Tannic Inks

One day last fall on the Barony of Three River s email list someone wondered what to do with all the walnuts in their yard. One thing led to another and I ended up teaching a class on making medieval ink.

In the grand history of ink there are two varities. One is carbon based and includes India and Sumi inks. These are made from soot with some kind of binder usually gum arabic. They were used in western Europe until around gradual shift to tannin based inks.

Tannin based inks use the reaction between iron and tannin to make a very dark and permanent ink. Gum arabic is also used but this time to give the ink body and keep it from soaking into the paper or parchment too fast. Ta walnuts, pomegranate rinds, many barks and most usefully from the galls that grow on oak trees.

There are no known period recipes for walnut ink.. However, there are plenty of modern recipes for it because the rich brown color is favored by artists. Because of the accessibly of walnuts we started with that.

My lab notes are transcribed in Appendix A. Several period recipes for ink are in Appendix B.

Walnut Ink

20 Walnuts

enough water to cover them

1 1/2 tablespoons vinegar

1 1/2 tablespoons Gum Arabic.

Crack the walnuts with a hammer or nut cracker and place them in a iron pot. Simmer at low heat for two hours or longer if necessary. Stir often. If the water gets low though evaporation add more.

Strain the liquid into another container. Dump the walnut pieces and clean out the iron pot. Place the liquid back in the iron pot and simmer some more. Add the vinegar and Gum Arabic. Stir. Allow the liquid to reduce by abou into a bottle. You should now have ink!

Iron Gall Ink

I decided to try this ink recipe

15th century, Manuscripts of Jehan Le Begue, 1431

Translation

Good ink is thus made. Take 1 1/2 lb. Of pounded galls, soak them in warm rain water, or warm wine or vinegar, of the quantity of 10 phials, and so let it stand for a day or more; then boil it until the said water, wine or vinega taken off the fire and a phial or two of wine or vinegar be immediately added, and so let much water be added as was boiled away from the said mixture, and let them all be put on the fire again.• When the mixture begins to t when it is only just warm strain it, and add to it 1 1/2 lb of gum-arabic in powder and 1 lb of Roman vitriol and mix the whole together.

My redaction is approximately 1/3 of the recipe above

1/2 lb ground oak galls

lots of water

3• cups vinegar

1/2 lb gum arabic

3 oz. vitriol

I make a tea of the ground galls, water, and 2 cups vinegar and let it soak for two days in an enamel lined pot. When I was home I would let it simmer, occasionally adding a little more water. I removed large chunks of gall with piece of linen to get the small bits out. I cleaned out the enamel pot and put liquid back in. On very low heat I added the Gum Arabic and the vitriol and let it simmer until it reduced by half.

As you can see by my labs notes I tried each recipe twice with small variations. My second batch of walnut ink got very thick and strange. My first gall ink was too small of a sample and didn t even need the vitriol.

I was surprised that using a cast iron dutch oven added enough iron to make both kinds of ink turn very dark.

Please feel free to ask me questions or to read the lab notes. The notes include a lot of information and details of false starts and the quest for vitriol.

Bibliography

Agricola, G., De Re Metallica, first Latin edition 1556, Translated by Herbert Clark Hoover and Lou-Henry, Dover Publications Inc., New York (1912).

I checked this out for hints on making vitriol.

Bayard, Tania. Translator and editor A Medieval Home Companion; Housekeeping in the FourteenthCentury. Harper Perennial, adivision of Harper Collins Publishers; New York: 1992. An ordinary household ink recipe

Eusman, Elmer. Ed. The Iron Gall Ink Corrosion Website. http://www.knaw.nl/ecpa/ink/index.html Accessed 7/14/03 this is an excellent website. It is dedicated to preserving manuscripts by studying how iron gall inks become others. Sections of this site are extremely scientific. However, the section on making your own ink is very readable.

Hinson, Janet. Trans. Ink recipe in Le Menagier do Paris.••• http://www.daviddfriedman.com/Medieval/Cookbooks/Menagier/Menagier.html#OTHER%20ODDS%20AND%20ENDS last accessed 7/22/03

Lehmann-Haupt, H. The Goettingen Model Book.University of Missouri Press.

Merrifield. Medieval, and Renaissance Treatises on the arts of Painting: Original Texts with English Translations from 1849; Dover reprint 1999, New York.

Theophilus. On Divers Arts. J.G Hawthorne & C.S. Smith, trans. Dover.

