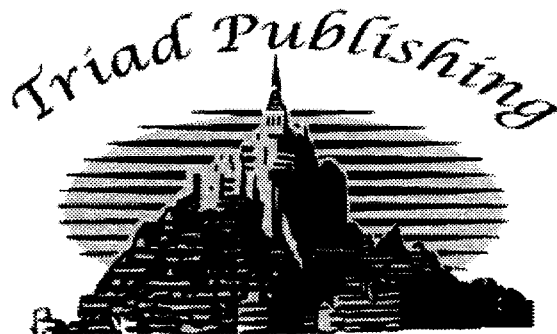


# THE ACETATE PATH

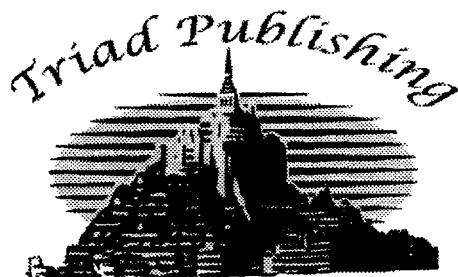
## *Resource Papers, Volume 1*

Collected by

Russell House







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Dear Reader,

I originally collected these papers as a resource for students who would participate in the seminar I conducted on this topic for The Philosophers of Nature in September 1997. Mr. Jean Dubuis knew of my plans for this seminar and decided to travel from France to share his considerable experience on the acetates with us. The videotapes of this seminar are available from Triad Publishing.

Compiled from a number of resources, ancient and modern, the writings collected here have been useful to me in my research on the 'Acetate Path'. Nothing, however, can compare in value with the generous and knowledgeable instruction that I received in 1985 from a teacher I will refer to as '*Artofferus*'. I hope that the videotape will show procedures and processes that will save much wasted labor, and remove the fear of the unknown. In addition, perhaps some things are said by way of veiled comments that will open new portals for your investigations.

Our hope is now, as it was then, to provide the best information and techniques known to us so that others can go further that we have been able to do.

With best wishes for you in your path of self-discovery,

Russ House



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## THE ACETATES PATH: A Paper by Jean Dubuis

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In the Antimony paths, such as Basilius Valentine's, Nicolas Flamel's or others', the principle induced is the one of the "Immortal" energy of the Antimony. We incorporate it to the mercury, liquid metal that will be able to transfer it to gold. The philosophical stone obtained by this system is only revived and evolved gold. The advantage of this method is that the life of antimony is not fragile.

In the acetates path, the principle engaged is different. It consists in incorporating the plant life, the plant consciousness, in the metal and thus accelerate its evolution and give it some kind of mineral-plant life. One of the big difficulties of this system is due to the fragility of the plant life.

We have explained in another text that the plant or the animal life could be sustained only by elements that had 4 electrons on their external layer.

In the mineral realm, the possible elements will therefore be: lead, tin, germanium, and silicon. Only lead and tin are metals, germanium and silicon being only semi-conductors, semi-metals.

Several alchemists have tried the tin path, but it presents big chemical problems, so this path has been abandoned despite its esoteric interest since it should theoretically give access to an important occult knowledge on the level of Jupiter.

Thus, lead is revealed to be the most interesting metal for the acetates path.

One of the important problems on this path is distillation or decomposition of the acetates. We have mainly experimented with 3 decompositions in this area: copper, calcium, and lead.

Concerning copper, regular vinegar easily attacks copper oxide. After filtration, the concentration of the solution gives copper acetate crystals. The decomposition of this acetate gives the radical vinegar that is, in fact, acetic acid very close to 100 %, but having a blue color because of some principles issued from copper. This preparation remains long and unpleasant because of the odors, so we gave it up after setting up the concentration of the vinegar through congelation. It is certain that in concentrating the vinegar through congelation, the plant life is maintained, which is not the case during the decomposition of the copper acetate.

Concerning calcium, its acetate is the only one which decomposition gives acetone. If the calcium used to produce the acetate contains a part of animal life (oyster shells for instance), the acetone obtained is the Acetone of the Ancients. A long decanting gives a red oil with interesting and beneficial properties.

Yet, the real alchemical acetates path will only be obtained through lead.

The problem of the purity of products exists in alchemy. However, the most important one remains that of **life**. It is why it is useless to purify a product if this purification destroys life.

In order to follow the path of **life** - the lazy man's way - we must obtain a little oak barrel having an opening on top and a faucet in the bottom. In it, throw all the left-overs of bottles of red wine, and even, of the glasses of red wine left over after meals. But only red wine and nothing else is to be used. Some time after a "mother" will build up in the barrel.

Remove the vinegar and pass it through a paper filter.

Pour this vinegar in a plate. Add slowly natural cerussite as long as the vinegar can dissolve it. (No Soxhlet, no heating). Place this plate in a sunny place. Protect it from dust with a fabric made of proper netting.

## THE ACETATES PATH: A Paper by Jean Dubuis

When all has evaporated, there remains in the plate an impure acetate in which the life of the acetate was not destroyed though the solar evaporation.

Prepare, through distillation of red wine and concentration through carbonate, an alcohol at 97-98%.

Pour it on the residues of the plate by trying to dissolve as much as possible of the product before filtration. The alcohol will dissolve the acetate but will not dissolve the impurities of the cerussite ore based on silicon.

Pour this alcohol in a clean plate and proceed with a solar evaporation. The small quantity retrieved will be a **living** acetate.

Have this living acetate evolve for several months at a temperature of 40 degrees Centigrade. When **life** will have had the elements of the acetate evolve, its decomposition will give evolved products.

It must be noted that the solar evaporation has interesting and irreplaceable chemical and alchemical properties. For example, let us follow the process of the Spirit of Menderenus, a very interesting experience:

Prepare acetic acid from vinegar, through congelation, in order to obtain an acid of about 60-70 %. Pour this acid in a solution of commercial ammonia until the pH indicates 7. Try to concentrate the solution with a regular fire. All will evaporate.

Place the solution in a plate under the Sun. Crystals will form in the solution. Retrieve the crystals in a flask. Otherwise they will sublime around 70 degrees Centigrade. These crystals are what is called "Spirit of Mendelenus", or, in our modern language, "ammonium acetate". It is even said that, at small doses, these crystals wipe out any trace of alcohol in the body.

During the dry distillation of the lead acetate, we obtain a red-orange liquid, the Sulfur. Then come gases very hard to condense. To obtain this condensation, Frater Albertus advised cooling with dry ice in acetone.

Another, easier, process for condensation, gives an identical result: mix ice and calcium chloride. It is possible to reach minus 55 centigrade.

According to Frater Albertus, the liquid obtained is the Philosophical Mercury. This Philosophical Mercury will be **animated** if the plant **life** has not been destroyed. It should then extract the tincture from gold. This liquid is close to acetaldehyde.

For the sake of curiosity, we tried to transfer the life of antimony into this liquid. Pieces of stibnite immersed in this liquid give very long and very thin translucent crystals. Our thinking is that these crystals are the Salt of Nature described in the text "the simplest path". We never succeeded in getting a significant quantity of these acetaldehyde crystals.

After this operation, this liquid does not extract the tincture from gold.

Jean DUBUIS



*accomplished astrologer and musician.*

3/24/94 UPDATE ON  
MELISSA EXPERIMENT.

We are imbibing Melissa salts on several different days and hours to see the results.

#### **Imbibing Melissa salts on Thursday at the Jupiter hour:**

We have been imbibing for three months. The salt is still accepting the tincture. We made the tincture by recovering the red honey [as shown in Fall, 93 seminar by Michel Auger. - Ed] and adding some tincture of Melissa saved from the original extraction.

#### **Imbibing Melissa salts on Saturday at the Jupiter hour:**

We have been imbibing for one month and the salt is accepting the tincture. We made the tincture the same way as in the example above.

The imbibed salts are being kept in an incubator at the correct temperature and out of the light.

Another batch of Melissa salts is being prepared to work in the same way as the above. We have decided to work the salts and do the imbibing on Sunday at the Jupiter hour to see the results.

Hint: It is helpful to color code the jars according to the day of the week on which they are imbibed. This helps to avoid mistakes.

Hint: If you are using a closed system for water circulation when using a condenser, it is helpful to use frozen cold packs in the water being circulated. Freezing 4 or 5 of them allows you to exchange them when they get warm, and then refreeze.

#### **METALLIC ALCHEMY:**

### **Some Comments on the Acetate Paths**

Jean Dubuis and the officers of LPN France are aware that there are difficulties related to the Flamel and Urbigerus paths because of the use of metallic mercury. Considering the problems of safety and issues of legality related to mercury work, Jean decided to share his insights on the acetate work. There are still issues of toxicity and other potential problems (corrosive acids, problems of flammability, pressure, cost of equipment, and lengthy processes), the path can lead to results of some value, with less danger.

The following notes are taken from the lecture given by Jean. They are not a complete transcription, nor are they adequate for someone who is just beginning laboratory work to proceed. Jean has prepared some lessons on this topic, which are published in various places in Mineral Lessons numbers 23 through 51, with a more concentrated study given in lessons 31-40. Jean is considering publishing 12 new lessons on the topic, which would incorporate materials given in the lecture. If there is a large interest on the topic, I will arrange for one or more practical seminars on the acetates. Please write to the address on the cover stating your interest. If you are able to arrange for facilities and wish to host for class of 10-12

persons for a weekend class, please indicate that as well.

#### **Theoretical Aspects**

Jean spoke of his researches on the Table of Mendeleev which arranges the chemical elements in columns and rows according to atomic properties. Column 4, wherein we find carbon, silicon, germanium, tin and lead is considered the most important column for the acetate path. Simply stated, the method of this path is to fix vegetable life on a metal so that the metal will evolve like a vegetable. In the column, we will find carbon, the basis of organic chemistry, and lead, the easiest metal to use in the path.

For the acetate work, we will need two alchemical liquids which must carry the secret fire. These are fermented by living things. The secret fire comes into our realm through the media of the air, and descends to the earth through dew and rain. In the earth, it is determined to the vegetable kingdom, generally through potassium salts. The grape is rich in these salts. The vine produces the grape, and from the grape juice, through a fermentation comes wine. A further acetic fermentation produces vinegar. Wine and vinegar are separately distilled.

#### **A Delicate Matter**

Alcohol distilled from wine which is over 70% pure, and concentrated vinegar over 20% acetic acid are delicate matters, and are readily influenced by the psychic energy of the alchemist and others. For this reason, these liquids must be preserved out of the sight and presence of all but the alchemist or their mate, to avoid the contamination. Aluminum is in the column of elements which are toxic to alchemical life. As a result

aluminum and boron compounds are not permitted to contact these, or other living products. Aluminum foil can be used, however, to wrap a bottle and to act as a shield against their interference. These should be stored in the oratory, in the dark.

### Liquid Batteries

These vegetable kingdom mercuries, philosophical alcohol and vinegar, act as storage batteries to retain, and then to give back the alchemical life in the acetate process. These liquids are not in themselves 'mercuries', the mercury being an invisible energy. Rather, these liquids are suitable vehicles for the energy.

Vinegar is more difficult to process by distillation than wine alcohol, requiring 30 or more distillations for purification. A alternative method is to take plastic bottles, and to fill 3/4 full with red wine vinegar of approximately 7% acidity. These are put in the freezer horizontally, and frozen at -30 degrees C.

The portion which does not freeze is decanted into a graduated vessel. 30 to 50 ml per liter will be acid. The portions which are 60 to 80 percent acid are distilled separately from the batches which are 20 to 50% acid. See *ORA ET LABORA* #2 for details.

### Radical Vinegar

A radical vinegar, which is blue in color can be prepared as follows: One needs copper oxide. It is best to prepare it yourself using old copper wires. The purity of copper in electrical wire is often quite high. The wires are put in the furnace and heated until they form a black material. The 20 to 50% acetic acid attained as above is poured over the wires in a flask and allowed to digest at moderate heat for a week. A Soxhlet extractor is not suitable for this step. The resulting blue liquid is quite toxic. It should be

filtered, and then distilled to remove 3/4 of the liquid. The fumes are hazardous and the stink is horrible, so the process should take place outdoors. Distillation must stop before the material is dry! Permit the liquid to crystallize, in a beaker for example. When crystal form, remove them from the container. One should work in this manner to obtain 2 kilograms (about 4.4 pounds) of copper acetate crystals, and dry them at 110 to 120 degrees C.

These crystals are distilled slowly, and an acetic acid of 99% or higher will distill over. This is called 'radical vinegar'. It is blue in color. Jean stated that Paracelsus College taught that the acid thus obtained should be redistilled to remove the blue color, as the copper was a toxic contaminant. It should not be distilled, as it would then lose its philosophical nature, effectively losing its determination on the level of Netzach (the sphere of Venus, which corresponds to copper), and returning to Malkuth on the Qabalistic tree of life. The coloration is due to the acid drawing the alchemical sulfur of the copper.

### On the Other Hand...

The problems of alcohol preparation are better known, in general. A method for distillation was suggested in the previous issue of the newsletter. Alcohol of 95% purity is digested on potassium carbonate for 1 or 2 days. Jean states that the potassium never metalizes the alcohol. One can redistill to get rid of the yellow color if desired. This must be prepared so that it is 100% pure alcohol.

