Raymond Carlson and Jordan Katz

Making and Knowing Project

**Annotation for BnF Ms. Fr. 640, fol. 118v:**

**“Casting in a Box Mold”**

**BnF Ms. Fr. 640, fol. 118v**

**Annotation**

The recipe “Casting in a Box Mold” on fol. 118v appears after a dense grouping of recipes that detail various forms of casting, such as *en noyeau* casting (casting with a core) and the casting of flowers.[[1]](#footnote-0) The box mold casting recipe privileges discussion of how to produce sand and how to heat the mold, devoting little attention to the casting of metal itself. As this entry will show, such emphases within this recipe can be explained through the process of reconstruction in conjunction with examination of relevant textual sources. Further, this recipe should be understood through its presumed use in producing portrait medals, whose mounting popularity in late sixteenth-century France aligns with the dating of the manuscript.[[2]](#footnote-1)

The author begins the recipe by describing the production of sand made by grinding cores from previously used molds, which are composed of plaster, brick and feather alum.[[3]](#footnote-2) It is unsurprising that sand would be reused, as this is still common practice today in metal foundries, where sand casting is the main technique used for the production of industrial machine parts.[[4]](#footnote-3) In our reconstructions, the only previously used cores available lacked feather alum. This ingredient, “*alun de plume*,” could refer to asbestos or other minerals such as feldspar or gypsum; in modern terms, it refers to the mineral Halotrichite, which is made of soft, parallel strands of a white color, which has the appearance of a feather.[[5]](#footnote-4) Whatever it was, “*alun de plume*” appears to have been important as a binding agent, but for which no substitute was introduced for the previous molds [[**Fig. 1**](https://drive.google.com/open?id=0BwJi-u8sfkVDUFJtQ25WSnRXanc)**: Grinding Previously Used Molds]**. This omission made it possible for us to pass the sand through a sieve, which the feather alum rendered impossible for the author **[**[**Fig. 2**](https://drive.google.com/open?id=0BwJi-u8sfkVDajM1UlNWcDRuMHc)**: Feather Alum]**. Given the time needed to break down the old molds, even using a sieve, one can only imagine the time needed to grind these molds to a “very soft” consistency without one, as the manuscript directs. In the recipe, the author then outlines the preparation of sal ammoniac water (a solution of ammonium chloride) using two balls of sal ammoniac the size of walnuts [*noix*], a process similar to that described in an earlier recipe on fol. 111v.[[6]](#footnote-5) In accordance with the manuscript, this solution was mixed with spirits (interpreted as brandy) and mixed with the sand we had produced through the grinding and sieving process **[**[**Fig. 3**](https://drive.google.com/open?id=0BwJi-u8sfkVDa3M5a1lfQTUyNjA)**: Sand Mixture]**, which was pressed into the “female-sided” box mold over the medal **[**[**Fig. 4**](https://drive.google.com/open?id=0BwJi-u8sfkVDd3lveGxOODZwQnM)**: Filling Female Box Mold]**. (The recipe calls for the molding of a medal, although the reconstruction used molded plaster models, which were seen as a fair substitute.) The author does not stipulate the process of packing the sand into the mold; however, this required a great deal of time in our reconstructions, as the medal was placed facing upwards as small quantities of sand were slowly layered on top of one another with additions of sand or water to adjust the mixture as needed.

After the molding of the medal, the author describes marking the medal’s side and reverse, as well as the sand, a step whose function was not immediately clear during our reconstructions and therefore not undertaken.[[7]](#footnote-6) Prior to filling the male side with sand, the author calls for the dusting of the entire side of the female mold with charcoal (“*charbon pulverisé*”), just as the medal itself had been dusted before insertion into the female side **[**[**Fig. 5**](https://drive.google.com/open?id=0BwJi-u8sfkVDVGtYYmYxMUxQYzQ)**: Applying Charcoal to Female Mold]**. In the reconstruction, this step was very helpful when separating the male and female molds. At this point the author warns specifically not to disturb the medal in order to remove it from the mold. The function of marking the location of the medal earlier becomes clear now, as the author explains that he supported the area of the box mold where the medal was (presumably the point marked) and then struck the back of the mold with his hand. Evidently, on rereading his text, the author rethought the word “struck” (“*frappé*”), adding a note in the margin to state that he had not struck the box mold but instead pressed it with his hands (“*l’ay pressé de la seule force des mains*”) to avoid distorting it **[**[**Fig. 6**](https://drive.google.com/open?id=0BwJi-u8sfkVDYjA4WjZCWlRaMFE)**: Marginal Note, re: Frappé]**.

