

## Refining Linseed Oil – Update 2012

*(Please note that there is now a specific bulk oil procedure. Have fun and feel free to ask me any questions. 17<sup>th</sup> century painting awaits...)*

The goal of the refining process is to create an oil which dries quickly and yellows as little as possible. While any drying oil will have a stronger paint film if the non-polymerizing fatty acids are removed, this process is especially important to modify the behavior of linseed oil, whose high proportion of linolenic acid (Omega 3) can cause yellowing, wrinkling and drying from the top. Eastlake typically explores many different technical avenues based on older practice, but offers an unusually succinct direction with regard to linseed oil: it is to be cold-pressed, and washed thoroughly to remove the fatty acids before any further modification or use.

Subsequently, not as much attention has been paid to the need to begin with a quality oil, or the long term potential of the fatty acids or incautious processing to darken the paint film. In part this may be because the oil used for painting was, during most of the 20<sup>th</sup> century, commercially refined, and often hot-pressed. Linseed oil was crucial to the general paint industry for most of the 19<sup>th</sup> and the first half of the 20<sup>th</sup> century, and the vast majority of the oil produced was for this purpose. Given, for example, that no commercial paint manufacturer has ever refined their own oil, this situation may have created unavoidable yellowing issues at certain times simply due to the unavailability of higher quality oil. The significant change in this crucial department was so taken for granted that it was not thought – despite the presence of Eastlake, for example, in all bibliographies – that this procedure might be worthwhile or feasible. Yet, the darkening of the oil is a given in early 20<sup>th</sup> century books; how to avoid this is in fact the focus of the **entire text** of Abendschein's *The Secret of the Old Masters* (1909). Despite obvious ongoing difficulties with modern oil, an attempt to reconstruct the type of oil used in the 17<sup>th</sup> century was apparently not considered by any author in English. This oil was known to be different: cold-pressed, and hand-refined. Was it inconceivable that this might matter? Perhaps the inconvenience of the procedure, its unaesthetic drudgery, acted as a deterrent. Wehlte simply states that cold-pressed oil should be used, and that the addition of dried barium sulphate (a mild alkali) is helpful. Even Laurie, who is usually direct, and unique in his willingness to acknowledge that something important has been lost from older practice, gets somewhat vague about the oil. This is a place it would have been quite logical to test Eastlake's procedure, especially since it had also been heartily endorsed by Merrifield. Laurie was the creator of Madderton's, and their “Cambridge Colours,” which were made from 1891 to 1939 and advertised as ground in linseed oil that had been “sun-refined.” These had a high-reputation, the back stock ultimately being purchased by Winsor & Newton. As such, it is conceivable that a conflict of interest between his roles as professor and purveyor may have contributed to his uncharacteristic reticence about the oil in print.

It is unfortunate that Eastlake's uniquely firm distinction should have become overlooked, or submerged by the commercialization of the oil, as it may provide the key to the seminal puzzle of why many older paintings known to have been made with linseed oil have remained bright over time. Certainly this oil introduces a dramatic qualitative change to the process.

A technical paradox is involved with hand refined cold-pressed linseed oil. It dries much more quickly – in one or two days – than either unrefined oil, or commercially refined oil, both of which usually take four or five days to dry. This oil has more body – or *boing*, as it is sometimes called – in paint and mediums than its commercial counterpart, and is virtually non-yellowing when it has been aged in the light or buffered in the putty medium. Because the oil is the foundation of both the paint and the medium, this means two important things. First, that the entire system can be constructed around a higher quality material which dries quickly and stably. Second, that all the variables around the most important constituent of the process come under the painter's direct control.