Thompson, J.C. Manuscript InksPortland, Oregon The Caber Press 1996.• I was very eager to see this book but was a little disappointed. The best bits are already on the Iron Gall Ink Corrosion website cited above.

VanTassle. Kristen Kirk. (SCA Elizabeth de Nevell) Walnut Ink. http://vantassle.freetcp.com/walnut.htm last accessed 1/13/2003 I used her walnut ink recipe. Update: New website

Appendix A

Lab notes

Walnut Ink

12 January 2003

I began prep for the walnut ink project. I only have 4 galls so I ll work on that next year.

I was given a grocery bag full of walnut from Zorniza s yard. She had recently collected the, and they were still in the husks. Somehow the squirrels missed them. I had planned to pound them with a hammer but after they d be mushy. The walnuts are also quite dirty with grass and leaves stuck to them.

Since they were so dirty and frozen I rinsed them quickly in hot water. I was surprised at how dark the water got from that brief contact with the nuts. I let this water down the drain and filled the bucket with just enough water to

(I should mention that the blackened and oxidized walnuts are perfect according to what I ve read.)

6:30 pm I put 20 walnuts and about 3 cups of water in my cast iron dutch oven. It s currently simmering.

7:15 pm• The water in the pan was low so I added two cups of water from the soaking walnuts.

8:00 pm Most of the skins had dissolved. I cracked a few nuts (this is not recommended. Will walnut juice come off of the counter top? [Yes it did])

Took sample

9:30 pm• I poured the liquid off of the solids and strained it to get the small bits out. That s enough for today.

14 January 2003

6:30 pm•••••••••••• Put the walnut juice (I guess I should call it tea) in the iron pot and set it to simmering again.

••••••••••••• Added• •••••••••••••• 1 ? tablespoons white vinegar

•• 1 ? table spoons gum Arabic (ground fine)

8:00 pm••••••••••••• reduced by a little less than half. Skimmed the scum off of the surface.

Took sample. Very thick and dark now.

25 January 2003

11:00 am•••••••••••• I started another batch of walnut ink today. It s a much larger batch since I want to give some away for largess. The remaining walnuts have been soaking in water since the 12th of January. I car sitting there.

••••••••••••• Took sample

I put about 20 cups of walnuts and their juice into the iron dutch oven. Each cup held about 12 walnuts. So I can multiply the recipe I used by 10.

I added 4 more cups of water. I plan to let it simmer all afternoon though I m very tired of the smell of walnuts.

2 February 2003

The cast iron dutch oven of walnuts sat for a week on the stove. I am so not popular right now.

2:30pmStrained out the walnuts and other gunk. It seems more like ink this time. More clingy.

••••••••••••• Added 1 cup white vinegar

•••••••••••••••••••••••••••••• 1 Tablespoon alum (as a preservative)••

During the after noon I had to skim off an icky black sludge several times.

8:00 pm•••••••••••• Down by about half. I put the ink through progressively smaller strainers. It wouldn t go though a coffee filter at all.

••••••••••••• Added• 1 cup vinegar

•••••••••••••••••••••••••••••• 3 Table spoons gum Arabic (I should add more but I can t smash any more up right now because someone in on the phone.)

[Gum Arabic is fairly easy to process. I have the lumps from a store in London. Trying to grind them in the mortar lead to bits of gum shrapnel all over. A sheet of plastic wrap around the mortar and loosely gathered to the pest contain the mess. The gum Arabic powder melted very nicely in the microwave.]

This batch didn t turn out as well as the first one. It seemed more tar-like and the liquid and sludge didn t want to stay together. I wish I had kept better notes. I m not sure if it was the vinegar or the alum or the extra cooking tir seemed to be mostly vinegar so I strained it off and mixed some of the sludge in with some ink from the first batch. This turned at pretty good. At least I had something to give as largess.

14 July 2003

According to what I ve recently read at the Ink Corrosion website the glycerin in the vinegar (or wine) should help the walnuts release its tannins. Maybe I succeeded better than I suspected. My black sludge hasn t gotten mol

I had planned to save some walnuts to show what they started out like but they molded, stank, and make my eyes itch so I threw them out.

Iron Gall Ink

14 July 2003

I was given a bag full of oak galls by Sean a member of B3R. I m not sure where he collected them but it s somewhere in the St. Louis area.

The quest for Iron Sulphate was fruitless. There is a product for Azaleas at Home Depot that has iron in it but it also has a lot of nitrogen. Not the impurities I wanted or needed.

