Painting

HISTORY

START PAINTING MEDIUMS

PAGE 1

1 MILLION B/C PLEISTOCENE PERIOD: "The Great Ice Age", is still continuing today. Pine trees developed and weapons and tools were polished. There were one hundred twenty five thousand people on earth at this time, according to the Geochronometric Lab at Yale University.

100,000 B/C MESOLITHIC PERIOD: Cro-Magnon Man until 10,000 B/C.

50,000 B/C Jinmium, Australia. Monoliths engraved with petrogliphs of dots, like found on Maui, and a kangaroo.

40,000 B/C Egypt and France were mining flint.

30,000 B/C Paleolithic Culture: Thirty six billion people lived in Europe and Africa in the course of the Old Stone Age.

20,000 B/C OLD STONE AGE: The earliest artwork in Europe was located in the caves of Western Africa and Europe.

16,000 B/C The first paint medium was animal fat, the first support was the rock and mud of secluded caves. Their painting tools included their fingers, scribing sticks, blending and painting brushes, and the first airbrush, a hollow reed to blow paint on the wall.

AURIGNACIAN ART: In a cave in Northern Spain the outline of an elephant was found, it had no included details. The most important caves were found in the Franco-Canterbrian and Spanish Levantine area. Small carving were always found deep in the floors of these caves. Paintings were done with mineral oxides, ocher's of red, brown and yellow, plus charred bone black.

Altamira, Font-de-Gaume and Lascaux represent the greatest achievements of Paleolithic Art, done by Cro-Magnon Man. Tree sap was the next medium used, boiling the sap without pressure made distilled turpentine, boiling the pine nuts made oil. A native tree of Africa made an alcohol based paint and a native tree of France made a turpentine based paint. The alcohol based paint of Morocco was harder, used a nearby shrub as a thinner, and came first.

10,000 B/C HOLOCENE PERIOD: Paleolithic man, Mesolithic man, are farmers and house builders.

8000 B/C NEOLITHIC PERIOD: Man was raising stock, working metal, and made clay pottery.

NEOLITHIC DEVELOPING AREAS
EURO-ASIA CULTURES AND TRIBES

HEADINGS

8000 B/C SOUTH CENTRAL AFRICA: Includes the head of the Nile River.

8000 B/C CHINA: Had domestic dogs, goats and pigs.

7000 B/C AEGEAN and CRETE: The tides of the Mediterranean Sea circled the island of Crete.

7000 B/C THAILAND:

6000 B/C TURKEY: [Catal Huyuk Culture]

6000 B/C ANATOLIA: Was an ancient Pre-Creek culture.

5000 B/C EGYPT: The Upper Nile had pottery, bas-relief murals on plaster and water based paint.

4000 B/C MINOAN: Was a culture just starting on Crete.

4000 B/C INDUS RIVER: Tribes were gathering.

4000 B/C TIGRIS EUPHRATES RIVERS: Mesopotamia, cultures were forming in the Fertile Crescent.

3000 B/C RUSSIA:

3000 B/C ETRURIA: Their highest art period, 500 B/C.

2000 B/C HELLENIC GREECE:

1500 B/C STONEHENGE ENGLAND:

1000 B/C MYCENAEN AGE: Knossos, Crete rules the world.

600 B/C ETRURIA: Their highest art period, 500 B/C.

500 B/C ROME:

B/C MEDIUM DEVELOPMENTS

4000 B/C: Boiled tree-sap, called pitch, was distilled into turpentine as a paint thinner for the resin paints, also, alcohol was fermented as a drink and as a thinner for the alcohol based paints, from another tree-sap. The third type of tree-sap made a water based paint, all three were known and used around the Mediterranean Sea area.

Clay was distinguished from mud and pottery was fired, the firing divisions according to heat intensity are;

DRY = leather hard.

EARTHEN WARE = heated red hot.

STONE WARE = heated over 18000, frit glaze was heated 15000 to 25000 in Egypt.

PORCELAIN = heated 30000, China was first to do this.

Egypt's first Kingdom was happening, their mastaba shaped tombs were positioned as a compass, like the later pyramids the entrance faced north.

They had watercolors, lime paint, and made plaster by heating limestone or gypsum; adding alum made a hard cement.

3000 B/C, The Third and Forth Dynasties had their Capitol in Memphis, they had developed to the "high-art" stage, and were pouring perfectly lifelike gold sculptures.

2700 B/C, The Pyramids of Gizeh were limestone, cut with metal saws. The base to height ratio is eleven to seven, it took ten thousand men working twenty years to make. It was finished with a covering of polished limestone that the Romans removed for their own buildings. I can't find the proof, but I think the top quarter was sheathed in gold leaf. Copper, at that time was more valuable then gold, and they had all the gold.

The "Pharaoh Khafra", in the Temple of the Sphinx was carved in diorite, it was life-size and carved with perfect realism in "high-art" style.

2500 B/C "The Seated Scribe" [2l"high] was carved in limestone and painted, by a slightly lesser artist. There was trouble in the air and the Semitic Assyrians were rising in power.

Resins continued to be developed based on turpentine and alcohol, sandarac (sandracca) resin, pine seed oil, castor oil and oil of spike were developed in Morocco, Africa. Lead is mined here also, to make the first protective seaworthy paint. Heating galena, the lead ore, leaves behind the sulfur-lead pigment white lead, which can be heated higher into yellow, orange, red and brown lead colors, they all dry fast, red lead the fastest.

Mastic resins from pine trees in Spain and France made distilled turpentine and pitch resin paints. The pigments of the time were the native iron oxides deposited in clay, and the lead colors. Egypt and China had larger selections. It's hard to tell who had the first vermilion, France or China, probably China, since they were more into mining ores.

Stick-lac was cultivated in India from the lacquer-secreting insects, depositing their lacquer on trees. Their nests were made of wax, which was also used for their textiles. Colored alcohol based tree saps and plants were also cultivated for use on cotton, hemp, linen, felt and wool products.

Egg and casein mediums, from domestic farm animals were used in the Baltic Sea area, where linseed oil would later be first used as a painting medium.

1800 B/C- Minoa was a Pre-Greek Aegean Sea culture, that followed Egyptian art, and they advanced architecture. Homer said there were ninety cities on Crete. The

Temple of Cnossus was three or four stories high, had drainage piping and flush toilets.

1500 B/C- The Eighteenth Dynasty of Egypt founded the city of Ammonium two hundred miles east of Memphis. Here was the world's only supply of ammonia, from the remains of a long extinct mollusk. A shrine was made there to their god Ammon. Ammonia made wax and oil water soluble, wax soap paints were developed, it dried insoluble to water. The Egyptians loved paint, it must have been a colorful empire.

1400 B/C- Babylonia had trees and not many rocks, their art decorated the mud and clay brick structures with tile. One found tile that I know of was colored Naples yellow.

1300 B/C- Hypostyle Hall, the Temple of Amen Ra in Karnac, Egypt was completely decorated with wax-based paint, as was everything Egyptian. There were gold stars on the blue ceiling, it was simple and massive, devout in their grand style with beautiful columns.

1257 B/C- The Temple of Rameses II at Abu Simbel, Egypt, [119'x65] was also massive, stiff, and meant to impress. Their period of "high-art" had clearly passed.

1100 B/C- The Greeks were entering the Peloponnesus and started the First Dark Age, this period would last until 500 B/C, ending with Doric architecture. The Doric Tribe was one of the three that invaded Greece. Homer is alive and writing.

800 B/C A Sumerian Palace of Sargon, in Khorsabad, had a ziggurate temple on top, the glazed tile facade went from white at the base, to black, scarlet, blue, orange, silver with gold at the top. It could be seen for twenty miles in any direction. THESE MESOPOTAMIA BUILDERS INVENTED THE TRUE DOME; vaulted chambers were covered with great tapestries, this was their art with no paintings. They furthered the arts of astronomy and writing, they invented cuneiform, a wedge-shaped alphabet that is the basis of all Western writing.

700 B/C The Etruscans are using turpentine, mastic, egg, wax soap, wax encaustic, and sandarac (sandracca) as their painting mediums.

400 B/C Theophrastus described refining clay pigments by settling them in water.

200 B/C Roman sculpture had achieved the high-art standards.

PAINTING SUPPORTS

ROCK AND MUD: Walls were the first supports, paintings still exist today after twenty thousand years of protection deep inside ancient caves.

PAPYRUS: Papyrus is soaked, pressed and dried strips of pith, it's a member of the sedge family. Papyrus was once abundant in Egypt and used by the Greeks and Romans as paper.

PAPER: Paper is made of wood, cotton and linen, linen is best, but cotton will do. Cotton paper is called rag 100%. The paper is glued throughout with an animal size, this is called vat sizing, and it is to be preferred. The papers I've found best are; a new paper called Twinrocker, Whatman, Strathmore, Lanaquarelle, Fabriano, Winsor & Newton, D'Arches and Waterford. They are all pH neutral, vat and surface sized.

WOOD: Wood is a classic support, today a good grade of plywood or masonite will do. Use 1/8 in. mahogany or birch for pictures up to 22 x 30 in. and 1/4 in. for pictures up to 3 x 4 ft., larger panels should be braced from the rear.

FLAX LINEN: Linen makes the best and strongest canvas, today we have no hemp canvas. It used to be the strongest and best.

COTTON: Canvas can be used as a support, up to 3 x 4 ft.

SAILCLOTH: Cotton sailcloth makes an excellent canvas.

HANDKERCHIEF OR AEROPLANE LINEN: This linen is good for small work and can be glued to wood for larger works

PRIMING GROUNDS
ADHESIVES FOR GROUNDS

ANIMAL: The best animal glue is rabbit skin glue, don't boil it. Casein is good if you use a stiff support, casein is skim-milk curd that dissolves in ammonia.

ACRYLIC: Gel is a good adhesive medium for grounds for acrylic painting.

VEGETABLE RYE: Paste is an adhesive, add ten percent alum [by weight] to glue to make it insoluble in water for tempera or, better still, add one percent of formaldehyde which is an anti-fungicide also. Whole egg will improve a ground by isolating it from the paint.

BODY ADDITIVES TO GROUNDS
GROUNDS NEED BODY, NOT JUST COLOR.