### Acetate Purity Issues

The preferred material to be used to form a lead acetate is galena, a lead sulfide. Previously Jean had used cerussite, a lead carbonate ore. It is

easier to work with, but presents certain drawbacks. The Australian ore was not a crystalline ore, and had many impurities. During extraction in a Soxhlet, the various color changes were one of the indications of the impure material. The resulting product is not lead acetate, but rather a mixture of various acetates.

# h

### Roasting of Galena

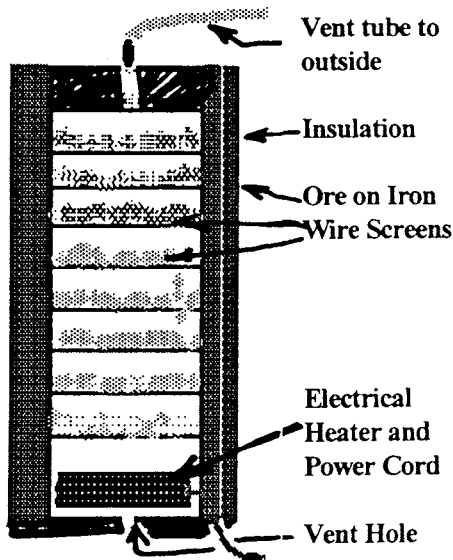
Lead sulfide ore is not easily attacked by acetic acid, so a lengthy roasting process is required in order to create a suitable material. A sketch of the device used to permit a slow, progressive roasting is published in the newsletter. A number of racks made of metal screen are stacked in a closed, vented furnace with an electrical heater producing heat in the range of 150 to 300 degrees C. All trays are loaded. After a month of continual heating, the lower tray is removed, all other trays lowered one level, and a tray of new material placed on top. The diagram indicates a tube leading outside to vent noxious fumes. The 150 degree heat should work in a month, a 300 degree heat in a week. The resulting material is extracted in a Soxhlet with the radical vinegar. The liquid is then filtered and slowly crystallized, yielding philosophical crystals of lead acetate.

### Transfer of Life

The acetic acid content must be removed from the crystals, to permit the transfer of vegetal life. Absolute alcohol, the 100% alcohol previously obtained, is circulated over the crystals. The added alcohol forms an acetic ether, with a distinct

odor. After circulation the material is recrystallized, then circulated again in pure alcohol. The lead dissolves very slowly in the alcohol. An acetic smell at any stage indicates that it is necessary to continue. The cycle of circulation and crystallization continues for 2 to 3 months. The resulting material is placed with philosophical alcohol in the incubator for a month at 40 degrees C during a lunar cycle to facilitate the transfer of the energy in it into the metal.

*NEXT MONTH* we will continue with distillation of the lead acetate, various cooling methods, calcination of the black lion, making the philosophers egg, imbibition, lighting the secret fire, and formation of the white stone. Also, a useful acetate path with oyster shells will be revealed.



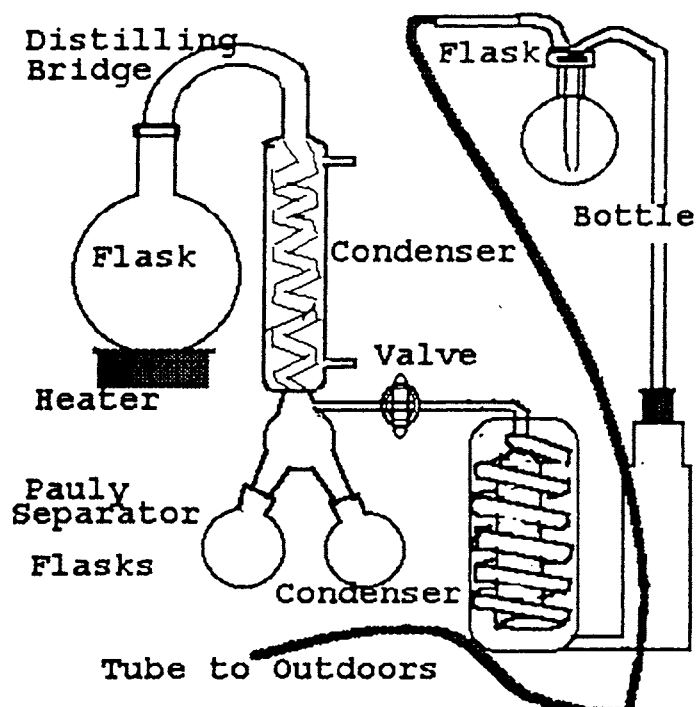
*Please continue to send your donations to help support the costs of publishing & mailing Ora et Labora. Our next issue should be available in April.*

*Russ House*

## Comments on the Acetate Paths - Part 2

This is the final portion of the notes I took during the lecture by Jean Dubuis in San Jose, California. The first part of the notes was published in the March, 1994 issue of *Ora et Labora*. - Russ House

After incubation for a month, the material is ready to be distilled. Please refer to the figure below. [The details of the lower coil condenser are inadequate to construct such a piece of apparatus. Full details will be provided upon request. Please enclose SASE...].



The Pauly Separator is to be considered mandatory. The lower condenser should be well insulated. The outer chamber is filled with cooling liquid. For example, 100 grams of ice with 143 grams of  $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$  (Calcium chloride), will give a temperature of 55-60 degrees below 0 Celsius. This is easier to use than mixtures like acetone and dry ice.

Distillation causes a variety of liquids to be driven off and condensed, which necessitates the Pauly separator. First will come any residual alcohol, with the 'water of crystallization'. There should be no acetic acid distillate. When red oil begins to appear, there will also be white smoke throughout the system. When the white fumes start, stop the heat.

There should be about 250 ml of volatile distillate in the lower condenser. In the high-placed flask, 5 or 6 ml of distillate will collect. It is to be kept closed for a full day, after which time, some red oil may separate from the mixture.

The volatile distillate should be frozen in a silicone sealed flask until required. This is the so-called Philosophical Mercury according to some.

To test the 'mercury' pure gold should be placed in a well sealed flask or tube with some of the volatile liquid and incubated for one month at 40 degrees C. If the mercury is good, it will take a tincture from the gold.

The black-gray material in the bottom of the distilling flask, the so-called "Black Lion", will self calcine if it comes into contact with the air when it is hot. It will heat to 700-800 degrees C! Therefore, only open it when it is cold. Crush to dust on a ceramic plate, making a layer 1-2 mm thick. Ignite it with a hot poker, and it will rapidly combust. This will yield the *terra foliata*, or foliated earth. This is a metallic earth.

One now has the earth, which is a *salt*, the red oil which is the *sulphur*, and the volatile *mercury*. Don't be greedy, use lots of mercury. In any case, you will make only a small stone. Imbibe the earth with the red oil. Saturate and digest for a week. Repeat 3 or 4 times. The material is then placed in a 'philosophical egg', and the mercury from the freezer is added, to a proportion of 1/3 of the volume of earth. Place in the incubator. It must not see the light at all while in incubation, as we are working to light the 'dark fire'. In 2 to 3 days at the appropriate temperature, the

secret fire is lighted, and after 8 days, the mercury is fixed. Remove the egg from the incubator, and dip the egg into hot water, at the same temperature as the temperature to light the fire. Now one uses dry ice and NaCl (sodium chloride or salt) in the collar around the egg. Additional mercury from the freezer is added slowly, with the egg inclined or banked so that the mercury is not rapidly heated when it contacts the earth. There is a problem of high pressures at this time. This is repeated seven or eight times over a 3 or 4 month period, after which time it is possible to get a stone.

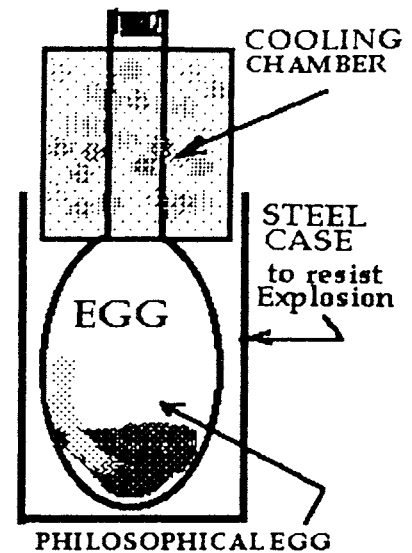
A completed stone appears like a hard, white wax. It is the white stone. Copper, silver or mercury can be transmuted with it. Copper is transmuted at a 1:1 ratio of copper to stone. Jean has not multiplied this white stone. It is thought that it could be multiplied with silver. In trying to take the stone to the red work, Jean thinks that it may be possible to use the mercury to dissolve gold, and then use that mercury in the work.

In another method of making the stone, which method was given to Jean by a good German alchemist, the *terra foliata* is imbibed with the red oil, and placed in a sealed ceramic crucible. The crucible lid was clamped to the crucible with a clamp made of metal plates above and below, with asbestos pads between the ceramic and metal surfaces. Jean used 12 crucibles for the work. In this process, to fix the life or oil is critical. Begin with incubation at 40-50-60 degrees C. At each stage, open one crucible to see if it is yet fixed. Raise the temperature slowly, open another and examine the matter. It is an initiation of the matter, which will follow a specific color sequence: black (Earth), blue (Water), yellow (Air), red (Fire), white again (Quintessence). Raise the heat slowly 50 degrees a month to 300 degrees C. After 150 degrees C in this process, the matter is generally fixed.

### USES OF THE WHITE PHILOSOPHERS STONE

Even if not multiplied it is a certain maximum sephirothic level. White stones go up to level 7 (Netzach), red stones to 6, 5, and 4 (Tiphareth, Geburah, Chesed). It is a medicine of the heart and soul, giving initiatic experiences. In an alcoholic distillation (?) it gives initiatic experiences on Yesod (level 9). If multiplied once, it gives experiences on Hod (level 8), and multiplied again on Netzach (level 7). This only applies to the alchemist who made the stone. For others there will be light experiences, conscious dreams, but significant healing effects.

ORA ET LABORA



### CAUTION

The sulphur of gold (gold tincture) can cure many illnesses. Even in homeopathic dilution, it modifies the blood. One should be careful with gold preparations. If  $\text{AuCl}_3$  (gold chloride) was used in the preparation, it can be very toxic. Native gold should be used, and the tincture dispensed homeopathically.

*Since giving this lecture and returning to France, Jean has begun seminars on the topic on France. Further, he plans to write a series of lessons on the acetate path. I apologize for the number of 'holes' in the notes which relate to the distillation of the acetate. The processes were not unlike those already known to me in those particulars, so I was not taking detailed notes on that aspect of the work.*



this alloy renders it much more solid, and the mixed mass continues tolerably ductile.

If, on the contrary, to one part of tin ten parts of copper be added, together with a little zinc, a semi-metal to be considered hereafter, from this combination there results a metalline compound, which is hard, brittle, and very sonorous; so that it is used for casting bells: This composition is called *bronze* and *bell-metal*.

Tin hath an affinity with the vitriolic, nitrous, and marine acids. All of them attack and corrode it; yet none of them is able to dissolve it without great difficulty: So that if a clear solution thereof be desired, particular methods must be employed for that purpose; for the acids do but in a manner calcine it, and convert it to a kind of white calx or precipitate. The solvent which has the greatest power over it is *aqua regis*, which has even a greater affinity therewith than with gold itself; whence it follows, that gold dissolved in *aqua regis* may be precipitated by means of tin; but then the *aqua regis* must be weakened. Gold thus precipitated by tin is of a most beautiful colour, and is used for a red in enamelling and painting on porcelain, as also to give a red colour to artificial gems. If the *aqua regis* be not lowered, the precipitate will not have the purple colour.

Tin hath the property of giving a great lustre to all red colours in general; on which account it is used by the dyers for striking a beautiful scarlet, and tin-vessels are employed in making fine syrup of violets. Water does not act upon this metal, as it does upon iron and copper; for which reason it is not subject to rust: nevertheless, when it is exposed to the air, its surface soon loses its polish and splendor.

Tin mixed with nitre, and exposed to the fire, detonates with it, makes it detonate, and is immediately converted to a *refractory calx*; for so all substances are called which are incapable of fusion.

Tin readily unites with sulphur, and with it becomes a brittle and friable mass.

#### Of LEAD.

NEXT to gold and mercury, lead is the heaviest of all metalline substances, but in hardness is exceeded by every one of them. Of all metals also it melts the easiest, except tin. While it is in fusion there gathers incessantly on its surface, as on that of tin, a blackish, dusty pellicle, which is nothing but a calx of lead.

This calx further calcined by a moderate fire, the flame being reverberated on it, soon grows white. If the calcination be continued it becomes yellow, and at last of a beautiful red. In this state it is called *minium*, and is used as a pigment. *Minium* is not easily made, and the operation succeeds well in large manufactures only.

To convert lead into *litharge*, which is the metal in a manner half vitrified, you need only keep it melted by a pretty strong fire; for then, as its surface gradually calcines, it tends more and more to fusion and vitrification.

All these preparations of lead are greatly disposed to perfect fusion and vitrification, and for that purpose require but a moderate degree of fire; the calx or earth of

lead being of all metalline earths that which vitrifies the most easily.

Lead hath not only the property of turning into glass with the greatest facility, but it hath also that of promoting greatly the vitrification of all the other imperfect metals; and, when it is actually vitrified, procures the ready fusion of all earths and stones in general, even those which are refractory, that is, which could not be fused without its help.