OK Hatchery in Kirkwood was closed this evening. If anyone would have it is them. I ll call tomorrow and try not to sound insane.

I m going to make my own Iron sulphate. I bought iron looking nails at Home Depot. ?Hard Cut Masonry Nails? Everything else distinctly said ?zinc coated? but thesedidn t. These are very magnetic. I tested one with the weak clinging to the other nails several minutes later. (These nails are also vaguely period looking so I can maybe use the leftovers.)

9:00 pm���������� currently these nails are in a Mason jar with 2 cups of white vinegar. I put a hole in the lid. They are bubbling a bit after only half an hour so I m going to put them outside. Wow, the nails are cov college roommates would be so proud.

I took a pound of oak galls and proceeded to make them into little pieces. The hammer method was too slow so I used the blender. (Don t tell Josef.) It worked really well but you should only do about a handful at a time. I let tl the blender so that it s very powdery. With my finest strainer, I sifted some of the oak gall powder into a separate bag. I might use it to make traveling ink.

19 July 2003

After talking with Josef, a chemical engineer, he didn t think we should try to make our own Iron Sulfate. 1. He wasn t sure how to get sufficiently strong sulfuric acid. 2. There is not a good way to isolate a work space in our h recommendation about needing a ventilation hood he was really uninclined to make it.

However, I finally found some Iron Sulfate at a plant nursery. It s funny to me because they call it Copperas. The brand is Hy-Yield brought at Heneke Nursery near B3R s meeting site. 4 lbs = $3.

The back of the packaging says

Sulfur (S)�� 11%

���������� 11% combined Sulfur (S)

Iron (FE)������������������������������������ 19%

���������� derived from Ferrous Sulfate

I wonder what the other 70% is. There is a website listed on the label but it wasn t helpful.

1:30 pm���������� I found the Material Safety Data Sheet for Hi-Yield Copperas and it says that the % is proprietary. Josef says that that happens a lot.

9:30 pm���������� I decide to go with the 1431 Ink recipe. It fits what I had in mind and I have everything!

15th century, Manuscripts of Jehan Le Begue, 1431

Translation

Good ink is thus made. ? Take 1 ? lb. Of pounded galls, soak them in warm rain water, or warm wine or vinegar, of the quantity of 10 phials, and so let it stand for a day or more; then boil it until the said water, wine or vinegar taken off the fire and a phial or two of wine or vinegar be immediately added, and so let much water be added as was boiled away from the said mixture, and let them all be put on the fire again.� When the mixture begins to b when it is only just warm strain it, and add to it 1 ? lb of gum-Arabic in powder and 1 lb of Roman vitriol and mix the whole together.

Material������������������ Period recipe Redacted������������������������������ What I used

Galls, pounded1 ? lbs������������ 1 cup, ? lb������������������������ 1 cup, ? lb

Water (liquid)������������ 10 phials?������������������������ 8 cups water 4 lbs

2 cups vinegar 1 lbs

Gum������������������ ����� 1 ? lbs������������ 1 cup liquid, ? lb solid 1 cup, ? lb solid

Vitriol������������ 1 lb���� 5 oz������������������������ 3 oz

I put the powdered galls in with the water and vinegar this evening and simmered.

To really follow this recipe I should add 2/3 cup copperas. However, I ve seen recommendations on the Ink Corrosion website that the ratio of galls to vitriol should be 3:1. Also, Jack Thompson has suggested in ?Manuscript I liquid form. I m going to error on the side of caution and use 1/3 cup dry copperas.

I m not too worried about not knowing exactly what a ?phial? was. Considering the recipe says to add water as it evaporates, there doesn t seem to be too specific of an amount used. I suspect that 10 cups of liquid was too m added anything else.

20 July 2003

10:30am���������� The gall powder soaked (cold) in the water and vinegar all night. This morning I started simmering again. I want it to reduce by 1/3. I m using the spoon handle to measure this.

The gall bits were floating yesterday and now they have sunk.

Every time I walk through the kitchen, I give it a stir.

It has turned black with out me adding any vitriol.

4:30 pm���������� The gall tea has evaporated by half.

���������� Took sample ? it s a lot darker!

6:00 pm������������ It had evaporated down to 1/3. Once I strain the muck out there won t be much left.

22 July 2003

I ended up with only 2/3 cup of gall ink and it is black! I took a sample of the leavings. I added 10 teaspoons of the gum solution but this is way too thin.

New Plan.I m going to start over with an enamel pan.

