Oleum Olivarum: Stradano's Engraving and the New Art of Olive-Oil Making in Sixteenth-Century Tuscany

ANCA-DELIA MOLDOVAN, *Villa I Tatti, The Harvard University Center for Italian Renaissance Studies, Italy*

This article demonstrates the merited inclusion of Giovanni Stradano's olive-oil engraving in the "Nova Reperta," a series showcasing postclassical inventions that Florentine nobleman and Alterati member Luigi Alamanni commissioned in the late 1580s. The image and accompanying inscription must be understood within their broader cultural, scientific, legal, political, and socioeconomic contexts. The print reflects olive oil's economic potential and the evolving dietary preferences in Medici Florence. It evinces the flexibility of the concept of invention. Rather than being technological, the novelties mirror ideas central to the Alterati academics around classical knowledge and the alchemical ability of humans to transform nature through artisanship.

INTRODUCTION: A SIXTEENTH-CENTURY OIL MILL

IN THE LATE 1580s, the Flemish artist Jan van der Straet (1523–1605), also known as Johannes Stradanus or under the Italianized name Giovanni Stradano, designed an engraving that vividly depicts the process of olive-oil manufacture.[1] From the moment of harvest to the transportation of the final product to the city markets, the *Oleum Olivarum* (Olive oil) print invites the viewer to step directly into the space of an oil mill buzzing with activity (fig. 1).

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[1] McGinty, 122–24; Amouretti et al., 382–83; Acidini, 61; Howard, Keating, and Atkinson, 171–72. On Stradano, see Baroni Vannucci.

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Figure 1. Philips Galle after Giovanni Stradano. *Oleum Olivarum* in the *Nova Reperta* series, ca. 1588. Engraving. Chicago, Newberry Library, VAULT Case Wing oversize Z 412 .85.

In the center of the composition stands the figure of a muleteer. From this principal point, the walls draw the gaze to the background, where Stradano depicted an undulating terrain flanked by high olive trees that can be recognized from the tortuous and gnarled trunks typical of this plant.[2] A man perched in a tree on the right shakes the branches with the help of a long stick, while a group of women collect the fruits from the ground in their baskets. The Latin inscription at the bottom of the print informs the reader that the right moment to perform this task to have an abundant supply of oil is when the olives are still bitter.[3] Brought to the workshop, the olives are unloaded into the circular basin of an ox-driven mill; a worker uses a spade to ensure that no berry escapes the stone.[4] The resulting ground paste is poured by workers into woven disks known

[2] On the soil and climate conditions suitable for olive cropping, see Cherubini, 182, 185; Pinto, 2002, 490–91; Lillie, 30–31. On the issue of tree representation between the Middle Ages and the early modern period, see Ashton, Davies, and Slive; Ogilvie. On olive trees' representation, see Girardi; Acidini.

[3] "Decussae olivae adhuc acerbae, ex arbore, / Pressaeque, pinguis dant olivi copiam": *Renaissance Invention*, 15, plate 13.

[4] On oil mills and the process of extraction, see Mazzotti, 287. See also Grimaldi, 49–74.

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as *fiscoli* (Lat. *fiscis*), *buscole*, or *gabbie*, which have been employed since antiquity.[5] The *fiscoli* are then stacked under the plate of a direct screw press actuated by three straining workers. A figure pours hot water over the squeezed olives, with more boiling in the caldron at his back, a process typically performed after the first and most precious cold-pressed juices have already been extracted.[6] Finally, the oil is carefully separated from the vegetable water and poured into large terracotta containers (the Florentine *orci*) or loaded into wooden barrels for transport on the back of the mule.[7]

At first glance, the process of olive-oil making, as depicted by Stradano, presents little technological innovation. After all, the vertical wheel mill was commonplace from late antiquity on, and Pliny the Elder (23–79 CE) attested to the direct screw press as a novelty of his own age in his *Natural History*.[8] It is rather surprising, therefore, that one finds this image among the nineteen prints of the *Nova Reperta* (New discoveries), a series celebrating the advancements of the postclassical world. Why did Stradano include the making of olive oil alongside the discovery of the Americas (by the Florentine Amerigo Vespucci [1454–1512] rather than Columbus [ca. 1450–1506]); the production of silk and cane sugar; and the invention of print, oil pigments, spectacles, and gunpowder? How did the old practice of oil extraction combine with the confident sense of present achievements declared on the frontispiece of the *Nova Reperta*, where one sees the personification of the past leaving the stage to be replaced by the new age?[9]

[5] On olive pressing mats, see Howard, Keating, and Atkinson, 171; Columella, 3:314–15 (*On Agriculture* 12.52.10). Tanaglia, 52 (*De Agricultura* 1.1517), mentioned the use of *gabbie*. Both *gabbie* and *buschole* appear in fifteenth-century Florentine inventories. See Mazzi and Raveggi, 182–83, 325.

[6] For the use of hot water in the extraction of the low-quality pomace oil, see Presta, 237; Amouretti et al., 384n6; Pinto, 2002, 491.

[7] On olive-oil containers, see Mazzi, 150; Grieco, 1993, 301. *Fiaschi* and *barili* appear in a "List of Goods Kept in 1543 in Different Medici residences," Archivio di Stato di Firenze (hereafter ASF), Mediceo del Principato (hereafter MP), vol. 616, insert 1, fols. 1^{r}–2^{v}. The list can be found on the Medici Archive Project database (https://mia.medici.org/Mia/#/mia/welcome, hereafter MAP), DocID 26466.

[8] On the vertical millstone, see Mazzotti, 287, 294. The most accurate translation of Pliny's passage on the direct screw press is found in Drachmann, 56–57 (*Natural History* 18.74.317–18): "Within the last twenty-two years people have invented to press with shorter presses and smaller press houses, with a shorter spar straight in the middle, bearing down with full weight from above on the lid laid on the grapes, and to build a superstructure [*congeries*] above the press." See Drachmann, 56–58, fig. 17; Frankel, 2:563–64, fig. 34.5.

[9] Gombrich, 195–96; Markey, 2020a, 25; Smith, 2020, 135. Since the submission of this article in 2022, Boumediene proposed a convincing interpretation of the frontispiece and concept of invention in the *Nova Reperta* series, in agreement with the present article.

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This article will first uncover the ways in which Stradano manipulated the concept of invention in the *Oleum Olivarum* image and its accompanying inscription to respond to the new scientific, dietary, and politico-economic importance of olive oil in sixteenth-century Florence.[10] The print evinces changing contemporaneous attitudes toward classical knowledge, nature, and craftsmanship. Therefore, any understanding of Stradano's association of olive oil with modern innovation necessarily delves deeper and can only be revealed upon examining this work in its broader context of production, patronage, and association with visual and textual sources.[11]

Giovanni Stradano was one of the most versatile artists who hailed from the Low Countries to work at the Medici Court in Florence in the early 1550s.[12] He operated first as a tapestry designer and a court artist under Vasari, and then, from the 1560s on, as an independent artist and member of the Accademia del Disegno. Stradano had a prolific career, both as a painter and as a designer of tapestries, maps, ephemera, and printed texts, many of which celebrated de' Medici's rule—first under Cosimo I de' Medici (Duke of Florence, 1537–69; Grand Duke, 1569–74) and then under his sons: Francesco I (r. 1574–87) and Ferdinando I (r. 1588–1609).

In *Il Riposo* (The respite, 1584), the Florentine writer Raffaello Borghini praises Stradano's invention in draftsmanship, describing how, to make his virtue known across the world, the artist created numerous cycles of drawings, which he sent to be printed in Antwerp by the renowned engraver Philips Galle (1537–1612).[13] Among these was the *Nova Reperta*, one of several series of prints that Stradano designed at the commission of and in collaboration with Luigi Alamanni (1558–1603).[14] Alamanni was Stradano's patron, a Florentine nobleman, a member of the Accademia degli Alterati, and possibly the nephew of the acclaimed poet Luigi Alamanni (1495–1556), whose bucolic verses dealt at length with the cultivation of olives.[15] The conspicuous notes written on the

[10] On the concept of invention in the early modern period, see Atkinson; Dupré, Swan, and Göttler, 180; Markey, 2020a, 38n4.

[11] This article builds upon Markey, 2012, who demonstrated the centrality of Florence and the Alterati for the *Nova Reperta* series, in connection with the America prints.

[12] Baroni Vannucci; Van Der Sman, 2012a, 135–36; Markey, 2012, 389–90, 392–93.

[13] Borghini, 583. See also Van Der Sman, 2012a, 136–37.

[14] On Giovanni Stradano and the *Nova Reperta*, see McGinty; Baroni Vannucci, 397–400; Gombrich; Margolin; Markey, 2008; Markey, 2012; and Markey, 2016, 119–37; *Renaissance Invention*; Van Der Sman, 2012a; Van Der Sman, 2012b. On the production and transmission of the series, see Bowen; Margócsy.

[15] On Stradano's patron Luigi Alamanni (1558–1603), see Rotondi. On the poet Luigi Alamanni (1495–1556), see Weiss.

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preserved preparatory drawings for the *Nova Reperta* demonstrate Alamanni's involvement in the conception of this project and testify to a close collaboration between artist, publisher, and patron—a relationship acknowledged on the frontispiece of the series.[16]

Lia Markey analyzed the *Nova Reperta* prints in the context of Alamanni's engagement with the Accademia degli Alterati, a small and rather restrictive literary academy founded in 1569 Florence.[17] Scholars have shown how Stradano and Alamanni chose to document, in many of these prints, the application of modern innovations in everyday life through genre scenes, rather than through the representation of the moment of invention or discovery.[18] In doing so, the *Nova Reperta* participated in contemporary conversations, among the Alterati academics and wider Italian intellectual community, about the competition between classical and modern knowledge; the balance between mechanical processes and nature; and the significance of invention, ultimately to emphasize Florence's leading role in global progress.[19]

As the ancient world had already established the technology of olive pressing, the literature on the *Nova Reperta* series has generally overlooked the *Oleum Olivarum* engraving.[20] Therefore, as early as the second quarter of the seventeenth century, scholars such as the Olivetan monk Secondo Lancellotti (1583–1643) struggled to grasp the novelty in this print and its accompanying Latin inscription.[21] This article sets out to show the extent to which the manufacture of olive oil gained a merited role among other early modern innovations showcased in the *Nova Reperta*. It does so by examining the *Oleum Olivarum* engraving in the context of the active scientific environment of Medici Florence and the circle of the Alterati. Stradano's print

[16] No drawing for the *Oleum Olivarum* survived. Stradano and Alamanni's collaboration extended beyond the *Nova Reperta*, and counted drawings of Homer's *Odyssey* and Dante's *Divine Comedy*, an incomplete series on the Florentine calcio, and a series on the discovery of America, *America Retectio,* the latter also printed in the Galle printshop in the late 1590s. See Van der Sman, 2012a, 147–59; Markey, 2012; and Markey, 2020a, 27–33.

[17] Van der Sman, 2012a, 150; Markey, 2012, 396; Markey, 2020a, 26–33. On the Accademia degli Alterati, see Blocker.

[18] See Viljoen; Smith, 2020; Zorach, Molà, and Crawford; Dupré, Swan, and Göttler, 180.

[19] Markey, 2012; Markey, 2020a, 25–33; Smith, 2020.

[20] McGinty, 122–24, briefly referred to the economic importance of olive oil in relation to the rationalization of agriculture in the Grand Duchy of Tuscany. Margolin, 24, excluded the *Oleum Olivarum* from the debate on modern novelties featuring the *Nova Reperta*. See also Van Der Sman, 2012b, 304n1. Markey, 2020b, is the first to hint at the significance of this image within the series.

[21] Lancellotti, 445.

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exhibits the social, cultural, and economic ambitions of the Florentine academics, as well as their interest in the toils of the artisan. This study brings Stradano's print into conversation with sources on craftsmanship and oil production, along with works interested in the classification and visualization of modern knowledge.[22] Through an interrogation of the geopolitical, socioeconomic, dietary, and legal contexts of olive growing and pressing in sixteenth-century Tuscany, I will show how Stradano reflected on the commercial relationship between city and countryside at a time of increasing intervention in the environment.