Glass of lead, besides its great fusibility, hath also the singular property of being so subtle and active as to corrode and penetrate the crucibles in which it is melted, unless they be of an earth that is exceeding hard, compact, and withal very refractory: for glass of lead being one of the most powerful fluxes that we know, if the earth of the crucible in which it is melted be in the smallest degree fusible, it will be immediately vitrified; especially if there be any metallic matter in its composition.

The great activity of glass of lead may be weakened by joining it with other vitrifiable matters; but unless these be added in a very great proportion, it will still remain powerful enough to penetrate common earths, and carry off the matters combined with it.

On these properties of lead, and of the glass of lead, depends the whole business of refining gold and silver. It hath been shewn, that as these two metals are indestructible by fire, and the only ones which have that advantage, they may be separated from the imperfect metals, when mixed therewith, by exposing the compound to a degree of fire sufficiently strong to vitrify the latter; which when once converted into glass can no longer remain united with any metal that has its metalline form. But it is very difficult to procure this vitrification of the imperfect metals, when united with gold and silver; nay, it is in a manner impossible to vitrify them entirely, for two reasons: first, because most of them are naturally very difficult to vitrify; secondly, because the union they have contracted with the perfect metals defends them, in a manner, from the action of the fire, and that so much the more effectually as the proportion of the perfect metals is greater; which being indestructible, and in some sort coating over those which they are alloyed, serve them as a preservative and impenetrable shield against the utmost violence of fire.

It is therefore clear, that a great deal of labour may be saved, and that gold and silver may be refined to a much greater degree of purity than can otherwise be obtained, if to a mixture of these metals with copper, for instance, or any other imperfect metal, be added a certain quantity of lead. For the lead, by its known property, will infallibly produce the desired vitrification; and as it likewise increases the proportion of the imperfect metals, and so lessens that of the perfect metals, in the mass, it evidently deprives the former of a part of their guard, and so effects a more complete vitrification. As the glass of lead hath the property of running through the crucible, and carrying with it the matters which it has vitrified, it follows, that when the vitrification of the imperfect metals is effected by its means, all those vitrified matters together penetrate the vessel containing the fused metalline mass, disappear, and leave only the gold and silver perfectly

perfectly pure, and freed, as far as is possible, from all admixture of heterogeneous parts.

The better to promote the separation of such parts, it is usual to employ in this process a particular sort of small crucibles, made of the ashes of calcined bones, which are exceedingly porous and easily pervaded. They are called *cupels*, on account of their figure, which is that of a wide-mouthed cup: and from hence the operation takes its name; for when we refine gold and silver in this manner, we are said to *cupel* those metals. It is easy to perceive, that the more lead is added, the more accurately will the gold and silver be refined; and that so much the more lead ought to be added as the perfect metals are alloyed with a greater proportion of the imperfect. This is the most severe trial to which a perfect metal can be put, and consequently any metal that stands it may be fairly considered as such.

In order to denote the fineness of gold, it is supposed to be divided into twenty-four parts called *carats*; and gold, which is quite pure and free from all alloy, is said to be twenty four carats fine; that which contains  $\frac{1}{24}$  part of alloy is called gold of twenty-three carats; that which contains  $\frac{2}{24}$  of alloy is but twenty-two carats; and so on. Silver again is supposed to be divided into twelve parts only, which are called *penny-weights*; so that when absolutely pure it is said to be twelve penny-weights fine; when it contains  $\frac{1}{12}$  of alloy, it is then called eleven penny-weights fine; when it contains  $\frac{2}{12}$  of alloy, it is called ten penny-weights fine; and so on.

In treating of copper, we promised to shew under the article of lead how to separate it from iron. The process is founded on that property of lead which renders it incapable of mixing and uniting with iron, though it readily dissolves all other metalline substances. Therefore if you have a mass compounded of copper and iron, it must be fused with a certain quantity of lead, and then the copper, having a greater affinity with lead than with iron, will desert the latter and join the former, which being incapable of any union with iron, as was said, will wholly exclude it from the new compound. The next point is to separate the lead from the copper; which is done by exposing the mass compounded of these two metals to a degree of fire strong enough to deprive the lead of its metalline form, but too weak to have the same effect on the copper: and this may be done, since of all the imperfect metals lead is, next to tin, the easiest to be calcined, and copper, on the contrary, resists the greatest force of fire longest, without losing its metalline form. Now what we gain by this exchange, *viz.* by separating copper from iron, and uniting it with lead, consists in this, that as lead is calcined with less fire than iron, the copper is less exposed to be destroyed: for it must be observed, that, however moderate the fire be, it is hardly possible to prevent a certain quantity thereof from being calcined in the operation.

Lead melted with a third part of tin forms a compound, which being exposed to a fire capable of making it thoroughly red hot, swells, puffs up, seems in some sort to take fire, and is presently calcined. These two metals mixed together are much sooner calcined than either of them separately.

Both lead and tin are in some measure affected by water, and by a moist air; but they are both much less subject than iron or copper to be corroded by these solvents, and of course are much less liable to rust.

The vitriolic acid acts upon and dissolves lead much in the same manner as it doth silver.

The nitrous acid dissolves this metal with much ease, and in great quantities; and from this solution a small portion of mercury may be obtained.

When this solution of lead is diluted with a good deal of water, the lead precipitates in the form of a white powder; which happens because the acid is rendered too weak to keep the lead dissolved.

If this solution of lead be evaporated to a certain degree, it shoots into crystals formed like regular pyramids with square bases. These crystals are of a yellowish colour, and of a saccharine taste: they do not easily dissolve in water. This nitrous metalline salt has the singular property of detonating in a crucible, without any additament, or the contact of any other inflammable substance. This property it derives from the great quantity of phlogiston contained in, and but loosely connected with the lead, which is one of its principles.

If spirit of salt, or even sea-salt in substance, be added to a solution of lead in the nitrous acid, a white precipitate immediately falls; which is no other than the lead united with the marine acid. This precipitate is extremely like the precipitate of silver made in the same manner; and that being called *luna cornea*, hath occasioned this to be named *plumbum corneum*. Like the *luna cornea*, it is very fusible, and, being melted, hardens like it into a kind of horny substance: it is volatile, and may be reduced by means of inflammable matters combined with alkalis. But it differs from the *luna cornea* in this chiefly, that it dissolves easily in water; whereas the *luna cornea*, on the contrary, dissolves therein with great difficulty, and in a very small quantity.

As this precipitation of lead from its solution in spirit of nitre is procured by the marine acid, lead is thereby proved to have a greater affinity with the latter acid than with the former. Yet, if you attempt to dissolve lead directly by the acid of sea-salt, the solution is not so easily effected as by the spirit of nitre, and it is always imperfect; for it wants one of the conditions essential to every solution in a liquor, namely transparency.

If lead be boiled for a long time in a lixivium of fixed alkali, part of it will be dissolved.

Sulphur renders this metal refractory and scarce fusible; and the mass they form when united together is friable. Hence it appears that sulphur acts upon lead much in the same manner as upon tin; that is, it renders both these metals less fusible, which are naturally the most fusible of any, while it exceedingly facilitates the fusion of silver, copper, and iron, metals which of themselves flow with the greatest difficulty.

#### Of QUICK-SILVER.

WE treat of quick-silver in a chapter apart, because this metallic substance cannot be classed with the metals properly so called, and yet has some properties which



intimately mixed by distillation, form a liquor slightly acid, used in medicine, and known by the name of *sweet* or *dulcified spirit of nitre*: a very proper name, seeing the nitrous acid, by uniting with the spirit of wine, actually loses almost all its acidity and corrosive quality.

Fifthly, when the distillation is finished, there remains in the bottom of the vessel a thick, blackish substance, nearly resembling that which is found after distilling oil of vitriol and spirit of wine.

Spirit of salt hath likewise been combined with spirit of wine; but it does not unite therewith so easily or so intimately as the two acids above mentioned. To mix them thoroughly, the spirit of salt must be highly concentrated, and smoking; and moreover the assistance of the still must be called in. Some authors pretend, that from this mixture also a small quantity of oil may be obtained; which probably happens when the liquors have the qualities above specified. The marine acid likewise, by uniting with spirit of wine, loses most of its acidity; on which account it is in like manner called *sweet* or *dulcified spirit of salt*. A thick residuum is also found here after distillation.

#### Of the ACETOUS FERMENTATION.

BESIDES an ardent spirit, wine affords a great deal of water, oil, earth, and a sort of acid which shall be considered presently. When the spirituous part is separated from these other matters, they undergo no further change. But if all the constituent parts of wine remain combined together, then, after some time, shorter or longer as the degree of heat in which the wine stands is greater or less, the fermentation begins afresh, or rather arrives at its second stage. The liquor once more grows turbid, a new intestine motion arises, and after some days it is found changed into an acid; which, however, is very different from those hitherto treated of. The liquor then takes the name of *vinegar*. The acetous fermentation differs from the spirituous, not only in its effect, but also in several of its concomitant circumstances. Moderate motion is of service to this, whereas it obstructs the spirituous; and it is attended with much more warmth than the spirituous. The vapours it produces are not noxious, like those of fermenting wine. Lastly, Vinegar deposits no tartar, even when the wine employed in this operation is quite new, and hath not had time to discharge its tartar: instead of tartar, vinegar deposits a viscid matter which is very apt to putrify.

#### Of VINEGAR.

If wine, which has gone through this second stage of fermentation, be distilled, instead of an ardent spirit, only an acid liquor is obtained, which is called *distilled vinegar*.

This acid has the same properties as the mineral acids; that is, it unites with alkaline salts, absorbent earths, and metallic substances, and therewith forms neutral saline combinations.

Its affinity with these substances observes the same order as that observed by the mineral acids with regard to

the same substances; but in general it is weaker; that is, any mineral acid is capable of expelling the acid of vinegar out of all matters with which it is united.

Vinegar hath likewise a greater affinity than sulphur with alkalis: whence it follows, that it is capable of decomposing that combination of sulphur with an alkali called liver of sulphur, and of precipitating the sulphur it contains.

The acid of vinegar is always clogged with a certain proportion of oily parts, which greatly weaken it, and deprive it of much of its activity; and for this reason it is not near so strong as the mineral acids, which are not entangled with any oil. By distillation, indeed, it may be freed from this oil, and at the same time from the great quantity of water which in a manner suffocates it, and by that means may be brought much nearer to the nature of the mineral acids: but this attempt hath not yet been prosecuted with the assiduity it deserves. Besides distillation, there is another way of freeing vinegar from a good deal of its phlegm; and that is, by exposing it to a hard frost, which readily congeals the watery part into ice, while the acid retains its fluidity.

Vinegar, saturated with a fixed alkali, forms a neutral oily salt, of a dark colour, which is semi-volatile, melts with a very gentle heat, flames when thrown upon burning coals, and dissolves in spirit of wine, of which, however, it requires six parts to complete the solution. This solution being evaporated to dryness leaves a matter in the form of leaves lying on each other; on which account it hath obtained the name of *terra foliata*. The same foliated matter will be obtained, though the salt be not previously dissolved in spirit of wine; but not so readily. This salt is also called *regenerated tartar*. Under the head of tartar we shall see the reason of these different appellations. Regenerated tartar is also in some degree capable of crystallizing: for this purpose a resolution thereof in water must be slowly evaporated to the consistence of a syrup, and then suffered to stand quiet in a cool place; by which means it will shoot into clusters of crystals, lying one upon another, not unlike the feathers on a quill.

With vinegar and several absorbent earths, such as calcined pearls, coral, shells of fish, &c. are also formed neutral saline compounds, each of which take the name of the particular earth employed in its composition.

Vinegar perfectly dissolves lead, and converts it to a neutral metallic salt, which shoots into crystals, and has a sweet saccharine taste. This compound is called *sugar of lead*, or *sal Saturni*.

If lead be exposed to the bare vapour of vinegar, it will be thereby corroded, calcined, and converted into a white matter much used in painting, and known by the name of *ceruse*, or, when it is finer than ordinary, *white-lead*.

Vinegar corrodes copper likewise, and converts it into a beautiful green rust, which also is used in painting, and distinguished by the name of *verdigris*. However, vinegar is not commonly employed to make verdigris: for this purpose they use wine, or the rape of wine, from which fire extricates an acid analogous to that of vinegar.

*To extract Lead from its Ore.*

HAVING roasted your lead-ore, reduce it to a fine powder; mix it with twice its weight of the black flux, and one fourth of its weight of clean iron filings and borax; put the whole into a crucible capable of containing at least thrice as much; over all put sea-salt four fingers thick; cover the crucible; lute the juncture; dry the whole with a gentle heat, and set it in a melting furnace.

Make the crucible moderately red: you will hear the sea-salt decrepitate, and after the decrepitation a small hissing in the crucible. Keep up the same degree of fire till that be over.

Then throw in as many coals as are necessary to complete the operation entirely, and raise the fire suddenly, so as to bring the whole mixture into perfect fusion. Keep up this degree of fire for a quarter of an hour, which is time sufficient for the precipitation of the regulus.

When the operation is finished, which may be known by the quietness of the matter in the crucible, and by a bright vivid flame that will rise from it, take the crucible out of the furnace, and separate the regulus from the scoria.

