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**p084v**

**Transcription [from tc\_p084v]**

<note id=”p084v\_c1”>Essaye huitres bruslees</note>.[[1]](#footnote-0)

**Translation [from tl p084v]**

<note id=”p084v\_c2”>Try burnt oysters.</note>.[[2]](#footnote-1)

Deciphering Marginalia: “Try burnt oysters”

Investigating Oysters, Calcination and Marginalia

The recipe on folio 84v of Ms. Fr. 640 entitled “Eau Magistra” briefly describes a process of making a binding agent from elm root and wine, which we have explored in a separate entry. However, this recipe also includes a marginal note next to the main body of the texts that reads “Try burnt oysters [Essaye huitres bruslées].”[[3]](#footnote-2) As it turns out, these three words are dense with information.

The note is embedded within two sections of the text: this recipe on *eau magistra*[[4]](#footnote-3) and a collection of marginal notes on sand for sand casting that can be read together in the left margin of the text as an addition to the previous experiment on the page, “Sand [Sable].”[[5]](#footnote-4) The reader’s perception of the location within the text directly determines the interpretation of the recipe. If perceived as belonging to the other marginalia in a vertical column, the injunction to “try burnt oysters” is located within a context of different types of sand. If perceived horizontally with the main body of the text, it belongs to the recipe for Eau Magistra.[[6]](#footnote-5)

The puzzle of which recipe “burnt oysters” belongs to is further compounded by the fact that the only other two references to oysters present in Ms. Fr. 640 also appear as marginal notes. A note on fol. 80v in the recipe “Casters of small tin work” reads, “Try calcinated [*calcinèe*] oyster shells; they are said to be excellent for molding.”[[7]](#footnote-6) On fol. 49r, next to a recipe entitled “Lead casting,” another note mentions oyster shell, though the meaning is less clear: “*Poncet*. They cast by soldering [using what] the glass-makers use. Lump [of metal] of… Calcinated [*calcinèe*] oyster shell.”[[8]](#footnote-7) These additional suggestions raise issues concerning whether their peripheral placement in the text is significant. What is their relationship to the text?Should we consider these in the light of Michael Camille’s work that has called attention to both the value of marginalia and the relationship between the author and reader of a text?[[9]](#footnote-8) Much recent scholarship explores the early modern reader’s interaction with texts by way of notes, annotations, and images in marginalia, making clear the diverse functions of marginal notes, from directing attention to particular sections, to exegesis, to engaging in dialogue with the author.[[10]](#footnote-9) However, questions of authority and mediation are further complicated in the marginalia of Ms. Fr. 640 because the author is both reader and writer (and practitioner). In this case, the marginal writing may reflect a second or later iteration of his experiments or a reflection on his experience. Did the author-practitioner of Ms. Fr. 640 actually try to work with oyster shells, or did he observe someone else perform this technique?[[11]](#footnote-10) If they are untested suggestions, should they be considered an invitation to experiment?[[12]](#footnote-11) If so, this implicitly raises the issue of the manuscript’s intended audience. This line of inquiry may help shed light on the larger mystery of the author’s identity and profession.

**Reconstructing Marginalia**

To determine the best interpretation of the recipe, we decided to reconstruct it using both readings. [fig. 1] Two of the notes refer to calcination (“*calcinées”*), while the third note speaks of burning (“*bruslèes*”). In order to determine whether these were separate processes, we needed to find out what exactly calcination was. In Cotgrave’s 1611 French dictionary, four entries refer to calcination. *Calciné* is defined as “calcinated, turned into dust, reduced by fire, unto pouder;” the verb *calciner* means “to calcinate, burne to dust, reduce unto pouder, by fire, any mettal or minerall.”[[13]](#footnote-12) It seems that the calcined materials were often used in sand casting, but little information on the actual process of calcination--besides applying heat or fire--can be found in the manuscript or other early modern sources. What preparation did we need in order to calcine the oyster shells? How should the shells be prepared and heated (i.e., at what temperature, and for how long?). What type of transformation or transition would the oysters undergo?