A major concern of the author was the heating of the box molds. Had the medal not separated after striking the molds, the author explains that he would have heated them. During reconstructions we were far less patient, opting not to heat the mold to remove the plaster model. Rather, our technique for removing the plaster model was to insert a knife into the channel made for pouring, creating a wedge that could lift the model out **[**[**Fig. 7**](https://drive.google.com/open?id=0BwJi-u8sfkVDX0xCc01WRGExZTA)**: Inserting Knife into Mold]**. Our impatience would prove more problematic when we did not heed the author’s next step: heating the molds by resting them on two iron trivets with the imprinted side facing upwards. The author’s attention to this action is evidenced by the small marginal drawing at right in the manuscript and the corresponding marginal note indicating the proper spacing of the trivets [[**Fig. 8**](https://drive.google.com/open?id=0BwJi-u8sfkVDMTR6TzdzbEZuVzg)**: Drawing in Margin, Iron Trivets**]. While the recipe ends here, not explaining how in fact to pour the medal, there are two further marginal notes that explain what is meant by heating the mold **[**[**Fig. 9**](https://drive.google.com/open?id=0BwJi-u8sfkVDZklEaktIXzNleGM)**: Additional Marginal Notes]**. As a result, our decision to let the molds sit in a laboratory fume hood overnight and warm for five to ten minutes in a fairly low oven was inadequate preparation for casting, as the moisture in our molds caused imperfections in the coloration and details of the medals **[**[**Figs. 10**](https://drive.google.com/open?id=0BwJi-u8sfkVDV0hGQkluVVdwa00)**,** [**fig. 11**](https://drive.google.com/open?id=0BwJi-u8sfkVDS25FTGh4SEJ0SGM)**: Final Medal, Obverse and Reverse]** during casting. The author’s second marginal note, which emphasizes the need to “redden the box mold” for gold and silver, proved especially prescient: when pouring silver into one box mold during reconstruction, steam and a spray of silver quickly shot from the one mold [[**Fig. 12**](https://drive.google.com/open?id=0BwJi-u8sfkVDQ0JKZVN2bHBOVjQ)**: Spray of sparks**], as the moisture retained in the sand turned explosively to steam. The resultant silver medal is a perfect snapshot of what occurred inside the mold as the steam forced the molten silver out of the mold and up through the gate **[**[**Fig. 13**](https://drive.google.com/open?id=0BwJi-u8sfkVDRTdxdnp1UXBkZjA)**: Silver Medal Showing Effects of Moisture in the Mold]**.

To understand the properties of the sand and the need to heat the mold, a particularly noteworthy recipe for comparison elsewhere in the manuscript can be consultedon fol. 161r, “preparing sand to cast in a molding box”. This recipe outlines a nearly identical process of breaking up previously used cores with a stick to create sand, soaking the sand in sal ammoniac, baking the sand in a furnace until it reddens, and grinding it up again. The recipe on fol. 161r gives insight to the value of using sand from previously used cores, as it explains that through the repetition of this process, the sand will reach a state such that it does not separate from the box mold. The author also stresses the importance of cooking the mold adequately so that the sal ammoniac can calcine properly. The presence of Latin words in the recipe on fol. 161r, “*gip de lateribus*” and “*alumen jameni*” (i.e., the “brick mortar” and “*alumen album*” of which the cores are composed[[8]](#footnote-7)) suggests a textual source for this recipe, which unfortunately could not be identified based on these phrases.

The recipe for sand-casting in BnF. Ms. Fr. 640 is assuredly linked to the longstanding tradition of portrait medals, which were frequently made using this process. The earliest surviving Renaissance portrait medals are two lost medals that entered the collection of Jean de France, Duc de Berry (1340-1416), by 1413, although there is no way to know whether the originals were cast or produced with a *repoussé* technique, as copies of both types are extant **[**[**Figs. 14**](https://drive.google.com/open?id=0BwJi-u8sfkVDZzJjOEV4OVlKV3c)**,** [**fig. 15**](https://drive.google.com/open?id=0BwJi-u8sfkVDdHhjb2J2X1kxU1U)**: Duc de Berry Medals, Constantine the Great and Hercules]**.[[9]](#footnote-8) Such objects complicate the widespread scholarly consensus that cast portrait medals were developed in Italy.[[10]](#footnote-9) The mass production of pilgrimage badges (made by pouring a tin-lead alloy into molds) as well as the production of medals for numerous French monarchs affirm the presence of artisans in fifteenth-century France capable of casting medals.[[11]](#footnote-10) Nonetheless, the most extensive early written sources of portrait medal casting are of Italian origin: Cennino Cennini furnishes a brief recipe for the making of medals using plaster and either a wax or clay mold, and Leon Battista Alberti was known to model portraits in relief in wax that were subsequently cast in bronze.[[12]](#footnote-11) The individual credited with the invention of the portrait medal genre itself is Pisanello (Antonio di Puccio Pisano, c.1395-c.1455), who was installed at the Este court in Ferrara.[[13]](#footnote-12) Bringing together humanist learning with erudite patrons concerned with the propagation of their fame, the Este court offered the ideal environment for the birth of the portrait medal, which shows a portrait on one side and an emblem or *impresa* on the reverse [[**Fig. 16**](https://drive.google.com/open?id=0BwJi-u8sfkVDUUFUazFrQXc3Z1U)**: Pisanello Medal**].[[14]](#footnote-13) As Ulrich Pfisterer has shown, portrait medals grew in popularity in Italy over the course of the fifteenth and sixteenth centuries, functioning as “social currency” that patrons could exchange in order to establish and solidify bonds of friendship.[[15]](#footnote-14) The level of erudition needed to decode the messages implicit in emblems and *imprese* delineated membership within tightly controlled social circles of learned individuals.[[16]](#footnote-15)

