

**TECHNIQUES OF THE GILDERS**

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**Being a survey of the many methods of  
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## Techniques of the gilders

When one walks up and down in the world, looking at all the varied examples of the gilders' craft, in the interiors of churches, on illuminated manuscripts, on the steel blades of military dress swords, on the windows of shops and offices, on the hulls of boats, on picture frames and the domes of churches and an infinity of others, one might imagine that there is some magical substance, some single adhesive perhaps, which binds the gold to whatever base is needful of it, and some single technique for using it. Alas, there is no such thing. There is such a multitude of crafts, tools and traditions, that the sum of them literally constitutes a highly skilled art.

Gilding, in one form or another has been known somewhere in the world for over four thousand years. It is found in the tombs of Egypt, and on the excavated bronze vessels in China, on the copper domes of churches in Russia, on the lovely and intricate religious books of Ireland, on the panels of icons and the walls of paintings. It is a most useful art, sometimes a trade, sometimes an avocation, one which permits the overlay or binding of gold on humbler materials, enriching them and gladdening the heart. The various vehicles, gums, glues and other materials used by gilders are collectively known as mordants, those which permit the binding of the thin sheets of gold and other metals to paper, leather, stretched silk, to several kinds of gesso. Used with mercury and fire, in "fire gilding", it permits the formation of amalgams with silver, copper, iron and bronze. Used with hot iron tools, it permits the stamping of letters and designs on the spines of books, on leather table tops, and on saddles. And used with the warm vapor of the breath, the burnished gilding of words, letters and designs on parchment and paper.

The term "water gilding" sounds as though it might be extremely simple; it is not. It requires many stages, the sealing of the wooden base, careful preparation of a gesso made of slaked plaster, gypsum or chalk, rabbit skin glue, a certain fine dark reddish clay called "bole", burnishing, then the careful laying of the gold leaf with water mixed with a bit of alcohol, often overlapping the edges of the gold, then burnishing the gold in a certain direction with an agate burnishing tool. It is used in church interior decorations and in the finishing of picture frames, in rich interiors of houses and palaces.

A technique which uses considerable heat is that used by the workmen who stamp the gold letters or designs onto the spines or fronts of leather bound books. Their mordant is a material, made up by the workman, called "glair", which is also used by some calligraphers in the illuminations and lettering on parchment or paper. Glair is made of an extremely simple material, the white of an egg, beaten up to a good froth, mixed four parts of eggwhite to six of water, put into a glass mug, wider at the top than at the bottom, and let stand overnight. The mixture will have produced a stiff upper layer, and down below, on the bottom, a liquid essence. The stiff material is pierced, and the liquid is poured into a clean container. It can be used at once, or kept to age; the longer it is kept, the better it is. If it is old, it smells, but it is no worse for it.

To stamp gold on a book spine, the workman prepares an iron tool, into which he places the desired letters, of iron, clamped into a straight line. He has a sort of brazier, in which he heats the tool, rather like a branding iron, but not so hot. First, he brushes his glair over the area to be gilded, and lets it dry a few minutes. Then he rubs a bit of Vaseline on the area to be gilded, so that the gold leaf will stick to something. He then takes up a section of gold leaf, perhaps a quarter of a leaf, with a ball of cotton, and presses it onto the surface of the book. He then presses his iron firmly onto the gold, indenting the leather somewhat. At this point, he wipes away the surplus gold and there appear the letters, gleaming and bright. One might think that the gold has been melted, but I doubt that this is so. The effect is caused, I believe by the cooking of the glair, which then holds the gold firmly.

When glair is used by calligraphers it is carefully brushed with a small brush onto the letter or other design to be gilded. It dries very quickly. After an interval of about twenty minutes it should be ready to work. The workman then takes a tube of metal or bamboo, about five inches long, puts one end in his mouth and breathes a warm, moist breath on the glair, so that a vapor appears on it. Only while that is seen, he can place the piece of gold leaf on it firmly, with a cotton ball or a small brush. It is important, even essential that this is done in a room which is humid, without drafts or dust. After an hour or two, the surplus gold can be brushed off, and the letter or design burnished with a special tool, often made of agate. These burnishers are made up in various shapes, suited to the type of work to be done, and set into handles. (Agate burnishers should be polished from time to time with moistened rottenstone powder on a leather pad). So this technique too requires heat, but it is the gentler heat of the moist breath. The preparation and use of glair can be found in the old books from the middle ages. I had the good fortune of seeing it demonstrated by the English gilder Sam Somerville, when he came to Victoria in 1992 to lecture to the Fairbank Society, a society of calligraphers; I had been invited to attend it, and enjoyed not only the lecture, but a visit by this master to my studio.

That particular process is also used when gilding with one of a variety of gums, which some prefer.

Another variant of it, taught to me by the gilder Dave Lock, in 1988, is done with dewaxed shellac. It may be a part of the originally oriental procedure of japanning. Purchase the dewaxed shellac flakes from a specialized dealer, and dissolve some of this in alcohol, if fresh. If not, the mixture must be heated using a source of heat which has no flames of course. The proportions are approximately one heaping teaspoonful of the shellac flakes to about two ounces of alcohol. The liquid should be a pale color, like weak urine. Let the dissolved shellac cool down, and it can be used then, or kept and used for a long time, as long as the jar is well closed.