? lb oak galls ground

4 lbs water +

3 cups vinegar

24 July 2003

Strained out the gunk and took samples

added ? lb gum dissolved

3 oz copperas let it simmer. It instantly went from brown to black when I added the copperas.

I think I have ink. It s still a little thin but should boil down nicely when I get a chance.

Appendix B

Examples of Medieval Ink Recipes

12th century, Theophilus On Divers Arts

When you are going to make ink, cut some pieces of thorn wood in April or May, before they grow blossoms or leaves.� Make little bundles of them and let them lie in the shade for two, three, or four weeks, until they are drie wooden mallets with which you should pound the thorn on another hard piece of wood, until you have completely removed the bark.� Put this immediately into a barrel full of water.� Fill two, three, four or five barrels with ba eight days, until the water absorbs all the sap of the bark into itself.� Next, pour this water into a very clean pan or cauldron, put fire under it and boil it.� From time to time also put some of the bark itself into the pan, so that will be boiled out.� After boiling it a little, take out the bark and again put some more in.� After this is done, boil the remaining water down to a third, take it out of that pan and put it into a smaller one.� Boil it until it grows bl absolutely careful not to add any water except that which is mixed with the sap.� When you see it begin to thicken, add a third part of pure wine, put it into two or three new pots and continue boiling until you see that it forms pot off the fire and put them in the sun until the black ink purges itself from the red dregs.� Next, take some small, carefully sewn parchment bags with bladders inside, pour the pure ink into them, and hang them in the sun ul Whenever you want, take some of the dry material, temper it with wine over the fire, add a little green vitriol [iron sulphate] and write.� If it happens through carelessness that the ink is not black enough, take a piece of iron a get red-hot, and immediately throw it into the ink.

Theophilus. On Divers Arts. J.G Hawthorne & C.S. Smith, trans. Dover.

14th Century, Le Menagier de Paris

�������������� Two different translations

1.� To Make Three Pints of Ink, take two ounces each of galls and gum Arabic, and three ounces of vitriol; and break the galls and soak them for three days, then boil in three quarts of rainwater or stagnant pond water (i.e. they have boiled long enough and the water has boiled down to about half, that is, so that there is only about three pints, then take it off the fire, and add the vitriol and the gum, and stir until cold, then put in a cold, damp plac will go bad.

Trans. Janet Hinson http://www.daviddfriedman.com/Medieval/Cookbooks/Menagier/Menagier.html#OTHER%20ODDS%20AND%20ENDS

2.� To make three pintes of ink: Take galls and gum, two ounces of each, and three ounces of copperas*. Crush the galls and soak them for three days. Then boil them in three quartes of rain water, or water from a still pool the water is almost half-boiled away (I.e., no more than three pintes are left), take it off the fire, add the copperas and gum, and stir it until it is cold. Then put it in a cold, damp place. After three weeks it spoils.

Tania Bayard. translator and editor A Medieval Home Companion; Housekeeping in the FourteenthCentury ,Harper Perennial, adivision of Harper Collins Publishers; New York: 1992.

15th Century, The Gottingen Model Book

The smoke black is best for illuminating. You shall soak it for fourteen days and everyday pour off the water and pour pure well water over it; and you shall grind it well with gum water and temper it therewith, not too strong, th

Lehmann-Haupt, H. The Goettingen Model Book.University of Missouri Press.

15th century, Manuscripts of Jehan Le Begue, 1431

Attramentum optimum sic fit. ? Recipe galle fracte libram 1 ? , et pone in aqua pluviali tepida, vel in aceto, aut vino tepido, ad x. fialarum quantitatem, et sic stet per unum diem vel plus, et postea buliantur donec remaneant ad atu aceti, et deponantur ab igne, et statim super addatur fiala una vel due aceti vel vini; et ponatur tantum de aqua, quantum consummata fuerit imsa mixtura, et iterum omnia ponatur ad ignem, et cum inceperit bulire deponatu reductum erit, coletur, et ponatur in ipso libra 1 ? gumi arabici pulverizati, et libram 1 vitrioli romani, et simul misceantur omnia.

Translation

Good ink is thus made. ? Take 1 ? lb. Of pounded galls, soak them in warm rain water, or warm wine or vinegar, of the quantity of 10 phials, and so let it stand for a day or more; then boil it until the said water, wine or vinegar taken off the fire and a phial or two of wine or vinegar be immediately added, and so let much water be added as was boiled away from the said mixture, and let them all be put on the fire again.� When the mixture begins to b when it is only just warm strain it, and add to it 1 ? lb of gum-arabic in powder and 1 lb of Roman vitriol and mix the whole together.

