Paper Museums: Collecting and Consumerism in Seventeenth-Century Prose

by

Maria Catharine Zytaruk

A thesis submitted in conformity with the requirements
for the degree of Doctor of Philosophy
Graduate Department of English
University of Toronto

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My thesis investigates the ways in which the impulse to possess the new and the unfamiliar found expression in seventeenth-century prose. Focusing on the critical relationship between the Scientific Revolution and early discourses of consumerism, I trace the connections between empirical forms of inquiry and the emerging taste for novelty. My major authors are Francis Bacon, John Evelyn, Henry Oldenburg, and Robert Hooke. I argue that, in the seventeenth century, the model of the museum was translated into a variety of textual forms, literary and nonliterary; these include herbaria, epistolary networks, periodicals, and natural history writings. Examining the methods by which individuals and institutions ascribe meanings to objects, I situate the works of my authors within the broader contexts of consumerism, material culture, and the history of science. My research illuminates the critical function of seventeenth-century encyclopedic texts in linking collecting with other early modern discourses of control.

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Introduction

In 1977, the two ebony cabinets that the diarist and virtuoso John Evelyn (1620-1706) commissioned on the continent for his collections were sold at auction.[1] One of these cabinets is inset with the nineteen pieces of Florentine mosaic he purchased in 1644.[2] The marble plaques of flowers, animals, and birds that Evelyn described as "like the natural"[3] decorate the outside of the elaborate cabinet. These Edenic scenes, manufactured specially for grand tourists, highlight the microcosmic dimension of the collection. Evelyn's second cabinet is engraved with flowers in the Dutch style; the interior is fitted with drawers veneered in rare tropical woods and ivory.[4] Even with their botanical specimens, medals, glass pieces, and shells long since decayed or dispersed, Evelyn's cabinets vividly testify to a culture of collecting that flourished in the seventeenth century. The material features of these miniature arks help to illuminate a particular moment in history when figures such as Evelyn began to assemble collections of new and curious objects.

The *pietra dura* plaques of Evelyn's first cabinet articulate one of the most popular early modern metaphors for collecting – that of "recreating paradise." What the physical construction of the cabinet reveals, especially its multiple tiny drawers, is an "encyclopedic" approach to knowledge. Collectors believed that they were reuniting the scattered pieces of creation in these chests. The fragments of phenomena that were preserved in these cabinets, I argue, served multiple functions in the seventeenth century:

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[1] See Christies, London, Auction Catalogue, 31 March 1977, lots 31 and 82.
[2] For this purchase, see *The Diary of John Evelyn*, ed. E. S. de Beer, 6 vols. (Oxford: Clarendon, 1955) vol. 2, 191 and 198. All references will be to this edition of the *Diary*. Evelyn's pietra dura cabinet was acquired by the Victoria and Albert Museum, London.
[3] *Diary* 2: 191.
[4] This cabinet is currently in the Geffrye Museum, London.

they were the "particulars" for Baconian natural histories and objects of consumption. The paradisal Florentine mosaics that conceal the actual natural objects contained in the cabinet show the ways in which an interplay between art and nature was achieved at the site of the collection. Mass-produced for inquisitive travellers, the *pietra dura* panels point to the connections between the culture of collecting and the emerging discourses of consumerism. Similarly, the tulips delicately incised upon the surface of Evelyn's second cabinet illustrate the relationship between the desire for novelty in the period and new forms of empirical inquiry. The tropical woods and ivory that were incorporated into the design of this cabinet suggest the ways in which these tiny arks formed part of larger narratives of appropriation and possession. This thesis traces the ways in which some of the visual conventions of such cabinets were translated into various prose forms of the seventeenth century. The impulses to accumulate, recontextualize, and consume objects found expression in a number of works associated with the early Royal Society.

It was probably the publication in the 1980s of two collections of essays, *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe* and *Tradescant's Rarities: Essays on the Foundation of the Ashmolean Museum, 1683*, which introduced increased numbers of scholars to the phenomenon of the cabinet of curiosities, a type of non-specialized collection in early modern Europe. Ferrante Imperato's museum in Naples was one the most celebrated collections of this kind. As the frontispiece to his *Dell'historia naturale* makes evident, visitors to these encyclopedic cabinets were confronted with a startling array of *naturalia* and *artificialia*.[5] Lorraine

[5] Evelyn visited Imperato's museum in 1645 and provides this account: "The repository [was] full of incomparable rarities; amongst the Natural Herbals most remarkable was the Byssus Marina, & Pinna Marina: Male & femal Camelion; an Onacratulus & an extraordinary greate Crocodile: a Salamander; some of the Orcades Anates, held there for strange rarity: The Male & female Manucodiata, the Male

Daston's review-article of the above publications was followed by her work, co-authored with Katherine Park, *Wonders and the Order of Nature 1150-1750*, which investigates the taste for the bizarre and anomalous in the period; these scholars examine such issues as the distinctions in the period between wonder and curiosity and the collapsing of the boundaries of art and nature. Daston and Barbara Shapiro have also provided valuable treatments of the idea of the "fact" in early modern culture, with the former arguing that "prodigies briefly became the prototype for a new kind of scientific fact": the latter demonstrating the ways in which Bacon helped to create the category, with its origins in law, of the "experimental fact." As Shapiro asserts, "'objects,' 'things', or 'specimens' sometimes became so closely associated with the 'matter of fact' that they were occasionally referred to as 'silent witnesses' or testimonies capable of producing a 'fact.'" In 1994, Paula Findlen published her groundbreaking investigation of early museums, *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy*, which situated collecting within the broader social and intellectual contexts of the period. A decade earlier, Susan Stewart had produced a provocative examination of the conceptual frameworks of collecting which looked at the ways in which the collection embodies an erasure of labour and a destruction of context; in 2000, Barbara M. Benedict's full-length study of literary representations of curiosity appeared.[6]

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having an hollow on the back in which 'tis reported (the female) both layes, & hatches her Egg: The Mandragoras also of both Sexes: Papyrs made of severall reedes, & some of silke, tables of the rinds of Trees writen with Japonique characters; and another of the branches of Palme: many Indian fruites: a Chrystal that had a prety quantity of uncongeal'd Water within its cavity; a petrified fishers net: divers sorts of Tarantulas, being a kind of monstrous spiders, with lark-like clawes & somewhat bigger," *Diary* 2: 330-31.

[6] See, *The Origins of Museums: The Cabinet of Curiosities in Sixteenth- and Seventeenth-Century Europe*, eds. Oliver Impey and Arthur MacGregor (Oxford: Clarendon, 1985); *Tradescant's Rarities: Essays on the Foundation of the Ashmolean Museum, 1683*, ed. Arthur MacGregor (Oxford: OUP, 1983). For her review-article of these publications, see Lorraine Daston, "The Factual Sensibility," *Isis* 79 (1988): 452-70. For Daston and Park's comprehensive investigation of marvels and anomalies, see their *Wonders and*

While this thesis draws upon such previous explorations of collecting, it focuses primarily upon the ways in which developments in material culture impacted the writing practices of the seventeenth century. It studies a particular group of texts, many of which have hitherto been the preserve of historians of science, in order to uncover the relationship between encyclopedic genres and the culture of collecting." By tracing the ways in which, in seventeenth-century England, the museum model incorporated and negotiated emerging discourses of consumerism, I build upon Findlen's argument that the Renaissance museum was an "epistemological structure which encompassed a variety of ideas, images and institutions."[7] The recent collection of essays co-edited by Findlen and Pamela H. Smith, *Merchants & Marvels: Commerce, Science, and Art in Early Modern Europe*, forms part of the current trend in scholarship, explain the editors, to reintegrate the "practitioners" of the new science – the broad range of individuals involved in producing natural knowledge – into the "story" of the Scientific Revolution. In illuminating the roles of these figures, they argue, such issues as the relationship between early modern science and the rise of capitalism come into sharper focus.[8] My investigation of Bacon's projected History of Trades and the writings that were generated

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the Order of Nature 1150-1750 (New York: Zone Books, 1998). Daston's argument about prodigies as "facts" is found in her article, "Marvelous Facts and Miraculous Evidence in Early Modern Europe," *Critical Inquiry* 18 (1991): 93-124, at 94-95. See also, her article, "Baconian Facts, Academic Civility and the Prehistory of Objectivity," *Annals of Scholarship* 8 (1991): 337-63, and her discussion with Park of "strange facts," *Wonders and the Order of Nature*. For Shapiro on the "fact," see her *A Culture of Fact: England, 1550-1720* (Ithaca: Cornell P, 2000). The above quotation is at 129. For Findlen's study of Renaissance naturalists and their collections, see her *Possessing Nature: Museums, Collecting, and Scientific Culture in Early Modern Italy*. Berkeley: U of California P, 1991. Stewart's treatment of collecting is in *On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection* (Baltimore: Johns Hopkins UP, 1984). For Benedict on curiosity, see *Curiosity, A Cultural History of Early Modern Inquiry* (Chicago: U of Chicago P, 2001).

[7] Findlen, "The Museum: Its Classical Etymology and Renaissance Genealogy," *Journal of the History of Collections* 1 (1989): 59-78, at 59.

[8] Pamela H. Smith and Paula Findlen, eds. *Merchants and Marvels: Commerce, Science, and Art In Early Modern Europe* (New York: Routledge, 2002). 15-16.

by the early Royal Society in response to this scheme constitutes, I think, a contribution in this area.

In establishing the connections between the early modern culture of collecting and the origins of British consumerism, I offer a counter-argument to Stewart's assertion that the collection is "the most abstract of all forms of consumption."[9] Examining the acquisition and exchange of specific objects within economic and intellectual spheres, I try to recover what might be called the literary culture of consumerism. Daston and Park have argued that the early modern appetite for the "singularities" of nature (monstrous births, mock suns) shows the ways in which "curiosity had thus become a highly refined form of consumerism, mimicking the luxury trade in its objects and its dynamic of insatiability."[10] Taking their argument in a new direction, I consider the methods by which knowledge about the mechanical arts itself became commodified in the period and was consumed by readers as a series of curiosities. My thesis demonstrates the crucial role of seventeenth-century prose in forging links between curiosity and imperialism by scrutinizing the textual representations of what might be called the micro-acts of empire-building – pasting foreign botanical specimens in a folio album, manufacturing transparent earthenware in Oxfordshire to replicate Chinese porcelain, grafting the American wild pear to the English apple, peering with a microscope into the recesses of the blue fly. I argue that the diverse textual forms that constitute seventeenth-century prose provide us with a unique cultural record of the processes by which identities, individual and national, were fashioned in response to changing conceptions of the material world.

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[9] Stewart, *On Longing*, 165.
[10] Daston and Park, 310.

Chapter One
"Occasional Specimens, not Compleate Systemes": John Evelyn as Collector

Introduction

In April 1644, while on the grand tour, John Evelyn visited the garden of Pierre Morin, a French author and naturalist.[1] Virtuosi like himself, explains Evelyn, continually made pilgrimages to this earthly paradise nestled in the Faubourg Saint-Germain. His account of Morin's cabinet identifies for us several of the salient features of the early modern culture of collecting:

> [Morin] is ariv'd to be one of the most skillfull & Curious Persons of France for his rare collection of Shells, Flowers & Insects: His Garden is of an exact Oval figure planted with Cypresse, cutt flat & set as even as a Wall could have form'd it: The Tulips, Anemonies, Ranunculus's, Crocus's &c being of the most exquisite; were held for the rarest in the World, which constantly drew all the Virtuosi of that kind to his house during the season; even Persons of the most illustrious quality: He lived in a kind of Hermitage at one side of his Garden where his collection of Purselan, of Currall, whereof one is carved into a large Crucifix, is greatly esteemed: besids his bookes of Prints, those of Alberts, Van Leydens, Calot, &c. But the very greatest curiosity which I esteemd, for being very ingenious and particular, was his collection of all the Sorts of Insects, especialy of Buter flys, of which he had so greate Variety; that the like I had never seene: These he spreads, & so medicates, that no corruption invading them he keepes in drawers, so plac'd that they present you with a most surprizing & delightfull tapissry: besides he shew'd me the remarkes he had made of their propagation, which he promisd to publish: some of these, as also of his best flowers, he had caus'd to be painted in miniature by rare hands, & some in oyle.[2]

In this passage, the encyclopedic nature of Morin's collections is dramatically captured. The Parisian's collecting impulse was not focused upon one specific category of objects; rather, he sought out the most curious examples of a wide range of phenomena. Such cabinets arose both out of and helped to sustain an aesthetic of variety. The wonder of

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[1] Pierre Morin (c. 1595-1658) was also an important nurseryman in the period. For an account of his garden, see Prudence Leith-Ross, "A Seventeenth-Century Paris Garden," *Garden History* 21 (1993): 150-7.

[2] *Diary* 2: 132-33. Evelyn visited Morin's collections again in 1651; among the curiosities he observed on that occasion were the following: some "crabs of the red-sea," "the head of the *Rynoceros* bird," and "one butterflie resembling a perfect bird," *Diary* 3: 33.

the early modern museum was located not simply in the "completeness" of its individual collections (of shells, flowers, insects), but rather, in its juxtaposition of different specimens and in its display of *naturalia* and *artificialia* together in one space. Evelyn's delight at witnessing the interplay between art and nature produced by the cabinet of curiosities is evident as he describes Morin's sculpted cypress trees, coral crucifix, and entomological tapestry. Pleasure is derived not only from the accumulating of such rarities, suggests Evelyn, but also from attempts at "translating" natural objects into new forms. The notes that Morin had compiled about the breeding habits of butterflies speak to the desire in the period to generate printed knowledge about nature and to subsume species into taxonomical schemes.[3] Similarly, Morin's commissioning of miniature paintings of his specimens shows the ways in which the cabinet of curiosities helped to shape a visual culture of natural history. At the same time, developments in visual art supplied collectors with new means by which to view and to frame nature; it was Morin's presentation of natural objects in a way that mimicked art that created "surprizing" or wondrous effects. Evelyn's account of Morin's cabinet reveals, then, some of the ways in which, in the seventeenth century, curiosity was implicated in other discourses of control.

The Parisian's horticultural cabinet made such an impression on Evelyn that, upon his return to England, he set about creating his own "Morin garden."[4] In this chapter, I argue that Evelyn, informed by such experiences on the continent, adopted the cabinet of

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[3] During his second visit to Morin's collections, Evelyn learned that the Parisian was compiling a natural history of insects, *Diary* 3: 33.

[4] See Evelyn's letter to his father-in-law Richard Browne, dated 2 May 1653, as quoted in W. G. Hiscock, *John Evelyn and His Family Circle* (London: Routledge, 1955) 29. Mark Laird, in his essay, "Parterre, Grove, and Flower Garden: European Horticulture and Planting Design in John Evelyn's Time," explores some of the connections between Evelyn's redesign of Sayes Court and Morin's garden, *John Evelyn's "Elysium Britannicum" and European Gardening*, eds. Therese O'Malley and Joachim Wolschke-Bulmahn (Washington: Dumbarton Oaks, 1998) 171-219.

curiosities as an epistemological model.[5] Among the manuscripts preserved in his archive are an annotated drawing of an Egyptian stone and an album of dried plants from Padua. These works show the ways in which the grand tour served as a collecting expedition for such curious travellers as Evelyn; they also permit us to explore the conceptual processes by which collectors mapped meanings upon their objects. The approach to knowledge that Evelyn witnessed on the continent, in which objects were productively integrated with books, caused him to search for ways to bring this model of learning to English readers. His translations of Gabriel Naudé's treatise, *Advis pour dresser une bibliothèque* and of Lucretius's *De rerum natura*, both publishing projects from the 1650s, are considered in this context. Cabinets of curiosities and collecting were frequently the subject of epistolary exchanges between Evelyn and several of his friends. Scattered among his correspondence are additional letters about all kinds of rarities addressed to a host of acquaintances who are either engaged in grand tours or are residents of the British colonies. These letters reflect important shifts in Evelyn's collecting patterns and reveal that he adopted two roles specifically designed to enhance his collecting opportunities. In the 1650s, Evelyn became an advisor for the grand tour and in the 1680s he acted as an agent for the Royal Society's museum. Earlier scholars

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[5] Evelyn is known principally for his diary – a remarkably rich record of the intellectual and material culture of the seventeenth century. For Evelyn's career and writings, see Douglas Chambers's forthcoming entry for the *Dictionary of National Biography*. With the British Library's acquisition of the Evelyn archive in 1995, his other writings, on such subjects as horticulture, education, cookery, politics, and religion, have begun to receive more scholarly attention. For a recent exploration of Evelyn's unfinished encyclopedia of gardening, the *Elysium Britannicum*, see the essays in *John Evelyn's "Elysium Britannicum" and European Gardening*. As a founding member of the Royal Society, Evelyn figures prominently in such examinations of the new science as Michael Hunter's *Science and Society in Restoration England* (Cambridge: Cambridge UP, 1981). See also, Hunter, "John Evelyn in the 1650s: A Virtuoso in Quest of a Role," *Science and the Shape of Orthodoxy: Intellectual Change in Late Seventeenth-Century Britain* (Woodbridge: Boydell, 1995) 67-98. For Evelyn's attempts to reconcile ancient and modern learning, see Joseph M. Levine, *Between the Ancients and the Moderns: Baroque Culture in Restoration England* (New Haven: Yale UP, 1999) 3-32.

have noted Evelyn's fascination with continental collections,[6] but these studies have tended to rely heavily on the diary entries, many of which were indebted to published descriptions of cabinets. Evelyn's vast correspondence, however, allows us to trace much more closely the development of his collecting impulse and, what Daston calls, "the factual sensibility."[7] His correspondence and publishing projects clearly embody his desire to accommodate older encyclopedic models of learning in the new Baconian program pursued by the Society.