Knowledge of the production of medals certainly carried from Italy to France through the travel of Italian artisans to France, the best known of which are Francesco Laurana in the fifteenth century and Benvenuto Cellini in the sixteenth century. While portrait medals were produced in France at the hands of goldsmiths beginning in the fifteenth century, Mark Jones has demonstrated that in France, centers for medal-making developed around Lyon—the center of French trade with the Italian peninsula—and reached their apogee of manufacture between the second half of the sixteenth century and the early seventeenth century.[[17]](#footnote-16) The appearance, function and understanding of medals in France differed somewhat from that in Italy. In the sixteenth century, French medals deemphasized erudite pairings of emblems and individual portraits in favor of standard images of French monarchs, and the function of such objects seems to be more closely centered on exchange with the royal court as a means of currying favor.[[18]](#footnote-17) Mounting interest in portrait medals in mid-sixteenth-century France is epitomized by Guillaume Rouillé’s *La premiere partie du promptuaire des médailles des plus renommées personnes* *[...]* (1553), which was dedicated to Marguerite of France, sister of the Duc de Berry, and features engravings of coins (some invented by Rouillé himself) with subjects ranging from Adam to Charles V to Sueiman, Emperor of the Ottoman Empire **[**[**Fig. 17**](https://drive.google.com/open?id=0BwJi-u8sfkVDVnJ3ekhxTHphZ3c)**: Guillaume Rouille]**.[[19]](#footnote-18) Rouillé writes in a prefatory note to readers that such portraits recalled antique tradition, preserving together for posterity text and an image of each subject’s face, “the most beautiful and most honest part of man.”[[20]](#footnote-19) Portrait medals were also linked to the academies that developed in late sixteenth-century France. As Frances Yates has shown, the first public French academy (*L’Académie de poésie et de musique*) produced medals for the admission of members.[[21]](#footnote-20) While such medals with portraits of academicians survive, they do not bear members’ *devises* on the reverse **[**[**Fig. 18**](https://drive.google.com/open?id=0BwJi-u8sfkVDY3hBTGxhdC1Od0k)**: French Academy Medal]**.[[22]](#footnote-21) By the time the author of BnF. Ms. Fr. 640 produced his manuscript, therefore, there was a well established demand for medals in France.

While the sand-casting recipe in BnF. Ms. Fr. 640 is presented in a first-person narrative that implies that all presented knowledge was achieved through direct experimentation, earlier published sources offer precedents for many of the techniques described by the author.[[23]](#footnote-22) Numerous books printed in sixteenth-century Italy detail methods for sand casting that closely align with the recipe in BnF. Ms. Fr. 640. In his *Pirotechnia* (1540), Vanocchio Biringuccio outlines the process of using a wax or clay model for the invention of one’s design, which can be preserved by casting this model in plaster of Paris, a technique that allows for the reuse of both the original and plaster models.[[24]](#footnote-23) Biringuccio offers multiple recipes for how to mold such a model in a wooden box frame that has been filled with sand, a process that closely mirrors the technique identified in the manuscript.[[25]](#footnote-24) Similarly, Benvenuto Cellini discusses the casting of medals using a model made of wax in his *Due trattati*, which were published in Florence in 1568.[[26]](#footnote-25) In comparison to the information presented in such historical accounts and treatises, the author of BnF. Ms. Fr. 640 is far more detailed in explaining the merits of the various ingredients and referencing means whereby the readers can test whether their use of the ingredients matches his own. For example, the author explains that the water with two walnut-sized pieces of sal ammoniac should be “fairly salty.” By presenting his text as a recipe, the author closely aligns himself with the tradition of Renaissance books of secrets. In his account of Renaissance books of secrets, William Eamon explains that the use of a “recipe” to record technical information was a common trait of books of secrets, distinguishing them from the “descriptive-historical” method that characterized authors such as Vanocchio Biringuccio.[[27]](#footnote-26)