Painter-refined linseed oil is significantly different than its commercial counterpart. No commercial oil, regardless of pedigree or price, has shown qualities comparable to HRO linseed oil. Working with the first batch of this oil was a revelation. It was finally possible to understand both the origin of certain more bravura techniques, and why linseed oil could be preferred. It is important to note that no testing has ever been done on this oil for the simple reason that it is not commercially available. The “linseed oil” of almost all research is a different product entirely, not necessarily cold-pressed, and either unrefined, or commercially refined. These constitute substantial differences in practice. These tests, unless done within the context of technical art history, also ignore factors related to the way the oil has been processed which, to painters, have long been known to play a significant role in the ultimate

behavior of the oil. HRO linseed oil offers a stable foundation for further manipulations in terms of rheology and working qualities. In terms of technique it is important to note that refining the oil makes it significantly less fat, thus less prone to all historical issues associated with “fatty oils.” The materials that have evolved using this oil as a basis help explain why the use of resin in older painting has turned out to be more tangential than was once generally believed. Using permutations of HRO linseed oil for the paint and medium, resins – and solvents – become virtually unnecessary.

For painters working with more emphatic or broken surface techniques, the behavior of HRO linseed oil provides straightforward access to older methods, and is especially of value when using the putty medium. For smooth surface techniques, or those purposely exploring a long open time, this is not as crucial. It is hoped, however, that technically inclined painters will at least refine a few liters of organic flax oil, so that its reliability and charismatic working qualities may then be experienced in practice.

## Organic Linseed Oils

Organic, cold-pressed, unrefined linseed oil is now widely available for the first time ever because of its positive role in human nutrition. It is typically found in a health food store, but can almost always be purchased more economically online in quarts or gallons. Another source is the discount grocery or dented can store, as the expiration date is moot for painting. It is always called Flax Oil, not linseed oil, and is inevitably beginning to be offered in variations. For painting purposes, the plain, direct-from-nature variety is required, not “high lignin,” “strawberry shake,” or “lemon parfait.” The purity of the oil and the care with which it is extracted are completely unprecedented; some varieties are even packed under nitrogen. However, budget brands of oil, may contain vitamin E (mixed tocopherols) or other natural preservatives. While these will theoretically be washed away, this oil is older and more recent oil is simpler to process.

While the quality of oil being marketed for painting has generally improved from earlier in the 20<sup>th</sup> century, it is still nowhere near that of a cold-pressed organic oil. If more painters understood the importance of quality oil both for the long term life of the work, and as the foundation of the older craft, this might change, as the industry is consumer driven. But of course, refined oil of this quality would be more expensive. For the time being, the raw oil exists. Once it is refined, it offers the foundation for a simple, yet versatile and uniquely powerful system. The refining must be done by the painter, but it means that no drier, solvent, or additional medium component is necessary at any point in the process. The maze of commercial materials and their confusing chorus of half-truths can be eliminated simply by using permutations of this oil and pigment alone. This provides quality and expediency built in at the absolute root of the process.

## Refining Sources

There are two major sources of historical procedures in English, the first is the English translation of the *De Mayerne Manuscript* (Sloane 2052) published in *Lost Secrets of Flemish Painting* (2001) by Donald Fels, the second is Eastlake's *Methods and Materials* published in 1847, which goes over other historical sources, but is focused on a specific selection from De Mayerne. These remain well worth consulting as they establish the level of both ingenuity and concern which older painters consistently brought to the fundamental issue of refining the oil.

These books also make numerous mention of procedures for the oil involving traditional varieties of lead: lead carbonate, lead oxide (litharge), and basic lead metal. A small amount of a lead compound can help the oil dry faster. Most painters now are anxious to avoid lead if possible. Using the faster drying hand refined (HRO) linseed oil, as opposed to commercial linseed oil, this can be done readily. The least yellowing and fastest drying system is entirely based on HRO linseed oil, but the system will also work well using commercial paint, with variations of HRO oil as the medium.

