcohol into it. If it clumps, start again and add less alcohol. It doesn't take much alcohol to break the surface tension of the size but you may have to experiment to find out how much works without ruining the size.

A word of caution about using alcohol to resize the edge: sizes containing albumin (protein), such as eggwhite or powdered albumen, react with alcohol and the protein becomes denatured. This can create strands or globules of denatured protein in the mix, which will cause lumps under the leaf. The reaction isn't immediate and the size will dry down sufficiently on the edge before it happens, so there is time to use alcohol with these sizes although they will have to be discarded after a few minutes. Starch also will react and clump where PVA, gelatin and rabbitskin sizes seem not to be affected. When the size is applied for a double gilding, you may find that it still beads up slightly. If this happens wait a few seconds and apply again. The moisture from the first application of size and alcohol may make it easier for a second application to take. If it still beads up add more alcohol to the mix and apply again. After the second laying on of leaf, follow the same procedures as before beginning with setting the edge with flannel and moving on in sequence until your final burnish.

## ROUGH EDGE GILDING

Rough edge gilding can give a very pleasing effect, as the gilt edge has more facets to reflect the light and doesn't offer that "solid block of metal" that most equate with gilding. Prior to sewing, open the pages flat. If the book has deckled edges, lightly trim the deckle to remove only the larger protrusions of deckle and keeping the general amount of deckle intact. The pages are then interleaved with plain paper, cut to the same size as the open folios, including the deckle. The plain paper will help support the deckled edges during the gilding process – a bit of deckle may still leak out, but it will be cut back during sanding. (A rough edge can't be scraped because the

edge isn't solid enough and some of the deckle might tear out.) The whole is then jogged, placed into the press and gilt. After sanding, the edge should be thoroughly brushed as dust can get down into the voids within the deckle. Bole or graphite should not be used in this process because it could seep down into the voids and color those areas. The size should also not be pooled on but should be just enough to thoroughly dampen the exposed deckle and the support paper. The result is that only the taller areas of the edge are gilt and the lower ones remain plain. This type of edge can be burnished because of the support paper and as with gilding in the rough, the result can be more interesting than solid gilt edge.

## GILDING IN THE ROUGH

For gilding in the rough, the book is sewn and left untrimmed. The same precautions are taken as with rough edge gilding. In this case, you may not even be able sand as there is no uniform support paper to brace the edge. Bole or graphite should not be used and the size should not be pooled on. This kind of edge can't be burnished, so the leaf will not be as lustrous as it might be otherwise.

## GAUFFERING

Popular during the 16th and 17th centuries, gauffering is rarely seen in modern work. It derives its name from the effect it produces, gauffre (French for "waffle"), and is associated with early German bindings. Gauffering is a simple method of adding design elements to the edge. Typically, it is done on edges where the paper is hard, as soft papers don't accept the impressions as clearly. It is also crisper when using eggwhite, as it creates a harder surface.

There are several different approaches to gauffering. After achieving a solid edge, leave the book in the press under pressure. The designs are made with finishing tools bearing simple, small designs. The hardness of the edge makes the use of complex or large tools difficult. The tools are heated on the stove as they are for tooling. You can use cold tools, but the design will not be as shiny and lustrous as with heated tools. The tools are heated and then cooled to just below the sizzle (as for tooling) and applied to the edge. For single tools, place down and gently rock North, South, East and West, then pick up. For rolls or fillets, run them along with short back and forth motions to be certain of coverage and to keep the tool under control. Dotted rolls and thin fillets work the best as their faces are not so heavy, and single tools should be towards the small size. Flat pallets are difficult to use as the edge is rarely, absolutely flat. Pallets that are curved for tooling on flat surfaces will do, but again they should be simple and small; using small tools the design itself can be built up to be as complex as desired.

The design should be planned out as you would for tooling leather. Take a strip of paper the length of the edge and mark off points with dividers. Tape this down to the gilding boards to give you references for tool placements. You can make a more complicated design, tape it over the edge and tool through the paper. Remove the paper and tool again to shine the impressions. Simple tools can be made with brass stock mounted into wooden handles. These can be an aspect of the design on the cover of the book.

Areas of the design can be scraped free of leaf with a sharp knife (a curved scalpel blade works well for this) and painted to add color. Watercolor is the best paint to use as it stains the paper instead of setting on the surface.

You can add a different color leaf and tool that. Apply egg glair to the edge and let dry – it will dull the brilliance of the previous leaf, thus setting up a contrast with the tooled leaf. Either pick the new leaf up on the tool or apply a thin coat of sweet oil (olive, palm, almond, etc.) and lay the leaf onto the edge. Even if you pick up the leaf on the tool, the use of sweet oil will make it easier to remove any excess of the new leaf.