Ms. Fr. 640 makes mention of calcination is several places. On fol.100r of the manuscript in the recipe “Vitrified saltpeter,” the author describes calcining other stones, suggesting that different heat sources and processes can lead to different levels of purification.[[14]](#footnote-13) In the recipe for “Grafting” on fol. 91r, a marginal note reads, “When the lead gets too hot, it calcinates.”[[15]](#footnote-14) On fol. 83r in a recipe about sand, the author directs the reader to “[Take] finely crushed slate and pumice stone mixed together. Calcinate them three times in a covered and sealed pot in strong fire, and each time dilute them with urine.”[[16]](#footnote-15) Other materials that are listed as calcined include stone, glass, bone, and shells. A recipe on fol. 92v about river tellins and mussel shells tells us that “The long shells that can be found in rivers of fresh water, being calcined, make a white and very fine [*impalpable*] sand which moulds very clean.”[[17]](#footnote-16)

We encountered information that provided some point of reference for our own calcination undertakings (albeit obliquely) from modern sources. In current scientific scholarship, oyster shells have been the subject of study due to both the problem of shells in landfills, as well as their potential antifungal properties. Raw oyster shells principally consist of calcium carbonate (CaCO3), while calcination of oyster shells yields calcium oxide (CaO).[[18]](#footnote-17) The “optimal temperatures for calcination” in one modern calcination experiment was 900°-950°C (1472°-1562°F).[[19]](#footnote-18) Another experiment exposed oyster shells to 1050°C (1922°F) and reported that the resultant powder had “turned completely into CaO after the treatment,” and that in order to produce this result, the “shell was washed several times and dried in an oven at 60°C (140°F) for twenty-four hours.”[[20]](#footnote-19)

To prepare our oyster shells, we boiled them in water and cleaned them by removing any remaining adductor muscle.[[21]](#footnote-20) We then removed the barnacles and other attached shells with hammers and pliers. After the shells had been rinsed in water several times, we contained the shells in a large towel and broke them into smaller pieces with a hammer. We attempted the calcination several times: the first time, we used a small jewelry kiln heated to 1500°F, exposing just a few pieces of shell to the heat.[[22]](#footnote-21) After ten minutes, the shells had turned to white, slippery ash.[[23]](#footnote-22) The next several attempts at calcination were done with a much larger ceramic kiln.[[24]](#footnote-23) After several attempts, in which we were able to produce a crushed oyster ash that was gray in color, though not fully calcined,[[25]](#footnote-24) the shells finally calcined after heating them over a 9-hour period, in which they reached a temperature of 1800°F for an hour. The resulting powder was smooth and silky, and quite similar in feel to talcum powder. In the pseudonymous Alessio Piemontese’s sixteenth-century *De Secreti*, this kind of sand—“very soft, as if impalpable”—is described as perfect for casting.[[26]](#footnote-25)

This was the material we used to conduct our two experiments: in the first, we interpreted the oyster ash as an ingredient in a binding agent used to moisten a sand in a sand-casting process; in the second, we used the oyster ash as the sand itself.

In the first process, the calcined-oyster-wine decoction, we wanted to examine the performance of the decoction as a binder in comparison to the other binders tested.[[27]](#footnote-26) Modelled after the procedure for creating the elm root infusion in fol. 84v “Eau Magistra,” we boiled two teaspoons of calcined oyster shells with one cup of inexpensive Cabernet Sauvignon on a hot plate. Upon contact with the wine, the powder immediately turned a teal green, then briefly became a clear emerald green, which then transitioned into a dull, opaque olive green--this was perhaps an oxidation reaction that produced these dramatic color changes. [fig. 2, fig. 3, fig. 4] We poured the mixture into an airtight glass container. After a few minutes, the mixture separated into a watery brown liquid on top and a muddy green mixture on the bottom. A half cup of this emulsion was then added to two cups of sifted sand and used for sand casting.