The Case of the Egyptian Stone: (Self)-Inscription and the Collection

Among the correspondence, commonplace books, and library catalogues that form Evelyn's substantial archive is a simple ink drawing of an Egyptian stone.[8] At first sight, Evelyn's drawing might seem only of marginal interest, perhaps copied from a printed work about Egypt. In characteristic fashion, however, Evelyn had carefully annotated the drawing in 1646, supplying us with the origin of the object and its pictorial representation. According to him, the stone was "brought from the Mummies out of Egypt" and given to him by Captain Powell at Venice. Evelyn made several copies of the stone's hieroglyphic markings, enclosing one in a letter to Thomas Henshaw, his travel companion who was in Rome at the time. Henshaw was asked to "communicate" the drawing to "Father Athanasius Kercher, then compiling his *Obiliscus Pamphilius*."[9] Evelyn viewed his recent acquisition as an opportunity to align himself (or so he hoped)

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[6] See, for example, George B. Parks, "John Evelyn and the Art of Travel," *Huntington Library Quarterly* 10 (1946-47): 251-76.
[7] Daston, "The Factual Sensibility."
[8] Evelyn's drawing of the Egyptian stone is in BL Add. 78351. For a detailed account of Evelyn's archive, see the essays in "John Evelyn in the British Library," *The Book Collector*, vol. 44, no. 2 (1995).
[9] Kircher's two works on hieroglyphics are *Oedipus Aegyptiacus*, 4 vols. (Rome, 1652-54) and *Obeliscus Pamphilius* (Rome, 1650).

with a publication by one of the leading scholars and collectors of the day. Somewhat bitterly, he notes that the Jesuit polymath failed to acknowledge his contribution to the work. Apparently Powell had offered Evelyn other Egyptian curiosities as well: "The [captain] gave me the hand & foote of the mummy found where this stone lay, & intended me the intire Mumy but the sea-men putt it to pieces, the nailes of the hande & tous coverd with plate gold." He arranged for the original stone to be sent back to England, but "it was broke to pieces, & lost by negligence." The inscribed stone was the product of the grand tour, then, Egyptian exotica being among the most popular categories of curiosities on the market. Not surprisingly, Evelyn acquired the object at Venice, one of the two major port cities on the *giro d'Italia*, where curiosities were regularly exchanged aboard ships.[10]

Evelyn's annotated drawing of the Egyptian stone situates him firmly within the emerging culture of collecting in seventeenth-century England – a culture in which the material and intellectual values of objects were intimately connected. Evelyn's was a period in which oppositions – "things-not-words," "ancients versus moderns," "art versus nature" – were at once championed and shown to be untenable. His Egyptian curiosity is a wonderful example of the interplay between the "thing" and the "word," or the object and the book. Inscribed with the language of an ancient civilization, it literally supplied a text for decoding and interpretation. At the same time, it functioned as a "particular" for the construction of printed knowledge about that culture. The piece of exotica also demonstrates the special capacity of curiosities to mediate between the private and public

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[10] For an account of the grand tour, see John Stoye, *English Travellers Abroad 1604-1667*, rev. ed. (New Haven: Yale UP, 1989). For Stoye's description of the *giro d'Italia,* see 117-33.

domains.[11] For Evelyn the collector, the stone was a fine addition to his private cabinet. If his drawing of the object appeared in print, the stone also became a vehicle through which he could fashion his more public identity.

Not only does the annotated drawing of the Egyptian stone testify to Evelyn's career as collector, it also provides us with an opportunity to consider the ways in which he assembled, revised, and combined the materials of his own archive. His two letter copybooks are among the great treasures of the collection and have much to contribute to our understanding of seventeenth-century culture.[12] He decided to copy selected letters from his outgoing correspondence, explains Evelyn, "not with the least Intention to make them public, but for my owne satisfaction, & to looke now and then back upon what has past in my private concerne & conversatione."[13] Evidently, he considered his acquisition of the Egyptian stone to be one of those matters of "private concerne & conversatione," for contained in the first letter book is a copy of his 1645 letter to Henshaw about the object. In the left margin of the letter, Evelyn has added a note confirming that his drawing of the stone had been, indeed, published in Kircher's *Obeliscus Pamphilius*. Henshaw's side of this correspondence is also preserved in the archive; in one letter he thanks Evelyn for the "curious dessign" of the stone, and in another he advises his friend that Kircher "was ravished at the sight of it."[14] Evelyn's tendency to use printed and manuscript sources as aides-memoire for the portions of his diary that document his

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[11] For the ways in which the Renaissance museum moved between private and public realms, see Findlen, "The Museum: Its Classical Etymology and Renaissance Genealogy," 59.

[12] A scholarly edition of Evelyn's letter copybooks by Douglas Chambers is forthcoming from Taylor and Francis. Until now, only selected letters have appeared in various editions of *The Diary and Correspondence of John Evelyn*, ed. William Bray, 4 vols. (London: Henry Bohn, 1862), hereafter to be referred to as *Diary and Correspondence*.

[13] This note is dated 15 November 1699.

[14] BL Add. 78298, no. 2, Evelyn to Henshaw, 31 June 1645. Both of Henshaw's letters to Evelyn about the stone are in BL Add. 78313; see letters dated 1 July 1645 and 29 July 1645.

travels has been well established.[15] In the case of the Egyptian stone episode, it is probable that Evelyn relied upon his letter copybook and his incoming correspondence to annotate his drawing and to create the detailed and continuous narrative about the object that appears in his diary entry for 8 August 1645.[16]

Clearly, Evelyn viewed his archive as a storehouse for the conversations, learning, and experiences of his career and, like the cabinet of curiosities, it was always necessarily incomplete. The commonplace books that form such an important part of the archive have themselves, of course, affinities with the model of the collection. Evelyn was devoted to this particular genre because it allowed one to digest one's reading into a useful form, "so in a little time you will find your papers furnish [you] with materialls of all subjects."[17] The "magazine" of knowledge envisaged here by Evelyn is of a piece with many of his other projects, most notably, with his great, unfinished encyclopedia of gardening, the *Elysium Britannicum*.[18] In a famous letter to Thomas Browne, dated 28 January 1659/60, Evelyn outlines his proposed chapter on the history of gardens for the *Elysium*. First, however, he explains to Browne his method of composition: "Though I have drawne [the work] in loose sheetes, almost every chap: rudely, yet I cannot say to have finished any thing tollerably...and those which are so completed are yet so written that I can at pleasure inserte whatsoever shall come to hand to obelize, correct, improve,

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[15] See *Diary* 1: 85f.
[16] See *Diary* 2: 468-69.
[17] Evelyn, *Memoires for my Grand-son*, ed. Geoffrey Keynes (Oxford: Nonesuch, 1926) 43-44.
[18] For discussion of Evelyn's commonplace books, see Hunter, "John Evelyn in the 1650s," at 72-74. A recent edition of the *Elysium* had been published: *Elysium Britannicum, or The Royal Gardens*, ed. John E. Ingram (Philadelphia: U of Pennsylvania P, 2001). Chambers discusses the *Elysium* in terms of a "magazine" of knowledge, as well as the work's debt to the model of the cabinet of curiosities in his essay, "'Elysium Britannicum not printed neere ready &c': The 'Elysium Britannicum' in the Correspondence of John Evelyn," *John Evelyn's "Elysium Britannicum" and European Gardening*, 107-30, at 113f.

and adorne it."[19] Evelyn's language is unmistakably that of a collector – of one who delights in fresh acquisitions. The phrase, "whatsoever shall come to hand," suggests the exchange networks on which collectors depended for their objects. Just as the collector enjoys finding a place in his cabinet for new curiosities, the author of the *Elysium* took satisfaction in augmenting and arranging his repository of knowledge. Similarly, the image of the collector and his ever-expanding cabinet accurately reflects Evelyn's approach to his own archive. As we have seen already with the example of his 1645 letter to Henshaw, Evelyn had a tendency to return to his letter books to add marginalia about the subjects or personages mentioned in his letters.

Evelyn's Hortus Hyemalis: Transplanting Natural Knowledge

Like other members of the early Royal Society, Evelyn was deeply influenced by Bacon's ambitious program for the reform of natural history, and the structure of the *Elysium* certainly shares this encyclopedic ideal. As scholars have pointed out, however, Bacon's call for the assembling of "particulars" of nature was also sometimes interpreted as a justification for the collecting of curiosities.[20] In Evelyn's case, the cabinet of curiosities as an epistemological model was probably first adopted by him during his extensive continental travels. Although one of a number of royalist exiles who went abroad during England's civil wars, Evelyn's protracted travels should not be attributed solely to political circumstance or convention. The endless curiosity with which he

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[19] Evelyn to Browne, 28 January 1659/60, *The Works of Sir Thomas Browne*, ed. Geoffrey Keynes, 4 vols. (Chicago: U of Chicago P, 1964) vol. 4, 276.

[20] Walter E. Houghton, "The English Virtuoso in the Seventeenth-Century," *Journal of the History of Ideas* 3 (1942): 51-73, at 72; Findlen, "Francis Bacon and the Reform of Natural History in the Seventeenth Century," *History and the Disciplines in Early Modern Europe*, ed. Donald Kelley (Rochester : U of Rochester P, 1997) 239-60, at 254. For the early modern curiosity trade, see Findlen, "Inventing Nature: Commerce, Art, and Science in the Early Modern Cabinet of Curiosities," *Merchants and Marvels*, 297-323.

approached his travels is almost legendary; historians of the grand tour point to Evelyn as the prototype of the inquisitive and educated traveller, not least because he compiled such a comprehensive record of his tours in his diary.[21] His letter books are also a rich source of information about his continental travels. In a 1664 letter addressed to his nephew George's travelling tutor at Rome, we find a compressed portrait of Evelyn's own grand tour. He is confident that Dr. Pope can curb his nephew's extravagant spending, since, when he was in Italy he found, "300 per annum plentifully sufficient for that perigrination, including [his] severall Masters, Mathematics, Musique, Languages etc. besides a Servant or two, and the amassing of no inconsiderable Collection too of Pictures, Medaills, and other trifles, and [being] in the company of the best men abroad in [his] time."[22] This is virtually a blueprint of the grand tour in the 1640s – a curriculum designed to supplement the education English gentlemen received at home. What this passage also makes evident, however, is that the grand tour was expected to function, to a greater or lesser degree, as a collecting expedition.

One of the aspects of continental collections that Evelyn found most intriguing was their representation of the interplay between the object and the book. The presence of Evelyn's *Hortus Hyemalis* among his manuscripts offers a starting point for this discussion.[23] To label Evelyn's collection of winter plants from the Botanic Garden at Padua simply a souvenir from the grand tour would be to ignore the cultural values ascribed to this kind of book in the period. We learn from Evelyn's diary that in 1645, he "went to see the Garden of Simples, rarely furnishd with plants, and gave order to the Gardner to make [him] a Collection of them for an *hortus hyemalis*, by permission of the

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[21] See Stoye, 127-32; Parks, "John Evelyn and the Art of Travel."
[22] BL Add. 78298, no. 216, Evelyn to Dr. Walter Pope, 30 March 1664.
[23] Evelyn's *Hortus Hyemalis* is BL Add. 78334.

Cavalier Dr. Vestlingius their Praefect & Botanic Professor, as well as *Anatomic.*"[24] Included with the dried flowers and herbs from Padua are Evelyn's detailed instructions for preserving botanical specimens in a folio album. According to his notes, the place of origin, season, and medicinal virtues for each plant should also be recorded in the collection.[25] We know from a broadside announcing the scheme of the *Elysium* that Evelyn planned to devote a chapter of book three to the "composing [of] the *Hortus Hyemalis*, and making Books of Natural, Arid Plants, and Flowers, with other curious ways of preserving them in their Natural."[26] Because only drafts of the third book of the *Elysium* survive, we cannot be certain what else would have gone into this particular chapter, but Evelyn's Padua album at least offers a model of some of these techniques.

On one level, the *Hortus Hyemalis* or *hortus siccus* is the ultimate expression of that popular seventeenth-century refrain – "things-not-words." This kind of collection demonstrated that "reading the book of nature" did not have to remain a metaphor. For Evelyn, the album both replicated his experience of wandering among the parterres of Europe's oldest public botanic garden and allowed for further study of the garden's contents. One might even view Evelyn's *Hortus Hyemalis* as an act of transplantation, creating, as in the case of any collection, a new environment for material objects. Simples from Padua's botanic garden would now be displayed in a large folio kept in Evelyn's library or perhaps in his cabinet. These collections were not uncommon among men of Evelyn's class and scientific interests. The *hortus siccus* was, of course, a form of knowledge that was also relied upon by physicians and apothecaries. Twenty years

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[24] *Diary* 2: 466.
[25] *Hortus Hyemalis*, fol. 5v.
[26] A photograph of one of these broadsides, "Elysium Britannicum or the Royal Gardens in Three Books," appears in *John Evelyn's "Elysium Britannicum" and European Gardening*, 47. All references will be to this copy.

after Evelyn commissioned his collection from Padua, Sir Thomas Browne's son Edward, following in Evelyn's footsteps on the grand tour, arranged for a collection of specimens from the same garden. John Locke also engaged in this form of collecting; his two-volume annotated herbarium remains today at the Bodleian Library.[27] In addition to being a pleasant investigative tool, Evelyn's botanical collection also functioned as social ornament. We learn from Pepys's famous diary that on 5 November 1665, he travelled to Deptford to visit Evelyn at his Sayes Court residence. Theirs was still a relatively new friendship, and the diary entry offers us a vivid portrait of a social encounter between English virtuosos. On this occasion, Evelyn exhibited several miniature paintings to Pepys, revealed "the whole secret of the Mezzo Tinto," and read from his own writings, including selections from the *Elysium*. During the same visit, Evelyn showed Pepys his "*Hortus hyemalis*; leaves laid up in a book of several plants, kept dry, which preserve Colour however, and look very finely, better than any herball."[28] The description conveys the high technical quality of the album as well as Evelyn's pride in displaying to Pepys the breadth of his learning. The album of botanical specimens portrayed Evelyn as a curious grand tourist and highlighted his connections to the University of Padua, one of Europe's foremost institutions for medicine. Because the album was so exquisitely assembled it also achieves the status of an aesthetic object in Pepys's account.