It burnishes very well, in about an hour or two. Indeed, it should be burnished then. (When heating up the alcohol and shellac flakes in a little jar, like a jam jar, one must leave the lid on the top of the jar, but not screwed down, just placed on it, so

that the alcohol will not all evaporate). After brushing the shellac on the work, wait about twenty minutes. You may then apply the leaf, if you wish, or wait until it is convenient; the shellac will continue to be receptive for a long time. In my own usage, gilding on small areas, I cut the leaf into small sizes and pick it up with a long-haired sable script or lettering brush, tapping the gold down and removing the surplus gold at this time.

As far as I know, professional gilders don't usually give away knowledge of their craft. They may train up a member of their family to continue their work, or assist them in it, but as their income may depend on their profession, they are private in the skills of it. In the case of my encounter with Dave Lock, this tradition was set aside, and it was to my great benefit. What happened was that some time after we moved to Victoria I had done paintings and gilded work and, having no dealer at the time, I ran an ad in the newspaper, inviting the public to visit my studio, where I would display all my work for sale, on a certain date. Quite a number of people came, as the artists here did not use gilding in their work, and it was exotic to them. (There are now several professional artists here who use gilding in their work and the materials are sold locally). During the show, a man came up to me and complimented me on the gilded work, and asked me if I would like to know more of the techniques of it. (I was by no means a master of the trade of gilding at that time). I answered of course that I would be very happy if someone would teach it to me, but I knew of no-one who would. He then told me that he himself was a gilder, a decorator gilder, and would come to my studio and teach me a good technique. I was elated to hear it, and asked him why he would do it, and he answered, (I should put this in capital letters), FOR THE HONOR OF THE ART. In other words, if I wanted to call myself a gilder I should improve myself at it, and do justice to the occupation itself, as well as to myself. Indeed, he did come and work with me, on two occasions, and without fee, and taught me the gilding with dewaxed shellac. I do use it from time to time, and the work I do in it is very good gilding, well burnished, and, although I doubt it as good as his, is as good as I can do. As with others who have been teachers to me, I praise his name.

Obviously the techniques have been developed to be used on particular materials, each one chosen to suit it. The ancient Egyptians used gold leaf on a gesso ground, on wooden carvings and the like. The term gesso has quite a number of meanings, many of which you will find in the literature. I believe the original gesso, for instance used by the Egyptians would have been made of finely ground gypsum or slaked plaster, mixed with glue and water. In England there is an evident preference for making gesso out of chalk, but in continental Europe not. There is a considerable difference in them; gypsum is a much harder substance than chalk. The two forms of gesso, in Italy are referred to as "gesso sottile" and "gesso grosso", obviously meaning thin and thick.

Although the traditional gesso powders and mixes are still sold, for those who chose to use them, there are newer gessos, compounded with various white ingredients in a polymer acrylic medium. These were developed, along with the acrylic paints in the nineteen fifties, particularly in Mexico, by Jose Gutierrez. I studied with him at

that time. I use a particular brand of them, Liquitex, both for gesso and modeling paste. The latter is polymer emulsion mixed with marble dust. These acrylic gessos have several virtues, one of which is their flexibility. In my own usage in gilding, I have experimented with the various mordants which work well on them. One of the first mordants I used on gessoed canvas was a gloss acrylic medium. It is amazingly simple and effective, and is used with loose gold leaf. The term “loose” refers to the method of packaging and using the leaf. Loose gold leaf is packaged between thin papers which have been very lightly dusted with rouge powder, to keep them from sticking to it. This comes in little booklets, of twenty five leaves. For those doing gilding on flat surfaces, or working in the wind, leaf also comes lightly pressed onto waxed papers, in the same kind of booklets, and can be picked up and applied by holding the protruding edges of the paper. This is called “patent gold” or “transfer leaf”, and cannot be burnished, but is rubbed up to a reasonable gloss with a clean cloth or cotton ball.

Several tools are essential in the studio usage of the gilder; a knife, with which to cut the gold leaf, a leather covered pad on which to do so and, for picking up whole leaves or half or quarter leaves, a specialized brush called a “gilders’ tip”. These are made of very long hairs of badger or other materials, set flat into a cardboard handle. To use this tip, first put a leaf of gold on the leather pad; it can be gently slid out of the opened book by touching the very edge of it with clean fingers. The gold leaf will not lie quite flat on the leather. Place yourself above it and gently blow a short puff of air at the middle of it, once or twice, and it should lie flat. Then, in order to pick up the leaf, take the gilders’ tip, rub it briskly on a woolen garment to give it a bit of static, and lay it on the gold so that it covers about two thirds of the sheet, holding the tip as flat as possible. Some gilders have the custom of rubbing the tip on their hair, instead. The traditional leather pad had padding under the leather, which is stretched over it and nailed to the wooden sides, and the traditional knife is not very sharp; it breaks the gold, rather than cutting it. It is used, essentially for dividing the leaf into halves or quarters. In my own usage, since I may cut a leaf of gold into a great many pieces, about sixty or more, I make up my pads without padding underneath, and use a sharp knife, for which I make a little sleeve at one edge of the pad. The knife blade should not touch anything else, because it may pick up grease and the gold would stick to it. The knife should be stropped from time to time, so that it does not tear the leaf.

