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Accounting for Invention: Guido Pancirolli's Lost and Found Things and the Development of Desiderata

Vera Keller

LEGAL HUMANISM AND THE RE-ORGANIZATION OF KNOWLEDGE

The Paduan law professor Guido Pancirolli's *Two Books of Things Lost and Things Found* (1599 and 1602) shaped the development of the research agenda in the early seventeenth century. Pancirolli described a comparison of things lost (*deperdita*) and newly found (*nova reperta*) as a way to reckon the advantages of an age, just as merchants compute credits and debits. Drawing on Pancirolli, both Francis Bacon, Lord High Chancellor of England, and Jakob Bornitz, an advocate of the imperial treasury under Emperors Rudolf II and Matthias, formulated a third category of objects desired for the future. By publishing lists of lost and desired things, Bacon and Bornitz delineated public research objectives for the collaborative accumulation of beneficial knowledge. The histories of individual *desiderata*, such as universal language, immortality, and longitude, have been written, yet no study has traced the development of the idea of a collaborative research agenda, or the *desiderata* list, itself.¹

¹ Robert Stillman, *The New Philosophy and Universal Languages in Seventeenth-century England: Bacon, Hobbes, and Wilkins* (Lewisburg, Penn.: Bucknell University Press, 1995); and David Boyd Haycock, "Living Forever in Early Modern Europe: Sir Francis Bacon and the Project for Immortality," in *The Age of Projects*, ed. Maximillian E. Novak (Toronto: University of Toronto Press, 2008), 166–84. Another genre of list also used to

Pancirolli's comparative survey of things known in past and present times revealed what was now found wanting and thus to be pursued. Historians recently have drawn attention to the study of ignorance through coining a new term, "agnotology." In early modern Europe, Pancirolli's lists of things similarly brought attention to lost knowledge and to the effects such loss had upon society. His lists of things drew from the global trade of both ancient and new worlds and suggested ways polities might profit from the recovery and discovery of knowledge. The importance of his category of lost things (*deperdita*) to the development of *desiderata* thus links the Renaissance restoration of the ancient world with the seventeenth-century advancement of learning. However, the political instrumentalization and re-organization of the search for *deperdita* also point to definitive change. In particular, the legal background of Pancirolli's inventory and its reception supports Barbara Shapiro's thesis about the importance of legal thinking in re-organizing the time-frame and social arrangements of research.

Studying the shared methods, ideas, and research objectives of Pancirolli, Bacon, and Bornitz demonstrates Shapiro's thesis at work on an international stage, rather than the peculiarly English "culture of fact" studied by Shapiro. As Shapiro described, in seventeenth-century English a "matter of fact" did not mean, as it does today, something already proven. It denoted an account of a deed within a pragmatic context which could not suffer either absolute proof or utter skepticism. The fact permitted a certain amount of doubt about the motivations and interests of human witnesses. It thus differed from two period philosophical reactions to doubt—skepticism on the one hand or the laying of certain new foundations on the other. Applying techniques developed for the human world of

direct investigation—the query list—has received much attention, particularly in relationship to methodical travel. See *inter alia* Justin Stagl, A History of Curiosity: The Theory of Travel, 1500–1800 (Chur, Switzerland: Harwood Academic Publishers, 1995); and Joan-Pau Rubiés, "Instructions for Travellers: Teaching the Eye to See," History and Anthropology 9 (1996): 139–90.

² Robert N. Proctor and Londa Schiebinger, *Agnotology: The Making and Unmaking of Ignorance* (Stanford: Stanford University Press, 2008).

³ L. Jonathan Cohen, "Some Historical Remarks on the Baconian Conception of Probability," *Journal of the History of Ideas* 41 (1980): 219–31, Barbara J. Shapiro, *Probability and Certainty in Seventeenth-century England: A Study of the Relationships Between Natural Science*, *Religion*, *History*, *Law*, *and Literature* (Princeton: Princeton University Press, 1983) and *A Culture of Fact: England*, 1550–1720 (Ithaca: Cornell University Press, 2000).

⁴ Shapiro, A Culture of Fact, 65.

⁵ This attitude can be compared to Jean Bodin. See Ann Blair, *The Theater of Nature: Jean Bodin and Renaissance Science* (Princeton: Princeton University Press, 1997).

deeds or facts to the natural world, as Bacon did, allowed for the interim acceptance of probable evidence in lieu of immediate scientific proof, while directing research forward towards the gradual accumulation of further evidence.⁶

While we may think today of "bare facts" as objective, the early modern fact was subjective. Lorraine Daston and Peter Galison have argued that objectivity has a history as a scientific virtue with roots in nineteenth-century conceptions of human nature. Seventeenth-century views of human nature entailed different attitudes towards reportage about nature, and thus a different conception of the fact. Rather than attempting to remove human nature from knowledge making, politically astute seventeenth-century writers such as Francis Bacon and Jakob Bornitz sought to study human nature and employ it in plans for collaborative research.

In addition to sharing a legal culture of fact, Bacon and Bornitz sharp-ened their studies of human nature through the latest social knowledge of the time, such as the new reason of state. The reason of state stressed both suspect human behaviors, such as dissimulation and utilitarian motivations, as well as ways to employ and profit from baser human passions. Drawing on Pancirolli's accounting for invention, informed by legal probabilism, and honed through political studies, Bacon and Bornitz devised a means to connect collaborative research to shared desires through the epistemic wish list.

THE ORIGINS OF PANCIROLLI'S TWO BOOKS

A celebrated professor of law, Guido Pancirolli (1523–99) is best known today for his posthumously published *Two Books of Memorable Things*.

⁶ Shapiro, A Culture of Fact, 26 and 106. Mary Poovey, A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society (Chicago: University of Chicago Press, 1998), 86, 107, and 111.

⁷ Lorraine Daston and Peter Galison, Objectivity (New York: Zone Books, 2007).

⁸ For Bacon, see Daston and Gallison, Objectivity, 32-33.

⁹ Brendan Dooley, *The Social History of Skepticism: Experience and Doubt in Early Modern Culture* (Baltimore: Johns Hopkins University Press, 1999). Friedrich Meinecke initiated a now immense field of research in reason of state in 1924 with *Die Idee der Staatsräson*. For an introduction, see Peter Burke, "Tacitism, Scepticism, and Reason of State," in *The Cambridge History of Political Thought 1450–1700*, ed. J.H. Burns (Cambridge: Cambridge University Press, 1991), 479–98; Michel Senellart, *Machiavélisme et raison d'état* (Paris: Pr. Univ. de France, 1989); and Maurizio Viroli, *From Politics to Reason of State: The Acquisition and Transformation of the Language of Politics*, 1250–1600 (Cambridge: Cambridge University Press, 1992).