The casting of portrait medals can be viewed as part of a broader early modern interest in the transformation of materials. Along with knowledge of the heavens and understanding of the body, the ability to manipulate materials provided a key impetus for interest in the acquisition of knowledge about nature. Yet metallurgy and casting also remained a secretive endeavor during this time. Because expertise in metalworking frequently garnered the support and patronage of the nobility and royalty, the practitioner often saw it in his best interest to keep this knowledge secret and mine it for its potential social and political expediency. Biringuccio’s *Pirotechnia*, however, discussed the technical details of mining gold ore openly within the framework of knowledge acquisition, dismissing craft secrecy as a duplicitous method of suggesting expertise and technique where it did not exist. From Biringuccio’s characterization of this phenomenon, though, it is evident that secrecy was indeed a common trope in such works.[[28]](#footnote-27) As an example, Bernard Palissy, the most well-known of French life-casting artisans, remained secretive concerning the specifics of his casts, the techniques of which can only be extrapolated from manuscripts such as our own.[[29]](#footnote-28) The classification of knowledge as “secret” could be rhetorical at times, but it also conveyed a concern about sharing knowledge in a society without any copyright protection.[[30]](#footnote-29) This designation was applied not only to esoteric knowledge but also frequently to the techniques and skills of artisans and craftspeople, collectively termed *arcana artis*.[[31]](#footnote-30)

Portrait medal casting recipes thereby fit into a larger corpus of books of secrets, the most famous of which was the book *Secreti del Reverendo Donno Alessio Piemontese*, first published in Venice in 1555 [[**Fig. 19**](https://drive.google.com/open?id=0BwJi-u8sfkVDUnRVNjRVU2ViZ0E)**: Secreti Frontispiece]**.[[32]](#footnote-31) Translations made the text popular beyond the Italian peninsula: the first French translation of the text appeared in Antwerp only two years later, and within a decade the text had been published more than twenty times in Italian, French, Latin, Dutch, English and German.[[33]](#footnote-32) Before the dawn of the seventeenth century, thirty editions of the *Secreti* were published in French alone.[[34]](#footnote-33) The *Secreti* are divided into six books, which were arranged somewhat thematically and include recipes for remedies, perfumes, preserved fruits and vegetables, beauty secrets, dyes and inks, and metals. While books of secrets generally display an interest in remedies and medical knowledge, BnF. Ms. Fr. 640 records little of note in this regard; it betrays a comparative lack of focus on healing procedures when juxtaposed with Piemontese’s *Secreti*. As noted in the annotation to fol. 48r (“Excellent Mustard”), the medicinal recipes in BnF. Ms. Fr. 640 are limited to those on fols. 7v, 20v, 37r, 47r, 77r.

In 1567, Girolamo Ruscelli—best known as an important editor and literary figure in Venice[[35]](#footnote-34) —claimed authorship of Piemontese’s text in the prefatory letter of the posthumously published *Secreti nuovi di meravigliosa virtù del signor Ieronimo Ruscelli* **[**[**Fig. 20**](https://drive.google.com/open?id=0BwJi-u8sfkVDZkFRU2paYlhpMkE)**: Ruscelli Frontispiece]**.[[36]](#footnote-35) Presumably written prior to Ruscelli’s arrival in Venice in 1548, this rare edition offers new recipes to the original *Secreti*, asserting that the text is a product of experiments undertaken and of knowledge gained by Ruscelli and twenty-seven fellow members of the “Accademia Segreta” in Naples, although no other sources related to the academy are known.[[37]](#footnote-36) As William Eamon and Françoise Paheau have shown in their study of the *Secreti nuovi*, the text contains a far higher number of medical recipes than the original *Secreti* (1,024 in comparison to 108).[[38]](#footnote-37) It seems possible that the author of BnF. Ms. Fr. 640 was aware of the *Secreti nuovi* because he wrote a Latinized version of Ruscelli’s name on the first page of the manuscript among a list of other classical and contemporary authors who may have informed his writing **[**[**Fig. 21**](https://drive.google.com/open?id=0BwJi-u8sfkVDWGtNanNQV3FELVU)**: BnF Ms. Fr. 640, fol. 1r, Ruscelli]**.[[39]](#footnote-38)

Why, however, did the author of BnF. Ms. Fr. 640 write Ruscelli’s name in the manuscript if his own text bears greater overall similarity to the *Secreti*—ascribed to Alessio Piemontese—than to the *Secreti nuovi*? It may be that Ruscelli’s presumed authorship of the *Secreti* was commonplace knowledge by the time of the manuscript’s writing. Yet publications suggest a different story. At the conclusion of their assiduous examination of the publication history of the *Secreti*, Massimiliano Celaschi and Antonello Gregori argue that while Ruscelli’s peers in Venice (where the text was first published) were clearly aware that the name Piemontese was synonymous with Ruscelli, the continued reprinting of the *Secreti* across Europe under the name Piemontese would have obscured this fact.[[40]](#footnote-39) The author of BnF. Ms. Fr. 640 may have seen an edition of the *Secreti*, the major representative of a genre to which his own manuscript seems to have aspired; however, a comparison with the original Italian edition shows some generally shared aims but no specific recipes that the author-practitioner of Ms. Fr. 640 borrowed.[[41]](#footnote-40)