The second part of the essay identifies the critical role of the recovery of Greek classical knowledge in the Latin inscription of the *Oleum Olivarum* print, and attributes it to the new botanical interests of scholars close to the Alterati, particularly Piero Vettori (1499–1585). Furthermore, the study links the medical and culinary reappraisal of ancient green oil to the gradual rejection of Galenic humoral theories in the second half of the sixteenth century. It also suggests the economic potential of this type of production for the Grand Duchy of Tuscany. Finally, my analysis shows how an emphasis on the collective work of the oil millers rather than actual technological developments allowed Stradano and his patron Alamanni to engage with ideas expressed by thinkers and artisans such as Leonardo da Vinci (1452–1519), Paracelsus (1493–1541), and the Italian mathematician Giuseppe Moletti (1531–88), who saw humans as alchemists capable of transforming nature.

The article adopts a holistic approach to reveal the cultural, semiotic, and material density of the *Oleum Olivarum* print, in relation both to its explicit object (olives and mills) and to the wider world it is part of and that it draws together. By looking through one representative image at the interconnections of multiple factors in Florentine high and low culture, this study shows that traditionally distinct fields of enquiry, such as intellectual, environmental, and art history, must talk to each other.

THE ALTERATI IN THE WORKSHOP: THE CONTEXT OF PRODUCTION

One cannot fully comprehend the original intent behind Stradano's olive-oil print, its sources, function, and audience, without setting this image against the broader background of the *Nova Reperta*, the Accademia degli Alterati, and Medici Florence. Starting in the late fourteenth century, Florence was a principal center in the development of the scholarly movement of humanism.[23]

[22] On the visualization of knowledge, with emphasis on early modern technical drawings, see *Picturing Machines 1400–1700*.

[23] Maxson.

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Intertwining practical and theoretical concerns, humanists devoted themselves to the study of disciplines considered to be useful to citizens' moral edification, such as history, rhetoric, and moral philosophy.[24] They cultivated a philological approach to Greek and Latin texts, and passionately investigated the physical remains of the ancient world. Building on this tradition, sixteenth-century Florence was a vibrant environment, driven by a desire not only to rediscover and study the classics but also to test and verify their authority through new observations. The creation by Cosimo I of botanical gardens for medical and study purposes in Pisa and Florence sparked scientific interest in botany.[25] Novel studies were carried out by figures close to the Alterati, such as Galileo Galilei (1564–1642) and the humanists Piero Vettori and Giovan Vettorio Soderini (1526–96).[26] Classical knowledge had to be updated and images became a favorite means to identify and classify an enlarged diversity of plants, trades, goods, and territories, in series such as the *Nova Reperta* itself.[27]

Historians of science argued that the new mid-sixteenth-century investigations of the natural world were powered by the application of empirical methodologies specific to the artisanal world.[28] One important factor in the adoption of experiential approaches by the learned elite was the development of state-financed industries and innovative technologies, some portrayed in the *Nova Reperta* series. Olive oil supported many of these developments. Oil was not only a revalued foodstuff, as will be later discussed, but it was also employed in the carding of wool for the tapestry workshop that Cosimo had set up in the Palazzo Vecchio in the early 1540s.[29] Adding to this was the use of oil in the pharmaceutical and scientific experimentation celebrated in the paintings adorning the *studiolo* of Francesco I de' Medici (1570–72).[30] There, Stradano depicted Francesco at work in an alchemist's laboratory, an important precedent for the *Nova Reperta* (fig. 2).[31] Upon Francesco's death in 1587, Lorenzo Giacomini

[24] Hankins.

[25] Ambrosoli, 96–113; Miglietti, 260; Markey, 2016, 21–23; Bellorini.

[26] As Markey noticed, Alamanni's correspondence with Galileo might have inspired some of his artistic commissions. See Markey, 2012, 396; Markey, 2020a, 27.

[27] For the role of images in the advancements of early modern science, including botany, see Lefèvre, Renn, and Schoepflin; Ambrosoli, 97–99.

[28] Smith, 2004; Smith, 2022; Long, 2011; and Long, 2015.

[29] Markey, 2016, 17.

[30] Berti; Conticelli, 2007; Conticelli, 2012; Markey, 2020a, 33–35; Dupré, Swan, and Göttler, 182.

[31] Conticelli, 2007, 331–38; Dill. On the laboratory activity of Francesco I, see also Findlen, 222–24.

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Figure 2. Giovanni Stradano. *The Alchemist's Laboratory*, 1570. Oil on slate. Florence, Palazzo Vecchio, Archivi Alinari. Photo credit: Archivi Alinari, Firenze.

Tebalducci Malespini (1552–98), an Alterati member and former student of Vettori, praised the Grand Duke's love for the study of science and agriculture. His interests in the "effects of Nature" caused him delight and increased the

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utility of his efforts to the state.[32] These works testify to the degree to which humanists and state authorities actively engaged in the mechanical arts (including occupations carried out through manual labor).[33]

Conversely, highly skilled artisans strove to elevate their status and participate in the intellectual tradition. The contact between artisanal and elite cultures between the fifteenth and sixteenth centuries informed remarkably complex careers at the crossroads of craftspeople, engineers, and thinkers—famously, Francesco di Giorgio Martini (1439–1501) and his younger contemporary Leonardo da Vinci.[34] Print and graphic representations played an important role in these sociocultural exchanges. A boom in books on mechanical arts by humanists, including treatises on agriculture, accompanied a new vernacular genre created by practitioners themselves.[35] How-to manuals rendered artisanal expertise—traditionally transmitted orally or through bodily experience—accessible to an engaged elite readership. Images particularly explained hands-on knowledge to the unskilled.[36] Engineers fashioned machine books to advertise their ideas, to entertain, and to inform patrons.[37]

Both the *Nova Reperta* series and the Accademia degli Alterati highlighted the fruitful intertwining of erudite and practical cultures in the early modern period. One might see in the *Oleum Olivarum* print a reflection of the ways in which the Alterati academics saw their status in Medici Florence through their social and economic aspirations and liberal arts education. Most of the members came from families of merchants or bankers with an anti-Medicean past, which made it harder for them to access the Florentine court or other public functions.[38] The Accademia degli Alterati provided a safe environment to exhibit their patrician status and level of education.

Markey showed how the *Nova Reperta* series recalled the professional as well as literary activities of the Alterati, which included figures such as the explorer Filippo Sassetti (1550–88) and the humanist Piero Vettori.[39] As an

[32] Giacomini Tebalducci Malespini, 27.

[33] Findlen, 346–52; Smith, 2004, 142n34, 151n66; Long, 2011, 120–26. On upper-class and farming interests, see Lillie, 24–38; Ambrosoli, 60–64, 103; Markey, 2016, 21–23.

[34] Long, 2004; Long, 2011; Long, 2015.

[35] Klemm, 111–65; Long, 2011; Long, 2015, 846–47; Smith, 2004, 66, 129–42; Smith, 2022, 91–116.

[36] Long, 2011, 112; *Picturing Machines*. Technical drawings reached a broad audience at the end of the sixteenth century through the printed "theaters of machines." See Galluzzi, 183–89.

[37] Popplow, 20–28; Long, 2011, 112.

[38] Blocker, 20–25, 150–51.

[39] On Sassetti and the Alterati, see Markey, 2012, 396–97; Blocker, esp. 91–92, 136, 143–44. On Vettori, see Baldi; Piras; Markey, 2020b.

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honorary member, though, Vettori never attended the meetings of this society.[40] He was, nevertheless, close to the Alterati affiliates, most of whom, like Giacomini Tebalducci Malespini, studied at his *Studio fiorentino*, and continued to engage with his work at their new academy.[41] Markey postulated the influence of Vettori's 1569 treatise on olive cultivation on the *Oleum Olivarum* print and noticed that other members of the Alterati also published works that dealt to some degree with olive plants—namely, Bernardo Davanzati (1529–1606) and Soderini.[42] Their writings evoke a common literary and scientific interest, as well as an increasing empirical approach to agriculture.

The Alterati were themselves innovators in the realm of literature, as they sought to improve their written productions using collective evaluations. Déborah Blocker noticed how these vernacular literary exercises mirrored the learning processes in contemporary Florentine workshops, in which guildsmen acquired skills through communal exchange of practical expertise.[43] Such familiarity with artisanal practices reflected the Alterati's continued involvement in the economic life of the city.[44] The application of technological invention within collaborative processes of production, as depicted in many of the *Nova Reperta* prints, would have thus resonated with the Accademia degli Alterati.[45]

The records of the Alterati meetings reflect subjects in close connection with those represented in the *Nova Reperta* and suggest that Alamanni and his colleagues used the prints to trigger their debates. Topics spanned from classical and modern artillery to the consequences of the discovery of the New World for Florence.[46] One must imagine that the range of subjects in Stradano's prints would have encouraged contextualized pro and counter debates—a common practice of the Alterati—about the value and constraints of contemporaneous discoveries and innovations, and the hiatus between modern and ancient.[47] An example is the oration on the writing of bibliographies, given in 1584 by the academy member Torquato Malaspina (1557–94), who highlighted the

[40] Blocker, 50n17.

[41] Blocker, 256–60, 304–05.

[42] Markey, 2020b. See also Blocker, 329–33; Vettori; Soderini and Davanzati. On Soderini, see Zaccaria, 2018. On Davanzati, see Zaccaria, 1987.

[43] Blocker, 369–73, 414–17. On the transmission of knowledge in workshops, see Smith, 2004; and Smith, 2022.

[44] Blocker, 372, 415–16. Blocker noticed that the collaborative practices of the Alterati members also unveiled political sympathies for the republic and its corporate guild order.

[45] See Viljoen; Smith, 2020; Zorach, Molà, and Crawford; Dupré, Swan, and Göttler, 180.

[46] Markey, 2012, 396; Markey, 2020a, 27–28, esp. 28n18–20.

[47] On the Alterati's pro and counter debates, see Blocker, 179–80, 226, 398–99, 414, 417–22.

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importance of knowledge of the past over fascination with the modern.[48] These discussions betray an increased awareness of the role of human developments in history and their impact on the physical environment (seen both on a global scale and in the relationship between city and countryside).[49]

FROM MYTH TO THE OIL MARKET: SOURCES AND CONTEXT

By the sixteenth century, a variety of new products had invaded the streets of the city, including novelties depicted in the *Nova Reperta*, such as printed books, luxuries, and cures.[50] In his detailed account of the Venetian trades and markets, Tommaso Garzoni (1549–89) mentioned in 1585 the sale of "virgin" olive oils—it is uncertain if the term alluded at this time to the first press or, more likely, to an oil obtained prior to submitting the olives to the press—alongside "pulp oils, and oils that are mostly dregs."[51] The new consumption practices stimulated the curiosity of the social elite regarding the contemporary technologies and craftspeople involved in the production of these goods.[52] It translated into a growing awareness of the achievements made in the present, and a desire to document them, which reached a pinnacle with the *Nova Reperta.* Indeed, scholars have rightly argued that this series integrates the late fifteenth-century textual tradition on the origin of contemporary discoveries—most famously Giovanni Tortelli's (ca. 1400–66) *De orthographia dictionum e Graecis tractarum* (The orthography of words derived from the

[48] Malaspina, 44. See also Markey, 2020a, 27.

[49] Markey, 2020a, 27–28. See also Glacken, 461–71. These pro and counter debates do not question environmental interventions in a general sense but in context-specific projects.

[50] Cavallo and Storey, 9; Calaresu; Hohti Erichsen. On the accessibility of oil, see Melis, 1984, 134.

[51] On Garzoni's text as one of the main sources for the *Nova Reperta*, see Markey, 2020a, 33. Garzoni, 518: "Dall'olive fa l'oglio, onde nascono gli ogliari, che vendono ogli vergini, ogli di polpa, ogli che sono tutti morchia." Ipsen, 170, noticed that the term "virgin" oil was rarely employed, even at the end of the eighteenth century, when Presta, 260–61, used it to describe a type of oil sieved through a basket directly from the crushed olives, as opposed to the *olio fino* obtained from the first cold press. Sporadic mentions of this oil and technique of extraction appear as early as Petrarca, 1:192 (*De rebus familiaribus*, letter 22). All translations are the author's except where otherwise noted. In transcribing the text, punctuation, capital letters, and accents have been adapted to facilitate comprehension. Changes have been kept to a minimum. Words composed with "che," which required syntactic doubling, have been transcribed as two words (e.g., *perciòche* > *perciò che*). "u" and "v" have been distinguished according to modern usage. "&" has been replaced by "et."