His student Heinrich Salmuth received a manuscript of the Italian original in 1596 from Joachim Camerarius the Younger. Salmuth translated it into Latin, added a copious commentary, and had it printed in two volumes in 1599 and 1602 in Frankfurt and Amberg. In those two cities alone, it reappeared at least another seven times by 1660.¹⁰

Pancirolli also wrote a history of his hometown, Emilia-Reggio, and given such historical interests, one might assume that he gathered his lost things from ancient historians. However, while Pancirolli did refer to historical authorities such as Pliny, he also stressed that many of his lost things appeared in ancient legal texts. Salmuth also indicated this legal background for the *Two Books* by including not only an extensive index of the many objects mentioned, but also a legal index of relevant laws. ¹¹ Salmuth's edition also appeared with an epigraph drawn from Joseph Justus Scaliger's 1576 edition of an ancient legal dictionary. ¹² To his readers, Pancirolli enjoyed the reputation of an expert legal humanist, and the *Two Books* emerged from and appeared within the context of legal humanism. ¹³

Such legal humanism also served as a source of counsel for an economically-oriented state-building Duke. It was Emanuele Filiberto (1528–80), the Duke of Savoy, who requested Pancirolli to draw up the *Two Books*. Pancirolli dedicated the work to the Duke's successor, Carlo Emanuele (1562–1630), with whom, he claimed, he often conversed about similar topics. ¹⁴ Carlo Emanuele was also the patron of Giovanni Botero (1544–1617), who argued (against Machiavelli) in his *Reason of State* that the revenue gained through manufacturing, trade and urbanism could offer the state more than military conquest alone could. ¹⁵ Pancirolli too made a

¹⁰ Aldo Bacchi Andreoli, Alcuni studi intorno a Guido Panciroli (Reggio-Emilia: Calderini, 1903). See also John Ferguson, Bibliographical Notes on Histories of Inventions and Books of Secrets (Glasgow: Maclehose, 1896), 10–13; Alfredo Serrai, Storia della bibliografia: Le Enciclopedie rinascimentali (Rome: Bulzoni, 1991), 183–86; and Catherine Atkinson, Inventing Inventors in Renaissance Europe: Polydore Vergils's De Inventoribus Rerum (Tübingen: Mohr Siebeck, 2007), 288–89.

¹¹ Guido Pancirolli, *Rerum memorabilium libri duo* (Amberg: Forster, 1599), following page 752, "Legum Quarundam Sensus Hoc Tractatu Obiter Indicatus."

¹² Sextus Pompeius Festus, *De verborum significatione*, ed. J. J. Scaliger (Paris: Stephan, 1576).

¹³ J. J. Scaliger reputedly called Pancirolli's edition of the *Notitia* "an excellent work." Tannegui Le Febre and Paul Colomiès, *Scaligerana* (Cologne [?]: N.A., 1695), 296, "optimus liber"

¹⁴ Sergio Mamino, "La Grande Galleria come 'Tipocosmo'. Interessi naturalistici e enciclopedismo in Carlo Emanuele I," in *Le Magnificenze del xvii-xviii secolo alla Biblioteca Reale di Torino*, ed. Giovanna Giacobello Bernard and Andreina Griseri (Milan: Biblioteca Reale di Torino, 1999), 47–74; here 53 and 65.

¹⁵ Andreoli, Guido Panciroli, 17 and Martha Pollak, Turin, 1564-1680: Urban Design,

case for the importance of his own legal humanism for the state. He dedicated his edition of the ancient *Notitia* (which recounted many details of both Roman and Byzantine imperial administration) to the Duke. As Pancirolli informed his patron in that work, ancient prudence lay no less in the *Notitia* (the "breviarium" or "ratiocinarium" of the Empire) than in military might. The ancient accounts noted down political information so carefully that none of it could be lost ("eo ordine ac diligentia descripta conservabantur, ut nihil inde posset deperire").¹⁶

Pancirolli brought this ancient idea of a preservative account to his Two Books. The comparison between lost and found would allow the Duke, "by Plutarch's Example," to "draw a Parallel and make a Comparison between the Latter and the Former, and consider with Yourself, whether is the greater, our Gain or our Loss; just as Merchants compute their Receipts on one Page, and their Disbursements on the other, that by balancing their Accompts, they may know their Condition whether they gain or lose."¹⁷ At the same time as developing this politically utilitarian view of shifting knowledge, Pancirolli continued within his preface to frame the mutability of human affairs in vanitas terms. Contemplating the mutable state of human knowledge should "inspire us" "with Meditations on the End of this present Life, and with vigorous Breathings after the Eternity of a Future."18 Pancirolli's lost and found things did indeed inspire such meditations in some readers. As Robert Burton wrote in his Anatomy of Melancholy, citing Pancirolli's preface, "Many good things are lost, which our predecessors made use of, as Pancirola will better enforme you; many new things are daily invented, to the publike good, so kingdomes, men, and knowledge ebbe and flow, are hid and revealed, and when you have all done, as the Preacher concluded, Nihil est sub sole novum."19

Pancirolli's Janus-faced *Two Books* looked to both the ancients and the moderns, and both to profit and piety. While B. C. Southgate has interpreted the seventeenth-century trope of "forgotten and lost" knowledge as a contrast between a lost, religious view, and a new-found, secular science,

Military Culture, and the Creation of the Absolutist Capital (Chicago: University of Chicago Press, 1991), 39.

¹⁶ Guido Pancirolli, *Notitia utraque dignitatum cum orientis*, *tum occidentis* (Venice: Franchesci, 1593), preface.

¹⁷ Translation from Pancirolli, *The History of Many Memorable Things lost* (London: John Nicholson, 1715), A3v.

¹⁸ Ibid., A4r.

¹⁹ Robert Burton, *The Anatomy of Melancholy*, fifth ed. (Oxford: Henry Cripps, 1638), 258.

deperdita were not antithetical to, but rather a part of a program for the advancement of knowledge. Southgate cited John Donne's comment in a 1628 sermon that "if new things be found out, as many, and as good, that were known before us, are forgotten and lost." However, Donne, who often drew on Pancirolli's *Two Books*, did not intend to contrast divine and secular knowledge. In fact, he continued to connect lost "natural," "moral" and "civil things" to lost divine wisdom. Likewise, Peter Harrison has shown that the restoration of divine wisdom served as a central trope for Bacon, and Bornitz also listed sacred knowledge among the lost items awaiting restoration.²²

Despite the pious sentiment expressed in his preface, however, Pancirolli drew upon ancient Roman law rather than biblical sources for his list of lost objects. The *Two Books* owed a substantial debt to Pancirolli's legal dictionary, printed posthumously in 1610. Pancirolli's *Thesaurus* represented an attempt to take stock of the ancient world via the miscellaneous objects referred to in Roman law. It contained "a congeries of such diverse information that it seems like a junk shop." Those objects which could not be matched with any entity currently existing in Pancirolli's world found a place on his list of lost things in the *Two Books*. Just as Giovanni Tortelli composed the "earliest catalogue of 'modern' inventions" within a discussion of neologisms in a 1450's lexicon, Pancirolli noted lost objects within a dictionary of ancient terms.²⁴

In particular, Pancirolli's explanation of terms from Roman tax law in the *Thesaurus* produced a very long list of lost taxable objects, especially naturalia from the Indian ocean region. These included Cinnamom, folium Barbaricum, Costum, Nardum, Cassia, Amomum, Malabathrum, Aroma Indicum, Laser, ferrum Indicum, various precious stones, opus byssicum,

²⁰ B. C. Southgate, "'Forgotten and Lost': Some Reactions to Autonomous Science in the Seventeenth Century," *Journal of the History of Ideas* 50 (1989): 249–68; here 249.

²¹ Theodore Redpath, *The Songs and Sonnets of John Donne* (Cambridge, Mass.: Harvard University Press, [1956] 2009), 340. Donne satirized Pancirolli in his fictive catalog, the *Courtier's Library*, and Pancirolli was often a source for Donne. Richard N. Ringler, "Donne's Specular Stone," *The Modern Language Review 60* (1965): 333–39; here 334; and Don Cameron Allen, "Donne and the Bezoar," *Modern Language Notes 56* (1941): 609–11; here 611.