CHALK- Chalk is calcium carbonate, marble dust or neutralized plaster of Paris. Make it by adding water, drying it, adding more water and drying it again and again until it's neutral to the tongue. A small quantity of skim milk is good in chalk grounds.

GYPSUM- Hydrated calcium sulfate, is light spar. It is dense and can be applied with a wide putty knife, that's the best way to apply a ground. Heated gypsum makes plaster of Paris.

KAOLIN CLAY- Kaolin is decomposed feldspar, it retains moisture too long, chalk is better.

BARYTA WHITE- This is a heavy spar with very little coloring power, usually it's a pigment additive.

TESTING THE GROUND- A good ground will not crackle when pressed form behind, oil should not change its color, and the ground should have an even sheen to it.

BODY COLOR FOR GROUNDS- Lead, titanium and zinc white are best, lead white was used up until the Flemish painters of the 1600's. Apply the mixture to a dry, lightly stretched canvas or support with out soaking through it. This will tight shrink it, pre-sizing will save time and money, spatula applying is always the best way to go.

COLORED GROUNDS

GLAZING THE GROUND- This method is called imprimatura, it reduces the absorbing quality of the ground. The Renaissance used this method as the middle tones of the picture, using the colors red, yellow and green earth, green earth was especially good because it was so transparent.

SOLID COLOR GROUND- Bolus grounds were toned red, brown or gray, like Rubins, Van dyck and Rembrandt used. Egg tempera, lead or zinc white, was the first color down on the colored ground, it was like laying out a painting on a blackboard with chalk. Glazes colored the painting and egg tempera white highlights were put in last. Mastic resin was the final varnish.

ISOLATING MEDIUMS

ISOLATING MEDIUMS- Mediums that won't mix or disturb the current painting medium, like dammar and turpentine over tempera or egg over oil or shellac and alcohol/lac over either. Theophilus Presbyter, in the 12th century, recommended cherry gum as a medium and at the same time as an intermediate layer for oil glazes. Collectively, fruit tree gums were called "cerasin".

THINNERS AND ADDITIVES TO MEDIUMS

WATER Thins; gum, glue, paste, egg, casein, lime, acrylics, wax-soap and water varnish.

TURPENTINE Thins; oil, alkali oil, resin, balsam and wax, don't use petroleum thinner or paraffin wax for painting. Oil of turpentine absorbs oxygen while drying, mineral spirts only evaporate, and petroleum won't dissolve dammar. Dammar is our friend, it doesn't turn yellow, we need it. We don't need petroleum in our paint, don't be fooled into using it.

ALCOHOL Thins; shellac, stick-lac and sandarac (sandracca), "the spirit of wine" paints. There are two types, de natured grain [ethyl], and wood [methyl], methyl is the more powerful solvent.

SPIKE Thins spirit paints, spike is a ancient Mediterranean scrub plant found around Morocco, today it's called the Lavender Plant, "Lavendula Spica".

SPIKE NARD Thins spirit paints, spike-nerd or Oil of Cajuput, is the ancient East Indian "Nardostachys" plant.

CASTOR OIL Dissolves spirit paints and makes them flexible, it is nondrying in its mass state. Castor oil comes from the seeds of the "ricinus communes" plant.

AMMONIA Thins; wax-soap, casein and water-varnish. Ammonia water was called the "spirits of hartshorn".

NATURAL EMULSIONS

EGG Egg's emulsion balance can be changed by mixing it with either more water or oil.

CASEIN Casein will emulsify with balsams, mastics or any water-based paint or emulsion, oil will emulsify with casein but turns yellow in time.

OTHER MIXED EMULSIONS

GUM Gum will emulsify with balsam, mastic, wax-soap and oil.

PASTE Paste will emulsify with balsam, mastic, wax-soap and oil.

GLUE Animal glues emulsify with balsam, mastic, wax-soap, and very well with oil.

WAX-SOAP Wax-soap emulsifies all of the above, the Byzantines added gum and Reynolds liked to add Venetian turpentine. I think it's great by itself. I did a test on glass with a palette knife, the paint was 3/8" thick and dried insoluble to water in one week. Try that with oil paint, The only problem I saw was it could be scratched with my finger nail, wax is pliable, balsam or resin make it harder. I added poppy oil to a batch in a humid area, [Nahiku, Maui] and it stayed wet for two weeks, gum didn't do any better.

There is a medium I couldn't find any reference to, and it seems a natural, An Indian artist would have used it in their paintings, because they had all the raw materials, the cultivated stick-lac insect with the wax nest, and an alkali, borax from Tibet. The two will mix together and form a water based emulsion, as adding ammonia and shellac will make a water varnish.

SYNTHETIC MEDIUMS

Synthetic paints were born in 1900, Germany made the first acrylic paints and we got them in 1930. Plexiglas is solid acrylic. Water based acrylics are made by polymerizing the acrylic monomer by emulsification. These are great paints that dry insoluble to water, however, smooth blends are easier made with thin washes over dried paint. Mistakes are corrected by over painting with white, twice, to get back to pure white, before repainting. This must be done because the new acrylic colors are not very opaque and show under colors. Pencil lines will also show through, it's better to draw with a non-waxy chalk and brush off the residue with a feather duster. Then, paint in the outlines with a light ultramarine blue, or yellow where

appropriate. Remember, the outline belongs to the object behind. Contrast of color and value separate the objects, not there outlines.

Alkyd resins are polyhydric alcohol with polybasic acid. These alkyd modified resins dry faster then natural oils, turpentine based "Liquin" is an alkyd resin. They mix well with normal oil paints and speed drying.

CATALYST AGENTS

These catalyst agents cause a chemical change within, by its addition to a different substance.

ALUM

Alum is a double sulfate of aluminum and potassium. It's used to temper dried paints and grounds, making them insoluble to water, but not impervious. It will act as a mordant to set dyes and harden plaster like cement, Brown beeswax can be whitened by boiling it in alum water.

AMMONIA

Ammonia is a suffocating gas, compounding nitrogen and hydrogen, it is soluble in water. Ammonia is an alkaloid compound that transforms shellac and wax, making them water-soluble. When the gas escapes the dried ammonia they again become insoluble, as in "cera colla" painting [see, Wax Mediums].

BORAX

Borax, like alum, is an alkali, in ancient day's it was called "tin-cal", a Chinese word. Borax is found in landlocked lakes in Tibet and in the Dead Sea, where it was gathered and used in India as a textile mordant and in Egypt as a flux ingredient to make frit, an isolated copper pigment in glass. It was also used to make a water varnish from stick-lac, the alcohol based tree sap pigments could also be made water soluble in a borax solution. [more under, "LAKE MINERALS"]

FORMALDEHYDE

Formaldehyde is a gas, usually sold in a 40 percent solution of water, called formalin, It hardens proteins and stops mold and fungus; it's also used as a preservative,

WATER BASED MEDIUMS AND GLUES

GUMS

Gums are hygroscopic, they will always absorb water unless it's tempered with alum or a 4% solution of formalin; formalin is a 37% solution of formaldehyde, available at your drugstore, sometimes:<)

Gums will emulsify with oil, balsams and resins. They are more painterly then egg emulsions alone. Here's a good recipe for a gum emulsion; 5 parts gum, 1 part stand

oil or sun thickened linseed oil, 1 part dammar resin and 1 part glycerin. The glycerin will improve the brush quality and act as the preservative.

ARABIC Gum acacia - the best is from Africa.

SENEGAL French, it's the hardest gum and best for water colors.

KORDOFAN An ancient gum from Sudan.

CHERRY One of the many fruit tree gums, almond, fig, peach, apricot, plum, they are all similar and mix well with egg and casein.

TRAGACANTH Comes from the astragalus scrub in Asia-Minor, it's used as the binder for pastels.

SARCOLLA An ancient gum made from the astragalus sarcolla plant of Iran, it's similar to gum arabic and best for gum tempera.

PASTE

Vegetable glues are starch pastes, rice starch makes the best glues, Others are; potato starch, wheat starch and rye starch, They all can be emulsified with oil, balsams and resin.

Vegetable glues give very bright gouache-like tones and have no effect on pigments. Starches set free by the addition of an alkali like ammonia become insoluble in water when dry.

Vasari and Plenderleith talk of bookbinders' boiled paste.

GLUE

Glues are used either hot or cold, hide glues are protein, chandrin, which is the adhesive, and glutin, which is the gelatin. Hide glues are used hot, most modern glues are used cold. Glue paintings should be sprayed with a 4 percent solution of formalin to harden it or given a glaze with mastic varnish.

GELATIN: Gelatin is an edible glue, made from the delicate animal tissues. It contains more glutin, preferably it's used with egg, gum or wax soap.

PARCHMENT: Cooked lamb and goatskin was the medium used for miniature paintings.

COLOGNE: Animal leather glues emulsify with fatty oils, add it to egg or wax-soap, it works better then gums, Cologne glue with kaolin clay cover best.

RABBIT: Rabbit skin glue is the best gesso glue.

BONE: Bone glue is inferior to hide glue.

FISH: Used cold, hide glue is more durable.

GLYCERIN: Has oily properties, is water or alcohol soluble, and will absorb moisture from the air.

[5] WATER BASED MEDIUM, EGG AND EGG TEMPERA

EGG

Egg yolk contains albumen [water], egg oil [nondrying] and lecithin [emulsifier]. Egg yolk itself is a painting medium, it bleaches white in sunlight. Mix egg and dry pigment, 1:1. Egg, unvarnished looks like gouache, it's a flat finish. Egg and egg emulsions dry hard, elastic and more resistant then oil color mediums by themselves. Oil of cloves, one drop per egg, will preserve a sealed wet egg, kept cool for one year. The icon, painted on wood was the next medium after fresco. Byzantium, after a ninth-century council had confirmed the defeat of the Iconoclasts, so it was safe to paint in the less durable egg. This style spread over Northern Europe and stayed in Russia for eight centuries.

Egg without the addition of oil is called distemper, this was a preferred style from Giotto [1266-1337] to Botticelli [1444-1510], The addition of alum to the egg made it waterproof. Giotto also added cherry gum to make it more fluid, it acts as a preservative as it was slightly alkaline. The support was wood or linen primed with gypsum or chalk. The ground had to be kept very clean because the thin medium shows through colors. A poor ground could be improved by a coat of egg and lime white before painting. Sandarac (sandracca) was a good hard, final varnish. Today, dammar will do the job.

