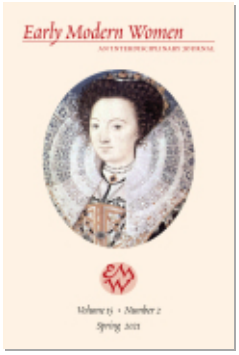
East of Italy: Women and Alchemy at the "Peripheries" of Early Modern Europe



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In the *Segreti della signora Isabella Cortese* (1561), one of the most popular "books of secrets" published in early modern Italy, the author — who presents herself as an itinerant female alchemist, addressing a readership of women — explains that the precious knowledge she shares has been gleaned from her travels along a well-worn route stretching from Italy to Moravia, Poland, and Hungary.[1] Cortese's volume, which contains alchemical recipes along with images of laboratory vessels and equipment, offers a literary representation of the female adept that highlights the gendered circulation of knowledge between western and central and eastern Europe. While a number of recent studies have offered important insight into women's alchemical activity in areas such as Italy, France, Germany, Spain, and England,[2] much remains to be understood about the shape of women's involvement with alchemy in other — often less thoroughly studied — early modern sites.

In 2012, Dóra Bobory and Jennifer M. Rampling identified the need for increased examination of alchemical activity at the "peripheries" of early modern Europe. They employ this term advisedly, acknowledging the scholarly trends and political, historical, and cultural biases that have led to greater focus on western Europe, while areas such as the Kingdom of Hungary, the Polish-Lithuanian

[1] Isabella Cortese, *I segreti della signora Isabella Cortese, ne' quali si contengono cose minerali, medicinali, artificiose, & alchimiche. . .appartenenti a ogni gran Signora* (Venice: Giovanni Bariletto, 1561). On Cortese's text, see Meredith K. Ray, *Daughters of Alchemy: Women and Scientific Culture in Early Modern Italy* (Cambridge, MA: Harvard University Press, 2015), 46–73.

[2] In addition to the authors included in this *Forum*, see, inter alia, work by Michelle DiMeo, Lynette Hunter, Elaine Leong, and Alisha Rankin.

Commonwealth, and Scandinavia have received comparably less critical attention.[3] Yet the web of connections linking women and alchemy throughout Europe — even over generations — was mobile and stretched beyond static geographic bounds. In an effort to sketch a broader and more interconnected picture of the dissemination and forms of alchemical knowledge among early modern women, this essay will trace a loose transnational lineage that extends from sixteenth-century Italy into some of the "peripheries" noted by Bobory and Rampling. From the medical-alchemical experiments of a Sforza countess, solicited from courtly contacts throughout Europe, to the Paracelsian reflections of a Paduan apothecary, dedicated to a Polish queen of Sforza descent, and finally to that queen's granddaughter — a princess of Sweden who conducted her own experiments, oversaw a pharmacy, and financed the publication of an influential herbarium — women's scientific activity resonated across early modern borders of all kinds.

Beween Italy and Poland: Caterina Sforza and Bona Sforza

A particularly rich example of the depth and variety of women's engagement with alchemy — which ranged from the quest for alchemical gold to the preparation of medicines, cosmetics, perfumes, soaps, inks, and dyes — can be found in the *Experimenti* of Caterina Sforza (1463–1509), countess of Imola and Forlì. As I have discussed elsewhere, Caterina amassed hundreds of such recipes, collected from a variety of sources, many of them women.[4] She maintained a laboratory space in the fortress of Ravaldino, where she conducted experiments, alone or with a trusted agent, and established gardens in the surrounding countryside to supply many of the organic ingredients she required. Caterina shared her knowl-

[3] See Dóra Bobory and Jennifer M. Rampling, "Alchemy on the Fringes: Communication and Practice at the Peripheries of Early Modern Europe," *Early Science and Medicine* 17 (2012): 523–47). On some of these regions, see, inter alia, studies by Dóra Borbory, Vladimír Karpenko, Rafal T. Prinke, Ivo Purš, and Joachim Telle. On female figures such as Christina of Sweden, see Susanna Åkerman, *Queen Christina of Sweden and Her Circle: The Transformation of a Seventeenth-Century Philosophical Libertine* (Leiden: Brill, 1991). On the construction and meanings of "Europe" in the early modern period, see Katharina N. Piechocki, *Cartographic Humanism* (Chicago: University of Chicago Press, 2019).