Eastlake (I, 331-334) focuses on a particular recipe given to De Mayerne by the German painter Sorg (313). De Mayerne notes that the oil is “well-defatted” by this process. This involves washing the oil repeatedly – fifteen times – by shaking it with a mixture of rainwater and salt, then allowing the cleaner oil to separate. The oil is then washed three times with rainwater. Whether on his own, or by consulting other painters of his time period, Eastlake develops the procedure to include sand, another traditional cleansing agent in De Mayerne, and recommends a six week procedure: shaking the oil several times each day, changing the water, sand, and salt every week, and finishing with an all water

wash for a week.

In her extended and highly recommended preface, Merrifield concurs with the usefulness of the procedure outlined by Eastlake, and comments that it proceeds more quickly if the oil is exposed to moderate heat, such as that of a low oven. In his early *Facts About Processes, Pigments, and Vehicles, A Manual for Students* (1895), Laurie also goes into a variation of the same procedure.

This process is simple compared to the complex set of steps involved in refining an oil commercially, but surprisingly effective. The addition of salt disrupts the loose hydrogen bonding in pure water by providing positive sodium and negative chlorine ions which, because of their opposite electrical charges, orient the water molecules around them in different ways. This means that the proverbial surface tension between the water and the oil is reduced in proportion to the salinity of the water. In conjunction with physical emulsification achieved by shaking the jar with the sand, this makes salt water very effective at separating the fatty acids from the triglycerides. Other impurities, such as mucilage and the water soluble phospholipids, are carried into the water as well. Oil refined by the washing procedure below exhibits none of the negative characteristics long associated with lower quality linseed oil. It does not skin or wrinkle, dries hard without any gumminess, and, if used with chalk or other calcium carbonate, or aged in the light, does not yellow perceptibly. Tests done with this oil a month after refining show barely perceptible yellowing after eight months on a white gesso ground. A three year old oil aged in the light exhibits no yellowing at all after the same time period.

## Refining Overview

The washing procedure is quickest in warm weather, for cold weather processing some sort of additional heat source such as a hot water bath or an incubator type environment – a low oven – will speed things along, especially with bulk oil, but is not necessary. Different brands of oil will respond differently, some shedding their break quickly, others requiring more shaking over a longer period of time. The most salient difference is between branded oils which are packed in quarts, oils which are marketed in bulk in gallons or five gallon pails. The branded oil – which is new, dated, and often kept under nitrogen – will process more quickly than bulk oil, which is significantly less expensive, may be older, and has been exposed to more oxygen. This is also related to the amount of free acid in the oil: oil which smells like a field of baking flowers (new, alkaline) will release its break relatively quickly, oil with a sharp or acrid smell (older, acid) may not. The branded oil is more efficient to process if the minutes are being counted from beginning to end, but there is no qualitative difference in the end result, the behavior at the easel is the same. Most organic flax oils are filtered, some contain a fine natural precipitate that alters the colour from orange towards green: this does not need to be removed prior to washing. All edible organic cold-pressed flax oil encountered has had a relatively alkaline smell. Quality cold-pressed oil for painting – easel or house, organic or not – can be significantly older, and may require more physical action to separate the fatty acids.

The least expensive type of fine salt available at larger grocery stores is pickling salt, available in four pound boxes. The least expensive type of clean salt is the fifty pound bag used for water softeners, available at about one third the price of pickling salt although it must be ground prior to use. A medium sized electric coffee grinder works well for this, pulverizing the salt quickly.

Processing linseed oil by hand is an inexact science. It is also unavoidably messy as oil is transferred from jar to jar; a sheet of plastic can be helpful for protecting a work surface or maintaining domestic tranquility. While the procedure below is relatively straightforward, variables of processing ingredients, oil quality, oil age, and ambient temperature can cause slight but unexpected changes in practice. Even a series of jars processed precisely the same way may show different amounts of break, or clear in different ways. This can be disconcerting, but is part of working with a complex organic substance. It is impossible to “wreck” the oil using this process, one simply learns more about its behavior incrementally as time goes on.

