

John Willinsky, *[The Intellectual Properties of Learning: A Prehistory from Saint Jerome to John Locke](#)* (Chicago: University of Chicago Press, 2018).

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Chapter Nine Learned Academies and Societies

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Chapter 9

Learned Academies and Societies

Within a decade or so of Johann Gutenberg first applying oil-based ink to cast-metal letters in the city of Mainz, Conrad Sweynheim and Arnold Pannartz, two of the town's newly trained printers, headed south carrying the tools of their trade and following the old Benedictines' trail through the Alps to Italy. This is to set our story back to the 1460s, to pick up how humanists worked with print in creating a new forum for the advancement of learning. Sweynheim and Pannartz ended their journey in a monastery, some fifty miles outside of Rome at the foot of Mount Taleo, that had been founded, you may recall, by Benedict of Nursia in the fifth century. Why they decided in or around 1464 to set up the first printing press outside of Germany in the Abbey of Santa Scholastica, named after Benedict's sister, remains something of a mystery.¹ Still, it is clear that Sweynheim and Pannartz were not print revolutionaries storming the Bastille of the scribal *ancien régime*. They were welcomed by the monks as harbingers of a new medium for Christian humanist learning.

Once settled in the abbey, Sweynheim and Pannartz cut and cast one of the earliest roman typefaces, reflecting humanist lightness and grace compared to the Germanic gothic or blackletter type of the north. What they began to print was, prosaically enough, Elio Donato's *Grammatica Latina* for instruction in the classical

¹ The recently departed Cardinal Nicholas of Cusa, a humanist and early promoter of print in Rome, may have instigated the setting up of the press, or perhaps, the German monks who had emigrated earlier to this monastery; see Edwin Hall, *Sweynheim and Pannartz and the Origins of Printing in Italy: German Technology and Italian Humanism in Renaissance Rome* (McMinnville: Phillip J. Pirages, 1991), 31-35. See also Johannes Röll, "A Crayfish in Subiaco: A Hint of Nicholas of Cusa's Involvement in Early Printing?" *The Library* 16, no. 2 (1994), 135-140.

Latin of Late Antiquity. This was how Gutenberg and his colleagues had begun, with grammars, Bibles, indulgences, treatises on canon law, and other workaday basics. But Sweynheim and Pannartz went on to print works meant to be read and enjoyed in a more literary spirit, including Saint Augustine's *City of God* and Lactantius's *Divine Institutions*, as suited their religious setting. And then they turned to Cicero, with an edition of *On the Orator* (*De oratore*). So began the marriage of print and humanism, a fruitful union in the scribal and monastic tradition of earlier days.

Within a few years of setting up shop in the abbey, however, Sweynheim and Pannartz carted their press down to Rome. They were attracted by the literary activity taking place in this urban center. Not just humanist scholars, but poets, professionals in law and medicine, churchmen, statesmen, monks, aristocrats, and among them women, were gathering together in Rome and other centers across fifteenth-century Italy out of an interest in literature, drama, music, art, or architecture.² They organized these interest groups into what were soon called *academies*. The name was, of course, an apt classical allusion to Plato and his friends meeting in the sacred grove of Academus outside of Athens. The Italian academies were the site of readings, performances, and festivals. A good number favored humanist studies in philosophy, philology, the classics, and natural history, with the members engaged in editing texts and preparing papers, as well as publishing and purchasing books. At various points, the academies attracted the patronage of the House of Medici and other noble families. The library of many a grand country villa served as the meeting place for local academies. Such gatherings broke

² Holt N. Parker studied the lives of eighty women humanists between the fourteenth and seventeenth century, whom he found to be characterized, for the most part, by being of noble birth, with family interests in humanism, of Protestant belief, and possessing a love of learning; "Women and Humanism: Nine Factors for the Woman Learning," *Viator* 35, no. 1 (2004): 582-93.

down the traditional boundary between patron and learned to be found in monastery and university.

Print played a critical role, not surprisingly, in the spread of humanism among a broader community.³ The print shop was as much a center of learning as the libraries that purchased their stock. Aldus Manutius, with whom Erasmus worked so closely on *Adages*, had come to printing through the academies, first finding membership in a Roman academy. At the turn of the sixteenth century, with his Aldine Press in Venice in full swing, Aldus began to refer to his own “New Academy” in letters and prefaces, suggesting a press-based association of scholars.⁴ The Aldine academy may not have been formally incorporated, as many academies were, but this hardly deterred the learned proof correctors, editors, and translators working with the press from gathering to converse in Greek and collaborating on the finest editions of antiquity for all of Europe to enjoy.⁵

Following the example of guilds and universities, when academies did undertake formal charters of incorporation, they often choose an artful, allegorical seal or *imprese*

³ James Hankins, “Humanist Academies and the ‘Platonic Academy of Florence,’” in *On Renaissance Academies*, ed. Marianne Pade (Rome: Quasar, 2011), 2-3. Eric Cochrane: “As the humanists’ audience expanded from the notaries and rhetoricians of the time of Salutati to the merchant-bankers of the time of Alberti, and as it expanded finally to include the cobblers, carpenters, and druggists who attended the lectures of the Accademia Fiorentina, so gradually, even those subjects which had previously been left to specialists were at last made available to the general reading public – a social category, by the way, for which the humanists deserve much credit”; “Science and Humanism in the Italian Renaissance,” *American Historical Review* 81, no. 5 (1976): 1056.

⁴ M. J. C. Lowry, “The ‘New Academy’ of Aldus Manutius: A Renaissance Dream,” *Bulletin of the John Rylands University Library* 58, no. 2 (1976), 378-420. Lowry: “The Aldine Academy was never more than an undefined company of friends, dreaming of a glorious past and peering hopefully into a golden future which never materialized”; *ibid.*, 385.

⁵ David Chambers, “The Earlier ‘Academies’ in Italy,” in *Italian Academies of the Sixteenth Century*, eds. David Chambers and F. Quiviger (London: Warburg Institute, 1995), 12. Amid humanist concerns with correction, Grafton cannot resist poking fun at Aldus’ mistranslation in Aeschylus’s *Agamemnon*: “Like vultures who in terrible pain for their *feet* [it should be *children*] wheel high above their nests”; “Renaissance Readers and Ancient Texts: Comments on Some Commentaries,” *Renaissance Quarterly* 38, no. 4 (1985), 621.

that was then displayed on their publications and at meetings. The academies came at it with a light touch, judging by the Accademia degli Intronati (Academy of the Stunned or Astounded) founded in Siena in 1525; Padua's Accademia degli Infiammati (the Enflamed); and Florence's satirical Accademia degli Umidi (the Humid) from the same period.⁶ The academicians were not, however, without serious intent. The Intronati members made it their business, according to an early history from before 1584, to do "everything that is possible to acquire learning... of humanities, of law, of music, of poetry of arithmetic" – and that included a policy to admit women to their circle of learning.⁷

The Accademia della Crusca (the Bran) provides an influential instance of the regulatory role that humanist academies came to play in areas such as language. The academy was founded in Florence in 1584, under the leadership of Lionardo Salviati, with a focus on Tuscan philology and linguistics. The idea for a vernacular dictionary had had an earlier start with the Benedictine monk Vincenzo Borghini, who died before he could see it through, with his friend Salviati realizing that it would take an academy to bring it about. The Accademia della Crusca sought to purify the vernacular Tuscan language, which would eventually develop into Italian. The academy's motto was a line from Petrarch: "She gathers the fairest flower" (*il più bel fior ne coglie*). And this is exactly the task the members set themselves. They gathered illustrative quotes from prior to the fourteenth century, particularly from the three crowns (*tre corone*) of Italian

⁶ Frances A. Yates, "The Italian Academies," in *Renaissance and Reform: The Italian Contribution* (London: Routledge and Kegan Paul, 1983), 6, 12.

⁷ The rules of the Intronati from 1584 are cited *ibid.*, 13. Yates also addresses women's admission to the academy, as well as Queen Christina's founding of an academy in Rome in the seventeenth century; *ibid.*, 26. It should be noted that *academy* was also used to refer to the *studium* and *universitas*, that is, the university. On the seven types of use of the term *academy* during this period, see James Hankins, "The Myth of the Platonic Academy of Florence," *Renaissance Quarterly* 44, no. 3 (1991), 435-433.

literature: Dante, Petrarch, and Boccaccio.⁸ Their intent was to restore the Tuscan tongue to what it was prior to the corrupting influence of Latin.⁹

The Accademia della Crusca completed the preparations for its Italian dictionary, *Vocabolario della lingua italiana*, with almost 25,000 alphabetized word forms over 960 pages, to which twenty-one members had contributed.¹⁰ As the work had not been supported by the Medici family, which had been the original hope, the academy turned to its members, asking them to *subscribe* to the publication of the dictionary, which is to say agreeing, with their signature, to cover a share of the printing costs for the book. This was a relatively new form of sponsorship for the learned book. The necessary patronage for such a project was borne by the academy's members (who may have been of relatively modest means), while the academy also solicited additional external sponsors. The subscriber is both sponsor and consumer, interested in obtaining a copy of the book, signaling a new property relation to learning compared to the tradition of benefactors operating at a distance from abbey or college. As this method of patronage spread, it became common to list subscribers in the front matter, as endorsers of the work when it went on sale in book stalls.¹¹ Print expanded the market for learning's intellectual properties while altering the nature of its sponsorship and economics.

When the academy's dictionary was published in 1612, it set a new lexicographic standard, particularly in its citing of "authorities" as evidence of use. The dictionary's definitions were supported by citations from the authors who constituted what the editors

⁸ Pietro G. Beltrami and Simone Fornara, "Italian Historical Dictionaries: From the Accademia della Crusca to the Web," *International Journal of Lexicography* 17, no. 4 (2004), 357-358. Beltrami and Fornara: "The aim was to demonstrate the continuity from ancient to modern Tuscan; in this way, the living Florentine language was documented with quotations from ancient authors"; *ibid.*, 360.

⁹ John Considine, *Academy Dictionaries, 1600-1800* (Cambridge: Cambridge University Press, 2014), 18.

¹⁰ *Ibid.*, 21.