Egg white is used mostly, it's called "glair medium" and was used like ink on illuminated manuscripts in the 5th century, and as a size for gold leaf. Egg white and alum make a good bodied paint medium, capable of making very opaque strokes.

EGG TEMPERA

TEMPERA'S ARE EMULSIONS, water and oil plus the stabilizer, The first tempera's were made about 1000 A/D, first with mastic, then linseed oil. The ratio's went like this; one part egg, one part mastic or oil, OR, two parts egg, one part oil, one part mastic. More egg made it water based, more oil made it oil based. Later sun thickened oils or stand oil was used. Most liked to use Strasbourg turpentine [balsam], today we have to use Venetian turpentine because no one imports Strasbourg to the U.S. except http://www.kremer-pigmente.de/

OIL OVER EGG TEMPERA

Van Eyck [1390-1441] became very skilled at this technique, painting in water based egg tempera, then glazing with oil and balsam, going back to tempera for details and glazing again, Giovanni Bellini [1430-1516], in his life time went from egg tempera to pure oil.

LIME_FRESCO

LIME

is the oxide of calcium [CaO], calcinated limestone or quicklime. Limestone and gypsum both heat to make plaster of Paris.

Egypt made the first cement, they fired their plentiful limestone and added clean sand. This natural limestone is calcium carbonate. Burning gives off carbonic acid gas or carbon dioxide, leaving caustic lime. Add water and you make slaked lime or calcium hydroxide. This is the mural material, add silica sand or crushed marble or, as the later Italians did, add some volcanic ash. (A good grade of volcanic ash came from Pozzuoli, it was light, fine and had rough edges). Slaking gives off heat and water, the top layer again absorbs carbonic acid gas from the air and forms a film of carbonate lime, on the top of a lime and water solution called calcium hydrate.

Now, this paste calcium hydrate is neutral, or no longer caustic. Limestone that contains clay slakes very slowly. The best lime has been burnt over wood, coal would give off sulfuric acid and make gypsum, that would damage pigments. Lime plus hydraulic clay set too quickly for murals, but would work for dried secco paintings. The best lime has set for two to twenty years, after removing the top layer of crust, the calcium hydrate can be mixed with different proportions of water to form "milk of lime" and "lime wash". Clear "lime water" is made from settled milk of lime and is an excellent medium to paint on dry, set plaster or cement. Thin lime paste mixes with skim milk, casein, glue, [one percent hide glue slows drying time, 200 percent], also resin varnish and egg. They are all used in secco painting and in stucco luster, the imitation marble. The "Athos Book" [Greek-Byzantine], said to add fibrous materials as oakum, chopped rope, calves hair and straw to prevent cracking. Clay causes cracks in mortar, sand is best, granite powder should be used in the final coat or powdered limestone.

Cement is hydraulic lime, Portland Cement contains 75 percent caustic lime and 25 percent clay, the addition of sand makes concrete.

GYPSUM is sulphate of lime or hydrated calcium sulphate or light spar, heated, slightly burnt (calcined) gypsum is plaster of Paris. Alabaster is a granular gypsum, and kaolin clay is decomposed light spar. Heated gypsum forms a sulfur dioxide gas and sulfuric acid.

MORTAR is sand and lime mixed 3:1, the last layer uses a finer sand and more lime, marble meal is best. A good "secco" ceiling fresco will measure from 1/4" to 1/2"

thick, let the final coat set for a day. Then, scrub off the skin of carbonate of lime and apply some lime-wash, paint onto the wet or dry lime-wash with paints ground in skim-milk casein or lime milk. Very fat lime plaster with too much lime, cracks easily. This secco paint may include lime-water, casein, glue or egg. Casein will increase the weather resistance, but will make the paint sticky while it's being applied.

The total thickness of a wall fresco should be about 1 1/2" thick. Pompiian walls were 3" thick, and could be painted on for up to two weeks wet, joins went unseen if they were necessary. Here is Doerner's advice on preparing a surface for fresco.

On a thoroughly wet wall, apply the roughcast, make it with 3 parts clean dry sand, mixed with one part lime. Through this on about 1/2" thick, the equalizing coat is applied when the roughcast no longer indents with finger pressure. This second coat can be slightly drier then the first, in about the same thickness, still using coarse sand. Apply all coats from the bottom up. The third coat is made with 2 parts finer sand and 1 part lime, this coating is thinner, perhaps 3/8" thick. A last coat is made of 1 part fine sand or marble meal and 1 part lime. Wet and brush the third coat with lime-wash before applying the painting layer 1/8" to 1/4" thick. Work this coat to perfection, two hours per square yard isn't too long.

Vitruvius described the plaster used by the ancient Pompeians. Six coats were applied, wet on wet, the last coat was given a mirror polish with a smooth roller, They all totaled to 3" thick, skim milk was added to the pigments for additional gloss.

Color's must be lime-proof, the best white is dried pit lime, wet and dried several times until it tastes neutral, or use litmus paper. This was the "bianco sangiovanni" of Cennini. Naturally this white has no binding power of its own and needs to be applied with egg or casein. Organic madder root could then be mixed in and used because the white was neutral. Yellow's were; Amberg ocher, a bright yellow that's long gone, yellow ocher, Naples yellow and native orpiment. The brown's were carefully washed iron-in-clay pigments, umber's and sienna's both raw and burnt. Red and orange's were realgar, an arsenic pigment like orpiment, magenta was madder root, painted secco with egg or casein, like the blue, lapis lazuli. It's not lapis lazuli couldn't handle the lye, but because it was such an expensive pigment, who could afford the sinking in properties of fresco,

Other blues were azurite, and light and dark frit. Cobalt native made a rose color, and burning the oxide moved the hue to blue. Green's were copper green frit, malachite and amazonite. Black's were made of carbon or iron oxide, they were applied very early on, and took many coats with the addition of an agent like egg, it could easily be painted over, like any color could. The more coats, the more intense the color. One need not be afraid to run over outlines with local color, they can be

easily modeled over as the support absorbs color. Highlights are added last as shadows are deepened.

Only paint until the plaster begins to set, the thicker the mortar the longer the working time. Paint from light to dark to light, lights are made from thick lime putty. A lime-water damp sponge will blend large areas.

If you get lime in your eyes, wash it out with sugar and skim milk. fresco should not be reworked for at least a month, apply the secco with wax-ammonia soap or casein and stipple in the additions. Dolomitic limestone sets slowly but dries hard, shortly after the fresco has set, use a glass roller to bring up a high gloss. DON'T TRY TO DO A FRESCO WITH COMMERCIAL CEMENT BECAUSE IT CONTAINS UNBURNT GYPSUM AND CLAY.

MEDIUMS, TURPENTINE AND OIL

Turpentine is the best thinner for oil paints, I don't agree with Mayer's Handbook saying that petroleum distilled paint thinner works for fine artwork. Doerner explained in his 1934 book, The Materials of the Artist, how there unnatural with paints that absorb oxygen while drying, being refined from a nondrying petroleum oil, they only evaporate, without absorbing oxygen. Petroleum thinners are good only for cleaning brushes of the trade, not the expensive brushes we use as artists. Petroleum thinner will not dissolve the valuable dammar varnish either, as turpentine does so well.

The essential oil of turpentine, is a volatile plant oil, steam distilled without pressure. Today's turpentine is very pure, there is no reason to buy double rectified artist's turpentine in the small bottles, they all dry without residue. French turpentine from the maritime pine is best.

The ancient oleoresin, is turpentine in its solid state, pitch or fused colophony, the residue from turpentine is rosin.

Siccatives are metal salts soluble in oil. They speed the absorption of oxygen by the fatty oils, a two percent addition to paints is all that can safely be used. The addition of dammar is a much safer practice, but that leaves you with two days drying time instead of one. Siccatives have been used for as long as mastic paints have been around, in the B/C era. The first pigments, iron ore limonite, contained manganese seccatives. Green contained a copper resinate, sugar of lead was an early drier, it's called lead acetate. Today we use a cobalt oxide and limonite mix, to me the deep color purple is objectionable, and I would rather have the clear sugar of lead or the white calcinated stannum oxide, like the Egyptians. Even white lead oxide could be heated and sponificated clear in oil. There were mediums called malbutter and megilp, made of heated oil, wax and lead in the past that worked very well, They added a buttery character to the paint and were very popular.

THE MAROGER MEDIUMS

For the past two hundred years or more, dedicated and informed artists of the western world have recognized the superior oil painting achievements of the European "old masters" of the 15th through 17th centuries. Since Sir Joshua Reynolds (1723-1792), painters have lamented the loss of the secrets that made possible the virtuoso brush work, luminous glazes, controlled drying, and permanence of works by Rubens, Rembrandt, Velasquez, Titian, and so many other masters of the Renaissance and Baroque periods.

The marvelous creations of these masters depended not only on talent and rigorous training, but also on a tradition of highly developed craft techniques which were passed from master to apprentice over many generations. Chief among these studio secrets were the oils and mediums mixed with their colors. From ancient times Linseed oil had been rejected as a painting medium because it dried slowly, darkened, and cracked. (Mastic and wax didn't. dj) The much acclaimed oil painting discovered by Jan Van Eyck (1382-1441), and the vastly improved mediums of his successors, were far more sophisticated substances. These superb mediums are available to us because of Jacques Maroger (1884-1962). (pronounced Mar-o-zhay). He kept the medium alive.

In 1907 Maroger began studies with Louls Anquetin (1861-1942). Called the French 'Michelangelo' by his Impressionist compatriots, Anquetin sought the painting power of the old masters through a remarkable mastery of drawing, but his skills were stymied by the then current oil painting materials. (The wars degraded art and supplies. dj)

By 1920 Maroger had turned the search toward the painting materials themselves. His growing expertise led him to a post as professor and Technical Director of Restoration at the Louve. He was elected president of the Society of Restorers of France, and Knight of the Legion of Honor for his researches. In 1948 his discoveries were published in The Secret Formulas and Techniques of the Old Masters. and he continued to enlarge his discoveries until his death.