## Improved Water, Sand, and Salt Method

The length and cumbersomeness of the six week procedure in Eastlake led to a search for a related non-invasive way to remove the fatty acids that would somehow be more efficient. Over the course of several years, the following factors emerged as significant to what is admittedly of paramount interest in this case, speed. First, that the oil be new, sealed, and processed soon after it is opened. Older oil, or bulk oil, even if it is high quality, may take longer to process. Second, that the water be hot to

begin with, hot tap water is sufficient and poses no risk of cracked jars. Third, that the sand be coarse and angular. The most efficient sand found to date for hand processing is the product used in swimming pool filters, pool sand, this is clean and dust-free, but any coarse sand is fine if it is clean. Fourth, that the oil be shaken until it is emulsified, then put through this procedure again *several times* while the water is still warm. Last, but most important in terms of efficiency, is that there be a small amount of a finer form of aggregate in the mix to act as a sponge for the fatty acids as the oil clears after it has been emulsified by being shaken. Many materials were tried as sponges, including other forms of silica and very fine sand, but the most efficient addition turned out to be a small amount of a crystalline calcium carbonate – not chalk – such as marble dust or whiting, in a grind that is not too fine. The wash is complete when ten to twenty percent of the oil has gone into the break layer, this takes from half an hour to an hour. Three washes are needed, followed by a final water-only rinse. This means that the former six week process can actually be completed, if need be, in a day or two. The oil will always remain turbid during the process. It is clarified at the end by heating it slightly to remove any remaining water.

### *Refining Linseed Oil Formula*

**First wash:** Place into each half gallon canning jar 0.50 liters (2 cups) of nutritional quality oil, along with 80 gr (1/4 cup) of pool sand, and 25 gr (1T) whiting or 15 gr (1T) medium grit marble dust. In a second jar, salt in the amount of 120 gr (3/4 cup) is dissolved in 1 liter (1 quart) of hot tap water, then added to the first jar. The oil-sand-salt mix is lidded tightly and shaken until it has emulsified, then allowed to rest, then shaken again for about five cycles over a period of ten minutes. The mix will emulsify quickly, but it is important not to skimp on shaking in the first wash especially as this is how the deeper cleaning is accomplished by creating a fine interface between the salt water and the oil. After five rounds of shaking, clearing, and shaking again, the resulting bright yellow emulsion will slowly separate into a layer of orange oil on top, and a layer of warm white break beneath which then separates and falls to the bottom of the jar. This takes about half an hour to an hour. The sand will be on the bottom of the jar, but the whiting or marble dust will be in the chunk of break. If the break remains floating, the marble dust is too fine for the oil, and something a little coarser can be tried in the next batch. This doesn't matter in terms of quality, the oil is simply a little more finicky to remove. The first wash removes about 15 to 20 percent of the oil by volume. Once the break is floating in a mass, or has peeled away, most of the oil can be removed to a new jar using a bulb baster or large syringe. Clean water is then added to the first jar, bringing the remaining oil to the top. This may cloud temporarily but will clear again quickly. It can then be removed to the new jar with a small ladle, a bent spoon, or a large – veterinary – syringe. Some of the break layer may be brought over to the second washing. If processing several jars at once, it can be helpful to consolidate all the leftover small amounts of oil first into one jar. Alternatively, this end bit of oil can be added to the first washing of the next batch of oil if that will be happening within a week or two. This procedure may seem finicky at first, but an efficient oil recovery program adds up in terms of the amount of final product.

**Second wash:** This repeats the same ingredients as the first. The break layer will take longer to form, and may take overnight to fall away. This can be stirred with two bamboo skewers, sometimes it then separates. Alternatively, after allowing the oil to sit for an hour or so, the jar can be spun gently, helping the break to detach and submerge. Small amounts of leftover oil can again be consolidated and recovered, or incorporated into a washing cycle in the near future. About 10 to 15 percent of the oil by volume is again removed.