Follow the directions for making a solid color edge (see below) and try gauffering it with leaf as previously described, or use stamping foils. Chase a part of the cover design across the edge with color, leaf and gauffering. Shape a nib from brass, mount it into a wood handle, heat it up and draw on the edge through stamping foil. Think something up and do it.

Instead of traditional gauffering, you can also try burnishing with objects, like onion bags or cheesecloth on the edge. Place the object on the edge and tape it to the gilding boards. Lay a thin piece of card stock over it so that the burnisher isn't damaged by the object and the object isn't moved by the burnisher. Press down with a lot of pressure to insure the design is embedded in the edge.

## RED UNDER GILT

For Bibles and devotionals, the typical gilding style is known as “red under gilt.” It differs from other gilding in that the color underlying the gold is a fluid stain of red (vermillion sometimes mixed with carmine) instead of bole. Historically, this was accomplished using aniline dyes. The book was placed in the press and prepared for gilding in the usual manner, scraping and sanding. It would then be taken out, lain on the bench and the edge fanned. Working first one edge then another, a sponge was used to apply the dye downward across all three edges. The book would then be turned over and the same thing done in the other direction. This had the effect of the color showing when the pages were opened. After that the book was placed in the press and gilt with a single layer of leaf.

The difference today is the use of a vermillion ink or transparent water based stain for the color. Care should be taken when applying the stain. Cut two boards the size of the textblock and place one on top and the other on the bottom. Fan the book and apply considerable hand pressure to the top board to keep the stain from seeping too far inward in an irregular manner, especially at the corners (which are usually rounded). Turn the book over and do the same from the other side. For more control you can apply the color to the edges while the book is in the press, but the pressure should be lessened so the color can seep in a bit.

You need to adjust your approach if the corners are rounded. The gilding boards are placed on the book as usual, but that means the rounded corners dip below the level of the boards. It is difficult to scrape the corners but you can sand them. If you find yourself doing this kind of gilding often, shape a pair of gilding boards with rounded corners to give better access for scraping. Although difficult, you can make it work with normal gilding boards.



The wet preparations should be carried over, just beyond the center point of the rounded corner(s) toward the other edge(s). Cut the leaf so there is extra to drape over the corner(s) completely covering it. When you begin the next edge, do the same with the wet preparation and again lay on the leaf so that it drapes completely over the whole corner: this will ensure complete coverage. Use a dogtooth burnisher to reach over the corner(s) when burnishing.

## COLORED EDGES

A simpler but no less beautiful method for edge decoration is the use of color. Colored edges allow for more variation than gilt edges. Edges can be colored solid, mottled, sprinkled, airbrushed, sponged, etc. More than one color can be used and leaf can be mixed with it. For a solid edge, the best results are achieved if the edge is prepared in the same manner as for gilding. Carefully trim the book, talc and place it in the press. Scrape and sand the edge as with gilding. If the edge needs to be dampened for scraping, use plain size. Bole is not used.

Gouache, watercolor, ink or acrylic paint can be used to color the edge. Graphite mixed with size can make a beautiful satin black edge. Gum arabic or gum tragacanth can be used as a size for edge coloring. Some of the older books suggest the addition of sweet oil, such as olive, palm or almond, added to the mixture to make burnishing easier. One should be cautious with oil – if not well mixed, it can cause the color to darken in a splotchy manner. Egg glair doesn't mix as easily with colors, so it doesn't make a good size for coloring edges. Sizes such as starch may also give problems getting a solid deep color, as brush burnishing can knock back some of the pigment. One of the simpler methods is to use gouache mixed with PVA – the gouache is more opaque than most mediums and the PVA emulsion encloses the pigment and helps to retain it.

After scraping and sanding, loosen the press a bit: this will allow for better penetration of the color into the edge. The paint should be thinned with size to the consistency of cream. Using a very soft pliable brush, apply a thin, consistent layer of color, working from spine to foredge. If doing the foredge, start in the center and work out. Upon nearing the end, lift the brush as you depart so as not to leave a pool of color deposited at the end. Apply another layer when the edge is dry – this should be enough to make the edge solid in most cases. Using the shoe brush, polish the edge as you would after applying bole for gilding. Apply beeswax and burnish with an agate.

## SPRINKLING

Traditionally, for sprinkled edges the book(s) were merely placed upon the edge of the bench after trimming and the color applied. Some binders' board and a weight were placed on top to keep the color from spraying into the pages. It was seen as a quick easy way to dress up the edges and it was something apprentices could do. Today, we rarely work on multiples in this way but the same process can be applied.