Evelyn's *Hortus Hyemalis* is perhaps most significant to us because it speaks to a period in which the compartmentalization of knowledge was not yet complete. Today, if one wishes to view the *Hortus Siccus* assembled by Thomas Browne and his son Edward

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[27] For Edward Browne's tour, see Stoye, 157-58. Locke's volumes are in MSS Locke c. 41, b. 7.
[28] *The Diary of Samuel Pepys*, eds. Robert Latham and William Matthews, 11 vols. (London: G. Bell, 1970-83) vol. 6, 289. For an account of Evelyn's friendship with Pepys, and an edition of their letters, see *Particular Friends: The Correspondence of Samuel Pepys and John Evelyn*, ed. Guy de la Bédoyère (Woodbridge: Boydell, 1997).

at Norwich, one must visit the Department of Botany at the Natural History Museum in London where the album is preserved as part of the Sloane Herbarium.[29] Because the elder Browne's album of dried plants is now kept apart from his more "literary" manuscripts held at the British Library, we are encouraged to isolate the *Hortus Siccus* as a scientific document, rather than to see it as another product of Browne's creative intellect. In a well-known passage from the diary, Evelyn describes visiting Browne (with whom he had corresponded but not yet met) at his home in Norwich in 1671. Evelyn's record of the occasion illustrates just how artificial a distinction between material and intellectual culture would have seemed to these figures: "Next morning I went to see Sir *Tho: Browne*...whose whole house & Garden being a Paradise & Cabinet of rarities, & that of the best collection, especially Medails, books, Plants, natural things."[30] What this passage demonstrates, beyond Browne's insatiable curiosity, is that the boundaries of the library, garden, and museum were always shifting. Scholars such as John Dixon Hunt have explored the ways in which continental gardens, through their display of antiquities and cultivation of medical simples, functioned as cabinets in the period.[31] Perhaps the purest expression of this important association between gardens and museums is simply the appendix to the catalogue *Musaeum Tradescantianum* (1656) which is a list of the plants growing in the Tradescants's garden at Lambeth.[32] Similarly, because, Evelyn's description leaves unclear exactly what physical space Browne's library occupies, the conceptual space of his library seems, consequently, larger as well – an immense storehouse continually replenished by both the products of publishers and

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[29] The album is numbered Hortus Siccus 108. For a description of the collection, see J.E. Dandy, *The Sloane Herbarium* (London: British Museum, 1958), 99.
[30] *Diary* 3: 594.
[31] See Hunt, "Curiosities to Adorn Cabinets and Gardens," *Origins of Museums*, 193-203.
[32] John Tradescant, *Musaeum Tradescantianum* (London, 1656) 73-178.

nature herself. Thus, while we might label the model of inquiry represented by Browne's remarkable house and garden "interdisciplinary," someone with Evelyn's experiences of continental cabinets would have instantly understood and appreciated the juxtaposition of *naturalia* and *artificialia* he saw assembled at Norwich.

The Paradisal Trope of Collecting

The language that Evelyn uses in his diary account of Browne's collections is also crucial. Comparing Browne's cabinet to a "paradise" of rarities, he articulates one of the most popular metaphors for knowledge in the period.[33] A recent publication by Jim Bennett and Scott Mandelbrote explores the proliferation and appropriation of biblical metaphors of knowledge in early modern Europe and traces the ways in which the stories of Eden, Noah's Ark, the Tower of Babel, and the Temple of Solomon informed a wide range of literary and scientific projects, especially those undertaken by the Samuel Hartlib and his associates.[34] Biblical metaphors of knowledge coalesced in the projects undertaken by John Wilkins and others to construct a universal and "philosophical" language because these projects "combined the endeavours of collecting, experimenting, ordering, and naming which fascinated early modern students of nature and which had once been the occupations of both Adam and Noah themselves."[35] The early modern museum figures prominently in Bennett and Mandelbrote's study which shows how

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[33] In a letter of 10 February 1659/60, Jeremy Taylor suggested that Evelyn call his *Elysium Britannicum* "Paradisus Britannicum" instead. For this letter, see *Diary and Correspondence*, vol. 3, 127-29.

[34] For the career of the seventeenth-century social reformer, Samuel Hartlib, see *Samuel Hartlib and Universal Reformation: Studies in Intellectual Communication*, eds. Mark Greengrass, Michael Leslie, and Timothy Raylor (Cambridge: Cambridge UP, 1994).

[35] Bennett and Mandelbrote, *The Garden, the Ark, the Tower, the Temple: Biblical Metaphors of Knowledge in Early Modern Europe* (Oxford: Museum of the History of Science in association with the Bodleian Library, 1998) 9. See also, 54-56, 88f. Wilkins presented his plan for a universal language in *An Essay Towards a Real Character and a Philosophical Language* (London, 1668).

biblical metaphors became very closely associated with the encyclopedic impulse to collect and to catalogue the world's productions. Not surprisingly, two of the publications the authors single out to illustrate their claims are the broadside prospectus for Evelyn's *Elysium* and the catalogue *Musaeum Tradescantianum.* Paradisal constructs confronted Evelyn everywhere in his continental tours – certainly in the physical arrangement of the botanic gardens[36] and in the copiousness of the museums he visited. By the time Evelyn embarked upon his grand tours in the seventeenth century, foreign cabinets of curiosities appeared on the travel itineraries of most English gentlemen.[37] The pages of Evelyn's diary are filled with accounts of some of the most impressive continental collections of the day (Cassiano dal Pozzo's Paper Museum in Rome, Ferrante Imperato's museum in Naples, Manfredo Settala's cabinet in Milan).[38]

One particular diary entry evokes the paradisal model to which many of these early modern collections aspired. Almost thirty years before he visited Browne's collections at Norwich, Evelyn had been introduced to another "paradise" – the Palace of Luxembourg in Paris. His extended description of the institution is significant for several reasons, not the least because the account is original.[39] Paula Findlen has recently examined the ways in which the Renaissance museum catalogue "functioned as the

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[36] See, for example, John Prest, *The Garden of Eden: The Botanic Garden and the Re-Creation of Paradise* (New Haven: Yale UP, 1981). Prest explores how the physical layout of early modern botanic gardens in quadrants, one for each of the continents, reflected this goal to reassemble the botanical species of Eden, 1, 42.

[37] For an account of the ways in which the travel literature and courtesy books of the period constructed the "aesthetic of rarity" among English gentlemen, see R.L.W. Caudill, "Some Literary Evidence of the Development of English Virtuoso Interests in the Seventeenth Century with Particular Reference to the Literature of Travel," (D. Phil. thesis, University of Oxford, 1975).

[38] See *Diary* 2: 277-78 (dal Pozzo), 331 (Imperato), 502 (Settala). In his *Numismata, A Discourse of Medals* (London, 1697), Evelyn called for medals to honour "the Diligent and Curious Collectors of both Artificial, and Natural Curiosities, Types, Models, Machines, &c. such as were *Favi, Aldrovandus, Imperanti; Mascardi, Septalius, Wormius, Paule Contant, Calceolarius, Piso, Caval. Pozzo, Ferdinando Gospi, Jo. Tradescant*, and above them all, the worthy Mr. *Charleton*, &c." 282.

[39] For the account of Luxembourg, see *Diary* 2: 128-31; for its apparent originality, see 128, note 1.

museum's own microcosm."[40] I would submit that Evelyn's narrative resembles a miniature museum catalogue in tracing his movement from the interior to the exterior of the palace, itemizing and trying to contain in words the diverse curiosities that fell under his gaze. He first tours the palace's art gallery, then the Duke of Orleans's ornate library, which houses not only books but also cabinets of medals and shells. From here, he moves outdoors to the elaborate gardens where he notes the "rarely designd" parterre, the amusing water-works, and the "Potts & Statues" displayed there. The entry for Luxembourg continues with Evelyn's observations of the garden of simples, the Duke's tortoise collection, and a "Conservatory for Snow." At the end of the entry Evelyn offers a rhetorical apology for the length of his account: "I have been the larger in the description of this Paradise, for the extraordinary delight I have taken in those sweete retirements." Here, the trope of paradise is used to encompass not only the products of nature, but also of art – those fashioned by human ingenuity.

Evelyn's catalogue of the natural and artificial "delights" in the paradise at Luxembourg reflects a tension inherent in the model of the collection. Throughout his account, there are competing images of containment and plenitude. The gardens are enclosed "with a stately wall," for example, and a large number of tortoises confined in the Duke's private aquarium, while a series of six cabinets hold his medals, shells, and precious stones. Nature is shown tamed and sculpted in the box parterre, "accurately kept cut," and in the grove of elm trees arranged into a star pattern. At the same time, Evelyn relies on a series of bold adjectives – "prodigious," "spacious," "ample" – to describe the palace's unique objects and grand architecture. Evelyn is also struck by the diversity of people he encounters on the palace's grounds; "by reason of the amplitude of the place,"

[40] Findlen, "The Museum: Its Classical Etymology and Renaissance Genealogy," 64.

he explains, free access is permitted to "Persons of quality," "strangers," "jolly Citizens," "melancholy Fryers," and "studious Scholars." The visitors themselves appear almost as aesthetic objects in Evelyn's account – another category of curiosities that needed to be recorded. "In summ,' he writes, 'nothing is wanting to render this Palace, & Gardens perfectly beautyfull & magnificent." Thus, Evelyn's catalogue reflects the abundance of the Duke's estate while simultaneously underscoring the processes of circumscription embodied in its collections.

One of the keys to understanding Evelyn's interpretation of the Duke's collections involves the issue of labour. What seems to impress Evelyn most about this paradise is its apparent effortlessness of maintenance: "you see no Gardners or people at Worke in it, and yet all kept in such exquisite order, as if they did nothing else but work." For Evelyn, the "confusion" of the gardeners's work at Luxembourg is best kept out of the sight of visitors, as if the revelation that this paradise required human intervention would somehow diminish its wonder. Evelyn's description of the Duke's gardens also suggests the Renaissance trope of *sprezzatura* or nonchalance.[41] Labour has been masked so successfully that the landscape appears to be a self-perpetuating paradise. Much of the recent work on cabinets has focused on the ways in which the debate of art versus nature was played out in these institutions. A host of particular curiosities (figured stones, artificial landscapes made out of shells, anthropomorphic flowers, trompe l'oeil paintings) helped to collapse the boundaries between art and nature. While some *lusus naturae* (jokes of nature) occurred naturally, others were the result of human labour.

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[41] For recent discussions of the trope of *sprezzatura* in relation to early modern science and collecting, see Mario Biagioli, "Scientific Revolution, Social Bricolage, and Etiquette," *The Scientific Revolution in National Context*, eds. Roy Porter and Mikulas Teich (Cambridge: Cambridge UP, 1992) 11-54; Jay Tribby, "Body/Building: Living the Museum Life in Early Modern Europe," *Rhetorica* 10 (1992): 139-63.

Writing of the ambivalent attitude toward labour projected by cabinets, Daston and Park argue that, "these objects crystallized painstaking labor, but labor cleansed of sweat and toil of the workshop."[42] Evelyn's catalogue of the curiosities (mineral, botanical, animal, human) at Luxembourg is of a piece with this prelapsarian image of labour. He admires the box parterre, for example, even highlighting its artifice by using the term "embrodery," but his account marginalizes the physical labour that actually executed its design. The curiosity value of the Duke's gardens depends directly upon the conditions of their production remaining secret.

The wondrous landscape created by the Duke of Orleans was an ambitious attempt to replant paradise; particular objects that were contained in libraries and cabinets also replicated the paradisal model but on a much smaller scale. We have already seen how Evelyn transplanted the botanical species from Padua into his *Hortus Hyemalis* and circulates the miniature paradise within his English culture of collecting. Evelyn's appreciation for these kinds of textual Edens appears throughout his diary. In 1683, for example, he visited the library of a Mr. Frazier in London where he was shown "divers very rare & curious bookes." Among Frazier's Dutch treasures were "Three or foure Herbals in *Miniature* very accurately don." While on the continent, Evelyn delighted in various paradisal representations produced by the decorative arts. Although his account of St. Mark's Church at Venice is not entirely original, one of the objects of Evelyn's curiosity was clearly the intricate mosaic work inside the church; "the walls [were]

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[42] Daston and Park, *Wonders and the Order of Nature: 1150-1750*, 277. For their discussion of the art versus nature debate, see 255-301. See also, *The Age of the Marvelous*, ed. Joy Kenseth (Hanover, NH: Hood Museum of Art, 1991); John Dixon Hunt, "Curiosities to Adorn Cabinets and Gardens." Susan Stewart has also explored the issue of labour in relation to the collection, arguing that, "In its erasure of labor, the collection is prelapsarian," *On Longing*, 165. For an examination of *lusus naturae* in the period, see Findlen, "Jokes of Nature and Jokes of Knowledge: The Playfulness of Scientific Discourse in Early Modern Europe," *Renaissance Quarterly* 43 (1990): 292-331.

sumptuously incrusted, & presenting to the Imagination the Shapes of Men, birds, trees, houses, flowers & a thousand varieties."[43] What all these examples reflect is the impulse to collect and to contain nature in some pleasing form, whether in the parterre of the botanic garden or between the leaves of a folio album.

As we have seen, at one point in his travels, Evelyn purchased nineteen pieces of *pietra commessa* (or Florentine mosaic) for his own cabinet. His description of these objects, fashioned especially for tourists, closely resembles his account of the interior of St. Mark's. *Pietra commessa*, Evelyn explains, is marble inlayed "with severall sorts of marbles & stones of divers colours, in the shapes of flowers, trees, beasts, birds & Landskips like the natural."[44] Evelyn's use of the term "landskip," like the word "embroidery," alerts us to that interplay between art and nature so characteristic of the cabinet and its curiosities. Artificial representations of nature, particularly of flowers, intrigued Evelyn so much that he intended to write a chapter on this subject for the *Elysium*. The continental influences are apparent in the heading of this chapter; sections were planned on paintings of flowers, silk and glass flowers, "embroderies," and *pietra commessa*. Ultimately, what Evelyn admired most about the Florentine mosaic was the realistic quality of its images. When he writes that the marble shapes of flowers and trees were "like the natural," we are reminded of the motives behind assembling the *hortus hyemalis* – to preserve plants "in their natural."[45] The value of both the *pietra commessa* and the album of dried plants was based on their ability to "capture" nature.

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[43] For Evelyn's visit to Frazier's library, see *Diary* 4: 330. For his account of St. Mark's Church, see *Diary* 2: 437. For its sources, see 437, notes 4 and 5.
[44] *Diary* 2: 198, 191.
[45] The heading of the fourth chapter of the third book of the *Elysium* was: "Of Painting of Flowers, Flowers enamel'd, in Silk, Wax, Gum, Horn, Feathers, Shells, Calicos, Moss, *Pietra Commessa*, Mettal, Inlayings, Embroderies, Carvings, and other artificial representations of them," Broadside for the *Elysium*.

The idea of recreating paradise through the activity of collecting was not, however, simply a theoretical model contemplated by such intellectuals as Evelyn. The continental vendors of curiosities consciously marketed their enterprise in this way – advertising that what could be had in their shops was indeed the world in miniature. In 1644, for example, Evelyn visited a shop in Paris called "Noahs-Arke" where "[were] to be had for mony all the Curiosities naturall or artificial imaginable, Indian or European, for luxury or Use, as Cabinets, Shells, Ivorys, Purselan, Dried fishes, rare Insects, Birds, Pictures, & a thousand exotic extravagances."[46] This window on the curiosity trade in the mid-seventeenth century shows how biblical metaphors were deployed to sustain the consumer culture of collecting. The wooden cabinets fashioned to hold curiosities, of which Evelyn possessed two, were miniature arks, then, representing private attempts to assemble, preserve, and display the rarities of the world. The most famous expression of this particular metaphor for collecting was, of course, the Tradescant collection at Lambeth which came to be known simply as "The Ark." Although Evelyn draws a distinction between luxury and functional objects, suggesting the diverse consumers (grand tourists, art collectors, physicians, apothecaries, naturalists, merchants) interested in "Noah's" wares, it is not altogether clear whether this kind of division was relevant once a curiosity was displayed in a cabinet or library.[47]

Evelyn's Translation of Naudé's Advis

In June 1645, Evelyn prepared for a voyage from Italy to the Holy Land. He was concerned that the curiosities he had accumulated thus far during his continental tours

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[46] *Diary* 2: 100.

[47] The distinctions between objects of luxury and objects of use will be treated in greater detail in chapters three and four of the thesis.

reach England safely. Evelyn wrote to Henshaw from Venice, asking his fellow virtuoso to pack up these "small collections" with his own and to send them to a designated address in England."[48] The image of Evelyn's circle at Venice, carefully arranging to ship their curiosities home from the grand tour is critical. As one might expect, many of these objects were, in fact, stolen, lost, or accidentally destroyed en route to England. As we have seen, Evelyn's Egyptian stone suffered such a cruel fate; it arrived in England in "severall fragments, & utterly defaced to [his] no small affliction."[49] While not all of Evelyn's shells from Amsterdam, his tiny paradisal mosaics from Florence, and his glass pieces from the furnaces at Murano may have arrived intact, the impact of these objects and others like them was nevertheless felt in England.[50]

Scholars have recently investigated the "culture of curiosity" emerging in seventeenth-century England and the ways in which English collectors negotiated the model of the cabinet of curiosities. [51] In this section, I wish to use Evelyn as a case study for the "transplantation" to England of continental ideas about collecting and the organization of knowledge. In 1652, Evelyn returned home to England after having spent much of the last decade abroad. He settled at Sayes Court, Deptford, and began work on several publishing and gardening projects. Michael Hunter has closely studied this middle period of Evelyn's career and argued that the royalist Evelyn became a "cultural consultant" to the English aristocracy and a "full-time savant" during this period because more public forms of employment were unavailable to him under the new republican

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[48] BL Add. 78298,, no. 2, Evelyn to Henshaw, 31 June 1645.
[49] *Diary* 2: 469.
[50] For details of these purchases, see *Diary* 2: 49, 467.
[51] See, for example, Katie Whitaker, "The Culture of Curiosity," *Cultures of Natural History*, 75-90; Arthur MacGregor, 'The Cabinet of Curiosities in Seventeenth-Century Britain,' *Origins of Museums*, 147-58; Ken Arnold, "Cabinets for the Curious: Practicing Science in Early Modern English Museums" (Ph.D. thesis, Princeton University, 1991).

regime.[52] One of the subjects about which Evelyn offered advice was the grand tour and, in particular, about the kinds of curiosities one should collect while travelling. With his English translation of Naudé's *Advis pour dresser une bibliothèque*, Evelyn also identified one of the cultural spaces these objects should inhabit – the library.