[52] Smith, 2004; Smith, 2022; Long, 2011; Long, 2015.

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Greek, 1471) and Polidoro Vergilio's (ca. 1470–1555) *De rerum inventoribus* (On the inventors of all things, 1499)—with the new interest in artisanship.[53]

A systematic representation of artisans at work, created outside the Italian space in the so-called *Book of Trades* (*Das Ständebuch*), was first published in Frankfurt am Main in 1568.[54] It included woodcuts designed by Jost Amman (1539–91) showing diverse professions and social groups in sixteenth-century Nuremberg.[55] Amman's woodcuts provided Stradano and his patron with visual models for their engravings (fig. 3). Sigmund Feyerabend (ca. 1528–90) printed Amman's illustrations in two separate editions: first, with accompanying German verses by Hans Sachs (1494–1576) and, second, with Latin compositions by Hartmann Schopper (ca. 1542–ca. 1595).[56] When interrogating the image and relative verses dedicated to the oil maker, it is interesting to note how the two editions of the *Book of Trades* address different audiences, which also reflects the geographical boundaries of olive production and, for the most part, consumption.[57] Sachs integrated olive oil with other types of nut and seed oil that would have been more familiar to the German public (fig. 3).[58] A wider humanistic audience, guaranteed by the Latin edition, allowed Schopper to concentrate instead on olives and their various botanical types, according to Virgil's (70–19 BCE) *Georgics*.[59]

[53] McGinty, 15; Markey, 2020a, 31; Viljoen, 61–63; Magni; Thomas.

[54] Sachs. The electronic database Verzeichnis der im deutschen Sprachbereich erschienenen Drucke des 16. Jahrhunderts (https://bvbat01.bib-bvb.de/TP61/start.do?View=vd16&SearchType=2) includes information on Sachs's edition of the *Book of Trades* (VD16 S 244) and offers access to digitalized copies. The *Book of Trades* was born out of a fifteenth-century manuscript tradition that portrayed the work of the elderly artisans who inhabited the charitable house founded in 1388 Nuremberg by Konrad Mendel. For more information, see Treue; Rabb; Viljoen, 61–63; Wood.

[55] Howard, Keating, and Atkinson, 171–72.

[56] Sachs (VD16 S 244); Schopper (VD16 S 3897). A second edition of the Latin *Book of Trades* was published in 1574 by the same Feyerabend, with the title *De omnibus illiberalibus sive mechanicis artibus* (VD16 S 3898).

[57] On the geographical distribution of oil consumption, see Braudel, 1:231–37; Montanari, 1979, 390–404; Montanari, 2005.

[58] Sachs, sig. c2^{r}: "Many an oil is made by me, / to eat or as a medicine at need. / Whether oil of olive, nut or pine, / oil of laurel, hemp or linseed, / I have to gather the berries with care / and to crunch and press them out, / so that thereby the oil I bring. / Minerva invented this thing." These verses are translated in Atkinson, 14.

[59] Schopper, 1568, sig. N2^{r}, closely followed Virgil, 142–43 (*Georgics* 2.85–86). He included the reference to the bitter *pausia*, an ancient variety of olives that was picked when unripe to produce bitter oil. The *pausia* olive was no longer known in early modern times, as seen from Vettori, 85; Felici, 2015.

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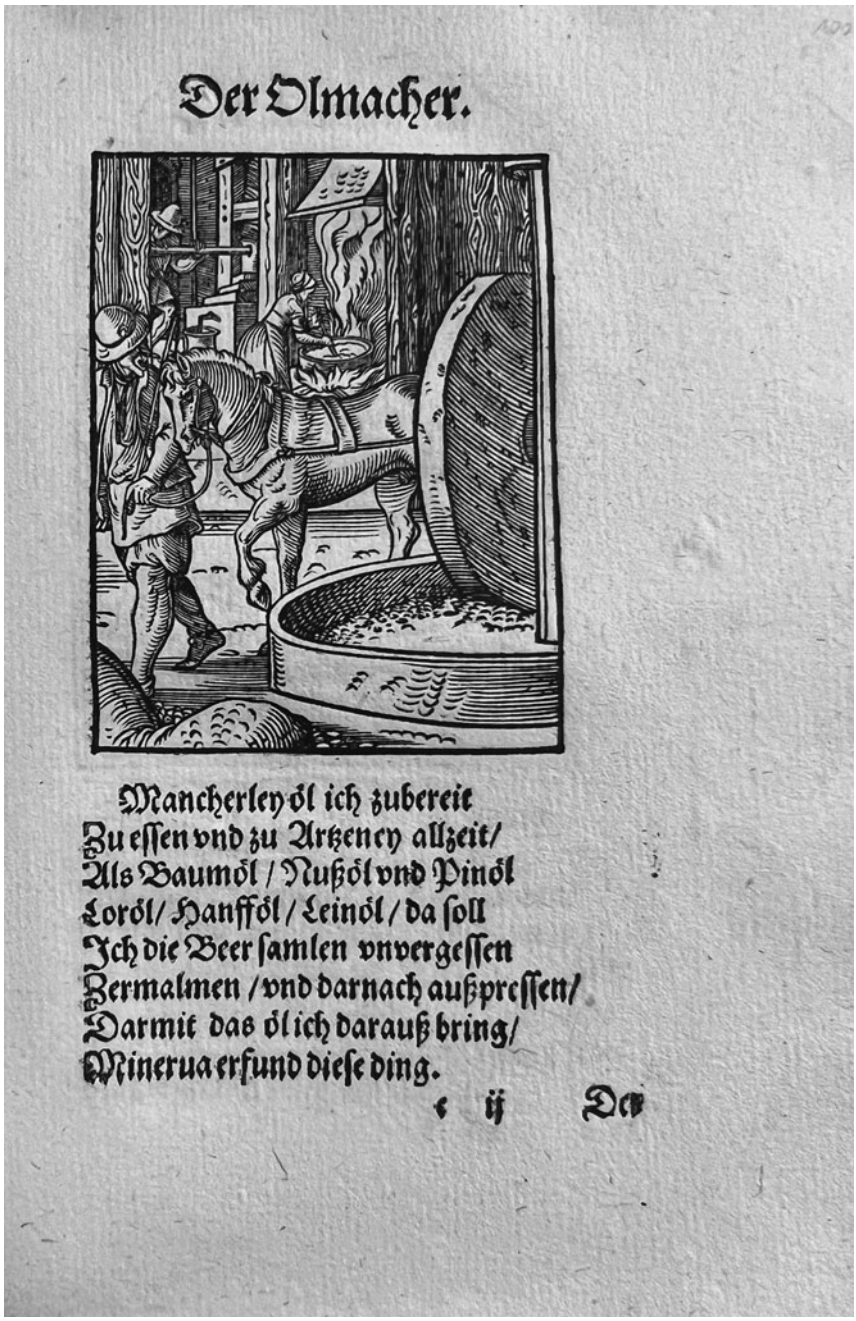

Figure 3. Jost Amman. *Der Olmacher*. Woodcut. In Hans Sachs, *Eygentliche Beschreibung Aller Stände auff Erden*. Frankfurt, 1568. Herzog August Bibliothek Wolfenbüttel: A: 61 Poet. (1), sig. c2^{r} [100^{r}].

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Madeleine Viljoen noticed how the preamble of the *Book of Trades* invoked Polidoro's work on the origin of modern inventions, although this model was hardly followed.[60] However, contrary to Stradano, both Polidoro's *De rerum inventoribus* and the verses accompanying Amman's woodcuts situated the discovery of the olive tree and oil in a mythical time. The *Book of Trades* briefly referenced Minerva, the goddess of war who invented the art of making oil according to Ovid (43 BCE–17 CE) and Virgil.[61] Polidoro instead preferred Pliny's story, which highlighted the civilizing role of Aristaeus, King of Arcadia, in the introduction of humanity to the oil mill.[62] Polidoro went on, however, to correct the pagan account, noticing that, in fact, "the Jews invented oil," since "the olive was before Noah's flood and [Moses] spoke of oil that was used in sacrifices."[63] He observed the Mediterranean area in which olive trees were commonly cultivated and some of the liturgical and para-liturgical uses of their liquor, without, however, manifesting any interest in describing the steps involved in the manufacturing of oil.[64] It will be explained later on that very little information on the process of oil extraction is to be found, even in the specialized postclassical agricultural literature.[65] This shows the extraordinary value of images in presenting one with a perspective not always transpiring from literary sources.

Stradano drew inspiration for his *Oleum Olivarum* print from Amman's woodcut depicting the occupation of the oil maker (fig. 3).[66] When analyzing the two images, one sees not only common references—such as the animal-powered millstone, the direct screw press in the background, and the fireplace on the right—but also how Stradano reinterpreted this image. The small area of the woodcut, compared to the print, did not allow for the inclusion of the moment of harvest, which is only mentioned in Sachs's accompanying verses.

[60] Viljoen, 62.

[61] Sachs, sig. c2^{r} (*Der Olmacher*): "Minerva invented this thing." The reference is found also in the Latin edition, with compositions by Schopper, 1568, sig. N2^{r}: "Who is the Goddess of warfare, who presides over the arts? / Pallas was the inventor of olives and [their] art." See also Ovid, 292–95 (*Metamorphoses* 6.70–82); Virgil, 98–99 (*Georgics* 1.18). According to Petrarca, 1:192, Minerva herself had brought the olive tree to the Ligurian shores.

[62] Vergil, 97 (*De rerum inventoribus* 3.2); Pliny, 1942, 2:640–41 (*Natural History* 7.56.199). The account is also mentioned by Diodorus Siculus, 3:72–75 (*Library of History* 4.81.1–3).

[63] Vergil, 97 (*De rerum inventoribus* 3.2). On the Jewish consumption of olive oil, see Motis Dolader.

[64] Vergil, 153 (*De rerum inventoribus* 5.3). On the liturgical and paraliturgical uses of oil, see Grieco, 1993, 298–99.

[65] Naso, 2018.

[66] Howard, Keating, and Atkinson, 171.

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It is not certain if Amman would have represented the harvest in any case, since his interest was not in depicting the various steps involved in the manufacturing of oil but in showcasing the status of the oil maker, powerfully placed in the foreground of the woodcut.[67] The narrative quality of Stradano's print directed attention instead to the space of the oil mill and the final presentation of olive oil as a product for market in the image of the muleteer.[68] The engraving exemplifies the complex and innovative ways in which the artist of the *Nova Reperta* navigated his sources to accommodate the various interests of the Alterati around processes of production, interactions with nature, and the complex interplay of classical learning and modern innovations.

Shifting the discussion to the context of the *Nova Reperta*, the *Oleum Olivarum* print shares thematic and compositional aspects with the engraving depicting the refinement of sugar.[69] Both images focus on the representation of the workshop and the artisanal tasks involved in the process of production. These include common technologies, such as the mill—powered by animals and water—and the press, which Stradano reproduced almost identically in the two images. Unlike Amman's woodcut, both prints open their imposing classical architecture suggestively onto landscapes where workers harvest the natural resources. This is despite the fact that oil pressing would have typically been performed in a dark and enclosed space, as advised by the poet Alamanni (not to be confused with Stradano's patron).[70] The oil lamp hanging from the fireplace on the left would have provided the necessary light and drawn attention, at the same time, to the important use of olive oil for lighting.[71]

Through the representation of production processes, the sugar and oil engravings are also related to the silk print (or, more precisely, to its background).[72] The *Nova Reperta* prints recall contemporaneous developments carried out by the first three Grand Dukes and praised by Giacomini Tebalducci Malespini in his eulogy to Francesco I.[73] Giacomini mentioned an expanded

[67] Viljoen, 62–63.

[68] On Stradano as a storyteller, see Van Der Sman, 2012a.

[69] Zorach, Molà, and Crawford, 165–67.

[70] Alamanni, 98^{v}.

[71] Sinety, 428. Stradano painted a similar lamp in *The Charity of Saint Nicholas*, 1585, Arezzo, Museo di Casa Vasari. On the latter painting, see Baroni Vannucci, 170–71.