Sign writers who gild lettering and other design on glass windows use gelatin as a mordant. They take an ordinary, empty gelatin capsule and put it into an empty, clean soup can and pour boiling water over it, filling the tin. The capsule dissolves, add some alcohol and the mordant is ready. Gilding with leaf has to be done at whatever angle is necessary for the work. Small work can be done with the work lying flat on a table. Large picture frames can be worked, from the bottom up, propped up at an angle.

Gilding on a window glass, however must obviously be done vertically, and the movement of the hand of the gilder must be as accurate as humanly possible. Holding the leather pad in the left hand, the gilder picks up the gold with the tip and

moves it through the air and places it perfectly flat on the prepared design, which he has drawn on the window. The very thin cardboard handle of the tip allows this. He then gives the gold a couple of light taps, either with the tip or another brush, so that it lies flat. There is a great deal of wastage in glass gilding; for this reason the gilder puts a sheet of brown paper on the floor underneath his work, and when he skews up the gold it falls onto the paper and is saved. Ordinarily, when quite a quantity has been saved, it can be sold. However, if one has any use for gold powder, these scraps of gold can be ground up in a mortar with honey, (to keep the bits of gold from sticking together), or salt. After grinding it nice and fine, water is added, gently stirred into the gold powder, let settle, and repeated many times, until all the honey or salt is gone. The contents of the mortar must be dried, and you have gold dust. In Japan this is used in the gilding of lacquer. No mordant is necessary for this; lacquer is a very slow drying material, drying only in a cool, damp atmosphere, and is applied in many layers. When the desired layer is still moist it is ready for gilding. The gold powder is put into a bamboo tube, the opening of which is covered by fine gauze, and the gold is gently tapped out of it onto the lacquer. When the lacquer has set, another coat of it is applied, sealing in the gold and protecting it. Another way of gilding on lacquer, which I saw done in Kyoto, is done with very small pieces of cut gold leaf, all even, lying on a pad. Each tiny piece of gold leaf is picked up with a thin needle, set into a handle, and moved to the desired position over the bowl or other object to be gilded and laid on it.

Gold dust can be used by calligraphers, mixed with gum Arabic or some other gum. It is painted onto a letter or other part of the design, which has been painted, let dry thoroughly and then burnished. Dry cakes of this mixture can be bought from specialty dealers; (it is very expensive). It is called "shell gold". To use it, simply moisten a fine brush with water and rub it on the cake until a bit of it dissolves, and paint it on the work. The burnish is not as bright as burnishing on leaf.

I had the pleasure of studying for a short time with a Japanese master, in Kyoto, Mataichiro Isoda, a painter of ladies and flowers, who used gilding in his work as backgrounds. He worked on stretched and primed silk and on mounted papers. His mordant was fish glue, used warm. This material is made up by boiling certain parts of the fish, particularly the bones of the head. It is sold in the form of a large, very thin translucent sheet of the dried material. Broken up, it is dissolved in boiling water. It is generally applied to the paper or silk with a wide, fine flat brush made up of about eight separate brushes, each in a bamboo handle, and mounted side by side, called a hake. The gold or silver leaf is laid on this while it is still moist, and sets very quickly. This process and material are used in the making of paneled screens, found in the interiors of Japanese houses.

A very useful material, varnish/oil gold size is a mordant which has had a number of names, and various ingredients, and is available for those who need it.

It is usually compounded of a powerful varnish, an oil and a thinner. One I use is sold under the Rolco brand, made of phenol, tung oil and mineral spirits. Applied to a surface of almost any non-absorbent material, it sets ready for gilding in an hour,

holds the leaf firmly and can even be used for exterior purposes. The gilding polishes up with a cloth, and cannot be burnished. Other resins are used by other manufacturers, some of them colored with pigments. Slower setting variants are also sold, which give a brighter gloss to the gold, but may attract more dust while setting. I commonly use this mordant on carvings in gesso and modeling paste, painted with acrylic paints and made as smooth as possible. I have also used it on ivory carvings and on the backgrounds of oil paintings. It is best used with loose gold leaf, but on flat surfaces it can be used with transfer gold. Some of its uses on exterior objects are on the tips of iron fences and in the carved lettering on marble monuments and headstones. It is reasonably durable for the purpose but has to be redone after some years.

For most purposes, including picture painting, gold leaf is laid on a warm colored ground, generally red oxide, which enhances its color and when visible in gaps in the gilding is harmonious with it. Silver or palladium leaf is generally laid on cooler colored grounds. When a background of gilding is wanted on an oil painting, it is often somewhat difficult to keep bits of the gold from sticking to the painting where it is not wanted. The painting should be dry, and the surface of it, where the gold is not to lie may be lightly protected with a film of talcum powder. The area to be gilded should then be carefully washed clean of the talcum powder with water, and well dried before the gold size is applied. If the design permits, gild first, then paint.

