S. C. Arteni

The Strasburg Manuscript, a compendium of Van Eyck's materials and techniques

14th I.S.F. Congress, Section Lipids in Art,
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Anonymous, St Luke Painting the Virgin, Walters 281, Northern France or Tournai, c 1430-35
http://employees.oneonta.edu/farberas/arth/Images/ARTH_214images/rogier/st_luke/wag281_luke_det.jpg

THE 14th WORLD CONGRESS
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PROCEEDINGS OF SECTION LIPIDS IN ART

Brighton (England) 17 - 22 September 1978

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THE 14 th WORLD CONGRESS OF THE
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BRIGHTON (England) - 17-22 September 1978

SECTION LIPIDS IN ART

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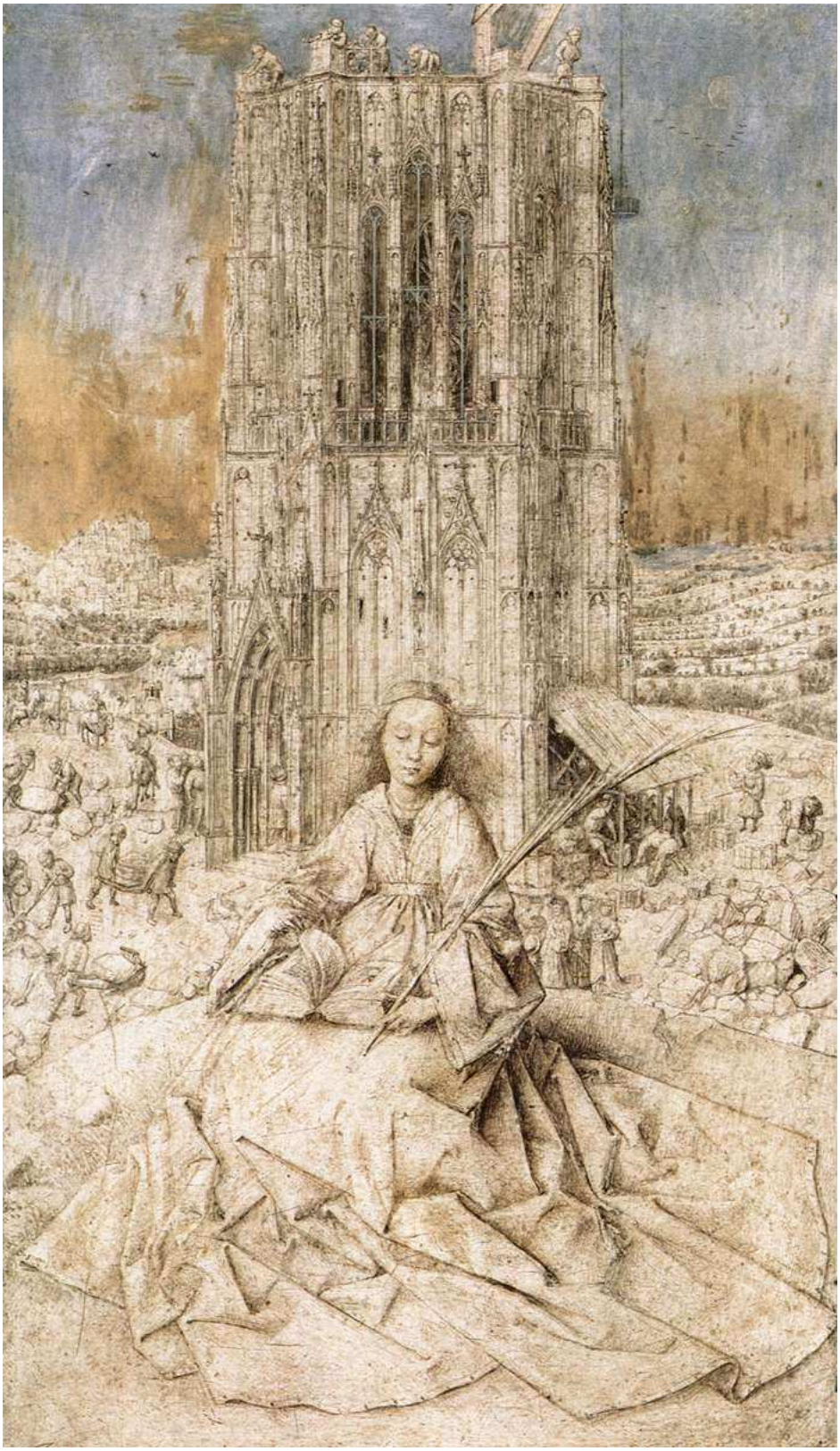
(1) National Gallery - London
(2) Università di Bologna - Istituto di Merceologia



Jan van Eyck
http://upload.wikimedia.org/wikipedia/commons/b/bd/Jan_van_Eyck_-_St_Barbara_-_WGA07617.jpg

THE STRASBURG MANUSCRIPT, A COMPENDIUM OF VAN EYCK'S MATERIALS AND TECHNIQUES

ARTENI S.C.
American Romanian Academy of Arts and Sciences

ABSTRACT

To the general acceptance that ancient painters had closely guarded formulae can be attributed the effort in search for the «secret of the old Masters». Instead there is evidence that information was freely circulated. Records of the methods of the Van Eycks are scanty but it is possible to speak with certainty of the ingredients they used due to the earliest surviving handbook on painting techniques in Germany and the Low Countries, presumed to be 15th century i.e. the Strasburg Manuscript. Vasari's statement is commented on. Literary research (stressing the importance of critical evaluation of the context) and laboratory research lead to recreation of the materials by reconstruction as well as by analysis. Test objectives and priorities include: nomenclature, thixotropy of Vehicles, highly variable mixtures which do not exhibit standard behaviour. In terms of materials, Oil Vehicles and gum resins as well as binders for distemper and illumination are discussed with notes including a review and comparison with other early records and manuscripts, interpretations and explanations of the texts and studies of the materials mentioned in the light of modern understanding of the technology of paint (e.g. alkyds). Evidence regarding underlying principles has been established.

THE STRASBURG MANUSCRIPT, A COMPENDIUM OF VAN EYCK'S MATERIALS AND TECHNIQUES

1. Preliminary observations

The Strasburg Manuscript remains a most useful work both as a collection of texts on technique and materials employed by 14-15th century painters and as a body of reliable information on the early School of Painting in the Low Countries. The anonymous author collected first hand informations from Heinrich von Lubbegge (active as miniaturist) and the alsacian «Meister» Andres von Colmar, who presumably had access to the more complex techniques developed around 1400 in the Burgundian area and attributed by tradition to the brothers Van Eyck. It may be worth while to add here some brief historical particulars.

By inheritance and purchase the dukes of Burgundy, vassals both of the German and French crowns and among the wealthiest princes of Europe, obtained the Franche Comté and Flanders 1384, Brabant 1430, southern Holland 1433, Luxemburg 1451 (cfr. «The Penguin Atlas of World History», 1974, I, p. 193). Alsace and Lorraine were kept under their influence, the last conquered 1475, the former pledged by Sigmund of Austria to Charles the Bold. The School of Painting developed with Melchior Broederlam, Claus Sluter of Haarlem and Claus de Werwe, Jean de Beaunetz, Jean Malouel of Gildern, Henri Bellechose of Brabant, Hans Tiefenthal active in Basel, the famous Andre Beauneveu (cfr. ENZO CARLI, JOSE GUIDOL, GENEVIEVE SOUCHAL, «La Pittura Gotica», Mondadori, p. 39), the miniaturists Van Lathem, Dreux Jean, Simon Marmion (cfr. MARCEL THOMAS, «Le Livre de Priere de Philippe le Bon», Les Dossiers de l'Archeologie 16, 1976, p. 84). It is known that Jan van Eyck (1385/1390-1441) travelled extensively to Spain, England and presumably Prague on behalf of the Great Duke of Occident, Philip the Good (cfr. J. LASSAIGNE, «La Pittura Fiaminga», Skira, 1961, I, p. 48).

2. The «secret» Oil Vehicle of Van Eyck; its history 15-17th century

The Oil Vehicle of Van Eyck is mentioned in terms of praise by Vasari; two valuable informations are given by him in the description of Van Eyck's discovery of a new oil technique (which has probably no historical basis):

1. Jan van Eyck delected himself with alchemy and boiled his oils (cfr. C.L. EASTLAKE, «Methods and Materials of Painting of the Great Schools and Masters», Dover, 1960, I, p. 205: «*bolliti con altre sue misture*»; BARTOLOMEO FACIO, «De Viris Ilustribus» in LASSAIGNE, op. cit., p. 48; X.DE LANGLAIS, «La Technique de la Peinture à l'Huile», Flammarion, 1969, p. 26-34).

2. He kept his method secret (cfr. V. and R. BORRADAILE, «The Strasburg Manuscript», London, 1966, p. 55: «... this oil ... not all painters know about it. »). The pungent smell of the Vehicle (cfr. EASTLAKE, op. cit., p. 207) may be attributed to the characteristic odour of heat-processed oils.

Thus it may be said that *Van Eyck did not discover but improved Oil Vehicles by careful heat-processing.* The nature of that Vehicle and the role played by walnut oil (Juglans Regia) has been described in a previous paper (cfr. S.C. ARTENI, « The Manufacture of Oil Vehicles for Painting Purposes», Proceedings 13th I.S.F. Congress, 1976) and compared to the instructions of Le Begue 1431 (quoted from Eraclius 13th century in A. P. LAURIE, «The Painter's Methods and Materials», Dover, 1967, p. 28). Many of the formulae of Le Begue's Manuscript are known to be from sources earlier than the 15th century. They may be traced to a very early period i.e. to Byzantine sources, due to the influence of Greek artists before and after the taking of Constantinople by the Latins 1204 (cfr. the Athos Book in S.C. ARTENI, «Studiu asupra bisericilor dela Voronet si Arbore; traditiile tehnice ale picturii bizantine, etc.», Rome, 1976; BORRADAILE, «The Strasburg Manuscript», op. cit., p. 52: «... Kriegeschem sitten... », i.e. Greek?).

A varnish from the Illuminierbuch (VALENTIN BOLTZEN, 1562-1566) quoted by De Mayerne 17th century, is identical to the oily varnish described by the Strasburg Manuscript; boiled oil is good as varnish, but for more strength some mastic may be dissolved into it by heat:

« Rp. Huile de Chanvre (Hemffol) qui soit vielle et claire, faittes la bouillir dans un chaudron... adjoustes y de la pierre ponce blanche (weissen Bimsstein) et des os de pieds de mouton bruslés... remués... mettés deux jours au soleil bien chaud. Si vous voulés avoir vostre plus fort adjoustés douclement à vostre huile chaude en remuant continuellement 2 oz. de Mastic pulverisé », (E. BERGER, «Quellen, etc.», dr. Martin Sandig oHG, 1975, p. 184).

« Vernix sur Parchemin ou Cuir. Rp. Huile de Lin de la plus claire 3 lb. mettes la dans un chaudron bien net, sur un petit fourneau, de sorte que le feu ne s'y puisse point mettre, ains seulement donne au cul du chaudron, donnés feu mediocre qui fait bouillir l'huile, sans qu'elle s'enfuye du pot ou chaudron, escumés diligement. Estant bien escumés et depurée par ebullition ,adjoustés 1 lb. de Mastic tresclair subtilement pulverisé... voyés s'il tire un fil de vernix, qui sera le signe de parfaite coction », (Ib., p. 182).

« Rp. Glorien c'est a dire Therebentine 1 lb. Huyle de Lin le double i. 2 lb. cuisés et escumés et y adjoustés le Mastic et les os brusles comme dessus. Il est bon », (Ib., p. 184).

An Italian varnish recorded by De Mayerne is composed of colophony and oil boiled until incorporated: this leads to a thick product. Old varnishes of Italian origin, like all the formulae extracted by De Mayerne from other treatises, are similar to those of the Strasburg Manuscript, thick and flowing:

« Vernixe da alcuni detta comune. Rp. Olio di lino

(sine igne) una parte, Pece greca i. Coloph. parti tre (vocat picem graecam Pegola) fatte bollir fin tanto che sia benissimo incorporata. Et se volete conoscer se l'e buona, la buttarete nel fuoco, se abiucera scopiare, ne far rumore niuno, questa sera perfetta. Ma vuol esser chiara lucente e bella», (Birelli 1503 in De Mayerne, BERGER, op. cit., p. 186).