[72] Zorach, Molà, and Crawford, 166–67.

[73] On the silk and sugar prints, see McGinty, 116–27; Viljoen, 68–71; and Zorach, Molà, and Crawford. Cosimo I introduced sugar refinement in Pisa, while Ferdinando I sought to refine Brazilian sugar in Livorno. See Goldthwaite, 537; Markey, 2020a, 26; Brege, 97–98. The importance of silk culture is well documented: in 1570, Francesco I de' Medici had 200 black mulberry trees planted in the Pistoiese countryside. See ASF, MP, vol. 1177, fol. 602^{r} (MAP, DocID 5340).

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planting of mulberry trees for silk production and even a failed experiment to introduce sugarcane into Tuscany.[74] While silk and sugar were modern commodities in Europe, Polidoro, citing Pliny, informed his readers that olive trees were present on the Italian Peninsula by 440 AUC (314 BCE).[75] Recent archeological findings in Sicily have pushed this date to as soon as the early Bronze Age, while pollen-core studies in the Tuscan hills around Lake Accesa bear witness to Etruscan cultivations of olive groves around 900 BCE.[76] In what way was Stradano's olive-oil making a novelty? Does the modern exclude the ancient, or was this passage a more fluid and complex transition?

OLIVE CULTIVATION AND OIL CONSUMPTION IN RENAISSANCE TUSCANY: AN INTRODUCTION

In the 1569 dedication to Cosimo I, Piero Vettori, opening his ode to the olive tree, rhetorically asked, "Who does not know Tuscany to be all plentiful in this noble plant, of which in great part Your Excellency, the Most Illustrious, is the lord and patron? . . . And what other fruit of our fields is so bountiful that it can be sent out widely to neighboring peoples, in the form of oil?"[77] Vettori's treatise must have appealed to Cosimo, who was personally involved in the cultivation of olive trees, as well as in the study of plants and their medical properties.[78] But the plentifulness of the Tuscan oil at this time was arguable, especially if one is to compare it with production in the small rival Republic of Lucca to the northwest.[79] The suggestion exposed, nevertheless, the politico-economic ambitions of the newly expanded Medici dominion and

[74] Giacomini Tebalducci Malespini, 27; Deerr, 1:79.

[75] Vergil, 97 (*De rerum inventoribus* 3.2); Pliny, 1945, 4:288–89 (*Natural History* 15.1.1–3). Sugarcane and silk production were first introduced into Sicily and Southern Italy between the eighth and eleventh centuries. See Sereni, 72.

[76] Tanasi et al.; Wiman, 17–18. Mattingly, 218, noticed that "it is likely that it was an improved technology of cultivation that was gradually transmitted westwards, rather than the olive tree itself."

[77] Vettori, sig. A2^{v} (modern pagination starting from sig. B1^{r}): "Perciò che chi non sa la Toscana essere tutta piena di questa nobil pianta, della quale in buona parte V.E. Illustriss. è signora, et padrona? Mi pare adunque che ella debba, et sia tenuta, come ella fa, ad amarla et favorirla. Et che altro frutto de' nostri campi ci abbonda egli di maniera che e' sene possa mandar fuori, et darne largamente a' popoli vicini, come dell'olio?"

[78] Markey, 2016, 21–23. It is interesting to consider that until about the 1570s, the Medici adopted the olive branch as a symbol of the peace and stability that their reign brought to Florence and its territories. See Simon, 533–34.

[79] Imberciadori, 447–52; Nanni; Grieco, 1993, 300–05; Pinto, 2002; Pinto, 2005; Cortonesi, 2–6. On olive-oil commerce, see Melis, 1984, 130–31.

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later reflected on the centrality of the muleteer, as the carrier of this precious good in the *Oleum Olivarum* print.[80] To understand in what way olive oil was a novel industry at the end of the sixteenth century in the Grand Duchy of Tuscany, one must step back from the current agricultural landscape of this space to encounter a significantly distinct premodern site.

Historians have typically divided the Italian Peninsula into two opposing climatic and cultural regions: a center-south Mediterranean region of Roman heritage that relied on the cultivation of olive trees and the consumption of olive oil and an Italy that extended to the north of the Apennines Mountains and distinguished itself through its Germanic influence and the use of animal-derived fats.[81] The northern geographical reach of the olive tree imposed, therefore, a physical boundary that, according to Fernand Braudel, distinguished the true Mediterranean from Europe.[82] It was a borderline often blurred by the plants' sensitivity to changes in local climate as well as political and cultural influences.[83]

Olive production depended not only on specific temperate climatic conditions but also on an extended period of peace and stability.[84] It took ten years—Vettori noticed—for a basal shoot to be born under the shadow of an olive tree, and between four and five years for it to arrive at maturity and produce its own biennial fruits.[85] The fall of the Roman Empire and subsequent social and economic unrest brought about a sharp decline in olive cultivation, with consequences, which Vettori was well aware, that remained felt in early modern groves.[86] A small number of olive trees continued to be planted during the Italian early Middle Ages; their oil served mainly to light churches and aid in liturgy (confirmation, unction of the sick, and priestly ordination). Animal fats, however, had largely replaced oil in culinary settings.[87]

The gradual reintroduction of olive trees into the Tuscan landscape, through intercultivation with grain and grapevines, depended on the development of urban centers and their extended control over the countryside. Communal

[80] After the conquest of Siena in 1559, the Duchy of Florence embraced most of today's region of Tuscany, except for the territory of the Republic of Lucca. See Diaz, 1:109–27; *Storia della Toscana*, vol. 1.

[81] Montanari, 1979, 390–92; Grieco, 1993, 297–98. For the consumption and production of oil during the Roman period, see Mattingly; Marzano.

[82] Braudel, 1:231–37.

[83] Montanari, 1979, 399, 402–04; Pini; Grieco, 1993, 298–99.

[84] Sereni, 78–79.

[85] Vettori, 50.

[86] Grieco, 1993, 298; Vettori, 24.

[87] Imberciadori, 444–47; Cherubini, 181; Grieco, 1993, 298–300; Montanari, 1997, 396–402; Pinto, 2002, 492; Archetti, 2:1099–136.

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legal codes (*statuti*) and, from the sixteenth century, the Medici Grand Dukes encouraged regular plantings of olive basal shoots and vines.[88] The construction of the *contado* (the rural territory subjected to the power of the city, generally coinciding with the ecclesiastical district under the jurisdiction of a bishop) and the rapid expansion of the métayage sharecropping system from the thirteenth century onward allowed city dwellers to invest their profits into the surrounding countryside and to initiate a diversification of the fields.[89] These developments brought them both economic profit, in the form of half of the products of their lands, and social affirmation, as the practice of agriculture became a noble fashion.

The boom in printed publications on estate management in the second half of the sixteenth century, some written by Alterati members, responded to these new socioeconomic trends. The Alterati were industrious landowners in their own right, and their villas in the *contado* of Florence yielded enough wine and oil to furnish their tables throughout the year. Blocker highlighted the preeminence of agriculture for the members of the academy, which, each year, interrupted its activity in September and November for the grape and olive harvests.[90]

The burgeoning of olive-oil production, thus, must also be considered in relation to a transformation in culinary habits. Oil was used in the frying of fish, eaten especially during the Lenten period, when other meats and animal-based products were forbidden by the Catholic Church.[91] Significantly, Allen Grieco demonstrated how the sixteenth century saw a growing consumption of shellfish and other delicate fish kinds by the highest Italian social ranks.[92] Ahead of the Lenten season in 1547, Eleonora di Toledo (1522–62), wife of Cosimo I, sent her father in Naples a favorite recipe for oysters.[93] It entailed carefully washing the oysters in the Tuscan Trebbiano wine and then lightly frying them in virgin oil—a relatively early mention of this term.[94] Olive oil also accompanied the salads and vegetables that the urban elites of Central Italy

[88] Imberciadori, 452; Sereni, 78–103; Pinto, 2005, 190–94.

[89] Melis, 1984, 126–30; Staley, 386–87; Malanima, 1:188–89; Pinto, 2005, 186–89; Ambrosoli, 157–58. Lillie, 27–31, noticed how this diversification especially occurred on hill farms. The spread of olive trees contributed to the reduction in cereal demand due to the post-1348 plague epidemics and subsequent demographic decline. See Pinto, 496. On the administrative organization of the *contado*, see Pirillo; Tangheroni, 93–94.

[90] Blocker, 329–30.

[91] Montanari, 2005, 403; Albala, 2011; Cavallo and Storey, 213–18.

[92] Grieco, 2019, 144–55.

[93] ASF, MP, vol. 1173, fol. 199^{r} (MAP, DocID 2475).

[94] As previously stated, the first mention of "virgin oil" known to the author is in Petrarca, 1:192. See also Lancellotti, 445.

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increasingly consumed, despite a traditionally negative perception of such foodstuffs.[95] Sixteenth-century recipe books document this dietary change.[96] A fascinating example is the *Letter on the Salads*, a medical and gastronomic compilation of eatable greens and vegetables that the naturalist and physician Costanzo Felici (ca. 1525–85) composed in 1565 at the request of the Bolognese scientist Ulisse Aldrovandi (1522–1605).[97] Felici's treatise suggests that olive oil was used at this time outside lean days in a variety of cold meat salads.[98] Driven by national and religious biases, English travelers such as Fynes Moryson (1566–1630) and Robert Dallington (1561–1637) grossly exaggerated the degree to which fish, vegetables, and, consequently, oil formed the staple diet of early modern Italians.[99]

It should be noted that Dallington's account contradicted Vettori's commercial claims. The English traveler remarked that the Grand Duchy of Tuscany had "olives, but not in such plentiful manner as to be able to send any oil into other parts: for they want hereof to serve their own turns; being a commodity so necessary, as without it, it were not possible they should live, feeding as they do upon nothing else but cold fruits and raw herbs."[100] The Grand Ducal efforts were indeed directed toward the preservation of the state's resources, appearing to support Dallington's account. They consisted of the reorganization of the administrative system that oversaw the production of olive oil throughout the rural district and built stockpiles in case of famine; imposed state control of prices; and issued proclamations that heavily restricted the extraction of oil, together with other essentials, both from the state and respective *contado*.[101]

[95] Albala, 2002, 259, noticed the important medical considerations in this culinary association: "Oil, which is temperately hot and moist, is used on raw herbs to temper their frigidity." On the issue of eating foods considered of cold complexion, see Grieco, 2019, 51–55. Lard was still predominantly used in fourteenth-century Tuscany, as discussed in Flandrin, 1983, 384; Grieco, 1993, 304–05. On oil as an urban product, see Brugnoli and Varanini, 68–79. On oil's presence in the Tuscan rural diet, see Grieco, 1993, 301; Balestracci, 73–74.

[96] Olsen; Giannetti; and Flandrin, 1996, 658–60, noticed a similar tendency in France.

[97] Felici, 1996; Giannetti, 4–5. Written in vernacular Italian, Felici's treatise privileged an experiential approach to dietetics, in line with broader sixteenth-century scientific developments.

[98] Felici, 1996, 71. Felici also wrote a treatise on olives for the Rimini nobleman Alessandro Ortigio. See Felici, 2015.

[99] On English travelers and their accounts of Italian eating habits, see Olsen.

[100] Dallington, 28–29; Moryson, 4:93.

[101] Although toughened during Medici rule, this legislation found its origins in the fourteenth-century communal administration. See *I capitoli del comune di Firenze*, 1:410–11. On Medici economic politics, see Diaz, 1:130–35; Imberciadori, 452; D'Alaimo; Dursteler, 85–87.