[4] On Caterina's experiments see Ray, *Daughters of Alchemy*, 14–45; see also Sheila Barker and Sharon Strocchia, "Household Medicine for a Renaissance Court: Caterina Sforza's *Ricettario* Reconsidered," in *Gender, Health, and Healing, 1250–1550*, ed. Sarah Ritchey and Sharon Strocchia (Amsterdam: Amsterdam University Press, 2020), 139–66.

edge selectively through epistolary, diplomatic, and personal channels: as for other women of her status, alchemical knowledge served both political and personal functions. After her death, Caterina's compilation of recipes was passed down to her youngest son — father to the first Medici grand duke, Cosimo I — placing it at the foundation of a well-documented Medici fascination with alchemy that persisted for several generations. Yet the Sforza legacy of scientifically engaged women extended well beyond Italy: notably, through the figure of Bona Sforza, daughter of Caterina's half-brother Gian Galeazzo Sforza and Isabella d'Aragona, resonating too in Bona's Jagiellon and Vasa descendants.

The marriage in 1518 of Bona Sforza (1493–1557) to King Sigismund I ("The Old") was a lavish affair, widely reported throughout Europe. The union generated new avenues of cultural, political and economic exchange between Italy and the Kingdom of Poland that helped to foster the circulation of scientific and medical knowledge.[5] Connections between Poland and the university city of Padua, where Copernicus had studied and Vesalius and Galileo would later hold teaching positions, expanded under Bona's reign. Young men of the Polish nobility traveled westward in increasing numbers to study at Padua, which held a "monopoly" of sorts on educating Poland's élite.[6] At the same time, the union of Bona and Sigismund was the catalyst for an influx of Italians to the east, including many from the worlds of science and medicine. Bona's retinue included the poet and natural philosopher Celio Calcagnini, author of a work on the rotation of the earth; the astronomer and astrologist Luca Guarico; and a large number of pharmacists and physicians, reflecting the new queen's interests in these areas. Among Bona's most trusted advisers was Giovanni Andrea Valentino, a physician from Modena who was later named secretary to the Crown; another of her physicians, Jacopo Ferdinando of Bari, taught medicine at Padua. Under Bona and Sigismund (and, subsequently, their daughter Anna Jagiellon and her consort, Stefan Batory), moreover, Poland was perceived by Italians as a haven

[5] On Bona Sforza, see W. Pociecha, *Królowa Bona (1494–1557)* (Warsaw: Państwowe Zakłady Wydawnictw Szkolnych, 1949); Maria Bogucka, *Bona Sforza* (Wroclaw: Zakład Narodowy im. Ossolińskich, 2009); see also Katarzyna Kosior, "Bona Sforza and the Realpolitik of Queenly Counsel in Sixteenth-Century Poland-Lithuania," in *Queenship and Counsel in Early Modern Europe*, ed. Helen Matheson-Pollock, Joanne Paul, and Katherine Fletcher (New York: Palgrave, 2018), 15–34.

[6] Henryk Baryzc, "Seventeenth Century Padua in the Intellectual Life of Poland," in *Polish Civilization: Essays and Studies*, ed. Mieczyslaw Giergiekewicz and Ludwik Krzyzanowksy (New York: New York University Press, 1979), 135.

of confessional tolerance, adding an additional layer of complexity to the circulation of people and ideas: for many radical religious exiles, as well as for other free thinkers, Poland became an increasingly attractive destination.[7] By the 1560s, the Neapolitan Giovanni Bernardino Bonifacio (a follower of Juan de Valdés) would enthuse that in Cracow one could find "great liberty, I would say the very greatest, to think, deliberate, live, write and publish."[8] This reputation for religious tolerance reverberated in the scientific and medical communities, and it helps to contextualize the presence at Bona's court of figures such as Samuel ben Meshullam, a Jewish physician who had studied at Padua, and Giorgio Biandrata, the Piemontese practitioner of women's medicine and antitrinitarian polemicist who sought refuge with the queen.[9]