« A far Vernice Liquida. Rp. 1 lb. de gomma di Vernice (Sandaracha i. gummi Juniperj) et 4 lb. d'oglio di linosa, fa bollire, ponendo al fuoco. Et piglia un altro vaso et poni 3 oz. d'oglio a poco a poco, et sempre mescola... et se vorraj sapere quando sara cotta, metti della detta vernice un puoco sopra uno cortell et se remanera visciosa et un puoco dura, sara cotta... Vernice Liquida et gentile. Piglia 3 lb. de Oglio de linosa et 1 lb. di Ambro giallo et oncie sei de pulvere de quadrello, poi fa un fornelletto che abbia due bocche et ogni bocca habbia il suo mantesetto... il fuoco sia di carbony et vuole essere gran fuoco... metti il tuo Ambro nella detta pignata et l'una parte dell'Oglio ... fali gran fuoco, infino che l'Ambro si disfa... Ma prima cuoceraj l'oglio che ti avanza... falli lento fuoco... fa che scemi quasi il terzo... disfatto che sia l'Ambra con quel poco d'oglio primo, gettali dentro questo altro oglio che hai fatto bollire e mescola sempre... e gettali dentro la pulvere sopradetta de quadrello... lascialo alquanto riposare », (Timoteo Roselli, «Summa de Secreti universaly», 1544, Venise, in De Mayerne, BERGER, op. cit., p. 196).

The Vehicle had almost entirely ceased to be used previous to 1600 but it was preserved in Holland at least until the mid 17th century:

« Nehmt 1/2 topf Leinol, 1/2 topf Regenwasser, ein Teil Alaun, ein Teil Salz, ein Stuck Roggenbrotrinde, lasst es heiss werden, dass das Gelbe des Oeles aufsteigt und ruhrt es um, dann werfet eine handvoll Sagemehl von Pinienholz hinein, wahrend ihr langsam uber dem Feuer ruhrt. Stellet dann den Topf 8 oder 10 Tage an die Sonne, so scheidet sich das Klare von dem truben Oel, und lasst es dann in ein Glass uber Bleiweiss und grobe Brocken von Roggenbrot destillieren... Klarer Firnis. Nehmt 1/4 Lot guten klaren Mastix in einen neuen Topf, lasset ihn langsam auf dem Feuer schmelzen, darnach nehmt von dem allerbesten cyprischen Terpentin 2 Lot, macht ihn in einem anderen Topf auch heiss, giesset denselben dem geschmolzenen Mastix bei, ruhret wohl um, nehmt es vom Feuer und giesst 2 Lot besseres Oel... » (Dutch recipes in De Mayerne, translated into German by BERGER, op. cit., p. 310; cfr. also «Collectanea Chymica Leydensia», 1680 in EASTLAKE, op. cit., p. 334).

Church (cfr. « The Chemistry of Paints and Painting », London, 1915) describes a heat treatment of oils similar to the one attributed by us to early Flemish painters.

The rather dark cold-pressed oil must be:

— bleached (cfr. Strasburg Manuscript: «luter» i.e. light);
— clarified (crystal clear, transparent);
— purified (cfr. De Mayerne «subtilisé» i.e. refined, no moisture present, acidity adapted to each pigment);
— drying;
— kept fluid;

Thus it is fit for mixing to pigments.

3. Oil painting described by Andres von Colmar

The validity of the recipes should not be underestimated at least until practical tests have been made. The Strasburg Manuscript is the basic reference for traditional northern practice before the Ruben's time. It states:

« How to prepare oil for colours. One must take linseed oil, hempseed oil or old walnut oil, the required quantity and put in it white calcined bone dust and also the same amount of pumice powder. Let them simmer in the oil and skim off the scum, then remove it from the fire and allow it to cool thoroughly. If the quantity is one mos (?), put 1 oz of zinc vitriol into the oil. This will dissolve in the oil and cause it to turn much clearer (lighter) and paler. After this, strain the oil through a clean linen cloth into a clean pipkin and leave this in the sun for four days and it will become thick (fat) and crystal clear. Now this oil is very quick drying and makes all colours lovely, clear and bright... Colours must first be ground in the oil and then tempered with more oil, all pigments being ground and tempered to the consistency of a soft (semi-liquid) paste, neither too thick nor too thin. ... Firstly, vermillon, red lead, Paris red, rose red (brazil wood), light blue azurite, indigo and also black; orpiment yellow, realgar, yellow ochre, burnt ochre, verdigris, green indigo and finally, white lead... these colours must all be well ground with oil and finally you must grind in three drops of varnish to every colour and put each one into a clean vessel. To all... colours you must add a little calcined bone dust or a little zinc vitriol, as much as a bean, in order to make the colours dry well », (cfr. BORRADAILE, op. cit., p. 55; cfr. EASTLAKE, op. cit., p. 130: «... if the quantity is about a *quart*, add to it an ounce of white copperas... it will acquire a thick consistence... makes all colours... glossy... All colours should be ground stiffly, and then tempered to a half-liquid state... »).

Practice has shown that oil colors mixed with a thick resinous varnish on the palette, in due proportions found by experience, are soft and fluid enough for any manipulation. *No essential spirit is mentioned in that writing.* The manufacture of varnishes is described by the same author. First a sandarac or mastic varnish:

« To begin with, take 1 lb. of ordinary varnish (sandarac?) or 1 lb. of mastic and crush one or the other whichever you wish, to powder in a mortar; to this add 3 lbs. of linseed oil, hempseed oil, or walnut oil. Let the oil cook in a clean saucepan and skim it, taking care, above everything, that it does not boil over and when it is well cooked and all the foam has subsided, sprinkle the varnish powder slowly into the hot oil and

the varnish will dissolve in it. When the powder has quite dissolved, let it simmer very gently on a low heat and stir continuously so that it does not burn and when you see that the varnish begins to thicken like *liquid honey*, take a drop of it up on a knife and let it cool, then put your finger on this drop and pull it slowly away and *if the varnish drows up like a thread* from the knife it means it is sufficiently cooked... When this has occured, move it from the fire and let it cool; next strain the varnish thoroughly through a strong linen cloth into a clean glazed vessel. Keep this varnish well covered until you need it for use. You now have a very good clear varnish, — the best possibile », (BORRADAILE, op. cit., p. 63).

Sandarac produces very light golden-yellow varnishes. Colophony or Venice turpentine boiled in oil:

« If you want to make another good varnish, clear and brilliant as crystal, get 1 lb. of gloriat (of turpentine) from the chemists and twice as much oil and let it also cook together and do exactly the same as you did in the first recipe... » (Ib.).

The third is a boiled oil to which may be mixed a slight amount of resin, in any case less than in the already mentioned recipes:

« Take old hempseed oil and heat it and skim it and add as much as you require of calcined bones ... and simmer together. Skim and then put it for two days in the sun. If you want it to be especially strong, take 2 ozs. of mastic and crush it to powder or 2 and 1/2 ozs. therebenthum and when the oil is at boiling point you must sprinkle in the powdered resin, stirring well until it begins to thicken so that a thread can be drawn out... » (Ib.).

Later on, oil was partially or completely replaced by an essential spirit. The described varnishes are ground into the colors or passed over the finished picture. A varnish over gold is also described:

« Again if you want to make another golden colour for painting over silver, tin or lead so that it looks like gold, make it as follows: to begin with, again take either glassa varnish or mastic and crush it to powder and pass it through a sieve into 1 lb. of oil but first let this oil cook and skim it, then slowly sprinkle the varnish into the hot oil and stir it together until the varnish is dissolved and let then gently simmer... and when it begins to thicken take 2 ozs. of Greek pitch or the same quantity of aleo atustrinum or of aleo tabellinum... This will turn the varnish into a lovely golden colour... After this, test the gold-size in the same way as you do for other varnishes to see whether it draws a thread... » (Ib., p. 67).

Such varnishes are of the consistency of light-bodied or even heavy-bodied Stand Oil (e.g. the brands manufactured by Permanent Pigments: Artists' Genuine Stand Oil Light and Heavy). For proper workability, the Strasburg Manuscript oil could not have this thick consistency as pigment can be ground by hand with extreme difficulty, if at all, in Stand Oil. The preparation of a Vehicle having identical working properties with the Strasburg Manuscript oil, is to be found in Xavier de Langlais' book on the Techniques of Oil Painting (op. cit., p. 151). First he describes the working qualities of such boiled oil: for the same degree of fluidity as raw oils, the boiled oil has a greater viscosity, is brilliant and the paste seems enameled; it is a better drier than any raw oil. Xavier de Langlais recommends boiling the oil with some water as the process is more even and the final product does not darken. This process is very similar to the Strasburg Manuscript method: in a new earthenware container pour 2/3 water and 1/3 oil; the oil rises to the top; add 20 gm. pumice powder and 10 gm. animal black for each 500 gm. of oil; boil at a very low fire for two hours or more, skimming if necessary; after the first two hours of boiling, if the process needs to be continued, some of the water consumed should be replaced. After cooling, pour the whole contents into a glass container which admits some air (covered with a piece of glass only) and leave in the sun. In two or three months the oil is clarified; in summertime the oil gains strength and becomes slightly thicker.

Pigment is ground with such an Oil Vehicle. The presence of *drier* (as well as the mettalic drier, if any, added to the paste) and *the few drops of varnish*, make the paint *thixotropic*, i.e. stiff when at rest but flowing freely on agitation, setting again on standing. This is a distinct *advantage in practice*, as it enables the paint to flow freely during application, so as to eliminate brush marks, but stiffens rapidly after application and prevents running, *no volatile diluent being thus necessary*.

Stand Linseed Oil is prepared today from refined linseed oil, by mantaining the oil at a high temperature for several hours with air excluded. It is a pale, viscous oil, which dries slowly to an elastic film with almost no after-yellowing. It may be found in a conveniently diluted form, as a medium prepared with petroleum distillate, sometimes with a small amount of spike oil (cfr. WINSOR AND NEWTON, « Notes on the Composition and Permanence of Artists' Colours », 8, p. 7). E.g. Rowney Painting Medium no. 700 (Stand Linseed Oil, white spirit and some oil of spike). Uses: as a painting medium with oil colors for glazing with transparent colors. Directions: mix with oil colors to give the desired consistency and apply the color thinly. Ground: paper maruflayed to wood; gesso ground; thin Mars red oil priming. Observations: very smooth; good for a la prima technique; opaque touches with minimum amount of medium applied wet-in-wet; some turpentine for opaque touches. Do not work much on the same spot or use for smooth glazes only. Cfr. also: Winton medium (Winsor and Newton) with Stand Linseed Oil and white spirit; Medium Lacque Lefranc and Bourgeois, strong Stand Oil.

It does not seem that the Masters ever used Stand Oil in that form (cfr. S. C. ARTENI, « The Manufacture of Oil Vehicles for Painting Purposes », Proceedings 13th I.S.F. Congress, 1976). A method which approximates the preparation of Stand Oil is quoted by Eastlake:

« A glass bottle containing the purified washed oil is placed in a water-bath, which is heated to ebullition. The bottle should have a wide opening, in order that a considerable surface of the oil may be exposed to the action of the air. Il mettalic oxides, such as litharge, white lead, or white copperas, are used, they are first enclosed in a small bag, and are suspended in the oil... White lead alone may be used in the proportion of one oz. to four, five or six oz. of oil, according as the oil is to be more or less drying... The boiling in the water-bath should continue at least sixteen hours. After twelve hours, the contents of the bag are mixed with the oil... The drying material subsides entirely, leaving the oil clear ». (Dreme in EASTLAKE, op. cit., p. 353).

4. Alkyds

Winsor and Newton produce a range of Alkyd Colours, an Oil Painting Primer and three different media (based on an oil-modified alkyd resin), all formulations being thixotropic in character:
Liquin «... a quick drying medium... free from the danger of cracking or yellowing. It is a liquid medium which flows well under the brush and is particularly suited to the painting of fine details and to the glazing of large areas. Its thixotropic nature and initial quick setting ensure that it is easily manageable and will not run in thin layers». (WINSOR and NEWTON, op. cit., p. 8).
Win-gel: «...this gelatinous medium for oil painting is perfectly clear and is thixotropic in character, i.e. it is jelly when at rest but becomes fluid upon being moved with brush or knife. No diluent is necessary... Win-gel has all the delightful handling properties of Megilp without the dangerous tendencies to yellow and crack... Drying time is short ... the painter will find he can use this versatile medium to make paint brush out easily, to put the finest detail, or, by keeping the artist's oil colour in excess of the medium and brushing the paint only as much as may be necessary, to apply in considerable thickness paints having greatly enhanced drying properties. Win-gel prevents sinking in, thick layers... will not wrinkle and thin layers will not run down ». (Ib.).
Oleopasto: « This translucent jelly medium of tube consistency is designed for impasto painting with oil colours. It is ... a quick drying, non cracking medium. Based on an oil-modified alkyd resin and incorporating a high-grade silica, it is ideal for textured or impasto work... It forms a flexible but tough film... » (Ib.).
Synthetic resins have a strength between that of mastic and copal. The above fragments are quoted as they best describe the *ideal properties of media*, sought by every painter.