²² Peter Harrison, *The Fall of Man and the Foundations of Science* (Cambridge: Cambridge University Press, 2007); and Jakob Bornitz, *Tractatus politicus de rerum sufficientia in rep. & civitate procuranda* (Frankfurt: Weiss, 1625), 229.

²³ Andreoli, Guido Panciroli, 44.

²⁴ Alex Keller, "A Renaissance Humanist Looks at New Inventions: The Article Horologium in Giovanni *Tortelli's De orthographia*," *Technology and Culture* 11 (1970): 345–65.

linum vivum, and purple.²⁵ Already in the *Thesaurus*, Pancirolli pointed out that "some of these are not known or seen today."²⁶

He discussed all these objects, all of which could be found in Pliny, again in the *Two Books*. However, while Pancirolli referred to Pliny in his discussions of *cinnamom*, *laser*, and *linum vivum*, he cited Marcianus the Roman jurist for *Costum*, *Amomum*, *Malobathrum*, and *opus Byssicum*, and he referred to both Pliny and Marcianus for *folium Barbaricum* and *ferrum Indicum*. Aelius Marcianus lived over a hundred years after Pliny the Elder. As Salmuth pointed out, while Marcianus noted these plants in his work on taxes (which was excerpted in Justinian's Digest), one could learn more about them from Dioscorides or Pliny.²⁷ Pancirolli could have referred to the older and fuller source, Pliny, for all these commodities, but he preferred to place them within Marcianus's context of ancient tax law.

In addition to such taxable goods, Pancirolli also discussed institutions, practices, and other objects within the *Thesaurus* which would also appear in the *Two Books*.²⁸ Pancirolli continually drew comparisons between such ancient practices and the present. Most suggestively, the *Thesaurus* concluded with a chapter on "the taxes invented after the Roman empire."²⁹ Just as Pancirolli compared ancient and newly invented taxes in his *Thesaurus*, he would balance the ancient taxable Indian *naturalia* among his lost things in the *Two Books* against the entire New World, including its flora, such as sarsaparilla and sassafras. His newly-found things also included other botanicals which were part of long-distance trade, such as sugar and rhubarb.

Despite the potential for profit in such newly-discovered commodities, Pancirolli's sixty-five lost things woefully outweighed his twenty-five new discoveries. Pancirolli's life-long interest in understanding the material world of ancient law explains this preponderance of ancient things. His likely sources for new things were more limited, and included Polydore Vergil's *Inventors of Things* and Julius Caesar Scaliger's *Exoteric Exercises*, a book-length critique of Girolamo Cardano's *On Subtlety*. Scaliger and

²⁵ Guido Pancirolli, *Thesaurus variarum lectionum vtriusque iuris* (Venice: Joannes Guerilius, 1610), 210–15.

²⁶ Ibid., 209, "ex quibus aliqua aut non visuntur, aut non cognoscuntur."

²⁷ Pancirolli, Rerum memorabilium, (1599), 48.

²⁸ Pancirolli, *Thesaurus*, 11–12, "diadem," 29, "de chartis," 34, "de notis," 50, "de specularibus," 54–62, "de ludis," 63, "de basilica," and "de domibus & insulis," 66–67, "de balneis et nymphaeis," 67–68, "porticis," 182, "legatis," 196, "testudinibus," 200, "myrrh," 276, "nomenclatorum schola," and 277, "thermae."

²⁹ Ibid., 379.

Cardano discussed many objects Pancirolli listed, and Pancirolli at points resonates with Scaliger.³⁰ For instance, Scaliger apologized that his discussion of ancient fish sauce and modern caviar was a digression "unworthy of a philosopher"; likewise, Pancirolli apologized for discussing the newfound caviar, a matter seemingly unworthy of ducal attention, yet necessary in order to balance the lost ancient fish sauce.³¹ Salmuth referred to Scaliger and Cardano among other sources.³²

Pancirolli also drew upon his own material experience. Sergio Mamino has argued that the ducal collections in Turin encouraged a comparison between the "conquests of the ancients and the invention of the moderns" expressed in Pancirolli's works. Pancirolli himself cited objects from the duke's galleries at Turin and elsewhere, such as the ancient *fibula* he gave to the duke, armaments from the Venetian *Arsenale*, and examples of Chinese printing.³³

The museum and library of one of Pancirolli's students, Lorenzo Pignoria, also offers a glimpse of collecting practices in Pancirolli's Paduan orbit.³⁴ According to one account of Pignoria's life, Pignoria was originally interested in natural philosophy, but conversations with his law professors, chiefly Pancirolli, "addicted" him to ancient knowledge.³⁵ Paintings of famous men and women—including Pancirolli—adorned Pignoria's portrait gallery. His collection of vernacular manuscripts included Pancirolli's "inventioni antiche, & moderne," and objects such as ancient fibulae, rings, lamps, sections of clothing dyed with the ancient purple, various writing materials (from papyri to Chinese paper), and botanicals could all be used to illuminate Pancirolli's text.³⁶

³⁰ Julius Caesar Scaliger, *Exotericarum exercitationum libri XV* (Frankfurt: Andreas Wechel, [1557] 1576); and Girolamo Cardano, *De subtilitate libri XXI* (Paris: Jacques Du Puys, 1551).

³¹ J. C. Scaliger, Exotericarvm exercitationvm, 909; and Guido Pancirolli, Rerum memorabilium libri duo (Amberg: Forster, 1602), 714.

³² For example, Pancirolli, Rerum memorabilium (1602), 553.

³³ Mamino, "La Grande Galleria come 'Tipocosmo,'" 65; Pancirolli, *Rerum memorabilium* (1599), 315 and 34–35, and (1602), 579.

³⁴ Giacomo Filippo Tomasini, "De Vita, Bibliotheca et Museo Laurentii Pignorii canonici Tarvisini dissertatio," in Lorenzo Pignoria, *Magnae Deum Matris Idaeae & Attidis Initia* (Amsterdam: Andrea Fris, 1669). See also Giacomo Filippo Tomasini, *Bibliothecæ Patavinae manuscriptæ pvblicae & privati* (Udine: Schirati, 1639), 87. For Pignoria, see F. Zen Benetti, "Per la biografia di Lorenzo Pignoria, erudito padovano," in *Viridarium floridum: Studi di stori Veneta offerti dagli allievi a Paolo Sambin*, ed. Maria Chiara Billanovich, Giorgio Cracco, and Antonio Rigon (Padua: Antenore, 1984), 317–36.

³⁵ Tomasini, "De Vita, Bibliotheca et Museo Laurentii Pignorii," 64.

³⁶ Ibid., 93.

The juxtaposition of these objects with Paduan legal humanism and Savoyard state-building sheds light on the material turn in the idea of invention found in Pancirolli's account. His emphasis on the existence or non-existence of a material object, especially a profitable one, lends a different flavor to invention than that found in Polydore Vergil. Vergil examined the cultural foundations of the world he inhabited, and he located them largely in the deep past. During the seventeenth century, the history of invention shifted towards largely material, utilitarian, and often mechanical, objects.³⁷ Although Pancirolli still included institutions, *naturalia* and a whole continent (the New World) alongside fabricated objects in his list of discovered things, his attention to objects and their profitability played a role in the shifting meaning of invention.