Bona had a particular passion for gardens, viticulture, and botanical medicine — interests that echo those of Caterina Sforza and would reverberate in Bona's own daughters and, later, her granddaughter. Not only did the queen employ numerous physicians and pharmacists, paying them handsomely, but she also established new gardens at Wawel castle and introduced new species of plants and trees to her adopted country.[10] Botanicals played a critical role in empirical medicine, which borrowed from many aspects of alchemy. Interest in Paracelsian medicine, in particular, with its strong links to alchemical principles and reliance on distillation and compounding, was widespread in Bona's kingdom, particularly in cities such as Cracow and Vilnius. Paracelsus claimed to have visited Poland around 1520, and several of his disciples would become physicians to the royal family, including the alchemist Alexander von Suchten, author of a treatise on antimony, who served Bona's son, King Sigismund Augustus, and

[7] See Johanna Kostylo, "Commonwealth of All Faiths: Republican Myth and the Italian Diaspora in Sixteenth-Century Poland-Lithuania," in *Citizenship and Identity in a Multinational Commonwealth: Poland-Lithuania in Context, 1550–1772,* ed. Karen Friedrich and Barbara M. Pendzich (Leiden: Brill, 2008), 184–85.

[8] Kostylo, "Commonwealth of All Faiths," 185n52.

[9] See Sarah Gwyneth Ross, "The Literary Lives of Health Workers," in *The Renaissance of Letters: Knowledge and Community in Italy, 1300–1650,* ed. Paula Findlen and Suzanne Sutherland (New York: Routledge, 2020), 198–99.

[10] See Gerardo Cioffari, *Bona Sforza: Donna del Rinascimento tra Italia e Polonia* (Bari: Levante Editore, 2000), 107–17.

Wojciech Ocszko, archiater to both Sigismund Augustus and Stefan Batory.[11] As has been shown for other court settings, such as that of Rudolf II, Paracelsian physicians and alchemical adepts often clustered around the figure of the prince, jockeying to obtain favor and status through the exchange of alchemical secrets.[12] On a broader scale, inventories of Polish burghers and booksellers from this period show the wide circulation and possession of "alchemical books," and it was not uncommon for landed gentry to copy fragments of alchemical texts into collections or compile their own manuals, as in Italy.[13] The extent to which Bona herself engaged in such endeavors is uncertain, but it is clear that her interests in these arenas led her to support an active scientific community around her. Indeed, according to the sixteenth-century writer Stanisław Orzechowski, under Bona, Poland was "on par with the Italians in terms of sophistication" and with "the Greeks" when it came to science.[14]

In 1548, facing increasing tensions over her monarchist political philosophy, Bona Sforza returned to Italy amid a cloud of controversy, having fallen out with her son, now king of Poland. Three of Bona's four daughters left for royal marriages, including Catherine (to whom we will return in a moment), who wed the Prince of Finland, later king of Sweden. Anna Jagiellon, Bona's eldest daughter, remained at her brother's court, coming to power only after his death, when she was elected co-ruler of the Polish-Lithuanian Commonwealth with her new husband, Stefan Batory. Under the couple, Poland's reputation for religious tolerance continued to grow, in ever sharper contrast to the Counter-Reformation climate in Italy or the Wars of Religion in France.[15]

[11] Wlodzimierz Hubicki, "Paracelsists in Poland," in *Science, Medicine and Society in the Renaissance: Essays to Honor Walter Pagel,*" ed. Allen Debus (New York: Science History Publications, 1972), 167.

[12] Rafal T. Prinke and Mike A. Zuber, "Alchemical Patronage and the Making of an Adept: Letters of Michael Sendivogius to Emperor Rudolf II and His Chamberlain Hans Popp," *Ambix* 65, no. 2 (2018): 325–55.