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The organization of the rural territory according to the city's needs favored a localized circulation of goods. The regulations allowed Stradano's muleteer to take the oil home from the mill, bearing the pomace as proof of local production, or to deliver the share due to the landlord. Beyond this, he could transport the oil to the closest market through the principal streets on specific market days and hours; the selling of oil was further subjected to the regulation of the oil merchants' guild. However, "turning the back to the city," especially if that city was Florence, when transporting the oil through the *contado* or into the district triggered a tax of a *giulio* per barrel (a silver coin of the value of 13 *soldi* and 4 *denari*).[102] The muleteer also had to carry an official note (*bulletta*) documenting the origin and quantity of the merchandise, the route, and the schedule of arrival. He was banned from introducing oil into areas that were already abundant in this product—for example, in the *contado* of San Gimignano.[103]

Official weights and measures dictated that the transportation of oil had to be done in *fiaschi* (a *fiasco* equals 2.08 liters) or wooden barrels, such as those illustrated in the *Oleum Olivarum* print, which show the richness of this image for the study of material culture. The authorities in the Grand Duchy of Tuscany strictly forbade the use of animal skin receptacles known as *otri*—like the ones depicted in the *Tacuinum sanitatis* (Almanac of health), illustrated in Lombardy from the end of the fourteenth century—since the amount of oil carried in such containers could not be regulated (fig. 4).[104] Defying these bans resulted in the confiscation of both the mule and the oil.[105] An instance of this punishment is found in a 1537 letter sent by Cosimo I, who intervened on behalf of Giannino da Montemagno after the latter's mule and olive oil were mistakenly seized by the Vicopisano guards.[106]

The plants themselves became controlled when an order issued on 14 April 1575 outlawed the transportation of olive basal shoots and other types of olive plants outside the state.[107] The ban blamed the exports for the shortage of plants that was causing incalculable harm to the cultivation of olive groves. It imposed strict penalties for all those facilitating illicit transactions, who were

[102] All of these regulations can be found in Cantini, 9:240–41 (under the Statuto della dogana di Firenze [hereafter SDF], 4 March 1579, Rub. 107). The guild of the oil merchants was absorbed in 1534 into the Università di Por San Piero. See Staley, 385–402.

[103] Cantini, 9:242–43 (SDF, 4 March 1579, Rub. 112).

[104] Cantini, 7:98 (*Bando*, 27 August 1569); Cantini, 9:241 (SDF, 4 March 1579, Rub. 109); Bibliothèque nationale de France, MS Latin 9333, fol. 88^{v}.

[105] Savelli, 230; Cantini, 9:240–42 (SDF, 4 March 1579, Rub. 107–12).

[106] ASF, MP, vol. 182, fol. 20^{r} (MAP, DocID 12621).

[107] Cantini, 8:207–209 (*Bando*, 14 April 1575).

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Figure 4. Ibn Butlân. *Oleum olive* in the *Tacuinum sanitatis*, fifteenth century. Paris, Bibliothèque nationale de France, MS Latin 9333, fol. 88^{v}.

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also deterred by an increased number of spies employed throughout the territory. It is difficult to assess the effectiveness of these measures, which were periodically renewed and, therefore, supposedly transgressed. For example, between 1580 and 1585, Vettori sent regular gifts of olive plants and olives for consumption to the Duke of Urbino, Francesco Maria II Della Rovere (1549–1631).[108] It is illuminating to note, however, that these political policies corresponded to a new empirical conception and utilitarian exploitation of natural resources, as reflected in the *Oleum Olivarum* print.[109] Stradano's muleteer impersonated, thus, the economic and legal links between city and countryside at a moment of growing intervention by the Medici in the environment, of which the Alterati members, as small landowners, would have been aware.[110]

The *Oleum Olivarum* print could have also hinted toward the economic potential of olive oil foreseen by Vettori for boosting the wealth and prestige of the state. Indeed, in 1570 the Grand Duchy of Tuscany allowed its first exports from a couple of privileged, small but fertile areas in the region of Pistoia (northwest of Florence).[111] These commercial activities were suppressed during years of low harvest—for example, in 1594 due to the damage caused by frost.[112] Overall, the planting and manufacture of oil in the Grand Duchy of Tuscany never reached levels comparable with those achieved in the Kingdom of Naples, which continued to supply the ports of Pisa and Livorno with oil, principally for the wool industry (to lubricate the fibers of wool before carding and spinning).[113] The local Tuscan olive-oil production distinguished itself, however, through its high quality and, consequently, its expensive price.[114] It was Vettori's declared ambition to obtain a balance between the value of the Tuscan oil and its levels of production, which is reflected in the Latin inscription at the bottom of the *Oleum Olivarum* print.

[108] Bramanti, 135.

[109] Appuhn made similar observations with respect to the Republic of Venice.

[110] On the general political and economic factors of human involvement in the countryside, see Ambrosoli, 60–68, 157–62; Miglietti, 239–304; Miglietti and Morgan.

[111] Cantini, 9:243–44 (SDF, 4 March 1579, Rub. 113); Melis, 2005, 364.

[112] Cantini, 14:72–73 (*Bando*, 18 April 1594); Braudel, 1:270n211.

[113] In 1484, Florence obtained a tax privilege for the export of oil and animal fat from the Kingdom of Naples. See Coniglio, 136–37. On the imports of oil into Tuscany, see Braudel and Romano, 36, 41, 49; Melis, 1984, 130. On the use of olive oil in the manufacturing of wool, see Pinto, 2002, 493; Ipsen.

[114] Cantini, 14:72–73; Melis, 1984, 130–33. Melis, 2005, 364–67, showed how in 1427 the tax authorities esteemed the value of Tuscan oil around 1.60 *fiorini d'oro* (gold florin of Florence) per hectoliter, compared to 0.33–1.10 f./hl for wine. The oil was sold on the market for 1.60–64 f./hl.

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STRADANO'S INSCRIPTION AND THE REINVENTION OF EARLY MODERN OLIVE OIL

The rise in oil consumption and olive planting in sixteenth-century Tuscany corresponded with a renewed interest in the study of plants and husbandry. The reappraisal of the empirical knowledge of Pliny and the Greek physicians and naturalists Pedanius Dioscorides (ca. 40–ca. 90 CE) and Theophrastus (ca. 371–ca. 287 BCE) fueled new scientific enquiries. Early modern texts, such as the treatises of Vettori and Soderini, responded, however, to contemporary local realities.[115] Their innovations largely concentrated on botanical aspects, seen as having the ability to improve the rendering of oil and transform it into one of the Grand Duchy's leading industries. This section will investigate how Stradano and his patron reacted to new developments in specialized literature by symbolically including the moment of the olive harvest.

The *Oleum Olivarum* print depicts pickers in warm garments, long-sleeve robes, mantels, and hats, since the harvest took place at the beginning of the cold season. In fact, the sixteenth-century Sienese naturalist and physician Pietro Andrea Mattioli (1501–77) informed the readers of his commentary on Dioscorides's *De materia medica* that in Tuscany the olives were picked in November and December, as seen from the periods of vacation in the calendar of the Alterati academics.[116] November was indeed the time when olives were harvested, according to most postclassical literature written between Tuscany and Umbria.[117] This schedule is also corroborated by the illustrated calendars showing the olive harvest, which were created predominantly in Central Italy, such as the terracotta roundels designed by Luca della Robbia (ca. 1400–82) for the ceiling of the *studiolo* of Piero di Cosimo de' Medici (1416–69) in Via Larga around the middle of the fifteenth century (fig. 5).[118]

Inspired by the fifteenth-century rediscovery of Columella's (first century CE) writings, the November roundel depicts a peasant sitting in an olive tree and stripping the berries from a branch into a basket.[119] According to Vettori, it was a common technique, but one that an ancient law, reported by Pliny, prohibited, together with the beating of the olive tree.[120] The specialized literature recommended picking the olives by hand to avoid bruising the berries

[115] Vettori, 67–68; Ambrosoli, 57–64, 139.

[116] Mattioli, 220. On Mattioli's commentary, see Findlen, 250; Ambrosoli, 5–6, 111–12. On Mattioli, see Preti.

[117] Naso, 2018, 1:46–47.

[118] On Della Robbia's roundels, see Horowitz.

[119] Columella, 3:312–13 (*On Agriculture* 12.52.8, 10). On the rediscovery of Columella, see Ambrosoli, 42–43.

[120] Vettori, 74; Pliny, 1945, 4:294–95 (*Natural History* 15.3.12).

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Figure 5. Luca della Robbia. November Roundel, from the *studiolo* of Piero de' Medici, ca. 1450–56. Tin-glazed terracotta. London, Victoria & Albert Museum. Photo credit: Iberfoto/Archivi Alinari.

or tearing away the shoots and thus ruining the production of the following year.[121] For the berries that could not be reached otherwise, the agronomists, including Vettori and the poet Luigi Alamanni, advised to gently shake the branches with a cane, as seen in the *Oleum Olivarum* print.[122] Undoubtedly, Stradano's patron would have been aware of Alamanni's verses, which also acknowledged the contribution of women and children to the harvest, the only type of labor performed by female workers in the engraving.[123]

[121] Naso, 2018, 1:50–52; Theophrastus, 1:172–73 (*De causis plantarum* 1.20.4); Cato and Varro, 288–91 (Varro, *On Agriculture* 1.54–55.2); Crescenzi, 2:89 (*Ruralia commoda* 5.19); Della Cornia, 227.

[122] Alamanni, 81^{v}; Vettori, 74–75.

[123] Alamanni, 81^{v}. The Florentine Giunta press produced two editions of Alamanni's *La coltivatione* in 1542 and 1548. On the gendering of the workshop in Stradano's print, see Zorach, Molà, and Crawford.

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Gathering the olives and extracting their oil entailed specialized knowledge. Pliny declared in his *Natural History* that "making olive oil requires even more science than making wine, as the same olive tree produces a variety of oils."[124] The art, according to Pliny, consisted primarily in recognizing the right moment to initiate the olive harvest.[125] Timing has been a predominant concern of agronomists from antiquity up to our own times, since the fruits' degrees of ripeness influence the quantity and quality of the oil.[126] The Latin inscription included at the bottom of the *Oleum Olivarum* print references these concerns, informing one that "[if] the olives are shaken from the tree while still bitter [and] pressed, they give a rich abundance of oil" (fig. 1). It is a statement that flags two complex issues—namely, the problematic correspondence between unripe olives and levels of production as well as the dissension between what the inscription considers as *repertum* (discovery) and what Stradano and his patron Alamanni chose to represent.

The Latin inscription advised one to pick the olives while they are still bitter (*adhuc acerbae*). Recognizing when this precise moment happened within the various stages of maturity of the fruit was a crucial, yet not an easy, task. While seasonality was an essential factor, it was not, however, the primary criterion in choosing the right moment to gather the berries, according to the classical and early modern texts.[127] They all pointed instead toward the importance of sight—the noblest among senses and the one, according to Aristotle's *Metaphysics*, that "best helps us to know things and reveals many distinctions"—in perceiving the various changes that occurred in the coloring of the berries (fig. 6).[128]

In all likelihood, Stradano's print did not refer to the bitter oil of antiquity made from white olives: the famous *oleum omphacium* recommended for its excellent medical properties by Pliny or Dioscorides.[129] Mattioli informed

[124] Pliny, 1945, 4:290–91 (*Natural History* 15.2.5). This idea is repeated in Della Cornia, 228.

[125] Pliny, 1945, 4:290–91 (*Natural History* 15.2.5–6).

[126] Naso, 2018, 1:46. On modern practices, see Vossen, 161.

[127] Naso, 2018, 1:46–50; Cato and Varro, 76–77 (Cato, *On Agriculture* 65.1); Columella, 3:118–19 (*On Agriculture* 11.2.83); Pliny, 1945, 4:90–91 (*Natural History* 12.60.130) and 4:290–91 (*Natural History* 15.2.5–8); Crescenzi, 2:89–92 (*Ruralia commoda* 5.19); Della Cornia, 228; Tanaglia, 52 (*De Agricultura* 1.1489–99).

[128] Aristotle, 1:2–3 (*Metaphysics* 1.980a). Avilio, 1:29, 1:83–84, highlighted the importance of the sense of sight for the development of biology in seventeenth-century Naples. On sight in the *Nova Reperta* prints, see Dupré, Swan, and Göttler, 180–82.

[129] Mattioli, 81 (*De Materia Medica* 1.28); Pliny, 1945, 4:90–91 (*Natural History* 12.60.130); Pliny, 1951, 6:418–19 (*Natural History* 23.4.7). On the medical use of olive oil in antiquity, see Mazzini.

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Figure 6. Gherardo Cibo. *Olea Europaea*. In Pietro Andrea Mattioli, *Discorsi*, ca. 1564–84. London, © British Library Board, Add MS 22332, fol. 181^{v}.