Evelyn's translation of Naudé's influential treatise must be situated within the context of his continental tours. The first edition of the *Advis* was published in Paris in 1627 with a revised edition appearing in 1644. Evelyn's bibliographer Geoffrey Keynes reminds us that Evelyn was living in Paris in 1644 and suggests that he may have used this second edition for his translation. Although his translation of the *Advis* did not appear until 1661, there is strong evidence that it was begun several years earlier.[53] The project was a natural choice for someone with Evelyn's devotion to the library as a site of knowledge. During his grand tours, he visited some of the most celebrated libraries on the continent. These extended periods abroad also enabled Evelyn to begin assembling his own library – a collection Hunter has described as "a serious arsenal of book learning."[54] The diary entries for Evelyn's library tours portray him as the classic bibliophile who pauses to admire the most curious items in various collections. The Vatican's "two Virgils written in Parchment," for example, were among the rarities Evelyn was permitted to examine. The treasures of these famous libraries (the Vatican Library, the Ambrosian Library, the Barberini Library) were not limited, however, to books and manuscripts. Like the Duke of Orleans's library, with its six cabinets of

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[52] Hunter, "John Evelyn in the 1650s," 68-71.
[53] Geoffrey Keynes, *John Evelyn: A Study in Bibliophily with a Bibliography of His Writings*, 2nd ed. (Oxford: Clarendon, 1968) 104.
[54] Hunter, "John Evelyn in the 1650s," 72. For an account of Evelyn's library, see Keynes, *John Evelyn: A Study in Bibliophily with a Bibliography of His Writings*, 3-30. Pepys, who himself, of course, assembled one of the most famous libraries of the period, writes in his diary of Evelyn's having given him as a gift a copy of his translation of Naudé, vol. 6, 252.

medals, shells, and precious stones, these libraries functioned not only as book repositories but also as galleries and museums. In addition to cataloguing the rare books he was shown, Evelyn also recorded images from the richly decorated interiors of the libraries at the Vatican and at Siena Cathedral.[55]

Evelyn's account of the library at the Palazzo Barberini in Rome reveals a somewhat broader vision of the library than is now practiced – it was "full of worthy Collections, Medails, Marbles, and Manuscripts."[56] The productive interplay between books and medals that Evelyn witnessed here and in other continental libraries was an issue to which he would return later in his career. In his famous letter to Pepys about libraries, dated 12 August 1689, Evelyn wrote that "men curious of books and antiquities" have always considered medals "a most necessary furniture to their libraries."[57] For Evelyn, medals served not only as aesthetic ornaments for the library space, they were also reliable and illuminating historical documents. As he explains in *Numismata* (1697), medals have "out-lasted the most antient Records, and transmitted to us the knowledge of a thousand useful things."[58] Thus medals, especially their reverses, provided a visual knowledge of the past that supplemented the narratives contained in a library's printed volumes.

Evelyn's decision to translate Naudé's *Advis* was clearly informed by his experiences in the Barberini Library and in other continental libraries – spaces where he saw books and curiosities, visual and printed materials, displayed together. The treatise,

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[55] *Diary* 2: 301(Vatican Library), 205 (Siena Cathedral). For the ways in which the Renaissance museum encompassed aspects of the *bibliotheca*, *studio*, *cabinet*, *galleria*, and *theatro* in the period, see Findlen, 'The Museum: Its Classical Etymology and Renaissance Genealogy,' 59.
[56] *Diary* 2: 229.
[57] Evelyn to Pepys, 12 August 1689, *Diary and Correspondence*, vol. 3, 207.
[58] Evelyn, *Numismata,* 2.

which identified an important role for material objects within the library, allowed Evelyn to communicate this expansive vision of the library to English readers. The great French librarian explains that he originally wrote the *Advis* to show men how to choose, procure, and organize books so "that they might appear with profit and honour in a fair and Sumptuous Bibliotheque." Evelyn's translation of the rigorous selection criteria and organizational principles set down in the *Advis* has been considered by some scholars to mark the beginnings of modern book collecting and library practice in England. For Naudé, the library was both a repository of knowledge and an investigative tool. Books, like soldiers in an army, must be "martiall'd in their several quarters" to facilitate productive inquiry. The organization of the library should also reflect the historical development of the disciplines themselves; holdings should display the battles between the ancients and the moderns in any given field. [59]

For our purposes, however, what is most striking about Naudé's treatise are its links to early modern cabinets of curiosities. The objects in cabinets and the networks of exchange that sustained these collections form a key component of the *Advis*.[60] In his second chapter, Naudé urges readers to obtain not only the catalogues of private and public libraries but also those of "*Studies* and *Cabinets*, which for not being much knownn, or visited, remain buried in perpetual silence." Naudé explains that these collections may contain some hidden treasures for the library or may supply useful

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[59] Naudé, *Instructions Concerning Erecting of a Library*, trans. John Evelyn (London, 1661), 2, 74-75, 23, 26-28. For the importance of Evelyn's translation of Naudé, see David McKitterick, "Bibliography, Bibliophily, and the Organization of Knowledge," McKitterick and David Vaisey, *The Foundations of Scholarship: Libraries and Collecting, 1650-1750* (Los Angeles: Clark Memorial Library, 1992), 31-61, at 31.

[60] In his article on the *Advis*, Paul Nelles also traces the relationship between Naudé's work and ideas about curiosity, examining Naudé's use of the term "curieux." See Nelles, "The Library as an Instrument of Discovery: Gabriel Naudé and the Uses of History," *History and the Disciplines in Early Modern Europe*, 41-57, at 43-45.

models for assembling library material. Naudé, like Evelyn, recognized the importance of establishing social networks for obtaining books and curiosities. To illustrate the advantages of the cooperative model of collecting, Naudé includes the following portrait in the *Advis*: "I know a person, who being curious of *Medalls*, *Pictures*, *Statues*, *Intaglia's*, and other *Cabinet* pieces, hath collected by this sole industry, above twelve hundred pounds worth, without ever having disbursed for." While Naudé admires the industry of men like Gian Pinelli who have "entertain'd correspondency with an infinite number of friends, strangers, and forreign Merchants" in order to augment their libraries, the author is aware that most individuals would find it difficult to maintain such extensive networks. Accordingly, he instructs his readers to choose "two or three rich *Merchants*...who by their various intelligences, and voyages, might furnish us with all kinds of novelties."[61] These passages are significant for several reasons: first, they depict objects as the products of social relations;[62] second, they suggest the diverse groups who participated in early cultures of collecting; and, third, they reflect the taste for the new and the rare that was typical of these cultures. It is also worth noting that although Naudé is explicit in stating that a social network is required to build a strong library, the kind of network described in the *Advis* was not composed entirely of close relationships. Books and curiosities could be procured from both intimates and acquaintances – perhaps even more successfully from the latter.

Naudé devotes the seventh chapter of his treatise to the ornamentation and decoration of the library. While we might expect here Naudé's advice about selecting antiquities, artwork, and stately furniture for the library, we find instead a censure of such

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[61] *Instructions*, 13-14, 59, 65.

[62] For an exploration of the social dimension of collecting, see *The Socialness of Things: Essays on the Socio-Semiotics of Objects*, ed. Stephen Harold Riggins (Berlin: Mouton de Gruyter, 1994).

extravagant practices. From Naudé's perspective, "so much gold on the Cieling, Ivory and glass upon the Walls, the Cedar Shelves, and Marble Floors" contribute little to the library as a site of inquiry. "In lieu of such gildings and adornings," he writes, "one may supply it in *Mathematical Instruments*, *Globes*, *Mapps*, *Spheres*, *Pictures*, *Animals*, *Stones*, and other curiosities as well *Artificial* as *Natural*, which are ordinarily collected from time to time, with very little expence."[63] In Naudé's model, investigative tools and material examples of phenomena replace the ornaments traditionally found within great libraries. His library curiosities are valued primarily for the empirical data they can provide to readers. By preferring botanical specimens to lavishly decorated interiors, however, he also implies that these curiosities have aesthetic value. Naudé cautions us, then, against forcing the objects of seventeenth-century collections into strict categories; his library curiosities clearly had multiple functions. The above passage, with its emphasis on the close observation of nature, is one of many Baconian elements in the *Advis*.[64] The empirical features of Naudé's model would have appealed strongly to Evelyn and his circle, for whom the institutionalization of Bacon's program of scientific reform had been a long-standing goal. When Evelyn fills his dedicatory epistle to Lord Clarendon with images of Bacon's "Solomon's House," he points to the intellectual origins shared by Naudé's work and the Royal Society.[65]

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[63] *Instructions*, 85.
[64] For a comprehensive discussion of the relationship between the *Advis* and Bacon's writings, see Nelles, "The Library as an Instrument of Discovery."
[65] Dedication, *Instructions*, sig. A4 and sig. A5r.

Evelyn's Translation of Lucretius's De Rerum Natura

During the 1650s Evelyn was at work on a wide range of publishing projects in addition to his translation of Naudé.[66] His translations of book one of Lucretius's *De rerum natura* (1656) and of Nicolas de Bonnefons's *The French Gardiner* (1658) both appeared during this period. Like his translation of Naudé, Evelyn's Lucretius can be viewed as an attempt to integrate an encyclopedic model of knowledge with the new Baconian program. It is probably not surprising that this particular project of Evelyn's has received relatively little scholarly attention. Like the *Elysium* and his History of Trades, this was yet another work that the author was not able to put into final form. Although he published the first book of his translation in 1656, he decided not to bring out the remaining five books or the commentary that he prepared for them.[67] Because Evelyn's entire translation did not appear in his lifetime,[68] it would be difficult to measure fully its impact. The first complete English translation of *De rerum natura* was that of Thomas Creech, published in 1682.[69] Hunter has referred to both the origins and the abandonment of Evelyn's translation as a "puzzle."[70] The translation was compatible with Evelyn's role as a virtuoso and another example of his interest in introducing currents of French intellectual culture into England,[71] concedes Hunter. What he finds

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[66] For a discussion of these various projects, see Hunter, "John Evelyn in the 1650s."
[67] Evelyn's translation of book six of Lucretius's *De rerum natura*, together with his commentary, is preserved in BL Add. 78356. As Keynes tells us, Evelyn was dismayed at the numerous printer's errors which accompanied the first book of his translation; apparently these had discouraged him from publishing the remaining books, *John Evelyn: A Study in Bibliophily with a Bibliography of His Writings*, 42.
[68] Another of Evelyn's contemporaries, Lucy Hutchinson, also prepared a translation of *De rerum natura* in the mid-seventeenth century. Like that of Evelyn, Hutchinson's translation did not appear in her day. An edition of Hutchinson's translation was only recently published. See *Lucy Hutchinson's Translation of Lucretius: De rerum natura*, ed. Hugh de Quehen (Ann Arbor: U of Michigan P, 1996).
[69] Creech was also a correspondent of Evelyn's. For some of these letters, see *Diary and Correspondence*, vol. 3. Dryden's translation of selections from the poem appeared in his *Sylvae: Or the Second Part of Poetical Miscellanies* (London, 1685).
[70] Hunter, "John Evelyn in the 1650s," 87.
[71] The first French translation of Lucretius was that of Michel de Marolles, published in 1650.

lacking, however, in Evelyn's commentary, is "any of the sense of excitement about the simplicity and clarity of Lucretius' atomistic view of nature" exhibited by such other purveyors of Epicurean thought in the period as Gassendi and Walter Charleton.[72] When we consider that Evelyn undertook his translation of Lucretius in the decade or so leading up the founding of the Royal Society and after he had adopted the museum as an epistemological model, the project actually appears much less of an anomaly.

An exploration of the sixth book of *De rerum natura* assists us in tracing the some of the connections between Lucretius's vision of nature and Evelyn's own approach to scientific knowledge. We learn that the poet will treat the subject of natural curiosities in book six because it is "ignoranc [that] makes [mortals] defer / to th'Empire of the Gods all things that are."[73] Often providing his audience with multiple explanations for such strange phenomena as thunder and lightning, whirlwinds, earthquakes, volcanoes, the flooding of the Nile, poisonous lakes, and the loadstone, Lucretius attempts to naturalize these wonders. Chambers has shown the ways in which the adoption, by Evelyn and other restoration figures, of Lucretius's atomism and the sceptical model paved the way for the new science.[74] The close observation of nature advocated by Lucretius in this section of the poem is certainly of a piece with Baconian empiricism; here, the poet supplies us with a series of natural "particulars" of nature before moving to general principles. For Lucretius, a determination of causes sometimes necessitated an

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[72] Hunter, "John Evelyn in the 1650s," 90. Dr. William Rand's translation of Gassendi's *Life of Peiresc* (London, 1657) was dedicated to Evelyn.

[73] *De rerum natura* 6. 57-58, *John Evelyn's Translation of Titus Lucretius Carus De rerum natura*, ed. Michael M. Repetzki (Frankfurt: Peter Lang, 2000). All references will be to this edition of Evelyn's translation.

[74] See Chambers, "John Evelyn and the Construction of the Scientific Self," *The Restoration Mind*, ed. Marshall Gerard (Newark, DE: U of Delaware P, 1997) 132-46. In this essay, Chambers argues that the Lucretian framework of atomism and scepticism was adopted by Evelyn not only a means by which to investigate nature, but also to fashion his social identity.

enumeration of "tedious ambages"[75] and required attentiveness on the part of the investigator.[76] As Bacon was to do in the seventeenth century, Lucretius constructed a model of knowledge that depended upon sensory evidence and did not admit premature conclusions.

It is not difficult, then, to understand why Lucretius's poem, particularly its catalogue of natural wonders, would have appealed to Evelyn who was to help to shape many of the Royal Society's projects, including its journal. As we will see, the Society's periodical, the *Philosophical Transactions*, occupied a liminal space between earlier encyclopedic models of learning and the new Baconian enterprise. The kinds of topics that Lucretius examines in book six continued, as we will see in the next chapter, to preoccupy the Fellows of the early Royal Society. One of the investigative tools developed by the institution – the miscellaneous "list of queries" – also embodied this encyclopedic approach.[77] In Lucretius, Evelyn discovered a model of inquiry – one that was also practiced by the cabinet collector – that proceeds from the identification of the most extreme instances of nature. We encounter in the sixth book of the poem a series of curiosities which included the following: "a tree on Helicionian hills / Whose very blossoms sent men often kills," "a spring [that is] cold / All day, & hot at Night," and "a cold Fountaine too on which if Flax / Is layd immediately it casts a flame."[78] When presenting these instances to the audience, Lucretius sometimes relies upon the language of rumour. To the description of the cold and hot spring, for example, he appends the phrase, "as report goes," both heightening the rarity of the phenomenon and diminishing

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[75] In the period, "ambages" signified circumlocutions, quibbles, or ambiguities, *OED*.
[76] 6. 1025-29.
[77] The Royal Society's lists of queries will be explored in greater detail in the next chapter.
[78] 6. 880-81 (poisonous tree); 6. 948-49 (cold and hot spring); 6. 982-83 (cold fountain).

the authority of the account. Lucretius's catalogue of curiosities would have been interpreted by Evelyn as a textual counterpart to the cabinets of rarities that he visited on the continent and which he himself assembled. The poet's stated purpose in enumerating such wonders was, we are told, to diminish the mortals' "admiration."[79] Whether a work of such artifice like that of Lucretius's can actually be said to naturalize or render the miracles of nature less astonishing can, of course, be debated.[80] The dynamics of the early museum also invite us to probe these tensions. Whether material or literary, the model of the collection permits simultaneous movement in two different directions; the collection at once enhances and decreases the curiosity value of objects. Lucretius's poem furnished Evelyn with another opportunity to translate this model of the museum into a literary form and to accommodate ancient models of learning within the emerging seventeenth-century discourses of science.