¹¹ J. R. Woodhouse, "Borghini and the Foundations of the Accademia della Crusca," in *Italian Academies of the Sixteenth Century*, eds. David Chambers and F. Quiviger (London: Warburg Institute, 1995), 165.

saw as the language's golden era. To take a simple example, the definition of *word* (*vocabolo*) is accompanied by two uses of the word by Dante, one poetic – “They took the words of the stars,” from the *Paradiso* – and one prosaic, from *Convivio*: “In the cities of Italy, many words can be seen to die out, to be born and to change.”¹² The definition that the dictionary provides, however, falls decidedly short of the full meanings of *word*: “Term which is used to indicate the particular names of all things.”¹³ The definition ends by noting: “And also from word (*Vocabolo*) comes dictionary (*Vocabulario*) which is what this book is.”¹⁴

With the dictionary, the humanist sought to describe the world of the Italian language, backed by historical evidence, even as the dictionary ended up giving definition to that world. Setting a linguistic standard for the vernacular in the way that the dictionary did served the linguistic authority of elites and the educated classes who served them.¹⁵ It affirmed that the vernacular, no less than Latin, belonged to the published and the powerful. The academy's presumption with the dictionary was challenged at the time, but the criticism was aimed at its reliance on archaic exemplars

¹² Cited in Beltrami and Fornara, “Italian Historical Dictionaries,” 361.

¹³ Ibid., 360.

¹⁴ Cited in *ibid.*, 361

¹⁵ Ibid. Arturo Tosi introduces the twentieth century Marxist theorist Antonio Gramsci into the discussion of the *questione della lingua* involving whose language counts, given how the area was “rich in multi-regional literature”; “The Accademia della Crusca in Italy: Past and Present,” *Language Policy* 10, no. 4 (2011), 290. Antonio Gramsci: “Every time the question of language surfaces, in one way or another, it means that a series of other problems are coming to the fore: the formation and enlargement of the governing class, the need to establish more intimate and secure relationships between the governing groups and the national-popular mass, in other words to reorganize cultural hegemony”; *Selections from Cultural Writings*, eds. D. Forgacs and G. Nowell Smith, trans. W. Boelhower (London: Lawrence and Wishart, 1985), 183-84. On language academies and nation formation, see Shirley Brice Heath, “A National Language Academy? Debate in the New Nation,” *International Journal of the Sociology of Language* 11 (1976), 9-43. For how the politics of language and cultural hegemony can play out in contemporary educational settings, see John Willinsky, *The Well-Tempered Tongue: The Politics of Standard English in the High School* (New York: Teachers College Press, 1988).

from earlier centuries.¹⁶ In 1623, the Accademia della Crusca revised the *Vocabolario*, with a second edition, which added 2,000 new entries and introduced quotations from the relatively contemporary writing of Machiavelli, Castiglione, and the rising star, Galileo. But the academy kept the dictionary and the language rooted in the past it most admired. Its members continued their research into the Italian language, issuing a third three-volume edition in 1691, dedicated to Cosimo III de' Medici. The Accademia della Crusca continues its lexicographical and philological activities to this day.¹⁷

If this Italian academy was first in setting a literary standard for a rising European vernacular language, the French, Spanish, and others soon followed suit, with government support for this linguistic consolidation of the nation-state. The English, on the other hand, famously resisted the idea. Proposals by no less than John Dryden, Daniel Defoe, and Jonathan Swift were rejected in turn. In the eighteenth century, Samuel Johnson, who set his own standard for English with his *Dictionary*, wrote in its Preface that he found “our speech copious without order, and energetick without rules,” adding that “if an academy should be established,” he would “hope the spirit of *English* liberty will hinder or destroy” it.¹⁸ Yet Johnson’s definitions were supported by citations in the humanist philological tradition, a practice picked up in the following century by the *Oxford English Dictionary*, which began as a project of the Philological Society of London before moving to Oxford University Press.¹⁹ This scholarly practice of working

¹⁶ Beltrami and Fornara, “Italian Historical Dictionaries,” 362.

¹⁷ Considine, *Academy Dictionaries*, 23-25. A fourth edition in six volumes was issued from 1729 to 1738; the academy was refounded in 1811, with work commencing on a fifth edition that had only arrived at the letter “O” when it ended in 1923. It is currently using digital technologies in its preparation of a dictionary of medieval Italian, based on a similar set of historical principles as its first dictionary. See the Accademia della Crusca website in Italian and English.

¹⁸ Samuel Johnson, *A Dictionary of the English Language*, vol. 1 (London: Rivington et al., 1785), 7, 5.

¹⁹ See John Willinsky, *Empire of Words: The Reign of the OED* (Princeton: Princeton University Press, 1994).

from the authority and evidence of earlier works, which were cited and documented, has long marked the intellectual properties of learning. It was being put to novel uses by the academies in establishing Europe's vernacular languages.

The Scientific Academies

During the seventeenth century, the academies also proved to be capital instruments for advancing the interests of those drawn to the experimental sciences. Galileo's involvement in the Accademia dei Lincei offers a prime instance, especially as it helped him steer a course through the intersecting worlds of science, print, and politics. Galileo joined more than a few humanist academies, if principally to aid his pursuit of de Medici patronage. Still, his membership in the Accademia dei Lincei played a key role in his publishing career as a scientist.²⁰ The academy had been founded in Rome in 1603 by Federico Cesi, an eighteen-year-old prince and son of the Marquis of Monticelli. Cesi was keen on forming the academy in collaboration with the Dutch naturalist and astrologer Johann Eck, as well as the mathematician Francesco Stelluti, and the engineer Anastasio de Filiis. The members lived in monastic communality, if stocked with the latest laboratory equipment of the day, as well as a fine library. It was arguably the first academy devoted to the study of natural philosophy in what amounted to a synthesis of Platonism, Aristotelianism, and atomism. "With the eyes of a lynx [lincei], as it were," the fourteenth-century Oxford philosopher William of Ockham wrote of Aristotle, "he explored the dark secrets of nature and revealed to posterity the hidden truths of natural

²⁰ Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: University of Chicago Press, 1993), 117-118, 11. The model of the patronized scholar was Tycho Brahe, "Prince of Astronomers," to whom King Frederick II granted in 1576 the fiefdom of Hven, a small island in the Danish Sound, complete with observatory, magnificent house, printing press and paper mill, all of which came to end in 1597 with Christian IV assuming the throne of Denmark.

philosophy.”²¹

In Cesi’s address “On the Natural Desire for Knowledge,” given in 1616, he spoke of how, as a result of the academy, “the public will enjoy many more books and compositions, I say learned and useful, and doubly so... coming so to be communicated to everyone the long labors of years and years of observation, experimentation, and contemplation of all these subjects.”²² Galileo affirmed, in turn, how the academicians “expect the more expert to write and publish their labors, to the benefit of the republic of letters.”²³ The academicians did more, however, than set expectations. Two years after joining the academy in 1611, Galileo published three letters on sunspots under the academy’s imprimatur, identifying himself on the title page as a Linceo. The *History and Demonstrations Concerning Sunspots and their Properties* (*Istoria e dimostrazioni intorno alle macchie solari e loro accidenti...*) contains a remarkable set of drawings, which Galileo made with the help of the Benedictine monk Benedetto Castelli, showing the movement of sunspots and thus illustrating the roughly twenty-five-day rotation of the sun.²⁴

²¹ William of Ockham, “On the Notion of Knowledge or Science,” *Religious Writings*, trans. Philotheus Boehner (Indianapolis: Bobbs-Merrill, 1964), 3. The naming is attributed to Cesi’s mentor, Della Porta, who identified the symbolic powers of the lynx (*lincei*), “whose sight passes through a mountain according to all writers”; cited by Paula Findlen, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy* (Berkeley: University of California Press, 1994), 316.

²² Federico Cesi, *The Natural Desire for Knowledge*, trans by Gregory Conti (Vatican City: Pontifical Academy of Sciences, 2003) 151. Biagioli notes how the “protocols of legitimation (social and epistemological)” in the seventeenth-century shift from “patronage networks” to “scientific corporations, like the early academies”; *Galileo, Courtier*, 353, 354.

²³ Cited by Eamon, *Science and the Secrets*, 232. On the other hand, Mario Biagioli identifies Galileo’s “secrecy” as among his “literary tactics,” as well as “his systematic withholding of instrument-making techniques to establish a monopoly over telescopic astronomy”; *Galileo’s Instruments of Credit: Telescopes, Images, Secrecy* (Chicago: University of Chicago Press 2006), 2. On a similar theme, Galileo also secured a patent in 1594 from the Venetian Senate for a horse-powered water pump; *ibid.*, 5.

²⁴ *Ibid.*, 127. See “Galileo’s Sunspot Drawings” online, a flip-book animation at Rice University’s Galileo Project.

The Aristotelian model of a fixed heaven was giving way to the evidence of close observation. It was in this book that Galileo made his first public statement in support of Copernicus: “I tell you that this planet [Saturn] also, perhaps no less than the horned Venus, harmonizes admirably with the great Copernican system, to the universal revelation, of which doctrine propitious winds are now seen to be directed toward us, leaving little fear of clouds or crosswinds.”²⁵ In a subsequent letter to Cesi, Galileo thanked him and Lodovico Cigoli for editing the book’s original effrontery into something tamer and more acceptable to church censors.²⁶ He shared the academy’s commitment to reaching a wider audience, explaining in a 1612 letter that he “wrote [*Concerning Sunspots*] in the common language [Italian] because I must have everyone able to read it,” noting that not everyone can be “sent through the universities.”²⁷ He also arranged for a Latin translation, so that, as he put it, “foreigners will be able to read this book too.”²⁸

The academy was serving Galileo as editor and publisher, public defender and advocate. Learning was that much more of a public enterprise in the age of print, and this altered its sponsorship, now mixed with the commerce of print, and its autonomy, negotiated with the authorities. The Linceans brokered deals with printers, engravers, and book licensers; they served as publicity agents and laboratory managers.²⁹ When Cesi arranged a banquet in Galileo’s honor, during a visit to Rome in 1611, he also ensured

²⁵ Galileo, “Letters on Sunspots” in *Galileo at Work: His Scientific Biography*, trans. Stillman Drake, (Chicago: University of Chicago Press, 1978), 198.