DOUBT AND METHOD IN THE TWO BOOKS

The material culture of Paduan, Venetian, and Savoyard collections just described might seem to affirm the importance of eye-witness observers to objective facts in the recovery of Pancirolli's lost things. However, an abyss of time yawned between the ancient words Pancirolli cited and modern experience. An object found abroad, such as inflammable linen, might engender a discussion (as it would in the Royal Society) of whether it did or did not fulfill Pancirolli's category of "asbestos." Many questions and doubts could arise in attempting to match such an object to one of Pancirolli's words. Did asbestos ever exist in the first place? Was it ever truly lost? And was this an example of it or an entirely new thing?

Pancirolli provided no method for answering such questions. Although loosely divided between natural and artificial objects, the *Two Books* seemed, like Pancirolli's *Thesaurus*, a contingent assortment which might easily be questioned or arranged differently. This was in sharp distinction to both Scaliger and Cardano, who placed their works within an allencompassing system moving through a scale of creation. Scaliger attacked Cardano on epistemological grounds and in particular, the philosophical acceptability of categories such as Cardano's "subtlety." ³⁹ By contrast,

³⁷ Atkinson, *Inventing Inventors in Renaissance Europe*.

³⁸ Daniel Carey, "Compiling Nature's History: Travellers and Travel Narratives in the Early Royal Society," *Annals of Science* 54 (1997): 269–92; here 276–77.

³⁹ Ian Maclean, "The Interpretation of Natural Signs: Cardano's *De subtilitate* versus Scaliger's *Exercitationes*," in *Occult and Scientific Mentalities in the Renaissance*, ed. Brian Vickers (Cambridge: Cambridge University Press, 1984), 231–52.

Pancirolli deracinated many of the same particulars discussed by Scaliger and Cardano from any physical framework. Nor did he propose his lists as either definitive or certain. He declared in his preface that he expected others to continue his work, and he doubted some objects he listed. For example, a sea creature, the *testudo*, appeared lost, unless the East-India travellers who claimed to have seen it can be believed, he said.⁴⁰ His student Salmuth also questioned Pancirolli's views about the loss of *asbestos*, the inventor of bells, and the quadrature of the circle. However, Salmuth displayed the legal, wait-and-see attitude, by claiming to be someone who did not defend his opinions obstinately and who was always open to persuasion through additional evidence.⁴¹

Pancirolli and Salmuth presented their work as doubtful and awaiting completion by others. What was placed on the list was not determined by system or by theory, but by its pragmatic potential to improve the felicity of the age. Drawing up such a list specified objects to be further questioned, discussed, or possibly re-discovered. Indeed, the very doubtfulness of certain objects would encourage a discussion rife with possible future benefits.

Such a chaotic repository awaiting a future re-ordering had a model in the waste-books of merchants, as Salmuth commented. Within waste-books, a tumult of particulars could be collected immediately, lest they be forgotten. Later "exact and permanent" tables might be drawn up out of the chaos.⁴² Pancirolli's comparative tables were like such unfinished works, awaiting further improvement, but which, in the meantime, brought attention to objects in order to prevent their loss. Salmuth's discussion of note-taking techniques fits within a tradition of information-management in which preventing loss was an "obsession."

The mixture of Savoyard reason of state and Paduan legal humanism found in Pancirolli's orbit shaped his accounting of inventions. The *Two Books* might not have found the same form had Pancirolli drawn his list of lost things from the historical study of Pliny alone or through the delineation of a philosophical system. Other texts, including the earlier works of Cardano and Scaliger, but also Claude de Saumaise's later *Plinian Exercises* included many of the same lost and found objects.⁴⁴ However, Cardano,

⁴⁰ Pancirolli, Rerum memorabilium (1599), 481.

⁴¹ Pancirolli, *Rerum memorabilium* (1602), 373, and 664. Thomas Browne pointed out Salmuth and Pancirolli's disagreement over asbestos. *Pseudodoxia epidemica* (London: Dod, 1646), 140.

⁴² Pancirolli, Rerum memorabilium (1599), 5.

⁴³ Ann M. Blair, *Too Much to Know: Managing Scholarly Information before the Modern Age* (New Haven: Yale University Press, 2010), 13.

⁴⁴ Claude de Saumaise, Plinianae exercitationes in Gaii Iulii Solini polyhistora (Paris:

Scaliger, and Saumaise did not organize these objects into such easily manipulable and calculable categories. As important as the works of Cardano, Scaliger, and Saumaise were, they did not become synonymous with the inventorying and manipulation of human things over time, and Pancirolli's *Two Books* did.

Pancirolli's *Two Books* spread rapidly through Europe. ⁴⁵ The Lutheran Salmuth's translation of the *Two Books* was placed on the Index, but expurgated copies were permitted. Furthermore, Flavio Gualteri retrotranslated Salmuth's Latin back to Italian in 1612. ⁴⁶ After translating the work, Gualteri also claimed to have located Pancirolli's Italian original, which served as the basis for Pierre de la Noue's French translation in 1617. ⁴⁷ Henry Peacham composed his 1638 *Valley of Varietie* as a partial translation of Pancirolli's *Two Books* (which also informed a variety of other English polyhistoric works, although a complete English translation did not appear until 1715). ⁴⁸ Pancirolli was very popular at Padua among both German and English students. This to some extent explains his rapid dissemination to England and German-speaking lands, and particularly to lawyers, including Bacon and Bornitz, who by 1608 at the latest had not only read Pancirolli, but used his categories in re-organizing knowledge. ⁴⁹

BACON'S COUPLING OF TIMES

Pancirolli instrumentalized chaos. By separating useful particulars from natural philosophy and attendant questions of epistemology and causality, he incorporated them into a world of human-made facts, cultural change over time, and legal probabilism. Bacon wove Pancirolli's things back into a philosophical system, yet he retained the utility of mixture, probabilism, and the incomplete.

Drouart, 1629), 401e, "amomum," 998, "asbestum linum," 1072c, "Malabathrum," 1302, "cassia," 1303, "cinammom," 1334, "bdellius," and 11463, "purpura tinctura."

⁴⁵ E.g. Bartholomäus Keckermann, *De natura et proprietatibus historiae commentarius* (Antonius: Hanau, 1610), 120.

⁴⁶ Raccolta breve d'alcune cose segnalate ch'ebbero gli antichi e d'alcune altre trovate da moderni (Venice: Giunti, 1612).

⁴⁷ Andreoli gives 1608 as the date of the French translation, but I cannot locate a copy earlier than 1617.

⁴⁸ Burton has been mentioned. See also Francis Kynaston, Bodleian MS. Add. C. 287, pp. 169 and 473.

⁴⁹ Jonathan Woolfson, *Padua and the Tudors: English Students in Italy, 1485–1603* (Toronto: University of Toronto Press, 1998), 47 and 49–50 and Andreoli, *Guido Panciroli*, 78–81.