*To separate Lead from Copper.*

WITH luting earth and charcoal-dust make a flat vessel, widening upwards, and large enough to contain your metalline mass. Set it shelving downwards from the back towards the fore-part; and in the fore-part, at the bottom, make a little gutter communicating with another vessel of the same nature, placed near the former and a little lower. Let the mouth of the gutter within side the upper vessel be narrowed, by means of a small iron plate fixed across it, while the loam is yet soft; so as to leave a very small aperture in the lower part of this canal sufficient to discharge the lead as it melts. Dry the whole by placing lighted coals round it.

When this apparatus is dry, put your mixed mass of copper and lead into the upper vessel: both in that, and in the other vessel, light a very gentle fire of wood or charcoal, so as not to exceed the degree of heat necessary to melt lead. In such a degree of heat the lead contained in the mixed mass will melt, and you will see it run out of the upper vessel into the lower; at the bottom of which it will unite into a regulus. When in this degree of heat no more lead flows, increase the fire a little, so as to make the vessel moderately red.

When no more will run, collect the lead contained in the lower vessel. Melt it over again in an iron ladle, with a degree of fire sufficient to make the ladle red; throw into it a little tallow or pitch, and while it burns keep stirring the metal, in order to reduce any part of it that may be calcined. Remove the pellicle or thin crust which will form on the surface; squeeze out all the lead it contains, and then put it to the mass of copper left in the upper vessel. Check the fire, and in the same manner take off a second skin that will form on the surface of the lead. Lastly, when the metal is ready to fix, take off the skin that will then appear on it. The lead

remaining after this will be very pure, and free from all alloy of copper.

With regard to the copper itself, you will find it in the upper vessel covered with a thin coat of lead, and if the lead mixed with it was in the proportion of a fourth or a fifth part only, and the fire applied was gentle and slow, it will retain nearly the same form after the operation that the mixed mass had before.

*The Calcination of Lead.*

TAKE what quantity of lead you please; melt it in one or more unglazed earthen pans: a dark grey powder will be found on its surface. Keep stirring the metal incessantly till it be wholly converted into such a powder, which is the *calx of lead*.

In the calcination of all metals, and particularly in this of lead, there appears a singular phenomenon which is not easily accounted for. It is this: though these matters lose a great deal of their substance, either by the dissipation of their phlogiston, or because some of the metal perhaps exhales in vapours, yet, when the calcination is over, their calxes are found to be increased in weight, and this increase is very considerable. An hundred pounds of lead, for example, converted into minium, which is nothing but a calx of lead brought to a red colour by continuing the calcination, are found to gain ten pounds weight; so that for an hundred pounds of lead we have one hundred and ten pounds of minium: a prodigious and almost incredible augmentation, if it be considered that, far from adding any thing to the lead, we have on the contrary dissipated part of it.

*To prepare Glass of Lead.*

TAKE two parts of litharge, and one part of pure crystalline sand; mingle them together as exactly as possible, adding a little nitre and sea-salt: put this mixture into a crucible of the most solid and most compact earth. Shut the crucible with a cover that may perfectly close it.

Set the crucible thus prepared in a melting furnace; fill the furnace with coals; light the fire gradually, so that the whole may be slowly heated: Then raise the fire so as to make the crucible very red, and bring the matter it contains into fusion; keep it thus melted for a quarter of an hour.

Then take the crucible out of the furnace, and break it: In the bottom thereof you will most commonly find a small button of lead, and over it a transparent glass of a yellow colour nearly resembling that of amber. Separate this glass from the little button of metal, and from the saline matters which you will find above it.

*Lead dissolved by the Nitrous Acid.*

PUT into a matras some *aqua fortis* precipitated like that used to dissolve silver; weaken it by mixing therewith an equal quantity of common water; set the matras in a hot sand-bath; throw into it, little by little, small bits of lead, till you see that no more will dissolve. *Aqua fortis* thus lowered will dissolve about a fourth of its weight of lead.

There is gradually formed upon the lead, as it dissolves, first a grey powder, and afterwards a white crust; which

When no effervescence appears upon stirring the liquor, add a little more cream of tartar, and the same phenomena will be renewed. Go on thus till you have obtained the point of perfect saturation.

Then filter your liquor. If the alkali you made use of was the salt of Soda, evaporate your liquor quickly to a pellicle, and there will shoot in it crystals of nine sides resembling a coffin; the bottom part thereof being concave, and streaked with a great many parallel lines; and this is *Suignette's salt*. If you have employed any other alkali but soda, or the basis of sea-salt, evaporate your liquor slowly to the consistence of a syrup: let it stand quiet; and there will form in it crystals having the figure of flatted parallelepipeds; and this is the *vegetable salt*, or *tartarified tartar*.

All soluble tartars are easily decomposed, by means of a certain degree of heat. They yield in distillation the same principles as tartar; and the alkali that remains when they are perfectly calcined, consists of that which the tartar naturally affords, and of the alkaline matter with which it was converted into a neutral salt.

*Crystal of Tartar combined with Iron. Chalybeated Tartar. Tincture of Steel with Tartar. Soluble Chalybeated Tartar.*

Mix four ounces of iron in filings with one pound of white tartar finely pulverised. Boil the mixture in about twelve times as much water as you took of tartar. When the saline part of the tartar is dissolved, filter the liquor boiling-hot through a flannel bag, and then set it in a cool place. In a very little time crystals of a russet colour will shoot therein. Decant the liquor from these crystals; evaporate it to a pellicle, and set it again to crystallise. Go on in this manner till it will shoot no more. Collect all the salt you have thus obtained, and keep it under the name of *chalybeated tartar*.

To make the tincture of steel with tartar, mix together six ounces of clean iron filings, and one pound of white tartar in powder. Put this mixture into a large iron kettle, and pour thereon as much rain-water as will moisten it. Make a paste of this matter, and leave it thus in a mass for twenty-four hours. Then pour on it twelve pounds of rain-water, and boil the whole for twelve hours at least, stirring the mixture frequently, and adding from time to time some hot water, to supply the place of what evaporates. When you have thus boiled the liquor, let it stand quiet for some time, and then pour it off from the sediment at bottom. Filter, and evaporate to the consistence of a syrup; and you have the *tincture of Mars with tartar*. The dispensatories generally order an ounce of rectified spirit of wine to be poured on this tincture, in order to preserve it, and to keep it from growing mouldy, as it is very apt to do.

*Soluble chalybeated tartar* is prepared by mixing four ounces of tartarified tartar with one pound of the tincture of Mars with tartar, and evaporating them together in an iron vessel to dryness; after which it is kept in a well stopped phial to prevent its growing moist in the air.

*Crystal of Tartar combined with the reguline part of Antimony. Stibiated or Emetic tartar.*

PULVERISE and mix together equal parts of the glass and of the liver of antimony. Put this mixture, with the same quantity of pulverised cream of tartar, into a vessel capable of containing as much water as will dissolve the cream of tartar. Boil the whole for twelve hours, from time to time adding warm water, to replace what is dissipated by evaporation. Having thus boiled your liquor, filter it while boiling hot; evaporate to dryness; and you will have a saline matter, which is *emetic tartar*.

*Of the Product of Acetous Fermentation.*

*Substances susceptible of the Acetous Fermentation turned into Vinegar.*

THE wine, the cyder, or the malt-liquor, you intend to convert into vinegar, being first thoroughly mixed with its lees, and with the tartar it may have deposited, put your liquor into a vat used before either for making or for holding vinegar. This vessel must not be quite full, and the external air must have access to the liquor contained in it. Set it where the air may have a degree of warmth answering nearly to the twentieth degree above 0 in Mr de Reaumur's thermometer. Stir the liquor from time to time. There will arise in it a new fermentative motion, accompanied with heat: its vinous odour will gradually change, and turn to a sour smell, which will become stronger and stronger till the fermentation be finished and cease of itself. Then stop your vessel close; the liquor it contains will be found converted into vinegar.

All substances that have undergone the spirituous fermentation are capable of being changed into an acid by passing through this second fermentation, or this second stage of fermentation. Spirituous liquors, such as wine, cyder, beer, being exposed to a hot air, grow sour in a very short time. Nay, these liquors, though kept with all possible care, in very close vessels, and in a cool place, degenerate at last, change their natures, and insensibly turn sour. Thus the product of spirituous fermentation naturally and spontaneously degenerates to an acid.

For this reason it is of great importance, in making wine, or any other vinous liquor, to stop the fermentation entirely, if you desire the wine should contain as much spirit as possible. It is even more advantageous to check the fermentation a little before it come to the height than afterwards; because the fermentation, tho' slackened and in appearance totally ceased, still continues in the vessels; but in a manner so much the less perceptible as it proceeds more slowly. Thus those liquors, in which the fermentation is not quite finished, but checked, continue for some time to gain more spirit; whereas, on the contrary, they degenerate and gradually turn sour, if you let the spirituous fermentation go on till it be entirely finished.

The production of the second fermentation, which we are now to consider, is an acid of so much the greater strength.

strength; the stronger and more generous the spirituous liquor in which it is excited originally was. The strength of this acid, commonly called *vinegar*, depends likewise in a great measure on the methods used in fermenting the vinous liquor, in order to convert it into vinegar: for if it be fermented in broad, flat vessels, and left to grow sour of itself, the spirituous parts will be dissipated, and the liquor be sour indeed, but vapid and effete.

The vinegar-makers, to increase the strength of their vinegar, use certain methods of which they make a mystery, keeping them very secret. However, Mr. Boerhaave give us, from some authors, the following description of a process for making vinegar:

“Take two large oaken vats or hogheads, and in each of these place a wooden grate or hurdle, at the distance of a foot from the bottom. Set the vessel upright, and on the grates place a moderately close layer of green twigs, or fresh cuttings of the vine. Then fill up the vessel with the foot-stalks of grapes, commonly called the *rape*, to within a foot of the top of the vessel, which must be left quite open.

“Having thus prepared the two vessels, pour into them the wine to be converted into vinegar, so as to fill one of them quite up, and the other but half full. Leave them thus for twenty-four hours, and then fill up the half-filled vessel with liquor from that which is quite full, and which will now in its turn be left only half full. Four and twenty hours afterwards repeat the same operation, and go on thus, keeping the vessels alternately full and half full during every twenty-four hours, till the vinegar be made. On the second or third day there will arise, in the half-filled vessel, a fermentative motion, accompanied with a sensible heat, which will gradually increase from day to day. On the contrary, the fermenting motion is almost imperceptible in the full vessel; and as the two vessels are alternately full and half full, the fermentation is by that means, in some measure, interrupted, and is only renewed every other day, in each vessel.

“When this motion appears to be entirely ceased, even in the half-filled vessel, it is a sign that the fermentation is finished; and therefore the vinegar is then to be put into common casks close stopped, and kept in a cool place.

“A greater or less degree of warmth accelerates or checks this, as well as the spirituous fermentation. In France it is finished in about fifteen days, during the summer; but if the heat of the air be very great, and exceed the twenty-fifth degree of Mr de Réaumur's thermometer, the half-filled vessel must be filled up every twelve hours; because if the fermentation be not so checked in that time, it will become so violent, and the liquor will be so heated, that many of the spirituous parts, on which the strength of the vinegar depends, will be dissipated; so that nothing will remain, after the fermentation, but a vapid wash, sour indeed, but effete. The better to prevent the dissipation of the spirituous parts, it is a proper and usual precaution to close the mouth of the half-filled vessel, in which the liquor ferments, with a cover made also of oak wood. As to the

full vessel, it is always left open, that the air may act freely on the liquor it contains: for it is not liable to the same inconveniences, because it ferments but very slowly.”

The vine-cuttings and grape-stalks, which the vinegar-makers put into their vessels, serve to increase the strength of the liquor. These matters contain a very manifest and perceptible acid. They also serve as a ferment; that is, they dispose the wine to become eager more expeditiously and more vigorously. They are the better and the more efficacious for having been once used, because they are thereby thoroughly drenched with the fermented acid: and therefore the vinegar-makers lay them by for preparing other vinegar, after washing them nimbly in running water, in order to free them from a viscid oily matter which settles on them during the fermentation. This matter must by all means be removed; because it is disposed to grow mouldy and rot; so that it cannot but be prejudicial to any liquor in which you put it.

As the acetous fermentation differs from the spirituous in its production, so it doth in many circumstances attending it. 1. Motion and agitation are not prejudicial to the acetous fermentation, as they are to the spirituous; on the contrary, moderate stirring, provided it be not continued, is of service to it. 2. This fermentation is accompanied with remarkable heat; whereas the warmth of the spirituous fermentation is scarce sensible. 3. We do not believe there ever was an instance of the vapour that rises from a liquor in acetous fermentation proving noxious, and producing either disorders or sudden death, as the vapour of fermenting wine doth. 4. Vinegar deposits a viscid oily matter, as hath just been observed, very different from the lees and tartar of wine. Vinegar never deposits any tartar; even though new wine, that hath not yet deposited its tartar, should be used in making it.

#### *To concentrate vinegar by Frost.*

EXPOSE to the air, in frosty weather, the vinegar you desire to concentrate. Icicles will form in it; but the whole liquor will not freeze. Take out those icicles and if you desire a further concentration of your vinegar by this method, the liquor which did not freeze the first time must be exposed to a stronger frost. More icicles will form therein, which must likewise be separated, and kept by themselves. The liquor which doth not freeze this second time will be a very strong concentrated vinegar.