By far the most pleasing and useful gold size I have ever used is a substance which was designed for another purpose entirely, Winsor and Newton's Copal Picture Varnish. Although the semi-fossil copal was in general use as a durable varnish for centuries, both on furniture and paintings, it came to have an unfortunate reputation for the latter, as it was very hard to remove, and darkened considerably in time. However, used as a component of an oil painter's medium, it is invaluable; it gives strength to the mixture of oils and turpentine, and permits the most delicate and durable of glazes to be done, among other virtues. As I had training in classical techniques as a picture painter I have used a copal ingredient for over forty years, without any ill effect whatsoever. As I had a supply of Winsor and Newton's varnish in my studio, I thought one day to try it out as a gold size; it worked perfectly, did not attract dust, and had a long enough setting time to allow the placing of many small pieces of gold leaf, so as to cover the work in hand. Interestingly enough, it could be burnished. However, that company ceased producing this varnish many years ago, replacing it on their material lists with ketones and other varnish bases. Copal gradually went out of fashion as a varnish. That resin comes from Central America, Congo and Sierra Leone, mainly. It is still harvested, under certain kinds of trees, but now is marketed as fake amber, which it rather resembles.

## Techniques continued

The main use of copal continues to be as incense. When burnt it produces a pungent, pleasing aroma; it is widely used in churches and mortuaries.

Gold foil was used for the gilding of furniture found in Egyptian tombs. Bedsteads and thrones, made of wood, were embellished and protected with areas of foil. Although the wooden bases had perished in time, the gilding remained, and some of the pieces could be reconstructed and are exhibited in museums. Foil much of this sort may be obtained from the famous English firm, Cornelissen and Son, and is listed in their catalogue. It is very costly, and is sold by weight; a single leaf of it, 100x100 mm. weighing half a gram presently costs about \$100. It is very useful and beautiful, and can be applied to small carvings. The use of it suggested by Cornelissen is for enamelling...."extremely thick leaf which will not break when exposed to heat." I have been experimenting with gilding with this material and am happy with the results. I used my usual oil/varnish gold size, and found the best way to attach it was to wait about 45 minutes after applying the size and lay small, cut pieces of the foil on it with tweezers, tap it down with a small brush and burnish with the agate burnisher at once. In that way, the foil was made to conform precisely to the form of the raised portions of the carving. It took the most perfect burnish of anything I had ever used, being very thick and of pure gold. It appears to be some 40 or 50 times thicker than ordinary gold leaf, cuts with small scissors rather than a knife. I have used it on gesso carvings and on metal.

Generally speaking, modern gold leaf is rolled and beaten to a thickness of about 2000 leaves from an ounce of gold, and in most western countries it is trimmed to sizes of roughly 3 and 3/8 in. or 4 in. square. It is available in what is called "glass gold", which is usually used by glass gilders, being of more flawless fineness, and as "double thick". Silver leaf from India is sometimes sold untrimmed, just as it comes from the gold beater. A large number of alloys of gold are available, producing different colors; many of them are alloys of the gold with silver or copper or both. One very unusual one has iron as the alloy. Palladium and platinum leaf are also available. One might think that the gold leaf available from the gold beaters of different countries would be quite identical, but it is not. I have used the leaf from England, France, the United States, Germany and Japan, and the leaf of each country is produced with different textures, depending on the differing choices in the material which is placed between the leaves of gold when it is beaten. In one country this material may be made of the air bladders of fish; in another of calf's intestinal membrane. These are materials called "goldbeaters' skin". The famous gold leaf of Kyoto, Japan continues to be made using paper.

Fire gilding, which I mentioned in the first section, was apparently invented in China, and was used there on bronze objects. This technique passed gradually in a southern and western direction, and became quite universal, in each country being used for differing purposes. Buddhist statues of bronze, often very old, bear traces of fire gilding. The copper domes of Orthodox churches in Russia have been gilded that way. Italian and French works of silversmiths bear areas of gilding, precisely



conforming to the designs of figures or other portions, and are termed parcel-gilt. Fire gilding is the only method by which a metal object can be made to appear to be completely made of gold. We attended, some years ago, an exhibition of Russian works of art, in Seattle, and were admiring two or three lovely golden bowls, displayed in glass cases. To my surprise, the label on the cases described the objects as being of silver. Evidently they were, and had been so perfectly gilded by fire gilding that they seemed, by this artifice, to be of gold.

Alas, this technique is so poisonous, not only to the workmen to use it, but for any living thing in the environment, that it is nowadays very little used. It utilizes an amalgam of gold with mercury, which is applied to the work and then heated to a great temperature with a furnace or torches. The gold portion then forms a true amalgam with the copper or silver or other metal, and the vapor of the mercury emerges into the air. If you look into the books from the Middle Ages, which deal with the metal arts, you will find a description of the technique. Poisoning by mercury is universally well known, and has been for a long time. Peter Ustinov made a tour some years ago of Russian churches which had golden domes, copper gilded by fire gilding, and took the trouble of looking into the records of the time in which they had been done. It appeared that the lives of some 2000 workers had been lost in doing the work on each of the churches, according to him. There may be some continuing use of this technique by jewelers, apparently, who work under powerful exhaust hoods which protect them somewhat, but void the vapors into the environment. Generally speaking, fire gilding has been replaced with anodized aluminum for domes, of mosques for instance, and electroplating for jewelers.