**Third wash:** This repeats the same ingredients, and may also take time to clear, with the break more likely to cling to the oil layer. The oil then needs to be transferred to a clean jar with as little of the break layer as possible. About 5 to 10 percent of the oil is removed.

**Rinse:** The final rinse is 0.50 liters of oil (2 cups) shaken with 1 liter (4 cups) of water and 80 grams (1/4 cup) of pool sand. This is done with at least three changes of water, but the exchange from jar to jar does not have to be exacting. The oil will be very turbid after this, but will clarify somewhat overnight. A very fine line of brighter yellow break is usually discernible at this point between the oil and the water. The oil can now be carefully removed from the water with a baster or large syringe. This will get most of it, water is then added so the remaining oil is close to the top of the jar, making it easy to ladle or spoon off. This oil wants to be as clean as possible. Again, leftover small amounts of oil from several jars can be consolidated into one, making it easier to salvage.

**Clearing and Storing:** The resulting oil is somewhat lighter in colour, but will be slightly cloudy

when it is finished due to residual water in the oil. Allowing it to rest for a day or two after the final rinse, before decanting, will allow some of the trapped water to fall out. There are several traditional ways to clear it, the simplest being to heat it – slowly and carefully – to just above the boiling point of water. The water in the oil may pop and crackle as it exits – if this becomes excessive turn the heat down – and any small amount of break carried over will be fried and go to the bottom of the pan. An oil which remains slightly turbid after heating can be put in the freezer overnight, then put in the light. One or two rounds of this will typically make it crystal clear. Oil which will be aged in a temperate climate on a windowsill will clear naturally over the winter.

Alternatively, the oil can be heated to 150°C for four hours. This makes it ready for use right away. However, this process means it cannot be used for making paint, and does change its working characteristics, making it just slightly thicker and more gelatinous, therefore less likely to run.

The oil can also be aged in the light with a small addition of alkaline stone dust to help neutralize any developing acid and further clean the oil of fatty acids. Both chalk and lime are mentioned by Eastlake in a late 17<sup>th</sup> century reference. A small amount of lime is also recommended both by Laurie and his predecessor at The Royal Academy, A.H. Church. A powder of dried hydrated lime (pit lime, fresco plaster) or agricultural hydrated lime is used for this at 0.125 gr (1/8 t) per 0.25 (1 cup) liters of oil. This is calcium hydroxide, not the much more caustic calcium oxide, and has proved both safe and functional in practice. Natural chalk is also added at 9 gr (1T) per 0.25 liters (1 cup) of oil. While lead is not necessary to make the oil dry well, a small addition of litharge – 10 gr (1t) per 0.25 liters of oil, shaken well – has been shown to slowly precipitate even more fatty acids out of the oil as it ages in the light. Lime is not used in conjunction with litharge as the oil may darken somewhat. Laurie also recommends the addition of white lead, 4 gr (1t) per 0.25 liters of oil can be used with chalk and lime. However, the oil dries in a day or two without the use of any lead. The oil is stored in a sunny windowsill in relatively full glass jars. These are not made too full as the oil expands in summer in the heat. A half full jar, on the other hand, will slowly begin to thicken, which may or may not be desired. Jars left half full for long periods need to have their lids left loose as the polymerizing oil will create a surprisingly strong vacuum over time. Wehlte warns that this can literally cause a jar to implode. While this has not actually happened in practice, lids have needed to be punctured to break the vacuum before the jar could be opened.

Another possibility before final storage is exposing the oil to oxygen for approximately one to two weeks, this situation is temperature sensitive and may go longer in the winter. If the layer of oil is thin – 250 ml in a 12x12 inch glass baking dish – almost all colour is removed through this method, and the oil develops a bit more body. Any remaining colour is quickly removed by exposure to the sun in glass. The oil becomes just perceptibly thicker through this method, and dries a bit faster. Longer exposure in the tray produces *Studio Oil* (section 4.19.2.2). Variations of this method using a lead tray are covered in *Unsun Oil*, (section 4.19.4.5).