#### *Vinegar analysed by Distillation.*

INTO a glass or stone cucurbit put the vinegar to be distilled; fit to it a glass head; place your alembic in the sand-bath of a distilling furnace, and lute on a receiver. Apply a very gentle heat at first. A clear, limpid, light liquor will rise, and fall in distinct drops, like water, from the nose of the alembic.

Continue distilling this first liquor, till the vinegar contained in the cucurbit be diminished about a fourth part. Then shift your receiver, and increase the fire a little. A clear liquor will still come over, but heavier and more acid

acid than the former. Distil in this manner till you have drawn off into your second receiver two thirds of the liquor that was left in the cucurbit.

A thick matter will now remain at the bottom of the still: put it into a retort; lute on a receiver; set your retort in a reverberating furnace, and distil with degrees of fire. There will come over a limpid liquor, very acid and sharp, yet ponderous, and requiring a great degree of fire to raise it; on which account it makes the receiver very hot. It hath a strong empyreumatic smell. When the distillation begins to slacken, increase your fire. There will rise an oil of a fetid, quick smell. At last when nothing more will rise with the strongest fire, break the retort, and in it you will find a black charred matter: burn it, and from the ashes lixiviated with water you will obtain a fixed alkali.

*The Acid of Vinegar combined with different Substances.*

*The Acid of Vinegar combined with Alkaline Substances. Foliated Salt of Tartar, or regenerated Tartar. Decomposition of that Salt.*

INTO a glass cucurbit put some very pure and well dried salt of tartar; and pour on it some good distilled vinegar, by little and little at a time. An effervescence will arise. Pour on more vinegar, till you attain the point of saturation. Then fit a head to the cucurbit; set it in a sand bath; and, having luted on a receiver, distil with a gentle heat, and very slowly, till nothing remain but a dry matter. On this residuum drop a little of the same vinegar; and if any effervescence appears, add more vinegar till you attain the point of saturation, and distil again as before. If you observe no effervescence, the operation was rightly performed.

It is not easy to hit the exact point of saturation in preparing this neutral salt; because the oily parts, with which the acid of vinegar is loaded, hinder it from acting so briskly and readily as it would do, if it were as pure as the mineral acids: and for this reason it often happens, that, when we have nearly attained the point of saturation, the addition of an acid makes no sensible effervescence, though the alkali be not yet entirely saturated; which deceives the operator, and makes him conclude erroneously that he hath attained the true point of saturation.

But he easily perceives his mistake, when, after having separated from this saline compound all its superfluous moisture by distillation, he drops fresh vinegar upon it: for then the salts being more concentrated, and consequently more active, produce an effervescence, which would not have been sensible if this last portion of acid, instead of coming into immediate contact with the dried alkali, could not have mixed therewith till diffused through, and in a manner suffocated by that phlegm from which the acid of the vinegar before neutralised was gradually separated by its combining with the alkali; that phlegm keeping in solution both the neutral salt already formed, and the alkali not yet saturated. And for this reason it is necessary to try, after the first desiccation of

this salt, which is called *regenerated tartar*, whether or no the just point of saturation hath been attained.

From what hath been said, concerning the desiccation of this neutral salt, it is plain, that the use of it is only to free the salt from the great quantity of superfluous moisture wherein it is dissolved: which proves, that the acid of vinegar, like all other acids dissolved in much water, is separated from most of this redundant phlegm by being combined with a fixed alkali. And hence we must conclude, that the acid of vinegar, contained in regenerated tartar desiccated, is vastly stronger and more concentrated than it was before.

Though the acid of vinegar is freed, by combining with a fixed alkali, from a great quantity of superfluous phlegm, yet the oily parts with which it is entangled still cleave to it: these parts are not separated from it by its conversion into a neutral salt, but, without quitting it, combine also with the fixed alkali; and this gives regenerated tartar a saponaceous quality, and several other peculiar properties.

Regenerated tartar, when dried, is of a brown colour. It is semi-volatile; melts with a very gentle heat, and then resembles an unctuous liquor; which indicates its containing an oil: when cast upon live coals, it flames; and, when distilled with a strong heat, yields an actual oil; all which evidently proves the existence of that oil.

This salt is soluble in spirit of wine; a quality which it probably owes also to its oil. It requires about six parts of spirit of wine to dissolve it; and the dissolution succeeds very well in a matras, with the help of a gentle warmth. If the spirit of wine be abstracted from this solution, by distilling with a small fire, it remains at the bottom of the cucurbit, in the form of a dry substance composed of leaves lying one upon another; which hath procured it the name of *terra foliata tartari*, or *foliated salt of tartar*.

It is not absolutely necessary that regenerated tartar be dissolved in spirit of wine to make the foliated salt: for it may be procured in this form only by evaporating the water in which it is dissolved. But the operation succeeds better with spirit of wine; probably because the success thereof depends on using an exceeding gentle warmth: now spirit of wine evaporates with much less heat than water.

Regenerated tartar may also be crystallised. If you desire to have it in this form, combine the acid with the alkali to the point of saturation; evaporate the liquor slowly to the consistence of a syrup, and set it in a cool place; where it will shoot into clusters of crystals lying one upon another like feathers.

Vinegar perfectly dissolves absorbent matters also, and particularly those of the animal kingdom; such as corals, crabs eyes, pearls, &c. In order to a dissolution of such matters, you must pulverise them, put them into a matras, and pour on them spirit of vinegar to the depth of four fingers breadth: an effervescence will arise: when that is over, set the mixture to digest two or three days in a sand-bath; then decant the liquor, filter it, and evaporate it to dryness with a very gentle heat. The matter which remains is called *salt of coral, of pearls,*

of

of crabs-eyes, &c. according to the substances dissolved. If, instead of evaporating the liquor, a fixed alkali be mixed therewith, the absorbent matter, that was dissolved by the acid, will precipitate in the form of a white powder, which is called the *magistery of coral*, of pearls, &c.

*The Acid of Vinegar combined with copper. Verdegris. Crystals of Copper. This Combination decomposed. Spirit of Verdegris.*

INTO a large matras put verdegris in powder. Pour on it distilled vinegar to the depth of four fingers breadth. Set the matras in a moderate sand-heat, and leave the whole in digestion, shaking it from time to time. The vinegar will acquire a very deep blue-green colour. When the liquor is sufficiently coloured, pour it off by inclination. Put some fresh vinegar into the matras; digest as before; and decant the liquor again when it is sufficiently coloured. Proceed in this manner till the vinegar will extract no more colour. There will remain in the matras a considerable quantity of undissolved matter. The vinegar thus impregnated with verdegris is called *tincture of copper*.

Mix these several tinctures, and evaporate them with a gentle heat to a pellicle. Then set the liquor in a cool place: in the space of a few days a great many crystals of a most beautiful green colour will shoot therein, and stick to the sides of the vessel. Pour off the liquor from the crystals; evaporate it again to a pellicle, and set it by to crystallise. Continue these evaporations and crystallisations, till no more crystals will shoot in the liquor. These are called *crystals of copper*, and are used in painting: To this combination of the acid of vinegar with copper the painters and dealers have given them the title of *distilled verdegris*.

Verdegris is prepared at Montpellier. To make it they take very clean plates of copper, which they lay, one over another, with husks of grapes between, and after a certain time take them out. Their surfaces are then covered all over with a very beautiful green crust, which is *verdegris*. This verdegris is nothing but copper corroded by the acid of tartar, analogous to the acid of vinegar, which abounds in the wines of Languedoc, and especially in the rape, husks, and stones of grapes that have a very austere taste. Verdegris is a sort of rust of copper, or copper corroded and opened by the acid of wine, but not yet converted entirely into a neutral salt: for it is not soluble in water, nor does it crystallise. This arises from its not being united with a sufficient quantity of acid. The design of the operation here described is to furnish the verdegris with the quantity of acid requisite to make it a true metallic salt; for which purpose distilled vinegar is very fit.

Crystals of copper may be obtained, without employing verdegris, by making use of copper itself dissolved by the acid of vinegar, according to the method practised with respect to lead, as shall be shewn hereafter. But verdegris is generally used, because it dissolves soonest; it being a copper already half dissolved by an acid correspondent to that of vinegar.

Crystals of copper are decomposed by the action of

fire alone, without any additament; because the acid of vinegar adheres but loosely to copper. In order to decompose this salt, and extract its acid, it must be put into a retort, and distilled in a reverberatory furnace with degrees of fire. An insipid phlegm rises first, which is the water retained by the salt in crystallising. This phlegm is succeeded by an acid liquor, which rises in the form of white vapours that fill the receiver. Towards the end of the distillation the fire must be violently urged, in order to raise the strongest and most fixed acid. At last there remains in the retort a black matter, which is nothing but copper, that may be reduced by melting it in a crucible with one part of saltpetre and two parts of tartar. A similar acid, but more oily, and in a much smaller quantity, may be obtained from verdegris by distillation.

The acid, which in this distillation comes over after the first phlegm, is an exceeding strong and concentrated vinegar. It is known by the title of *spirit of verdegris*.

*The Acid of Vinegar combined with Lead. Ceruse. Salt or Sugar of Lead. This Combination decomposed.*

INTO the glass head of a cucurbit put thin plates of lead, and secure them so that they may not fall out when the head is put upon the cucurbit. Fit on this head to a wide-mouthed cucurbit containing some vinegar. Set it in a sand-bath; lute on a receiver, and distil with a gentle heat for ten or twelve hours. Then take off the head: in it you will find the leaden plates covered, and in a manner, crusted over with a white matter. This being brushed off with a hare's foot is what we call *ceruse*. The leaden plates thus cleansed may be employed again for the same purpose, till they be wholly converted into ceruse by repeated distillations. During the operation there will come over into the receiver a liquor somewhat turbid and whitish. This is a distilled vinegar in which some lead is dissolved.

Reduce a quantity of ceruse into powder; put it into a matras; pour on it twelve or fifteen times as much distilled vinegar; set the matras in a sand-bath; leave the matter in digestion for a day, shaking it from time to time: then decant your liquor, and keep it apart. Pour fresh vinegar on what is left in the matras, and digest as before. Proceed thus till you have dissolved one half, or two thirds, of the ceruse.

Evaporate to a pellicle the liquors you poured off from the ceruse, and set them in a cool place. Greyish crystals will shoot therein. Decant the liquor from the crystals; evaporate it again to a pellicle, and set it by to crystallise. Proceed thus evaporating and crystallising, as long as any crystals will shoot. Dissolve your crystals in distilled vinegar, and evaporate the solution, which will then shoot into whiter and purer crystals. This is the *sal*, or *sugar of lead*.

Lead is easily dissolved by the acid of vinegar. If it be barely exposed to the vapour of that acid, its surface is corroded, and converted into a kind of calx or white rust, much used in painting, and known by the name of *ceruse*, or *white lead*. But this preparation of lead is not combined with a sufficient quantity of acid to convert

it into a salt: it is no more than lead divided and opened by the acid of vinegar; a matter which is to lead what verdegris is to copper. And therefore if you desire to combine ceruse with the quantity of acid necessary to convert it into a true neutral salt, you must treat it in the same manner as we did verdegris in order to procure crystals of copper; that is, you must dissolve it in distilled vinegar, as the process directs.

The salt of lead is not very white when first shoots; and for this reason it is dissolved again in distilled vinegar, and crystallised a second time. If salt of lead be repeatedly dissolved in distilled vinegar, and the liquor evaporated, it will grow thick; but still cannot be desiccated without great difficulty. If the same operation be oftener repeated, this quality will be thereby more and more increased; till at last it will remain on the fire like an oil or melted wax: it coagulates as it cools, and then looks, at first sight, like a metallic mass, somewhat resembling silver. This matter runs with a very gentle heat, almost as easily as wax.

The salt of lead hath a saccharine taste, which hath procured it the name also of sugar of lead. For this reason, when wine begins to turn sour, the sure way to cure it of that disagreeable taste, is to substitute a sweet one which is not disagreeable to the taste, by mixing therewith ceruse, litharge, or some such preparation of lead; for the acid of the wine dissolves the lead, and therewith forms a sugar of lead, which remains mixed with the wine, and hath a taste which, joined with that of the wine, is not unpleasent. But, as lead is one of the most dangerous poisons we know, this method ought never to be practised; and whoever uses such a pernicious drug deserves to be most severely punished. Yet some thing very like this happens every day, and must needs have very bad consequences; while there is nobody to blame, and those to whom the thing may prove fatal can have no mistrust of it.

Salt of lead may be decomposed by distillation without additament. In order to perform this, you must put the salt of lead into a glass or stone retort, leaving a full third thereof empty, and distil in a reverberating furnace with degrees of fire. A spirit rises, which fills the receiver with clouds. When nothing more will come over with a fire that makes the retort red-hot, let the vessels cool, and then unlute them. You will find in the receiver an austere liquor, which is inflammable; or, at least, an inflammable spirit may be obtained from it, if about one half thereof be drawn off by distillation in a glass alembic. The retort in which the salt of lead was decomposed contains, at the end of the operation, a blackish matter: this is lead, which will resume its metallic form on being melted in a crucible; because the acid by which it was dissolved, and from which it hath been separated, being of a very oily nature, hath left in it a sufficient quantity of phlogiston.

What is most remarkable in this decomposition of salt of lead, is the inflammable spirit which it yields, though the vinegar which entered into the composition of the salt seemed to contain none at all.