"Stephen Kaldor's involvement with Maroger's teaching began at age nine as a drawing student of Anne Didusch Schuler, Maroger's first assistant and a master painter in her own right. As pupil of Maroger from 1950 until 1962 I participated in many trials of his reconstructed old master mediums and materials. My notes and experience with Maroger are the basis of the mediums I have been making for myself and my students since the early fifties I guarantee that they are authentic and made of top quality ingredients." Stephen Kaldor

BLACK OIL is made of purified raw linseed oil cooked with lead. It may be used as a medium, a diluent in the palette cup, to grind colors from dry pigments, and it is the basis of other mediums.

MASTIC VARNISH is made of pure gum spirits of turpentine and mastic resin tears. It can be added to Black Oil for an instant Flemish type medium. Diluted slightly with turpentine, it may be used as a final picture varnish, after the oil

painting has completely dried, but it will yellow.
Others 1999,

ITALIAN FORMULA MEDIUM combines black oil with beeswax for a transparent paste which dries to a soft semigloss luster and give an opulent body to impastos.

FLEMISH FORMULA MEDIUM combines black oil with mastic tears, pure gum spirits of turpentine, and beeswax for a transparent gel medium.

Colors have more intensely and a rich gloss finish.

E'TUDE FORMULA MEDIUM is a sketching or student medium which is made like the Italian Formula but of less refined oil and is slightly faster drying.

All of the formulas have similarly agreeable handling qualities and may be Intermixed wet, but alternate layering is not recommended.

HOW TO USE THE MAROGER MEDIUMS

I. The GROUND, or surface to be painted, whether the traditional white lead in linseed oil, acrylic gesso, or some other, should be permanent, nonabsorbent, and have sufficient "tooth", I.E. not slippery. A glaze of Maroger Medium and color over a white ground makes a toned surface that is very compatible for painting when dry.

2 Oil COLORS are ideally made of dry pigments freshly ground in Black Oil If TUBE OIL COLORS are used, it is recommended that one part medium be added to each four parts of color. The exception is LEAD (FLAKE) WHITE which may be ground in raw linseed oil.

3 GLAZES are mostly medium tinted with a small amount of transparent color. Some medium should be available on the palette, or in the cup, to add to colors for the feel and relative transparency the artist desires

4. A meager COAT OF MEDIUM, not too slippery, should be swiped on the area to be painted, unless a dry scumble is desired.

Theophilus Presbyter, the monk of Paderborn, [1200 A/D] wrote on oils and pigments, he knew back then that cold pressed linseed oil was good, He said the best linseed oil was from the Baltic Sea area, and freezing oil and snow together for a week was a great purifier, then sun dry the oil in a. container 1/2" high, covered, for long enough for the oil to become thick. Cennini called this the best of all oils,

Stand oil is linseed oil boiled with carbonic acid, it dries very slowly, doesn't yellow, and is very sticky to paint with. Turpentine must be constantly be added to keep it flowing, linseed oil will keep it from being sticky, it was known of and used early in the 15th century. It can't be used alone with a drier, because it separates the paint and it looks like a sponge print.

Nut oil was recommended by Heraclius and Theophilus, Leonardo liked it because it didn't yellow as much as linseed oil, Durer and Van Eyck used it in the 1400's. It was

used all through the high renaissance in Italy, the greatest artists that ever lived used it and preferred it over all others. Get it at http://www.kremer-pigmente.de/. It should be lighter then most linseed oils. Nut oil is pressed from the seeds of ripe but not brown walnuts. It was also recommended by Vasari, Borghini, Lornazzo, Armenini, Bisagno, Volpato, etc., as late as De Mayerne and even later. No doubt nut oil was more popular then, than now. Storage was the problem then, not so today.

Poppy oil is a slow drying oil that seldom yellows, it will stay wet for ten days and wrinkles less then linseed oil. Poppy oil is pressed from the seeds of the white poppy, its major use is in the processing of tube oil color's.

Castor oil has its place with lacs and spirit paints, adding 5% to shellac will make it pliable and remove the brittle quality.

Lavender oil comes from the flowers of the lavender plant, spike oil, from the whole plant. Lavender oil is preferred, both dissolve mastic, sandarac (sandracca), and shellac and were used since ancient times.

Oil of cloves is the slowest drying oil of all, how about a month and a half. Portrait painters find it useful, the slow one's.

Copaiva balsam oil and resin redissolve the lower layers and really slide the paint around.

Venice turpentine is a superior turpentine, it's from the larch tree. Strasbourg turpentine is similar and comes from the white fir, we could make this fine medium here in the United States, they do in Canada. They're not really a thin turpentine, but a thicker and undistilled balsam. They're non-yellowing and have an enamel-like effect on the painting. Rubins used it 2:1 in oil, Van Dyck used it 1:1 as an intermediate varnish with egg and oils. Reynolds used it with ammonia and wax. I like it as a painting medium with cold pressed linseed oil and dammar resin, 3:2:1. It paints and glazes beautifully.

Dammar, Chios or Lavantine, some Copals (Brazilian, Manila, Borneo), Shellac, and the ancient oleoresin are soft resins, dammar (dammar) makes the best natural picture varnish for wax and mastic painting, it's the hardest. Resin and balsams keep oils from wrinkling and forming a skin. Any resin or balsam added to oil paints permit painting layers in rapid succession, before the lower coat is dry. Oil paint without resin or balsam must be completely dry before a second coat is applied, or it may chip off. Because the lower level will continue to shrink at a different rate. Linseed oil by itself is a poor binder.

Hard resins are succinite amber, hard copals. Don't use them as a varnish, they are too hard to remove, they also crack and yellow.

The best Copal resin I have liked is made by Garrett. Ron Garrett, copal@3lefties.com

Amber resin is very hard fossil resin, it can cause cracks over some soft paints and darkens in time, Don't bother with it.

Acrylic resin can be made hard or soft, the artist gets the soft, the furniture industry makes a hard varnish that is water soluble, I've been using it on my acrylics as a final finish for sixteen years with perfect results, there as clear as the day I put them on.

WAX MEDIUMS

There are two kinds of wax, those from the animal itself are called tallow's, we don't use them in the art's. The second type is from the insect's nest, this is very valuable to us and has been used in turpentine based paints, water based paints and by itself since ancient times. Ancient Greece had a mountain 3370' high that was famous for honey and beeswax, it was called Hymettus. Etrusca used wax and mastic paints in 500 B/C, the Minoan's in 700 B/C and the Egyptians even earlier. It was their easel and wall media beside buon and secco fresco, they mixed ammonia with it or turpentine, or turpentine and mastic.

Old brown wax can be whitened by just leaving thin strips in the sun, or by melting and cooling it in alum water. The second nest wax comes from the Indian lac producing insect, the laccifer lacca. It's softer and not as useful in painting, but very good in batik tapestry, they did a lot of dying in India.

The third nest wax is from a Chinese insect and it melts

hotter then beeswax, so it's a good substitute. This insect is cultivated on two different trees with human assistance. Clever people these Chinese.

Wax dissolves in turpentine, mastic, balsam and oils, but not water or alcohol. It's non-yellowing and forms an emulsion in lyes. The Greeks and Romans stored their pigments in small covered containers and called them "waxes", pigments in wax and mastic. Add a little turpentine with your brush and paint away! These ancients were pretty clever also.

They painted with pure melted encaustic wax and pigment too, this was probably the wax Pliny talked about, the punic or eleodoric wax. Three times melted and cured in salt water, when this wax was applied on stone for decoration, it was called "ganosis". Traces of this wax are found on Egyptian sculptures and tombs as far back as 2500 B/C.

The early Greeks, before the "Dark Ages", around 500 B/C, were fond of decorating their statues and the friezes of buildings, and probably a lot more places that were not so protected from twenty five hundred years of weather. Traces of wax were found on the Trojan Column in Rome.

AMMONIA-AND-WAX

Ammonia, NH_3, is a compound of nitrogen and hydrogen, a water soluble gas.

Ammoniac, a salt and gum found in the Qattara Depression 200 miles East of Memphis, Egypt. Ammoniac is the remains of a long extinct insect that lived in the area.

Ammonium, is the Egyptian city founded about 500 B/C, as a shrine to their god Ammon. Ammonium is also NH_4, a radical that plays the part of a metal in the compound formed when ammonia reacts with acids, ammonium salts are alkali.

Ammonium hydroxide, basic NH_4OH is a weak alkali.

Carbonate, a salt of carbonic acid, as calcium carbonate or ammonium carbonate, made by mixing the ammonium alkali with carbonic acid. H_2C0_3 is formed when carbon dioxide dissolves in water.

Ammonium carbonate or ammonium hydroxide [common ammonia water], can be mixed with white beeswax 1:2 and boiled until the effervescence stops, stir the mix until it's cool. This will be a water soluble wax soap emulsion that will mix with casein, gum, glue, egg, gelatin, turpentine, resin, balsam, shellac or oil. The volatile ammonia alkali dissipates and the soap dries insoluble to water, like it was before you started. Put a cap on the container and it will store for a very long time. Grind your store bought dry pigments into it as you need them.

Giotto added a little cherry gum to the mix and the Byzantine's added a little "milk of fig". This is the ancient "cera colla' paint of the Dark Ages, except for the shellac, that was tested right here on Maui, and it worked fine.

I attribute the discovery of cera colla to Egypt and their god Ammon not to Byzantium.

Potassium carbonate or caustic lye soda, is obtained in the impure form from wood ashes, potash [+IUM], are all the same alkali. It will emulsify wax, but will remain soluble in water, or hygroscopic.

CASEIN TEMPERA EMULSION

There are two types of casein tempera paints, both very strong glues, casein with lime is so strong that if it's not diluted very thin with 5 parts water, it could pull an old thin coat of plaster off a lower coat. Casein sets quickly, mat, and transparent, all of the pigment is exposed, making a very luminous surface. Use only pigments that can stand up to lye, vegetable dyes will bleach out. Casein should be prepared fresh daily, in small quantities instead of depending on preservatives which effect there painting qualities. Lime combines with casein to make a weatherproof mural paint.