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his readers that this type of oil was no longer produced during his time.[130] One might imagine that the absence of such niche production was due to the self-sufficient economies that characterized the postclassical Italian Peninsula. The bitter oil—also called "summer oil" because it was pressed before the end of October, or mid-September in Pliny—yielded less oil and was thus less profitable.[131]

It is possible that Mattioli's successful commentary of Dioscorides, which he translated into vernacular Italian in 1544, informed to some extent the *Oleum Olivarum* print. Mattioli was close to the Medici court, and Cosimo himself owned and heavily annotated a copy of his work.[132] In the sections dedicated to the olive tree and oil, Mattioli referenced Tuscan customs and briefly listed the stages involved in the making of olive oil, including a rare mention of the addition of warm water during the pressing of olives, as depicted by Stradano.[133] Mattioli listed the principal stages of ripeness according to colors: going from green to yellow, purple, and black (fig. 6).[134] He recounted that typically "the oil made from fully ripened olives is the one that is employed in daily use. Those who want a sweeter oil, more appropriate for their health, make oil from unripe olives, picked at the time when berries are yellow and starting to turn slightly red."[135] Mattioli's reference to a superior oil made from olives at veraison (as they turn from green to purple) recalls the "green oil" described by Columella and Pliny.[136] In medical terms, Pliny appreciated this type of production as a secondary *omphacium*.[137] Likely, this oil was also alluded to in the *Oleum Olivarum* engraving. Both classical and modern authors agreed that the oil extracted from olives at veraison was the best compromise

[130] Mattioli, 81.

[131] Columella, 3:118–19, 3:308–09 (*On Agriculture* 11.2.83, 12.52.1); Pliny, 1945, 4:90–91 (*Natural History* 12.60.130); Pliny, 1945, 6:418–19 (*Natural History* 23.4.7).

[132] Bellorini, 23–28.

[133] Mattioli, 220, suggested the use of warm water early in the process of pressing. The English traveler Philip Skippon (1641–91) mentioned the use of boiled water during the first press when visiting the Republic of Lucca. See Cianflone and Dugo, 546.

[134] Mattioli, 220. In 1564–84, the Arcevia botanist Gherardo Cibo illustrated a manuscript copy of Mattioli's commentaries. Cibo depicted an olive twig bearing olives at various degrees of maturity against a harvest landscape (fig. 6). See British Library, Add MS 22332, fol. 181^{v}.

[135] Mattioli, 81: "Percio ché communemente nell'uso nostro cotidiano adoperiamo noi quello, che si cava dalle ben mature olive: come che molti per haverlo et più dolce, et più alla sanità conferente, se lo facciano cavare dalle olive immature, colte nel tempo, che già fatte ben gialle, cominciano leggiermente a rassoggiare."

[136] Columella, 3:118–19 (*On Agriculture* 11.2.83): "At this time too, olive trees should be stripped if you wish to make green oil from them; it is best made from speckled berries when they begin to turn black, for bitter oil ought not to be made except from white olives."

[137] Pliny, 1945, 4:90–91 (*Natural History* 12.60.130).

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between quantity and flavor.[138] This opinion formed especially since the oil made from ripened berries, which peasants typically left to fall to the ground and ferment in piles, was greasy and of less agreeable taste.

It is interesting to consider, however, the nuances that distinguish the recommendations of postclassical authors: these ranged from Crescenzi's (1304–1309) advice to delay the picking of speckled olives until the berries are almost black to Tanaglia's (1480–89), on early harvest, or Mattioli's, on reddish olives.[139] This variety suggests a gradual, and by no means total, rejection of the humoral doctrine that had dictated gastronomic thought throughout the Middle Ages.[140] According to theories of Hippocratic (450–370 BCE) and Galenic (129–ca. 216) origin, health was contingent on maintaining the balance of the four humors.[141] Thus, a hot and dry humoral complexion should be balanced by a cold and humid diet. To some extent, humoral doctrine remained pertinent throughout the early modern period. In the third quarter of the fifteenth century, the cook Bartolomeo Sacchi (1421–81), better known as Platina, still warned against the cold and dry nature of the oil of unripe berries.[142] Although Platina admitted the delicate flavor of the *omphacium* oil, he believed it to be more dangerous for digestion than the temperate oil pressed from mature olives—in stark contrast with the later writings of Mattioli.

The reevaluation of the medical and culinary qualities of green oil by the Italian elite paralleled the appraisal of fish and vegetables (both excessively cold and watery foods that were prone to corruption). Concordant with the analysis proposed in this article, Ken Albala and Grieco demonstrated how the new scientific and gastronomic interests of the mid-sixteenth century were at the root of this dietary evolution, evidenced, for example, in Mattioli, and later in the *Oleum Olivarum* print (although predated by authors such as Tanaglia).[143] Furthermore, Naso noticed how the agronomic texts of the late fifteenth and sixteenth centuries revealed a change toward the appreciation of more delicate and sweet flavors, in the context of the growing culinary

[138] Pliny, 1945, 4:290–91 (*Natural History* 15.2.5–6); Della Cornia, 228. See also Naso, 2018, 1:48–50.

[139] Crescenzi, 2:89; Tanaglia, 52 (*De Agricultura* 1.1489–99); Mattioli, 81; Gallo, 119. Agostino Gallo is an exception at the end of the sixteenth century, recommending a late harvest when most of the olives have already turned black. See also Naso, 2018, 1:47–48.

[140] On dietary knowledge and medicine, see Grieco, 2019; Albala, 2002.

[141] Albala, 2002, 48–52.

[142] Platina, 148–49. Unlike Dioscorides, Galen, 2:130–31 (*Method of Medicine* 6.2.3932K), advised against the oil of unripe olives.

[143] Albala, 2002, 36–37; Grieco, 2019, 144–55. Cavallo and Storey, 213–18, highlighted the role of the Catholic Reformation in imposing a strict observation of Lenten food, further challenging the traditional Hippocratic and Galenic views in the late sixteenth century.

use of olive oil in salads.[144] It is perhaps not by chance that this shift in taste corresponded to a significant increase in the presence of sugar in the cuisine of the European upper class.[145] The visual dialogue between the olive-oil- and sugar-making prints in the *Nova Reperta* invites one to reflect on this apparent dichotomy between bitter olives and the resulting sweet flavor of their juice.

While appraisal of the benefits of unripe olives clearly transpired from most classical and postclassical sources, the idea that these speckled immature berries led to an abundance of oil, as advocated in Stradano's inscription, contradicted most specialized literature. Indeed, the common knowledge originating from the Latin agronomists Cato and Columella was that the olives yield more if left to mature, despite the lesser quality of the oil.[146] This opinion is well exemplified by the verses of the elder Alamanni: "He who values more sweet taste than abundance / in that holy liquor should pick them [the berries] bitter, / And he who seeks the opposite: the longer he lingers, the more he will fill his vessels with oil."[147]

The *Oleum Olivarum* print registers, therefore, a shift from the earlier dependences on Latin agronomists and humoral theories to a new empirical approach toward nature in the third quarter of the sixteenth century. As anticipated at the beginning of this article, this transformation can be related to the works of Vettori and Soderini.[148] The latter proclaimed "the proof of experience" as the sole base of agriculture.[149] In actual fact, this late sixteenth-century hands-on approach heavily relied on a revived interest in and a careful rereading of the empiricism of Pliny and the ancient Greek authors, who had been attentively translated in the middle of that same century (as seen in the case of Mattioli).[150] Indeed, it is revealing to think that the idea and catalogue format of the *Nova Reperta* itself originated in Pliny's encyclopedic classification of human knowledge.[151]

It is in Theophrastus's *De causis plantarum* (On the causes of plants) that one finds a fervent diatribe against the idea that "olives pressed when green yield less

[144] Naso, 2018, 1:48, 1:59. Agostino Gallo and Bartolomeo Scappi both mentioned the use of "sweet olive oil" in salads. Gallo, 119; Scappi, 4^{v}.

[145] Flandrin, 1996, 670–71.

[146] Cato and Varro, 76–77 (Cato, *On Agriculture* 65.2); Columella, 3:308–09 (*On Agriculture* 12.52.1); Crescenzi, 2:89–90; Naso, 2018, 1:48–54.

[147] Alamanni, 81^{v}: "Chi il dolce piu che l'abbondanza stima / In quel santo liquor; le coglia acerbe, / Et chi il contrario vuol; quanto piu indugia / Tanto piu colmerà d'olio i suoi vasi."

[148] Naso, 2018, 1:48–49; Markey, 2020b. On early modern treatises, see Gaulin; Ambrosoli, 12–25, 41–68.

[149] Soderini, 5.

[150] Vettori, 52, 57, 59. The appreciation of the ancient naturalist Pliny within the Alterati circle is reflected also in the 1584 oration by academy member Torquato Malaspina. See Malaspina, 44; Ambrosoli, 96–118; and Bellorini.

[151] As noticed by Markey, 2020a, 33.

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oil, and the best yield of all is from the olives gathered last."[152] Contrary to this, Theophrastus argued that "the greater yield [of ripe olives] may be only apparent, owing to the presence of the watery part and the dregs, since the fact that olives contain the oil before they turn dark is evident, and that this oil is purer and lighter in color."[153] Theophrastus's argument was carried forth by Pliny and was recovered in 1569 by Vettori.[154] Recurrent is Vettori's exposition of the errors of his contemporaries who believed the brown color to be a sign that the olives were starting to mature, when in reality they were beginning to decompose, "since the berries were already previously mature, and pressed then [when still bitter] they would have yielded a larger quantity of oil."[155] It is evident, therefore, that the Latin inscription in Stradano's print looked back at Theophrastus and Pliny, and that this transmission occurred through Vettori's treatise.

Markey argued that "Vettori's comparative analysis of present-day methods and those of antiquity recalls Stradano's efforts in the *Nova Reperta* to demonstrate new methods that surpassed those of the ancients."[156] Indeed, Vettori lamented the errors of classical authors like Palladius (writing at the turn of the fifth century), who limited himself to copying his predecessors "in an era in which diligence started to fade."[157] Even the celebrated Virgil and Vettori's fellow countryman, the elder poet Alamanni, did not escape the critical eye of the Florentine humanist, who often dismissed their poetic license: "But let us leave them in their error, and follow what we see from experience to succeed better."[158] Similar attitudes were noted within the Alterati circle—for

[152] Theophrastus, 3:290–91 (*De causis plantarum* 6.8.2).

[153] Theophrastus, 3:290–95 (*De causis plantarum* 6.8.3–5).

[154] Pliny, 1945, 4:292–95 (*Natural History* 15.3.9–10). Another author who looked back at Pliny's text was Tanaglia, 52 (*De Agricultura* 1.1489–99). Tanaglia composed the *De Agricultura* in imitation of the *Georgics* and in honor of the Medici. His work, which circulated in manuscript format, demonstrates innovative agricultural knowledge and deserves more scholarly attention. See Naso, 2018, 1:47.

[155] Vettori, 80–81: "è malagevole a cavare alcuni cotali errori del capo alle persone. Come, circa a questa medesima materia, che il colore bruno nelle ulive non sia segno che elle comincino all'hora a maturarsi, ma più tosto a 'nfracidare, e che elle fossero mature prima. E strette all'hora, harebbono versato più olio; però che hoggi ciascuno tien per fermo altrimenti." See also Naso, 2018, 1:48–49.

[156] Markey, 2020b.

[157] Vettori, 52. On the early modern reception of classical knowledge, see Ambrosoli, 12–162.

[158] Vettori, 53: "Ma lasciamo stare costoro nel loro erroe, et andiancene dietro a quel che noi veggiamo per isperienza riuscir meglio, che non è cosa più malagevole che voler rimutar gl'huomini d'una loro usanza, benchè cattiva."

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example, in the oration of Malaspina, who praised the "telling of the true effect of nature" by Aristotle, Theophrastus, and Pliny.[159]

Moreover, Vettori's position toward authority can be compared with the earlier observations of the mechanics of nature by Leonardo da Vinci.[160] Leonardo similarly rebuffed the pretentious attitude of those who quote from the works of others rather than relying on their own experience.[161] Vettori's treatise did not exclude, however, classical expertise, but scrutinized and selected it to create new literature and technologies that more profitably responded to the economic and cultural necessities of the early modern world. In doing this, it overcame the science of the past—while still building on it—aligning its efforts with those seen in the *Nova Reperta*.