A comparison of the recipe for sand casting in BnF. Ms. Fr. 640 to the *Secreti* and Biringuccio’s *Pirotechnia* reveals many parallels between the techniques described in the two processes as well as a few differences, the most significant of which will be highlighted here.[[42]](#footnote-41) The first has to do with the means of releasing the medal from the mold: Biringuccio recommends greasing the medal in animal fat and applying charcoal dust to it.[[43]](#footnote-42) Ruscelli notably does not recommend applying charcoal at all.[[44]](#footnote-43) The author of BnF. Ms. Fr. 640, by comparison, stresses instead that any grease or oil on the medal should be *removed*, and charcoal should be applied at numerous stages in the mold-making process. Like the author of BnF. Ms. Fr. 640, the *Secreti* and *Pirotechnia* both place significant emphasis on drying the molds over a fire but devote no time in this section to the actual pouring of the medal.[[45]](#footnote-44)

A final note of difference here is the type of sand required for the recipes. The sand casting recipes in BnF. Ms. Fr. 640 advocate the use of old crushed molds on fols. 118v and 161r. Biringuccio and Ruscelli, by comparison, offer very detailed steps for preparing different types of clay and powder that can be used in any combination for such an enterprise. Following the recipe for “The true and most perfect practice of molding medals,” the *Secreti* includes a list of seven different types of sand (“*Terra prima da gittarvi i metalli fusi*,” “*Terra seconda*,” “*Terra terza*,” etc.) **[**[**Fig. 22**](https://drive.google.com/open?id=0BwJi-u8sfkVDTGFGX1JpdVE2VWM)**: Secreti, Terre]**.[[46]](#footnote-45) Still, the objective of such sands remains the same, that “the goodness and perfection of each sand in which to cast fused metals consists in the following: that they are very soft, as if impalpable, because the designs are imprinted very clearly.”[[47]](#footnote-46) Such information was carried through in later translations of the text.[[48]](#footnote-47)

The author of BnF. Ms. Fr. 640, however, was by no means unconcerned with the properties of casting “sands.” Far from it. Spread throughout BnF. Ms. Fr. 640 are forty-one recipes with titles denoting a recipe devoted exclusively to “sand,” many of them indicating the ideal properties of sand, as well as where and how to procure it.[[49]](#footnote-48) The differences among types of sand in such recipes attest to the many uses of this material within the workshop as well as the clear attention the author paid to the ideal function for each variety of sand. It may be that the author of BnF. Ms. Fr. 640 simply did not believe such diverse sands to be necessary to the production of medals, at least in this one instance. In the upper right margin of the folio with “Casting in a box mold,” the author later inserted a recipe for “Excellent sand,” which simply restates the value of sand made from crushed, used cores. One may hypothesize that the author found that this particular recipe of sand worked best for the sand casting of medals, offering a personal touch to a recipe that would otherwise have been well known among medal-makers in this period.

1. Bibliothèque Nationale de France, Paris, Ms. Fr. 640 (henceforth cited as BnF. Ms. Fr. 640), fol. 118v. [↑](#footnote-ref-0)
2. Pamela Smith and Tonny Beentjes have demonstrated that the manuscript likely dates from the last two decades of the sixteenth century. See Pamela H. Smith and Tonny Beentjes, “Nature and Art, Making and Knowing: Reconstructing Sixteenth-Century Life-Casting Techniques,” *Renaissance Quarterly* 63 (2010): 130, n. 4. [↑](#footnote-ref-1)
3. The manuscript makes reference to the use of “*alun de plume*,” which translates to feather alum, according to a definition provided in a 1611 French-English dictionary by Randle Cotgrave. See the entry for “*alun de plume*” in Randle Cotgrave, *A Dictionarie of the French and English Tongues* (London: Adam Islip, 1611). [↑](#footnote-ref-2)
4. On the reuse of sand in molds, see the following online data sheet: CWC, Managing Partner of the Recycling Technology Assistance Partnership (ReTAP), “Technology Brief: Beneficial Reuse of Spent Foundry Sand,” August 1996, http://infohouse.p2ric.org/ref/05/04013.pdf. [↑](#footnote-ref-3)
5. See E.H.S. Bailey, “‘Feather Alum’ from Colorado,” *Transactions of the Annual Meeting of the Kansas Academy of Science* 12 (1889-90): 101. [↑](#footnote-ref-4)
6. The recipe on fol. 111v calls for sal ammoniac balls the size of chestnuts. Under the heading “Sal ammoniac water”, the author writes: “You need two chestnuts [*chastaignes*] of sal ammoniac which is crushed into a water pot, when you taste it should not be too much salted.” The translation of *noix* as walnuts follows the definition of this term provided in the French-English dictionary of 1611 by Randle Cotgrave. See the entry in Cotgrave, *A Dictionarie of the French and English Tongues*. [↑](#footnote-ref-5)
7. “*J’ay souflé ma medaille & l’ay moulée, et la femelle du chassis estant remplye,*