Start with fresh skim milk curd and add four times as much slaked lime to make a paste. This is the glue the wood workers use on furniture. This is also the casein lime medium, mix the pigments in some thin paste to paint with. Casein medium will

emulsify egg, mastic, balsam and wax soap. Oil will emulsify also but will quickly turn yellow, stand oil is better suited.

Casein powder is available in two types, pure dried curd, which is insoluble in water but is soluble in ammonia and mono ammonium caseinate, which will dissolve in water. If it chunks up because it's old, add some ammonia. It doesn't take much ammonia water to dissolve either fresh curd or the powdered pure curd, soak the pure powdered curd for a few hours before adding the ammonia, 1/5 its volume over moderate heat will cause the effervescent reaction. When the reaction resides the casein will be in a colloidal state, stir it until it's cool. Casein is still strong when it's water thin.

Thin a shellac size to apply an intermediate sealing coat to a casein painting or it will soak up an oil glaze like a blotter.

Casein and lead mix well together, combining this white with an oil white makes a fast drying white for water or oil, whichever has the higher concentration. Copper colors turn blue in ammonia.

MEDIUMS ALCOHOL BASED

SANDARAC or SANDRACCA

Sandarac (sandracca) is a coniferous resin from the Alerce Tree of Morocco, it was probably the first permanent paint, it's a hard resin. "Sandracca" as it was called in ancient times, was the term used for paint itself. It's soluble in alcohol and oil of spike, and can be made fluid with castor oil. Sandracca was used as the intermediate and final varnish over tempera paintings at the time of Giotto, and as a medium by itself. Because it was harder, it was actually a superior paint than the softer mastic's or oil's, but the people liked all the combinations possible with a turpentine based paint better. Sandracca does not mix or adhere to oil, so it lost the final battle in the paint wars during the Dark Ages. It did have some early victories though, a major one was back before 1000 B/C. The Phoenician's painted their ships of commerce with sandracca (sandarac), castor oil and red lead, all available on the other side of the Pillars of Hercules, or Strait of Gibraltar. Just across from their city-state of Gades, in Iberia, or Farther Spain, as it was later called.

Phoenicia at that time was the third largest land holding state in the Mediterranean. It was really part of the second largest, the Assyrian Empire, that included Egypt and the whole Tigris-Euphrates Valley down to the Persian gulf. This was a nation of sea travelers that covered the known world. They brought tin down from England because Egypt was mined out, indigo from India was a world seller. China showed England what could be done with porcelain, and how black a textile dye could be.

Eric The Red not only had red hair, he had a red boat to boot.

Castor oil was another great battle won by sandracca (sandarac). Here's the story as Homer told it back in 1000 B/C. The mighty Zeus had taken the shape of a swan and had a blue egg with his daughter Leda, a very beautiful goddess. Out of this blue egg

were born Pollux and Helen, the most beautiful goddess in the world, she had a mighty fighter for a brother. Leda had another egg with another man, King Tyndereus, and had another set of twins, Castor and Clytemnestra, who were both mortals. Well Castor and Pollux had great times together fighting this war and that, till they both got killed one day. Zeus allowed Pollux to share his immortal being with his brother, spending half their time on Olympus and half the time in Hade's realm. Now there are two bright stars in the heavens to remind us that Sandracca (sandarac) was once "King of Paint".

STICK-LAC

Stick-lac, shellac or lac as it is sometimes called, is another alcohol based paint that got shot out of the saddle. It was India's favorite son. Gathered with care from the branches of a tree that housed their lacquer secreting insect, the Laccifer Lacca.

They traded their wool and dyes in Tibet for borax and mixed it with water and stick-lac to make what we call today, water varnish. Yesterday I mixed it with ammonia and made a water paint that dried insoluble to water.

India had some great lacquer colors also, ruby red "dragon's blood" was the sap of a tree from Singapore, dammar varnish comes from there also. Dammar means "torch" in Malaysian. Another sap, alcohol based paint was "Gamboge" from Thailand and "Karmes".

LACQUER

Japan has a lacquer tree called the Rhus Verniciflua, it was used to produced the famous Chinese "Ning-Po Lacquered Boxes" that the French loved so well, they traded their lavender perfumes and called the boxes "cloisonne".

LAC AND DYES

Indian Stick-lac could also be made from the secretion of the "coccus laccae" insect that lives in the bark of the Ficus tree, it's often called shellac, it can be made water soluble by adding an alkali, than its called water-shellac.

Red shellac is from East India, the red is the dye, removed by boiling in water. White shellac is made by adding potash lye or borax, as a red pigment the dye is precipitated on a clay base. It will work on dry lime, not wet, and in all other mediums.

The mordant, fixes the coloring matter, alum is the most common. Tin oxides lighten the color toward yellow, as on the English Army coats of the 16th century. Cochineal and tin made vermilion, alum would have made a more crimson color. Iron is a mordant used for dark brown and black, zinc works for yellow.

TRANSPARENT COLORS

YELLOW, Imperial yellow is from the flowers of the "sophora japonica", it contains flavonal quercetin, similar to the famous Indian Yellow, both had staying power and were a golden-yellow color when used full strength.

Yellow wood sap from the sumac tree, "rhus cotinus" works, flavone also occurs in vines of weld, from Northern India. Four other sources of transparent yellow are; safflower and saffron, the root of the "curcuma tinclora" and the husks of pomegranate with carbonate of zinc.

ORANGE, henna "lawsona alba".

RED, Cochineal, ground female "coccus cacti" insect, originally from Central America, imported to Morocco. Soluble in ammonia. The coloring matter is carminic acid, an anthraquinone derivative. Today nobody makes this hue, or Indian Yellow Transparent.

Karmes Scarlet is the oldest Magenta color, made from an insect found on the oak tree, it secrets an alcohol based lac and is found all over Europe.

Madder root from the "rubia tinctoria" red to brown found from Anatolia to Persia. India and China use the "rubia cordifolia", which is a cooler magenta color. India exported madder, indigo, weld and Indian Yellow.

Brazilwood, named the country, it's clear in wood and boiling it makes a magenta dye. To change the dye to red, you use a tin mordant, Brazilwood dye comes from the local "caesalpinia" tree. Logwood, from the "haematoxylon" tree makes hematin, boiled, it turns violet to blue-black.

BLUE, Grown in India, the "Indiagofera tinctoria" thrives in the tropical climate, the active ingredient is found in the leaves, an indol derivative is fermented from a sugar, this precipitation is insoluble in water. Alkalis dissolve it and form the sodium salt indigo white, which oxidizes into many shades of blue. Aniline blue has the same chemical composition and replaced it in 1870. This blue was the most important color in Chinese rugs.

COLOR CARPET MATERIALS

Jute is the cheapest and most used vegetable fiber. Hemp is next.

Flax linen was an Egyptian crop, so it was not used much in carpets.

Cotton was grown in Egypt, India and China. Wool and fur were Tibetan, the best from Kansu.

Silk started in China about 2640 B/C, then Japan and India. Silk has an affinity toward metallic salts as mordants, tin phosphate and tin silicate are the most common. Black silk uses an iron mordant.

COLOR OF CALCINED ELEMENTS IN GLAZES

1. **Antimony = Naples Yellow**
2. **Cadmium = Yellow, Orange, Red**
3. **Chrome Green = Green**
   Chrome + Alumina = Transparent Corumdum Red
   Chrome + Cobalt = Blue/Green
   Chrome + Tin = Pink (light Magenta)
   Chrome + Tin + Silica = Red
   Chrome + Tin + Calcium = Red, Magenta, Violet
   Chrome = Tin +Tin + Cobalt = Ultramarine Blue, Purple, Violet
4. **Chromium = Green Opaque**
   Chromium + Iron + Manganese = Black
   Chromium Trivalent = Green
   Chromium Hexavalent = Yellow
5. **Cobalt = Azure Blue**
   Cobalt = Uranium = Green
   Cobalt + Zinc = Ultramarine Blue
   Cobalt + Chromium + Manganese = Black
6. **Copper = Green, Turquoise, Red, Ruby Red Violet**
   Copper Oxide = Green
   Copper Oxide + Zinc = Brilliant Green
7. **Ferric Oxide Lead Silicate = Yellow**
   Iron = Green, Yellow, Orange, Red, Brown, Black, Cyan, Ultramarine Blue
   Iron Oxide = Opaque Red
8. **Gold = Magenta**
9. **Lead = Yellow**
   Lead + Chromate = Red
   Litharge = Red Minium (Roman)
10. **Divalent Manganese = Yellow to Brown**
    Manganese = Brown, Red, Magenta, Violet, Purple
11. **Magnetite = Black**
12. **Molybdenum = Smokey Gray to Blue**
13. **Nickle = Gray, Blue, Purple, Green , Yellow, Brown**
    Nickle Oxide = Slate Blue Gray
14. **Potassium Oxide = Yellow Green**
15. **Platinum = Silver**
16. **Silver = Dull Silver**
    Silver Chloride = Yellow Side Silver
17. **Selenium + Cadmium + Sulphur = Red**
    Selenium + Cadmium = Orange

    Selenium + Sulphur = Yellow
18. **Salt fires Glossie**
19. **Tin = White**

Tin + Chrome = Crimson
Tin + Vanadium = Yellow

20. **Titanium = Opaques**
21. **Uranium = Red, Black**
22. **Vanadium = Emerald Green, Yellow Green, Yellow, Orange, Red, Brown**
23. **Zirconia = Pink, Magenta**
    Zirconium + Vanadium = Cyan, Turquoise
24. **Clay = Glossie Red Oxide (Terra Sigillata, Roman)**
25. **Clay = Black (Terra Nigra, Roman)**

Fine Art Water colours

Q What is the difference in use between paper made of cotton and paper made of cellulose?

A Cotton fibres are slightly longer and more structured so that the fibres in the paper bond more tightly. As a result cotton paper is slightly stronger and expands slightly more evenly when wet.

Q What is 'wood-free' paper made of?

A When pure cellulose is extracted from wood without containing 'wood shavings', it provides an exceptional good raw material for paper. Unlike 'wood-based' paper, pure cellulose paper scarcely yellows and is very durable. This paper is sold as 'wood-free'.

Q What is the difference between Ultramarine deep 506 and French ultramarine 503?