The bench and floor are cover with waste paper. The color is prepared as for a solid colored edge, the liquid being just a bit thinner, and poured out into a shallow dish. A piece of hardware cloth (heavy screen with 1/4" mesh) is laid across a small wooden frame (about 25cm x 25cm) and stapled. The frame gives the screen enough rigidity to be held in one hand. With the other

hand, dip a small nail brush into the dish to charge it with color. Rid the brush of excess color by rubbing it across the screen, over some waste paper until you achieve a fine spray. Once you have regulated the quality of the droplets, turn toward the book edge and sprinkle. As you will see from the waste paper, the droplets will be large and varied the first several times you rub the brush across the screen – the droplets become finer and more uniform once some of the excess color is off the brush and screen. Note any build up on the screen of foam from the brush rubbing across it. If this happens, bang the screen or brush on the waste paper.

Alternately, you can use a glue brush and iron press pin or heavy pipe to sprinkle the edge. The brush is charged with the color and then hit upon the iron pin causing the color to be flung off the brush in droplets. Regulate the size of the droplets using waste paper.

For a more finished look, prepare the edge as with the solid colored edge by scraping and sanding. If you leave the book in the press you have more control because the droplets are falling straight down as opposed to going sideways if the book is on the bench. Of course you want to protect the press with waste paper.

Several different colors may be applied to the edge to give variation. As with the solid colored edges, burnishing the edge will give a nice sheen and the beeswax will protect the color. After any of these treatments, place the book in the press and burnish as with the gilt edge.

Other things to try are to sprinkle rice, small seeds, sand or other small consistently sized objects on the edge before sprinkling. Do this on the white edge or after one color has been put on. You can even do this several times to build up a complex layering of color. Melted wax can be dripped or splashed on the edge before coloring or after an initial color has been laid on. The wax can be used in sprinkling or solid colored edges. After the color is dry, knock the face of the book on the bench to loosen and break off the wax. Return the book to the press and burnish.

An example of a sprinkling pattern from one of the historical texts is known as “Chinese.” It comes from the *Whole Art of Bookbinding*, which is attributed to Henry Parry: stipple sponge with light blue, go over the vacancies with yellow and Brazil red then dab on vermillion in spots. Throw on rice, bold sprinkle with bark blue, remove rice and burnish. This pattern shows one way to go beyond straight colored or sprinkled edges.

Use stencils or other objects to mask off areas before sprinkling. Watch for a buildup of color along the edges of the masking material.

Another striking method for decorating the edge is with flakes of leaf. Place the book into the press, scrape and sand the edge as with gilding. Color the edge as a background to the flakes, graphite is a particularly attractive background color for this. When dry, brush burnish the edge. Place a couple of leaves into a fine tea strainer. Apply a layer of plain size to the edge. With a toothbrush, force the leaf through the strainer so it falls onto the wet size. When the size is dry, burnish through paper, then wax and burnish with an agate. Use several types of leaf, palladium and gold, variegated, etc., and experiment with screens having different size mesh. The smaller the mesh, the smaller the leaf flakes. You can cut shapes of leaf and lay them onto the edge using a gilding screen or tip.

Many of these methods can be used in combination. You can do a solid gilt edge and sprinkle it with gold of a different alloy, giving a subtle effect or even palladium creating silver flecks on the gold edge. Colored edges can be built up by sprinkling numerous different colors or shades of the same color. Each edge can be treated differently. The instructions given here should allow you to get the basics down so you can expand your own vocabulary of methods.

## FOREEDGE PAINTING

Another traditional method of edge decoration is fore-edge painting. The process is simple and easy to do on the face of it. The results, however, can leave something to be desired if one is a poor painter or the paints are not applied skillfully.

The preparation is to place the book in the press as you would for gilding. Fore-edge painting is more often done on the fore-edge of the book, but it is also possible to do so on the top and bottom. Place the book into the press without tacking. Scrape and sand the edge as usual. Burnish several times and remove it from the press.

Take a piece of wood large enough for the book to lie on. Cut a piece of waste paper or thin board as large or larger than the book. Lay the waste material on the board, fan the book edge, and lay the book on top of the paper. Hold the book with both hands to fan it, one on the spine and one on the fore-edge. Bend the spine downwards, causing the fore-edge to fan. Grasp the fore-edge and hold firm. Place the book down on the waste paper and board. With one hand, hold the fanned book and with the other lay a small piece of wood across the book. Using two woodworking clamps, secure the fanned book between the small piece of wood and the board. This will hold the book in its fanned position while you paint the book. The clamps may cause the board to rest at an angle. If this proves to be a problem, lay the board on top of some smaller boards to even it out. By clamping it to a board instead of your bench, you can move it around as you work or place it aside to dry. In lieu of clamps, you can place two pieces of binders' board on the top and bottom of the fanned book and wrap the package with cord several times around to hold the fan. Make sure the binders' boards are longer than the height of the book so the cord doesn't scrape against the top and bottom edge of the book.