Bacon rarely cited his sources and did not mention Pancirolli's name until 1608. Several earlier sources, however, appeared to draw on Pancirolli's accounting for invention. In *The Masculine Birth of Time* (ca. 1602), Bacon recognized that ancient fragments ought to be collected, but these should be the remains of ancient inventions, rather than manuscripts.⁵⁰ In order to demonstrate how the present looks both backward and forward, Bacon suggested collecting tables of both ancient and modern inventions. Unlike those who sought ancient manuscript fragments, investigating such inventions would allow a "marriage with things themselves," begetting a more heroic mankind.⁵¹

Bacon further elaborated this idea in Of the Interpretation of Nature (1603?). He suggested making a "distribution of sciences, arts, inventions, works, and their portions, according to the use and tribute which they yield and render to the conditions of man's life . . . to chart and tax what may be reasonably exacted or demanded . . . and then upon those charges and taxations to distinguishe and present, as it were in several columns, what is extant and already found, and what is defective and further to be provided." Human nature made an accurate reckoning of man's estate difficult. On the one hand, "after the manner of slothful and faulty officers and accomptants it will be returned (by way of excuse) that no such are to be had," yet on the other, "it will be as fit to check and control the vain and void assignations and gifts whereby certain ignorant, extravagant and abusing witts have pretended to indue the state of man with wonders."52 Julie Solomon has argued that Bacon's mercantile metaphor contributed to a distancing of the self in the pursuit of objectivity.⁵³ Yet rather than disciplining a single dispassionate self, Bacon here brought together different sorts of flawed men, one too credulous or boastful and the other too skeptical or lazy, in order to reach an approximate human inventory.

In his Commentarius Solutus (1608), a "Marchant's wast booke,"

⁵⁰ Francis Bacon, "Temporis Partus Masculus," in *The Works of Francis Bacon*, ed. James Spedding (London: Longmans et al., 1887), 3:535. "Verumtamen ut perspicere possis, quam res praesentes bifrontes vates sint, quamque et futuras et praeteritas coram sistant, decrevi antiquitatis fragmentum unum aut alterum (inventorum dico non librorum) agnosco . . . decrevi utriusque temporis tabulis (quae non tantum scientiae decursus et fluxus, sed et alios rerum provisus complectantur) tibi gratificari." 558. ". . . legitimum connubium cum rebus ipsis firmabo."

⁵¹ Rob Iliffe, "The Masculine Birth of Time: Temporal Frameworks of Early Modern Natural Philosophy," *British Journal for History of Science* 33 (2000): 427–53; 443.

⁵² Francis Bacon, "Valerius Terminus," in *The Works*, 3: 234.

⁵³ Julie Solomon, *Objectivity in the Making: Francis Bacon and the Politics of Inquiry* (Baltimore: Johns Hopkins University Press, 1998), 107.

which has been compared to Bacon's praise for collections of ancient political *notitia*, Bacon mentioned Pancirolli at last.⁵⁴ In a blend of plans for personal preferment and the public advancement of learning, Bacon noted down several titles to be written, including a "History of Marvailes, Historia naturae errantis or variantis, to be compiled with Judgment and without credulity and all the popular errors detected," by drawing on, among others, "Pancarolus, de reb. memorabilibus."⁵⁵

As would later critics, Bacon suggested cleansing Pancirolli's account from credulity and error. ⁵⁶ Nevertheless, the institution in which he envisioned this re-writing taking place stressed the role of human nature in the advancement of knowledge. In his *Commentarius Solutus* he proposed a "college for Inventors" with "2 Galeries wth statuas for Inventors past and spaces or Bases for Inventors to come." Through a clever deployment of blank space and missing objects, inventors might be tempted to compete with the past, allowing individual ambition to motivate collective advancement.

The bifurcation found in Bacon's tables of time and in his parallel galleries of past and future inventions also appeared in his *Twoo Bookes of the proficience and advancement of Learning, divine and humane* of 1605. One volume defended learning against "discredites and disgraces," while the other accused current learning by specifying its "deficients" (or "desiderata" according to the supervised Latin 1623 translation and expansion of the *Advancement*). 57 Within one such deficient—natural magic—Bacon further developed the ways that human nature might be drawn upon in the designation of research objectives. In so doing, he emphasized the application of political tools designed for the study of humans to the study of the

⁵⁴ Francis Bacon, "Book of Private Memoranda" (1608), in *The Works of Francis Bacon*, ed. James Spedding (London: Longmans, et. al., 1868), 11: 62; Richard Yeo, "Between Memory and Paperbooks: Baconianism and Natural History in Seventeenth-Century England," *History of Science* 45 (2007): 1–46; here 10. See also Francis Bacon, *Of the Advancement and Proficience of Learning* (Oxford: Lichfield, 1640), 230, "Pancirollus, par. 2" cited as the source for Bacon's account of invention.

⁵⁵ Bacon, "Book of Private Memoranda" ([1608], 1868), 66; Anthony Grafton, "Renaissance Histories of Art and Nature," in *The Artificial and the Natural*, ed. Bernadette Bensaude-Vincent and William R. Newman (Cambridge, Mass.: MIT Press, 2007), 185–210; 190.

⁵⁶ Michael Watson, *Theatrum variarum rerum* (Bremen: Cöler and Wessel, 1663), Charles Perrault, *Paralèlle des anciens et des modernes* (Paris: Jean Baptiste Coignard, 1692), 79–84; and Olaus Borrichius, "De deperditis," *Dissertationes, seu Orationes academicae* (Copenhagen: Paul and Martin, 1715).

⁵⁷ Francis Bacon, Twoo Bookes of the proficience and advancement of Learning, divine and humane (London: Henrie Tomes, 1605), 1: 4.

natural world through a category of knowledge he called "natural prudence," in an explicit comparison with civil prudence.⁵⁸

Just as politics could be divided between science and prudence, he wrote, natural knowledge was divided between the speculative and the operative. Natural prudence, like civil prudence, was a practical art directing action to certain ends, but each part of natural prudence also related upwards towards speculative natural philosophy. Bacon divided natural prudence into experimental, philosophical (confusingly enough, given that this was a section of prudence rather than philosophy), and magical parts. These corresponded, respectively, to three parts of speculative knowledge: natural history, physics, and metaphysics. Only the latter, metaphysics and its operative correlative, magic, could lead to Bacon's ultimate goal of the discovery of forms and thus "radicall and fundamental alterations" in natural knowledge. Not even philosophical mechanics (mechanics' highest form) could offer any more than mere "coastings along the shoare." 159

Thus, of any operative form of natural knowledge, magic offered the greatest epistemic potential. It also was afflicted with the most errors, doubts and fictions. Just as Ixion's mistaken copulation with a cloud rather than with Juno generated chimaeras, so too did the "high and vaporous imaginations" of magic "beget Beliefes and hopes of strange and impossible shapes." To both encourage mankind to pursue the potentially rich epistemic payload of magic, and yet to limit man's tendency towards credulity, Bacon turned again to the idea of a balanced inventory. The desire for seeming impossibility would encourage pursuit, yet such impossibilities might be coupled with the closest existing objects—Juno, rather than a cloud, as it were—in order to prevent "vaporous imaginations."

A "Kalender resembling an Inuentorie of the estate of man" would contain "all the inuentions, (being the works or fruits of Nature or Art) which are now extant, and whereof man is alreadie possessed, out of which doth naturally result a Note, what things are yet held impossible, or not inuented." In 1605, this inventory did not include lost objects, but in 1623

⁵⁸ Cf. Markku Peltonen's "Politics and Science: Francis Bacon and the True Greatness of States," *Historical Journal* 35 (1992): 279–305. On politics, passions and natural philosophy in Bacon, see Guido Giglioni, "Mastering the Appetites of Matter. Francis Bacon's *Sylva Sylvarum*," in *The Body as Object and Instrument of Knowledge: Embodied Empiricism in Early Modern Science*, ed. C. T. Wolfe and O. Gal (Dordrecht: Springer, 2010), 149–67.

⁵⁹ Bacon, Twoo Bookes (1605), 2: 24.