A The difference must be sought in a phenomenon known as 'granulation'. Granulation is a property of some pigments and means that the pigment in the paint, after application, forms tiny clusters. This creates the 'flaky' or 'curdled' effect that enlivens the paint surface, and provides additional expressive opportunities. In the water colour charts there is an indication of what colours granulate.

Granulation is a typical property of ultramarine pigment in general, albeit that a particular type of ultramarine has it in a more marked form. This type is generally known as French ultramarine and is used when a specific granulating effect is required.

Q Why is it that some shades of water colour can be easily washed off after drying and other shades not?

A The phenomenon that some colours become imprinted on the paper and can be only partly removed, is connected with the type of pigment. Pigments are rolled out in the binding medium to a certain particle size. Besides particles of this maximum size there are also pigment particles that are smaller or even very much smaller. With some pigments extremely small particles are very much in the majority. These particles penetrate into the paper and attach themselves to the paper fibres, while large particles stay more in the surface. This is why a paint based on a pigment with an extreme majority of small particles is difficult to remove. This phenomenon is called 'staining'. Examples of strongly adhering colours are: phthalo blue, phthalo green, quinacridone rose and indanthrene blue.

Q Can water colour be used on any type of paper?

A Normally yes, but preferably not. If large amounts of water are used, ordinary drawing paper bobbles badly, causing the colours to run into the indentations. Water colour paper is specially sized to prevent this as far as possible. The thicker the water colour paper the less bobbling occurs.

WATERCOLOUR MATERIALS - PAPERS

CONTENTS

- 1. Raw Materials
- 2. Method of Manufacture
- 3. Paper/Pigment Interaction
- 4.My personal choice of papers

1. RAW MATERIALS

- **Woodpulp paper.** e.g. Bockingford, Langton. These have a hard surface. Watercolours do not penetrate the paper, which means that liftable pigments will lift very easily. Therefore not suitable for a technique requiring building up of washes unless considerable care is used with the choice of pigment plus a soft brush and not reworking whilst wet. It has a strong surface and will withstand considerable abuse with a rubber.
- **Rag Papers.** e.g. Whatmans, Bloxworth, Waterfords, Winsor and Newton Artists Paper are made from pure cotton buds. A soft absorbent paper, which tends to become more adsorbent, the rougher the paper. Pigments will stain into the paper, making them difficult to lift, and mistakes cannot easily be rectified. The advantage is that techniques requiring washes to be built up in layers can be used without much fear of lifting. It is very soft and will mark easily with a rubber causing

subsequent washes to possibly have blemishes, so care must be taken with initial pencil work. It has a very white finish giving you the maximum possible tonal range.

- **Sizing.** To reduce the adsorbancy of paper it is sized. Size may be gelatine (smelly like Arches) or one of various resins. Internal size is added to the pulp, external sizing is added afterwards to the paper. The tooth of the paper or it's ability to take the paint from the brush depends on the size, as does its adsorbancy. The size will also slightly affect certain colours.

2. METHOD OF MANUFACTURE

- **Mould**
  Paper is made from a "soup" of cellulose which has been created from woodpulp or from rag. This "soup" is called paper Stock. To make mould paper a sieve with a very fine wire mesh, a "Mould", is dipped into the Stock. It is carefully pulled from the stock, drained and dried, when the dried stock can be lifted from the sieve as paper.

  A full size sheet of Mould paper can always be identified by the deckle edge, where the Stock faded out at the edge of the mould.

- **Machine made**
  The machine paper making process was invented by Foudrinier. The mould is replaced by a continuous wire mesh run. Stock is poured onto the mesh, then it passes over vacuum chambers which suck out the moisture. The wet paper is lifted from the mesh and run round hot rolls to dry it. Machine made paper therefore starts as a continuous strip which has to be guillotined. Machine made paper always has guillotined edges.

- **Wireside**
  The side of the paper which rested on the wire can be identified by faint wire marks. With some papers the wire side has the same characteristics as the top side. Some papers have a very pronounced wire mark which may not be to your liking. With other papers, particularly rag, the wire side has many little craters where the water drained away. These craters will fill with paint, giving finished painting a dull matt finish.

- **Watermark**
  To identify the paper there is sometimes a watermark. It will only appear once on a full imperial sheet. When the paper is held up to the light if the watermark is right reading you are looking at the top side of the paper. If you buy Imperial sheets, mark the back before you cut the paper so that you will know which side is which on all the sheets after they have been cut.

- **Grain**
  Machine made paper drags the paper fibres in the machine direction creating a pronounced grain direction. Mould papers on the other hand do not have a defined grain direction.

3. PARER/PIGMENT INTERACTION

- **Using a rubber**
  Because the surface of a rag paper can so easily be damaged, avoid using a rubber. Transfer the finished drawing to the paper with a carbon or graphite paper. If you must rub out use a "putty" rubber, and dab it onto the surface so that its sticky nature pulls the pencil mark off, rather than rubbing it out.

- **Scratching Highlights.**
  With a very sharp scalpel clean highlights can be scraped into the hard surface of a woodpulp paper when the painting is bone dry. The technique will not work cleanly with softer Rag Papers.

- **Archival Quality**
  Some Papers have not been made from stable materials, or buffered to prevent colour deterioration. Such papers will go brown and brittle with age, and will affect some colours. If you want your work to last make sure that you use an archival quality of paper. i.e. it has a neutral ph, and a buffering of Calcium Carbonate.

- **Care of papers.**
  Papers can be damaged very easily. Scuffing or knocks will damage the surface so that subsequent washes become uneven.

- **Storage**
  Papers can also be contaminated by the atmosphere, particularly the cotton papers. Protect your papers by keeping them carefully wrapped in a polythene bag, or shut in the book in which they came.

  The contamination can also affect the paper while it is exposed on your easel if you take several days over the work. The paper can become unevenly adsorbent, making very uneven applications of colour, though they tend to even up as they dry.

  To be safe keep the works covered all the time when not in use. Storing flat in a plastic bag will protect them whilst also helping to keep them flat for framing.

- **Pigment Behaviour**
  Pigments will behave in a different way on the different types of paper described here.
  - *Lifting colour.* In general the liftability of pigments depends on the pigment on the type of paper and the sizing. The artist needs a paper on which it is possible to place washes on top of washes without danger of disturbing the underneath wash and creating a muddy finish, lifting, but on which pigments can be lifted to make corrections with a bit of effort. It also depends on the type of pigment.
  - *Staining pigments.* Difficult to remove on most types of Cotton Paper, but some reduction can be made on woodpulp
  - *Liftable Pigments.* Usually can be totally removed on Woodpulp, but only partially on Cotton papers. The artist needs to experiment to find the paper which meets his preferred techiques. The student should carry out tests on different papers to learn about the different paper behaviours. These tests are explained in pigments. Never paint on a paper without knowing what is it, and make notes of the different effects occuring with the different papers as a learning aid.
  - *Granulation.* This will occur more on smooth HP papers than the rougher types.
  - *Non compatability.* This must also be mentioned. Some pigments do not like certain papers, for example Winsor Blue and Whatmans NOT seem to dislike each other and leave fine pricks of white creating a very dead looking sky.

4. My Personal Choice of Paper

For a smooth paper I prefer Whatman's HP. It is a delicate paper which must be handled with care as the surface can be easily bruised. Sometimes it is a bit dry, giving a hard edge to a wash while it is still being laid. To prevent this I usually dampening the paper to kill the dryness. Laid flat, with a very wet wash of granualting pigments can give very pronounced granulation.

For NOT surfaces I prefer Winsor and Newton NOT. (Whatman's I have discarded because of the problem with Pthalocyanine blue pigment which I feel is essential for clear skies.) The pigments are well adhered to the surface, but are fairly easily lifted to make alterations. Care has to be taken with the first wash as it tends to cauliflower if ponds are allowed to form. Keep the board sloping, or pre-stretch the paper.

DEMONSTRATION Main menu

DEMONSTRATION Main menu

WATERCOLOUR MATERIALS - PIGMENTS

CONTENTS

- 1. Pigment Names
- 2. Pigment Characteristics
- 3. Testing Pigments
- 4. Pigment Categories
- 5. Pigment Labelling
- 6. Pigment Additatives
- 7. My Personal Choices.

1. PIGMENTS NAMES

Early Artists struggled to make their own pigments using the materials which were available to them. Many of them were completely unsuitable as we can see as we look at their paintings today where there have clearly been colour changes and fading.

Pigments were given very romantic sounding names, and it is perhaps for that reason that they are still available today. Van Dyke Brown, Rose Madder etc.

Many new pigments have become available to overcome these disadvantages, and in choosing a pallette the artist should not be enticed by the romantic names, but should buy pigments which will have the characteristics that the artist needs.

2. PIGMENT CHARACTERISTICS

- **Transparency**
  Whilst all watercolours will allow show-through, some are entirely transparent, whilst some, when used heavily, will leave a trace of colour showing over a black wash. They are known as opaque or semi-opaque.

  Transparent colours should be used for skies, water and for other transparent situations.

  Opaque or Semi-Opaque colours should be used to give a more solid feeling to trees, buildings and foreground.

- **Texture**
  Some pigments when applied very wet and heavily, will dry following the texture of the paper. The heavy particles actually sink into the hollows in the paper leaving a darker mark. This effect is particularly noticeable with these pigments on a HP paper.

  Mixtures of textured pigments can make very pronounced texture effects.

Textured pigments are ideal for the texture of a tree, or shadows on a white wall. They should be avoided for transparent situations like sky or water.

Some pigments do not get on well together and produce strong texture pattern when they are mixed together. This can occur with pigments which alone do not produce texture. Such a combination is Winsor Blue and Cadmium Red.

- **Liftability**
  The liftability of a pigment depends both on the pigment and the paper. For example a pigment cannot be totally lifted back to white paper on Whatmans, but Ultra Marine on Bockingford can be totally removed.

  Stains Some pigments soak into the paper and make a stain which can only be lightly removed with difficulty. Stains are liquid colours.

  Liftable colours generally come from finely ground pigments, earths etc., which are glued on the surface of the paper rather than soaking into it.