In preparing our sand for this casting, we pulverized and then sifted pre-used molds made of a 2:1 mixture of plaster and pulverised bricks. After stirring the decoction to reconstitute the suspension of the ash particles in the wine, we gradually added approximately half a cup total of calcined oyster wine infusion to two cups of sifted sand. It was easy to achieve the desired texture for sand casting; the mixture would hold together when squeezed into the palm of the hand, but dissolved with the pressure of a fingertip.[[28]](#footnote-27) [fig. 5] We built the mold around a plaster pattern dusted with charcoal, and the resulting pattern was crisp and clear.[[29]](#footnote-28) [fig. 6] A day later, the mold was dry and ready for the metal pour. We poured molten tin into the mold and the resulting cast object was extremely fine in its detail--indeed, the best cast accomplished in our research. [fig. 7] The mold, however, did not survive; it broke apart and thus was only usable once. [fig. 8] Our test of this recipe produced one of the desiderata of a good “sand”—fineness of impression—but not the concomitant durability.

In our second experimental process, we used the sifted calcined oysters as the sand. Two cups of calcined oysters were mixed with the whipped egg whites of two eggs. This did not seem to moisten the oyster shell “sand” sufficiently; the sand seemed to absorb the moisture much more quickly that the brick dust molds--it would not “clump” enough to be a useful packed mold material. Since we ran out of eggs in the lab, we used some of the remaining elm root emulsion we had on hand.[[30]](#footnote-29) We kept adding this until the mixture would “clump”, but then the mixture had the qualities of being wet and dry at the same time; the calcined oyster shells seemed “dry”, but when squeezed, water would come out. It was as if they were both absorbing and repelling the water. [fig. 9, fig. 10]

We made our box mold according to the sand-casting process described in Ms. Fr. 640 on fol. 118v, building the wet sand around a plaster pattern and leaving the mold to dry.[[31]](#footnote-30) We placed extra sand in a plastic cup. Unexpectedly, when we checked on our mold several days later, the sand had expanded out of the frame into a useless, dry pile—the calcined oyster shells had turned to “quicklime.” The exothermic reaction that occurred when the lime present in the CaO reacted with moisture from the air resulted in a mold that “puffed up” and disintegrated. The heat of the exothermic reaction melted and deformed the plastic cup in which we had stored the extra sand. We could not use either the mold or the sand for a metal pour. [fig. 11]

In retrospect, the successful sand-casting of our first experiment using oyster ash as a liquid binder indicated that the fine oyster ash might have mixed with the brick dust and plaster of pulverized molds from previous castings to produce a finer sand that resulted in the fine impression.[[32]](#footnote-31) The manuscript does not say explicitly to mix the oyster shells with another sand, but this is how the successful cast worked; the oxidation reaction that produced the brilliant green color in the wine perhaps holds the key to the success of the experiment. The calcined oyster shells had already been exposed to moisture, so they had already undergone a reaction. Meanwhile, the wine still acted as a binding agent in the mold.[[33]](#footnote-32) It would be interesting to determine if the oyster ash that produced the exothermic reaction could be used again as a sand in a box mold; perhaps this sand would be capable of hardening and maintaining an impression in which to cast metal. Further experimentation with oyster ash is certainly worth pursuing.

In conclusion, a hands-on approach in the laboratory, paired with textual research and analysis enabled us to explore the ways in which the oyster marginalia might illuminate the compilation of the text and the author’s role as both writer and reader of his own text. Our findings suggest that the author knew or speculated about the promising properties of oyster shells, but he had yet to perfect a procedure for their successful use. The presence of distancing language, phrases such as “try” or “it is said to be…” indicate that the author was less personally familiar with the use of oyster shells as a material. Perhaps he heard it suggested or had observed the properties of calcined oyster shells in another context. But unlike other more confidently phrased imperatives, such as in “Casting in a box mold” on fol. 118v, where the author writes in the first person, on fol. 84v he offers no tips, warnings, or reminders that would suggest a hands-on familiarity with the processes. Perhaps these notes were untested by the author and instead intended as suggestions for future experiments, as seems to be the case with a list of processes on fol. 169r, in which the author-practitioner appears to differentiate between processes he has “seen” and included in the manuscript and those he aspires to try.