THE ART OF DISTILLATION

BY  
JOHN FRENCH

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WITH A NEW FORWARD

BY  
FRATER ALBERTUS

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With  
Illustrations Redrawn

By  
RICHARD GRIMES

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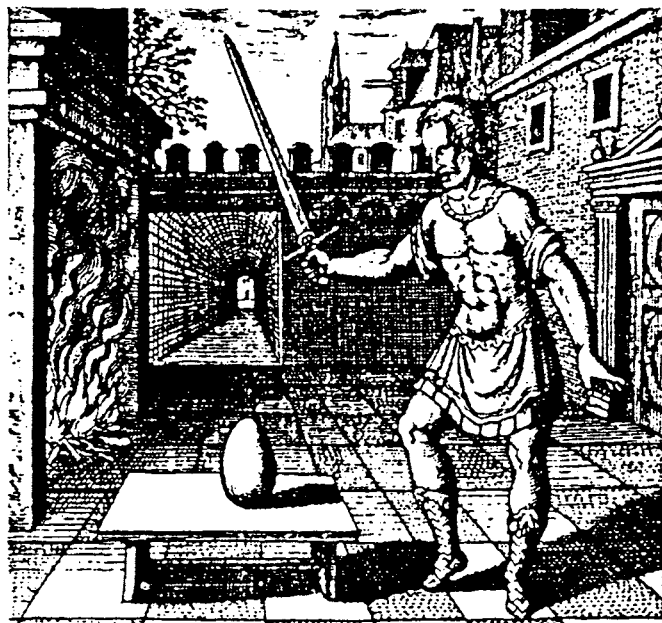
extracted. Filter and clarify all the menstruum being put together. Then evaporate it half away and set the other part in a cold place until it crystallizes. These crystals dissolve again in fresh spirit of vinegar. Filter and coagulate the liquor again into crystals, and this do often until they be sufficiently impregnated with the sal ammoniac of the vinegar as their proper ferment. Digest them in a temperate balneum that they may be resolved into a liquor like oil. Then distill this liquor in sand in a retort with a large receiver annexed to it, and well closed that no spirits evaporate, together with the observation of the degrees of the fire. Then there will distill forth a spirit of such a fragrant smell that the fragrancy of all flowers and compounded perfumes are not to be compared to it. After distillation when all things are cold, take out and cast away the black feces which is of no use. Then separate the yellow oil which swims on the top of the spirit and the blood red oil which sinks to the bottom of it. Separate the phlegm from the spirit in balneum. You shall by this means have a most fragrant spirit that even ravishes the senses, and so balsamical that it cures all old and new sores inward and outward, and so cordial that the dying are with admiration revived with it.

They that have this medicine need scarce use any other either for inward or outward griefs.

# *THE COMPLETE CHEMIST*

(1677)

OR A  
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TEACHING BY A SHORT AND EASY METHOD  
ALL ITS MOST  
NECESSARY PREPARATIONS



*Christopher Glaser*

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in the fire reduces them into Dross by the devouring *Sulphur* predominant in it. The *Chymists* call it *Saturn*, from its sympathy with that Planet; and though it be of a very coarse and impure composition, yet it affords good Medicines both internal and external.

'Tis to be observed that *Lead* in it self without having passed through the Artist's hands is a Metal friendly to Man, and causes no prejudice by it self through any malignant quality either within or without. For we see persons every day, who being shot, keep the Bullets in their Bodies without any inconvenience; and Plates made of *Lead* being applied outwardly soften the hardness of Nerves and Tendons, and take away divers external Tumors, which would not easily yield to other Remedies.

*The Purification of Lead.*

**B**Efore you can imploy *Lead*, 'tis necessary first to purify it as much as its imperfection admits, in order to extract out of it what is profitable. Melt it in a great Iron-spoon, then put to it by degrees some small pieces of *Wax* or *Soot*, which pieces presently flame and leave a little Scum upon the *Lead*, which must be taken off with an *Iron Spatula*.  
Cast

Cast new little pieces of *Soot* or *Wax* and take away the *Scum* in this manner, till the *Lead* remain as bright as a *Looking-glass*; then pour it into a *Basin*, and let it cool.

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*The Calcination of Lead.*

**P**UT *Lead* thus purified into a *Glass* not *Vernisht*, and set the same in a *Wind-Furnace* amidst the burning *Coals*. Yet the *Fire* must not be violent; but 'tis enough that the *Pot* be red, and the *Lead* melted. Stir it continually with an *Iron rod* till it be turned into *Powder*, or a grayish *Calx*, inclining to green; which let cool, and then by *sifting* separate its impurities.

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*Another Calcination of Lead.*

**L**AY some purified *Lead* upon a *Tile* that resists the *Fire*, and hath edges to keep the melted *Lead* from running into the *Fire*. Place the *Tile* in a *Reverberatory Fire*, so that the flame may beat continually upon the *Lead*. But the *Fire* must not be too violent; for then it will remain always melted, or else *Vitrific*; to prevent which, the *Fire* must be

be moderate, and the *Lead* must be stirred continually with an Iron-rod; so the *Lead* will first turn to a gray Powder somewhat greenish, and by continuing the motion it will become yellow, and at last red, at which time 'tis called *Minium*. The *Calx* of a Pound of *Lead* will be found encreased above two ounces, by reason of the Particles of Fire incorporated with it, and by their activity reducing it into very subtle parts. This augmentation is also observed in the *Calcination* of *Tin* and other imperfect Metals.

*Lead* is reduced into Dross, which is a sort of *Calcination*, in great *Cupples*, near the Mines, or in Mint-houses, when they purifie *Gold* and *Silver* by *Lead*, which destroys the imperfect Metals mixt with the perfect, and reduces them into Dross; which is called *Litharge* of *Gold* when it is drawn from the Cuppling of *Gold*, and *Litharge* of *Silver* when it is so drawn from *Silver*; and imploy'd for the purifying of these Metals.

*Another Calcination of Lead.*

TAKE a Pound of *Lead* purified as above; melt it in an Earthen Pot not Vernisht, that resists the Fire, Then cast into it half a pound of *Sulphur* grossly powdered, and stir it all together with an Iron-rod, till the  
*Sulphur*

*Sulphur* cease to flame and be consumed; and then you shall find the *Lead* in the bottom of the Pot in a black powder which is called *Plumbum Ustum*, or *Burnt Lead*.

---

*Another Calcination of Lead.*

**L**ead is also calcined by acid vapors, and by this means reduced into a white *Calx*. The process is as follows. Hang Plates of *Lead* in a covered Vessel, into the bottom of which there is some *Vinegar*; place the Vessel upon some gentle heat, or in Horse-dung; and the steams of the *Vinegar* will corrode the *Lead-plates*, and cause to come out of them a white Powder, like Flower, which gather off with a *Hare's-Foot*; and put the Plates again into the Vessel till they be all reduced into *Cenise*. You may make use of any of these *Calx's* for the preparations which are to be made upon *Lead*; but the grayish powder mentioned first is the most convenient of all.

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*Salt or Sugar of Saturn.*

TAke a pound of grayish powder of *Lead*; put it into a great *Matrice*, and pour upon it three pounds of distilled *Vinegar*. Set the *Matrice* in digestion in a *Sand-Furnace* during the space of twenty four hours, in which you must shake the *Matrice* now and then; otherwise the *Calx* will harden in the bottom of the Vessel and endanger to break it. Then pour off the distilled *Vinegar* by inclination into another Vessel; you will find it charged with the substance of the *Lead*, and its acidity turned to a great sweetness. Put new distilled *Vinegar* upon the *Lead*, and proceed as before, mixing and keeping all the *Solutions*. Continue to put new *Vinegar*, to digest, and to pour off by inclination, till the distilled *Vinegar* dissolve no more *Lead*, nor become sweet, or till all the *Lead* be dissolved, which it will not fail to be, provided the *Calx* of *Lead* be well made. Then filter all the *Solutions* through gray Paper, and put them into a *Gourd* with its *Alembick*, and *Recipient* in *Balneo Maria*; and you shall first draw off an insipid Water, the dissolved *Lead* retaining all the acid Spirits of the *Vinegar*; which incorporate with it and make a very white Crystalline Salt like Needles, resembling

*Salpeter* refined. This Liquor must not be distilled to *siccity*; but you must observe this proportion, that if you have dissolved a pound of *Lead* there must remain about four pounds of Liquor in the *Gourd*, to the end the Salt may Christallize. For when the Liquor is too clear, the Salt is too much diffused in it; and will not Christallize; and being too much deprived of moisture, the whole turns to a confused Mass.

Wherefore then take the *Gourd* out of the *Bath*, and set it in a cool place, during three or four days, at the end of which you shall find a good part of the Liquor turned into Salt. Separate the floating Liquor, and dry the Salt between two Papers. Afterwards put the Liquor which you had poured off by inclination, into a less *Gourd*, and distill off about a third part; then set the *Gourd* a day or two in a cool place, and you shall again find Crystallized Salt, which you shall dry as the first. Evaporate and Crystallize again the remaining Liquor, and reiterate the same operation, till you have reduced into *Crystals* all that is so reducible. And in case your Salt be not white enough the first time, dissolve it with the Phlegm of *Vinegar*, which filtre through gray Paper, and Crystallize as before; you shall thereby have a very fair Salt of *Saturn*. This Salt is a very good Medicine in the *Asthma*, and other diseases of the Breast, being given in some Pectoral Decoction. The Dose is from five



to fifteen grains. Tis also used outwardly with good success in Wounds, and Ulcers; for it kills and destroys the corroding Salts of them; it is likewise excellent for Inflammations, being dissolved in *Night-shade* water, or some other appropriate Water, and then applied. Moreover it serves well in *Lotions* for Inflammations and Itchings of the Eyes. But it is suspected inwardly for those that have weakness in the Kidnies, and parts necessary to Generation. And therefore in this case it must be used discreetly; and with great circumspection.

*The Magistery of Lead.*

Dissolve the *Calx* of *Lead* in *Vinegar*; Distilled as is taught in in the preceding *Chapter*. Pour off the *Solution* by Inclination, and pass it through gray Paper. Then put upon it some Oil of *Tartar, per deliquium*, and you will instantly see the Liquor as white as curdled Milk, whereon pour a good deal of common Water very clean; and let it settle; and the *Lead* will precipitate to the bottom in a white powder; and this is by reason of the Oyl of *Tartar*, which being an *Alkali* Salt dissolved, breaks the force of the distilled *Vinegar*, which had reduced the *Lead* into Liquor, and constrains it to let go its

its former hold. Pour off the floating Liquor by inclination, and put some common Water upon the Powder, to *Dulcify* it, which pour away when it is well settled. Repeat this washing so often till the Powder be wholly freed from the *Acrimony* of the Salts. Then dry it and keep it for use.

This *Magistery* is exceeding white, and good for *Pomatums*. But 'tis also used in *Unguents* and *Eye-Waters* as a good *Dissolutive*.

If out of curiosity you desire to reduce the *Salt*, or *Magistery* of *Saturn* into *Lead* as it was before; melt a little Salt of *Tartar* in a *Crusible*, then put thereto a little of this *Salt* or *Magistery*, and you shall see it presently return to *Lead*; for the *acid Spirit* of *Vinegar*, which kept the *Lead* in the form of a Salt or white Powder, is destroyed by the *Salt* of *Tartar*, by which it is at the same time both melted and reduced back to Metal.

*A burning Spirit of Saturn, (as it is called)*  
but rather, *A Spirit of the Volatile Salt*  
of *Vinegar*.

TAke two pound of *Salt* of *Saturn*; well purified by several *Solutions* and *Crystallizations* with distilled *Vinegar*. Put it into

a *Retort*, so as to fill the same but half way, and place it in a *Furnace* of Sand, fitting thereunto a large *Receiver*. Lute the joynings well, and make the Fire gentle at first. There will come forth in the first place a phlegmatick Water and afterwards the Spirit; which will cause the resemblance of Veins in the *Receiver*, as when you distill *Aquavite*: for this Spirit is almost of the same nature, proceeding from the *Volatile Salt* of the distilled *Vinegar*, which the *Lead* fixt and retained in its dissolution. But when this Spirit is urged by the Fire, it forsakes the body whereunto it adhered. Encrease the Fire by little and little and continue it to make the *Retort* red. There will come forth a red earthy Oil towards the end, but in very little quantity; which Oil some account the true *Red Oil of Saturn*, but erroneously, it being nothing else but the more heavy and earthy part of the distilled *Vinegar*. The Distillation being ended leave the Vessels to cool: then unlute the *Receiver*, wherein are the Phlegm, the Spirit and the Oil confusedly together, and there remains a black earth in the *Retort*. You must rectify what is in the *Receiver*, in a little *Gourd* in *Balneo Marie*: The Spirit will come forth first, which is inflammable like that of Wine; but it will smell like the Spirit of *Lavendar* or *Rosemary*: The Phlegm and the thick Oily Liquor will remain in the bottom of the *Gourd*. This Spirit is an excellent Remedy

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against

against the *Plague*, *Putrid Feavors*, and *Hypochondriacal Melancholy*. The Dose from 4 to 12 drops in some convenient Liquor. The Phlegm may serve to wash Wounds and *fetid Ulcers*. The Earth left in the *Retort*, is very black whilst inclosed; but as soon as you have broken the *Retort*, and it takes Air, it grows hot of it self and turns from black to yellow, and at the same time is rarified to the eye. If you put it into a *Cruet* sible to melt, it returns easily to *Lead*.