Vettori declared that his goal was unearthing the ways in which the "most diligent among the ancients" planted olive groves before the "barbaric invasion" of the Roman Empire. His interests are mainly in the method of propagation through *ovuli*, an ancient technique—"or let us call it new, for I have rediscovered and almost resurrected it."[162] In the complex framework of early modern thought, Vettori's rediscovery is viewed as discovery.[163] By analogy, so was Theophrastus's recovered knowledge in the *Oleum Olivarum* print, hence justifying the inclusion of this engraving in the *Nova Reperta* series.

The addition of the Latin inscription and the image of harvest—with respect to Amman's woodcut of the oil maker in the *Book of Trades*—transformed oil making into a modern innovation by uncovering the science of the most "diligent among the ancients." In this sense, olive oil relates to another print in the *Nova Reperta* series—namely, the *Mola aquaria* (Water mill), the inscription of which stated, "Whoever thinks that watermills were invented in ancient times is all wrong."[164] Again, as in Vettori's treatise, the ancient technology

[159] Malaspina, 44.

[160] Glacken, 470; Smith, 2004, 89–92.

[161] Glacken, 465; Kemp, 1981; Kemp, 2006, 87–95; Galluzzi, 130–40.

[162] Vettori, 24–25: "Quand'io scoprirrò, come ponevano gl'uliveti gl'antichi più diligenti, innanzi che per la rovina dell'imperio Romano et empito de barbari in Italia, si distruggessero, o almanco si smarrissero tutte le buone arti, et discipline in questo paese . . . et libero questo modo nostro antico, o vogliamolo chiamar nuovo, per essere stato ritrovato, et quasi risuscitato da me, come s'è potuto conoscere per molti, che hanno veduto i miei posticci d'ulivi."

[163] Ambrosoli, 11, similarly reflected on the rediscovery of alfalfa in Western Europe: "Very ancient plants are transformed into innovations when they become part of a plan to introduce them into a system that previously ignored them. These innovations, in their turn, throw light on the effort to learn which was made by individual farmers, laymen, and scientists, and on their relationship with the economic institutions of their times."

[164] "Aquarias quisquis molas antiquitus / Putat repertas, tota aberrat is via": *Renaissance Invention*, 13, plate 11, which also includes the translation.

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is claimed anew by Florence, whose industry largely depended upon water mills, also used in the extraction of oil.[165] It is a concept one can see at play in the *Nova Reperta*, in the often fine lines delineating excitement for novel technologies and classical knowledge, and in their joint effort in improving and celebrating the economy of the Grand Duchy of Tuscany.

If the discovery of creating a good balance between quantity and quality of oil rests so firmly in the knowledge of when to pick the olives from the trees, why did Stradano and his patron push this crucial step in the process of olive-oil making to the background and concentrate instead on the mechanical aspects of oil manufacturing?

IN THE MILL: THE ALCHEMY OF OLIVE-OIL MAKING IN STRADANO'S PRINT

Postclassical agricultural literature dedicates little space to the actual process of oil production, which Vettori neglected altogether.[166] Interestingly, this was not the case for the Latin writers, who gave detailed guidelines on building a pressroom and manufacturing the oil.[167] This observation reveals the limitations of empirical experience in sixteenth-century agricultural works, and the extent to which the educated elite was interested in and comfortable with getting its hands dirty. Instances are found in the correspondence between the dedicatee of Vettori's treatise, Cosimo I de' Medici, and his land administrators in Pisa and Livorno, dating to around the 1560s.[168] These letters testify to a campaign of olive growing in Cosimo's lands, as well as to the Duke's specialized knowledge in strictly insisting that the workers maintained the correct distance between olive plants (an aspect of primary importance in Vettori).[169] It is in matters of tree reproduction, soil improvement, harvest, and the properties of the oil and olives that these letters appear to be most interested, and not in the actual work happening in the loud and smelly environment of the mill, which, as the elder poet Alamanni advised, should be kept separate from other living

[165] Tanaglia, 17 (*De Agricultura* 1.346–48), mentioned the use of both water- and animal-powered mills in oil extraction. On watermills in the Medici's properties, see Nanni, 151, 156. See also Mazzotti.

[166] Naso, 2018, 56–58.

[167] Cato and Varro, 28–37 (Cato, *On Agriculture* 13.14.2–18.9); Columella, 3:310–23 (*On Agriculture* 12.52.6–22); Pliny, 1950, 5:386–89 (*Natural History* 18.74.317–18). See also Rossiter, 353–61.

[168] For example, ASF, MP, vol. 214, fol. 36^{r} (MAP, DocID 22349); ASF, MP, vol. 219, fol. 29^{r} (MAP, DocID 9068); ASF, MP, vol. 606, fol. 21^{r} (MAP, DocID 16707).

[169] Vettori, 42–63.

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spaces.[170] Conversely, what makes Stradano's print such a powerfully innovative image—despite the rather idealized rendering—is that it foregrounds the oil mill and its workers. The mill here is important but not for its ancient technology. It is a celebration of the work of artisans and their creative power mirroring the collaborative literary practices of the Alterati academics.

A number of early modern artworks document oil mills, reflecting the desire to associate Florence with olive-oil production. A vertical millstone driven by an ox, like the one in Stradano, appears in the calendar opening a book of hours commissioned by Lorenzo de' Medici (1449–92) for his daughter Maddalena (1473–1519) and decorated in Florence around 1486–87.[171] The latter also includes the olive harvest, which is delayed until December.[172] Another example is found in a manuscript copy of Columella's *De re rustica* (On agriculture) from the second half of the fifteenth century, held in the Biblioteca Vallicelliana in Rome (fig. 7). Here, one finds olive crushing and pressing inhabiting the initial "X" at the start of book 12, which deals with the responsibilities of the bailiff's wife and the storage of provisions.[173] In this case, the workers are turning a direct double press in which a wooden plate is forced downward by two screws fixed at opposite ends, a type that is encountered in contemporary inventories of the Tuscan countryside.[174] Outside Tuscany, around the end of the sixteenth century, the humanist Marc Antonio Bonciario (1555–1616) used a direct screw press, similar to the one employed by Stradano's workers, as his personal emblem of membership to the Academy of the Insensati di Perugia (Academy of the Senseless).[175] It shows the importance of artworks in documenting material culture, left otherwise to the often evasive archival documents and scarce archeological sources.[176]

One can find depictions of oil mills and oil-making machinery in the notes of Leonardo da Vinci (fig. 8), and, before him, in the treatises of the Sienese artist, architect, and engineer Francesco di Giorgio Martini.[177] The innovative

[170] Alamanni, 98^{v}: "Alla cava (s' ei puo) la chiusa stanza / Ove l'amara uliva olio diviene / Sotto il pesante sasso; et bassa, et scura, / Et lontana dall'altre esser conviene; / Che l'odor, e'l romor fa danno a molti." On noble practices of agriculture, see Ambrosoli, 39.

[171] Waddesdon Manor, MS 16, fol. 2^{r}. On this manuscript, see Delaissé, Marrow, and De Wit, 324–47.

[172] Waddesdon Manor, MS 16, fol. 12^{r}.

[173] Biblioteca Vallicelliana, MS E 39, fol. 191^{r}. On this manuscript, see Santoni, Cerchiai, and Manodori.

[174] Mazzi, 150; Cortonesi, 13.

[175] Ferro, 2:694.

[176] Amouretti et al., 408.

[177] For example, Biblioteca degli Intronati, MS S.IV.5, fol. 75^{v}. On Francesco di Giorgio, see Martini, 1967; Long, 2004; and Long, 2011, 41–47.

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Figure 7. Initial "X." In Columella, *De re rustica*, 1451–1500. Rome, Biblioteca Vallicelliana, MS E 39, fol. 191[r]. Per concessione della Biblioteca Vallicelliana, Roma – Ministero della Cultura. Photo by Antonio Idini.

technologies presented in these works challenge one to think about their relationship with the *Nova Reperta*. The scientific illustrations of mills and presses in Leonardo and Francesco di Giorgio are accompanied by drawings of various parts, measurements, and technical observations that explicate engineering knowledge. Moreover, for Leonardo, drawing became a tool both for his experimental processes and for the investigation of nature.[178] The observation of mechanical movement helped him understand by analogy the operation of natural phenomena. The role of visual representations in explaining the correspondence between the work of art and that of nature evokes, in more general terms, the principle behind the *Nova Reperta* prints and their place within the intellectual debates of the Alterati academics.

[178] Kemp, 1981, 91–151; Kemp, 2006, 87–115; Long, 2004, 131–40; and Galluzzi, 127–28.

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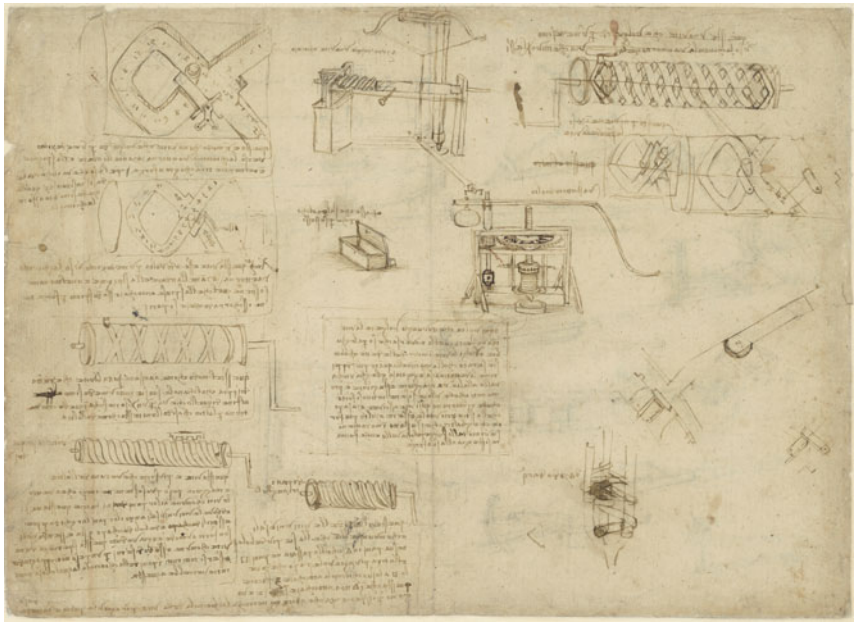

Figure 8. Leonardo da Vinci. Study for an olive press, 1480. Milan, Veneranda Biblioteca Ambrosiana, Codex Atlanticus, fol. 47[r]. © Veneranda Biblioteca Ambrosiana/Mondadori Portfolio.

In Francesco di Giorgio and, in a less organized manner, in the encyclopedic notes of Leonardo, the agricultural/industrial implements are placed alongside other types of mills employed in military and architectural engineering.[179] This juxtaposition of machine variations and observations anticipates the catalogue of Renaissance innovations depicted by Stradano. In fact, one can also notice in the *Nova Reperta* the recurrence of technologies and their application in new industries, as seen, for example, in the deployment of the classical press and grinding stone in sugar refinement, distillery, and armor polishing.[180] This is reminiscent of the concept of progress exposed in the work *De rerum natura* (On the nature of things) of Lucretius (ca. 99–ca. 55 BCE)—the Latin poet esteemed by Alamanni—according to which "all things illuminate each other's rise."[181] The notion of the old illuminating the new seems to have inspired Vettori's modern discoveries and channeled the argumentative debates of the Alterati.

[179] See Leonardo's oil press design in Biblioteca Ambrosiana, Codex Atlanticus, fol. 47[r].

[180] Cressy, Nelson, and Karr Schmidt; Zorach, Molà, and Crawford.

[181] Lucretius, 200–01 (*De rerum natura* 5.1448–57). On the importance of Lucretius for the Alterati and the *Nova Reperta*, see Markey, 2012, 410–12; Blocker, 443–51.