²⁶ Galileo, *Discoveries and Opinions of Galileo*, trans. Stillman Drake (New York: Anchor, 1957), 147-48.

²⁷ Cited by Freedberg, *Eye of the Lynx*, 125-26.

²⁸ Cited by *ibid.*

²⁹ David Freedberg: “The Linceans spurred Galileo on when he was unwell (which was often), arranged for publication of the work, decided on printing policy, provided the prefatory material, counseled him on what to include and exclude (not that he always listened), and helped him negotiate the unexpected and ever-trickier demands of the censors”; *The Eye of the Lynx: Galileo, His Friends, and the Beginnings of Modern Natural History* (Chicago: University of Chicago Press, 2002), 117.

that the master was able to step into the night air to make further observations with his telescope of the orbital period of the Medicean stars (Jupiter's moons).³⁰

To take another instance of the academy's brokerage role in defending and safeguarding the intellectual properties of learning, Galileo composed an open letter in 1615 to the Grand Duchess Christina of Tuscany, in which he cast the work of science as no less than a pursuit of "the glory and greatness of Almighty God [that] are marvelously discerned in all his works and divinely read in the open book of heaven."³¹ Pope Paul IV begged to differ. A year later, he forbade Galileo any further public pronouncements on astronomy. Once again, Cesi and the other Linceans interceded, if somewhat surreptitiously. They arranged for him to ghost-write a lecture for his student, Mario Guiducci, on his current interests in the Great Comet of 1618, in which he was able to attack a number of popular views. The lecture was given in the Florentine Academy and later published as *Discourse on Comets* (*Discorso delle comete*) in 1619.

This work was rebutted, in turn, by the Jesuit mathematician Orazio Grassi in an anonymous tract. Cesi then encouraged Galileo to respond "quickly," but in a way that "doesn't come out in the form of a duel," as he wrote.³² In 1623, Galileo responded with *The Assayer* (*Il Saggiatore*), published under his own name and as a Lincean.³³ The academy not only succeeded in steering this work through the censors, it provided *The Assayer* with the finest of engraved title pages. The work was executed by Francesco Villamena, and features the draped muses, Natural Philosophy and Mathematics, set in a

³⁰ Meredith K. Ray, *Daughters of Alchemy: Women and Scientific Culture in Early Modern Italy* (Cambridge: Harvard University Press, 2015), 147.

³¹ Galileo, "Letter to the Grand Duchess of Tuscany," in *Discoveries and Opinions of Galileo*, 196.

³² Cited by Freedberg, *Eye of the Lynx*, 140.

³³ Drake ranks this "scientific manifesto... the greatest polemic ever written in physical science"; *Discoveries and Opinions of Galileo*, 227.

classicist edifice atop a foundation stone bearing a wreathed and crowned lynx. Here was Galileo – both humanist (having given early lectures on Dante and the architecture of Hell) and anti-humanist (later scoffing at the tyranny of old books) – set within the neo-classicist temple of print. The academies' enthusiasm for the artistry of printers was now serving the sciences well.³⁴

The *Assayer* achieved considerable success. It even found favor with the newly elected Pope Urban VIII with whom Galileo met, and whose nephew, the Cardinal Francesco Barberini, was already a member of Accademia dei Lincei³⁵ All must have seemed right with the world of learning, for the moment. Galileo initiated another grand work, this time comparing Aristotle and Copernicus, which he had long been wanting to publish. The *Dialogue Concerning the Two Chief World Systems* (*Dialogo sopra i due massimi sistemi del mondo*) was published in 1632. However, the death of Cesi, two years earlier, quickly dissipated the force of the Accademia dei Lincei, leaving Galileo politically vulnerable. His enemies within the church, as well as among the Aristotelians, particularly at Padua, were soon able to turn the pope against him.³⁶

In 1633, Galileo found himself, at the age of sixty-nine, appearing before the Inquisition. Among his inquisitors, Cardinal Barberini refused to condemn him, but seven of the ten found him guilty of heresy. Galileo was required by their judgment to “abjure,

³⁴ While I focus on the contribution of the academies, as a humanist form, to the sciences, for other contributions, see Cochrane, “Science and Humanism”; Ann Blair, “Humanist Methods in Natural Philosophy: The Commonplace Book,” *Journal of the History of Ideas* 53, no. 4 (1992), 541-551; and Rens Bod, *A New History of the Humanities: The Search for Principles and Patterns From Antiquity to the Present* (Oxford: Oxford University Press, 2014), 198-211.

³⁵ Cardinal Francesco Barberini's was known to have dissected deformed animals, such as a two-headed calf, in his home for educational purposes; Findlen, *Possessing Nature*, 213.

³⁶ Eric Cochrane: “Galileo's act provoked the unanimous hostility of all the Aristotelians of all persuasions. Nor is it surprising that they expressed their defenselessness by resorting to force - by appealing to political and ecclesiastical authority in order to censure Telesio, to condemn Galileo, and to break up the new order of the Scolopians, who had dared teach Galilean physics to school children”: “Science and Humanism,” 1046.

curse, and detest said errors and heresies”; he had to publicly proclaim: “I swear that for the future I will never say again, nor assert orally or in writing such things.”³⁷ The *Dialogue* was banned, although his sentence “to formal prison of the Holy Office at our discretion” was commuted to house arrest. Still, the irrepressible Galileo was not without friends, who were able to assist him in publishing *Discourses and Mathematical Demonstrations Relating to Two New Sciences* (*Discorsi e dimostrazioni matematiche, intorno à due nuove scienze*) in Leiden in 1638, some four years before his death at the age of 78.³⁸

In its time, the members of the Accademia dei Lincei had skillfully managed for Galileo the proprieties and properties, as well as the capital requirements, of print. This was more than the Italian universities or the noble patrons of scholars were providing those engaging in the new science. Although, to be fair, Cesi was nobility, having inherited the title of Duke of Acquasparta.³⁹ Although Cesi’s death unsettled the Accademia dei Lincei, this was not the end of its contribution. Its members went on to complete a second of Cesi’s extraordinary publishing projects. In 1611, when Galileo first joined the academy, Cesi showed his new recruit hundreds of natural history illustrations that had been created by both Spanish and indigenous artists in New Spain. It

³⁷ “Sentence, 22 June 1633,” and “Abjuration, 22 June 1633,” in *The Trial of Galileo, 1612-1633*, ed. Thomas F. Mayer (Toronto: University of Toronto Press, 2012), 194.

³⁸ Galileo’s book was published by the House of Elsevier (as was Thomas Hobbes’ later in the century), a Dutch firm operating from 1580 until 1712, with a later Dutch company assuming the distinguished name and tree-of-knowledge trademark in 1880, and, as Elsevier, growing into the largest scholarly journal publisher in the world.

³⁹ Bruce T. Moran, writing on the shift from court to academy: “There, credibility emerged as a result of corporate effort combined with experimental practices and the communal determination of ‘matters of fact’”; “Courts and Academies,” in *Early Modern Science*, eds. Katherine Park and Lorraine Daston, vol. 3 of *The Cambridge History of Science* (Cambridge: Cambridge University Press, 2006), 267. R. W. Serjeantson: “The new philosophical academies allowed the development of new forms of authentication” concerning “how experimental reports were published”; “Proof and Persuasion,” in *Early Modern Science*, 169.

was but a small sample from the enormous collection assembled by Francisco Hernández during his extraordinary scientific expedition to Mexico from 1571 to 1577.

Commissioned by King Philip II of Spain as the royal physician for the Indies, Hernández had been instructed, as the king's letter put it, to "consult, wheresoever you go [in New Spain], all the doctors, medicine men, herbalists, Indians, and other persons with knowledge in such matters," with special attention paid to "medicinal plants" and "what their uses are in practice [and] their powers."⁴⁰ During the expedition, Hernández wrote to the king requesting further funding for his encyclopedic work, as well as, in his words, to "translate it into Spanish [from Latin], and into Nahuatl for the benefit of the native population."⁴¹

Had Hernández's proposal been realized, it might have given European imperialism a distinctive turn in what was otherwise a presumptive exercise of intellectual property rights over all that it touched. While nothing came of the proposal, it reflects Hernández's broader acknowledgement of the intellectual rights and responsibilities involved in working with indigenous peoples, given what he had learned from them and the expedition more broadly.⁴² Still, he managed to return to Spain with a rare set of papers reflecting a comprehensive, bilingual survey of plants and animals based on Nahua (Aztec) knowledge, language, and medicinal practices, reflecting

⁴⁰ "The Instructions of Philip II to Dr. Francisco Hernández," in *The Mexican Treasury: The Writings of Dr. Francisco Hernández*, trans. Rafael Chabrán, Cynthia L. Chamberlin, and Simon Varey (Stanford: Stanford University Press, 2000), 46.

⁴¹ Hernández, "Letter 9, March 20, 1575," in *The Mexican Treasury*, 56.

⁴² The intellectual property legacy of such expeditions is found today in bio-prospecting: John Merson, "Bio-Prospecting or Bio-Piracy: Intellectual Property Rights and Biodiversity in a Colonial and Postcolonial Context," *Osiris* 15 (2000), 282-296.

imperialism's remarkable capacity to acquire and credit, if not repay, the learning of others.⁴³

By the seventeenth century, Hernández's unpublished collection was gathering dust in the royal archives of Spain. Cesi made it the Accademia dei Lincei's mission to see this rare collaboration between Spanish and Nahuatl physicians and scientists into print. The academy's members set to work ordering, editing, annotating, and adding materials over the next three to four decades. There was much checking and correcting of the illustrations, relying on plants from America that Cesi obtained from Jesuit and Dominican missionaries and Spanish trade officials. The Linceans turned to those who had served in the region to further review and verify the illustrations.⁴⁴ Cesi managed to see some of the printed pages for the work in 1628, just two years before his death. A full edition of the *Mexican Treasury* (*Tesoro Messicano*) was finally published in 1651. This 950-page folio volume, the largest compilation of new world natural history to date, was duly accredited to Francisco Hernández, Nardo Antonio Recchi, and Johann Schreck (who was identified as an academy member), with the book's authorship and editing spanning a great many decades.⁴⁵ Here was the humanist practice, given to improving

⁴³ Hernández commissioned indigenous artists to illustrate plants, animals, and minerals; collaborated with local healing shamans at the Mexican missionary hospitals to test the medicinal qualities of local plants and manners of treatment involving indigenous taxonomies and pharmaceutical knowledge; conducted post mortems, ran experiments, and recorded observations and conversations in Nahuatl, Spanish, and Latin. The medicinal plants were drawn from the Aztec gardens of the hospital at Huaxtepec, which had been cultivated by the Aztec king Nezahualcoyotl of Texcoco a century earlier; Jorge Cañizares Esquer, *Nature, Empire, and Nation: Explorations of the History of Science in the Iberian World* (Stanford: Stanford University Press, 2006), 8, 28.