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an acid Liquor which we call Vinegar. We treat here onely of Wine-vinegar, as most employed in Medicine.

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*Distillation of Vinegar.*

**P**UT five pounds, of good Vinegar in a Body of Glass, and fit thereto an Head and Receiver, set it in a Sand-furnace, and distill with a slow fire about two pounds of Liquor, which will have scarce any force, whence we call it phlegm of Vinegar: then change your Receiver, and increase your fire by little and little, and distill all over till there remain onely in the bottom of the Body a matter of the consistence of hony; then slack your fire, that the Distillation taste not of burning, and keep what is distilled; the use thereof is to dissolve calcined Minerals, and to reduce them into the form of Salts. The hony-like consistence which remains in the bottom may be put in a Retort, and forced over by gradual fire, it will yield an acid Spirit, and after a sinking Oyl, and a fixed Salt which remains behind in the Retort, which purified by many Solutions and Coagulations resembles the fixed Salt of Tartar.



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upon that which it hath assumed, and then you will find, that the dissolvent doth let fall the assumed metal or mineral, and falls upon the other, which it doth sooner seize on, and dissolveth it as being more friendly to it; of which precipitation in the fourth Part shall be spoken more at large.

This one thing more is worthy your observation, that among all metals there is none more soluble than Zinck, and therefore that all the other (as well in the dry as in the wet way) may be precipitated thereby and reduced into light calxes, in so much that the calx of gold or silver precipitated in this manner (if so be you proceed well) retaineth its splendor or gloss, and is like a fine powder wherewith you may write out of a pen.

To make a subtile spirit and pleasant oil of Zinck.

Because I made mention here of Zinck, I thought good not to omit, that there may be made a penetrating spirit and wholesome oil out of it by the help of vinegar, which is thus to be done. Take of the flores (which were taught to be made in the first part) one part, put them into a glass (fit for digestion) and pour upon them 8, or 10 parts of good sharp vinegar made of honey; or in want thereof take wine vinegar, and set the glass with the flores and vinegar in a warm place to dissolve, and the solution being performed, pour off the clear, which will look yellow and after you have filtered it abstract the phlegm, and there will remain a red liquor or balsome, to which you must add pure sand,



well calcined, and distill it, and first there will come over an unsavory phlegme, afterward a subtle spirit, and at last a yellow and red oil which are to be kept by themselves separated from the spirit, as a treasure for to heal all wounds very speedily. The spirit is not inferior unto the oil, not only for inward use to provoke sweat thereby, but also externally for the quenching of all inflammations, and doubtless this spirit and oil is good for more diseases but because its further use is not known to me yet, I will not write of it, but leave the further trial to others.

To distil a spirit and oil out of Lead.

In the same manner as was taught of Zinck, there may be out of lead also distilled a subtle spirit and a sweet oil, and it is done thus: Pour strong vinegar upon MINIUM, or any other calx of lead, which is made per se, and not with sulphur, let it digest and dissolve in sand or warm ashes, so long till the vinegar be coloured yellow by the lead, and turned quite sweet. Then pour off the clear solution, and pour on other vinegar, and let this likewise dissolve, and this repeat so often till the vinegar will dissolve no more, nor grow sweet; then take all these solutions, and evaporate all the moisture, and there will remain a thick sweet yellow liquor, like unto honey, if the vinegar was not distilled and made clear, then no liquor remaineth, but only a white sweet salt. This liquor or salt may be distilled after the same manner as was taught with the Zinck, and there will come over not only a

penetrating subtle spirit, but also a yellow oil, which will not be much, but very effectual, in all the same uses, as of the spirit, and oil of Zinck was taught.

N. B. This is to be observed, that for to make this spirit and oil, you need no distilled spirit, but that it may be done as well with undistilled vinegar, and the undistilled yields more spirit than the distilled. But if you look for a white and clear salt, then the vinegar must be distilled, else it doth not shoot into crystals, but remaineth a yellow liquor like unto honey, and it is also needless to make the solution in glasses, and by digestion continued for a long time, but it may as well be done in a glazed pot, viz. pouring the vinegar upon the Mineum in the pot, and boiling it on a coal fire; for you need not fear that any thing of the vinegar will evaporate, in regard that the lead keeps all the spirits, and lets only go an unsavory phlegm. You must also continually stir the lead about with a wooden spatulla, else it would turn to a hard stone, and would not dissolve: the same must be done also when the solution is done in glasses; and the solution after this way may be done in three or four hours: and when both kind of solutions are done, there will be no difference betwixt them, and I think it providently done not to spend a whole day about that which may be done in a hour.

And if you will have this spirit and oil better and more effectual, you may mix 1 ounce of crude Tartar made into powder with 1 lb. of dissolved and purified lead, and so distil it after the same manner as you did distil it by it self, and you will get a much subtler spirit and a better oil than if it were made alone by it self.

# QUERCETANUS

(Jos. Duchesne)



Mineral and Metallic

## MEDICINES

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1986

## LEAD

### Chapter VII

Preparation of Saturn which is efficient against the Lepra of human  
*and metallic Bodies, and of which an oily Solvent can be made.*

Distill a large quantity of good vinegar, till you have a cask full of it, because it is the basis and the foundation of this Work. To strengthen it more, distill it several times over the feces, then mix everything you have distilled with as much other non-dephlegmatized vinegar, and let them go over together, so that the distillate will become all the more efficacious. The dregs that remain at the bottom are put in a retort over a good fire by means of which one can extract an excellent oil from them, which can burn of its own and dissolve all kinds of minerals.

After preparing this solvent, take 80 lbs of powdered litharge- and NOT white lead or minium of lead calx (oxide), as several artists do, especially Isaac Hollandus. Take, I say, this litharge and put it in several big and very strong flasks. Pour on it as much of your vinegar that it will overflow by 6 fingers' breadth, and then put it on an ash-fire. Extract the salt of Saturn by a slow digestion, and on the feces that are left after the extraction of the salt and the crystals, pour once more the same amount of menstruum as indicated above. Continue doing this till all your litharge has turned into crystals which are, properly speaking, what the philosophers call the Chaos or the metallic materia prima.

On this crystalline substance, again put for the last time fresh distilled vinegar. Dissolve it over a slow fire and filter it, so as to obtain a perfectly pure and flawless menstruum which, after passing through the steam-bath, will leave a substance that melts like wax at the bottom of the alembic. It hardens in the cold as it melts in the heat. Thereafter, divide this melting substance among several alembics and little by little pour fresh menstruum upon it, as if to feed and water it only. Do this by first pouring on only two drops, then three, then five, then seven, increasing the amount in this way till the materia does not absorb any more. You will recognize this when you see the solvent coming out as acid as it was at the beginning. Therefore, whenever you distill your imbibed materia, take care that you continue till the phlegma is as acid as before, because this is how the child refuses the nurse's milk when its stomach is full. When the materia has been prepared in this way and converted into an excellent and precious gum, digest it in the steam bath for 30 or 40 days, till it becomes black and has a bad smell like

that of liquid pitch. It is from this liquid and black pitch that you must extract, by the same bath, an excellent phlegma which can serve as a proper menstruum for extracting a precious salt from calcined earth, as we will write later. Owing to the continual distillation that you will make of the said pitch on sand, and by finally giving a strong fire above and below through the usual degrees up to a very violent fire, you will extract a red and quite thick oil which, together with the preceding distillations, will constitute as strong and violent a water as that extracted from wine, and will have the same great power. The philosophers call it water of life (brandy) of Saturn. Its substance is so pure and subtle that it must be kept in a well closed vessel lest it evaporate.

To complete the perfection of this solvent, this water of life of Saturn must be put in a gentle bath, in a long-necked alembic, where the purest spirit of this water will rise imperceptibly till you see the appearance of some lines and filaments through the glass of the head. It is an infallible sign that all of the spirit has risen, and you must therefore stop this distillation and extract this first precious spirit. Preserve it carefully in a cold place and in a well sealed container. After this spirit, a milky phlegma will appear in a stronger bath. It will be much better for washing your calcined materia than the first of which we spoke above. Finally, by a stronger degree of fire and after changing the receptacle, you will still separate an ardent spirit which will first come out white and watery, then red and oily, but it will be heavy and lie at the bottom of the receptacle. However, if you wish, you can make it go over with a stronger fire.

In regard to the earth or the feces that are left at the bottom of the retorts as a black powder, they can also be dissolved with some fresh distilled vinegar and thus turn into new lapilli of a sticky and gummy consistency, and finally, by means of the above-mentioned digestions and distillations, into wonderfully active and burning spirits. There are some who divide this earth into two, but although Isaac (Hollandus) himself adopts this division, I am nevertheless of the opinion that the best and shortest method is to calcine all the earth together and to reverberate it by a gentle flame till it becomes yellow like ochre. When this earth has become yellow due to the cohobation of the phlegmas, the salt can again be separated from it, according to the ordinary rules and operations of the Art.

Having achieved the extraction of this rare and precious salt, take the first salt which you have little by little extracted and which you have preserved. Pour it on 1 oz of the last salt, repeating this imbibition till 1 oz of this salt weighs 3 or 4 oz and has retained the weight of the sal ammoniac of this spirit, till finally the volatile exceeds the fixed. If you work this process exactly, you will find an excellent earth at the bottom. Sublimate it in a very clear and well sealed glass vessel, and you will have the pleasure

of seeing in it the sublimation of a Philosophical Mercury in the form of a fine talc, which you must keep as a most valuable substance.

To crown this work, take 1 part of this Mercury and add it to 4 parts of the above-mentioned spirit or to as much ardent spirit to make of them a solvent for the Sun and the Moon, such as the philosophers imagined were capable of turning them into spirit without destroying their bodies or losing their characteristics. Therefore, wonderful works can be made with this truly philosophical solvent, both for the health of human and of metallic bodies. It can even be made with coral and litharge, and in that case you will without doubt make the finest and most harmless of all solvents.

#### *ANOTHER SOLVENT OF GOLD BY CRYSTALS OF SATURN*

Take minium, or better, litharge. Dissolve it twice in vinegar then filter and congeal it. Repeat this operation of dissolving, filtering, and congealing three times. When at the last time you have congealed to the consistency of oil, put your congelation in a cold place for 8 or 10 days, during which time small ice-like crystals will form. Remove all their humor by inclination and dry them very gently near the fire on a piece of cloth. After that, put the thus dried pieces of crystals in an alembic pot with some good brandy, three times rectified on common salt prepared and melted, each time renewing the same salt or rather passing it over sulphur or vitriol. Then set everything to digest in the bath for 3 or 4 days. Finally, distill this brandy thus rectified over the pieces of crystal of which we have spoken, to the consistency of honey or oil. That done, coagulate your materia again into small crystal cubes and crush them with calcined gold, that is, 6 weights of ice cubes to 1 of gold. Now put everything into a well-closed retort in the Horse's Belly for 40 days. Then put your vessel on an ash-fire to gently distill all the moisture from it. By putting it on sand afterwards, extract the oil with much white smoke which the philosophers call menstruals. Do this by raising the fire according to the degrees of the Art.

To bring this work to a happy end, take all the oil and put it in a small alembic in a very gentle B. M., first to extract the brandy and secondly the phlegma, which you can discern from the brandy by the tears that fall into the receptacle. Now take this brandy and pour it on the feces of your oil, and leave both thus in the bath for 1 or 2 days, till your water is colored. Thereafter, distill your colored water, pour it back on the materia, and distill it again. Continue distilling and putting your water back on the feces of the oil till you have extracted all the tincture. If the waters extracted from your oil were not sufficient for the complete extraction of your tincture, put them back in a gentle bath to draw out one-third which is to be used once more for extracting the rest of the tincture contained in the feces of your oil, by

the above-indicated process. Finally, withdraw from your bath all your tinged brandy (which can always be useful), and you will find a golden oil at the bottom, excellent for health when flavored with oil of cinnamon and given with the specific waters for the diseases you wish to fight with its power.

### *OIL OF SATURN*

Take lead calx and dissolve it in good vinegar, then filter and evaporate 3 parts of your vinegar with a slow fire. Let the rest coagulate for 24 hours, or in the air if it is in winter, during which time the salt of the lead turns into (crystals) ice cubes. Then separate your vinegar by inclination and put the crystals on a small ash-fire to separate them from the rest of the vinegar, which you may have left. This operation is done by means of the bath, till your crystals are left completely dry. When in this state put them, after powdering them, in a flask and pour on them fresh vinegar of the same strength as the previous. Then dissolve, filter, and evaporate 2 of the 3 parts of your menstruum. Finally, let small pieces of crystals form in the cold air or in a cold cellar, as before. Thereafter, distill the rest of your vinegar in a retort and at a slow fire to begin with, then at such a degree of heat that a red oil appears. When this happens, take immediately another receptacle, and by increasing the flame-fire, you will extract all the oil of Saturn, which has various properties for the medicine of human bodies and that of metals.