5. Observations on Cennini's Oil Vehicles and egg tempera

Cennini does not mention water in his egg tempera, except for the preparation of the wall:
« Cap. LXXII. El modo de colorire in muro in secco... La prima tempera, toggli la chiara e rossume dell'uovo, metti dentro alcune tagliature di cime di fico, e ribatti bene insieme. Poi metti... di questa tempera... non troppa, ne poca, come sarebbe un vino mezzo innaquato; ... inanzi cominci a colorire... abbi un rossume d'uovo con la chiara, e mettilo in due scodelle d'acqua chiara rimescolata bene insieme... e con la... spugna... della detta tempera va... sopra tutto il lavoro... La seconda tempera si e propio rossume d'uovo; ... universale in muro, in tavola... Cap. CXLV. Come si colorisce in tavola... ti conviene temperare i tuoi colori sempre con rossume d'uovo, e ben temperati: *sempre tanto rossume quanto il colore* che temperi ». (CENNINO CENNINI, « Il Libro dell'Arte », Neri Pozza, 1971, p. 85).
Neither do later texts (e.g. Marciana Manuscript, 16th century, in M. P. MERRIFIELD, « Original Treatises, etc. », Dover, 1967, p. 611, vol. II):
« La tempera di questi colori fatti a putrido .i. a acqua e el tuorlo del vuovo *un pocho manco che la meta* del colore etc. ».
See further Cennini:
« Cap. LXXXII. A fare un vestire d'azzurro... mettivi dentro un poco di colla stemprata... *Ancor metti... un rossume* d'un ovo; ... ». (CENNINI, op. cit.).
About Oil Vehicles Cennini states:
« Cap. XCI. Come tu dei fare l'olio buono per tempera, e anche per mordenti, bollito con fuoco... E fallo bollire per mezzo... Ma per far mordenti, quando e tornato per mezzo mettivi per ciascuna libra d'olio un'oncia di vernice liquida... Cap. XCII. Come si fa l'olio buono e perfetto cotto al sole... se vel tieni tanto che torni per mezzo, e perfettissimo da colorire ». (CENNINI, op. cit.).
Some thick varnish was needed to obtain the viscous quality of a mordant i.e. the oil was sun-bleached, not sun thickened to the consistency of honey (or it was clarified by heat processing); the rate at which thickening occurs is influenced by lenght of exposure to sun and air. Oil used for the grinding of pigments is still sun-bleached by exposure to sun in open glass vessels by Prof. C. Ferrario, an Italian color manufacturer (cfr. G. PIVA, « Manuale Pratico di Tecnica Pittorica », Hoepli, 1971, p. 268). The rather dark cold-pressed oil allows a deposit which may reach one third, if exposed to sun for a certain lenght of time.
The following percentage by weight is suggested by Doerner (cfr. « The Materials of the Artists », Hart Davis, 1973, p. 229) for grinding tempera colors (i.e. by volume, using water: 1 part yolk or egg-oil emulsion + 1 part water + 2 parts pigment):

Lead white	30%	English red	75%
Zinc white	50%	Light ochre	90%
Naples yellow	35%	Burnt Sienna	180%
Gold ochre	80%	Prussian blue	120%
Cadmium yellow	80%	Cobalt blue	200%
Vermillon	50%	Chromium oxide	220%

6. The Strasburg Manuscript water media

For a thorough study of the subject see our previous paper (cfr. S.C. ARTENI, «Despre Imaginile

Sacre si Spiritul unei Tehnici», Buna Vestire XIII, 3-4, Rome, 1974, p. 152-160). Gum water formulations for tempering all colors for painting and illuminating:

« How to make a (water) for tempering all your colours. Procure... gum arabic 1/2 oz., ... pound it till it is reduced to powder... Then put the powder... into a glazed receptacle, which must be very clean and pour over it clear water to the height of a finger's breadth and let it stand overnight to soften. Mix it well with the water with a finger and add a settit (?) of white myrrh... soak... till it melts, then strain... This water should be as thick as oil.

Put the whites of two eggs in a clean dish and beat with a spoon till they are liquid and take a clean linen towel and wring the white of egg through it... until it ceases to foam. Then take one settit (?) of gum arabic and put it in the egg white and let it melt, next take a good spoonful of vinegar and mix it with the glaire and add to this as much sal ammoniac as a pea... keep this (water) medium in a glass jar... ». (BORRADAILE, op. cit., p. 29).

« If you wish to make really good (water) mediums... take... two parts gum arabic and one part cherry gum, and put these two gums in a clear bowl and pour over them clear water to cover the gum by a finger's breadth. Leave this to soften for about half a day. When the gum is well softened in the water, stir it well... Then put a small potful of honey (the volume of a walnut) in this mixture and half an egg shell of vinegar. Stir... and strain... This (water) medium if properly prepared should be of the consistency of a thin oil ». (Ib., p. 43).

« If you want to make varnish with which you can varnish anything... take two or more egg whites... and beat the white well, throwing away the scum. After this take 1/2 oz. of gum arabic and 3/4 oz. of either the gum of almond tree or that of the cherry tree. The former is stronger, the latter clearer. The two gums should be ground together and you must put them in the above mentioned white of egg and leave overnight... Then grind it well together by stirring and add a pot of honey... This varnish should be of the consistency of newly run honey... Again if you want to use this as a medium for tempering colours, put half an egg shell full of vinegar in it and if it is too thick, add some pure water and put it in a glass, first straining it... ». (Ib., p. 65).

Glue size medium:

« Now I am going to teach you how all colours may be tempered with size for putting on wood, on walls and on fabric... Take parchment clippings and... wash them well with water and make from them with water a clear size neither too strong nor too weak and as soon as it is cooked, put a saucerful of vinegar in it... and let it boil up again. Then take it off the fire and strain... put it aside in a cool place... it will keep fresh for a long time. When the size has set to a jelly and you want to temper your colours with it, take an equal quantity of water and of size and mix... add (a little?)... honey, which should be well mixed (and warm)...; and with this medium one can temper all colours, neither too thick not too thin, just like the other colours... These colours must all be covered with varnish which will make them shiny, after which... they will retain their gloss indefinitely ». (Ib., p. 53).

Observations on gum media:

«... make it *lustrous* with gum arabic... pour the colour out of the vessel, as much as you require, that is, and add gum water to *make it shiny* ». (Ib., p. 49).

On the preparation of colors and later media see our comparative tables. A modern formula for gum water used in grinding is suggested by Ralph Mayer (cfr. «The Artist's Handbook», Faber, 1973, p. 299); pigments are ground in the medium; the second method is to grind the pigment in the basic gum water; when dried it can be reground with the additives:

— Pulverised gum arabic (binder and adhesive)	2 oz.
— Distilled boiling water	4 fl. ozs.
— Honey water 1:1, sugar (plasticizer)	1 ¼ fl. ozs.
— Glycerin (brushability)	1 ½ fl. ozs.
— Fluid oxgall extraxt (wetting agent)	2 teaspoons
— Odorant oil of cloves (assists preservation)	some drops
— Preservative:	
carbolic acid	¼ teaspoon
salicylic acid	¼ teaspoon
Dowicide A	¼ teaspoon

7. **Development of the Strasburg Manuscript illuminating media;** Boltz von Rufach's six media for tempering i.e. "Temperaturwasser", 1562 (cfr. E. BERGER, « Quellen und Technik der Fresko-, Oel- und Temperamalerei des Mittelalters », dr. Martin Sandig oHG, 1973, p. 187):

1. Gum arabic 1/2 oz.
   Gum tragacanth 1/2 the volume of a walnut
   Water 2 fingers' breadths
   Leave to soften for 4 days / stir / warm / strain / add water until of the consistency of oil / the older the better /

2. Parchment glue 1/2 the volume of a walnut
   Water
   Honey 4 drops
   After warming add some Rosewater / warm before use / for: minium, lead yellow, Paris red, orpiment, lake, mountain (copper) green, "raushgelb" / (the same may be done with glaire)

3. Gum arabic 2 parts
   Cherry gum 1 part

Water	like in formula no. 1
Some honey and Rosewater	

4. Gum arabic 1 part
   Almond gum 2/5 ca.
   Water the same volume as the gums
   Rosewater

5. Beat 2 glaires / leave one day and one night / skim off the scum / add 1/4 oz. gum arabic / add honey the volume of a bean / add a spoonful Rosewater /

6. For all colors:

Gum arabic	1 oz.
Cherry gum	1 oz.
"Bitumen" (fishglue?)	1/5 oz.
White myrrh (makes it fluid)	1/2 oz.

Grind / add water / add two egg shells of vinegar / strain /

TABLE 1. COMPARATIVE FORMULAE FOR ILLUMINATING MATERIALS, 15-17 th C.

BOLOGNESE MS. 15th c. (1)	PADUAN MS. 16-17th c. (2)
p. 502: gum water (gum arab. + water)	p. 658: gum water (gum arab. + rose water + some sugar candy)
p. 480: egg shell white - *gum* water	
p. 502: lead white - *gum* water + white incense	
p. 502: verdigris - *gum* + vinegar	p. 678: lampblack - *gum* water + oxgall
	p. 682: verdigris - *gum* water + vinegar + honey
p. 422: vegetal green - *gum* or glaire	
p. 430: blue green any - glaire or size	
p. 420: copper green - *gum*	p. 706: mountain copper green - parch. size
p. 420: mixed green - *gum* on gesso	
p. 420: vegetal green - *gum*	
p. 412: indigo - glaire	
p. 428: vegetal yellow - *gum* and glaire	
p. 480 - 504: saffron - *gum* or glaire	p. 706: saffron - *gum* or glaire
p. 502: orpiment - *gum* + yolk (body)	p. 662: orpiment - *gum*
p. 504: giallolino (lead) - *gum* + some yolk	p. 704: lead yellow - parch. glue
p. 504: minium - *gum*	p. 704: minium - parch.glue + honey
p. 500: vermillon - glaire + some yolk for body	p. 706: vermillon - glaire + myrrh
	p. 664: vermillon - glaire
p. 436 - 438: lake - *gum* or glaire	p. 712: lake - *gum* + spirit of vine or sugar candy for grinding
p. 504: lake - *gum* + some incense for body	p. 660: lake, burnt lake - *gum* + sugar
	p. 704: rose color lake - *gum* or parch.glue
p. 406: vegetal blues - *gum*	p. 660: ultramarine - clear parch.glue
p. 502: azure - *gum* and glaire/only parch, size for body	p. 704, 712: smaltino - *gum* (grind spirit of wine)
p. 407: azure - parch. glue or glaire or *gum*/glue size only for body	
p. 408 - 410: azure - glaire + yolk (shiny) or glaire + tragacanth	
p. 504: earth colors (on walls) - *gum* or glaire or Cennini's egg. temp.	

(1) Cfr. M.P. MERRIFIELD, « Original Treatises, etc. », Dover, 1967, p. 340-600, vol. II.
(2) Ib., p. 648-717.
Note: *gum* means gum arabic water.

TABLE 2. THE STRASBURG MANUSCRIPT

HEINRICH VON LUBBEGGE (for writing and flourishing) p. 21 - 25:	ANDRES VON COLMAR (for writing, flourishing and painting transparent glazes) p. 26-29:
vermillon - yolk + glair for tempering	vermillon - yolk + glaire (writing and flourishing)
verdigris mixed to saffron - gum + vinegar ± some yolk	verdigris - vinegar + 1 part yolk (3 drops) + 3 drops honey + gum (the volume of a walnut)
orpiment - yolk + glaire for tempering	
blue writing - gum + yolk	azurite - gum + myrrh + tragacanth (writing and painting)
blue - gum + honey ± yolk	
trans.blue - yolk + gum	
brazil red - glaire	brazil red, indigo + brazil, saffron, Berberis wood yell, sap green, bistre — gum
	french ochre (Metz) - gum (flourishes on gold ground)
	rag colors red, violet, blue, rose — some contain gum; other are tempered with gum or glaire (violet or blue)

Note: Lead white, ochres, red lead, and all colors for painting are usually tempered by Andres von Colmar with the media described in the text.

APPENDIX A.

ALCHEMY AND THE ART OF PAINTING IN OILS (*by* S.C. ARTENI).