[13] See Rafal T. Prinke, "*Antemurale Alchimiae:* Patrons, Readers, and Practitioners of Alchemy in the Polish-Lithuanian Commonwealth," *Early Science and Medicine* 17 (2012): 542.

[14] Translation from https://culinary.krakow.pl/get_pdf.php?dok_id=226256.

[15] See Daniel Stone, *The Polish Lithuanian State, 1386–1795* (Seattle: University of Washington Press, 2001), 120; Kostylo, "Commonwealth of All Faiths," 202.

Between Poland and Sweden: Anna Jagiellon and Anna Vasa

Like her mother, Anna Jagiellon (1523-1596) was a well-educated woman with wide-ranging interests, and was known for promoting the education of girls at her court in Cracow.[16] Also like Bona, Anna and Stefan employed a number of highly paid court physicians, retaining not only the religious radical Biandrata, but also David Mayer, reputed to have been a disciple of Paracelsus.[17] Records at the University of Warsaw Library show that Anna owned a copy of Vesalius's *De humani corporis fabrica Librem septem* (1543), as well as several volumes on plague and disease; intriguingly, they also show that she inherited from her brother, Sigismund Augustus, a large portion of his extensive library, including hundreds of works on medicine and pharmacy as well as alchemy and astrology.[18] It is worth mentioning here that the noted Polish alchemist Michael Sendivogius, who spent several years in Prague at the court of Rudolf II and had close links to figures such as John Dee, Edward Kelley, and Olbracht Łaski, all known for their interest in alchemy as well as their Polish ties, received direct support from Anna's husband Stefan Batory and later from Anna's nephew, King Sigismund III Vasa.[19]

A powerful female leader, Anna presided over what had become one of the largest states in Europe, making her a compelling prospect as a patron. The queen's scientific interests, together with her reputation for supporting the women in her court, help to explain, for example, why the Paduan apothecary Camilla Erculiani, author of a work containing Paracelsian, alchemical, and heterodox themes, chose Anna as her dedicatee and defender in 1584.[20] Erculiani elected to publish her

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[16] On Anna Jagiellon, see Maria Bogucka, *Anna Jagiellonka* (Wroclaw: Zakład Narodowy, 1994); Bogucka, "The Court of Anna Jagiellon: Size, Structure, Functions," in *Acta Poloniae Historica* 99 (2009): 91–105; and Katarzyna Kosior, "Anna Jagiellon: A Female Political Figure in the Early Modern Polish-Lithuanian Commonwealth," in *A Companion to Global Queenship* (Yorkshire: Arc Humanities Press, 2018), 67–78.

[17] Hubicki, "Paracelsists in Poland," 167.

[18] See *Katalog Ksiasek z biblioteki krola Zygmunta II Augusta w zbiorach Rosyskiej Bilioteki Narodwej w Sankt Persburgu* (Catalogue of Books from the Library of Sigismund II Augustus, King of Poland, in the Collection of the National Library of Russia in Saint Petersburg), which completes the work of Alodia Kawecka-Gryczowa (Warsaw: Biblioteka Narodowa, 2015), 14.

[19] Prinke and Zuber, "Alchemical Patronage and the Making of An Adept," 325–55.

[20] Eleonora Carinci, "Una 'speziala' padovana: *Lettere di philosophia naturale di Camilla Erculiana* (1584)," *Italian Studies* 2 (2013): 202–29; Ray, *Daughters of Alchemy*, 111–31.