⁴⁴ Luigi Guerrini, "The 'Accademia dei Lincei' and the New World," Unpublished paper, Max Planck Institute for the History of Science, Berlin, 2008, 9-11.

⁴⁵ The full title is *Rerum medicarum Novae Hispaniae thesaurus, seu, Plantarum animalium mineralium Mexicanorum historia*, with various editions published from 1628 to 1651. It is available online, in its 1628/30 edition, through the Internet Archive. Schreck had been heavily involved in an earlier stage, although he died in 1630, while still in Beijing as part of the Jesuit mission there. Freedberg notes that its "taxonomic, ethnobotanical, and pharmacological" contributions included species recorded for the first

textual accuracy and precision through consulting the best sources, at work in natural history.

The academy's involvement in science, along with the place that it created for Nahuatl learning, marked a cosmopolitan transition for humanist's literary and historical concerns with classical antiquity.⁴⁶ As the seventeenth century progressed, societies devoted to the study of natural history became points of civic pride in London, Paris, and Berlin. They were chartered by the court, granted publishing and patent rights, as well as land and other sustaining subsidies. Whether humanist or scientific, or a blend of the two, the academies amounted to a new "intellectual regime," writes Luce Giard, a historian at the Centre de la Recherche Scientifique in Paris, with "a widening of the social base of culture, a transformation in the means of access to texts and the channels of circulation of knowledge."⁴⁷ It may not have been, as Giard holds, a "return of intellectual debate to the community," as if the medieval or early modern universities had ever had a lock on the discussion of ideas, but the academies undoubtedly contributed to learning's public presence, "based on ties of friendship or patronage," as Giard puts it, "between a magnate and his clients, a group of intellectuals, professional and amateur."⁴⁸ By the end of the eighteenth century, as many as 2,500 academies had left some sort of trace on the European historical record, from Cardinal Bessarion's humanist Roman

time in Europe, preserving the Nahuatl names and terms" while other species are "now lost or endangered"; *Eye of the Lynx*, 275.

⁴⁶ Compare Steven Shapin, who highlights the distinctions between scientific societies and humanist academies: "The new societies... made the production of new knowledge, rather than the guardianship of and commentary on the old, central to their identity and they aimed, with varying success, to link the progress of science to civic concerns rather than wholly scholarly or religious ones"; *The Scientific Revolution* (Chicago: University of Chicago Press, 1996), 133.

⁴⁷ Luce Giard, "Remapping Knowledge, Reshaping Institutions," in *Science, Culture and Popular Belief in Renaissance Europe*, eds. Stephen Pumfrey, Paolo L. Rossi, and Maurice Slawinski (Manchester: University of Manchester Press, 1991), 19.

⁴⁸ *Ibid.*, 38.

academy of the 1470s to the Lunar Society of Birmingham founded in 1765.⁴⁹ There is, however, one more society I wish to consider in this chapter for the part that it played in seventeenth-century scholarly publishing.

The Royal Society of London

In England, John Wilkins, warden of Wadham College at the University of Oxford, began hosting an “experimental philosophical club” sometime around 1650.⁵⁰ Following the English Civil War, Bishop Wilkins had been outspoken in his efforts to reestablish the university’s somewhat compromised intellectual independence (complicated by his marriage to the sister of Lord Protector Cromwell who had himself named Chancellor of the University of Oxford in 1650). The club was intended to contribute to his cause through its embrace of the new experimental science. Its meetings were attended by Christopher Wren, Robert Hooke, and the young student John Locke, as well as by the new cut of professors, occupying endowed positions in the sciences: John Wallis, Savilian Professor of Geometry; Seth Ward, Savilian Professor of Astronomy; and Thomas Willis, Sedleian Professor of Natural Philosophy.⁵¹ Henry Oldenburg and Robert Boyle visited the club, with Boyle moving his personal laboratory to Oxford in 1656 to

⁴⁹ David Lux, “The Reorganization of Science 1450-1700,” in *Patronage and Institutions: Science, Technology, and Medicine at the European Court, 1500-1750*, ed. Bruce T. Moran (Rochester: Boydell, 1991), 189.

⁵⁰ John Aubrey in his memoirs, collected in 1685, writes, “Till about the year 1649 when Experimental Philosophy was first cultivated by a Club at Oxford, it was held a strange Presumption for a man to attempt an Innovation in Learning, and not to be good manners to be more knowing than his Neighbors and Forefathers”; *Memoir of John Aubrey, F.R.S. Embracing his Autobiographical Sketches*, ed. John Britton (London: J. B. Nichols and Son, 1845), 93.

⁵¹ Peter Laslett, “The Foundation of the Royal Society and the Medical Profession in England,” *British Medical Journal* (1960, July 16), 166-7; Maurice Cranston, *John Locke, A Biography* (New York: McMillan, 1957), 116. In 1667, Thomas Sprat described the basis of membership in the club: “The University had, at that time, many Members of its own, who had begun a *free way* of reasoning; and was also frequented by some *Gentlemen*, of Philosophical Minds, whom the misfortunes of the Kingdom, and the security and ease of a Retirement amongst Gown-men, had drawn thither”; *The History of the Royal Society of London, for the Improving of Natural Knowledge* (London: Knapton, 1722), 53.

be closer to the action.⁵² Fees were collected from club members to purchase scientific instruments and equipment “for the furnishing of an elaboratory,” as club member Seth Ward wrote in a letter from 1652, “and for making chymicall experiments which we doe constantly every one of us in course undertakings by weeks to manage the worke.”⁵³ As well, Ward points out that “we have conceived it requisite to examine all the books of our public library (everyone takeing his part) and to make a catalogue or index of matters... in philosophy physyc mathematics.”⁵⁴

Wilkins left Waldham in 1659 to take up a Cambridge post (although he soon lost it with the Restoration in 1660, which placed Charles II on the throne). This left Wilkins free to attend the informal meetings of the scientifically minded in London at Gresham College. The College had been endowed by Sir Thomas Gresham, who had done well as financial advisor to kings and queen, and in establishing the Royal Exchange. On his death in 1579, he gave his great house, as well as all the land and revenue from the Royal Exchange, to the creation of a college with seven professorships, in Law, Rhetoric, Divinity, Music, Physic, Geometry, and Astronomy, who gave public presentations.⁵⁵ It also provided a meeting place for others interested in the sciences, including a dozen of those who met with Wilkins, including Wren and Boyle. This group decided that the Restoration crowning of King Charles II (following the death of Cromwell and the

⁵² Robert G. Frank, “Medicine,” in *The History of the University of Oxford, Seventeenth-Century*, Vol. 4, ed. Nicholas Tyacke (Oxford: Oxford University Press, 1997), 549.

⁵³ H. W. Robinson, “An Unpublished Letter of Dr Seth Ward Relating to the Early Meetings of the Oxford Philosophical Society,” *Notes and Records: The Royal Society Journal of the History of Science*, 7 (1949), 69. Charles Webster, *The Great Instauration: Science Medicine and Reform 1626-1660* (London: Duckworth, 1975), 165, 195.

⁵⁴ Robinson, “Letter of Dr Seth Ward,” 69.

⁵⁵ Charles Webster notes that the rules intended to preserve the dedication to learning at Gresham restricted appointments to unmarried scholars, which led to “a severe danger that an institution designed to give versatile young scholars the opportunity to energize the intellectual life of London, would lapse into an almshouse for eccentric old bachelors”; *The Great Instauration*, 52-53.

collapse of the Protectorate) offered a perfect opportunity to request that the king be a patron for a new scientific society. After all, Charles was known to have had his own laboratory installed in Whitehall.⁵⁶ On November 28, 1660, after Wren's weekly astronomy lecture, those who met formally declared the founding of a new society dedicated to "improving natural knowledge."

It took until 1662 for the king to grant an initial charter, which laid out the formal terms of incorporation for the "Royal Society." The initial charter opens by aligning the new learning with the emerging force of British imperialism: "We have long and fully resolved with Ourselves to extend not only the boundaries of the Empire, but also the very arts and sciences."⁵⁷ It continues with the court's favoring of the new science: "Therefore we look with favor upon all forms of learning, but with particular grace we encourage philosophical studies, especially those which by actual experiments attempt either to shape out a new philosophy or to perfect the old."⁵⁸ Among the charter's key provisions, three bear on intellectual property rights: The Society is able to appoint "one or more typographers or printers" to whom it may be granted "faculty to print such things, matters and affairs touching or concerning the aforesaid Society"; the Society has a right to the bodies of executed criminals "to anatomize" in order "to obtain the better effect of in their philosophical studies"; and its members are allowed, by letter, "to enjoy mutual

⁵⁶ Royal Society Minutes, January 11, 1664: "Sir Robert Moray mentioned that the King had made an experiment of cold, with three glasses filled with sweet water, used for washing..."; Thomas Birch, *The History of the Royal Society of London for Improving of Natural Knowledge from Its First Rise*, vol. 2 (London: Millar, 1756), 5.

⁵⁷ *Translation of the First Charter, Granted to the President, Council and Fellows of the Royal Society of London by King Charles the Second, A.D. 1662*, The Royal Society. London, online.

⁵⁸ Ibid. Roger Hahn sees the role of scientific academies more radically: "A transformed notion of 'academy' that ultimately provided the Republic of Letters with a viable institutional framework, at once elitist and community-directed," for what he sees as "the task of building a new order in addition to destroying the old one"; *The Anatomy of a Scientific Institution: The Paris Academy of Sciences, 1666-1803* (Berkeley: University of California Press, 1971), 43.

intelligence and knowledge with all manner of strangers and foreigners... without any molestation, interruption or disturbance.”⁵⁹ The Society had gained rights to print, to bodies, and to correspondence, each of which represented a precious element of intellectual autonomy, given this was otherwise a period in which such matters were closely watched and controlled by church, state, and the Company of Stationers (with more on this theme to follow).