It is difficult to know to what extent artists carried on alchemists' techniques faithfully (cfr. STANISLAS KLOSSOWSKI DE ROLA, «Florilège de l'Art Secret», éditions du Seuil). However, methods of preparation of mediums and Vehicles are still closely based on alchemists' teaching and philosophy (cfr. JEHAN DE LA FONTAINE's hermetical poem 1413). Of course, new materials often simplify methods, but they do not really affect the fundamental principles: the harmonious resolution of all opposite principles i.e. the philosopher's stone; transmutation i.e. change into another superior nature, form or condition by means of heat (cfr. Philippus Aureolus Paracelsus, 1493?-1541, quoted by De Mayerne, and our notes on Van Eyck); distillation i.e. to extract, purify, concentrate or transform to obtain the universal solvent (results: spirits of turpentine or wine, purified and/or heat-refined Oil Vehicles).

The ideal of harmony extends also to colors as pigments, distilled i.e. purified in water and carefully mixed with the Vehicle (cfr. S.C. ARTENI, « Studiu asupra Bisericilor dela Voronet si Arbore, etc. », 1976, on the extensive use of egg-media due to Byantine influence until heat-processed Oil Vehicles are introduced). The symbolism of colors and their association with the Planets, numbers, etc., are evident (cfr. ROLAND D. GRAY, « Goethe the Alchemist: A Study of Alchemical Symbolism in Goethe's Literary and Scientific Works », Cambridge, England, 1952). Pigments thus were endowed with a significance far beyond their application as hues, and were used to denote a wide range of meaning related to metaphysical theories (cfr. S.C. ARTENI, « Despre Imaginile Sacre si Spiritul unei Tecnici », 1974). Associated with natural forces colors were believed to posess magical powers. The ideas associated with their ingredients and the methods by which they were prepared linked them with the practice of alchemy and its symbolic language: e.g. the magical vertues of cinnabar, the preparation of vermilion, realgar and orpiment, the use of gold, etc.

What causes Brancusi's « Seal » to be a work of Art when compared with a hazarduosly shaped stone found on a river's shore? The person who placed that piece of rock upon the altar and worshipped it, represented the *spiritual by means of matter*. By the process of carving the stone, Brancusi unveils the *spiritual* concealed *within the physical substance*. The concept of «Kunstwollen» defines the difference. The anonimity of this ritual act is oneness and Art is not self-expression but an expression of the harmony.

Quality of seeing fluctuates with the norms of time. Aesthetic evaluations are as cautionless as attitude toward historical testimonies. Inadequate scientific evidence is transformed into dogmas. But, we still have a fine body of factual historical evidence from which sound comparative technical data may be extracted. Here is a fragment quoted by De Mayerne, which may be considered as the origin of the famous Maroger Medium, excellent in itself but by no means a reconstruction of some lost secret:

> « Huyle pour *coucher l'or* en feuille... Prenés une pinte d'huile de lin, pure et nette, deux pots de terre tout neufs, Litharge d'or 2 ozs., mettés un des pots avec l'huile sur le feu et quand l'huile commencera à chauffer mettés la grosseur de trois (deux) noix de gomme arabique dedans et puis à mesure qu'elle chauffera mettés une douzaine de grains de Mastic dedans: pour la faire bouillir vous couperés en deux un oignon... et quand vous verres que l'huile commencera à bouillir, et jettera une grosse escume, vous prendrés l'aultre dit pot et brasserés d'un pot en l'aultre... puis prendres demie once de Camphre que jetterés dedans... Laissés froidir, passés par un linge, et mettés dans une phiole de verre, au soleil pur purifier. N. Pour *dorer* sur bois, verre, pierre et sur tout. Pour dorer sur bois Rp. terre d'ombre de Venise, Ocre jaune, et un peu de mine de plomb, broyés sur une pierre avec ceste huile et appliqués... » (cfr. BERGER, op. cit., p. 156; recipe attributed to Bouffault).

Zinc compounds and zinc oxide (the last known in the Middle Ages as « lana philosophica » or « nil album ») were considered at the beginning of the 19th century as effective driers (cfr. MERRIFIELD, I-CCXLIII). Zinc oxide has no drying properties at all. Zinc sulphate is a powder, $ZnSO_4.7H_2O$, used for preserving skins ans wood, in the bleaching of paper and has astringent, styptic and emetic properties. It is also called « zinc vitriol ». Zinc sulphate is used as a drier (cfr. a few recipes in DE MAYERNE and PACHECO; « Per... olio molto secante... specie di vitriolo che nasce in Germania chiamato chuperosa. » in « L'Epitome Cosmografica de Padre Vinc. Coronelli », 1693, p. 99), but its properties in this respect are rather problematical. As it contains much water of crystallisation it is necessary to dry it before it is added to the oil.

According to Eastlake, the substance called « galicen stein » by the Strasburg Manuscript is believed to be anhydrous zinc sulphate.

Alum, a solid $K_2SO_4.Al_2(SO_4)_3.24H_2O$ is used as an astringent and styptic, and in dyeing and tanning. Commonly alum is also aluminum sulphate $Al_2(SO_4)_3$. The term covers a class of double sulphates having the general formula $R_2SO_4.X_2(SO_4)_3.24H_2O$ where R is a univalent alkali metal or ammonium and X one of a number of trivalent metals (on the use of alum in the bleaching and purifying of varnishes cfr. Italian MSS in MERRIFIELD; for oils cfr. DE MAYERNE). A variety of substances was classed under the name of alum. « Alumen » or « Glasse » and « Glace » is a name given in medieval textbooks to similar salts including sulphate of iron (a good drier), sulphates of aluminum (cfr. ERACLIUS, LE BEGUE; MERRIFIELD, II-893), a white pigment (cfr. Le Begue in MERRIFIELD, I-232), crystallised and vitrified substances (« glassa » is a name given to sandarac and amber too; cfr. AGRICOLA, « De Metallicis » and Italian MSS quoted by MERRIFIELD).

We suggest that, due to its properties rather similar to alum, zinc sulphate is recommended by the Strasburg Manuscript basically as a bleaching agent rather than a drier, accelerating also the deposit of the substances used during boiling. Further research seems necessary to determine the action of zinc sulphate upon oils or whether iron sulphate has been used instead as a drier.

APENDIX B.

LES MATERIAUX POUR COULEURS A L'EAU ET PASTELS DANS LE MANUSCRIT DU DOCTEUR TURQUET DE MAYERNE (S. C. ARTENI)

> « ... on peint avec le liant et non avec le pigment. » (Maroger); « Seule une belle matière peut être à l'echelle d'une belle idée. » (Dufy)

La survie d'un tableau n'est pas un problème d'aujourd'hui. Deja Rubens restaurait Bassano. Les artistes recherchent souvent des effets qui exigent une matière appropriée. Je me suis tourné vers le passé pour en recueillir l'enseignement et l'experience concernant la nature, la composition et l'emploi d'un certain nombre de produits.

1. *Le subjectile* par sa nature, sa texture, sa preparation, son degré d'absorption, regle la facture, l'aspect final et la conservation.

— Encollage du papier et enduit:

« Colle de Bouche. Rp. Hausenblasen i. Ichtyocolle 1 oz. un peu de sucre candy et un peu de rataillons de parchemin fort blanc et tresnet, mettés le tout dans un pot neuf, et versés dessus une livre d'eau de fontaine tres pure, faittes bouillir lentement, jusques à consomption de la moitié. Coulés et versés vostre colle dans des formes pour la couper en tranches selon l'art ». (Extrait par de Mayerne de l'ILLUMINIERBUCH, 16ème siécle, dans E. BERGER, « Quellen fur Maltechnik wahrend der Renaissance und deren Folgezeit », dr. Martin Sandig oHG, 1975, p. 174).

« Pour preparer le papier afin qu'il ne boive et que les couleurs s'estendent facilement dessus. Prenez Colle de poisson (Eisinglass) bien nette et fort blanche, mettés la par pieces menues dans de l'eau sur cendres chaudes affin qu'elle se dissolue, et face comme une gelée.

Trempés dedans icelle fondue une esponge molle, la-

quelle passerés sur vostre papier. Lequel estant seiché ne boira, ny ne ridera aulcunement. », (De Mayerne dans BERGER, op. cit., p. 172).

« Eau pour papier qui boit. (Montillet, N.B.). Rp. Ichtiocolle, cuisses la à feu mediocre dans Eau Rose (l'ayant choisie tres nette et blanche, telle qu'est la recente) jusques à tant, qu'estant mise sur une assiette, elle se gelle. Coulés a travers un linge bien net; faites dissoudre à part l'Alum en Eau rose. Fondés votre colle caillé sur un lent feu et y adjoustés autant de vostre dicte dissolution d'Alum qu'il faudra pour la tenir liquide. Guardés la dans une phiole ou elle se conserve sans noircir. », (Ib.; sur l'alum dans la peinture à l'eau cfr. MAI MAI SZE, « The Way of Chinese Painting », Vintage, 1959, p. 71)

— Parchemin:

« Miniature. Pour Enluminer sur Velin bien preparé et fort lisse, il fault premierement donner une legere couche de blanc avec Ichthyocolle et puis fault peindre dessus. Ceste couche empesche que les couleurs ne se separent point, et adherent mieulx. », (BERGER, op. cit., p. 216)

— Enduit du papier à écrire:

« Papier à tablettes qui doibt estre choisy fort et bien collé, et iceluy se doibt mettre la paste sur laquelle on ecrit avec un stile d'argent, et quand on veult effacer il ne fault que passer par dessus un pinceau molle trempé en eau commune ou Rose ou bien repasser par dessus de la paste... Os de pourceau calcinés à blancheur. Os de cheval. Os de pieds de mouton, excellents. Corne de cerf et de daim, tresbonne. Mais sur tout les Coques d'oeufs non calcinées. Broyés comme les couleurs avec eau legerement gommée. Et enduisés sur le papier avec le pinceau. » (Ib., p. 152)

2. *Les couleurs: dilution; condition d'utilisation:*

« Pour destremper les couleurs d'enlumineure, faut prendre eau gommé et sucre candy. », (Ib., p. 290)

(Huskins) « Les Azures comme toutte aultre couleur se couchent avec eau de gomme et tant soit peu de sucre candy. Huskins met touttes ses couleurs dedans des petits plateux d'yvoire, et dict quelles ne se seichent pas comme dedans les coquilles. Pour travailler il a un platteau d'yvoire tourné de diametre environ quattre poulces qui se creuse lentement vers le milieu. Il met ses couleurs en fort petite quantité l'une contre l'autre à la circonference et jcelles premierement destrempes avec Eau de Gomme et quand il sen veult servir, il ne faict que mouillir son pinceau dedans de l'eau fort nette, duquel il prend la couleur... », (Ib., p. 152)

« Mr. Noryate en ses couleurs n'use jamais d'alum, ains seulement de gomme et aux couleurs fort claires et riches comme à la Lacque de Venise de fort peu de sucre candy. Si on y met trop il s'humecte à l'air et guaste toute l'enlumineure. Il ne fault que laver simplement ce que vous voulés enluminer, avec des couleurs transparentes qui n'ayent point de corps, et le principal artifice d'enlumineure est de bien mesnager votre blanc du parchemin ou du papier... », (Ib. p. 172)

« Cynabre coulant pour Escrire. Broyés premierement vostre cynabre avec urine sur le marbre ou escaille, et le laissés seicher, assemblés avec la corne et rebroyes avec urine... jusques à six fois. Seichés et reduisés en poudre impalpable que mettrés dans un pot de terre verny... ou du verre... et le delayerées avec eau rose dans quoy vous aurés dissoult assés bonne quantité de gomme Arabique... adjoustés a cela de la Myrrhe trespure dissoulte en la mesme eau à part et meslée bien; fort peu de myrrhe suffit, comme la grosseur d'une petite febue ordinaire ou d'un gros pois, pour accomoder une once de Cynabre. », (Ib., p. 212-214)

« Pour la preparation et application des couleurs. Prenés par exemple: Ocre Jaulne un morceau broyés le avec Gomme arabique seiche, fort finement puis y adioutés tant soit peu de sucre candy, par exemple sil y a la grosseur d'un pois d'ocre ou autre couleur mettés la grosseur d'une teste d'espingle assez grosse de sucre candi, pour la Gomme, il en fault tant que la couleur estant seiche ne reluise pas, ce que vous essayerés sur une carte. Estant ainsi broyé mettés dans une coquille fort delié et quand vous vous en voudrés servir mouillés le pinceau dans de l'eau claire. Le sucre candy se met pour lier les couleurs et les empescher de sesclatter. », (Ib., p. 240; cfr. U. FORNI, « Manuale del Pittore Restauratore », Firenze, 1866, p. 295-296: « Bianco di ostriche e gusci d'uovo »)

3. Recommandations concernant l'emploi des *mediums à l'eau*, un temoignage remarcable sur la survie des materiaux et processus de l'ancienne tempera allemande et flamande:

« Cooper le Jeunne neveu de M. Huskins. Februar 1634.
Von temperaturen:
Laues Wasser begerren.
Legmoss. Saftgrun. Turnsall. Beergelb.
Zuo etliches Wasser auch
Saffran und Indigh.
Hoing, Essig, Wein, Weinstein.
Spongrunn.
Gallen.
Opement. Rauchgelb.
Pergament Leim.
Blau. Berggrun. Manten (i.e. bleu de cuivre). Minj. Raushgel. Opiement. Bleigel. Kreidern. Lac. Lichter Ogger. Braun Ogger, Schittgel. Alle schwartz beinach. Indig. Cinober.
Gel im ey (jaune d'oeuf) mitt wasser vermischt.
Cinnaber. Lac. Und alle lichte Farben, so man gar satt und glauth haben will.
Weiss Vom Ey.
Bleiweiss. Kreidt. Cinober. Und ettliche zarte ferble...
... Zur Verschattigung ist zumerchen wer Jede farb wenig (honigs?) wol leiden... », (BERGER, op.. cit., p. 242-246)

4. *Vernis et technique du vernissage*:

« Methode pour vernir sur enluminure. Il fault avoir premierement une liqueur visqueuse qui ait corps mais transparent et tel qu'il n'altere en facon qualconque les couleurs. Ceste liqueur pourra estre principalement la colle de poisson, fort blanche, fort claire et cuite à consistance espaisse et forte. Voyés ce que fera la colle forte ordinaire de Flandres qui est claire et blanche. Item la gelée de corne de cerf bien forte. Item la Gomme tragacante bien delayée en quelque eau distillée comme (si la besoigne le vault) en eau rose. Item le blanc d'oeuf. Item la Gomme arabique, de Prunier, de cerisier, dissoulte à consistence de syrop, mais specialement l'Arabique... Sur vostre piece bien seiche passés vostre vernix qui doit estre fort siccatif, comme celuy qui sans Therebentine se faict avec la Gomme, le mastic, le Benjoin, depuré par l'esprit de vin et les huiles de Therebentine de Venize et d'aspic fort clairs et fort blancs. Une bonne et forte couche se fera si on laisse infuser toute la nuit de la gomme tragacante dedans de l'eau claire sur des cendres chaudes. La gomme se dissouldra... », (Ib., p. 328-330)

« Pour faire que les couleurs se reservent et ne s'enlevent pas si tost par Eau ou aultre Humidité. L'Allum a ceste proprieté. Dissolués le dans de l'eau tres pure, et passés fort legerement pardessus vostre Enlumineure un pinceau fort mol de queue de gris. Ne repassant jamais deux fois. Laissés seicher, ainsi les couleurs se raffirment et pourront porter le vernix. Mais je croij que cecy fera encor mieux si par dessus l'eau d'allum on donne une legere couche de colle de poisson qui empeschera que le vernix ne change en aucune facon les couleurs. N. M. Huskins, excellent enlumineur à Londres. Laissés seicher et repassés une seconde fois vostre eau d'Alum sur l'enlumineure. Le pinceau soit fort long et fort mol. », « Ib., p. 330)

« Remarque pour Vernix sur enlumineure. Si vous mettes le vernix gras et huileux sur les couleurs appliquées à l'eau, vous le guastés. Il faut premierement que vous couchiés sur la peinture un vernix de gomme arabique ou de blanc d'oeuf. Lequel il fault passer legerement et tout d'un coup sur la peinture, sans y retourner à deux fois... Cap. Salé. Vernix. Rp. Blanc d'oeuf battu en eau no. 3. Gummj Cerasor 1/2 once. Gummi arab. 2 onces. Ms: optime addendo Aqu ros. parum.

Calef. sine ebullitione. Colendo adde mellis alb. instar fabre... Rp. Cervisia 1 lb. Gummj arab 1 ½ once. Coque... », (Ib., p. 188; i.e. blanc d'oeuf + gomme de cerisier et arabique + miel, en eau de roses; ou biere + gomme arabique, cuites à consistance d'huile)

5. *Detrempe* (sur la peinture à la colle en Flandres cfr. Raffaello Borghini, « Il Riposo », 1584, dans. M. Merrifield, « The Art of Fresco Painting », Tiranti, 1966, p. 34):

« Pour peindre à destrempe d'autant que les couleurs destrempées avec la colle, le blanc d'oeuf ou la Gomme, sont plus obscures estant moytes qu'estant seiches. Apres avoit imprimé vostre toile, il la fault mouillir par derriere et peindre dessus. Ainsi vous ne vous tromperés point. Comme aussi pour racomoder un tableau à destrempe affin que vostre oeuil ne se trompe point, et que vostre racomodement ne soit point de pieces inegalement rapportées, humectés fort par derriere vostre tableau de sorte que l'humidité passe... Pour la liqueur à delayer vos couleurs, oultre la colle de poisson, et celle de retaillons de cuir des gantiers, songés au blanc d'oeuf reduict en eau avec le liguier d'ont les peintres anciens usoyent. Lequel est plus ou au moings aussi fort que la colle de poisson et demeure tousiours liquide. », (Berger, op. cit., p. 328).

6. *Verni à dorer* à la gomme arabique (Berger note que les témoignages anciens suggerent de dissoudre d'abord la gomme dans de l'huile et ensuite ajouter eventuellement de l'eau):

« Prenes une pinte d'huile de lin, pure et nette, deux pots de terre tout neufs, Litharge d'or 2 oz., mettes un des pots avec l'huile sur le feu et quand l'huile commencera a chauffer mettes la grosseur de trois (deux) noix de gomme arabique dedans et puis a mesure qu'elle chauffera mettes une douzaine de grains de Mastic dedans: pour la faire bouillir vous couperes en deux un oignon de la grosseur d'un oeuf de pigeon en quatre, et quand vous verres que l'huile commencera a bouillir et jettera une grosse escume, vous prendres l'aultre dit pot et brasseres d'un pot en l'aultre puis remettres sur le feu et quand elle escumera derechef recommenceres a brasser, continuant toujours jusques a tant que l'huile n'escume plus; puis prendres demie once de Camphre que jetteres dedans, et le remueres doulcement, tant qu'il soit fondu a loisir. Laisses froidir, passes par un linge, et mettes dans une phiole de verre, au soleil pour purifier. (Pour dorer sur bois, verre, pierre et sur tout. Pour dorer sur boir Rp. terre d'ombre de Venise, Ocre jaune, et un peu de mine de plomb, broyes sur une pierre avec ceste huile et appliques). », (Ib., p. 156)

7. *Crayons et pastels*:

« Crayons de toutes couleurs principalement pour visaiges. Une matiere est la craye, avec laquelle fault allier les couleurs, le vermillon, la lacque, la terre d'ombre, l'ocre jaune et avec du Laict broyer le tout et en faire de crayons. L'autre est la terre de quoy on faict les pipes de Tabaco, qui se doibt mesler avec eau. Ceste sorte dure plus, est moins frangible et s'estend facilement. Pour la lacque qui est si seiche que malaisement elle se peult estendre sur le papier il fault mesler la terre et la destremper avec savon de Venise dissoult en eau. Toute la mixtion ayant esté tres bien broyée sur le marbre... faittes vos rouleaux et les egualés avec une palette... laissés seicher... Il y a de deux sortes de terre a pipes, l'une est blanche qui est la meilleure. L'aultre est bleue. », (Ib. p. 274)

« Pour faire Crayons à peindre sur papier, de toutes couleurs. Leonard jeune peintre flamand servant M. Cary, disciple de Mr. Van Deick. 31 Juillet 1634.

Fault prendre vos couleurs et les broyés fort subtilement sur la pierre et considerer combien chasqu'une peult porter de plastre sans s'alterer beaucoup... comme la lacque qui en veult fort peu. Aux unes la moitié, le quart, le tiers, aux aultres la cinquiesme ou sixiesme partie. A vostre couleur... adjoustés du plastre faict d'Alabastre bruslée à extreme blancheur et avec tant soit peu d'eau commune faittes paste... laquelle vous formerés en crayons sur la paulme de la main.

Le Papier à peindre dessus doibt estre de quelque couleur... ayés du papier bleu ou gris.

T.M. Pour faire que la couleur tienne au papier, il fault que ledict papier boive fort et fault avoir une eau fort feible de Colle de poisson ou de Gomme arabique, ou de blanc d'oeuf battu et meslés avec beaucoup d'eau, et sur la superficie dicelle mise dans un ... bassin, soit posée la feuille à son envers, la tenant par les deux bouts... L'eau visqueuse penetrant le papier humectera la couleur sans la souslever et icelle seiche adherera au papier.

Pour vernir. Si ce sont habits, sans aultre preparation le vernix d'enlumineure soit dextrement passé... Sur les visaiges passés... l'eau de Colle de poisson, ou le vernix de Gomme arabique. Laissés seicher, puis vernissés.

Mon opinion est que le viel plastre qui a desja servy blanc comme neige... est meilleur et ne lie pas si fort que celuy qui a este nouvellement bruslé, mais il la fault incorporer avec laict, ou colle pourrie, afin de pouvoir former les pointes... Voyés ce qui se pourra faire avec le marle blanche. Avec le bol blanc. Avec la croye qui s'estime la meilleure de tout, avec la Chaux esteinte, morte... », (Ib., p. 346)

— Plâtre comme liant:

«Artifice de Crayons de Mr. Aulmont. Paintre francois... Le matiere dont le corps se donne aux crayons est le plastre... broyés... en poudre impalpable, seulement quand vous en voudrés travailler, aultrement le plastre... vieil... s'esteinte et ne lie point. Prenés vos couleurs, et les broyés ...avec de l'eau, que tout soit fort liquide... saulpoudrés vostre plastre en suffisante quantite qui puisse lier, meslant exactement avec la spatule... ramassés habilement vostre paste en une forme longue et suffisament espaisse pour coupper vos crayons. Laisses prendre et seicher... puis couppés vos crayons... avec une scie delicate... Quand vos crayons ne forment pas le traict net par l'endurcissement du plastre, il faut en broyant vostre couleur avec l'eau y racler un peu de savon blanc de Venise, advisant qu'il n'y en ait pas trop... quand ils sont bien faicts il doivent estre mattes, mols et marquer comme la croye la plus molle qu'il se puisse. Les couleurs qui se precipitent par l'alum comme la lacque... sont fort dures et ont plus besoin de savon que les autres.

Le moyen de se servir de la lacque pour... enfoncer... mouillés legerement vostre crayon avec la langue ou ayés un mouchoir legerement mouillé, dont vous envelopperés pour fort peu le bout de vostre crayon et vous en servirés... », (Ib., p. 348)

— Fixage du dessin:

« Pour faire attacher vos couleurs ayés un papier non trop colé, et qui admette l'eau, trempés le dans de l'eau de colle de poisson fort nette et le laissés seicher, faites vostre crayon, puis tenant le papier par les deux bouts, et mettés l'envers sur de l'eau bien nette tant que l'humidité passe... levés... laissés seicher... Dr. Pridion, Londinij: La terre preparée pour former en Pipes pour prendre du Tabac soit prise toute humide, adjoustés y les couleurs... formés en crayons... », (Ib., p. 348-350)

8. A propos de pastels en general et de ceux de *Chardin* en particulier:

« ... les transformations dans la maniere de peindre et... les progres dans la vision des artistes furent les consequences purement materielles d'une pratique nouvelle... Girardot me dit: "Le pastel me parait se fixer de lui-même avec le temps sous l'influence des humidités de l'atmosphere qui agissent à la fois sur la colle du papier et sur la gomme du pastel. Plus un pastel est vieux, plus il est solide". », (Ch. Moreau Vauthier, « La Peinture, les divers Procédés, les Maladies des Couleurs, les faux Tableaux », Hachette, p. 50, 109)

LIST OF SELECTED SUPPLIES.

Dry pigments: Maimeri (Italy);
Lefranc et Bourgeois (France);
C. Roberson and Co. (England);
G. Rowney and Co. (England);
Winsor and Newton Ltd. (England);
Old Holland Artists' Colors MFG. (Holland);
Permanent Pigments Inc. (U.S.A.);
Grumbacher Inc. (U.S.A.);

Tempera (to be thinned with water):
— egg tempera: — G. Rowney and Co.;
Old Holland Artists' Colors MFG;
G. Sennelier (+ medium);
— casein tempera: — Shiva, *U.S.A.* (+ medium);
— gum size tempera: — H. Schmincke and Co. (+ gum-size and egg medium);

Emulsion (to be added to oil colors):
— egg medium: — Lefranc et Bourgeois;
— casein binder: — Talens and Zoon;
— Maroger medium: — C. Roberson and Co.;

Water color media:
— gum water; media: — C. Roberson and Co.;
Winsor and Newton Ltd.;

— prepared size; ox gall liquid and paste: — C. Roberson and Co.;
Winsor and Newton Ltd.;

— gum arabic; water color megilp; Aquapasto: — Winsor and Newton Ltd.;

— parchment size and cuttings: — C. Roberson and Co.;

— retarder for tempera: — Bodson et Nelis;

— White shellac varnish in spirit of vine: — Winsor and Newton Ltd.;

— Gouache varnish: — Lefranc et Bourgeois;

Illuminating materials:
— gold in shells french; gold leaf; burnishers; vellum; ivories: — Winsor and Newton Ltd.;

— water matt gold size; raising preparation: — Winsor and Newton Ltd.;
C. Roberson and Co.;

— armenian bole; white gilding powder: — Talas, New York.