**Bulk Oil Procedure:** A bulk cold-pressed organic oil can be chosen over the branded nutritional varieties, and will be significantly more economical for larger scale processing. These oils are typically somewhat older, have been exposed to more oxygen, and come in two types: one which is edible, the other of which is designed for use in high quality paint of one kind or another. The edible type offers the assurance of minimal processing – in spite of all these oils being theoretically “unrefined,” this word seems to have several definitions – and is typically more alkaline: smelling sweet, not sour or acrid. The various bulk oils also shed their break readily, but not quite as readily or cleanly as an oil protected from interaction with oxygen and light. Processing bulk oils can be helped by the substitution of a larger aggregate for the sponge such as coarser marble dust (150-300 μ), by the addition of 20 gr (1T) of fine aquarium sand to the pool sand, or both. It is also logical, once familiar with the procedure, to begin processing bulk oil in bulk. This is covered in *Motorized Alternatives and Larger Scale Processing*, below.

**Adjustments and Fine Points:** If the boundary between the oil and break layer is not clean, spinning the jar will help resolve it and then allow clumps of break to fall to the bottom of the jar. The fatty acids themselves are a pale gray. If the break in a set of jars seems to contain trapped oil – more yellow means more trapped oil – it can simply be transferred to a jar of its own, mixed with unsalted water, and stirred with skewers, checked again in a day, or placed in a hot water bath on very low heat. While physically sturdy, canning jars are sensitive to thermal shock and should always be heated or cooled slowly. Putting a cold jar in hot water, or water hotter than tap water in a particularly cold jar, can result in cracking. Even being careful, jars need to be inspected periodically for cracks at the base,

any cracked jar discarded. Canning jar lids need to be replaced from time to time as they build up enough residue to not close quite tightly enough for leak-free shaking. Jars are most easily cleaned with vegetable soap and sodium carbonate – washing soda – before the oil and fatty-acid residue in them has dried. Jars with dried residue can be soaked in water and sodium carbonate and will eventually come clean again. A procedure which may prove interesting at some point is to take a portion of the removed fatty acid break and allow it to dry out in a thin layer on a plate. The result will be a very thin tissue whose consistency resembles old newsprint, having no elasticity or film strength.

**Possible Further Refinements:** In modern oil refining, the first phase of the process is called degumming. This has typically been done with a mild acid, both phosphoric and citric acid are common, but more recent procedures have introduced enzymatic degumming using EDTA or other proprietary enzymes. The purpose of degumming is to eliminate the phospholipids. Water is recognized as taking care of a large proportion of the phospholipids, so the original 17<sup>th</sup> century process does accomplish this to some extent. But there are also phospholipids which are not soluble in water unless treated with acid first. The question of whether this matters to the final quality of the oil for painting would be difficult to answer without significant testing. No modern information on it has been encountered, and no older recipes which incorporate the concept of an initial acid wash. It may be that, because the function of the phospholipids, along with the tocopherols, is anti-oxidant, their elimination leads to a faster drying oil. But, since HRO linseed oil dries very quickly in any event, the difference involved in getting all of the phospholipids out may be moot in practice. However, a preliminary wash with sand and raw apple cider vinegar reduced to approximately 1 percent acidity (one part 5 percent vinegar to three parts water) in hot water did act on the oil more noticeably than a similar wash of citric acid, and might be considered if emulating the steps of the modern process in a milder manner is of interest.