### *ANOTHER EXCELLENT OIL OF SATURN*

Extract the calcined salt of Saturn or of white lead according to the method of the Art, then dissolve, filter, and coagulate it with common water till it is perfectly clear and crystalline. Now put it to circulate for some time in B. M. with a good spirit of wine, in order to make it purer than it is after ordinary preparations. Finally, it has to be put back in the same bath with dew water and be circulated as before. The thus prepared salt turns into a precious oil of which 4 or 5 drops only, mixed with a suitable liquid, are a very great and very powerful remedy for all internal inflammations, pneumonias, pleurisies, liver complaints, fevers, and the like. Its powers are even greater because they put an end to all inflammations and heal even ophthalmias if a little of this oil is mixed with tutty (crude zinc oxide). It is also excellent for all kinds of cankerous ulcers.

*FLOWERS OF SATURN WHICH ARE A SPECIFIC REMEDY FOR  
OPHTHALMIAS*

Prepare a clay vessel made up of 8 or 9 little pots, put one upon the other, as we said in the chapter on tin. After the vessel is red-hot, throw some-lead filings mixed with saltpeter through the tube, little by little. Then you will see the spirit of saltpeter distill through the beak of the first pot counting from the bottom, and the sweetness of Saturn will rise in the other upper vessels in the form of flowers, of which you can make a salt with vinegar. When this salt is turned into oil, you will have an excellent remedy for ophthalmia and all diseases of the eye.

*EXTRACTION OF THE MERCURY OF SATURN*

Take 2 lbs of minium, such as it is, when it can easily be converted into glass. Put it in a crucible in the midst of a strong fire and imbibe it 6 or 7 times with good vinegar. Then add to the thus prepared minium an equal amount of crude tartar, and finally distill this mixture of minium and tartar through the retort for 12 hours, but take care to make the fire strong from the beginning. You will have 17 oz of Mercury in your receptacle which must be half filled with cold water. At the bottom of the retort there will be real gold. One can reasonably imagine that it is the gold which the philosophers call the fixed grain separated from its Mercury, and in fact such a Saturnian Mercury is much lighter and brisker than vulgar mercury.

*ANOTHER METHOD OF EXTRACTING THE MERCURY OF SATURN*

Mix 2 lbs of minium with as much good tartar, and put them in a glazed pot pierced by small holes at the bottom. Put this pot on another that is neither glazed nor pierced, and put it underground to serve as a receptacle, but only after you have carefully luted the joints and put some fresh water at the bottom to attract the Mercury and prevent the breakage of the vessel. Finally, cover the pot that contains the materia with another very tightly luted pot and give it a moderate fire for the first 6 hours, then a stronger fire for the next 6, and finally a very strong fire during the last 6 hours- and you will find the Mercury of Saturn at the bottom of your receptacle.



## A METHOD OF MAKING THE GLASS OF SATURN

Saturn is a metal whose effects are so great and wonderful for the health of human bodies that it can not only do great things in the state in which we have just prepared it but also if it is vitrified by means of calcinations according to the rules of the true philosophy. Because glass is the extreme degree and the ultimate perfection to which all things can be brought by the Art, you must therefore not doubt that the glass of lead has in itself not only a very pure substance but, in addition, an abundance of salt, even greater than can be found in any other metal. This is so because Saturn abounds so much in salt that the other two Principles, which are the liquids and the sulphurs, disappear completely, with the result that usually only the pure salt is left behind. Often it exceeds the weight of the metal from which it is extracted by more than half. That is why the philosophers who seek the Mercury and the Sulphur of Saturn cry out so loud, "*Cavete, cavete a vitrificatione*" (beware of the vitrification). This teaches us that all metals which contain more Salt than the other two Principles can be entirely vitrified. Among these there is Saturn which, being better provided with Salt than with Mercury and Sulphur, can easily turn into glass. This does not mean that the other metals cannot also be turned into glass by the length and the power of a continual fire. The exception is gold, which, being of a more perfect nature than the other metals due to the great equality and combination of the Elements it contains, can in no way be turned into glass, because it is so richly composed of Water, Earth, and Air that nothing can produce in it any alteration of rust or corruption, and even fire cannot impress any change on its mass. This is all the more so as it is of a fiery nature and that instead of being destroyed by fire, it is rather preserved by it, according to this axiom of Nature: *All like things love and preserve their likes.*

In regard to iron, it is not absolutely impossible to vitrify it, although it can only be turned into glass with great difficulty. This is so because it contains much more Sulphur, which has a fiery nature, than Salt which, as we have said, is the basis of all vitrifications. Salt having an earthy nature, is purified by the continual power of the fire and can easily turn into glass and a pellucid and transparent nature.

It is hardly less difficult to turn silver into glass than iron, because it is of a very fixed substance, and it only occurs if it is partly driven to this perfection by the addition of salts and the length of strong fires. Even then it does not become real glass but rather a stone of a hyacinth color. The violence of the fire will have caused it to lose its own sapphires color, because it is volatile and not completely fixed like the substance of silver.

But let us return to our Saturn which is the *foundation for making all kinds of artificial stones*, after the artists have turned it into small pieces of ice (crystals) with the help of the acid plant solvent (vinegar). Now then, the glass of Saturn is made as follows:

Take 4 parts of minium, 1 part of Etamps sand or small white river pebbles, well calcined. Put them in a crucible over a strong fire, and you will promptly make glass that is yellow in color and of a transparent nature, which can give good ingress to medicines that are too fixed and too dry, consequently deprived of their inceration.

Note that this glass of Saturn is in no way composed of a mixture of pebbles or of anything else that could be added to its vitrification, but that it is such by its own nature. To prove it, do as follows: Restore the metallic nature that it had before, and without calcining it at all; put it, all lead that it is, in a tightly luted crucible in the furnace of a glassmaker or a potter. After removing your materia, grind what has not vitrified the first time, and put it back in the furnace to be reverberated again. Continue doing this 3 or 4 times, and you will find that your Saturn has completely turned into a very beautiful glass, quite suitable for making precious stones. If you wish to avoid pulverizing your materia so often, you have only to put it in the fire of the glassmaker, and at the end of the 5 or 6 days that it has been in this continual fire, it will not fail to become vitrified just as well as by any other method.

I think that if one were to sublimate this glass of Saturn with sal ammoniac, it could be melted with a candle and thus be turned into transparent wax. Also, if this same glass were first powdered and then mixed with camphor or amber or with some other resin or sulphurous and transparent gum, one could make beautiful and pellucid sealing wax from it, which would in truth only be suitable for Lords, as it would be extremely costly.

SATURN'S PREPARATION EXPERIMENTED AGAINST LEPROSY  
OF HUMAN AND METALLIC BODIES, AND FROM WHICH AN  
OLYMPIC SOLVENT CAN BE MADE

JOSEPH DUSCHESNE (QUERCETANUS)

*translated from: "RECUEIL des PLUS CURIEUX et RARES SECRETS  
(Paris 1641)*

Distil in great quantities a good vinegar as it is the basis and foundation of this work. And, in order to fortify it the better, distil it many times upon its own fæces, afterwards mix all that has distilled with equal parts of another not dephlegmated vinegar, and make them pass together so that it may become more efficacious. The fæces which shall remain at the bottom you may put them in a retort at a good fire, by the force of which an excellent oil may be driven, which may burn itself and solve all kinds of minerals.

After having prepared this solvent, you have to take 80 pounds of litharge in powder, and not ceruse, nor minium, nor lead's calx as many artists do especially Isaac Hollandus, take this litharge and put it in several matrasses of great capacity, and pour upon it all your distilled vinegar, so that it swims ten fingers above; then, on an ash fire, you shall extract Saturn's salt by a slow digestion, and upon the fæces which shall remain after the extraction of the salt and of the crystals, you shall pour new menstruum in the same quantity as we have said, and you shall continue this until all your litharge has been re-

duced to crystals, which, to speak properly, are what philosophers call the chaos or the first metallic matter. Upon this crystalline matter you shall pour again, and for the last time, new distilled vinegar, and you shall make the whole to solve at a slow fire, and you shall filter it, so that a perfectly pure and neat menstruum is made, which, having passed through the vaporous bath, shall leave at the bottom of the alembic a matter melting like wax, which hardens at coolness even as it melts at heat.

You shall then divide this melting matter in many alembics, and shall pour upon it new menstruum, little by little, in order to nourish and moisten it little by little, which you shall do putting at the beginning but only two ounces, then three, then five, seven, augmenting it until the matter does not want to receive anything more, which you shall know when the solvent comes as sharp as it was at the beginning, so that each time you distil your imbibed matter you shall take care to continue until the phlegm comes as sharp as before, because it is thus that the child rejects its nourishing milk after its stomach has been filled up.

This matter, being thus prepared and changed into an excellent and precious gum, you shall digest it at the vaporous bath for 30-40 days, until it remains of a black colour and a stinking smell as liquid pitch, and it is from this liquid pitch that you shall drive out in the same bath an excellent phlegm, which may serve as a proper menstruum to extract from the calcinated earth a precious salt, as we shall later on say.

And, on the other hand, from the repeated distillation which you shall do of the said pitch on the sand bath, eventually giving a good fire above and below, you shall drive out, by the ordinary degrees until a most violent fire, a red and very thick oil which, when united with the preceding distillates, shall compose together a water as strong and violent as the one which is driven out from wine, and even of a higher virtue: which is called by philosophers the water of life of Saturn, whose substance is so pure and subtle that one has to keep it in a most closed vessel so that it may not exhalate. To finish the perfection of this solvent, this water of life of Saturn is to be put again on a mild bath, in an alembic of a very long neck, in which the most pure spirit of this water shall imperceptibly rise the first (. . .) After this spirit, a lacteous phlegm shall come over by a more strong bath, which may serve better than the one of which we have previously spoken, to wash your calcined matter, and eventually, by a stronger degree of fire, after having changed the receiver, you shall separate also a burning water which at the beginning shall come white and aqueous then red and oily, but this one shall be heavy and shall remain at the bottom of the vessel; you may however make it to pass over by the strength of the greater fire.

As for the earth that shall remain at the bottom of the retort as a black powder, you may solve it again by another distilled vinegar, and change it by this means into a new lapis of a sticky and gummy consistency, and finally with the aid of the

digestions and distillations above mentioned, you may take out from it spirits which are marvellously active and ardent.

Some divide this earth into 2, and although Isaac himself thus show this division, I think that it is best and briefier to calcine all the earth together, and to reverberate by a mild flame until it does become as yellow as gold, and when this earth is yellow by the cohobation of the phlegms you may again extract the salt, according to the rules and ordinary operations of the art.

Having attained to the extraction of this rare and precious salt, you shall take the first spirit which you have extracted little by little by several cohobations, and which you have afterwards kept, and you shall pour it upon this last salt, reiterating this imbibition until an ounce of salt weighs three or four of the spirit, so that it has retained the weight of armoniacal salt of this spirit, and that, to finish with, the volatile overcomes the fixt in proportion: if you do work this operation with exactitude, you shall find at the bottom an excellent earth, which you shall sublimate in an appropriate glass vessel, very clear and well sealed, where you shall have the pleasure of seeing the sublimation of a philosophical mercury in the form of a happy earth, or rather of a fair gipsy, which you shall keep as a matter of great price.

To crown this work, one part is to be taken of this mercury which you shall unite with four of the spirit of which we have spoken above, or with the same quantity of the first burning

water, to make with it a solvent of Sol and Luna, even as philosophers have imagined it, capable of reducing them into a spirit, without destroying their bodies nor losing their species; so that from this solution, truly philosophical, you may do admirable works for the health both of the human bodies and of the metallic ones. This same thing may be done both from choral or from litharge, and in this case you shall make from it, undoubtedly, the fairest and most innocent of all solvents.

"Another solvent for gold by the crystals of Saturn"

- Minium or litharge are solved into vinegar and 3 times recrystallised.
- These crystals are digested 3 or 4 days with rectified aqua vitae.
- The aqua vitae is distilled and a honey or oil remains behind.
- This is the congealed into crystals 6 parts of which are grinded with 1 part of calcined gold.
- This is digested for 40 days.
- It is distilled: first an extraneous humidity comes over, then an oil and many white fumes "which the philosophers call menstrual".
- By rectification, first an aqua vitae comes over, then the phlegm.
- The water of life is poured upon the faeces of the oil which remained behind, and this is left 2 days at the bath to digest; it does become coloured.

- By distillation and cohobation the whole of the tincture is extracted.
- The water of life is retired off at the balneum "and you shall find at the bottom an oil of gold, most excellent for health when it has been aromatised with an oil of cinnamon or in other ways."



*per* reduced into this condition attract the Air more powerfully, and dissolve into Liquor: which happens not to this of *Silver*; for it preserves it self always in a solid form, and may be carried about in a Box; for which reason Surgeons prefer it before others, and make use of it.

Many Authors fill their Books with several *Tinctures* and other preparations of *Gold* and *Silver*; which we omit as either useless or hurtful, persisting in our first design, to set down nothing superfluous, or that may fruitlessly puzzle the Reader, but to communicate to the publick all that is profitable, and that may be understood and easily performed by Artists, yea even by such as have no skill but what they derive from their Writings.

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### C H A P. III.

## *Of Lead; or Saturn.*

**L***ead* is an imperfect Metal, consisting naturally of an impure Salt, and undigested *Mercury*, and a *Terrestrial Sulphur*, which abounds in this body, for which reason it easily unites with the Oils of Vegetables, and the Fats of Animals, which are Sulphureous. It easily destroys all other imperfect Metals, and  
in