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Jan van Eyck

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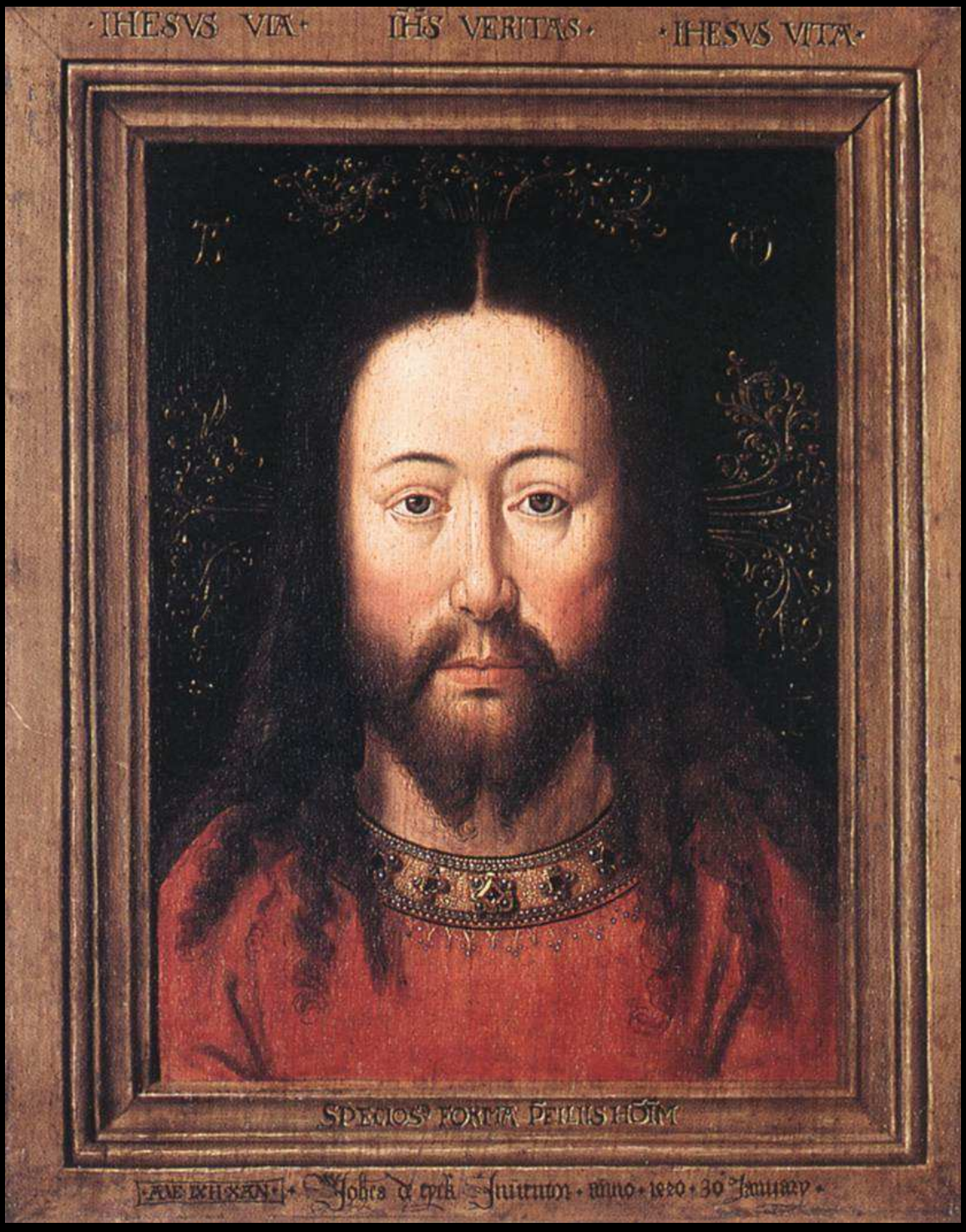
Jan van Eyck
http://www.the-athenaeum.org/art/full.php?ID=102132



Jan van Eyck
http://www.artrenewal.org/artwork/636/2636/11878/portrait_of_christ-large.jpg

Jan van Eyck
http://upload.wikimedia.org/wikipedia/commons/b/be/Van_Eyck-Sendelbinde.jpg

Jan van Eyck
http://biblelessonsite.org/images2/eyck3.jpg

Jan van Eyck

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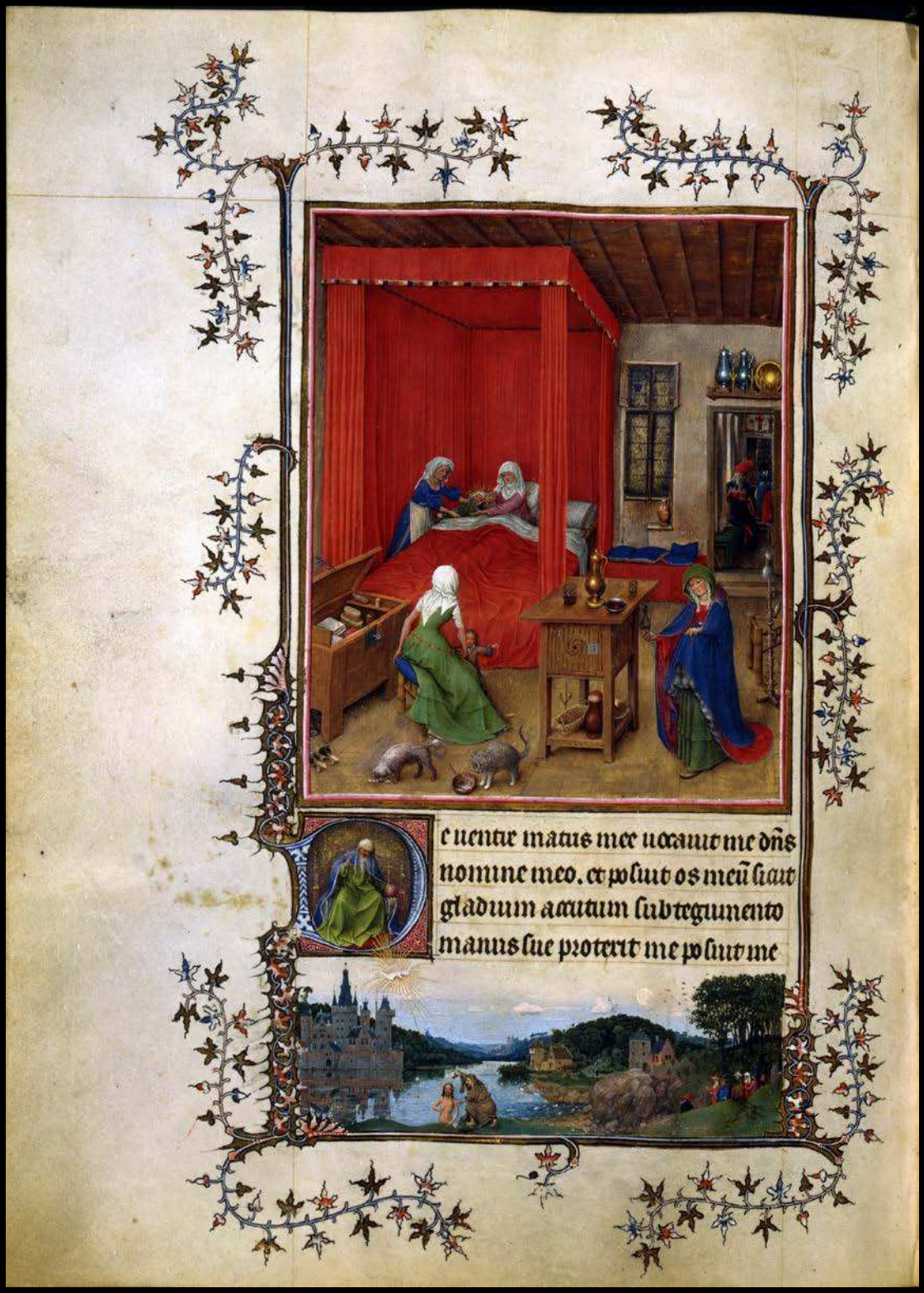
Jan van Eyck
http://www.casa-in-italia.com/artpx/flem/images/Van_Eyck_Berlin_Michele_Arnolfini.JPG

Jan van Eyck

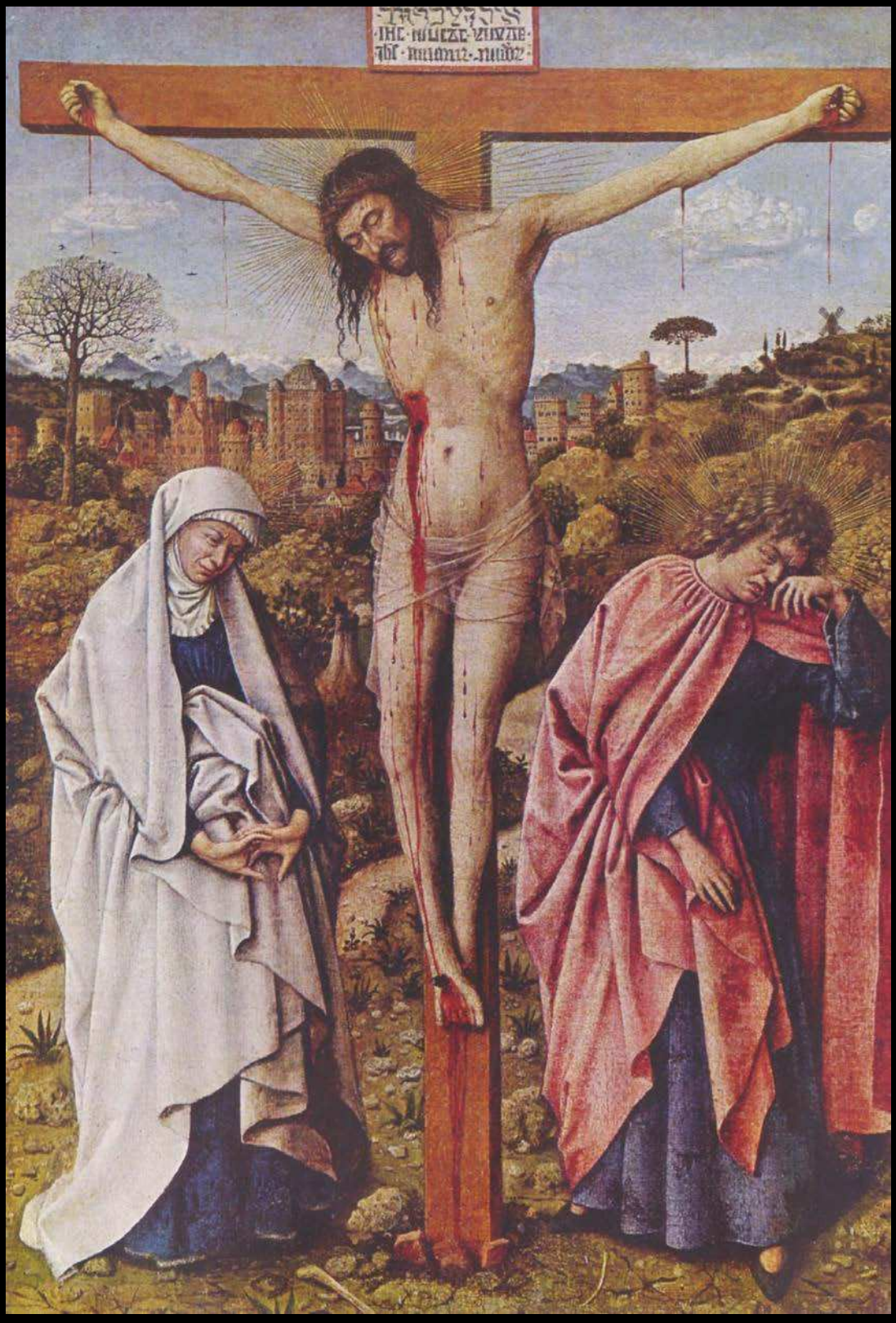
http://www.the-athenaeum.org/art/full.php?ID=116318