Letters on Natural Philosophy (1584) not in Italy, but in Cracow, with the Officina Lazari, overseen by a former student at the University of Padua who had published other works on natural philosophy and alchemy in Poland.[21] Notably, the dedicatory letter to Erculiani's volume (which ruminates on the production of theriac, the physical causes of the universal flood, and women's participation in science), states that Anna's Polish subjects in Padua — whom Erculiani had likely encountered at her apothecary there — described their queen as an "amatrice delle scientie" (lover of the sciences) and assured Erculiani of a warm reception in Poland for her volume.[22] Tellingly, Erculiani's dedicatory letter also makes it clear that the author seeks protection from inevitable detractors, or "malivoli."[23] If Erculiani refers, on one level, to those who might object to a woman publishing a work of natural philosophy, her decision to choose Anna for her patron also suggests that her motivations — and concerns — went deeper: by publishing in Poland, not only did Erculiani hope to appeal to a female sovereign with shared scientific interests, but also to extend her links to a country with strong cultural ties to Italy in the midst of its own intellectual Renaissance, and to benefit from its more permissive political and religious policies. The window of opportunity was narrow, for after the death of Queen Anna, the last member of the Jagiellon dynasty, just a few years later, Poland's official policy of religious tolerance would begin to shift, mirroring more closely, under the reign of Sigismund III Vasa (1587–1632), the Counter-Reformation climate in Italy that authors such as Erculiani had sought to evade.

Bona Sforza's legacy of scientific interests, however, continued to make itself evident — even more actively — in the example of her granddaughter, Anna Wazowna or Vasa (1568-1625), who was tutored for a time by Anna Jagiellon. Daughter of the Jagiellonian princess, Catherine (1526–1583; sister to Queen Anna) and King Jan (John) Vasa III of Sweden (1537–1592), Anna Vasa was born in Sweden, the year after her royal parents were released from captivity in Gripsholm Castle under John's eldest brother, Eric XIV. Raised to be fluent in

[21] These included a commentary on Hermes Trismegistus's alchemical treatise *Pymander* dedicated in part to Stefen Batory (Buchwald-Pelcowa, "Il libro italiano," 428n2).

[22] "essendo fatta certissima da molti delli suoi creati, che li seranno grate, per conoscerla virtuosissima, & amatrice delle scientie," from Camilla Erculiani, *Lettere di philosophia naturale* (Cracow: Nella stamperia di Lazaro, 1584), aii-v.

[23] "ho conosciuto V[ostra] M[aestà] essere ancora lei attissima a diffendere quest'opera da malivoli" (Erculiani, *Lettere*, aiiir).

Polish, Anna Vasa first returned to her mother's native country in 1587, accompanying her brother Zygmunt (Sigismund III) (1566–1632), by then elected to the throne of the Polish-Lithuanian Commonwealth. Catherine (to whom the other major portion of King Sigismund Augustus's library was bequeathed), had died in 1583. Anna Jagiellon assumed responsibility for her niece's education in this period, hosting her at Wawel Castle and encouraging her in the scientific interests she would continue to develop more fully back in Sweden. Various marriage projects were undertaken for the princess, though they never came to fruition, and while she was initially received enthusiastically in Poland, her Lutheran confession would eventually lead to tensions at the Catholic court of the Jagiellons.

After her aunt's death, Anna Vasa returned to Sweden to the castle of Stegeborg, where she turned her attention in earnest to medical-alchemical activities. Likely compelled in part by her own long-standing illness — Anna may have suffered from a rare neurological disease causing nausea, headaches, double vision, and cardiac and gastrointestinal problems — she became deeply engaged in the study of the properties of plants and herbs for medicinal and pharmacological purposes, even building — as her distant relative Caterina Sforza had before her — a dedicated laboratory space within the castle, in addition to the pharmacy she oversaw.[24] Alicja Saar Kozłowska, who has studied Anna Vasa's correspondence, characterizes her scientific practice as phytotherapy, or science-based medicine, arguing that Anna conducted carefully conceived and executed experiments.[25] Similar to both Caterina and Bona Sforza, Anna Vasa also kept extensive gardens to furnish materials for her experiments, maintaining them at considerable expense.[26]

Anna's correspondence reflects her efforts to make innovations to existing medical and alchemical recipes. Her letters, many of them exchanged between 1624–1625 with Ursula Meierin, a noblewoman who served at the court of

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[24] Perhaps this was *impressio basillaris*, a developmental skeletal defect, on which see Alicja Saar Kozłowska, "Polskie Lata Anny Wazówny Przyczynek Do Badań Nad Osobowościa Postaci w Świetle Nowo Poznanych Źródeł" [Polish Years of Anna Vasa: A Reason for Research on Her Personality and Character in the Light of Newly Discovered Sources], 9: http://pilsudski.jcom.pl/foto/Anna/POLSKIE.pdf?i=1, accessed 8/22/2020.