One of my reference books describes one of the methods of mercury gilding, called VERMEIL. Derived from a French word meaning red, the term vermeil applies to a particular kind of gilding for metal objects, which adds a warm rose tone to the gold hue. The process is commonly used to gild silver and bronze objects. The liquid for vermeil gilding is made by mixing and heating an amalgam of gold and mercury. The metal object to be gilded is dipped into this molten liquid, then into water to cool and clean it. The result is a covering of rosy gold. Vermeil and its analogous expressions, argent dore or silver gilt, are mentioned in French household inventories as early as 1316; the technique was apparently continued to be used until at least the nineteenth century. (The reference to this technique was written in a most brief manner, and I have to make some assumptions regarding how it would have worked. It may be that the powdered ore of mercury was used, rather than the silvery liquid form, as it is of a reddish color. And it is almost certain that the objects to be gilded would have had to be prepared for the plating by wire brushing or immersion in acids. There is a reference to this technique in one of the early books, which I do not have, unfortunately. It is not in Cennini.) Obviously, the objects to be gilded in this manner would have been quite small, because of the cost of the gold. Generally, they would have been articles of jewelry or small fittings for extremely valuable pieces of furniture.

The actual technique of fire gilding, to my knowledge, is nowhere described in modern times; catalogues of works of decorative arts in auction sales describe the

works shown as simply parcel-gilt, or *d'argent vermeil dore*. For that matter it would be rare to find any mention of any of the techniques of gilding used in the making of artifacts, and only having the confidence of a particular practitioner, and seeing the work done, could one find the knowledge of it. However, if one can find them, there are publications by professional gilders in which they describe quite exactly the techniques they use, for instance the American Society of Gilders.

One of the most famous and highly regarded treatises which include actual recipes for goldbeating and the use of gold in religious paintings was written about the year 1120 by a man using the pseudonym THEOPHILUS, thought to have been the north German Benedictine monk, Roger of Helmarshausen, some of whose works in precious metals still is preserved. I have the edition of his treatise, which was written in Latin, translated by Hawthorne and Smith and called ON DIVERS ARTS. As with the greater part of his writings the work is pragmatically described, and a pleasure to read. Chapter 23 bears the heading GOLD LEAF, and that is the one thing which has been confusing to me ever since I came across it. In this chapter Theophilus clearly describes the material between which he places to gold to be beaten as Byzantine parchment rubbed with burnt ochre and burnished. The authors, examining the term, have determined that the material was paper, (one of the first uses of paper in northern Europe). Made in Egypt and Damascus it arrived in Europe via Constantinople, and Theophilus describes it as being made of flax fibre. In a single session of beating, his gold is stretched in size from "two fingers" in width and height to four, coming a bit outside of his paper, which measured four fingers. He then cuts shapes out of the gold with scissors to apply to paintings, as required, for halos, hems of robes etc. and lays it with glair, made without water, and if necessary, laid in repeated layers of gold and glair, each layer allowed to dry, and the whole finally burnished. This procedure does quite clearly explain the splendid luster of these mediaeval gilded pieces, usually described by our contemporaries as being done in gold leaf for those portions, erroneously. What is confusing is simply the use of the words "gold leaf" in the heading, translated from the Latin. What he has made is not gold leaf, as we know it, but gold foil, a material able to be cut with scissors. I have described at least one of the gold foils available these days as being some 40 or 50 times thicker than leaf. (He gives a most useful tip for picking up the pieces of foil he has shaped with scissors; he says to moisten the tip of the handle of the brush in one's mouth, and pick up the section of foil with that as adhesive, and apply to gold where it is needed. It works.)

Who to blame for this obvious error? The translation was obviously done with great care, and I finally came across the solution, in an etymology I bought recently. I looked up the word FOIL, which has a Latin root, and found that there is but one word in Latin to describe both leaf and foil, folium. Since Theophilus had only the one word to describe what he was making, he differentiated between the two, which we term leaf and foil, by describing the production as of "thick or thin". He was making the thick.

Therefore GOLD FOIL rather than GOLD LEAF should be used in future translations, thus clarifying the mystery for us readers, who humbly wish to learn from these writings.

The making of sheet gold into gold leaf is described in the traditional literature as being done in four stages. After the first beating, the sheets of gold are removed and each one cut into four, and inserted again between the layers of isolating material, producing after the beating sixteen and then again, cut and beaten, producing sixty four. After the fourth beating an enormous quantity of gold leaf has been produced. If, then, Theophilus had begun with, say, twenty five layers of paper and gold, (the paper then available to him having been quite thick, as it was used for documents), and continued through the four stages, he would have had many hundreds of leaves of gold, which he would have simply described as "thin". (The isolating material for the beatings is different, stage by stage, first parchment, then treated paper, then goldbeaters' skin for the third and fourth.) He says, however, that this thin gold would be of no use in the decorative work on halos and the like, and it is easy to understand that the gold for those purposes should be as thick and burnished as possible.

I should now deal with the two terms used to describe the gilding in pictures of various sorts, whether on panel, canvas or stretched paper screens. The terms are "gold ground" and "gold background". Some people imagine, apparently that Russian icons are painted on panels completely gilded, the painted image superimposed on the gold; this is incorrect. They have gilded backgrounds, done first, just after the drawing of the figure has been made. The contours of the image of the figure are scratched into the gesso ground, to indicate where the gold is to be laid. In the workshop system, used in monasteries and in secular usage the various stages of panel construction, gessoing, gilding and painting are done by different workmen, each a specialist in his trade.