1. Marc Smith, Professor of Paleography, École des chartes, has noted that this marginal note does not necessarily belong to the “Eau Magistra” entry, but rather part of the preceding entry titled “Sand” [*“Sable”*]. [↑](#footnote-ref-0)
2. See note 1. [↑](#footnote-ref-1)
3. Ms. Fr. 640, 84v, “Eau Magistra”. [↑](#footnote-ref-2)
4. See Cataldo and Visco, “‘Eau Magistra’: Investigating Binders for Sand-casting.” [↑](#footnote-ref-3)
5. Ms. Fr. 640, 84v, “Sand”. [↑](#footnote-ref-4)
6. See Cataldo and Visco, Field Notes, 14-15 October 2014, “Sand casting,” for further details on sand-casting recipes. [↑](#footnote-ref-5)
7. Ms. Fr. 640, 80v, “Casters of small tin work”. [↑](#footnote-ref-6)
8. Ms. Fr. 640, 49r, “Lead casting”. [↑](#footnote-ref-7)
9. See Michael Camille, *Image on the Edge: The Margins of Medieval Art* (Cambridge, MA: Harvard University Press, 1992). [↑](#footnote-ref-8)
10. For more on reading as a visual mode, see William H. Sherman, *Used Books: Marking Readers in Renaissance England* (Philadelphia, PA: University of Pennsylvania Press, 2009), and Ann Blair, *Too Much To Know: Managing Scholarly Information before the Modern Age* (New Haven: Yale University Press, 2011). [↑](#footnote-ref-9)
11. For an early modern perspective on observing workshop practices, see T.L. Davis, *The Life of Denis Zachaire: An Account of an Alchemist’s Life in the Sixteenth Century* (Edmonds, WA: The Alchemical Press, 1993). Hugh Plat also observed and collected workshop practices and recipes. [↑](#footnote-ref-10)
12. On this point, see William Eamon’s discussion of recipes as “prescriptions for an experiment,” William Eamon, *Science and the Secrets of Nature* (Princeton, NJ: Princeton University Press, 1994), 194, and his more recent critical reflections on recipes as straightforward instructions for action: William Eamon, “How to Read a Book of Secrets,” in *Secrets and Knowledge in Medicine and Science, 1500 -1800*, eds. Elaine Leong and Alicia Rankin. (Aldershot: Ashgate Publishing Limited, 2011). [↑](#footnote-ref-11)
13. See Randle Cotgrave, *A Dictionary of the French and English Tongues* (London: Adam Islip, 1611), s.v. “*calcination*,” “*calcinatoire*,” “*calciné,*” and “*calciner*.” [↑](#footnote-ref-12)
14. Ms. Fr. 640, 100r, “Vitrified saltpeter”. [↑](#footnote-ref-13)
15. Ms. Fr. 640, 91r, “Grafting”: “Quand le plomb chaufe trop, il se calcine.” Marginal note. [↑](#footnote-ref-14)
16. Ms. Fr. 640, 83r, “Other sand”: “Charbon de sarment & terre argille bien tamisée tant d’un que d’aultre, & le joindre ensemble avecq glaire d’oeuf bien battue, puys le faire calciner dans le four, & pour en user le destremper en vinaigre.” [↑](#footnote-ref-15)
17. Ms. Fr. 640, 92v, “Sand of river tellins and mussels”: “Les coquilles longues qui se trouvent aulx rivieres d’eau doulce, estant calcinées, font un sable blanc impalpable qui moule fort net.” [↑](#footnote-ref-16)
18. CaO (s) + H2O (l) Ca(OH)2 (aq) (ΔHr = −63.7 kJ/mol of CaO). For more on the chemistry of slaked lime, see Bassam Z. Shakhashiri, “Lime: Calcium Oxide CaO,” in *Science is Fun*, University of Wisconsin, Madison. Accessed 19 December 2014, <http://scifun.chem.wisc.edu/chemweek/PDF/LIME\_CalciumOxide.pdf> [↑](#footnote-ref-17)
19. See Jong-Hyeon Jung, Kyun-Seun Yoo, Hyun-Gyu Kim, Hyung-Keum Lee, “Reuse of waste oyster shells as a SO2/NOx Removal Absorbent,” *Journal of Industrial and Engineering Chemistry*, 13.4 (2007) 512-517. doi. [↑](#footnote-ref-18)