Evelyn as Advisor for the Grand Tour

In 1653, Evelyn began to plan the gardens at Sayes Court. Drawing upon his knowledge of continental gardens, Evelyn incorporated various French and Italian features into the design of the landscape.[81] Ever curious about the processes of nature, he constructed an "elaboratorie" in his privy garden to conduct experiments right on the grounds of his estate. The correspondence that survives from the 1650s ties together, in some interesting ways, Evelyn's projects and his accumulation of curiosities. With his

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[79] 6. 732-33. Here the term "admiration" is used in the sense of "to wonder at."
[80] For an exploration of *De rerum natura* as an elaborate literary production, see E. J. Kenney's commentary upon the third book of the poem in *Lucretius: De Rerum Natura*, ed. E. J. Kenney (Cambridge: Cambridge UP, 1971) esp. 14-31.
[81] For Evelyn's redesign of Sayes Court, see Laird, "Parterre, Grove, and Flower Garden: European Horticulture and Planting Design in John Evelyn's Time."

own travelling days behind him, Evelyn composed numerous letters from Sayes Court about the grand tour and about the activity of collecting. His series of exchanges with Benjamin Maddox, a young man touring the continent in the 1650s, is particularly useful for studying this stage of Evelyn's career. On one level, these letters allowed him to extend vicariously his own grand tour – the reports he received from Maddox fed his continued curiosity about continental culture. What also becomes evident from the letter books, however, is that Evelyn expected more from his touring protégés than simply information from the continent – he wanted them to supply him with curiosities as well.

On 1 March 1698, a few years before his death, Evelyn wrote to his "old fellow traveller" Henshaw. In a well-known passage, Evelyn offers the following snapshot of their days together on the grand tour: "Whenever I think of the agreeable toil we took among the ruins and antiquities, to admire the superb buildings, visit the cabinets of curiosities of the virtuosi, the sweet walks by the banks of the Tiber, the Via Flaminia, the gardens and villas of that glorious city, I call back the time, and, methinks [grow] young again."[82] Evelyn's experiences in the 1640s, wandering among the ruins of the classical past, inspecting the objects in famous collections, constituted a formative period in his career. There can be little doubt that the knowledge he acquired during his travels inspired his treatise on engraving, *Sculptura* (1662), and his translation of Roland Fréart de Chambray's *Parallel of the Ancient Architecture with the Modern* (1664). Although Evelyn had been settled at Sayes Court less than a decade when he began corresponding with Maddox about the grand tour, one can already see how wistful he was about his time abroad. The role he assumed in the 1650s of advisor for the grand tour was a strategy for bridging the distance between himself and the continent. In a letter dated 11 June 1656,

[82] Evelyn to Henshaw, 1 March 1698, *Diary and Correspondence*, vol. 3, 376.

Evelyn asks Maddox to supply him with reports of his travels: "Sir, I esteeme it a very greate favour, that you will sometymes divert me with this friendly intercourse, I shall extreamely cherish it, and wish that I had that in exchange for it, which might contribute anything to your benefit or Instruction."[83] For Evelyn, the reports he expected in return for his directions about curricula, itineraries, and readings were necessary "diversions" and "refreshments."[84] Maddox's letters from various points along the tour often prompted Evelyn to retrace the steps of his own travels. When Evelyn learns, for example, that Tours will be his protégé's next destination, he reveals that he also "chose that sweete retirement, wher I withdrew from the noyse of Paris, and the confusion of greate Townes: France has not (in my opinion) a more delicious or civill place, nor better accommodated for a studious Genius."[85]

Evelyn's nostalgia for his time abroad does not, however, dominate his letters to Maddox. The ways in which Maddox's travels can serve Evelyn's current projects is more often the topic of these exchanges. In one letter, Evelyn asks Maddox to confirm the existence of a "prodigious" aloe tree mentioned in a recent publication by the French physician Pierre Borel. Although Borel "speakes so confidently" of this botanical curiosity, Evelyn is doubtful. In a letter dated 10 January 1656/57, he urges Maddox to visit the apothecary's garden in Montpellier where the aloe supposedly grows: "I shall be much better assured by your particular and ocular inquiry,"[86] explains Evelyn. A published account of a curiosity, even one from such a respected source as Borel, was not

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[83] BL Add. 78298, no. 97, Evelyn to Maddox, 11 June 1656.
[84] Evelyn describes these travel reports as "refreshments" in his letter of 30 March 1664 to Dr. Walter Pope, BL Add. 78298, no. 216.
[85] BL Add. 78298, 101, Evelyn to Maddox, 21 September 1656.
[86] BL Add. 78298, 129, Evelyn to Maddox, 10 January 1658. Maddox's reply to Evelyn's request about the aloe plant is in BL Add. 78316, Maddox to Evelyn, 25 September 1656.

so credible, therefore, as a trusted friend's first-hand observation of the object. The term "ocular" recurs in Evelyn's letters on travel and suggests the influence of Baconian empiricism on his ideas about the grand tour. Evelyn and other early members of the Royal Society came to view the grand tour, in part, as means by which to collect "evidence" for their projects.[87] It was hoped that at least some of the reports of curiosities and objects that flowed back to England would form the basis of solid and useful knowledge. The curriculum Evelyn set out for Maddox and other Englishmen on the grand tour advocated the close study of "things." As he informs Maddox, "Every body hath Book-learning, which is of much ostentation, but of smale fruit unlesse [experimental learning] also be superadded to it." The method of inquiry Evelyn describes above, in which material objects supplement knowledge contained in books, is obviously of a piece with Naudé's recommendations in the *Advis* for furnishing the library with natural and artificial curiosities. Evelyn's letter to Maddox of 1658 focuses upon chemical curiosities. Here, he advises the young grand tourist that Montpellier is "wont to be a place of rare opportunitie for the learning the many excellent receipts to make Perfumes, sweete pouders, Pomanders, Antidots, and divers such curiosities."[88] In another letter from this period about the grand tour, Evelyn instructs Francis Carter to take notice of the trades (leather-tanning, stone-cutting, metalwork) practiced on the continent.[89] Evelyn was one of several seventeenth-century figures inspired by Bacon's scheme for a complete history of trades, and his letters to Maddox and Carter must also

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[87] For a discussion of the grand tours by early members of the Royal Society, see Robert Illiffe, "Foreign Bodies: Travel, Empire and the Early Royal Society of London. Part I. Englishmen on Tour," *Canadian Journal of History* 33 (1998): 357-85.
[88] BL Add. 78298, 129, Evelyn to Maddox, 10 January 1658.
[89] BL Add. 78298, no. 266, Evelyn to Carter, 24 November 1665. The evidence suggests that this letter is misdated and is actually from the late 1650s.

be seen in this context.[90] In the 1650s, Evelyn began to assemble information for this project, and the folio commonplace book containing this work, entitled "Trades: Secreats & Receipts Mechanical," is still preserved in his archive.[91] One can see, then, that Evelyn deliberately shaped the grand tours of his correspondents according to this current interest in the trades

Evelyn's history of trades was just one of the projects with which he expected his grand tour correspondents to assist him. He also opportunely recruited these travellers as his agents on the continent for botanical curiosities. With Evelyn engaged in extensive horticultural improvements at Sayes Court during this period, it is not surprising that requests for seeds, bulbs, and roots appear regularly in this correspondence. Among the rarities Evelyn desired from Maddox in southern France were the seeds of several evergreens for his "plantation."[92] In a letter of 30 March 1664, Evelyn feels compelled to remind a different grand tour correspondent that one country's native plants are another's wonders – that it is context that determines the curiosity value of objects. After he asks Walter Pope for myrtle and jasmine seeds from Italy, Evelyn adds in parenthesis, "which you remember rarities with us."[93] Such letters signal a further development in Evelyn's collecting activities. While on the continent, he collected Egyptian curiosities, medals, antiquities, and pieces of decorative art for his cabinet. His letters to Maddox and other

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[90] Bacon's History of Trades will be treated in greater detail in the third chapter of the thesis, as will Evelyn's letters to Maddox and Carter about chemical and mechanical curiosities.

[91] Evelyn's commonplace book about the trades is in BL Add. 78341. For the History of Trades, see Walter E. Houghton, "The History of Trades: Its Relation to Seventeenth-Century Thought as seen in Bacon, Petty, Evelyn, and Boyle," *Journal of the History of Ideas* 2 (1941): 33-60. For Evelyn's contribution to the project, see also, Hunter, "John Evelyn in the 1650s: A Virtuoso in Quest of a Role," 75-82.

[92] BL Add. 78298, no. 111, Evelyn to Maddox. This letter is undated, but its sequence in the letter copybook suggests it is from March 1657.

[93] BL Add. 78298, no. 216, Evelyn to Dr. Walter Pope, 30 March 1664. For other requests for seeds from the grand tour see, for example, BL Add. 78298, no. 308, Evelyn to Dr. David Stokes, 21 August 1668.

grand tourists, however, reveal Evelyn's increasing interest in the kinds of curiosities he could propagate in his own environment. The network for seed-exchange that he expanded significantly through his role as consultant for the grand tour enabled him to transform Sayes Court into an impressive cabinet of horticultural curiosities.

Evelyn's Critique of the Museum Model

On 7 February 1664/65, Evelyn composed an intriguing letter about the collections of Charles II. The letter is addressed to Thomas Chiffinch, then "Page of the Back-Stayres to his Majestie and keeper of his Closet," and outlines Evelyn's scheme for organizing the royal collections. He suggests that Chiffinch "may compleately martial" the King's "precious Treasures and Curiosities" under fifteen heads. Evelyn's catalogue includes the usual categories of curiosities (jewels, medals, watches, statues, exotica). Like most taxonomies proposed in the period, however, Evelyn's plan also contains a miscellaneous category that quickly exposes the limitations of his scheme. He advises that a category be established for "Curiosities & Rarities of all sorts, not reducible to the former heads." Because his other classes are designed to contain *artificialia*, we can assume that his miscellaneous category would absorb the *naturalia* of the collection. Perhaps not surprisingly, Evelyn offers to make this "Inventory of Particulars" himself and to "cause them to be fairely transcribed in a Booke" for the King's pleasure. In addition to this first catalogue, Evelyn recommends the creation of "another Register [of] the names and portraitures of all the exotic and rare Beasts" in the King's "Paradyse at St. James's Parke." It is Evelyn's rationale for compiling this second inventory that is most

significant for our purposes: "Because [these animals] are truely Royal curiosities, and in some respects to be preferrd before those dead and inanimate rarities of art and nature."[94]

This critique of the model of the cabinet of curiosities reflects a subtle shift in Evelyn's ideas about collecting. Certainly Evelyn's defense of the royal vivarium and his call for an illustrated catalogue formed part of his nationalistic hopes, expressed at the beginning of the letter, that the collections of Charles II would become as famous as those assembled by the Dukes of Florence. Probably also in his mind were the royal menagerie at Versailles and other notable European collections of live animals.[95] When Evelyn emphasizes the sterile aspects of the cabinet of curiosities, however, he also reveals a progression in his thinking about curiosities and their ultimate value. In his later years, the cabinets that most impressed him were those assembled by Robert Plot at Oxford, William Courten at the Middle Temple, and Hans Sloane in London. These collections were celebrated for their strong scientific character (they included both "common" and "curious" examples of nature) and for the natural history publications they generated. Plot's *Natural History of Oxfordshire* (1677), John Ray's *Historium Plantarum* (1686), and Sloane's *Voyage to Jamaica* (1707, 1725) all testified to the important role such collections could play in the compilation of systematic natural histories. Evelyn's own accounts of these cabinets tended to focus on their scientific value. He describes Sloane's curiosities as a "universal Collection of the natural productions of Jamaica consisting of Plants, fruits, Corralls, Minerals, stones, Earth, shells, animals, Insects &c: collected by him with greate Judgement." In another entry, Evelyn admires Courten's extensive collection of zoological specimens and their

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[94] BL Add. 78298, no. 235, MS JE A1, Evelyn to Thomas Chiffinch, 7 February 1664/5.
[95] For a discussion of some of these collections, see Wilma George, "Alive or Dead: Zoological Collections in the Seventeenth Century," *Origins of Museums*, 179-87.

excellent preservation.[96] For the early fellow of the Royal Society and master gardener, the King's miscellaneous collection of polished stones and dried flowers did not encourage the kind of "profitable speculations"[97] that Evelyn associated with carefully selected and living curiosities. The vision of the living museum he champions in the Chiffinch letter, symbolized by the vivarium at St. James Park, was consistent his replanting of the gardens at Sayes Court. Using the seeds sent to him from the continent and elsewhere he created a living cabinet of curiosities – a collection based on experimentation and on the first-hand observation of nature.

That a museum should assist in the production of empirical knowledge was, of course, the Royal Society's stated argument for creating its "repository" of rarities. As Michael Hunter has shown, for several reasons, this museum never actually achieved the status of a research collection. Although the aim was to assemble a complete inventory of the world's productions, anomalies such as two-headed calves and marvelous fish continued to dominate the collection.[98] Evelyn passionately defended the institution against attacks by Henry Stubbe in his letter of 27 July 1670 to John Beale: "The Members of the Royal *Society* bring in Occasional *Specimens*, not Compleate *Systemes*; but as Materials and particulars, which may in time amount to a rich and Considerable

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[96] See *Diary* 4: 68 (Plot); 4: 531-32 and 5: 13-14 (Courten); 5: 48 (Sloane). Ray consulted Courten's collection of botanical specimens when preparing his tables for this work. See, Carol Gibson-Wood, "Classification and Value in a Seventeenth-Century Museum, William Courten's Collection," *Journal of the History of Collections* 9 (1997): 61-77, esp. 65. Sloane's natural history, *A Voyage to the Islands Madera, Barbados, Nieves, S. Christophers and Jamaica*, was published in two illustrated folio volumes.

[97] BL Add. 78298, no. 235, Evelyn to Chiffinch, 7 February 1664/65.

[98] See Hunter, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository,'" *Establishing the New Science: The Experience of the Early Royal Society* (Woodbridge: Boydell, 1989), 123-55. See also, Hunter, "The Cabinet Institutionalized: The Royal Society's 'Repository' and its Background," *Origins of Museums*, 159-68.

Magazine, capable of furnishing a most august and noble structure."[99] Evelyn's general description of the Royal Society's inductive method could also be read as an apology for its repository. Among his own donations to the museum were the following: natural history specimens, souvenirs from the grand tour (pumice stones from Vesuvius, a table of veins and arteries from Padua), and a Spanish sowing machine.[100] While perhaps not all of the above were the Baconian "particulars" required for solid knowledge, a series of letters from the 1680s shows Evelyn actively soliciting donations of New World flora and fauna for the Royal Society's repository. In these letters, he strongly urges correspondents in the British colonies to collect objects and information for systematic natural histories.

Evelyn's Letters to the New World

From 1671 to 1674, Evelyn served as a member of the Council of Foreign Plantations (later the Council for Trade and Plantations). This appointment produced connections that enabled Evelyn to extend his epistolary network into America and the Caribbean.[101] Just as he had advised grand tourists in the 1650s to look upon their travels as collecting expeditions, he also pressed his correspondents in Jamaica and Barbados to seek out the natural rarities of these regions. In a letter of 4 April 1684, Evelyn reminds

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[99] BL Add. 78298, no. 331, Evelyn to John Beale, 27 July 1670. Beale's contributions to the Society's horticultural projects are explored in chapter four of the thesis.

[100] For Evelyn's donations, see Nehemiah Grew's catalogue, *Musaeum Regalis Societatis, or a Catalogue & Description of the Natural and Artificial Rarities Belonging to the Royal Society And preserved at Gresham Colledge* (London, 1681), 4 (tables of veins and arteries), 235 (mosses), 347 (pumice stones), 371 (Spanish plowing machine). For an account of the anatomical tables see, Richard K. Aspin, "Illustrations from the Wellcome Institute Library: John Evelyn's Tables of Veins and Arteries: A Rediscovered Letter," *Medical History* 39 (1995): 493-99. Aspin makes the point that with the advent of superior techniques for preserving anatomical specimens, the scientific value of Evelyn's tables became limited, 494.

[101] Chambers explores the relationship between Evelyn's letters to his New World correspondents and the *Elysium* in his essay, "'Elysium Britannicum not printed neere ready &c': The 'Elysium Britannicum' in the Correspondence of John Evelyn," 121-23.