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It is, however, significant that the innovative engineering projects of Leonardo and Francesco di Giorgio Martini do not appear in Stradano's traditional olive-oil mill. In 1591—the year in which Philips Galles printed the first edition of the *Nova Reperta*—an artisan named Luca Colombini, from Spoleto, patented in Livorno a type of basket for the pressing of small olives, which promised to increment the production and quality of the oil.[182] The fact that Stradano and his patron Alamanni did not concern themselves with portraying the most innovative mill practices led to a blurred division between ancient and modern, inviting a rather rhetorical reading of the technological advancements of olive-oil making in the *Oleum Olivarum* print.

This is further reinforced when closely examining the *Oleum Olivarum* print. Stradano depicted the various stages in the process of oil making in unprecedented detail and with attention to the rendering of the properties of different materials: stone, wood, ceramics, copper, and reeds (also due to the great skill of the engraver). A close examination reveals, however, the lack of accuracy in the representation of the tools and craftsmanship involved in the process of olive-oil making. Marie-Claire Amouretti highlighted the expertise required in the operation of a traditional oil mill, which included the knowledge of how much olive paste one could fit into the *fiscoli*.[183] The workers in Stradano's print overfilled the baskets with still-intact olives, which would have posed a high level of resistance, causing the screw to break.[184] Other incongruities are evident in the off-centered grinding stone and the pole extending from behind the stone and at the ox's back, rendering it of no practical function. Scholars Dirk Imhof, James Clifton, and James Akerman noticed similar discrepancies depicted in the *Nova Reperta* series, including in the print shop and the representation of mathematical and navigational technologies.[185]

Stradano would have certainly visited one of the Tuscan oil mills as a source. His didactic design evinces knowledge of the space and the steps required in the production of oil. It is, however, not scientific precision that interests him but, rather, a broader symbolic rendering of the process, tools, and human work involved in the creation of a resurrected Florentine olive oil. The celebration of human ingenuity places Stradano's print in conversation with broader

[182] Savelli, 230; Molà, 15.

[183] Amouretti et al., 382–84.

[184] I am grateful to Ipsen for this observation. Stradano's intact olives are most likely an artistic license employed to make the content of the baskets evident. Pliny, 1945, 4:304–05 (*Natural History* 15.6.23), did mention a method of extracting the lees by washing the olives in hot water and submitting them directly to the press.

[185] Imhof; Clifton; Akerman, Raposo, and Shank. Scholars have also noticed technical inaccuracies in presentational drawings and machine books. See Popplow.

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sixteenth-century philosophic attitudes toward technology and nature seen in Leonardo and the later writings of the Swiss physician Paracelsus, the German mineralogist and metallurgist Agricola (1494–1555), and the French craftsman Bernard Palissy (1510–89).[186] According to Clarence J. Glacken, what unites these artisans and thinkers, who originated from very different time periods and contexts, is their conscious recognition of the creative power of humankind to transform nature, even in the most ordinary activities.[187] The link between the *Nova Reperta* and some of these writings has been drawn by Pamela Smith, who demonstrated the ability of Stradano's depicted artisans and tools "to imitate by art the process of nature," with limited attention, however, toward the *Oleum Olivarum* print.[188]

Stradano's oil makers not only imitate nature but also transform it, adding value for the benefit of humankind.[189] In fact, Glacken showed how the idea that God gave humans the capacity to enhance nature (an idea, however, that was not devoid of nuances) springs from many of the aforementioned sixteenth-century thinkers.[190] Among the latter, one must consider the Italian mathematician Guidobaldo del Monte.[191] In his address to Francesco Maria II Della Rovere opening the *Six Books of Mechanics* (1577), Guidobaldo reflected on the utility and nobility of mechanics for the state of Urbino—reminiscent of Vettori's similar praise of agriculture.[192] In fact, Guidobaldo mentioned oil among the benefits that the technical application of simple machinery brought to everyday life.[193] He praised the tools of artisans and farmers for their ability to rival nature.[194]

Agriculture itself, as the oldest among the arts, is celebrated by Giuseppe Moletti (1531–88), professor of mathematics at the University of Padua, in his commentary on the pseudo-Aristotelian *Mechanica* (Mechanical problems).[195] For Moletti, as for Leonardo before him, both nature and art

[186] Glacken, 461–71; Smith, 2004, 89–92; Kemp, 2006, 87–115.

[187] Glacken, 461–71; Smith, 2020.

[188] Smith, 2020, 143. See also McGinty.

[189] This idea was not extraneous to the Alterati academics. Soderini, 5, compared art's capability to correct and moderate nature through human ingenuity and diligence to experience—as the sole fundament of agriculture—that has the power to rectify wines against their nature.

[190] Glacken, 461–71; Miglietti, 290–302.

[191] On Guidobaldo, see Klemm, 159–62; Ingegno; Bertoloni Meli; Becchi, Bertoloni Meli, and Gamba; Galluzzi, 192–95.

[192] Vettori himself exchanged correspondence with the Duke of Urbino on matters of agriculture. See Bramanti; Del Monte, sig. +2^{r}-++4^{v}. According to Henninger-Voss, 233–25, Guidobaldo distinguished, however, between noble mechanics and actual handwork.

[193] Del Monte, sig. +3^{v}; Klemm, 159–62.

[194] Bertoloni Meli, 19.

[195] Laird. On Moletti, see also Favino.

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operated according to the same mechanical principles. By imitating natural laws, humankind could improve nature:

> Nature would not have given us the vine, the olive, or grain, since wild grapes, olives, and grain are unsuitable for our uses. And without the wine press, olive press, and mill, we would not have wine, oil, or flour. Similarly, while nature gives us wool, flax, and cotton, art gives us the means to spin yarn and weave cloth, which we learned from the spider. So in general, while nature gives us the raw materials, art makes them useful to man.[196]

This creative power of humans, who are able to change their environment through their daily activities, was associated by Paracelsus with alchemical experimentations.[197] The figure who carefully decants the oil on the right side of the muleteer in the *Oleum Olivarum* print (fig. 1) is reminiscent of the alchemist who, as Paracelsus declared, brought nature (olives) to completion (oil).[198] His concentration on this delicate and final procedure in the transformation of matter contrasts the heavy physical work in the oil mill, and sends one to the distillation print in the *Nova Reperta* series, another of the postclassical inventions that can be traced to the Medici court.[199]

Indeed, as seen at the beginning of the paper, Stradano famously represented Francesco I's undertakings in alchemy in the panels decorating the *studiolo* of the Grand Duke (fig. 2).[200] Francesco is depicted leaning over a small furnace on the right of *The Laboratory of an Alchemist* (1570). He is diligently heating a pan while mixing the green liquid—which had been pressed out of plants on the left—with a spoon.[201] Francesco's pose and actions are mirrored in the worker ladling the oil on the right of the *Oleum Olivarum* print (figs. 1–2). Like the latter, Francesco is separating the medicine from the dregs through the agency of fire, a process described by Paracelsus.[202] In fact, the medical distillery, also included by Stradano in the *Nova Reperta*, was one of the most important branches of alchemy.[203] The relationship between the two images is all the more relevant given the pharmaceutical usage of olive oil.[204] This use was

[196] Biblioteca Ambrosiana, MS. S100 sup., fol. 178[r], translated by Laird, 179.

[197] Smith, 2004, 141–42.

[198] Glacken, 464.

[199] *Renaissance Invention*, 10, plate 8; Dill, 91–96.

[200] Conticelli, 2007, 331–38.

[201] Dill, 93.

[202] Glacken, 467.

[203] Dill, 91–96. To the pharmaceutical theme in the *Nova Reperta* also connects the engraving representing guaiacum from the Americas (commonly known as holywood) as the cure for venereal infection.

[204] Albala, 2002; Naso, 2005.

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especially the case for the bitter oil depicted by Stradano and recommended by the Greek physician and botanist Dioscorides, among others.[205] The archives richly document the medical use of oil at the Florentine court.[206]

Fire was important in both alchemy and oil manufacturing—for example, in boiling the water needed in the working of the pomace.[207] Moreover, a warm environment was a crucial condition during the entire process of making and storing oil, especially since these operations took place in early winter. Pliny reported from Theophrastus that "the cause of oil as of other things is entirely warmth, and this is why steps are taken to produce warmth even in the presses and the cellars by lighting large fires."[208] It is perhaps why Stradano decided to retain the image of the fireplace from Amman's woodcut, despite Columella's severe admonition against lighting fires in the mill, especially in those where—as in the *Oleum Olivarum* print—green oil is pressed, since "the taste of the oil is spoiled by smoke and soot."[209]

Like the supervision of olive planting by Cosimo I, alchemy represented one of the acceptable forms through which the governing strata negotiated its engagement into manual work, as these occupations still required a high degree of erudite knowledge. Stradano and his patron thus placed the manufacturing of olive oil at the intersection of artisanal work and humanistic knowledge. In doing so, they also recalled the apparently divergent concerns of the Alterati academics. On the one hand, the *Oleum Olivarum* print reflected the collaborative literary practices of the Alterati by depicting the combined effort of the mill workers in creating a novel product for the Florentine market. On the other hand, the harvest scene and Latin inscription alluded instead to their patrician aspirations.

CONCLUSION

This article emphasized the status of olive-oil making on a par with the other postclassical discoveries depicted in the *Nova Reperta* series. It has integrated the *Oleum Olivarum* print within the diverse economic, scientific, humanistic, and

[205] Mattioli, 81 (*De Materia Medica* 1.28).

[206] ASF, MP, vol. 1170, fol. 678^{r} (MAP, DocID 6060); ASF, MP, vol. 3113, fol. 29^{r} (MAP, DocID 17330).

[207] Smith, 2004. Gandolfi, 422–24, declared that it is not possible to extract all of the oil without the help of fire.

[208] Pliny, 1945, 4:294–95 (*Natural History* 15.3.11); Theophrastus, 3:278–79 (*De causis plantarum* 6.7.3). Columella, 1:74–75 (*On Agriculture* 1.6.18), explained that "every liquid is thinned with heat and thickened by great cold; and if oil freezes, which seldom happens, it becomes rancid."

[209] Columella, 3:316–17 (*On Agriculture* 12.52.13).

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social ambitions of the Accademia degli Alterati. The study demonstrates the impact of Piero Vettori, a figure close to the Alterati, on the concept of innovation as displayed in the olive-oil print, particularly in the Latin inscription accompanying it. It has explored the complex intertwining between classical knowledge and modern achievements echoed throughout the *Nova Reperta* series. The essay also integrates the print into the broader empirical approach to nature manifested through a novel interest in artisanship, as well as into the political and economic exploitation of the surrounding countryside characterizing sixteenth-century Florence.

Representing the process of production rather than the mythical moment of discovery allowed Stradano and Alamanni to reflect on the modern innovations of olive-oil making. In doing so, the olive-oil-making print engaged with both agricultural literature and visual sources. Stradano changed the focus from the figure of the olive maker in Amman's woodcut to the actual process of production. He created a new link between the olive harvest—unknown to Germanic areas—and the reclaimed classical knowledge of when to pick the berries, the alchemical work of transforming olives into oil, and the muleteer transporting the oil to the market. The latter impersonated the ultimate politico-economic goal of making olive oil an export product to enrich the economy and power of the Grand Duchy of Tuscany.

The highly innovative role of the *Oleum Olivarum* print stands, thus, in bringing together the mechanical arts involved in the manufacturing of oil and the new empirical, yet highly learned, approach to the study of agriculture. Through depicting both the nobility and utility of olive-oil making, Stradano and his patron Alamanni symbolically elevated the new art of olive-oil making to an argument worthy of the erudite discussions happening in the Accademia degli Alterati.

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Anca-Delia Moldovan is an independent scholar whose work investigates calendrical and agricultural representations at the intersection of art, science, intellectual, and material cultures. Moldovan gained her PhD in History of Art from the University of Warwick in 2020. Her research was supported by a fellowship at I Tatti, The Harvard University Center for Italian Renaissance Studies in Florence (2023–24); the Warburg Institute in London (2022–23); the Newberry Library in Chicago (2019, 2021–22); the Herzog August Bibliothek, Wolfenbüttel (2022); and the Institute of Advanced Study, Warwick (2019–20). Her forthcoming book, entitled *Illustrating the Year: The Iconography of the Calendar and Its Cultural Impact in Early Modern Northern Italy*, examines the way premodern people represented seasonal time and their relationship with nature, as well as patronage, classical knowledge, devotional practices, and urban rhythms.

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