   *j’ay marqué & faict une ligne sur le revers & bort de la medaille & sur le sable prochain aussy.”* [↑](#footnote-ref-6)
8. Thanks for these translations are given to Heather Wacha, who indicated them in the comments section of the online edition of the manuscript. [↑](#footnote-ref-7)
9. A collection inventory of 1413 references the presence of medals depicting Constantine the Great and Hercules. Medals made with the *repoussé* technique are composed of two hammered plates soldered together. On the origin of portrait medals and the two medals in the collection of the Duc de Berry, see the entries by Stephen Scher in Stephen Scher, ed., *The Currency of Fame* (New York: Harry N. Abrams, Inc., Publishers, in association with The Frick Collection, 1994), 13-16, 32-37. [↑](#footnote-ref-8)
10. Within the vast literature on Italian medals, see especially Lore Börner, *Die italienischen Medaillen der Renaissance und des Barock (1450 bis 1750)* (Berlin: Gebr. Mann Verlag, 1997); John Graham Pollard, *Renaissance Medals. Volume I: Italy* (New York and Oxford: Oxford University Press, 2007). [↑](#footnote-ref-9)
11. On the technical processes of making pilgrimage badges, see Brian Spencer, *Pilgrim Souvenirs and Secular Badges* (London: The Stationery Office, 1998),7-13. On the production of medals in fifteenth-century France, see Fernand Mazerolle, *Les médailleurs français du XVe siècle au milieu du XVIIe* (Paris: Imprimerie Nationale, 1902-4):I: vi-xii, 3-8; II: 1-9; III: plates. 1-3. [↑](#footnote-ref-10)
12. The two earliest surviving manuscripts of Cennini’s text diverge in their description of which materials could be used for the making of molds for medals. The manuscript in the Biblioteca Riccardiana lists *terra* (clay), while the manuscript in the Biblioteca Mediceo-Laurenziana lists *ciera* (wax). See Cennino d’Andrea Cennini, *The Craftsman’s Handbook. The Italian “Il libro dell’arte,*” trans. Daniel Thomspon, Jr. (New York: Dover Publications, 1960), 130. [↑](#footnote-ref-11)
13. Pisanello’s contribution to the genre of medals was well-known in the Renaissance, as Vasari cites in a letter by Giovanni Paleologo Il Giovio in praise of Pisannelo in his *Vite*: “Costui fu ancora prestantissimo nell’opera de’ bassi rilievi, stimati difficilissimi dagl’artefici, perché sono il mezzo tra il piano delle pitture e ’l tondo delle statue. E perciò si veggiono di sua mano molte lodate medaglie di gran principi, fatte in forma maiuscola della misura propria di quel riverso che il Guidi mi ha mandato del cavallo armato.” See Giorgio Vasari, *Le vite de’ più eccelenti pittori, scultori e architettori*, ed. Gaetano Milanesi (Florence: Sansoni, 1906), III: 10-11. On Pisanello and the production of portrait medals, see especially Luke Syson and Dillian Gordon, *Pisanello: Painter to the Renaissance Court* (London: National Gallery Company, distributed by Yale University Press, 2001), 109-30; Beverly Louise Brown, “Portraiture at the Courts of Italy,” in *The Renaissance Portrait from Donatello to Bellini*, ed. Keith Christiansen and Stefan Weppelmann (New York: The Metropolitan Museum of Art, Distributed by Yale University Press, 2011), 26-47. [↑](#footnote-ref-12)
14. On the use of *imprese* in medals, see especially Kristen Lippincott, “‘*Un Gran Pelago’*: The Impresa and the Medal Reverse in Fifteenth-Century Italy,” in *Perspectives on the Renaissance Medal*, ed. Stephen Scher (New York and London: Garland Publishing, Inc., 2000), 75-96. [↑](#footnote-ref-13)
15. Ulrich Pfisterer, *Lysippus und seine Freunde. Liebesgaben und Gedächtnis im Rom der Renaissance oder: Das erste Jahrhundert der Medaille* (Berlin: Akademie Verlag, 2008), 221-57. [↑](#footnote-ref-14)
16. Whether medals could also function as actual currency rather than as social currency is a well-debated topic. See, for example, Andrea Saccocci, “Funzioni monetarie della medaglia,” in *Le stagioni della medaglia italiana. Atti del sesto convegno internazionale di studio sulla storia della medaglia 17-19 dicembre 1998*, ed. Giovanni Gorini (Padova: Editoriale Programma, 2001), 57-68. On the function of precious metals as a material for currency versus as an object of material production in sixteenth-century France, see Rebecca Zorach, *Blood, Milk, Ink, Gold: Abundance and Excess in the French Renaissance* (Chicago and London: The University of Chicago Press, 2005), 196-208. [↑](#footnote-ref-15)