⁶⁰ Ibid., 2: 33.

⁶¹ Ibid., 2: 32.

Bacon added the lost things, that is, "such inventions, as is manifest have bin in times past celebrated, but are now perisht." Two other balanced lists would both motivate and limit investigation. Every "reputed impossibilitie" would be listed alongside "what thing is extant, which commeth the nearest in degree to that *Impossibilitie*; to the ende, that by these *Optatiues* and *Potentialls*, Mans enquirie may bee the more awake in deducing direction of works from the speculation of causes."

These columns represent a slight shift from the inventory Bacon had described in *The Interpretation of Nature*. There Bacon had mixed together operative and speculative works. In the *Advancement*, Bacon distinguished the two as different types and stages of knowledge. The *optativa* were clearly operative. However, if properly directed, *optativa* might lead man's enquiry upwards towards speculative knowledge. As Bacon said elsewhere, even "in the very work of Interpretation concerning particular subjects I always give a place to a List of things human, or List of Optativa. For to wish intelligently is as much a part of science as to inquire intelligently." ⁶³

In the *History of the Air*, for instance, Bacon included a list of optatives, such as "various motions using the dilation and contraction of air through heat," coupled with those items already in existence which came closest to them. These "approximations" included two devices of the Dutch inventor at the early Stuart court, Cornelis Drebbel (1572–1633), a solar-powered musical instrument and what Bacon called the "imposture of the imitation of the marine tide," otherwise known as Drebbel's perpetual motion. ⁶⁴ Bacon did not accept Drebbel's account of this device as true. That did not prevent him, however from prudently employing this suspect, yet desirable object for the purposes of advancing knowledge.

Indeed, Bacon applied the model of specifying desired objects to all parts of learning. In the Latin translation of the *Advancement*, the "deficients" were catalogued at the end as fifty desirables, the "*Novus Orbis Scientiarum sive Desiderata*." They appeared in the form of titles to not-yet-written book chapters. Catalogs of desired manuscripts were long tools of the humanist recovery of ancient knowledge, and fictive catalogs had become a popular period genre.⁶⁵ This particular list, however, included

⁶² Bacon, Of the Advancement and Proficience of Learning (1640), 171 and Francis Bacon, Opera (London: Haviland, 1623), 176, ". . . adjectis iis, quae olim innotuisse constat, nunc autem perierunt."

⁶³ Francis Bacon, *Novum organum*, ed. Graham Rees and Maria Wakely (Oxford: Clarendon 2004), 418–19.

⁶⁴ Francis Bacon, "Historia densi et rari," (1623), 107.

⁶⁵ Dirk Werle, Copia librorum: Problemgeschichte imaginierter Bibliotheken 1580–1630 (Tübingen: Max Niemeyer, 2007). See e.g. Rodney P. Robinson, "The Inventory of Nic-

the material turn from desired manuscripts to lost inventions Bacon had suggested in *The Masculine Birth of Time*, since one *desideratum* was the "Inventory of Human Things."⁶⁶ Although the majority of Bacon's *desiderata* were epistemic, and not material objects, few others would distinguish between *desiderata* as missing pieces of learning and *optativa* as wished-for things.⁶⁷

JAKOB BORNITZ AND THE ADHUC REPERIENDA

Bacon's inventories could be easily compared to the lists of ancient, newly found and future inventions of Jakob Bornitz. There is no evidence that Bacon and Bornitz knew each other's work. They did, however, share the common influence of Pancirolli's *Two Books*, and they were both positioned professionally, as lawyers and statesmen, to appreciate Pancirolli's work and to extend it in similar directions. Little known in English historiography today, Bornitz offers a telling comparison to Bacon. He was admired by the same Ramist Central European readers who read Bacon—Jan Amos Comenius, Samuel Hartlib, Gottfried Wilhelm Leibniz, and Henry Oldenburg, and his works could be found in several early Stuart libraries.⁶⁸

Bornitz traveled in England, the Netherlands, France, Italy, and Germany, conversed "familiarly" (*familiariter*) with many artisans, and investigated their works. Upon his return home with a law degree, he became an advocate for the court of Saxony, a syndic for the Upper Lusatian town of

colò Niccoli," Classical Philology 16 (1921): 251–55. Such early Renaissance inventories have only been termed "desiderata lists" in retrospect.

⁶⁶ Bacon, "Historia densi et rari," (1623), 491-92.

⁶⁷ E.g. Joachim Morsius, *Nuncius olympicus* ("Philadelphia": 1626), #139. "Magia naturalis intacta veterum philosophorum . . . welcher Schatz die höhesten desiderata gibt/ das ist zu verstehen alles was ihme der Mensche in diesem leben erwünschen mag."

⁶⁸ Samuel Hartlib, *The Hartlib Papers CD*, 2nd ed. (Sheffield, 2002), 1/33/87A, henceforth cited as *Ephemerides*. Noel Malcolm, "The Library of Henry Oldenburg," *Electronic British Library Journal* (2005): Article 7; G. W. Leibniz, *Sämtliche Schriften*, s.1 (Berlin: Akademi Verlag, 1990), 5: 441; Richard deMolen, "The Library of William Camden," *Proceedings of the American Philosophical Society* 128 (1984): 327–409. Bodleian library 4 A 9 Jur.Seld., Bornitz's *Aerarium* (Frankfurt: 1612), was first in Donne's and then in Selden's collection. Geoffrey Keynes, *A Bibliography of Dr. John Donne* (Cambridge: Cambridge University Press, 1958); Kevin Sharpe, *Reading Revolutions: The Politics of Reading in Early Modern England* (New Haven: Yale University Press, 2000), 79; and David McKitterick, *The Library of Sir Thomas Knyvett of Ashwellthorpe, c.* 1539–1618 (Cambridge: Cambridge University Press, 1978).

Zittau in 1604, the advocate of the imperial treasury (*kammerprokurator*) of Upper Lusatia in 1607, and an imperial councilor in Schweidnitz under Emperors Rudolf II, Matthias and Ferdinand.⁶⁹ The post of treasury advocate had been invented by Rudolf II in 1595 in order to wrest more revenue from the recalcitrant merchants of Upper Lusatia for a money-hungry state treasury.⁷⁰

Bornitz's political thought represents a significant step in shifting ethical norms concerning the relation between public and private goods. As Winfried Schulze has stressed, Bornitz preceded Bernard Mandeville in his conception of how the individual pursuit of things could profit the public.⁷¹ As someone whose task it was to invent new taxes and other imperial revenue streams, Bornitz was professionally well placed to find public benefit in increasing the individual consumption of goods.

Bornitz's early formulation of these ideas, On Acquiring Political Prudence (1602), introduced the discourse of reason of state to Germanspeaking lands. Bornitz argued that there were two types of reason of state—the immoral, Machiavellian version exemplified by tyrants such as Nero and Tiberius, and true prudence. The latter depended on knowledge collected through experience, history and methodical travel by a "political artisan (artifex politicus)."72 While Bornitz rejected a certain version of reason of state, he appreciated its ability to deal with changing circumstances. He did not think the state could be governed through idealized political philosophy, universal law, or ancient ethics, due to the continual change within the human condition. "There is a continual growth in nature and human ability, for it appears plainly from Pancirolli's comparison of the inventions of the ancients and moderns that our times far surpass the ancients."73 Such optimism might indicate that Bornitz had only read Pancirolli's first volume (1599) and had yet to realize how few new inventions Pancirolli would oppose to the ancients.