There are, however, certain paintings which have actually been done on completely gilded grounds, Japanese screen paintings done from the thirteenth to the nineteenth centuries that is from the Momoyama to the end of the Edo period. These are folding paper screens on wood frames, hinged together generally with paper hinges, and are up to six panels each. Because the paintings are done on the gilded grounds, there is no limitation on the intricacy of detail, as there would be ordinarily, so that the painted subjects may be of great complexity. I have reproductions of five of them in an old Arts of Asia magazine, with a brief article on them by a collector, and have actually seen one of this type exhibited at the Art Gallery of Greater Victoria, with a lecturer present. Quite typically, his lecture had to do with the themes and subjects of the paintings, and their traditions, and neglected to speak of the techniques used. Assuming that the gilding had been done with fish glue or some similar material, I was curious to know how the painting had been done on this ground, and asked him during the lecture. He answered after a considerable pause that it had been done in lacquer; I didn't believe it then, and don't now. I imagine that he made up his answer on the spot.

## More techniques

These screens would have had to be ready for the patron in a reasonable time. Lacquer is a very slow drying material. I have the idea that the paint may have been done with a medium compatible with the gold size, quite possibly the same one. There is no evidence of lacquer on the paintings.

Generally speaking I find these paintings to be unattractive and an ostentatious display of the gold. There is one example, however, which is the very epitome of good painting and the appropriate use of gilding. It is "Screens of the Wind God and the Thunder God", by Tawaraya Sotatsu, Edo period, 17<sup>th</sup> century. Color on gold foiled paper. Kenin-ji Temple, Kyoto. National Treasure. It is joyful, free and humorous and the artist has used his colors transparently and semi-transparently, showing the gold throughout. Pair of two-fold screens.

In my own work I have used small gilded panels occasionally, on which I have painted in oils, with deliberate effect. These could be referred to as "gold ground". The gilding was done with Japan gold size, or varnish/oil gold size. When dry I isolated the gold ground with Winsor and Newton retouch varnish, which dulled the appearance of the gold somewhat, but made it possible to paint on it without difficulty. My intention was to leave the gilded ground visible throughout, in many areas, and it not only worked well, but proved very durable. I have one done in 1984, still in perfect condition. My medium was what I usually use in oils, copal, stand oil, linseed oil, turpentine, and the varnish thin copal varnish, with a light spray of damar over it. This painting, called "*Archangel with Sceptre*" measures 7 x 5 inches.

Now, to resume the description of Russian Icons, I must say that this is a task which involves objects which are inherently both artistic and religious, inseparably. The technical procedures and materials of gilders depended not only on the necessity of the workmanship but the continuation of very old traditions and symbolic usages. I shall be deriving my information on various published writing on the subject, attributing where appropriate. From the book, "The Art Treasures from Moscow Museums": "Icons were painted on boards, mainly of bass wood, as linden was not so sensitive to changes in humidity and was less likely to warp than other kinds of wood. In the North of Russia, icon painters often made use of larch and spruce. A large icon was painted on several boards which were connected by pegs and braced by splines which helped to avoid warping. The face of the icon board was pasted over with canvas....which was covered over with a smooth, solid coat of ivory-coloured priming, or gesso ground. Icons were painted with tempera: pigments mixed with egg yolk" (Reading Theophilus on the subject would be appropriate.)

The procedure of gessoing the canvas layer would involve first priming it with thin gesso, and then scraping thick gesso onto the surface with a spatula several times, to create a smooth surface, and then finishing with thin again. This would have been scraped smooth. The boards would have been glued together with casein glue, and planed flat. The function of the canvas would have been to additionally

hold the boards together and provide a base to which the gesso would adhere well. Evidence of the presence of the canvas layer would be its overlap on the edges and possibly the back. As for the medium used in gilding the background, it is not mentioned. I would have to assume that it was glair.

(As I have now, in this little essay, had to conjecture regarding some process several times it is usually because I have not encountered an explanation of it in any reliable source material. I am sorry for it; I cannot pretend to know of a certainty what I do not.) I will continue here with some information gleaned from a web site on Russian Icons. The author is George O'Hanlon, who seems to have access to some very interesting data. "In the earliest Russian icons, from about the tenth to fourteenth centuries, gold is of greenish tint because of its high content of silver. The gold leaf is also thicker than the gold leaf of icons of the fifteenth and sixteenth centuries. Such greenish gold can be seen in icons of the twelfth century George the Great Martyr, *Shoulder Length Deesis*, and on other icons up to the fourteenth century. After that period, gold leaf in Russian icons is thinner and has a bright yellow or reddish color, because it contains small amounts of copper. From the sixteenth century Russian icon painters began to use another type of gold leaf- "dvoinik"- two thin sheets of gold and silver forged together. The upper side of "dvoinik" is of gold while the lower side is silver".

"The technique of applying gold hatching most often found in ancient Russian icons is by grinding gold leaf (and mixing it) in a gum base. In ancient Russian art all paints were originally called "tvoryoniye", (from the word "tvorit", meaning to *grind*). From the nineteenth century, however, only gold and silver paints were called tvornyoniye".

The third important usage of gilding in Russian icons is in gilded silver filigree areas representing not only halos but the heavens, and its use in borders and framing. In the book, "Treasures from the Kremlin", from the exhibition of works from State Museums of Moscow at the Metropolitan Museum of New York, (1979), there are illustrations and descriptions of 12 splendid icons, dating from the twelfth to the seventeenth centuries, showing the increasing use of gilded silver elements over this period.