17. Jones claims that until 1550, the making of medal remained “a provincial Italian rather that specifically French cultural phenomenon.” See Mark Jones, “Medal-Making in France 1400-1650: The Italian Dimension,” *Studies in the History of Art* (1987): 57-71 (64). [↑](#footnote-ref-16)
18. In the seventeenth century, the use of emblems or *devises* became more common in French medals. See Mark Jones, “Medals and devices in seventeenth century France,” in *Medaglisti e committenti. Il ruolo della committenza nella creazione della medaglia. Atti del quinto convegno internazionale di studio sulla storia della medaglia. Udine 8-11 giugno 1984* (Padova: Editoriale Programma, 2002), 37-46. On portrait medals in sixteenth and seventeenth century France broadly, see especially George Hill, *Medals of the Renaissance*, ed. Graham Pollard (London: British Museum Publications Limited, 1978), 130-42; Jones, “Medal-Making in France”;Scher, *The Currency of Fame*, 305-43; John Graham Pollard, *Renaissance Medals. Volume II: France, Germany, The Netherlands, and England* (New York and Oxford: Oxford University Press, 2007), xxvi-xxix. [↑](#footnote-ref-17)
19. Guillaume Rouillé, *La premiere partie du propmptuaire des médailles des plus renommés personnes* *qui ont esté depuils le comencement du monde: evec brieve descrpition de leurs vies & faicts, recueillie des bons auteurs* (Lyon: Guillaume Rouillé, 1553). The enduring popularity of this text is evidenced by its reprinting in 1577. On Rouillé and the broader Renaissance tradition of anthologizing portrait medals, see Francis Haskell, *History and its Images: Art and the Interpretation of the Past* (New Haven and London: Yale University Press, 1993), 26-36. [↑](#footnote-ref-18)
20. “*la tresbelle, & treshonneste partie de l’homme*.” See Rouillé, *La premiere partie*, fol. 3r. [↑](#footnote-ref-19)
21. See Frances Yates, *The French Academies of the Sixteenth Century* (London: The Warburg Institute, 1947), 22. In the production of emblems, the French term *devise* is understood to substitute the Italian term *motto*, which constitutes the short Latin phrase that was part of an emblem. See Henri Zerner, *Renaissance Art in France: The Invention of Classicism*, trans. Deke Dusinberre, Scott Wilson, and Rachel Zerner (Paris: Flammarion, 2003), 89. [↑](#footnote-ref-20)
22. Yates, *The French Academies*, 22, n.2. [↑](#footnote-ref-21)
23. This essay will set aside the question of what information the author may specifically have gleaned from oral conversations with other artisans. [↑](#footnote-ref-22)
24. 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), 232-33. [↑](#footnote-ref-23)
25. *Ibid*, 234-38, 326-27. [↑](#footnote-ref-24)
26. Benvenuto Cellini, *Due trattati uno intorno alle otto principali arti dell’oreficeria. L’altro in materia dell’arte della Scultura; dove si veggono infiniti segreti nel lavorar le Figure in Marmo, & nel gettare di Bronzo* (Florence: Valente Panizzij, & Marco Peri, 1568), 19-20. [↑](#footnote-ref-25)
27. See William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton: Princeton University Press, 1994), 131. [↑](#footnote-ref-26)
28. Pamela O. Long, *Openness, Secrecy, Authorship: Technical Arts and the Culture of Knowledge from Antiquity to the Renaissance* (Baltimore: Johns Hopkins University Press, 2001), 181. [↑](#footnote-ref-27)
29. Hanna Rose Shell, “Casting Life, Recasting Experience: Bernard Palissy’s Occupation between Maker and Nature,” *Configurations* 12, no.1 (2004): 9. [↑](#footnote-ref-28)
30. Daniel Jütte, “Trading in Secrets: Jews and the Early Modern Quest for Clandestine Knowledge,” *Isis* 103, no. 4 (2012): 682. [↑](#footnote-ref-29)
31. *Ibid*, 683. See footnote 62, where Jütte notes that porcelain manufacturers in eighteenth-century Dresden were kept under strict surveillance and forbidden from sharing their craft secrets. [↑](#footnote-ref-30)
32. Alessio Piemontese, *Secreti del Reverendo Donno Alessio Piemontese* (Venice: Sigismondo Bondogna, 1555). [↑](#footnote-ref-31)