⁶⁹ Michael Stolleis, *Pecunia Nervus Rerum: zur Staatsfinanzierung in der frühen Neuzeit* (Frankfurt: Klostermann, 1983), 131; and Michel Senellart, "La critique allemande de la raison d'état machiavélienne dans la première moitié du XVIIe siècle: Jacob Bornitz," *Corpus: revue de philosophie* 31 (1997): 175–87.

⁷⁰ W. von Boetticher, "Benjamin Leuber, Kammerprokurator und Oberlausitscher Schriftsteller des 17. Jahrhunderts," *Neues Lausitzisches Magazin* 105 (1929): 152–84; Joachim Bahlcke und Volker Dudeck, *Welt—Macht—Geist: das Haus Habsburg und die Oberlausitz* 1526–1635 (Görlitz: Oettel, 2002).

⁷¹ Winfried Schulze, Vom Gemeinnutz zum Eigennutz: Über den Normenwandel in der ständischen Gesellschaft der Frühen Neuzeit (Munich: Historisches Kolleg, 1987), 25.

⁷² Jakob Bornitz, *Discursus politicus de prudentia politica comparanda* (Erfurt: Birnstilius, [1602], 1604), B4v.

⁷³ Ibid., B6v.

Bornitz advised states to follow Pancirolli's advice. In 1610, he suggested they encourage both the recovery of lost and discovery of new inventions. According to Bornitz, Botero claimed in his *Reason of State*, that artisans (or artists, or engineers, "vulgò ingegnieri, Künstler") were essential to the balance of trade. Thus, Bornitz argued, Tiberius acted truly imprudently to murder the inventor of flexible glass whose art has yet to be restored, as Pancirolli described. States should particularly investigate and reward the discovery of doubtful things. Just as printers, gunmakers, and military architects were supported with privileges, those who discover perpetual motion and the quadrature of the circle, and who make *chrysopoeisis* more certain ("certiorem") were also worthy of recognition.⁷⁴ Botero and Pancirolli do not cite each other in their works, and thus it is difficult to establish whether they exchanged ideas in the Savoyard orbit. In this passage, however, Bornitz brought together Botero's economic thought with Pancirolli's account of lost, desirable knowledge.

Bornitz's appreciation for artisans sheds light on the political ideas informing Habsburg patronage. The wonders of art and alchemy at the Rudolfine court were once interpreted as Rudolf's retreat from the practice of politics into arcane and outdated magic. As R. J. W. Evans and Thomas DaCosta Kaufmann have argued, both the aesthetic and inventive interests of the Rudolfine court point instead to the pursuit of a self-consciously cutting-edge "mastery of nature." Bornitz's magnum opus, On the Sufficiency of Things in a Republic (1625), offered a studied political calculation of Rudolfine art which supports this view.

In order to emphasize the importance of material goods to political health, Bornitz played upon a commonplace from Terence which was one of Rudolf II's favorite artistic themes. Rather than "Without Ceres and Bacchus Venus freezes (*Sine Cerere et Baccho friget Venus*)," Bornitz claimed, "Without Ceres and Bacchus society freezes (*Sine Cerere et Baccho friget civitas*)." The prudent statesman, unlike the imprudent Tiberius, supported the continual perfection of natural goods through industry, as exemplified by alchemy and the arts.⁷⁷

⁷⁴ Jakob Bornitz, *De praemiis* (Leipzig: Schurer, 1610), 82–83.

⁷⁵ R. J. W. Evans, Rudolf II and his World: A Study in Intellectual History, 1576–1612 (Oxford: Clarendon Press, 1973); and Thomas DaCosta Kaufmann, The Mastery of Nature: Aspects of Art, Science, and Humanism in the Renaissance (Princeton: Princeton University Press, 1993).

⁷⁶ Bornitz (1625), 227–28; Huigen Leeflang, *Hendrick Goltzius (1558–1617): Drawings*, *Prints and Paintings* (Zwolle: Waanders, 2003), 275.

⁷⁷ Bornitz, *Tractatus politicus*, 58–60.

Bornitz surveyed all the arts through extensive reading, travels, and acquaintance with Rudolfine artists like Rudolf Spranger, Hans von Aachen, and Joseph Heintz.⁷⁸ His survey concluded with three chapters on lost arts, newly invented ones, and finally those hoped for before the end of the world (the *adhuc reperienda*). The *adhuc reperienda* represented a new category of items not found in Pancirolli. These were already reputed to exist but were not sufficiently investigated to be placed within the more secure category of new discoveries. Bornitz included some of the same items Bacon had listed among his *optativa*, namely, the purported perpetual motion and musical instrument of Cornelis Drebbel.⁷⁹ While Pancirolli permitted doubt within his two lists, both Bacon and Bornitz devised a third category in which to isolate doubtful yet desirable objects requiring further investigation.

THE ARTISAN AND THE LAWYERS

The fact that both Bornitz and Bacon wrote about Drebbel's inventions was no accident, as Drebbel worked at both the Stuart and Rudolfine courts. He was a heroic inventor, often credited with recovering lost inventions such as purple (his scarlet dye). Drebbel himself, who otherwise never referred to the ancients, claimed that his perpetual motion fulfilled the lost glass microcosm of Archimedes, which Salmuth had favorably compared to the new-found astronomical automata Pancirolli discussed. The academic alchemist Andreas Libavius, in a dissertation on Drebbel's "new Archimedean sphere," even proposed that Drebbel built it from flexible glass, one of Pancirolli's most sought-after lost objects.

In 1610, Rudolf had invited Drebbel to Prague in order to build his perpetual motion there, but Rudolf died soon after Drebbel arrived.⁸³ Bornitz, in his chapter on the *deperdita*, told how Rudolf planned to rebuild the Archimedean sphere immediately after telling the tale of Tiberius's mur-

⁷⁸ Ibid., 203.

⁷⁹ Bacon, Novum organum, 420.

⁸⁰ Leibniz, Sämtliche Schriften und Briefe, Third Series, ed. Paul Ritter et al. (Berlin: Akademie, 1995), 4: 454.

⁸¹ Cornelis Drebbel, Wonder-vondt van de eeuwighe bewegingh (Alkmaar: Schagen, 1607), B1v. Pancirolli, Rerum memorabilium (1602), 542.

⁸² Andreas Libavius, *Probabilis investigatio caussarum physicarum*, aliarumque globi Archimedaei novi (Coburg: Bertsch, 1612), 30.

⁸³ F. M. Jaeger, Cornelis Drebbel en zijne tijdgenooten (Groningen: Noordhoff, 1922).

der of the inventor of flexible glass.⁸⁴ Often held up as a modern competitor to ancient inventors, Drebbel showed that mankind could compete with the ancients, and Rudolf's patronage of him indicated the ruler's prudent concern for recovering *deperdita*.

Despite heroic individuals, however, either the ruler or the inventor could die, and the inventor's secrets might be lost. Drebbel offered a cautionary tale of an inventor who could fulfill ancient *deperdita* yet who threatened the survival of knowledge through his secrecy and mortality. As Drebbel's exasperated associates the Küfflers informed the French polymath Nicolas-Claude Fabri de Peiresc, Drebbel planned to carry a thousand secrets to his grave. The London intelligencer Samuel Hartlib recorded many tales of the desired objects which faded with the dying inventor's breath. Drebbel "wrote to Dr Kuffler that hee had something in translatione Metallorum which hee would impart vnto him. But before hee could come hee was dead." Ars Volandi was the last Invention in pursuit of which Drebbel dyed." Drebbel was vpon the Invention of bringing the Moone so neare to ones face, as to see things in it. Hee dyed in the pursuit of this Invention." After his death others sought to recover his lost inventions.