Thomas Lynch, the Governor of Jamaica, "of the promise you made your friends of Collecting Materials...to Compile the natural history of *Jamaica.*" In his postscript to the letter Evelyn expresses his hope that Lynch would also contribute curiosities to his institution's museum: "The Royal Society hopes you do not Forget their Repository when anything of rare or natural comes to your hands." Evelyn's letter to William London in Barbados is more explicit about what kinds of donations the Royal Society welcomed: "The particulars they collect are *Animals & Insects* of all sorts; their *skinns, Sceletons*; *Fruits*, *stones*, *shells*, *Woods*, *Gumms*, *Minerals* & whatever Nature produces."[102] An articulation of the paradisal metaphor for collecting, this passage makes clear that the Society conceived of its museum as a miniature version of all creation.

Evelyn acted on behalf of the Royal Society, then, in two ways: first, by asking for contributions to its repository and, second, by encouraging the compilation of Baconian natural histories that were compatible with the institution's scientific program. What makes Evelyn's letters to his New World correspondents so significant, however, are the ways in which they blur the boundary between institutional and private interests. As we have seen, Evelyn possessed a great curiosity about the transplantation of botanical species.[103] With his contacts in the New World, his opportunities for seed-exchange were virtually endless. For obvious scientific and economic reasons, the Royal Society was also keenly interested in the possibilities associated with transplantation.[104] Evelyn did not actually ask Lynch for seeds for Sayes Court; in a letter to one of the

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[102] BL Add. 78299, no. 473, Evelyn to Thomas Lynch, 4 April 1684; BL Add. 78299, no. 436, Evelyn to William London, 27 September 1681.

[103] For an excellent account of voyages of botanical discovery and the exchange of botanical knowledge, see Marguerite Duval, *The King's Garden*, trans. Annette Tomarken and Claudine Cowen (Charlottesville: UP of Virginia, 1982).

[104] The Society's botanical experiments in the areas of grafting and transplantation will be explored in greater detail in the fourth chapter of the thesis.

governor's associates in Jamaica, however, he wrote: "as you know me a friend to Gardens and Planting; so, if any-thing curious of that sort (Roots, Seedes, Kernels, etc.) come in your way (rare in these Parts) you would remember how acceptable they use to be among such Lovers of the Parterr...as I am."[105] The transplantations carried out by Evelyn and other gentlemen on their private estates were clearly an issue of some concern to the Royal Society. As Thomas Sprat wrote in his *History of the Royal Society* (1667), "the chief Progress that has hitherto bin made [in transplantations], has bin rather for the *collection* of *Curiosities* to adorn *Cabinets* and *Gardens*, than for the solidity of *Philosophical Discoveries*."[106] In some important ways, Evelyn's letters about New World specimens complicate Sprat's distinction between transplantations for "curiosity" and transplantations for "use."

On 23 September 1681, Evelyn wrote to Sir Christopher Wren about a "most industrious man" (William London), intent upon compiling "a *Natural Historie* of our *American Plantations*."[107] He wanted the Royal Society "to direct, and assist him...[and] to consider what Rarities and Exotics we should request him to send us for the *Repositorie*, and to propagate in this *Climate*." Evelyn also made the following offer: "What I am capable of furnishing as to other Seedes etc. I shall send him very readily; for I think the Correspondence should be cherish'd, and all Encouragements given him to prosecute his *History*." The kinds of exchanges Evelyn sketches out in this letter and the role he expected to play in them are telling. He wishes to establish a trade in natural

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[105] BL Add. 78299, no. 488, Evelyn to Peter Fountain, 25 October 1684.
[106] Thomas Sprat, *The History of the Royal Society*, eds. Jackson I. Cope and Harold Whitmore Jones (St. Louis: Washington UP, 1958) 386. All subsequent references will be to this edition.
[107] BL Add. 78299, no. 435, Evelyn to Christopher Wren, 23 September 1681. Chambers explores the relationship between Evelyn's letters to his New World correspondents and the *Elysium* in his essay, "'Elysium Britannicum not printed neere ready &c': The 'Elysium Britannicum' in the Correspondence of John Evelyn," 121-23.

specimens – for transplantation and study purposes – between the Royal Society and its American friend. Seeds from Evelyn's gardens at Sayes Court, the products of his private experiments, would be used to sustain the written correspondence between the two parties. Presumably, Wren pledged support for the project because Evelyn swiftly wrote back to William London in Barbados about the work.[108] In the letter, Evelyn details various successes and failures (experienced by himself and others) at transplanting botanical species; he also captures the sense of novelty and intrigue associated with botany in the period. The natural productions of the New World are represented here by Evelyn as objects of desire. His letters to Lynch and London, like those he addressed to his grand tour correspondents in the 1650s, were opportunities to confirm the existence of rumoured curiosities; in this case such rarities include "an *Orange* [newly planted in *Barbados*] of a most prodigious size, and such an Improvement of the *China*" and some wild "*Narcissus Tuberoso*'s" (*Polyanthus tuberosis*) growing in the region. The knowledge of these unfamiliar species, as well as their seeds, bulbs, and roots, functioned as a kind of material and intellectual capital in Evelyn's circle.

Offering us a window on to the seed trade in the late seventeenth-century, he portrays the London nurserymen as "mercenary" and the Dutch as a "jealous" people guarding their aromatics in the East Indies from the rest of the world. In order to bolster his argument that such barriers to botanical experimentation can be overcome, Evelyn refers to a tale from Richard Hakluyt's *Principal Navigations* about an English pilgrim "who some yeares since brought home the first head of *Saffron*, out of *Greece* (whence it

[108] BL Add. 78299, no. 436, Evelyn to London, 27 September 1681.

was death to transport it) in the holow head or top of his Pilgrims staff."[109] Ingenuity coupled with some good fortune, suggests Evelyn, will eventually enable England to redistribute such valuable botanical species throughout its colonies. The examples of sugar, ginger, indigo, and the "other beneficial *Spices* and *Drougs*" now cultivated in the Western plantations, he asserts, testify to substantial rewards attendant on botanical experiments. In this letter, both the aesthetic and commercial values of transplantation are fused, with Evelyn's advocating the replanting of the British Empire. Although he claims not to have "the Impudence to beg" botanical rarities for himself, the expectation clearly is that Evelyn would appreciate such specimens in return for acting as an intermediary between London and the Royal Society. Evelyn's letters to Wren and London illustrate how inseparable private and institutional motives were in the production of seventeenth-century natural histories. The knowledge Evelyn gained by working in his own gardens, accumulating botanical curiosities, directly benefited the Royal Society. The specimens from these experiments facilitated the exchange of both objects and knowledge between the Royal Society and its correspondents. At the same time, Evelyn's role as an agent for the institution's repository also promised to yield curiosities for his own collections.

Evelyn's New World letters are also of importance because they permit us to trace developments in the visual culture of natural history. Writing to William London about

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[109] In his letter, Evelyn mistakenly gives Holinshed rather than Hakluyt as the source of this tale. Hakluyt's account, which stresses the economic rewards associated with the propagation of non-native species in Britain is as follows: "It is reported at Saffronwalden that a Pilgrim purposing to do good to his countrey, stole an head of Saffron, and hid the same in his Palmers staffe, which he had made hollow before of purpose, and so he brought this root into this realme, with venture of his life: for it he had bene taken, by the law of the countrey from whence it came, he had died for the fact. If the like love in this age were in our people that now become great travellers, many knowledges, and many trades, and many herbes and plants might be brought into this realme that might doe the realme good," Hakluyt, *The Principal Navigations Voyages Traffiques and Discoveries of the English Nation*, 12 vols (Glasgow: James MacLehose, 1904) vol. 5, 240-41.

the latter's scheme for a natural history of the American colonies,[110] Evelyn urges his correspondent to "be curious to adorne [his] Worke, with true and handsome draughts, of the Animals, Plants, and other things that you describe in the natural Part." According to Evelyn, many authors of such histories fail to procure adequate illustrations for their treatises; he hopes that London will "sprinkle here and there a Prospect of the Countries, by the true and naturall *Landskipe*, [for] it would be of infinite Satisfaction, and imprint an *Idea* of those Places you passe-through, which are so strange to us, and so desirable." Here, Evelyn points to the ways in which, in the later seventeenth century, an image of the natural object itself was becoming a commodity within the curious sphere. The many problems inherent in transporting specimens and living creatures from distant lands meant that by the time such objects became displayed in cabinets they had usually lost many of their defining features including colour and shape.[111] Thus, an accurate representation of an unfamiliar plant or animal was often preferable to the actual object, especially for those individuals with taxonomical ambitions. When Evelyn calls upon London to provide readers with views of the American colonies, he also underlines the aesthetic function of such natural history publications. In his letter to Wren about London's project, Evelyn had indicated that the projected natural history would contain "things of Use, as well as Curiositie"[112]; his discussion of the plates for London's work shows Evelyn's theorizing about this opposition. His use of the terms "prospect" and

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[110] For a comprehensive survey of natural history writings about the New World, see Raymond Phineas Stearns, *Science in the British Colonies of America* (Urbana, IL: U of Illinois P, 1970). Particularly relevant for our purposes is Stearns's account of the field naturalist John Banister's (1650-92) projected natural history of Virginia, 195-211.

[111] In 1696, John Woodward published his *Brief Instructions for Making Observations in all Parts of the World: as also for Collecting, Preserving, and Sending over Natural Things* (London, 1696). Here, Woodward directs travellers to seek out not only curious, but also "ordinary" and "trivial" natural objects; he furnishes instructions for drying plants between the leaves of a book, packaging and labeling seeds, and preserving insects in bottles of brandy, 10, 12-13, 15.

[112] BL Add. 78299, no. 435, Evelyn to Wren, 23 September 1681.

"landskip" suggest the ways in which such treatises could put frames around nature – presenting the reader with scenes which resembled landscape paintings. For Evelyn, illustrations should serve as "ornaments" to a natural history; such pleasing and realistic images also invited readers to imagine themselves in the scenes depicted on the page. The "virtual" quality of the illustrated natural history was clearly appreciated by Evelyn.

Throughout Evelyn's letter to William London, we encounter the theme of possession. The transplantation of new species, the collecting of curiosities, and the engraving of images of natural phenomena all constitute acts of appropriation. It was not until the naturalist artist Mark Catesby's (1682-1749) *Natural History of Carolina, Florida* and the *Bahama Islands* (1731-47) that the first major illustrated natural history of the New World appeared.[113] In the exquisite colour plates in Catesby's publication, we find the kind of visual representation of the natural productions of the British colonies that Evelyn had pressed his own correspondent to undertake. Whereas a natural specimen in a cabinet articulated an erasure of context, illustrations like those executed by Catesby conveyed the interdependent relationships among natural phenomena.[114] His plate of the logwood tree (*Lignum campechianum*) and the green lizard of Jamaica,[115] for example, expresses visually the kinds of connections between natural objects which often became severed in the model of the museum collection. A skilled field naturalist,

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[113] The various that roles Catesby assumed during his career (of naturalist, artist, gardener, traveller, Fellow of Royal Society) testify to his endless curiosity about nature, particularly regarding that of the New World. The most recent critical assessment of Catesby's life and work is the collection of essays, *Empire's Nature: Mark Catesby's New World Vision*, ed. Amy R. W. Meyers and Margaret Beck Pritchard (Chapel Hill: U of North Carolina P, 1998). Much useful information about Catesby can also be found in George Frederick Frick and Raymond Phineas Stearns, *Mark Catesby: The Colonial Audubon* (Urbana, IL: U of Illinois P, 1961). See also, Henrietta McBurney, *Mark Catesby's Natural History of America: The Watercolors from the Royal Library, Windsor Castle* (London: Merrell Holberton, 1997).

[114] Catesby's *Natural History* problematizes Mary Louise Pratt's argument that "natural history extracted specimens...from their organic or ecological relations with each other," and "interrupted existing networks of historical and material relations among people, plants, and animals wherever it applied itself," *Imperial Eyes: Travel Writing and Transculturation* (London: Routledge, 1992) 31-32.

[115] Catesby, *Natural History*, vol. 2, plate 66.

Catesby prepared drawings of flora and fauna in the wild, observing and translating into visual form the interactions between different creatures and between the creatures and their environment.[116] In the text that accompanies this particular illustration, we find a rich record of the diverse values that were ascribed to New World nature in the early modern period. Here, Catesby writes of the "the bloody Disputes which this useful Tree has occasioned between the *Spaniards* and *English*" and wishes that "the Inhabitants of our Southern Plantations could be induced to propagate it, as well for their own Advantage, as that we may be supplied by them, when wholly deprived of getting it from the *Spaniards* as we have hitherto done either by Force or Stealth."[117] Catesby's treatment of the logwood, a source of black and violet dyes, testifies to the ways in which natural histories were implicated in economic discourses. In his letter to William London, Evelyn had displayed a keen awareness of the importance of New World species for the expansion and vitality of the British Empire; he assigned a critical role to the illustrated natural history in England's search for new commodities. In Catesby, we find this relationship between botany and empire-building made concrete.

Another of Catesby's plates, that of the cacao tree,[118] brings home the commercial dimension of the natural history. The species is rendered in amazing detail with a view of a cross-section of one of the tree's pods. It is from the tree's seeds, explains Catesby, that chocolate is made.[119] The artist's inclusion of a single cacao seed in the bottom left of the plate provides readers with a sense of scale – another type of information more

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[116] For an exploration of the ways in which Catesby's illustrations in the *Natural History* negotiate the issue of environmental relationships in an imperial context, see Amy R. W. Meyers, "Picturing a World in Flux: Mark Catesby's Response to Environmental Interchange and Colonial Expansion," *Empire's Nature*, 228-61.

[117] Catesby, *Natural History*, vol. 2, 66.

[118] Catesby, *Natural History*, vol. 2, appendix, plate 6.

[119] Catesby, *Natural History*, vol. 2, appendix 6.

difficult to convey in the cabinet of curiosities. A species such as the cacao tree was usually represented in the early museum only by its seeds.[120] As was the case with his description of the logwood, Catesby's discussion of the cacao tree stresses the commercial value of the species. He recounts how, in Jamaica in 1714, he had observed, "the remains of extensive Cacao-walks, planted by the *Spaniards*, when in possession of that Island" which should serve as "sufficient inducement...for their successors to continue the same gainful agriculture." Spain and France will continue to dominate the trade of this commodity, writes Catesby, unless parts of the British colonies such as the "Sugar-islands" begin cultivating this species. The objective was to supply not only domestic but also foreign markets.[121] Like Evelyn before him, Catesby firmly tied his nation's economic self-sufficiency with the transplantation and cultivation of non-native species – with the reordering of creation. There is no evidence that William London ever completed his projected natural history of the American colonies; Evelyn's letter to him, however, in which he both solicits donations for the Royal Society's repository and calls for an empirical, illustrated natural history of the New World remains a critical document. In this letter we encounter two related, yet distinct, approaches to the investigation of nature – the cabinet of curiosities and the illustrated natural history. By the time that Catesby began publishing the volumes of his *Natural History*, almost half a century after Evelyn had composed this letter to his correspondent in Barbados, the

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[120] As Grew tells us, for example, the Royal Society's museum contained a "cacaw-nut" from New Spain; these "kernels," he writes, are used as a form of currency by the Indians who also apparently "treat Noblemen [with *Chacawlate*]...as they pass through their Countrey." The author also provides an account of the delicacies and of the hot beverage made from these seeds that is served in coffee houses, Grew 204-5.

[121] Catesby, *Natural History*, vol. 2, appendix 6.

cabinet of curiosities had been replaced by more specialized collections, private and institutional.

Conclusion

I began this chapter by examining Evelyn's extended account of Pierre Morin's horticultural cabinet of rarities. The impact of this and other continental collections upon Evelyn was clearly profound. Focusing upon some of the materials in his archive and on two of his lesser-known publications, I use Evelyn as a case study for the ways in which members of the early Royal Society adopted the museum as a conceptual model. Taken together, his album of dried plants from Padua, his English versions of Lucretius and Naudé, and his letters to continental and New World correspondents reveal his enthusiasm for the encyclopedic approach to knowledge; they should be interpreted as acts of "translation" – instances of Evelyn's expressing the model of the cabinet of curiosities in textual form. My investigation of his collecting impulse has relied heavily upon his unpublished correspondence which provides a rich record of seventeenth-century attitudes towards material culture. In the next chapter, I explore the ways in which another founding member of the Royal Society, Henry Oldenburg, also a grand tourist and connoisseur of cabinets, created a new kind of publication, the *Philosophical Transactions*, which was informed by the collecting culture of the early modern period.