I will try to deal with these three procedures. Assuming the backgrounds were gilded with glair, the process would involve the use of the gold leaf placed on flat cards and slid off smoothly onto the wet glair preparation. (The useful tool, the gilders' tip had not yet been invented in the earliest periods). The glair would have been made with varying proportions of water; for the finest leaf, four parts beaten egg white to six of water, with less water for the thicker early leaf. The brush used for applying the glair would have been put back into the glair container after each use, and not allowed to dry in the air, as this material would have hardened in the brush and be almost impossible to remove. The areas to be gilded would not have been brushed with the glair all at once, because of the rapid drying of it, but areas done bit by bit, and the gold leaf laid into it while wet, and then the adjoining section wetted with the glair, and so on. Halos, represented by flat disks in icons,

were sometimes gilded in a slightly different manner than the backgrounds. There is evidence, for instance, in two of the illustrated icons of the use of “skewings” rather than whole leaves of gold leaf. An example is “*Annunciation*”, Russian school, 16<sup>th</sup> century, in both the halos of the angel and the Virgin of this material, on what seems to be a darker ground. Skewings are the bits of gold leaf brushed off after gilding an area, and saved; they are irregular in size. These bits may be picked up with a needle point or a fine pointed brush and applied. This kind of gilding gives a sort of shimmering glow to the area. As I have mentioned, they can also be placed in a bamboo tube with a meshed aperture, well shaken and broken up, and then applied to the work by tapping the tube over it.

The hatching procedure, done onto the painted surface of the egg tempera painting would involve ground gold leaf mixed with a gum and water, not necessarily gum Arabic, but possibly. There are several gums which had been in use, and still are; gum Ammoniac, Benzoin, and Damar among them. Hatching was done with very fine brushes, to emphasize the edges of garments and paint decorative elements. The effect of hatchings, even when burnished would have been quite different from the burnished gilding with leaf, much more subtle.

The use of gilded silver elements became widespread as time went on, primarily in silver filigree, in some cases actually attached into the body of the icon, and in others over the surface of it, and removable. Later examples are shown with enameling also on the filigree, and some use of stamped silver gilt backgrounds. All of these would probably have been fire-gilded, as would the more modern chased silver.

Russian icons are invariably varnished, usually with a brownish varnish, either by choice or the effect of time and exposure to smoke and dust. It is said that the varnish on the oldest ones is very hard to remove, in order to clean and restore them. Because of the use of silver in gold alloys used in the making of the leaf it was necessary to protect the leafed surfaces from corrosion. And in addition, since icons were sometimes carried out of doors and used in processions, they would have had to be protected from the elements. Here again, there is no listing of the varnish type; several kinds would have been available in Russia, including amber varnish. At the earliest period, as it is evident from Theophilus’ writing that copal was known to the north Germans, it may have been available to the Russians as well. Softer varnishes could have been made of the resins of various kinds of conifers which grow in Russia.

Most of the older icons in various parts of Russia had become almost invisible under their darkened coats of varnish, over time. Some of them had been badly retouched or restored. In the present era, many hundreds of them have been gathered up for restoration and conservation; they are considered properties of the State. Quite a number of them had been produced in monasteries, and others in royal workshops, and the names of the greatest artists preserved, fortunately.

## Gustav Klimt

For my last entry in this little essay on the techniques of the gilders, I wish to deal with the splendid work of one of the greatest virtuosos in that work, the Viennese painter Klimt. He was born in Baumgarten, near Vienna in 1862, and began his studies at an early age at the School of Applied Art, where he remained a student for seven years. His career began with involvement in public mural painting, then private commissions for wall decorations, and then easel painting in oils, particularly in portraiture and landscape painting. Member of the Viennese Secession, and sometimes leader of it. Ultimately he resigned from the group.

During a period of about ten years he gilded extensively, gradually beginning and quite suddenly ceasing at a certain point. Various reasons are given for the end of his "golden period". His fortunes rose and fell more with the artistic fashions of the day than with his capacity. He was assisted by two of his brothers, Georg and Ernst; the latter worked with him until 1892. Georg created and gilded the frames for some of Klimt's portraits, and those frames came to be considered integral parts of the works. It is said and often repeated that his inspiration for his gilded work came from a single experience, seeing the Byzantine mosaics in a church in Ravenna, and the term Byzantine is used in regard to his work, both as praise and epithet. To my mind this is not altogether appropriate. Certainly the great use of gold in it impressed him, but if anything, his main influences and procedures are those of Art Nouveau and Japanese arts.

But how and when his unique gilded paintings came to be produced in a particular city in a particular time needs some description of the state of the arts in Europe at that time, and the state of Viennese society in which his works found their place. There is a certain aesthetic, cultural and economic matrix necessary for the introduction of imaginative gilding where it has been conventional and conservative. And of course it is necessary that one skilled artist exists who can adventure into that matrix, just as others, among the jewelers and fabric designers and architects were entering it at the time.

Gilding, like others of the applied arts tends to be conventional and based on precedent. Picture frame gilders, for instance, have their own associations and share technical and design information with one another. Calligraphic gilders also associate with one another in clubs and other organizations, and tend to use the same techniques as one another. Glass gilders, too, are obliged to conform to the expectations of their clients for styles in lettering and design, and do so, as they earn their livings at this trade. The various forms of gold leaf traditionally made by goldbeaters and the mordants use in laying it are made available by dealers in them, just as primed canvases and oil paints are, and as they were a century ago.