Invention needed saving from inventors themselves, argued Bornitz and Bacon. This was not because their low social status made their knowledge automatically suspect, as Shapin and Schaffer might suggest. The actions of an individual of high social status, such as Tiberius, posed perhaps an even greater threat to knowledge. Rather, the value of the inventor's knowledge for society was so great that the state could not afford its loss, and the longevity of knowledge was shorter for an individual (especially a secretive one) than for a collectivity. This was why Bacon moved memory from the individual to a community. And, as Rosalie Colie has described, he incorporated many of Drebbel's inventions into his account of a bureaucratic, long-lived institution, Salomon's House in the *New Atlantis*. Posses-

⁸⁴ Bornitz, Tractatus politicus, 225.

⁸⁵ Carpentras Ms. 1776 fol. 408v. and fol. 411r.

⁸⁶ Hartlib, Ephemerides, 29/5/103A, 1656.

⁸⁷ Ibid., 29/5/74A.

⁸⁸ Ibid., 29/8/12B.

⁸⁹ Gottfried Wilhelm Leibniz, Philosophischer Briefwechsel (Berlin: Akademie Verlag, 2006), 263, "verlohrne inventum Drebelii."

⁹⁰ Steven Shapin and Simon Schaffer, Leviathan and the Air-pump: Hobbes, Boyle, and the Experimental Life (Princeton: Princeton University Press, 1985).

⁹¹ Yeo, "Between Memory and Paperbooks."

⁹² Rosalie Colie, "Cornelis Drebbel and Salomon de Caus: Two Jacobean Models for Salomon's House," *Huntington Library Quarterly* 18 (1954): 245–69.

sions, the *Magnalia Naturae*, which (implicitly) also provided a wish-list for everyone else. Bornitz too recommended collecting craftsmen within corporations more easily overseen by "ministers."⁹³

Within a collectivity of knowledge, even projects only partially fulfilled before an individual's death counted as an "approximation," and such unfinished work could be combined with the fragments of others. Collection thus extended collaboration and longevity, and both extended possibility, argued Bacon. "For I take it, those things are to bee held possible, which may be done by some person, though not by everie one: and which may be done by many, though not by any one: and which may be done in succession of ages, though not within the houre-glasse of one mans life: and which may be done by publique designation, though not by private endeavour."

CONCLUSION: AGNOTOLOGY BEFORE OBJECTIVITY

Although Pancirolli did not use the English phrase "matter of fact" studied by Barbara Shapiro, his *Two Books* encouraged similar attitudes of probabilism and the gradual accumulation of evidence fostered by legal culture. The international reason of state also stressed both the necessity and ability of the political actor to respond to the changing moment. These two intellectual strands encouraged the development of pragmatic techniques for dealing with the mutability and imperfection of human knowledge. The idea of a *desiderata* list provided one powerful new way to advance knowledge, not by suppressing human nature, but by drawing upon it.

Several scholars have connected the mercantile metaphors in the work of Bacon to the idea of an ideally reliable and objective Baconian observer, who sets aside subjectivity in order to document natural particulars in the drily factual manner of merchants.⁹⁵ Despite many interventions including

⁹³ Bornitz, Tractatus politicus, 253.

⁹⁴ Bacon, Twoo Bookes (1605), 2: 7.

⁹⁵ Solomon, Objectivity in the Making, 107; Anke te Heesen, "Accounting for the Natural World: Double-Entry Bookkeeping in the Field," in Colonial Botany: Science, Commerce, and Politics in the early modern World, ed. Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), 237–51; Michelle Burnham, Folded Selves: Colonial New England Writing in the World System (Lebanon, N.H.: University Press of New England, 2007), 30; Deborah E. Harkness, "Accounting for Science: How a Merchant Kept his Books in Elizabethan London," in The Self-Perception of Early Modern Capitalists, ed. Margaret C. Jacob and Catherine Secretan (New York: Palgrave Macmillan, 2008), 205–28; here 214; and Blair, Too Much to Know, 69. Poovey, A History of the Modern Fact, discusses both Bacon and double-entry accounting at length but does not discuss Bacon's metaphor of double-entry accounting.

Shapiro's, Bacon still suffers from the reputation of a collector of facts (in their modern objective sense). Practices of collecting empirical data have been equated with the Scientific Revolution itself, and thus a debate over Bacon's significance has revolved around whether he was an innovator or late-comer to empiricism. Several historians have demonstrated ably that empiricism flourished before Bacon, particularly in relationship to mercantile methods and state formation. Provided the second state formation of the second state formation of the second state formation.

Pancirolli, Bacon and Bornitz, however, were more like the federal tax agents than the merchants of knowledge. They sought a public profit from the desire-driven activities of humankind. They deployed their accounting metaphors not to separate individuals from their human nature, but as a way to reckon with the unavoidably interested and suspect nature of human reporters of knowledge. Pancirolli's early modern agnotology suggested how human nature could precipitate knowledge's loss, but also how shared desires might spur its recovery.

If mechanical objectivity was the scientific virtue of the nineteenth century, then in the seventeenth century, shared interest (which saved and advanced knowledge) was a virtue, while a secretive, private interest (which led to knowledge's loss) was a vice. As Larry Stewart has stressed, new foundations for natural knowledge trumpeted the ethical role of moving knowledge from private and towards a collective or public interest. Bacon's *desiderata* list, like his other politically astute techniques for reorganizing knowledge, proved influential because it formulated the recovery, preservation, and advancement of knowledge as fulfilling the interest of all humankind.

The *desiderata* list allowed a unit of desired knowledge to remain suspended in a state of active research over the long term, past the narrow

⁹⁶ These interventions include Lisa Jardine, Francis Bacon: Discovery and the Art of Discourse (London: Cambridge University Press, 1974); Peter Urbach, Francis Bacon's Philosophy of Science: An Account and a Reappraisal (La Salle, Ill.: Open Court, 1987); Antonio Perez-Ramos, Francis Bacon's Idea of Science and the Maker's Knowledge Tradition (Oxford: Clarendon Press, 1988); and Brian Vickers, "Francis Bacon and the Progress of Knowledge," Journal of the History of Ideas 53 (1992): 495–518.

⁹⁷ As in Erich Ash, *Power, Knowledge, and Expertise in Elizabethan England* (Baltimore: Johns Hopkins University Press, 2004); Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006); and Deborah E. Harkness, *The Jewel House: Elizabethan London and the Scientific Revolution* (New Haven: Yale University Press, 2007).

⁹⁸ Larry Stewart, The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain (Cambridge: Cambridge University Press, 1992); Stillman, The New Philosophy; and J. A. W. Gunn, Politics and the Public Interest in the Seventeenth Century (London: Routledge & Kegan Paul, 1969).

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lifespans, limited abilities, and biases of individuals. This technique stressed both more sustained doubt and a wider horizon of possibility for future knowledge than that suggested by objective empiricism. Bacon and Bornitz did not speculate about where the border between the possible and the impossible lay, and they employed this doubt to encourage inventors to venture *plus ultra*. By looking both to the lost knowledge of the deep past and to the desired discoveries of the future, Bacon and Bornitz sought a means to guide knowledge through a doubtful present.

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