Other mild alkaline ingredients were tried in place of or in conjunction with the salt. Alum, for example, is mentioned in De Mayerne (119). This and sodium bicarbonate were tested but did not seem to make a difference. Similarly, other forms of salt – halite, (inexpensive) and unprocessed sea salt (expensive) – didn't appear to have any affect. Dead Sea salt seemed to have a negative effect and was not pursued. The procedure did prove sensitive to certain types of changes, however, such as substituting clean snow for the salt water. While only intermittently available, the highly ionized water in snow was at least as efficient at attracting the break out of the oil as the warm salt water. Another interesting variation is the addition of coarse calcium carbonate “sand,” available from specialty suppliers of painting materials but also in larger pet stores as “Calci-sand.” Other ingredients which produced significant changes even in very small amounts were borax and washing soda (sodium carbonate). Borax can be introduced at 0.125 gr (a scant 1/16<sup>th</sup> teaspoon) per quart or liter cups of water if local water is quite hard and may aid the efficiency of the washing process. Sodium carbonate, on the other hand, even in quite small amounts (0.33 gr, (1/16 t) per quart or liter of water), has the effect of saponifying the fatty acids, capturing or entraining a significant amount of oil and making for a long process of de-emulsification, even with subsequent water only washing. While sodium carbonate does not harm or saponify the triglycerides, it may be too strong for the procedure in any amount without finding a way – besides waiting for days – to cause it to release the entrained oil once again. It has proven very useful, however, as an adjunct for cleaning jars.

Finally, it is important to note that the oldest agent for refining the oil was simply water, and that the final water-only rinse can be repeated several times with cumulative benefit, especially if rainwater is readily available, or high quality water is available without cost, or if the oil will be used without preheating or a period of aging in the light.

**Integrating the Process:** With an involved procedure it can be appealing to dive in, create a lifetime supply, and then move on. With regard to refining the oil, it may prove helpful to be patient and feel one's way with how a given oil and set of ingredients responds. The procedure can be done quickly, but it doesn't need to be. A step could be taken each day, meaning four days from start to finish. The behavior of oil is subtle, and experience has shown that, within the often harried context of modern life, it is easy to miss things that are cumulatively important. By exploring the procedure moderately and consistently, much more will be known about it by the end of a few months. It has become integrated into the working routine, one's technique with the baster improves, and a decent inventory of oil begins to accumulate. If, for example, two quarts of oil are processed each month in four half gallon jars, this gives, at the end of a year, about four gallons of oil at a moderate expense per month. This provides a relatively effortless way to slowly accumulate that highly prized commodity, aged oil. Painters who

work large, or want to make their own paint might go to a larger amount after a few rounds of getting to know the procedure. Eight half gallon jars are needed to process a gallon of oil. This has proven to be a reasonable and economical manual scale of production for developing the procedure. Wide mouth gallon jars are that much more efficient if they can be handled.

## The Colour of the Oil

Painters tend – strongly! – to believe that the lightest oil must be the best. This may have been one reason behind the original exhaustive 17<sup>th</sup> century washing procedure recast by Eastlake: in addition to losing the fatty acids, the oil loses all organic colouring matter. But what actually matters is not the colour the oil starts out, but the colour it ends up after drying. The orange colour of organic, unrefined, cold-pressed linseed oil is fugitive: it is not responsible for any aspect of the long term darkening of the oil. This orange colour can be removed by a treatment with bleaching clay – attapulgate, or Fuller's Earth – as is common in the commercial process for edible oils. In the studio the colour is removed in a week or two, a centrifuge is helpful for actually removing the finest particles of clay which otherwise remain in suspension for months. But this oil will not dry faster, and still contains all the fatty acids which can contribute to long term darkening. Bleaching the oil via this method is also not mentioned in any older text. As such, this process may well be of doubtful utility for painters refining their own oils, although it is a cosmetic treatment to which, of course, all commercial oils are treated, because a light oil *looks so much better*. The traditional method of allowing the finished oil to remain in full jars with alkaline additions on a sunny, south facing windowsill has proven to minimize long term yellowing. If colourless oil is desired, it can be achieved by placing the oil, once processed, in a thin layer in a glass tray exposed to oxygen. In two or three weeks, all colour will be gone from the oil.

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