The matrix was well described in an article, taken from the internet: "Gustav Klimt's home city was the fascinating turn-of-the-century Vienna of the Belle Epoque. With its two million inhabitants, the city was the fourth largest in Europe, and it witnessed a cultural flowering unparalleled elsewhere. Artists and intellectuals

developed enormous creativity, torn as they were between reality and illusion, between the traditional and the modern. With inhabitants such as Sigmund Freud, Otto Wagner, Gustav Mahler and Arnold Schoenberg, the city was a “laboratory of the apocalypse”, a late bloom, a last creative tumult before its decline. The dominant haute bourgeoisie, known for its pretentiousness, its splendid banquets, its inordinate love of pleasure, had a catalytic effect on the city’s culture. It was out of this “laboratory” that Klimt’s art grew, and his visions were at once filled to the brim with life and only too conscious of death; the traditional and the modern were dovetailed together, linking a passing world with an emerging one.”

Now, to describe some of Klimt’s techniques: He was retained to design nine panels for what is called the Stoclet Frieze, a huge enterprise for a large mansion owned by a family of art collectors. He created the design for an ornamental three-part mosaic frieze of marble inlaid with gold, enamel and semi-precious stones. The design incorporated both abstract and figurative elements. It was done on brown wrapping paper, casein and other tempera paints and gold, silver and copper leaf. The probable mordant was casein glue, a milk derivative. The execution of his designs was put into the hands of a team of specialists, each trained in a particular trade; he wrote extensive notes on what he expected, and was extremely critical of the work as it was being done. His training had included knowledge of all the arts involved.

He painted a series of commissioned portraits of society women, the wives of industrialists and other wealthy people, in which he gilded not only the backgrounds but elements of his design of the imaginary garments. As he painted in oils on stretched linen canvases, which have remained in good condition, I assume that the priming was done conventionally by companies which did this work, first sizing with rabbit-skin glue, then priming with layers of lead white oil paint, and then left in attics to mature for a considerable time before being sold, half a year or so. His mordants would have had to be compatible with the ground and with any underpainting he did on it, allowing the gold leaf to adhere to it maintaining the necessary flexibility of the painting. Good varnish/oil gold size, available in that era would have been used for the backgrounds, and the gilding repeated. This would give a moderate gloss to the gilding, but not a burnish. As for the many gilded elements on the painting itself, they could have been done the same way, after the paint had been well dried. In areas in which he required a burnishable gloss he would have used gold foil or silver foil, which burnishes even on varnish/oil gold size. Where he used silver or copper, which he did, he would have had to varnish those areas afterward. He used as many as six various procedures in gilding these paintings; these were mentioned in an analysis of the surface appearance of them by a gilding expert. Where he used impastos to give the gilding relief, which he did for instance on “The Kiss” and other works, I believe he made them by extruding a type of oil-compatible paste with for instance a pastry-cook’s tool, to build up the surface. Although this is referred to as gesso, it would not have been what we know as gesso, but a thick version of the priming material, almost certainly based on white lead in oil, and not gypsum. (As I have not encountered a description of his



gilding procedures on his oil paintings, my comments are conjectural and to some extent based on my own usage).

One of my favorite portraits of this series is that of Adele Bloch-Bauer, his first of this sitter, from 1907, oil on canvas 138 x 138 cm., a splendid composition on a square canvas, with the subject somewhat to the right of the centre. The face of the subject is depicted in three dimensions, done from a photograph, and the neck and hands also; the rest of the painting is in two dimensions, even the hair. The outer part of the background is done by gilding twice, first in flat gilding, this painted over with a thin coat of oil paint in a warm color, then gilding again in the manner I have described as being done on certain halos in Russian icons, using the "skewings" of gold leaf tapped at random over the surface through a sort of sieve. The broad golden choker worn on the neck of the subject and the upper hem of the dress are richly gilded, the hem certainly gilded in thin rectangular pieces, almost certainly in gold foil. There are areas of Klimt's typical spiral designs on the inner part of the background, which is designed in sinuous curves, very much in the Art Nouveau manner. If these have also been gilded, the gilding is covered with a patina. There are also a number of circular elements gilded on the dress. On the upper left side of the painting there are three well-spaced squares which appear to be thin white semi-glazes over the skewings, allowing the gold to show through.

In 1909 Klimt traveled to Paris, where the work of the Expressionists had been exhibited from 1908, and saw the work of Lautrec and the Fauves. His gilding days were over. One of his portraits of the period started with a gilded background, but he covered it with a layer of paint, and afterward a new series of portraits were done without it. His success resumed once again.

A century later he did have a follower, another Viennese, called Hundertwasser. He modeled many of his paintings on the spiral designs, as it were enlarging elements of Klimt's paintings. He also gilded, both with gold leaf and foil, and worked on brown wrapping paper, pasted on cloth. Thus ended the story; alas for it.

Anthony Thorn  
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(The quoted portion, from the Internet is from a lengthy text titled "Gustav Klimt and his Oil Paintings" <http://www.canvaz.com/klimt/gustav-klimt.htm>)