16th Century, The Secretes of the ReverencdeMaister Alexis of Piemount, 1558

To make ynke, or a colour to wryte with, in a verye good perfection. Take good Galles, and breaketheim in three or foure pieces, that is to say, stampe them slightly, and put them in a fryingepanne, or some other yronpanne, then take a pounde of them, and put it in some vessel leaded, pouringe into it as muche white wine as wyll cover it over, more then a good hand breadth. After, take a pounde of GommeArabick, well stramped, and eyghte our myre all well together and set in the sunnecertainedayes, stering it as often as you may: then boyle it a little if you se that you have neede, and after straine it, and it will be perfecte.� And upon the lees that shall remayne in t wine, and boyle it a little, and strain it. You may put wine upon the same lees as often as you will: that is to say, until you see y the wine whiche you put in, will straine or be coloured no more.� Then, mingle al the saied wine, gomme and vitriole as at the beginning then keeping it in the Sunne, you shal have a better inck than the fyrste, and do so every day, for the oftener you do it, the better you shall have it, and with lessecoste.

And if you finde it thicke, or that it be not flowingeynough, put to it a little cleare lie, which will meke it liquide and thinnneinoughe. If it be to cleare, adde to it a little gommeArabick. The galles must be small, curled and massiv vitriolle is always within of a color like unto the elemyt. The best gomme, is cleere and brittle, that in stamping it, it becommeth a pouldereasely, without cleaving together.

16th Century,Manuscript from the Library of the University of Padua, believed to be Venetian

How very fine ink is made. ? Take of strong white wine lb 8 and of well broken galls of Istria oz viij, put them together in a glazed vase, and expose them to the heat of the sun or in a covered furnace for 8 days, stiring them fre the galls, strain it, and add to it of Roman vitriol oz vj, and leave it in the shade for a week longer, stirring it frequently.&#65533; Then take of gum Arabic oz ij, dissolve it in a pint of rose-water, and for 8 days more continue to mix this time use the ink with a little boiled wine, and you will fined it good.

Merrifield 1849, Medieval and Renaissance Treatises on the arts of Painting: Original Texts with English Translations; Dover reprint 1999, New York.

16th Century, A Booke of Secrets, written first in Italian, and now newly translated into English, by W.P., London, Edward White, 1596

Take halfe a pint of water, a pint wanting a quarter of wine, and as much vineger, which being mixed together make a quart and a quarter of a pint more, then take six ounces of gauls beaten into small pouder and sifted throu it selfe, and pourehalfe the water, wine and vineger into it, take likewise foure ounces of vietriall, and beat it into pouder, and put it also in a pot by it selfe, whereinto put a quarter of the wine, water, and vineger that remaineth ounces of gum Arabike beaten to pouder, that done, cover the three pots close, and let them stand three or fouredaies together, stirring them every day three or foure times, on the first day set the pot with gaules on the fire, a about till it be throughlywarme, then straine it through a cloath into another pot, and mixe it with the other two pots, stirring them well together, and being covered, then let it stand three daies, til thou meanest to use it, on the f out, and it wil be good inke.
If there remaine any dregs behind, poure some raine water that hath stand long in a tub or vessell into it, for the older the water is, the better it is, and keepe that untill you make more inke, so it is better then clean water.

Thompson, J.C. Manuscript Inks Portland, Oregon The Caber Press 1996

16th Century, ABook Containing Divers Sorts of Hands, by John de Beau Chesne and M. John Baildon, 1571

To make common yncke of Wyne take a quart,
Two ounces of gomme, let that be a parte,
Five ounces of galles, of copres take three,
Long standing dooth make it better to be;
If wyne ye do want, rayne water is best,
And as much stuffe as above at the least:
If yncke be to thick, put vinegar in,
For water dooth make the colour more dimme.
In hast for a shift when ye have a great nead,
Take woll, or wollen to stand you in steede;
which burnt in the fire the powder bette small
With vinegre, or water make yncke with all.
If yncke ye desire to keep long in store
Put bay salte therein, and it will not hoare.
Of that common yncke be not to your minde
Some lampblack thereto with gomme water grinde

The Ink&#65533; Corrosion Website http://www.knaw.nl/ecpa/ink/html/make.html#drie Accessed 7/14/03

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