Jan van Eyck, silverpoint
http://www.wga.hu/frames-e.html?/bio/e/eyck_van/jan/biograph.html

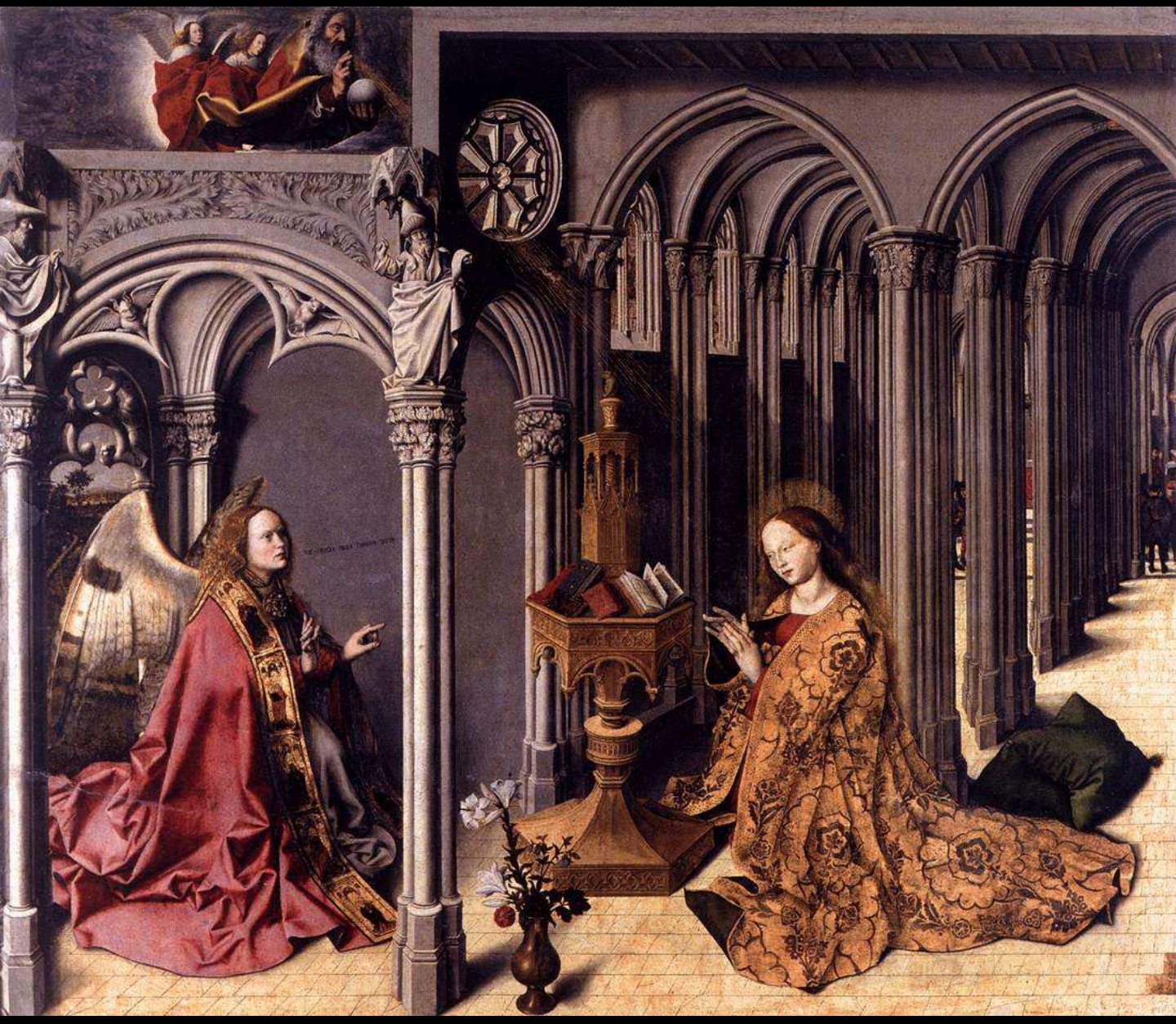


Attributed to Jan van Eyck, illumination

http://upload.wikimedia.org/wikipedia/commons/5/59/14th-century_painters_-_Les_Tr%C3%A8s_Belles_Heures_de_Notre_Dame_de_Jean_de_Berry_-_WGA16014.jpg



Attributed to Hubert and/or Jan van Eyck
http://upload.wikimedia.org/wikipedia/commons/f/fe/Hubert_van_Eyck_001.jpg



Barthelemy van Eyck
http://www.wga.hu/frames-e.html?/html/e/eyckbart/

Barthelemy van Eyck, illumination
http://www.wga.hu/frames-e.html?/html/e/eyckbart/

Rogier van der Weyden, illumination
http://upload.wikimedia.org/wikipedia/commons/b/ba/Jacques_de_Guise%2C_Chroniques_de_Hainaut%2C_frontispiece%2C_KBR_9242.jpg

Updates on materials and techniques (September 13, 2013)

The Restoration and Technical Examination of Jan Van Eyck's Margaret, the Artist's Wife

Jill Dunkerton (National Gallery, London)

http://vlaamseprimitieven.vlaamsekunstcollectie.be/en/research/webpublications/the-restoration-and-technical-examination-of-jan-van-eycks-margaret-the-art

"…Examination by infrared reflectography has revealed a detailed underdrawing for Margaret's head and headdress, but with only a simple outlining for the lower part of the portrait, the design of which seems to have been more fully developed at a later stage. The underdrawing has been executed with a brush and a liquid medium. The lines are sometimes relatively broad and free, for example those that indicate the crimped edges of her headdress, including the marks which suggest that originally the edge of the fabric was to echo the curve of her right cheek…

Margaret is expensively dressed in a red wool gown, lined with grey fur, probably squirrel. The rich red colour, beautifully preserved, is built up with several layers of paint. Over the white chalk ground is a thin layer of the opaque red pigment, vermilion, bound in a medium of heat-bodied linseed oil (identified by GC-MS). This seems to have been a flat, unmodelled layer, brushed in broadly, the sweeping brush marks clearly visible in the X-radiograph, especially in the area of her hands, which were added over the red underpaint…Over this red underlayer, the folds of the dress were modelled with layers of red lake glaze. .. To darken the shadows Van Eyck added a little bone black and also some natural ultramarine...

By chance a hair shed from a paint brush used for his portrait of his wife remains embedded in the black paint at the left edge. Its length (about 6 mm) and colour indicate that it is probably from a fine brush made from the tail fur of a squirrel or a member of the weasel family, much like a modern sable brush. Heat-bodied linseed oil was identified in all the paint samples that were analysed from the painting and the front frame mouldings. Heat-bodied oils have been partially pre-polymerised (polymerisation is the process by which it sets or 'dries') by gentle heating. Oils could also be placed in a dish exposed to sunlight (1)…

(1) For paint media in early Netherlandish and German painting, including heat-bodied oil, see 'Methods and materials of Northern European painting', National Gallery Technical Bulletin, 18, 1997, pp. 6-55, esp. pp. 40-3…"

Jan van Eyck, Margaret, the artist's wife
http://s283.photobucket.com/user/Frekkken_snork/media/MargarettheArtistsWife.jpg.html

National Gallery Technical Bulletin Volume 18, 1997
The materials and technique of five paintings by Rogier van der Weyden and his Workshop

Rachel Billinge, Lorne Campbell, Jill Dunkerton, Susan Foister, Jo Kirby, Jennie Pilc, Ashok Roy, Marika Spring and Raymond White

"…The five paintings considered here were painted on oak panels…prepared with white grounds consisting of natural chalk bound in glue ... In cross-sections from four of the paintings it has been established that there is a thin off-white priming layer ('imprimitura') which has been applied after the underdrawing was carried out on the chalk ground. It was not possible to establish whether a priming is present in 'Portrait of a Lady' since no samples were taken for cross-sections. Such a thin 'imprimitura' layer is hard to see in cross-section or on the painting with the stereomicroscope; it is difficult to judge what colour it would have appeared at an initial stage of painting when it was exposed ... On 'The Magdalen Reading' and 'The Exhumation of Saint Hubert' the 'imprimitura' appears to be light grey, consisting of lead white tinted with a small amount of black; on the panel depicting 'Saint Ivo(?)' it contains only lead white. On the 'Pieta', in addition to lead white, the 'imprimitura' contains a small amount of fine opaque red pigment … and some black, giving it a very light pinkish-grey colour...

…The paint media of the pictures were analysed by two complementary techniques: gas chromatography linked to mass spectrometry (GC-MS), which provides detailed identification of the components of the medium; and Fourier-transform infra-red microspectrophotometry (FTIR) which, although less chemically specific, is able to indicate where in the layer structure of the painting various organic components are located. The binding medium is predominantly linseed oil. One exception to the use of linseed oil was found: the white veil on 'Portrait of a Lady' contains walnut oil. Egg tempera was identified in underlayers in 'The Exhumation of Saint Hubert', the 'Pietà' and 'Portrait of a Lady' (note 35). In addition to linseed oil, some pine resin was found in a red lake glaze on Saint Jerome's robe in the 'Pietà'. This is a component of glazes detected occasionally on other fifteenth-century paintings, an early example being the red glaze on the turban in Campin's 'Portrait of a Man' … pine resin would enhance the transparency of a linseed-oil bound glaze…"

Note 35.
"Egg fats were found in the underpaint in the following areas: the opaque red of Saint Jerome's robe and the sky in the 'Pietà'; one of the white window-panes in the background of 'The Exhumation of Saint Hubert'…"

Rogier van der Weyden, The Magdalen reading

http://www.bbc.co.uk/arts/yourpaintings/paintings/the-magdalen-reading-115734

Rogier van der Weyden and studio, The exhumation of Saint Hubert
http://www.bbc.co.uk/arts/yourpaintings/paintings/the-exhumation-of-saint-hubert-115581

Studio of Rogier van der Weyden, Saint Ivo (?)
http://www.bbc.co.uk/arts/yourpaintings/paintings/a-man-reading-saint-ivo-114064

Attributed to the studio of Rogier van der Weyden, Pietà
http://www.bbc.co.uk/arts/yourpaintings/paintings/pieta-114838

Studio of Rogier van der Weyden, Portrait of a lady
http://www.bbc.co.uk/arts/yourpaintings/paintings/portrait-of-a-lady-114867

National Gallery Technical Bulletin Volume 18, 1997
Methods and materials of Northern European painting in the National Gallery, 1400–1550

Rachel Billinge, Lorne Campbell, Jill Dunkerton, Susan Foister, Jo Kirby, Jennie Pilc, Ashok Roy, Marika Spring and Raymond White

"…linseed oil was that most commonly used. In the fifteenth century walnut oil was sometimes used by painters of the Early Netherlandish School, usually for whites, blues or other pale, cool colours (note 152)…

…This pattern is observed in other Netherlandish School paintings of the period so it may be that there was a tendency towards using the initially less yellowing walnut oil for pale cool colours, although the practice was certainly not observed consistently or universally…

…In the sixteenth-century Netherlandish School paintings examined, walnut oil was occasionally found, particularly for areas of white paint…

…The limited use of egg tempera, generally confined to layers of underpaint or priming … is seen in the products of several fifteenth-century Early Netherlandish workshops, including those of Campin, van der Weyden and Bouts ... It is also found occasionally in the work of later Netherlandish School painters, again usually in areas of underpaint, but too infrequently for any particular pattern to become apparent. While one must presume that a reason behind the use of egg may be the sound practice of applying an oil-rich paint over a leaner and rapidly drying underpaint, very little is known about the development of painting practice, and the use of egg tempera in particular, in the Low Countries during the period before 1400, or when Campin and his contemporaries would have been training ... Egg tempera seems to have been used in certain areas of pale-coloured flesh paint and white paint in Gerard David's 'The Virgin and Child with Saints and Donor' … probably because egg tempera gives a cooler tone to white than oil and was preferred for this reason ... If so, it demonstrates a sophisticated understanding of the optical as well as the working properties of the different media…

…Examination of the paint medium has revealed numerous examples of the use of heat-prepolymerised or other forms of modified oils, used for pigments that dried poorly, or where particular body or richness and gloss was required, or simply, perhaps, where more rapid drying was necessary... The use of oil thickened by standing (possibly, but not necessarily, in the sun) can almost certainly be assumed; the polymerisation that begins to occur naturally results in no chemical alteration that can be detected by mass-spectrometry. At the other extreme, paint could be thinned by the addition of more ordinary, unpolymerised, drying oil…