The charter did not, however, make provisions for the Society’s ongoing financial support. A third royal charter in 1669 did provide a tract of land for the purposes of establishing a permanent home for the Society. Yet the members felt compelled to sell it back to the king, as the Society still lacked the resources to erect a building. This must have been all the more difficult to bear for Society members, given the situation of the Académie des Sciences, founded in Paris in 1666 by Jean-Baptiste Colbert, finance minister for Louis XIV. The Académie provided *gratifications* to support members, as well as the privilege of meeting in the king’s library. In return for this patronage, Académie members served the crown as scientific advisors, cartographers, and engineers. Until 1688, any reports or reviews published by the members appeared under the name of the Académie alone, and its scientific endeavors, from desalination of sea water to hydraulic engineering, had a practical bent to them.⁶⁰

In contrast, the Royal Society possessed a greater degree of autonomy, making it more fully a part of “the world of letters,” as the charter expresses it.⁶¹ It was entrusted by

⁵⁹ Ibid.

⁶⁰ Robin Briggs, “The Académie Royale des Sciences and the Pursuit of Utility,” *Past and Present* 131 (1991), 46-48. Alice Stroup: The Académie was “the beneficiary of the most generous patronage of science known during the seventeenth century”; “Royal Funding of the Parisian Académie Royale des Sciences During the 1690s,” *Transactions of the American Philosophical Society* 77 (1987), 1.

⁶¹ “First Charter, 1662.” Noah Moxham on the Académie Royale des Sciences: “Evidently, this [financial sponsorship] enabled Louis to exploit the work of the Académie for his own prestige and the knowledge it

the crown to print works of learning for the benefit of all humankind, much as the universities had been granted, during this period of continuing press censorship and Stationers' Company monopolies among printers. The Society was also allowed to carry on the international correspondence needed at the time to establish and verify claims of discovery and invention. Still, it was not long before the Society's first secretary, Henry Oldenburg, ran into the limits of that autonomy. He was briefly imprisoned in 1667 on suspicion of espionage, in light of his unceasing flow of letters from abroad and as a foreigner living on English soil, but then he was also asked by the State Paper Office to translate intercepted letters in the interest of the country's security. More generally, the trust bestowed by the crown on the Society may have been based on the Royalist tendencies of its initial membership.⁶²

Whatever the king's motives for granting this low-cost charter to the Society, its members were happy to bring papers and demonstrations "before their *weekly Meetings*, to undergo a just and full Examination" at Gresham College, as Thomas Sprat, Bishop of Rochester and Society member, wrote in his 1667 history of the Society.⁶³ They were said to share a goal in the objective and disinterested truth on any given matter: "It was in Vain that any man amongst them strive to preferr himself before another," Sprat wrote, "or to seek for any greater glory from the Subtilty of his Wits; seeing as it was the inartificial Process of the *Experiment*, and not the *Acuteness* of any Commentary upon it,

produced specifically as a royal possession to be incorporated into the mechanisms of favor and patronage, but it made the work frustratingly useless as a contribution to the wider republic of letters"; "Edward Tyson's Phocaena: A Case Study in the Institutional Context of Scientific Publishing," *Notes and Records: The Royal Society Journal of the History of Science* 66 (2012), 241.

⁶² Lotte Mulligan, "Civil War Politics, Religion and the Royal Society" *Past & Present*, 59, no. 1 (1973), 96. J. G. A. Pocock on the original Oxford experimental philosophical club: "It is tempting to define the politics of the Oxford Scientists at this time as conservative and empirical, authoritarian and latitudinarian [religion by reason]"; "Introduction," in *The Political Works of James Harrington*, ed. J. G. A. Pocock (Cambridge: Cambridge University Press, 1977), 84.

⁶³ Thomas Sprat, *History of the Royal Society of London*, 91.

which they have had in Veneration.”⁶⁴

This just and full examination was not, however, entirely straightforward. Many of the experiments were done outside the college, for example, in Boyle’s laboratory and Hooke’s lodging, with a witness or two and only a report presented to the Society by way of making the experiment public.⁶⁵ Attendance at meetings was sporadic during its first few decades, judging by the anniversary meetings, which brought out forty or so,⁶⁶ But then the Society was not in the business of collectively endorsing scientific findings or discoveries. Just the opposite. Its motto – *nullius in verba* (take no one’s word for it) – meant that everyone (well, every member, at least) had a right to judge the work for himself, and that no one should be asked to take the Society’s word for it by way of a collective or corporate endorsement.⁶⁷ In light of this accumulation of individual judgments, Sprat took care in describing how the membership consisted of “very many Men of particular Professions, yet the far greater Number are *Gentlemen*, free, and unconfin’d.”⁶⁸ For Sprat, the financial independence of gentlemen protected the Society

⁶⁴ Ibid., 91. Steven Shapin describes this period as displacing “solitary knowers from the center of the knowledge-making scenes and replacing them with a moral economy”; *A Social History of Truth: Civility and Science in Seventeenth Century England* (Chicago: University of Chicago Press, 1994), 27. This civility, for Shapin, relies upon “trust” and “trusteeship,” which for Locke, he points out, is the basis of legitimate sovereignty; *ibid.*, 11.

⁶⁵ Steven Shapin, “The House of Experiment in Seventeenth-Century England,” in *Never Pure: Historical Studies of Science As If it Was Produced by People with Bodies, Situated In Time, Space, Culture, and Society, and Struggling for Credibility and Authority* (Baltimore, Md.: Johns Hopkins University Press, 2010), 77.

⁶⁶ See Michael Hunter, for exact tables of seventeenth-century anniversary meeting attendance and membership numbers; *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge: Boydell and Brewer, 1989), 112-114.

⁶⁷ Adrian Johns points to William Petty’s “*Discourse Made Before the Royal Society... Concerning the Use of Duplicate Proportion*,” in which Petty writes of it being a “sample of the Royal Society’s labors” and adding that, “the Society have been pleased to order it to be published: (I dare not say, as approving it, but as committing it to Examination.)”; “Science and the Book,” in *The Cambridge History of the Book in Britain*, vol. 4, 1557-1695, eds. John Barnard and D. F. McKenzie (Cambridge: Cambridge University Press, 2002), 279, 302-3 n65.

⁶⁸ Sprat, *History of the Royal Society*, 67. Hunter provides a Royal Society membership breakdown by occupation for those somewhat active after election, which places “gentlemen” at fourteen percent of the

against the “*two Corruptions of Learning*.”⁶⁹ The first being how “*Knowledge* still degenerates to consult *present Profit* too soon,” while the other is, referring to the universities, “that *Philosophers* have been always *Masters* and Scholars; some imposing, and all the other submitting; and not as equal Observers without Dependence.”⁷⁰ This well defines the space occupied by academy and society in early modern Europe, which fell between the craft guilds (given to chasing profits) and universities (deferring to the authority of the past).

The Society offered, in principle, a more open and public space for learning than university, cathedral school, and monastery. The Society was located in London, initially at Gresham College, a site of public presentations. Yet its membership was a matter of nomination and election, initially restricted to fifty-five in number, with allowances for accepting those at the rank of baron or above (expanded to 115 by 1663). It was the Society’s publishing program that ensured it a larger public.

Sprat is clear about the Society being on the side of openness, access, and public use. One part of his unrealized plan for the Society was to have it somehow assemble the funds needed to purchase inventions from their inventors and turn these intellectual properties into public goods: “The Royal Society will be able by degrees, to purchase such extraordinary inventions, which are now close lock’d up in *Cabinets*; and then bring them into the common stock, which shall be upon all occasions expos’d to all mens

membership, and when combined with “aristocrats” adds up to twenty-five percent of the members having independent means; *Establishing the New Science*, 116.

⁶⁹ Sprat, *History of the Royal Society*, *ibid.*

⁷⁰ *Ibid.* Later in the book, Sprat continues his defense against the charges of “men of business, against many sorts of *Knowledge*” which include, that “it inclines men to be unsettled, and *contentious*; That it takes up more of their time,” and on the list goes; *ibid.*, 331. Sprat is following Francis Bacon’s listing of the charges against learning in *The Advancement of Learning* (Oxford: Oxford University Press, 1906), 11 ff. Noel Malcolm: “Most modern descriptions of the early years of the Royal Society still fail to give a sufficient sense of just how nervous of criticism the publicists of the Society were”; *Aspects of Hobbes*, (Oxford: Clarendon Press, 2002), 330.

use.”⁷¹ His goal of duly rewarding inventors while protecting public interests in the inventions was to be a principle of intellectual property law. It had been part of Francis Bacon’s vision for science, earlier in the century, which had inspired the Royal Society: “The *Artificers* should reap the common crop of their Arts: but the *publick* should still have a *Title* to the miraculous productions.”⁷²

Sprat paid homage to Bacon’s emphasis on experimentation, but the Society also followed the Lord Chancellor’s embrace of print as a means of verification through publication: “We should not approve any discovery,” Bacon wrote, “unless it is in writing.”⁷³ Within two years of being granted its printing rights by royal charter, the Society issued the first book to bear its grand seal. The right to print was an important privilege of intellectual autonomy for learning, but it meant little enough if the Society could not raise sufficient funds to pay the printers. The Society principally relied on the unsteady support of its members, as they were asked to subscribe to the printing of one title after another. This was the new economy of sponsorship for learning’s printed properties, and the Society was finding its way with the commerce of print, although it did get off to a good start.

The Society’s first publication proved to be an uncharacteristic work of great practical interest to the state, namely, John Evelyn’s *Sylva, or A Discourse of Forest-*

⁷¹ Sprat, *History of the Royal Society*, 75.

⁷² Ibid.

⁷³ Francis Bacon, *The New Organon*, ed. Lisa Jardine and Michael Silverthorne (Cambridge: Cambridge University Press, 2000), 82. For all of Bacon’s suspicions of “literature and book-learning,” he had been quick to praise the invention of printing (along with gunpowder and the compass) for “what a change have these three made in the world in these times; the one [printing] in the state of learning,” while in *De Augmentis*, he praises “the art of printing, which brings books within reach of men of all fortunes”; Francis Bacon, “In Praise of Knowledge,” in *The Works of Francis Bacon*, eds. James Spedding, Robert Leslie Ellis, and Douglas Denon Heath, vol. 8 (London: Longman, 1858), 125; Francis Bacon, “de Augmentis,” in *The Works of Francis Bacon*, vol. 5, 110.