Chapter Two
Virtual Museum: Epistolary Commerce and the Accumulation of "Particulars"

Introduction

In 1681, the Royal Society published one of its most impressive and ambitious works – Nehemiah Grew's illustrated catalogue of the institution's "repository" for rarities. Among the diverse curiosities described in *Musaeum Regalis Societatis* were the following: a snowshoe from Greenland, a flying squirrel from Virginia, "a great chequered tortoise-shell" from Madagascar," a "cacaw-nut" from New Spain, a red and blue parrot from Java, a cone from the cedar trees at Mount Lebanon, a small quantity of Ethiopian pepper, a pair of ginger-roots from Egypt, the rose of Jericho, "a little box turn'd out of a nutshell," a saffron kiln given by Charles Howard, the first Earl of Carlisle, and a reflecting telescope donated by Newton.[1] A great jumble of *naturalia* and *artificialia*, this museum constituted the Society's initial and ultimately unsuccessful attempt at assembling a research collection for its Fellows.[2] While the modern reader might confidently assign to the objects listed by Grew the labels, "cultural artifact," "botanical specimen," "commercial commodity," and "scientific instrument," such strict categorizations would not reflect the commingling of values implied by the term "curiosity" in the period. At the site of the collection several impulses coalesced: an appreciation of exquisite workmanship, an appetite for exotic botanical and zoological species, taxonomic ambition, economic interest, and a spirit of empirical inquiry.

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[1] Grew, *Musaeum Regalis Societatis.* 375, 20, 36, 204, 57, 212, 220, 228, 219, 372, 371, 360.
[2] As Hunter has argued, rather than becoming a representative and systematized collection of the world's productions, the repository retained the virtuoso and eclectic character of the early modern cabinet of curiosities, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository.'"

This chapter traces some of the crucial connections between the model of the early museum and the Royal Society's periodical, the *Philosophical Transactions*. Under its first editor, Henry Oldenburg (c. 1618-1677), the journal displayed a close engagement with the collecting culture of the seventeenth century. At the practical level, the *Philosophical Transactions* functioned as a medium for securing donations for the Society's repository. More significantly, the journal became an archive of "matters of fact" – a collection of first-hand observations about all manner of natural and artificial phenomena. Building upon Paula Findlen's scholarship on the museum as an epistemological structure,[3] I will consider the ways in which Oldenburg constructed what today might be called a "virtual museum." An examination of Oldenburg's methods of gathering information, his editorial prefaces, and selected articles in the journal makes evident the relationship between the form of the *Philosophical Transactions* and early modern cultures of collecting. The Society's use of the "list of queries" as an epistemological tool is also explored in this chapter. Out of the units of natural knowledge that flowed through his correspondence network, Oldenburg created a *cento* or literary patchwork. The processes of accumulation and recontextualization inherent in the model of the museum are clearly embodied in the *Philosophical Transactions*.

[3] Findlen's argument that the museum was both a cultural space and an epistemological structure in the period is found in her article, "The Museum: Its Classical Etymology and Renaissance Genealogy," and in her full-length study of collecting, *Possessing Nature*.

Henry Oldenburg: The Making of an Intellectual Broker

The seventeenth century witnessed the creation of great webs of correspondence by such celebrated figures as Boyle, Gassendi, Leibniz, Locke, and Mersenne.[4] As part of this movement, Oldenburg built an impressive international information exchange, engaging in epistolary transactions with the leading philosophers, scientists, and writers of his day: Spinoza, Newton, Huygens, and Milton were among his correspondents. In this chapter, I am concerned with the correspondence network as a genre devoted to the exchange of natural and artificial curiosities. John Evelyn, for example, constructed an epistolary circle for "hortulan" information in which correspondents from both Europe and America supplied him with seeds, roots, bulbs, as well as botanical knowledge. A more obvious precursor to Oldenburg's *Philosophical Transactions* is the "Office of Public Address" proposed by the energetic seventeenth-century reformer Samuel Hartlib (c. 1600-1662). Baconian in spirit, the network was conceived as a state-sponsored institution for the exchange and dissemination of information about science and technology.[5] Although never realized on the grand scale envisioned by the Hartlib circle, the Office nevertheless stood as an influential model of cooperative research. The plans for the international network were highly publicized, and a number of Fellows of the early Royal Society in addition to Oldenburg were closely associated with Hartlib's projects.[6]

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[4] For a discussion of the correspondence and archives of Leibniz and Boyle, see Michael Hunter, *Archives of the Scientific Revolution: The Formation and Exchange of Ideas in Seventeenth-Century Europe* (Woodbridge: Boydell, 1998).

[5] For an account of Hartlib's "Office of Address," see Charles Webster, *The Great Instauration: Science, Medicine and Reform 1626-1660* (New York: Holmes and Meier, 1976) 67-77. See also the recent collection of essays, *Samuel Hartlib and Universal Reformation.*

[6] Fellows of the early Royal Society with strong ties to the Hartlib circle included Evelyn, Beale, Petty, and Boyle.

Among Oldenburg's eighteenth-century intellectual heirs was James Petiver (1663-1718), the proprietor of a successful London apothecary shop and a Fellow of the Royal Society. An assiduous collector of natural curiosities, Petiver maintained a vigorous correspondence with merchants, missionaries, surgeons, and planters stationed in all parts of the world.[7] Peter Collinson (1694-1768), a wealthy linen merchant, performed a similar function later in the century for the field of natural history. Through such impressive colonial contacts as Benjamin Franklin, William Byrd II, and John Bartram, Collinson supplied English gardens and cabinets with a startling variety of seeds and botanical specimens from North America.[8] It was, of course, the famous physician and founder of the British Museum, Hans Sloane (1660-1753), who most closely resembled Oldenburg both in his international correspondence network for scientific matters and in his efforts to resuscitate the Society's *Philosophical Transactions* during the years 1695-1713.[9]

While these men may have differed in social status, occupation, temperament, and intellectual orientation, each clearly recognized the crucial role that communication would play in the increase and promotion of natural knowledge. To obtain information and specimens, the intellectual broker required a certain degree of cosmopolitanism, sociability, diplomacy, and determination. Oldenburg's suitability for becoming the

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[7] For a comprehensive survey of Petiver's epistolary efforts to secure natural history specimens and information, see Raymond Phineas Stearns, "James Petiver: Promoter of Natural Science, c. 1663-1718," *Proceedings of the American Antiquarian Society*, new ser. 62 (1952): 243-365. Stearns tells us that Hans Sloane eventually acquired Petiver's collections and that a number of Petiver's specimens may still be found today in the British Museum, 244.

[8] For Collinson's role in promoting the study of botany in the eighteenth century, see Stearns, *Science in the British Colonies of America* (Urbana, IL: U of Illinois P, 1970). For Collinson's letters, see *Brothers of the Spade: Correspondence of Peter Collinson, of London, and of John Custis, of Williamsburg, Virginia 1734-1746*, ed. E. G. Swem (Barre, MA: Barre Gazette, 1957).

[9] For Sloane's career, *Sir Hans Sloane: Collector, Scientist, Antiquary, Founding Father of the British Museum*, ed. Arthur MacGregor (London: British Museum P, 1994); E. St. John Brooks, *Sir Hans Sloane: The Great Collector and His Circle* (London: Batchworth, 1954).

Society's primary "intelligencer" has been charted by several scholars.[10] Oldenburg's predisposition to forming an epistolary network (and later the *Philosophical Transactions*) arose from his exceptional linguistic skills, his appointment by the Senate of Bremen to negotiate with Cromwell during the Anglo-Dutch wars, his employment as travelling tutor to Boyle's nephew, Richard Jones,[11] and his participation in the Montmor Academy in Paris.[12]

It is Oldenburg's period as travelling tutor in the late 1650s that is particularly relevant for our purposes. By the time he accompanied Jones and various other pupils to the continent in the mid-seventeenth century, visiting cabinets and collecting curiosities were considered standard activities for the grand tourist. As Bacon advocates in his essay "Of Travel" (1625), the inquisitive grand tourist should seek out "antiquities and ruins," "houses and gardens of state and pleasure," "treasuries of jewels and robes," and "cabinets and rarities."[13] Oldenburg's correspondence gives us some idea of the ways in which these conventions manifested themselves in his own continental travels. In a letter dated 19 March 1657/8, for example, he confides in Boyle his hope of eventually visiting Kircher's famous collections at the Jesuit College in Rome:

> [his ocular demonstration of the Seas' flux and reflux by an elliptique glasse ring, filled wth Mercury,] his strange Grotta de' Serpi, his story of the ye growth of pulverised and sowne Cockles irrigated by sea-water; his Thermometre by a wild-oat's-beard; his vegetable phaenix's resurrection out of its owne dust by ye warmth of ye Sun; his pretended ocular confutation of Keplers magnetical

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[10] See, for example, Michael Hunter, "Promoting the New Science: Henry Oldenburg and the Early Royal Society," *Establishing the New Science*, 245-60; Marie Boas Hall, "The Royal Society's Role in the Diffusion of Information in the Seventeenth Century," *Notes and Records of the Royal Society* 29 (1975): 173-92.

[11] Jones was the son of Boyle's sister Catherine, Lady Ranelagh.

[12] The Montmor Academy for scientific learning operated privately at the home of Henri-Louis Habert de Montmor (c. 1600-1679) in Paris from approximately 1655 to 1664.

[13] Francis Bacon, *The Works of Francis Bacon*, eds. James Spedding, Richard Ellis, and Douglas Denon Heath, 14 vols. (London: Longman, 1857-74) vol. 12, 138.

> motions of ye Planets about the Sun, and of Gilberts magnetical motion of ye Earth, and of twenty other remarquable things...[14]

A tantalizing catalogue of experimental curiosities, indeed, the passage reveals Oldenburg's keen anticipation of witnessing first-hand such wonders.[15] The phoenix, or rather the birds that were substituted by collectors for the fabulous creature (birds of paradise, falcons), was one of several stock cabinet rarities.[16] Kircher's claim to produce a plant from its ashes was a variation on this miracle, one that continued to excite Oldenburg's imagination.[17] The repetition of the term "ocular" in the passage evokes the Baconian model of empirical inquiry adopted enthusiastically by Oldenburg and other Fellows of the early Royal Society. His use of the terms "demonstration" and

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[14] Vol. 1: 155, *The Correspondence of Henry Oldenburg*, ed. A. Rupert Hall and Marie Boas Hall, vols. 1-9 (Madison: U of Wisconsin P, 1965-73); vols. 10-11 (London: Mansell, 1975-76); vols. 12-13 (London: Taylor and Francis, 1986). All references to Oldenburg's correspondence will be to this edition and hereafter cited as *OC* followed by the volume and page in the edition.

[15] For a recent account of Kircher's curiosities, see Ingrid D. Rowland, *The Ecstatic Journey: Athanasius Kircher in Baroque Rome* (Chicago: U of Chicago Library, 2000).

[16] Thomas Browne, in his treatment of credulity, *Pseudodoxia Epidemica*, explores the myth of the phoenix and the ways in which the "culture of curiosity" perpetuates this mistaken belief: "The Manucodiata or bird of Paradise, hath had the honour of this name, and their feathers brought from the Molucca's, do passe for those of the Phaenix; which though promoted by rarity with us, the Easterne travellers will hardly admit, who know they are common in those parts, and the ordinary plume of Janizaries amongst the Turks," *Sir Thomas Browne's Pseudodoxia Epidemica*, ed. Robin Robbins, vol. 1 (Oxford: Clarendon, 1981) 203. All subsequent quotations will be to this edition. For a survey of the curiosities most commonly found in early modern cabinets, see chapter six, "Some Old Exhibits," in David Murray, *Museums: Their History and Their Use*, 3 vols. (Glasgow: Jackson, 1984) vol. 1, 39-77.

[17] In a letter dated 20 October 1659, Robert Southwell assures Oldenburg that when he travels to Rome he "shall be able fully to satisfy [Oldenburg] concerining Kerchers plant," *OC* 1: 324. Southwell had apparently just received a report of the fabulous plant from an English gentleman "newly come out of Italy" who "remembers to have seene in a glasse half as bigg as his head (close luted) a plante [grown] up ye length of his finger wth a kind of asshes at ye bottome." Seventeenth-century literature contains many references to the "revived plant." Browne's treatment of the theme of resurrection in the *Religio Medici* includes the following passage: "A plant or vegetable consumed to ashes, to a contemplative and schoole Philosopher seemes utterly destroyed, and the forme to have taken his leave for ever: But to a sensible Artist the formes are not perished, but withdrawne into their incombustible part, where they lie secure from the action of that devouring element. This is made good by experience, which can from the ashes of plant revive the plant, and from its cinders recall it into its stalk and leaves againe," Browne, *Works*, vol. 1, 59. Glanvill, in *The Vanity of Dogmatizing* (1661) also cites the revived plant in his discussion of atomism: "This *Hypothesis* may yet seem to receive further confirmation, from the artificial *resurrection* of *Plants* from their *ashes*, which *Chymists* are so well acquainted with..." (New York: Columbia UP, 1931). Samuel Butler's "Satire upon the Royal Society" offers another representation of the revived plant. Mocking the Society's experiments of measuring wind and weighing air, Butler writes of the "*Chymists* [who] *from a* Rose's *Ashes / Can raise the* Rose *itself in Glasses*," *The Genuine Remains in Verse and Prose of Mr. Samuel Butler*, ed. R. Thyer, 2 vols. (London, 1759) vol. 1, 55.

"confutation" to characterize Kircher's cabinet conveys the experimental features of the Jesuit's collecting enterprise; his chamber of wonders had a scientific and corrective function. While reinforcing the "things-not-words" dichotomy championed by the Royal Society, Oldenburg also underscores the visual delight and spectacle widely associated with Kircher's celebrated museum. At the same time, by referring to Kircher's "story" of the irrigated cockles and his "pretended" confutation of Kepler, Oldenburg highlights Kircher's performativity and the narrative qualities of his collection. Visitors who encountered this dazzling display of "remarquable things" were drawn into a web of fantasy created by this self-styled magus.

His miniature portrait of Kircher's museum functions additionally as a well-crafted advertisement for the particular genre of continental news Oldenburg was positioned to deliver to Boyle and to other virtuosi. It was during this period abroad that he began to fashion his role as an intelligencer by accumulating experiences and material objects that would feed the curiosity of his correspondents. Scattered throughout Oldenburg's letters from the grand tour are references to the latest European works on natural philosophy, to experiments performed at private academies, to continental cabinets and libraries, to new chemical recipes, and to rare botanical species. In his milieu, these items constitute the commodities of knowledge, to be accumulated, displayed, and exchanged. An intense appetite for the new and the rare fueled the knowledge economy that Oldenburg played such a key role in shaping. In letter addressed to Oldenburg in 1658, we find a strong articulation of the commercial metaphor for knowledge. Hearing from a "learned acquaintance" about a new medicinal cure for syphilis, Boyle hopes to send Oldenburg the preparation to "trade among [his]

philosophicall merchants" (*OC* 1: 192). Boyle recognized that the communication of such a chemical "secret" served more than one purpose.[18] Not only did it enlarge the field of medicine, it also facilitated future exchanges of information.

Oldenburg's private epistolary network depended not only upon his ability to procure new books and objects, but also upon his skills to present them as rarities to his addressees. On 11 April 1659, for example, he wrote to Boyle from Paris about several recent scientific publications.[19] Included in his catalogue of new notable books is published version of Annibal Barlet's lectures on chemistry.[20] Apparently Oldenburg also coveted a pair of rare manuscripts on alchemy but could not afford the high sum being asked. In another letter sent from Paris in 1659, he supplies Boyle's curious gaze with an altogether different kind of scientific object: "I adde hereunto some few seeds of the sensitive plante, wch I was presented wth here, and you may try, how they will speed at Oxford" (*OC* 1: 253).[21] Although on a much smaller scale than Evelyn's hortulan epistolary circle, Oldenburg's correspondence network was also the occasion for seed exchanges.[22]

The image of Oldenburg's carefully enclosing a packet of rare seeds with his letter to Boyle is symbolic of several features of this emerging culture of curiosity. For Oldenburg's intellectual circle, the sensitive plant and a host of other such curiosities

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[18] For a recent account of the relationship between secrets and early modern science, see William Eamon, *Science and the Secrets of Nature: Books of Secrets in Medieval and Early Modern Culture* (Princeton: Princeton UP, 1994).

[19] This letter is in *OC* 1: 213-17.

[20] Barlet's work was entitled, *Abregé des choses necessaries au cours de la chymie* (1657).