  Use of Liftable Colours

  - Sketches can be lightly drawn in watercolour using a liftable colour which can be corrected and will totally disappear when painted over.
  - Mistakes can be lifted with liftable colours.
  - Highlights can be lifted out at the end with liftable colours.
  - Heavy Backgrounds can be painted in, and totally lifted using liftable colours.

  Use of Stains

  - First Washes of a watercolour as they can be painted over with no fear of the colour lifting. Highly liftable colours such as Ultra Marine and Yellow Ochre should be used only with great care for the first wash as they will damage very easily and can produce mud if they are disturbed by a subsequent wash.
  - Permanence
    Some colours are fugitive to light and really should not be used. The colour can be tested by covering half a sample, then leaving the sample exposed in a sunny window for six months. Manufacturers Colour Charts indicate permanence, though as there is no standard for testing their result do not totally agree.
  - Bleeding
    Some colours, particularly the Cadmium Reds will bleed if another colour is run against them. These colours must therefore be applied

towards the end of the painting process, so once they have dried water will not come near them again.

Good pigment manufacturers supply a chart identifying each of these characteristics for each of their pigments. If your local art shop cannot provide these leaflets try telephoning the manufacturers' technical department. Alteratively buy a copy of "The Wilcox Guilde to the Finest watercolours" by Micheal Wilcox, ISBN 0 89134 409 8. Most manufacturers' pigments are listed.

3. TESTING PIGMENTS

Make a really strong mixture of pigment, almost as thick as mud. Apply this mixture a test paper as a wash, diluting the pond as you go to creat a graduated wash. When really bone dry (use a hair dryer) try lifting a thin line of paint using a flat brush. If it lifts cleanly you have a pigment that will lift on that particular paper. If it leaves various degrees of stain, then you have a stain.

Try making a mask of pscrap paper, amd using a NATURAL sponge, try washing the exposed portion of pigment away. Again this will give you a measure of liftability.

Try a wash of clean water round the edge of the first wash. If it bleeds, then that pigment should be kept to the end of the painting process.

4. PIGMENT CATEGORIES

Pigments can be classified into different families according to their origin.

- **Earth Colours**
  These originate as clays or rocks and are named after their places of origin, Sienna, Umber, Rosso di Pozzuoli, Ochre.

  Some of them are heated (calcined) to create a darker variety, hence Burnt Sienna, Burnt Umber.

  They are finely ground to make into paint, but nevertheless they tend to be particles which will not stain the paper and as a result can generally be fully lifted. In some case, like Yellow Ochre, they will lift extremely easily.

  They are absolutely permanent, the ancient cave paintings used these materials and the colours are still there to see.

  The roasting process tends to create different shades, so on the cheaper ranges some manufacturers mix a dark and a light roast to give the right colour. Unfortunately the colours will separate when painting wet washes giving you an effect that you might or might not want!

  They are all opaque or semi-opaque colours.

- **Blacks**
  These are made by collecting the soot from a burning material. Lamp

Black from burning lamp oil, Ivory Black by burning ivory, though now a days the ivory has been replaced with bones.

Many artists do not have black in their palette as you can create more variety within your blacks by mixing complementaries.

- **Lakes**
  Vegetable and Animal materials have in the past produced many colours. In their natural form they are dyes, and often lack much strength and tend to migrate into adjacent colours, so they are precipitated onto some sort of inert material. This sometimes means that the inert material will lift but that there may still be a weaker underlying stain. Examples are Crimson Lake, made from Cochineal beetles blood, Madder made from the roots of the Madder plant. They are often not permanent colours. The word lake is not always included in the title, such as Indigo, Saffron, Indian Yellow.

  Many of the pigments are not permanent and much work has been done to replace these pigments with organic permanent colours.

- **Inorganic**
  These are chemically produced substances that belong to the inorganic branch of chemistry, they do not contain the element carbon.

  Examples are Vermilion produced by burning mercury in sulphur to produce a black residue which is finely ground to produce the colour.

  Other examples are Prussian Blue, (Ferric Ferrocyanide). Chrome Yellow (Lead Chromate). Viridian (Hydrated Chromium Oxide). Cobalt (Cobalt aluminate) Cadmium Red (Cadmium sulphoselenide).

  Being all totally different chemicals they will all have different properties. Some of them (Cadmium colours for example) are highly stable and lightfast.

- **Synthetic compounds. (Organic)**
  These are chemically produced substances that belong to the organic branch of chemistry, they contain the element carbon.

  In general they have all been developed since the discovery of Mauvine by Perkins in 1856. The prime interest being to replace some of the disadvantages of the earlier pigments.

  They are often complex chemicals, coming in different families, such as Azos, Arylamides, Naphols etc. Within the families there are numerous subtle changes which affect the pigments properties.

5. PIGMENT LABELLING

There is a move by the ASTMS committee to establish a common practice in labelling so soon we should begin to see:-

- **Common names** - used for the name of the principal pigment, where such a name exits.
- **Hues** - Where substitute materials are being used the word Hue used to indicate that the material is not what the label says even though it looks and might behave that way. Under the Hue name should appear the common name of the substitute pigment being used.
- **Trade Names** - Where manufacturer's use Trade names, the common name should appear under the Trade name.
- **Mixtures** - where mixtures are used the common names of all the pigments should be listed.

  Many new paints being offered are in fact mixtures of other pigments. e.g. Paynes Grey. Using the basic colours rather than the mixtures will give much more variety to your painting, mean carrying less tubes, and therefore less chance of tubes drying out.

  Some mixtures are of totally unsuitable pigments, e.g. Rowneys Brown Pink, a mixture of a yellow dye and insoluble earth pigment. It goes on as lovely brown colour, but the brown will lift to leave the naked yellow stain producing very unpredictable effects.

  Another disadvantage of using mixtures, is that they are tertiary colours and therefore by definition can only produce further tertiary colours reducing the artists ability to find bright clean colours in the pallette.

  It is recommended that the artist selects pure pigments and avoids mixtures.

6. PIGMENT ADDITATIVES.

- **Normal Additatives**
  - *Gum Arabic.*
    Watercolour Pigments are bound together with a material called Gum Arabic, though in practice has nothing to do with Arabia. It comes from the Accaccia Tree and is normally produced in Senegal!

    It is water soluble, and always remains soluble Thus pigment made of Gum Arabic can be dissolved no matter how hard they have become. Because of the solubility of the gum Arabic, they will tend to dissolve if they are re-wetted on the paper. Where pigments

have gone hard, if they are Artists Quality, the gum Arabic can be softened by wetting them the night before they are required.

- *Dextrine*
  This is a sugar which is partially soluble in water. It is cheaper than Gum Arabic, and it is therefore used as the main binding agent in the cheaper students colours. When Dextrine really goes hard it is impossible to dissolve, so that the occasional use of students colours can be false economy as they become to hard to use before they are used up. Artists Colours are always made with Gum Arabic.
- *Glycerine*
  This material is hygroscopic, it absorbs moisture from the air. It is added into the pigment mixture to help to keep the mixture moist. Where pigments are in daily use they may become too soft through the action of the glycerine, and if this happens the box should be left open to dry off a bit over night.
- *Oxgall*
  This is a wetting agent, which helps to spread he pigment evenly on the paper.
- *Extenders*
  Some pigments are very expensive, so in cheaper ranges of paints, the colour is made to go further by adding extenders. The common one is chalk. Where extenders have been added it is impossible to a true deep colour as the white extender is reducing the strength of the colour. In very cheap paints the pigments almost have a pastel appearance as so much extended has been added.
- *Student (and children's) Colours*
  These are often heavily filled with extenders and should be avoided by the serious artist for that reason.

- **Other Additatives**
  - *Honey*
    Honey is highly hygroscopic. A drop of honey on hard pigment will soften the paint overnight, or keep it moist if they are going to be left for a period.
  - *Ox Gall.*
    A few drops can be added to the pond of colour to help the colour to spread more evenly if the paper seems to be slightly rejecting the water. It is often needed when making watercolour wash lines on Mounts Card.

- *Flour*
  Wet in wet watercolour sometimes runs too much. Adding some flour will thicken the paint and reduce this tendency. I am not sure if there would be long term discoleration or risk of bacterial growth. Not used it myself.
- *Acrylic Gel Medium*
  Acrylic is a dispersion of plastic in water. When the water dries a chemical action takes place and the pigment becomes trapped in a permanent layer. A few drops added to a pond for the early washes to make sure that they do not subsequently lift. Usefull for holding white colouds in place while they dry. It also seems to increase granulation. Added to a pond of "tree mix" it will slow the drying and tend to create a granulated texture perfect for the foliage.
- *Salt.*
  Sprinkling various salts, (table, diswasher, bath etc, into a wet wash can create usefull textures. The surface must be flat, and not moved until dry.

7. My Personal Choices

- **Stains**
  Winsor Blue
  Permanent Magenta
  Viridian
- **Granulating**
  Ultramarine
  Burnt Sienna
  Cobalt Blue Light
  (Maimeri) Cadmium red
- **Other Colours**
  Raw Sienna
  Raw Umber
  Burnt Umber
  Transparent yellow (Winsor and Newton)
  Indian Yellow

DEMONSTRATION Main menu

DEMONSTRATION Main menu

WATERCOLOUR MATERIALS - BRUSHES AND SUNDRIES

CONTENTS

- 1. Desireable Brush Characteristics
- 2. Types of Hair
- 3. Brush Shapes
- 4. Masking Fluid

1. DESIREABLE BRUSH CHARACTERISTICS

- It must hold a lot of water so that the colour does not run out whilst painting a wash.
- It needs to have a good point to paint around tricky shapes, but a compromise is to use two brushes, keeping a small size 1 for those intricate shapes.
- It must be soft so that finished washes are not disturbed when the brush lays a subsequent wash over the top.
- It must have a reasonable spring so that it keeps its shape whilst painting and does not collapse away from the paper.

2. TYPES OF HAIR

- **Sable.**
  Expensive as it comes from the tail of the Asiatic Mink, (sometimes known as Red Sable or Kolinsky). Claimed to make the very best Watercolour brushes as it has a good spring keeping a point for working around intricate shapes within the wash, and holds a lot of water. The points wear fairly quickly so they should be used with care when picking up colour.
- **Squirrel.**
  A soft hair which lacks the spring of Sable but it is used in cheaper brushes and can give reasonable results.
- **Ox Hair.**
  Taken from the cows ear. Holds an incredible amount of liquid. Very soft, which means that the brush cannot be shaped easily, but because it is so soft makes an ideal wash brush for laying over another wash. Cannot be pointed to paint around a shape so it must be used in conjunction with a pointed brush.