The principle at work here is to paint, not the actual edge of the paper where the leaf will lie, but the very edge of the broad side of the paper where the text is – the skill lies in the actual painting. Watercolor is the only paint that works for this process: acrylics, gouache and oils are all too thick. You want the paint to work more as a stain than as a paint. This is a delicate process – too thick and the paint may flake off, too thin and watery and it may seep into the pages and/or warp the textblock. The paint has to be applied in a downwards motion: brushing up will pile the paint along the edge and brushing sideways can cause it to seep in.

The lucky few can paint freehand, but the rest of us need some help. Create a picture/design on a separate piece of paper. You can take pictures from magazines and newspapers, images from the book, photographs of your own printed from your computer, abstract designs, etc. Size the image to fit the fanned edge and tape it to the top of the book using low tack painter's tape, being careful not to get the tape on the actual edge in case it leaves residue, which may resist the paint

or gilding. Cut a piece of artists' graphite paper about 4–5cm wide by the height (front to back) of the fanned edge. (More than this will create smudges of graphite on the edge as your drawing hand lies on it.) If you are right-handed, place the graphite paper on the far left-hand side, underneath the picture. Using a pencil, trace the outline onto the edge. When done with that section, lift the picture and move the graphite paper down the next area and begin to trace again. Continue until the complete image is traced. You don't need to trace every aspect of the picture, just enough to act as a guide. Remove the picture and tape it to one of the clamps so you will have it to follow.

Use only good quality watercolors for this; poorer ones are not ground as finely. Tube colors can be a bit problematic if they dry out. They have no preservatives, so they can break down if they dry out and are rewetted often. Also, they may lose some of their brilliance or become gritty when rewetted. If using tube watercolors, squeeze out new paint if the old becomes dry. Pan watercolors can be rewetted without these issues. You may use your gilding size as a medium for the watercolor, but not egg glair as it can be brittle, causing the paint to flake off as the pages are fanned.

The color and image is built up or layered over the process. Don't try to apply too much color at once, but build up gradually; begin with the lighter shades and apply the darker ones over them. When finished, leave the book clamped until it is dry, then remove. Upon closing the book, you will see that your painting is not only on the side of the paper, where you want it but also on the very edge where you don't. That isn't a problem.

Place the book back into the press for gilding. You have scraped and sanded the edge already so you only need to give it a light sanding to clean off the any residue left from the painting. Some of the image that fell onto the edge of the pages will come off, but probably not all of it; however, it will not show under the gilt edge. Carry on with the gilding as usual, apply the bole, layers of size and the leaf. Burnish and remove from the press and break open as usual. You will see that the image does not appear on the edge but only when fanned.

The history of fore-edge paintings is mostly pictorial. For the classical era in which the technique arose, this makes sense and there is nothing to say one shouldn't do that now. However, be sure to think about how the imagery you put on the fore-edge relates to what you are doing with the rest of your binding's design. Abstract images, playful images, images that strengthen or support your design can be incorporated, and they may also be pictorial.

### WHAT'S THE POINT?

The edges of a book are a place where you can further your design, embellish what you have, add a historical note to the binding or just play. Think of it as another surface upon which you can show your ideas, test your skills and learn your craft. A solid, gilt edge is intimidating to those who know just enough about it to understand the challenge, but enticing to those who are willing to test themselves and their abilities. We all fail at it the first time we do it, and maybe even the second time. Use this paper as a point of departure. When you fail ask yourself what might have happened, what other direction you might go. Patience is required for this, as it is for most aspects of what we do. Did you rush the setting or burnishing (smear leaf or color)? Did you do

it too late (flaking of leaf)? Is the room too dry? If so, you need to work faster. Is the room moist? Take more time. Eliminate distractions from your procedure – messy benches, phone calls, people coming and going. Focus on what you are doing until the process becomes habit. Then let yourself play.

### LASTLY

As no one person can know everything, this paper is and will remain, a work in progress. I would appreciate questions, observations and corrections to its content. I don't regularly do everything described in here, nor perform the operations the same way each time. Who would want to do that? I wish to learn more and I assume you do too, so let's collaborate on the final draft, may it never be done.

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