33. On the publication history of this text, see especially Massimiliano Celaschi and Angonella Gregori, *Da Girolamo Ruscelli a Alessio Piemontese. I* Secreti *in Italia e in Europa dal Cinque al Settecento* (Rome: Vecchiarelli Editore, 2014), 127-206. [↑](#footnote-ref-32)
34. French was the second most popular language—after Italian—in which editions of the *Secreti* appeared during the sixteenth century. For a list of all the editions of the *Secreti* through the eighteenth century, see Celaschi and Gregori, Da Girolamo Ruscelli *a Alessio Piemontese*, 351-406. [↑](#footnote-ref-33)
35. On Ruscelli’s role as an editor, see Brian Richardson, *Print Culture in Renaissance Italy: The Editor and the Vernacular Text 1470-1600* (Cambridge: Cambridge University Press, 1994), *passim*. [↑](#footnote-ref-34)
36. “Ieronimo” is a Latinized version of the Italian name Girolamo, although the more precise Latin translation would be Hieronymous. See Girolamo Ruscelli, *Secreti nuovi di meravigliosa virtù del signor Ieronimo Ruscelli* (Venice: Gli heredi di Marchiò Sessa, 1567). [↑](#footnote-ref-35)
37. On the text and related academy, see John Ferguson, “The Secrets of Alexis. A Sixteenth Century Collection of Medical and Technical Receipts,” *Proceedings from the Royal Society of Medicine* 24 (1931): 225-46; William Eamon and Françoise Paheau, “The Accademia Segreta of Girolamo Ruscelli: A Sixteenth-Century Italian Scientific Society,” *Isis* 75, no.2 (1984): 327-42; Celaschi and Gregori, *Da Girolamo Ruscelli a Alessio Piemontese*, 120-26. [↑](#footnote-ref-36)
38. Eamon and Paheau, “The Accademia Segreta,” 335. [↑](#footnote-ref-37)
39. BnF. Ms. Fr. 640, fol. 2r. [↑](#footnote-ref-38)
40. Celaschi and Gregori, *Da Girolamo Ruscelli a Alessio Piemontese*, 206. More copies of the *Secreti* were published in Venice than in any other European city, a fact likely owing both to the book’s origins there and to Venice’s preeminence in the Italian publishing industry. [↑](#footnote-ref-39)
41. A complete review of French and Latin versions of the *Secreti* is necessary in order to determine this point definitively. [↑](#footnote-ref-40)
42. For an excellent overview of the processes described in the *Pirotechnia* and *Secreti*, see Patricia Tuttle, “An Investigation of the Renaissance Casting Techniques of Incuse-Reverse and Double-Sided Medals,” *Studies in the History of Art* 21 (1987): 205-212. [↑](#footnote-ref-41)
43. Biringuccio, *Pirotechnia*, 326. [↑](#footnote-ref-42)
44. Tuttle has rightly observed the oddity of this omission, given the need for charcoal to help the molds separate (Tuttle, “An Investigation,” 206). [↑](#footnote-ref-43)
45. “Having brought them [the molds] to this point, finally cast them in whatever metal you wish,” Biringuccio blithely concludes. See Biringuccio, *Pirotechnia*, 327. [↑](#footnote-ref-44)
46. The full title of the recipe is: “*La vera et perfettissima pratica di gittar medaglie, & ogni altro lavoro di rilevo basso, così in bronzo, come in oro, argento, rame, piombo, stagno, & ancor di cristallo, di vetro, & di marmo*” (Piemontese, *Secreti,* 205). [↑](#footnote-ref-45)
47. “*La bontà & perfettione di ciascuna terra da gittarvi dentro metalli fussi consiste in queste cose, cioè che principalmente sieno sottilissime, & come impalpabili, perche i disegni vengano improntati nettissimi*” (Piemontese, *Secreti*, 206). [↑](#footnote-ref-46)
48. # An English version of the *Secreti* repeats such information, noting that the sand should be “fine and small, and in no ways rough, or full of grommel.” For the relevant recipes, see Alexis of Piedmont, *The secretes of the reverende mayster Alexis of Piemovnt . Conteinyng many excellẽt remedies against dyuers diseases, woundes, and other accidentes. with the manner to make distillations, parfumes, confitures, dyinges, colours, fusions, and meltings. A worke wel approued, verye profytable and necessary for euery man*, trans. Wyllyam Warde (London: 1559), fols. 133v-134v.

    [↑](#footnote-ref-47)
49. Such a count includes only recipes about sand and excludes recipes on how sand can be used. See fols. 41r, 49r, 67r, 67v, 69r, 71v, 81r, 81v (two recipes), 82v, 83r (four recipes), 84r, 84v (two recipes), 85v (two recipes), 86v, 87r, 87v (two recipes), 88v (two recipes), 89r, 89v, 90r (two recipes), 92v, 93r (two recipes), 99r, 111v, 117v, 118v, 120r, 132v, 134r, 160r, 164v. [↑](#footnote-ref-48)