Trees and the Propagation of Timber in His Majesty's Dominions, published in 1664.⁷⁴ In his dedication to King Charles II, Evelyn describes the book as “the Publique Fruit of your *Royal Society*,” alluding to how this work was a collective effort on the part of the Society, which had been inspired by the suggestion of the navy’s “principal *Officers* and *Commissioners*.”⁷⁵ The front matter of Evelyn’s book shows signs of the Society finding its way in publishing. The title page refers to the book “as it was Deliver’d in the Royal Society” and as “Published by express Order of the Royal Society”; after the first edition, Evelyn’s standing was noted as a “Fellow of the Royal Society.” The front matter also features a very prominent Royal Society seal, with its motto: *Nullius in verba*. The 120-page work, with only a single illustration of hand-tools, sold out its thousand-copy print run in its second year, with expanded editions following.⁷⁶

Still, the Society was unable to raise sufficient funds in 1665 for its second book, Robert Hooke’s *Micrographia or, Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses, with Observations and Inquiries Thereupon*.⁷⁷ The book was privately funded, while still carrying the Society’s seal and a dedication to the Society from its author. This rather sensational work sold well enough to go into a second printing, with its fold-out and full-page scientific etchings, that ranged from a drone fly

⁷⁴ John Evelyn, *Sylva, or A Discourse of Forest-Trees and the Propagation of Timber in His Majesty's Dominions* (London: John Martyn and James Allestry, 1664). A facsimile is available at the Internet Archive, online. Suggesting its reluctance to become otherwise involved in matters of state, the Society turned down a proposal by founding member Robert Moray to examine, at the king’s request, “any philosophical and mechanical invention” for which a patent was being considered, with nothing coming of it then, nor in 1709, when it was proposed again; Birch, *History of the Royal Society*, 116. Christine Macleod, “The 1690s Patents Boom: Invention or Stock-Jobbing?” *Economic History Review* 39, no. 4 (1986), 552. Moray had connections with Charles II, having travelled in his company during the king’s exile, while, at this time, having rooms near the king’s laboratory.

⁷⁵ *Ibid.*, unpagged.

⁷⁶ Gillian Darley, *John Evelyn: Living for Ingenuity* (New Haven: Yale University Press, 2006), 185.

⁷⁷ Robert Hooke, *Micrographia or, Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses, with Observations and Inquiries Thereupon* (London: John Martyn and James Allestry, 1665). Available online at Project Gutenberg.

eye, the anatomy of a flea, the point of a needle, the structure of plant *cells* (so-named for the first time), all the way up to craters on the moon.⁷⁸

With future books, the Society experimented with paying subsidies to booksellers to carry their books, as well as agreeing, in other cases, to buy a certain number of copies in advance, which were then handed out to members.⁷⁹ The Society's struggling efforts to make ends meet, left printers and booksellers "averse to the printing of mathematical books," as one correspondent wrote to Isaac Newton in 1672, with a later letter pointing to how sales of John Wallis' mathematical work failed to cover its own printing costs.⁸⁰ Then in 1686, the Society offered to include the members' names on each fish engraving they sponsored (at one guinea each) in the lavishly illustrated *Historia Piscium*.⁸¹ While that bit of vanity-baiting worked, and the book was printed at Oxford University under the supervision of John Fell (with more on the university's press operations in the next chapter), booksellers were only able to sell a small portion of the 500 copies printed on varying qualities of paper. The Society was forced to pay employees, such as Robert Hooke, in copies of the fish book.⁸²

⁷⁸ Robert D. Purrington, *The First Professional Scientist: Robert Hooke and the Royal Society of London* (Basel: Springer, 2009), 115.

⁷⁹ Johns, "Science and the Book," 302. For example, the Society agreed to purchase 50 copies for its members and 100 for others of Johannes Goedaert's *Of Insects: Done into English and Methodized, with the Addition of Notes*, which Society member Martin Lister not only edited, but financed in 1682; *ibid.* Lister is also notable for having his two daughters as illustrators, perfecting their art with microscopes; Anna Marie Roos, "The Art of science: a 'Rediscovery' of the Lister Copperplates," *Notes and Records: The Royal Society Journal of the History of Science* 65 (2011), 2ff.

⁸⁰ Cited by A. N. L. Munby, "The Distribution of the First Edition of Newton's 'Principia,'" *Notes and Records: The Royal Society Journal of the History of Science* 10, no. 1 (1952), 29.

⁸¹ Sachiko Kusakawa, "The *Historia Piscium*, (1686)," *Notes and Records: The Royal Society Journal of the History of Science* 54, no. 2 (2000), 180, 187. Around half the 141 members subscribed, with 25 subscribers coming from outside the Society, including Fell, who saw to the printing at the university; *ibid.*, 189. Elsewhere, Kusakawa notes that "the cost of producing illustrations could form up to three-quarters of the capital investment of producing a book," while keeping works within the financial reach of students became a reason for not including illustrations; "Illustrating Nature," in *Books and the Sciences in History*, eds. Marina Frasca-Spada and Nick Jardine (Cambridge: Cambridge University Press, 2000), 90-113, 97.

⁸² Kusakawa, "The *Historia Piscium*," 192. Cf. Adrian Johns: "The Royal Society... could be seen as an authoritative center for natural knowledge because it mastered the use of the press," *The Nature of the*

The Society's financial ineptitude almost cost it one of publishing's greatest scientific works. For in 1686, Newton finally agreed to have his *Principia* printed, only to find that the Society's members were not prepared to finance yet another title.⁸³ The book might have been further stalled had not fellow member and man of independent means, Edmond Halley, come forward with a proposal, documented in the Society minutes for June 2, 1686: "Printing it [*Principia*] at his own charge, which he engaged to do."⁸⁴ Newton, in his Preface, speaks of Halley's "tremendous assistance; not only did he correct the typographical errors and see to the making of the woodcuts, but it was he who started me off on the road to this publication."⁸⁵ Newton acknowledges Halley's prompting, including his "subsequent encouragement and kind patronage," as well as how "he never stopped asking me to communicate it to the Royal Society."⁸⁶ The title page does include a declaration of the Society's "IMPRIMATUR" affirmed by "S. PEPYS, Reg. Soc. PRAESES" (president of the Royal Society), dated July 5, 1686, along with indications that the Society's printer was employed and the author was a Society Fellow.⁸⁷ Halley initially handled the *Principia*'s distribution, placing an advance notice in the *Philosophical Transactions* and asking Newton to call on his Cambridge

Book: Print and Knowledge in the Making (Chicago: University of Chicago Press, 1998), 465. He points to how "it came to maintain its own printers, its own journal, its own correspondence networks and its own right to license books"; *ibid.*

⁸³ *Ibid.*, 192. Adrian Johns furthers the intrigue by reporting that the Royal Society suspected that the printers may have printed extra copies of *Historia Piscium*, increasing the unsold stock borne by the Society; "The Ambivalence of Authorship in Early Modern Natural Philosophy," in *Scientific Authorship: Credit and Intellectual Property in Science*, Mario Biagioli and Peter Galison (London: Routledge, 2003), 75.

⁸⁴ Cited by Munby, "First Edition of Newton's 'Principia,'" 30.

⁸⁵ Isaac Newton, *The Principia: Mathematical Principles of Natural Philosophy*, trans. I. Bernard Cohen and Anne Whitman (Berkeley: University of California Press, 1999), 383.

⁸⁶ *Ibid.*

⁸⁷ Isaac Newton, *Philosophiæ Naturalis Principia Mathematica* (London: Joseph Streater, 1687). Newton's own copy is available online at the Cambridge Digital Library.

booksellers to take copies.⁸⁸

The Society licensed books of learning, while struggling with their financing and sales. It took a different path with the periodical. These pamphlet-length publications issued on a generally regular basis were appearing in increasing numbers among booksellers around St. Paul's and in the coffee houses of London.⁸⁹ The Society's secretary, Oldenburg, saw an opportunity to report on its affairs and use its printers. He had first-hand access, as secretary to the Royal Society, to the papers presented, demonstrations performed, and the 300 or so letters received annually. Such a publication might even finance his position with the Society (which went unpaid until 1669). He may have been more immediately inspired by a letter in November of 1664 from the French astronomer, Adrien Auzout, offering to contribute "what I can concerning England," as he described it to his friend, patron, and Society fellow, Robert Boyle, to "a Journal of all what passeth in Europe in matters of knowledge both Philosophical and Political," including notices of new books, experiments, and discoveries, as well as "the disputes which arise among learned men and interesting problems."⁹⁰ This was the *Journal des sçavans*, which was about to be printed in Paris on January 5, 1665, inaugurating the new literary genre that we now think of as the learned journal.

Rather than serve as a stringer for the Parisian *Journal*, Oldenburg decided to

⁸⁸ Munby, "First Edition of Newton's 'Principia,'" 31. In having Newton place the book with Cambridge booksellers, Halley suggested, in a 1687 letter to Newton that he "go halves with me, rather than have your excellent work smothered by their combinations"; cited by *ibid.*, 29.

⁸⁹ James Raven: "The other striking advance of the early seventeenth century concerned the publication of weekly and other regularly produced newsletters and periodicals"; *The Business of Books: Booksellers and the English Book Trade 1450-1850* (New Haven: Yale University Press, 2007), 58.