[25] Alicja Saar Kozłowska, "Princess Anna Vasa: An Extraordinary Woman in Swedish and Polish History," in *The Vasa Dynasty and the Baltic Region. Politics, Religion, and Culture 1560–1660. A Symposium at Kalmar Castle, February 4–6 2000,* ed. Lars Andersson (Kalmar: Kalmar Castle, 2003), 41.

[26] Saar Kozłowska, "Princess Anna Vasa," 41.

Sigismund III, reveal profound curiosity about experimental medicines in particular — and reflect the close overlaps between medicine and alchemy. Though surrounded by physicians, Anna was deeply distrustful of established medical culture, and complained of doctors trying to force ineffective and distasteful prescriptions upon her. She writes,

> I would like to do everything possible so that I am not blamed for not wanting to take [their remedies]. However, I feel and notice that both at the beginning of my illness and now, as soon as I take the smallest amount of medicine . . . it does not serve me well.[27]

Elsewhere, she scoffs that "[p]hysicians think their advice is the best . . . but they have no idea how the patient feels."[28] Anna much preferred to create her own remedies, often employing them first on herself to assess their efficacy before sharing them privately with a small circle of family members and friends. In a letter written from Brodnica on 10 September 1624, for example, she describes a new cure for earache she is developing, indicating that she plans to use it on "two servants who don't hear very well" before passing it on to the king: "I asked to have such an oil prepared at my pharmacy. However, I won't be sending it to Your Highness until I try it out on somebody first."[29]

Anna's prescriptions for curative waters, pills, purgatives, and other medicines centered on a range of botanical ingredients — aloe, mulberry juice, rhubarb — as well as other less commonly found materials: *sal tartari*, balsam, precious stones, and gems. A letter to Ursula Meierin, dated 26 August 1624, makes clear that Anna preferred to prepare these compositions with her own hand, although, as indicated in her comments regarding the earache remedy, she also oversaw a larger, more organized, pharmacy where she could commission others to produce medicines according to her direction. The limitations of working alone are evident in some of Anna's letters: lamenting that she does not have much of a certain fever powder at hand, for example, Anna explains, "I would like to send [it] to his

[27] Letter of August 26, 1624, quoted in Saar Kozłowska, "Polskie Lata Anny Wazówny," 29n74 (my translation). Anna's letters to Ursula Meierin are contained in *Extranea IX Polen, 1624–25* (Riksvarget Library, Stockholm). The translations that follow are my own, with grateful acknowledgment of assistance from Patrycja Arundel, Victor Frans, and Wojciech Kandefer.

[28] Letter of 4 December 1624 in Saar Kozłowska, "Polskie Lata Anny Wazówny," 31n81.

[29] Letter of 10 September 1624 in Saar Kozłowska, "Polskie Lata Anny Wazówny," 27n68.

Royal Majesty . . . but I have very little of it and I do not know if I can manage to make more because I detest the smell and as you know, I don't like having anyone with me."[30] Many of Anna's letters strongly reflect the practical, sensory experience of experiment, both positive and negative: the smell, taste, touch, colors.