20. Ronge Xing, Yukun Qin, Xiaohong Guan, Song Liu, Huahua Yu, Pengcheng Li, “Comparison of antifungal activities of scallop shell, oyster shell and their pyrolyzed products” *Egyptian Journal of Aquatic Research* 39 (2013) : 83-90.I Available online 5 September 2013. *doi*: 10.1016/j.ejar.2013.07.003. [↑](#footnote-ref-19)
21. Many thanks and sincerest gratitude to Donna Bilak, Ph.D., for procuring these shells from the Grand Central Oyster Bar, boiling them, and helping us remove barnacles and prepare them for calcination. [↑](#footnote-ref-20)
22. We were able to do this thanks to Jeanette Caines, who allowed us to use her small kiln at the Jewelry Arts Institute in midtown Manhattan and was an invaluable resource for guiding this reconstruction. [↑](#footnote-ref-21)
23. We tried also to calcine a whole shell, but the shell exploded in the kiln. See Cataldo and Visco Field Notes, 5 November 2014, “Calcinating oyster shells trial run.” [↑](#footnote-ref-22)
24. We used a Paragon Dragon kiln (24 x 24 x 19 inches). We are grateful to Julia Walther, professional ceramicist, and her advice on operating kilns. [↑](#footnote-ref-23)
25. Fully calcined oyster ash is slippery and white in color. See Cataldo and Visco Field Notes, 24 November 2014, “First kiln attempt” as well as 5 December 2014, “Successful oyster calcination.” [↑](#footnote-ref-24)
26. Alessio Piemontese, *Secreti del Reverendo Donno Alessio Piemontese* (Venice: Sigismondo Bondogna, 1555), 206. See also the annotation on fol. 118v (Raymond Carlson and Jordan Katz). [↑](#footnote-ref-25)
27. See Cataldo and Visco’s annotation on binders, as well as Ms. Fr. 640, fol. 84v, “Eau Magistra.” [↑](#footnote-ref-26)
28. For the “squeeze test” specified by the author, see Ms. Fr. 640, fol. 118v, and its analysis by Cataldo and Visco in their annotation on “Sands and Binders,” discussing fols. 82r and 84v, among several binder recipes. [↑](#footnote-ref-27)
29. These were skills and processes we learned during the residency of expert maker, T.P.C. (Tonny) Beentjes of University of Amsterdam. [↑](#footnote-ref-28)
30. This substitution seemed to be very much in the spirit of the manuscript and the Making and Knowing project. As William Eamon has written, “Even if some writers of books of secrets--Isabella Cortese and Leonardo Fioravanti, for example--discouraged readers from deviating from their instructions, readers did not shy away from experimenting with ingredients and procedures, substituting ingredients, changing the amounts specified, and even pronouncing them useless in their experiments found them so.” William Eamon, “How to Read a Book of Secrets,” in *Secrets and Knowledge in Medicine and Science, 1500 -1800*, eds. Elaine Leong and Alicia Rankin. (Aldershot: Ashgate Publishing Limited, 2011), 34. [↑](#footnote-ref-29)
31. We are grateful for the expertise of Tonny Beentjes, Programme leader of metals conservation, University of Amsterdam, who guided us as we reconstructed sand casting techniques from Ms. Fr. fol. 118v, “Casting in a box mold” in the Craft and Science Laboratory Course, Fall 2014. [↑](#footnote-ref-30)
32. See Fall2014Annotation\_CataldoVisco\_Binder [↑](#footnote-ref-31)
33. Biringuccio suggests that wine alone can be used as a binder in sand casting. See Vannoccio Biringuccio, *The Pirotechnia of Vannoccio Biringuccio. The Classic Sixteenth-Century Treatise on Metals and Metallurgy*, trans. and ed. by Cyril Stanley Smith and Martha Teach Gnudi (New York: Dover Publications, 1990), 328. On folio 69r in the recipe “Sand”, the manuscript author also mentions wine alone as a binding agent for sands in casting processes. [↑](#footnote-ref-32)