- **Man made fibres, Draylon, Nylon etc.**
  There are several ranges of these brushes. They are very poor at holding a volume of water, and as they wear they develop "hooks" which have to be removed with a scalpel and good eyesight. The fibre is fairly tough hair, which can tend to scratch when laying over a previous wash spoiling the transparency of the two washes, but ideal for lifting liftable watercolours. Not really suitable for watercolour work.

3. BRUSH SHAPES

- **Rounds**
  - A round ferrule which will produce a point. Comes in size range 000 to 12. The tiny ones do not carry enough liquid for watercolour, so the smallest we need is probably a size 1. A size 6 or 7 or 8 is a good general purpose brush. The 12 in sable makes a wonderful wash brush, but the price is very high.
- **French Mops**
  A fraction of the cost of a 12 sable, but will do almost the same job. Tremendous carrying power, but with no point. (A wash could be applied using two brushes, a mop and a good pointed small sable.) They are very soft and can be used to lay over a previous wash with little danger of damaging the underneath wash. They also can be used to give ragged edges for clouds etc. They are reasonably priced.
- **Flats or ONE STROKE Brushes**
  These are flat brushes which come to a knife edge rather than a point. Very useful for taking washes up to straight lines, houses, telegraph poles etc. Also helpful for generating textures where the texture has a line to it, Shiplap boarding, brick work, water. Needs to be used with care side-ways as so many fibres touching the wash underneath may leave an unwanted mark.

  They come in sizes from 3/16ths to bigger than an inch. A small one is very useful for painting windows and shimmering reflections. The 1/2 inch size is a good general purpose brush.
- **Wash brushes**
  Made from Ox Hair, in a flat about 2 inches width. A very useful inexpensive tool.
- **Hakes.**
  Introduced to the country from South East Asia by Ron Ranson. A flat brush, 2 inches wide, made from goat hair. They hold an enormous volume of liquid, (almost too much), they can be shaped

to paint around areas. The hairs are very soft and can be pushed into any shape that you want. In that way they can be distorted to produce random shapes for trees and grass. They need very big mixing ponds and big tubes of paint to use as they hold a very large volume of paint. Ron ransom uses a large baker's tray to mix sufficient paint.

- **Chinese Brushes.**
  Bamboo handled and made from pony tail. They come in different sizes, and two types, bushy and very long and thin. They hold a lot of paint. The pointed ones are amazingly flexible adjusting from thick to extremely fine in one stroke. Useful for rigging and branches (provided you do not succumb to making them sinuous).
- **Fans**
  A brush where the bristles are splayed into a fan shape. Intended for oil painters and known as hair brushes, but very useful for the watercolourist for grass etc. They come in a variety of materials, natural and man made, which will create slightly different effects.
- **Riggers**
  Traditionally used for painting rigging on marine views in oil. Essential to be made of sable for watercolour work.
- **Mapping Pens, Ruling Springs.**
  Not really a brush, but very useful for drawing fine lines. Watercolour will work quite well in a mapping pen, particularly the stains.
- **Sources**
  I buy all my brushes now by mail order from A B S Brushes Their brushes are reasonably priced and good quality. Their catalogue is a delight to look through!

DEMONSTRATION Main menu

WATERCOLOUR MATERIALS - MASKING FLUID and RUBBERS

4. MASKING FLUID or DRAWING GUM

- **Masking Fluid** A rubber solution which will resist pigments and which can then be rubbed away to reveal pure white paper.

  It works well on a hard surface wood pulp paper like Bockingford. It does not work so well on softer cotton papers as it soaks into the paper and cannot so easily be rubbed off without tearing. The best technique seems to be to rub the masking fluid away with a ball of paper tissue, or a rolling a ball of half dried sticky gum over the dried fluid. (The bit that collects round the cap!). Cannot be removed at all from rough papers.

  It is a treacly liquid, difficult to use as it comes out of the pot, but it can be diluted with water, about half and half seems to be a good mixture. Diluted it will work well producing fine lines which can be applied with a mapping pen, brush, or ruling pen (spring bow). The bow is useful since there is no danger of ruining a brush, the pen can be easily used. Don't use it as a rule, but holding it like a brush to get a variety of marks.

  Colour the fluid whilst it is being diluted by adding some liftable pigment, (Ultramarine), which will enables one to see where the fluid has been placed.

- **Drawing Gum**(Pebeo)
  This is similar to masking fluid. It was developed for working on fabrics. It is easier to use than masking fluid, and can be pulled from cotton papers (HP, NOT) with little risk of tearing. Now days I always use it in preference to Masking Fluid.

Do add paint to the white mark left by the masking fluid to soften the harshness a little, and to disguise the characteristic marks of the fluid.

5. PUTTY RUBBERS

The different manufacturer's putty rubbers vary considerably. Some work well others are almost useless for watercolour work. To use they are kneaded in the hand until they become sticky, then they are 'dabbed' on the paper, and they seem to pull graphite or light pencil marks away almost as a result of their stickyness rather than by rubbing the surface away. Because they are kneadable they can be shaped to a point, a very useful feature. I personnaly prefer the Faber Castell Kneadable Putty Rubber, which I find a delight to use though it is very difficult to find supplies.
A suggestion which I picked up from another web site - use Blue Tack. Following the suggestion I have found that it behaves in a similar way to the difficult to get Faber Castell putty rubbers. Perhaps the problem is solved!

Watercolour papers come in different surfaces and weights. Do you know which is best suited to which painting techniques?

Here's How:

1. Machine-made papers come in three surfaces: rough, hot-pressed or HP, and cold-pressed (or NOT).
2. Rough paper has a prominent tooth, or textured surface. This creates a grainy effect as pools of water collect in the indentations in the paper.
3. Hot-pressed paper has a fine-grained, smooth surface, with almost no tooth. Paint dries very quickly on it. This makes it ideal for large, even washes of colour.
4. Cold-pressed paper has a slightly textured surface, somewhere in between rough and hot-pressed paper. It's the paper used most often by watercolour artists.
5. Paper differs from manufacturer to manufacturer, so experiment not only with the different kinds of paper but also with various makes of paper.
6. The thickness of watercolour paper is indicated by its weight, measured either in grams per square metre (gsm) or pounds per ream (lb).
7. The standard machine weights are 190 gsm (90 lb), 300 gsm (140 lb), 356 gsm (260 lb), and 638 gsm (300 lb). Paper less than 356 gsm (260 lb) should stretched before use, otherwise it'll warp.

Tips:

1. Watercolour paper is usually white, but it need not be. A variety of cool and warm tints are available.
2. Use acid-free paper for paintings you wish to keep as this will yellow less with age.
3. Cold-pressed paper is called NOT paper because it's not hot-pressed.
4. You can buy prestretched watercolour paper in drawing blocks. When you've finished a painting, you use a palette knife to remove the top sheet from the block.

If you make a mistake in a watercolour, you need to react fast if you're going to remove it before the paint dries.

Here's How:

1. Decide whether it really is a mistake or whether it adds an unexpected quality to the painting. Consider letting the painting go in its own direction rather than forcing your preconceived ideas on it.
2. If you do want to get rid of something, you can try sponging it out or scrubbing it out with a brush.
3. Take a damp bit of clean sponge and press it gently onto the painting to pick up the paint from the area you want to remove. Don't rub as you can damage the paper.
4. Alternatively, apply a wash of clean water over the area you want to get rid of, let the water soak in and loosen the colour, then lift it off with a sponge.
5. If the colour proves a little stubborn, moisten a bristle brush in clean water, then scrub gently onto the offending part of the painting to loosen the paint. Soak up the loose paint with a tissue.
6. If you think the whole painting is a disaster but don't want to waste the sheet of paper, submerge it in a bowl of clean water to soak out as much paint as possible.
7. Stretch the piece of paper again. It'll retain a shadow of your previous painting, so it'll be better suited to a dark or colourful scene than a light, bright one.

Tips:

1. Not every painting need be a perfect work you want to frame. Keep your "mistakes" as you may find you later like an effect you created in error.
2. Some pigments, such as alizarin crimson, will leave a stain.

What's the difference between watercolour paints that come in pans and those in tubes? How do you decide which is best for you?

Here's How:

1. To make watercolour paints, pigment is mixed with gum arabic and a small amount of glycerine for adhesion and flexibility. This is then dried before being put into pans or tubes.
2. Pans are small square cakes of pigment cut into either full pan or half pan size. These are put in small plastic or metal boxes to keep the pan together as you use it.
3. To get paint from a pan, use a damp brush to pick up a little colour, then put it on your palette. Add more water here or mix with other colours.
4. Unless you're very good about washing your brushes before getting a new colour, a pan can become quite dirty with other colours. Use a damp cloth to wipe them clean.
5. Tube paints contain more glycerine than pans. This makes them a little easier to mix with water. Tubes are therefore easier to use if you want large areas of colour.
6. Tubes are easy to keep clean as you squeeze a little bit of paint from a tube when you wish to use that colour. But it also means you may squeeze out colour you then don't use.
7. If you don't clean off your palette, you can use paint squeezed from tubes or lifted from pans later as it remains water soluble.
8. Pans are easier to use because you have immediate access to the colours. You don't have to put your brush down, open a tube of paint, and squeeze a little colour out.
9. Pans are less expensive than tubes, but tend to dry out. They're ideal for small amounts of colour and sketching trips.
10. Tubes are easier on your brushes than pans as you don't have the temptation to scrub with your brush to pick up a colour.
11. Ultimately, each has its own advantages. Try both and see which you prefer. It may well be a mixture of the two.

Tips:

1. There's a huge difference in quality between student and professional watercolours. Rather buy a few quality paints than a large range of cheap colours.
2. Once you've learnt to mix colours, a range of blues, yellows, and reds can provide you with all the colours you need.
3. When you replace a pan, remove any bits of an old pan before putting in the new one. Otherwise it won't fit snuggly.