Anna Vasa's correspondence also displays her considerable knowledge about disease and methods of treatment, and suggests she drew on many sources, including recipes passed on to her by her mother, Catherine Jagiellon.[31] As was common among many women who engaged in alchemical experimentation throughout Europe, Anna's goal was not necessarily *chrysopoeia*, or the transmutation of metals, but rather alchemy in its broader, practical context: the production of compounds composed from mineral and organic ingredients and refined through the kinds of purification and distillation processes common to alchemy, for use as preventative and curative aids. However, the fact that Anna, as mentioned above, often worked alone on her experiments in a dedicated private work space — separate from the pharmacy where she ordered and oversaw the production of remedies to share with acquaintances and family members — suggests a deeper and more deliberate alchemical element to Anna's scientific pursuits. In another letter to Ursula dating to 1624, for example, Anna describes a "white water," made from ingredients such as *sal tartari*, or white calcinated tartar, the salt central to many alchemical operations and thought to increase the malleability of metals. Anna tells Ursula that she is running low on the ingredients she needs to produce this white water, complaining: "I cannot make it now, because of the lack of eggs — if God allows me to live until March, I will do it with great diligence."[32] By eggs, she may refer to the animal product (egg whites, for example, were often used in cosmetics), or her reference may be to the long-necked oval (or egg-shaped) digesting flasks known by the same name, often used in alchemical experiments. In other recipes, Anna also utilized compounds made from *tartarum ketnolatum* (a kind of aqua vitae), black balsam, and pearls, other prized used alchemical ingredients. As Saar Kozłowska (who argues that other, possibly encrypted letters from Anna on these subjects likely exist) muses, the scope of Anna's activity was "close to the domain of alchemy, searching for the philosopher's stone."[33]

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[30] Saar Kozłowska, "Polskie Lata Anny Wazówny," 29n76.

[31] Saar Kozłowska, "Princess Anna Vasa," 41.

[32] Saar Kozłowska, "Polskie Lata Anny Wazówny," 30n79.

[33] Saar Kozłowska, "Princess Anna Vasa," 44.

The depth of Anna's interest in botanical medicine and alchemy, finally, is also evident in her patronage of a work by Simon Syrenius, a Polish botanist and professor of the Academy of Cracow who had studied at Padua. Syrenius's 1613 *Herbarium* was among the most important of the herbals published in the Polish Renaissance: modeled on that of Pier Matthioli, it is an encyclopedic atlas of over 750 plants along with descriptions of their nature, provenance, and practical applications.[34] Such volumes were indispensable tools to alchemical as well as medical practice. Anna financed the publication of the elaborate, five-volume work, which was produced two years after Syrenius's death by Basyli Skalski of the Officina Lazari in Cracow — the same publisher that had printed the *Letters on Natural Philosophy* of Camilla Erculiani, dedicated to Anna Jagiellon, almost thirty years earlier. The *Herbarium* — which was later translated into Russian — features a dedicatory letter to Anna Vasa penned by Gabriel Joannicy, Syrenius's colleague, prominently advertising her as the work's patron — another major avenue through which early modern women participated in and impacted scientific culture. As Sarah Hutton has pointed out, just as women depended on male support to participate in many aspects of scientific culture, male practitioners likewise depended on the women "with whom they pursued their investigation."[35] This is most certainly the case for Anna Vasa and Simon Syrenius. Beyond her patronage activity, it has been suggested by some scholars that Anna also produced her own *Herbarium*, which was held in a private collection of the Radziwell family until the eighteenth century, but has since been lost.[36]

As we can see in the Sforza, Jagiellon, and Vasa examples discussed here, early modern women's alchemical engagement took many forms, from hands-on practice to patronage and print, and traced a wide transnational path throughout Europe. Women's scientific activities shared commonalities (for example, engagement with empirical culture and the production and exchange of medical-alchemical recipes), as well as differences (including degree of access to court networks, political power, or resources to support alchemical experiment). Numerous factors — social, political, religious, geographic — impacted women's participation in alchemy, and in scientific culture more broadly, and will need far deeper and more comprehensive comparative investigation than could be attempted in these

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[34] A pre-Linnean botanist, Simon Syrenius (1540–1611) taught at the Jagiellonian University.

[35] Sarah Hutton, "Science and Natural Philosophy," in *The Routledge History of Women in Early Modern Europe*, ed. Amanda L. Capern (London: Routledge, 2019), 386–403, here 388.

[36] Saar Kozłowska, "Princess Anna Vasa," 45-46.

brief pages. However, by bringing the experience of women in central and eastern Europe, Scandinavia, and other such sites of early modern science to the fore, we can continue to access a richer and more complete understanding of women and alchemy in the Renaissance world.