⁹⁰ Henry Oldenburg, "356. Oldenburg to Boyle, 24 November 1664," in *The Correspondence of Henry Oldenburg*, vol. 2, 1663-65, trans. A. Rupert Hall and Marie Boas Hall (Madison: Wisconsin University Press, 1966), 319-320. Andrade reports on Society minutes, recording Hooke's designs for a journal, possibly from 1663, as "but one perplexity in the history of the early days of the publication"; "The Birth and Early Days of the Philosophical Transactions," *Notes and Records of the Royal Society of London* 20, no. 1 (1965), 12. On Boyle's patronage of science, see Michael Hunter, *Boyle: Between God and Science* (New Haven: Yale University Press, 2009), 123.

fashion his own news-book. He applied to the Society for a license to print this new periodical to be the *Philosophical Transactions*. The Society passed a motion on March 1, 1665, “that the Philosophical Transactions, to be composed by Henry Oldenburg... be licensed by the Council of the Society, being first reviewed by some of the Members of the same.”⁹¹ It was surely an expedited review; the first issue was dated five days later on March 6th, 1644/5.⁹² Although some erroneously referred in later years to the *Transactions of the Royal Society* (as the Society was to note with dismay in the eighteenth century), Oldenburg was clear from the first volume that “these Rude Collections,” as he states in the dedication to the Royal Society, “are only the Gleanings of my *private* diversions in broken hours.”⁹³

To Oldenburg’s credit, he was remarkably clear at the outset about how the *Philosophical Transactions* was, in fact, taking a bold new tack in making print an instrument of learning. On the first page of the first issue, he offers a manifesto and a vision for this new genre, under the guise of an “Introduction”: “Whereas there is nothing more necessary for promoting the improvement of Philosophical Matters than communicating to such, as apply their Studies and Endeavors that way,” he asserts, “it is therefore thought fit to employ the Press.”⁹⁴ The printing press, as he sees it, can do more than convey the results of experiments and discoveries. It can actively promote the

⁹¹ *Proceedings of the Royal Society of London, June 4, 1891 to February 25th, 1892*, vol. 50 (London: Harrison and Sons, 1842), 504. The *Journal des sçavans* ceased publication in its first year, after its right to publish was suspended, but was reinstated with a shift in editor from Denys de Sallo to Abbé Jean Gallois; Thomas Broman, “Periodical Literature,” in *Books and the Sciences*, 225-238, 229. Broman, noting the success of Peter Bayle’s *Nouvelles de la Republique des Lettres*, started in 1684, concludes that “the role of science as a form of public knowledge was decisively shaped by the market for periodical literature and by the distinctive structure of the publications”; *ibid.*, 230-231.

⁹² The year is represented as 1664/5 because the New Year started on March 25 in Britain at that time, and was only changed to January 1 in 1751, as it had been on the continent in 1665.

⁹³ Henry Oldenburg, “To the Royal Society,” *Philosophical Transactions*, January 1665, unpagged.

⁹⁴ Henry Oldenburg, “The Introduction,” *Philosophical Transactions* 1, no. 1 (1664/5), 1.

development of natural philosophy. Treating science as news – that is, a breaking story still in process – increases and encourages access to the formation of this knowledge. Its sixteen-page pamphlet format made it far more affordable than science books. Oldenburg imagined that a monthly publication would appeal, as he continues in this “Introduction,” to “those whose engagement in such Studies and delight in the advancement of Learning, and profitable Discoveries, doth entitle them to the knowledge of what this Kingdom, or other parts of the World, do, from time to time, afford.”⁹⁵ Oldenburg was declaring the *inherent access rights* of both those who labor over, as well as those who enjoy, such studies. He was doing so amid a political climate in which the king was all too ready to hand out press monopolies in exchange for press censorship that restricted such entitlements.

Oldenburg sought to honor the rightful claim of the scientifically engaged to “the progress of the Studies, Labors, and attempts of the curious and learned in things of this kind,” as he continues.⁹⁶ The attempts include failed experiments, disproven hypotheses, and open questions. These are the transactions of science, and with them he *opens* the whole of experimental science to a broader public, outside the closed membership of the Society. Here, then, is the common enterprise of scholarly publishing: Encouraging “those addicted to and conversant with” learning to collaborate on, as Oldenburg writes, “the Grand design of improving Natural knowledge and perfecting all *Philosophical Arts*, and *Sciences*.”⁹⁷ He concludes that those addicted to learning are destined to share what they know for “the Glory of God, the Honor and Advantage of these Kingdoms, and the

⁹⁵ Ibid.

⁹⁶ Ibid., 2

⁹⁷ Ibid.

Universal Good of Mankind.”⁹⁸ The *Transactions* may not have met his immediate financial expectations, although the initial issues sold out. Still, what Oldenburg and other journal publishers created was a form of intellectual property that outlived kingdoms in its pursuit of what he named the universal good of humankind.⁹⁹ The *Transactions* may have suffered losses through to the end of the nineteenth century, but by the latter half of the twentieth century, the revenue from society journals, generally, was bearing a good part of their organization’s expenses.¹⁰⁰ The Oldenburgian question pressing on us today (coming well after the history in this book) is how do we think “it fit to employ” the internet, given that “there is nothing more necessary for promoting the improvement of Philosophical Matters than communicating to such, as apply their Studies and Endeavors that way.”

Oldenburg was also involved in an early intellectual property registry of inventions. He was seen to seal letters at meetings, while the Society’s president deposited inventions in a box, along with the date received, to further establish inventors’ priorities over who deserve to be credited with the invention.¹⁰¹ As well, the *Transactions* was regarded by members as a registry. In a letter to Newton in 1672, Oldenburg related

⁹⁸ Ibid.

⁹⁹ Henry Oldenburg wrote to Boyle that “what was hoped, might have brought me in, about 150 lb. per annum, English and Latin together, will now scarce amount to 50, especially since the Stationers, by reason of the war, refuse to print Latin”; “501. Oldenburg to Boyle, 24 March 1665/6,” in *The Correspondence of Henry Oldenburg*, vol. 3, 1666-1667, trans. A. Rupert Hall and Marie Boas Hall (Madison: Wisconsin University Press, 1966), 69. The reference to war is the Second Anglo-Dutch War (1665-1667), which would have added to the risks of printing the *Transactions* in Latin with an intended market on the continent. See also Marie Boas Hall, *Henry Oldenburg: Shaping the Royal Society* (Oxford: Oxford University Press, 2002), 85-86.

¹⁰⁰ Aileen Fyfe presents the consistent financial losses suffered by the *Transactions*, from the Society taking it on in 1752 through to the end of the nineteenth century, reflecting the Society’s sense of it as a responsibility, in Oldenburg’s initial terms, rather than a revenue source; “Journals, Learned Societies and Money: *Philosophical Transactions*, ca. 1750–1900,” *Notes and Records* (2015): DOI: 10.1098.

¹⁰¹ Rob Iliffe describes how, with mathematical inventions, an elaborate encoding technique was developed for putting the world on notice that a new technique was under development, without revealing anything substantial about it in advance; “‘In the Warehouse’: Privacy, Property, and Priority in the Early Royal Society,” *History of Science*, 30 (1992), 35-36.

how, after Newton's letter on "Light and Colors" was read to "the publick meeting of the R. Society," the members "voted unanimously, that if you contradicted it not, this discourse should without delay be printed, there being cause to apprehend that the ingenious & surprising notion therein contain'd (for such they were taken to be) may be easily snatched from you, and the Honor of it be assumed by forainers."¹⁰² This is the commonwealth of learning seeking to protect the author's and commonwealth members' intellectual property rights in their own work by ensuring public accessibility to this published accreditation.¹⁰³

Still, proprietary disputes arose within the Society during this period. In the 1670s, the members Robert Hooke and Christiaan Huygens each claimed to have invented a balance-spring that added to the reliability of pocket watches.¹⁰⁴ After Huygens revealed his invention by sharing diagrams of his design at a Society meeting, Hooke came forward with the claim that he had deliberately kept his own invention of the balance-spring out of the *Transactions* because he did not trust Oldenburg. Hooke refused to make him, as he put it in a subsequent publication, "acquainted with my Invention, since I looked on him as one that made a trade of intelligence."¹⁰⁵ Huygens may have had the stronger case, only to find that his seeming friend, the French watchmaker Isaac Thuret, claimed the balance-spring as his own invention in the course of implementing

¹⁰² Henry Oldenburg, "41 Oldenburg to Newton, 8 February 1671/1," in *The Correspondence of Isaac Newton*, vol. 1, 1661-1775 (Cambridge: Cambridge University Press, 1959), 107. Newton's paper appeared in the *Philosophical Transactions* 6, no. 80 (1671/2), 3075-87.

¹⁰³ See N. Moxham for discussion of the late seventeenth-century shift in which "*Transactions* had to absorb functions of registration and research communication that the Society had at certain times been resolved to keep separate"; "Fit for Print: Developing an Institutional Model of Scientific Periodical Publishing in England, 1665-ca. 1714," *Notes and Record* (2015), DOI: 10.1098.

¹⁰⁴ *Ibid.*

¹⁰⁵ Robert Hooke, "Postscript," in *Lampas: Or Descriptions of some Mechanical Improvements of Lamps and Waterpoises* (London: John Martyn, 1677), 53.

Huygens' designs.¹⁰⁶

This mix of craft, commerce, and science, amid charges of theft and betrayed trust, soured the Royal Society on including such matters of craft and trade in its program.¹⁰⁷ Society fellows soon discovered, however, that the purest of mathematical interests could give rise to no less acrimony over priority claims of invention. This was certainly the case with the Newton-Leibniz conflict over the discovery of the calculus during the second decade of the eighteenth century, to get ahead of my story.¹⁰⁸

Charges of usurpation and plagiarism were rampant at the time. Adrian Johns, Allan Grant Maclear Professor of History at the University of Chicago, provides a bemusing *who's who* of plagiarism within natural philosophy, naming both the accused and the accuser: "Isaac Newton (by Robert Hooke), Robert Hooke (by John Flamsteed)... and John Wallis (by almost everyone)."¹⁰⁹ The very cries of *usurpation* suggest an implied grasp of intellectual property rights (and wrongs). This was natural philosophy's contribution to the growing public recognition of authorship – as a point of honor, integrity, and contention – in the Age of Dryden. But then within the realm of learning, a text's authorship had long been an object of analysis and interpretation among learned readers, most vividly, perhaps, among the Renaissance humanists, but the properties of authorship were also of growing interest in the open and public pursuit of experimental science.

During the 1660s, the English philosopher Thomas Hobbes, for one, was having

¹⁰⁶ Ibid., 50, 54.

¹⁰⁷ Iliffe, "In the Warehouse," 54.