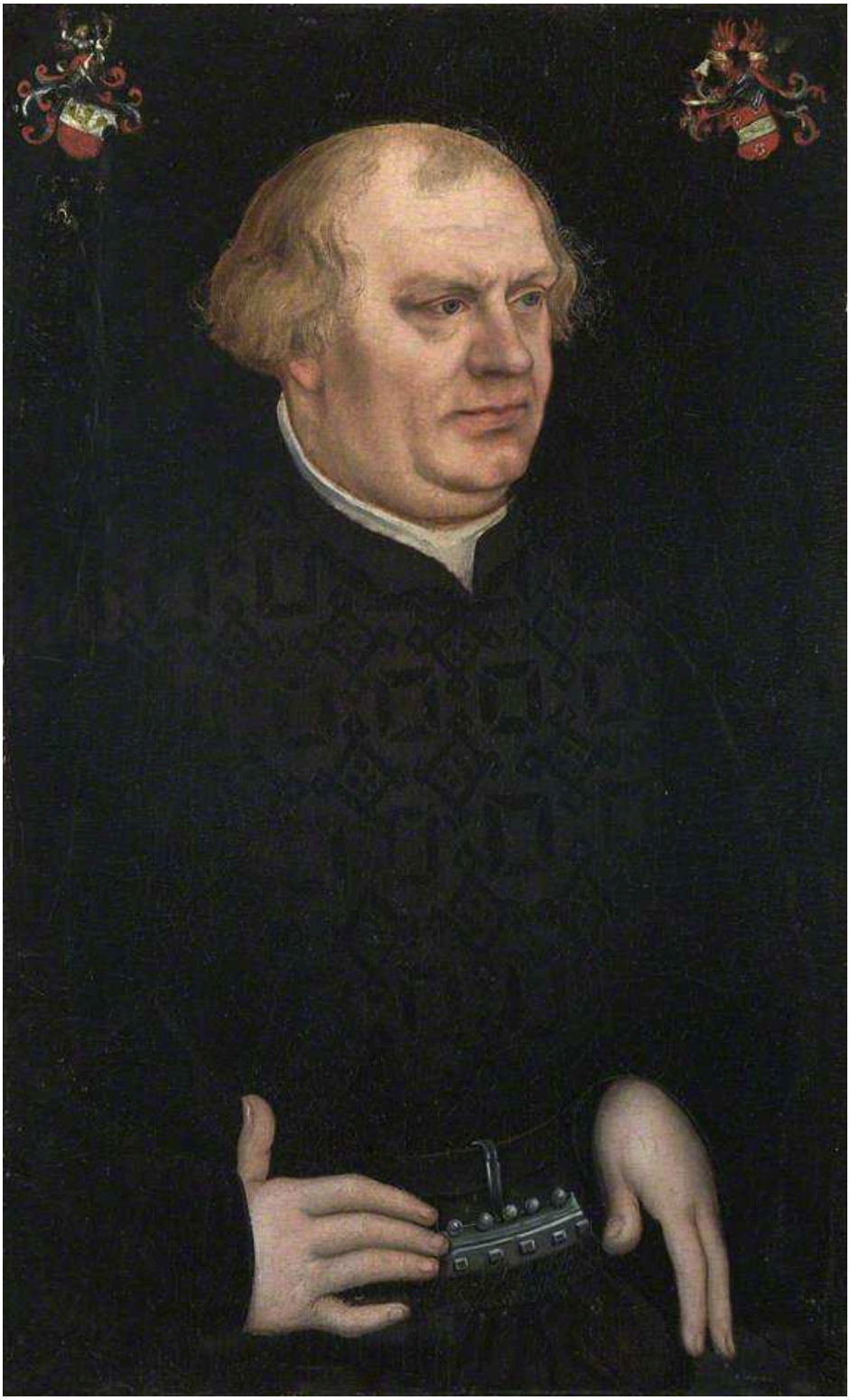
..It is interesting to note that the writer of a mid-fourteenth-century Netherlandish manuscript on the distillation of alcohol and the preparation of various 'waters' from flowers and other materials also copied down brief summaries of the preparations of several 'oils'; these accounts, which are in Latin, are from an earlier alchemical source. They include the preparation of oil of turpentine – ‘terebintina’ – by sublimation (of the resinous raw material presumably) to give an oil 'as clear as fountain water and it burns like fire' ... There is therefore no reason to suppose that volatile diluents were not available by the fifteenth century, although no documentary evidence has yet been found to associate their use with the application of paint. The use of heat-bodied oil is particularly appropriate for pigments that dry poorly, such as black and red lake pigments: it was used in the black background of Lucas Cranach's ‘Portrait of a Man’ … for instance. Concern for the drying properties of pigments was shown in other ways as well; for example, Cranach's black backgrounds are very thinly painted and have dried well, showing only a thin fine network of drying cracks. In order that the paint should dry properly a little verdigris was added to the lamp black pigment in the ‘Portrait of a Man’ to act as a drier. In paintings by other artists azurite has been used similarly. A heat-bodied linseed oil was used by Stephan Lochner with the red lake pigment used to glaze red garments in ‘Saints Matthew, Catherine of Alexandria and John the Evangelist’ … but in addition a zinc salt (possibly white vitriol, zinc sulphate $ZnSO_4 . 7H_2O$) seems to have been incorporated, as suggested in sources like the Strasburg Manuscript, perhaps because it was thought to act as a drier, although one of the references to the material in the Strasburg Manuscript suggests that it was thought to help clarify or bleach the oil…

…in areas of red and green glazes, the medium present was very frequently a heat-bodied oil (usually linseed)…

…**The Strasburg Manuscript recommends that, for each colour, three drops of varnish should be added to the pigment, ground with oil; in practice traces of resin have only been found in red and green glazes, more frequently in the red** ... Red and green glazes with a similar composition have also been observed on the thirteenth- and fourteenth-century Norwegian altar frontals … and it occurs in both Early Netherlandish and German School paintings...”

Note 152
“… It has been suggested that proteinaceous media, like animal-skin glue or egg white, were used for areas of pure blue, particularly where ultramarine was used: see, for example, in the case of van Eyck, E. M. Gifford, 'Jan van Eyck's ‘Annunciation’: Development and Alterations', ‘Le dessin sous-jacent dans la peinture. Colloque X: Le dessin sous-jacent dans le processus de creation’ 1995... This is even obliquely referred to, in garbled fashion, in the ‘Liber diversarum arcium' …The possibilities for examining suitable areas of blue paint were limited but even allowing for the possibility of contamination by conservation treatment, there was very little evidence for the use of any medium other than oil for blue paint. In the case of the ‘Mater Dolorosa’ … from the workshop of Dieric Bouts, the Virgin's blue robe was painted with azurite in linseed oil, but examination by FTIR microscopy revealed the presence of traces of animal-skin glue, closely associated with the surface of the azurite particles, as if the pigment had been ground with an aqueous solution of glue (and had then been allowed to dry) before it was ground with the oil. A similar phenomenon has been reported in two other paintings, Roger van der Weyden's ‘The Magdalen Reading’ … and ‘The Virgin and Child with Two Angels’ … by a follower of Robert Campin…No cases of a blue paint in an essentially aqueous proteinaceous medium alone have yet been identified…”

Gerard David, The Virgin and Child with saints and donor
http://www.bbc.co.uk/arts/yourpaintings/paintings/the-virgin-and-child-with-saints-and-donor-116012



Lucas Cranach the Elder, Portrait of a man
http://www.bbc.co.uk/arts/yourpaintings/paintings/portrait-of-a-man-probably-johann-feige-114939

Stefan Lochner,
Saints Matthew, Catherine of Alexandria and John the Evangelist
http://www.bbc.co.uk/arts/yourpaintings/paintings/saints-matthew-catherine-of-alexandria-and-john-the-evang115268

Studio of Dieric Bouts the Elder, Mater Dolorosa
http://www.bbc.co.uk/arts/yourpaintings/paintings/mater-dolorosa-114751

Robert Campin (after), The Virgin and Child in an apse with two Angels
http://www.bbc.co.uk/arts/yourpaintings/paintings/the-virgin-and-child-in-an-apse-with-two-angels-115967

An update on oil processing: Tad Spurgeon's experiments (September 13, 2013)

Tad Spurgeon

http://www.tadspurgeon.com/unsunoil.php
http://www.tadspurgeon.com/printer_friendly.php?sectionID=20&page=unsun+oil

unsun oil

If a thin layer of oil is put in a lead tray open to the air, a complex series of reactions take place over time, resulting in an oil which is thick and polymerized on the one hand, but with a different rheology than stand oil or sun oil. This process takes several months at room temperature, I've let it go as long as seven months. Up until a very thick viscosity, this oil has the unique characteristic of both holding and sliding.

The oil produced by this process has significantly more body than raw oil, but is not sticky or glutinous like stand oil or sun oil. It begins cloudy, but clears over time. The cloudy oil dries transparently, however.

If the oil is heat pre-polymerized first at a low level -- 100 to 110 C, 48 to 72 hours -- before it is introduced to the lead, no yellowing takes place in the final product. This is a procedure I began doing in an attempt to artificially age the oil, "old" oil being universally feted in the older texts. This is a slightly different concept than the "semi heat bodied oil" from the National Gallery Technical Bulletin research into 17th Century Dutch painting. What was actually done to the oil then of course cannot be known: also the degree of heat involved. But this process results in a very useful product: the real goal.

A batch of unsun oil which is in the process of gelling:

The same gel a few weeks later, relatively uniform and firm. **Made with lead metal, heat, and walnut oil**:

…experiments have been ongoing in making an unsun oil with **unrefined linseed oil** as well.

The final product. About the consistency of stand oil or moderate sun oil. Could be made thinner or thicker. Less sticky than sun oil, dries faster. Procedure was to wash the oil, then place in a thin layer in a lead tray exposed to oxygen but protected from dust. The oil remained in the tray for a month with occasional stirring. It threw no sediment of break. This oil dried hard overnight at 18C. Living in a northern climate with variable sun in the summer, this is a perfect material to make instead of sun oil.

An update on the alkyd primer and alkyd mediums manufactured by Winsor and Newton (September 13, 2013)

http://www.winsornewton.com/assets/products/OilPaintingPrimer.jpg

A ready-to-use primer in a non yellowing oil-modified alkyd resin medium. No thinning or stirring is required. Oil Painting Primer can be applied directly to metal or porous surfaces (glue-sized canvas, untreated wood, hardwood, plywood, paper) with virtually no sinking in.

A small amount of oil colour can be mixed into the Oil Painting Primer for tinted priming. The treaded ground accepts oil colours easily and without chalkiness or absorbency.

http://www.winsornewton.com/products/oil-colours/primers-for-oils/oil-painting-primer/

http://c408239.r39.cf1.rackcdn.com/catalog/product/cache/1/image/9df78eab33525d08d6e5fb8d27136e95/1/2/122970_ei_01.24.jpg

http://cdn.dickblick.com/items/004/45/00445-2304-3ww-l.jpg

http://cdn.dickblick.com/items/004/45/00445-2205-3ww-l.jpg

http://cdn.dickblick.com/items/004/45/00445-2500-3ww-l.jpg

http://cdn.dickblick.com/items/004/45/00445-2400-3ww-l.jpg

Two limners mentioned by de Mayerne:
Noryate (Edward Norgate) and
Huskins (John Hoskins the Elder)

Reconstruction of the box used by painters of miniatures according to Edward Norgate (1580/81-1650)
http://members.ziggo.nl/jcdhollander/roodkrijt/abraham_bloemaert.html

Letter, written and illuminated by Edward Norgate, from James I to Ottoman sultan Osman II

http://www.soas.ac.uk/gallery/bridge/full63992.jpg

John Hoskins the Elder, c 1590—1664
http://upload.wikimedia.org/wikipedia/commons/7/75/HenriettaMariavonFrankreich.jpg

An update on the use of cherry gum (September 13, 2013)

Amicucci, Italy
tempera all'uovo di volo
Con la tempera all'uovo si sono espressi i più grandi pittori fin dal medioevo. Il suo legante è costituito per metà circa da una soluzione al 15% di gomma naturale di ciliegio e miele e per l'altra metà da rosso d'uovo. La presenza di lecitine e di lipoproteine nel tuorlo d'uovo facilita la formazione di emulsioni acqua-olio stabili e reversibili, quindi, nella tempera all'uovo, è possibile incorporare olio di lino o vernice mastice per rendere più agevole la pennellata e più "setoso" l'aspetto della pittura. Il tono di colore varia pochissimo tra bagnato e asciutto, al contrario delle normali tempere, quindi sono molto indicate per il ritocco pittorico nel restauro di dipinti.
http://www.amicucci.it/it/catalogo/colori/colori+a+tempera/6/index.aspx#open