¹⁰⁸ Richard S. Westfall: "Newton carried out its investigation, arranged its evidence, and wrote its report... Not surprisingly, the committee, or court, found in Newton's favor"; *Never at Rest: A Biography of Isaac Newton* (Cambridge: Cambridge University Press, 1983), 725.

¹⁰⁹ Johns, *Nature of the Book*, 461.

none of the Royal Society's pretense of openness around its experiments. Hobbes took exception to the closed nature of the Society's meetings: "Cannot anyone who wishes come," Hobbes asks, "since, as I suppose, they meet in a public place, and given his opinion on the experiments [*experimenta*] which are seen, as well as they?" And again: "By what law would they prevent it? Is this Society not constituted by public privilege?"¹¹⁰ This right of access to the basis of knowledge claims is commonly used today, as I noted in the first chapter, in the case made for open access.

The question Hobbes raised of who can witness the Society's demonstrations was more than rhetorical. There is, to begin with, Hobbes' own exclusion from the Royal Society, despite his study of optics and mathematics, as well as the friends and supporters that he possessed among its membership. What kept him out of the society appears to have been the public mathematical disputes, dating back to the 1650s, that he conducted with founding members John Wallis, Seth Ward, John Wilkins, and Robert Boyle. Still, the Society's interest in increasing access to learning managed to triumph. In 1675, Society Fellow and Hobbes' friend, John Aubrey, wrote to the philosopher to say that Robert Hooke was interested in publishing, on behalf of the Society, any mathematical and scientific papers he might have on hand.¹¹¹ Hobbes responded that he "could be content it should be published by the society much rather than any other," but that he

¹¹⁰ Thomas Hobbes, "Physical Dialogue (1661)" in Steven Shapin and Simon Schaffer, *Leviathan and the Air Pump: Hobbes, Boyle, and the Experimental Life* (Princeton: Princeton University Press, 1985), 113. Quentin Skinner notes the common critiques of the extent of the Society's experimentation: "Few of the other early Fellows of the Royal Society did experimental work with anything like Boyle's competence. The Society indeed became very sensitive to the criticism, which Pepys mentions and Petty amongst others tried to meet, that much of their early and isolated experimental work tended to look rather useless, even (as Stubbe was to insist) wholly ridiculous"; "Thomas Hobbes and the Nature of the Early Royal Society," *Historical Journal* 12, no. 2 (1969), 228. Hobbes also objected, in his final year, to the "privilege of stationers [that] is (in my opinion) a very great hindrance to the advancement of all humane learning"; "Science and the Book" in *The Cambridge History of the Book in Britain, 1557-1695*, eds. John Barnard and D. F. McKenzie, vol. 4 (Cambridge: Cambridge University Press, 2002), 292, 293.

¹¹¹ Noel Malcolm, "Hobbes and the Royal Society," *Perspectives on Thomas Hobbes*, eds. G. A. J. Rogers and Alan Ryan (Oxford: Oxford University Press, 1988), 44.

cannot forgive how the Society had allowed that the “evill words and disgraces put upon me by Dr. Wallis are still countenanced without any publique Act of the Society to do me Right.”¹¹² It was, of course, the Society’s stance not to pronounce on such public disputes (unless they bore on their president, in the case of Newton).

The force of Hobbes’ question about access to these experiments – “By what law would they prevent it?” – applies, as well, to the Society’s exclusion of the philosopher Margaret Cavendish. A contemporary of Boyle, Cavendish published on natural philosophy, as well as related works of fiction, without the fellowship of such a society.¹¹³ The frontispiece prepared by Peter van Schuppen for her *Philosophical and Physical Opinions*, published in 1655, brings the point home. The engraving portrays Cavendish sitting at a desk, with the verse inscribed beneath: “Studious She is all Alone... Her Library on which She looks / It is her Head her Thoughts her Books.”¹¹⁴ She dared to dedicate the book to the “two universities,” in the expressed hope that they might reach out to encourage those confined “like Birds in Cages, to Hop up and down in Houses,” for otherwise “in time we should grow irrational as idiots.”¹¹⁵ In 1666, she

¹¹² Cited *ibid.*, 45. The membership of the Royal Society generally favored Londoners over men working in the new sciences elsewhere. John Wilkins and Seth Ward on Hobbes’ critique of the universities: “He may better assert, that there are Universities in the *Moone*, and that they maintaine all those Positions, then impose them upon us. *There* it will be hard to prove the contrary, We *now* challenge him to make proofe of what he hath delivered, and Promise to give him satisfaction”; *Vindiciae academiæ containing, some brieffe animadversions upon Mr Websters book, stiled, The examination of academies* (London: Leonard Lichfield, 1654), 60.

¹¹³ Margaret Cavendish: “I had neither Learning nor Art to set for these Conceptions... But I can assure you Noble Readers, I was very Studious... for all that time my Brain was like an University, Senate, or Council-Chamber, wherein all my Conceptions, Imaginations, Observations, Wit, and Judgment did meet to Dispute”; “An Epistle to the Reader,” in *Philosophical and Physical Opinions* (London: William Wilson, 1663), unpag. Ray reports that Cavendish was “associated with the Newcastle Circle society” and “was part of a network of scientists and philosophers that included William and Charles Cavendish, Thomas Hobbes and Descartes”; *Daughters of Alchemy*, 159.

¹¹⁴ Marchioness of Newcastle [Margaret Cavendish], *Philosophical and Physical Opinions* (London: William Wilson, 1663).

¹¹⁵ *Ibid.* Cavendish’s “dedication” to the universities: “We are shut out of all power, and Authority by reason we are never employed either in civil nor marshall affaires, our counsels are despised, and laught at,

published *Observations upon Experimental Philosophy*, in which she criticizes how “our age [is] more for deluding experiments than rational arguments, which some call a ‘tedious babble.’”¹¹⁶ In 1667, Cavendish made a request to visit the Royal Society, which was granted after some debate among the members. At Gresham College, Boyle demonstrated for her that air possessed weight and acids dissolved flesh (Samuel Pepys disparagingly noting in his diary that “her dress so antick, and her deportment so ordinary that I do not like her at all”).¹¹⁷ Although she expressed her appreciation at the time, she declined to support the Royal Society in her capacity as the Duchess of Newcastle, when she was approached the following year with such a request.¹¹⁸

The Royal Society of London for Improving Natural Knowledge may have been decidedly clubbish in managing its exclusive membership. Through its publications, on the other hand, it demonstrated a more expansive spirit, fostering greater if still limited access to this learning, while struggling to get the sponsorship financially right. The concept of such an association also proved a popular and portable model for those with an interest in learning in its more communal aspects. In 1722, John Macky, in his breezy travelogue, *A Journey Through England*, wrote of his London encounter with “an Infinity of CLUBS or SOCIETIES, for the Improvement of Learning and keeping up good Humour and Mirth.”¹¹⁹

the best of our actions are troden down with scorn, by the over-weaning conceit men have of themselves and through a dispisement of us”; *ibid.*

¹¹⁶ Margaret Cavendish, *Observations upon Experimental Philosophy*, ed. Eileen O'Neill (Cambridge: Cambridge University Press, 2001), 196.

¹¹⁷ Samuel Pepys, “29th May, 1667,” in *Diary and Correspondence of Samuel Pepys, F.R.S.*, ed. J. Smith, vol. 3 (Philadelphia: J. B. Lippincott, 1855), 139. Gerald Dennis Meyer, *The Scientific Lady in England 1650-1760: An Account of Her Rise, with Emphasis on the Major Roles of the Telescope and Microscope* (Berkeley: University of California Press, 1955), 10-11. Women were not admitted until 1945.

¹¹⁸ Hunter, *Establishing the New Science*, 167-68.

¹¹⁹ John Macky, *A Journey through England in Familiar Letters*, 2nd ed. (London: J. Hooke, 1722), 287. Steven Shapin writes of the spread later in the eighteenth century: “The ‘lit and phils’ [literary and

The earlier Italian humanist academies were gatherings of professors, monks, clergy, professionals, merchants, and nobility, men and women (although not in all academies) of a certain class who came together to share books, prepare papers, and take on projects often involving the new invention of print. This combination of academy and print brought learning and its books into the marketplace, subject to subsidies, subscriptions, and privileges that continued to set learning apart, within its own economy and incorporated structure. For the Accademia della Crusca, this involved using humanist traditions to set a literary and learned standard for the Italian language. The Accademia dei Lyncei helped move heaven and earth in advancing Galileo's work and recovering that of Hernández. The Royal Society of London used book and journal to advance the intellectual properties of learning, if in more of an epistemological than an economic sense.

The intellectual autonomy achieved by the academies through print was no less fragile than their economic status. The church could be both academy patron, as exemplified by Cardinal Bessarion's humanist printing program, and avenging prosecutor through the offices of the Inquisition. The state may have chartered the academies, as well as granting them printing privileges in an era of censorship. Yet the state also required degrees of deference to its own mission. All told, the academies proved able defenders of learning's distinctive intellectual properties. They complemented and challenged the universities, proving a source of much original work in humanism and the

philosophical societies] of the Midlands and North of England represented serious attempts at middle-class cultural self-expression, bringing together enlightened medical men, dissenting divines, and a locally elite audience of culturally adventurous manufacturers and tradesmen"; "Property, Patronage, and the Politics of Science: The Founding of the Royal Society of Edinburgh," *British Journal for the History of Science* 7, no. 1 (1974), 3. The Royal Society of Edinburgh for the Advancement of Learning and Useful Knowledge was founded in 1783. Peter Clark points to how British this may all be: "Clubs and societies became one of the most distinctive social and cultural institutions of Georgian Britain"; *British Clubs and Societies 1580-1800: The Origins of an Associational World* (Oxford: Oxford University Press, 2000), 2.

experimental sciences, while building a broader engagement with the public, commerce, and the authorities.

The academies did much to promote learning's long-standing intellectual properties within the new marketplace of printers and booksellers. The values of commerce often conflicted with the learned properties of autonomy, access, and communality. Yet the learned were a reliable source and market for books; they were given to promoting their value and encouraging others in assembling private and public libraries. During this period, the universities were also swept up in the political impact and learned potential of print. In the next chapter, I step back historically to the havoc that the Reformation wreaked on learning, for all its liberation of the soul, before turning to the century-long struggle of the English universities to find their place in the print market.