[21] The sensitive plant or *mimosa pudica* was an object of interest because of the curious tendency of its leaves to curve downwards and its leaflets to fold together when touched. Evelyn, for example, writes of visiting the Oxford physic garden in 1654 "where the Sensitive [&humble] plant was shew'd us for a greate wonder," *Diary* 3: 109-10.

[22] To take but one example, Oldenburg entered into a correspondence in 1662/3 about melon seeds with Jean de la Quintinie, the French King's gardener at Versailles. See, for example, *OC* 2: 31 and *OC* 2: 60. In 1670, de la Quintinie visited Evelyn's gardens at Sayes Court; Evelyn's translation of de la Quintinie's *The Compleat Gard'ner* appeared in 1693.

became objects of veneration. Among the items that appear to achieve this elevated status in Oldenburg's correspondence are recipes for invisible ink (an essential tool for intelligencers), clocks of perpetual motion, burning mirrors, echoes, and transparent beehives.[23] Scholars from several disciplines have investigated the concept of the fetish, with the relationship between collecting and the fetish receiving much critical attention in recent years. [24] According to Susan M. Pearce, fetishistic collections are "formed by people whose imaginations identify with the objects which they desire to gather."[25] Displaying a "possessive but worshipful attitude towards his objects,"[26] the fetishistic collector is driven to assemble random "samples" of phenomena while the "systematic collector" is interested instead in accumulating representative "examples" that will "demonstrate a point."[27] Oldenburg's epistolary network, which facilitated the exchange of curiosities, invites us to examine some of these impulses that Pearce associates with fetishistic collecting. In a letter dated 20 October 1659, for example, Robert Southwell[28] recounts to Oldenburg a visit to a fascinating cabinet at Montpellier. Assembled by Nicolas Grollier de Servières (1593-1685), a retired military engineer, the collection

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[23] *OC* 1: 138, 156 (invisible ink); 1: 324 (clocks of perpetual motion); 1: 295 (burning mirrors); 1: 433-34, 473 (echoes); 1: 102 (transparent beehives). With its Virgilian genealogy and economic potential, apiculture became a popular topic in seventeenth-century literature. See, for example, Samuel Hartlib, *The Reformed Common-Wealth of Bees* (1655). For the Hartlib circle's adoption of the beehive as a social model of cooperation and industry, see the essays in *Samuel Hartlib and Universal Reformation*; see also, Bennett and Mandelbrote, *The Garden, the Ark, the Tower, the Temple*. For the use of apiaries in the garden, see book two, chapter thirteen of Evelyn's *Elysium Britannicum*, 273-87.

[24] Susan M. Pearce surveys some of these approaches, many of which incorporate Marxist and Freudian elements, in her essay, "Collecting Reconsidered," *Interpreting Objects and Collections*, ed. Susan M. Pearce (London: Routledge, 1994) 193-204. For other treatments of collecting and fetishism, see Susan Stewart, *On Longing*; James Clifford, "On Collecting Art and Culture," *The Cultural Studies Reader*, ed. Simon During (London: Routledge, 1993) 49-73; Jean Beaudrillard, "The System of Collecting," *The Cultures of Collecting*, ed. John Elsner and Roger Cardinal (London: Reaktion, 1994) 7-24; and Frederick Baekeland, "Psychological Aspects of Art Collecting," *Interpreting Objects and Collections*, 204-19; Mieke Bal, "Telling Objects: A Narrative Perspective on Collecting," *The Cultures of Collecting*, 97-115.

[25] Pearce, "Collecting Reconsidered,"200.

[26] Pearce, "Collecting Reconsidered," 200.

[27] Pearce, "Collecting Reconsidered," 201-2.

[28] Southwell (1607-1677) was a traveller, diplomat, and later secretary of state; in 1690 he was elected President of the Royal Society and held that office for five years.

consisted largely of mechanical curiosities. "He has the finest Rarityes I ever saw," Southwell reports excitedly. De Servières is

> most wonderfull Curious is all worke, of ye hand...The [King] being at Lyons came 4. times to see his rarityes. he has divers sorts of Clocks with perpetuall motion, turnings in Ivory beyond what I ever saw, and one rarity amonghst ye rest wch I fancyed particularly, yt is on ye Seiling he has one hand yet shews ye Winds, wch is common, but after the fashion he has an other yt tells ye difference of ye Weather, dry or moist, opposite to ye usage of a Glasse yt serves for hot and Cold. (*OC* 1: 324)

Like Oldenburg's portrait of Kircher's museum, Southwell's catalogue of the Montpellier cabinet captures the intense theatricality of such curious enterprises. Relying upon a group of epithets commonly used to characterize early modern collections – "finest," "wonderful," and "curious" – he signals to Oldenburg that this cabinet will surely satisfy the appetite of the inquisitive traveller. This particular collection, with its elaborate time-pieces[29] and weatherglasses, invites its audience to participate in navigational narratives – to imagine itself engaged in daring maritime adventures. De Servières's ability to attract the most impressive of visitors, Louis XIV, further authenticates the high quality of this collector's artificial contrivances. Southwell heightens his representation of such objects as powerful charms by mentioning that the King, evidently captivated by de Servières's offerings, returned to the cabinet on several occasions. The image he projects here, of the cabinet as an altar for the curious, highlights the devotional aspects of the collecting culture. Placing himself at this elite cultural site, Southwell also firmly establishes his own social identity as a connoisseur of curious objects.

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[29] For an account of the production and the cultural significance of clocks in the period, see chapter four, "Running like Clockwork," in Lisa Jardine, *Ingenious Pursuits: Building the Scientific Revolution* (New York: Nan. A. Tate, 1991) 133-76. Jardine offers an excellent treament of the material culture of the Royal Society, exploring its development of numerous devices, instruments, and methods for mapping the natural world.

The nature of sound and echoes was one of those ancient fascinations, like apiculture, that received new life in the seventeenth century. Lucretius treats the subject of echoes in book four of *De rerum natura* and Ovid mythologizes the echo in the *Metamorphoses*. In the "Catalogue of Particular Histories" Bacon appends to the *Parasceve*, he urges his readers to investigate the subjects of hearing and sound,[30] while the *New Atlantis* contains a description of the "sound-houses" where the Fellows of Solomon's House "practise and demonstrate all sounds, and their generation."[31] Evelyn includes a chapter entitled, "Of artificial Echo's, Musick, & Hydraulick motions," in the second book of his *Elysium Britannicum* where he considers the ornamental role of echoes in the pleasure garden and describes the echo chambers of such celebrated gardens as the Tuileries at Paris.[32] Interpreting echoes as one of the "sports of nature" or *lusus naturae*,[33] Plot also devotes a section of his *Natural History of Oxfordshire* to the subject.[34] On 19 September 1661, Southwell responded to Oldenburg's query for information with an extended catalogue of various echoes. He recalls "that ye Duke of Toscany has made rare tryalls concerning the velocity in the motion of Sound," and that he supplied Boyle with an account of these experiments. At Naples, Lyons, Brussells, and Milan, Southwell witnessed wonderful echoes, but it was the cathedral of Gloucester that contained "the best whispering place [he] ever saw" (*OC* 1: 433-34).[35] Portraying

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[30] *Works* 8: 378.
[31] *Works* 3: 162. In these "sound-houses" they "represent and imitate all articulate sounds and letters, and the voices and notes of beasts and birds. [They] have certain helps which set to the ear do further the hearing greatly. [They] have also divers strange and artificial echoes, reflecting the voice many times, and as it were tossing it: and some that give back the voice louder than it came...[and] the means to convey sounds in trunks and pipes, in strange lines and distances," 162-63.
[32] Evelyn, book two, chapter twelve, *Elysium Britannicum*, 225-31, 228-29.
[33] For an account of *lusus naturae*, see Findlen, "Jokes of Nature and Jokes of Knowledge: The Playfulness of Scientific Discourse in Early Modern Europe."
[34] Robert Plot, *Natural History of Oxfordshire*, 7-17, 7.
[35] Evelyn also mentions the whispering place at Gloucester Cathedral, *Elysium Britannicum*, 230.

himself as the obsessive collector, delighting in the acquisition of new echoes, Southwell reveals something critical about this culture of curiosity. Materiality was not a defining quality of curiosities nor of the collection – for the inquiring gentleman, something as intangible as an echo could become a collectible. In this case, it was the epistolary form, an ideal genre for miscellaneous observations, which gave concrete expression to the collecting spirit.

Southwell's catalogue of echoes, in which he describes rather than theorizes about sound, is emblematic of many of the early Royal Society's scientific enterprises.[36] The tendency of the institution's projects not to progress beyond an initial stage of gathering "particulars" has recently been the subject of much fruitful scholarship. Steven Shapin has argued persuasively that the social ideal of gentlemanly conduct conditioned scientific discourse in the seventeenth century and that expressions of truth-claims were often inflected by tropes of modesty.[37] Examining the ways in which the legal criteria for establishing truth helped to shape the standards of scientific knowledge in the period, Barbara Shapiro has illuminated the Royal Society's adoption of the "fact" as a unit of reliable evidence.[38] According to Shapiro, the fact was not synonymous with truth, "but something which was capable of proof by eyewitness testimony."[39] The letters composed by Southwell and other Fellows of the early Royal Society, with their embedded catalogues of curiosities, should be situated within the context of early modern notions of civility and of the fact. We must also, however, rely upon additional interpretive

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[36] Perhaps one of the best examples of this feature of the Society's work was its attempt to answer Bacon's call for a History of Trades; this subject will be discussed in greater detail later in this chapter.
[37] Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England* (Chicago: U of Chicago P, 1994).
[38] For Shapiro's arguments on this topic see, *A Culture of Fact: England, 1550-1720* (Ithaca: Cornell UP, 2000) and her earlier study, *Probability and Certainty in Seventeenth-Century England: A Study between Natural Science, Religion, History, Law, and Literature* (Princeton: Princeton UP, 1983).
[39] Shapiro, *A Culture of Fact*, 110.

frameworks to understand fully these collecting impulses. That Southwell's letter does not move from an enumeration of specific instances of echoes to a synthesis cannot be attributed solely to his reluctance to appear ambitious, dogmatic, or disputative. It is true that many of the Society's early Fellows were simply not equipped intellectually nor inclined to carry out the kind of rigorous and systematic investigation of nature called for by Bacon in the Great Instauration[40] and that the collecting of samples was the most suitable contribution that the virtuosi could make to the institution's scientific program.[41] What such explanations fail to account for, however, is the degree to which the activity of collecting functioned as an end in itself. For Southwell, echoes were stimulating and pleasing objects of inquiry. Translating his experiences of them into epistolary form, he was able to take possession of these immaterial curiosities. At the same time, because the echoes were not put in service of a particular acoustic theory, they, like other early modern "strange facts," retained a life of their own. It was within the model of the collection, then, and the dynamics of epistolary exchange that value came to be assigned to curious phenomena.

If clocks of perpetual motion and "whispering places" became fixations in the period and the subjects of countless descriptions exchanged by the members of Oldenburg's correspondence network, such curiosities were also implicated in the early modern culture of gift-giving. Recently, scholars have begun to explore the crucial role

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[40] In book two of the *Novum Organum*, for example, Bacon outlines a method of inquiry involving tables of "Degrees or Comparison" and an elaborate scheme of "Prerogative Instances" to uncover the laws and forms of nature, *Works* 8: 167-350.

[41] Several scholars have explored the relationship between the collecting activities of the virtuosi and Baconianism. See, for example, Houghton, "The English Virtuoso in the Seventeenth Century" and Findlen, "Francis Bacon and the Reform of Natural History in the Seventeenth Century."

played by gift-giving in the development of the new science.[42] These studies show that gifts of specimens communicated scientific information, assisted individuals and institutions in constructing their identities, and maintained patronage systems. Seeking out items that would be of particular interest to his correspondents, Oldenburg demonstrated his commitment to new empirical forms of enquiry, his status as a connoisseur of the curious, and his civility within the epistolary sphere. I am interested here in the ways in which his curious letters functioned as extensions of similar acts of civility that he and his entourage experienced on the grand tour. Among the generous introductions and invitations he received during this period was Henri-Louis Habert de Montmor's inclusion of Oldenburg in his private academy. The contact with learned natural philosophers and the exposure to Cartesianism offered by the Montmor Academy in Paris in 1659-60 clearly had an important impact upon the future founder of the *Philosophical Transactions*. Settled once again in England at the Restoration, Oldenburg wrote to de Montmor on 28 June 1660 to express his gratitude. In the first half of the letter, Oldenburg thanks his host for his "kindness and civility" and "the privilege of taking part in the learned meetings which take place under [his] illustrious patronage" (*OC* 1: 378); the second half of the letter is devoted to the subject of seventeenth-century variegated roses, of which Oldenburg has enclosed some petals. Although he signals to his addressee with the phrase, "to change the subject" (*OC* 1: 379), that the discourse on roses marks a break from the first part of the letter, this is not actually the case. His

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[42] See, for example, Findlen, "The Economy of Scientific Exchange in Early Modern Italy," *Patronage and Institutions: Science, Technology and Medicine at the European Court 1500-1750*, ed. Bruce Moran (Woodbridge: Boydell, 1991) 5-24; Mario Biagioli, *Galileo, Courtier: The Practice of Science in the Culture of Absolutism* (Chicago: U of Chicago P, 1993). For an account of the function of gifts in early modern France, see Natalie Zemon Davis, *The Gift in Sixteenth-Century France* (Madison: U of Wisconsin P, 2000) and "Beyond the Market: Books as Gifts in Sixteenth-Century France," *Transactions of the Royal Historical Society*, 5th ser. 33 (1983): 69-88. See also, Marcel Mauss's classic study, *The Gift: The Form and Reason for Exchange in Archaic Societies*, trans. W. D. Halls (London: Routledge, 1990).

extended acknowledgement of de Montmor's generosity includes the expected offer to repay this kindness and it is clear from the letter that Oldenburg's catalogue of curious roses and his gift of their petals represent his attempt to reciprocate his host's civilities.

On more than one level, Oldenburg's botanical enclosures serve as a link between his participation in the Montmor Academy and the early Royal Society. Recalling that de Montmor was once "so obliging as to talk to [them] about several sorts of rare roses which [he] had been informed were to be found in England," Oldenburg made "special inquiries," upon his return to London, locating a few species that were "out of the ordinary" (*OC* 1: 379). The varieties about which he gathers information include the "*Rosa mundi*," the "spotted Parkinson," and "the rose of York and Lancaster." Possibly at least one of these species was only introduced into England in the seventeenth century.[43] By identifying a way in which he can serve de Montmor, Oldenburg maintains the social bond between them as individuals, while at the same time creating a connection between their institutions – the Montmor Academy, then still in operation, and the bourgeoning Royal Society in London. The transaction embodied in this letter – rose petals (with promise of bushes) in exchange for membership in a foreign academy of learning – is telling. Once again, the Royal Society's rallying cry, "things not words," is interrogated. In an economy of knowledge sustained by the swift trading of curious books, objects, reports, ideas, and images, the distinction between material and intellectual value is difficult to sustain.

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[43] The York and Lancaster Rose (*Rosa damascena* 'Versicolor'), a flower from Asia Minor, may have been a new introduction to England in the period. For a description of this species, see "*Rosa damascena*," *The New Royal Horticultural Society Dictionary of Gardening*, ed. Mark Griffiths, vol. 4 (London: Macmillan, 1992).

The discourse of transplantation, negotiated in Oldenburg's letter about curious roses, reflects the impulse to create a new context for material objects. "Strange petals," become a gift exchanged between inquisitive men and includes an implication that these rarities will eventually be the stuff of de Montmor's private botanical experiments as well. In a letter Oldenburg wrote to Hartlib two years earlier, this process of recontextualization, embedded in the practices of both collecting and gift-giving, is expressed rather differently. On 12 September 1658, Oldenburg informed Hartlib of his happy return to Frankfurt after "having performed [a] voyage to Nurnberg, Iena, Leipsig, Dresden, Weimar, Gotha, Fulda etc. wth contentment" (*OC* 1: 179). Offering Hartlib some details of his travels through Germany, Oldenburg writes: "At Gotha particularly we were entertained wth much honor and civility: The Prince there feasting us at his castle, urging us to lodge there a night (wch we excused) presenting Mr Jones wth a artificiall piece of his Cabinet, defraying us in our Inne" (*OC* 1: 179). One of several acts of hospitality, the Duke Saxe-Gotha's gift of an object from his cabinet to Jones is typical of the exchanges that gave rise to the collecting culture of the early modern period. Gifts of curiosities testified to the social standing and refined taste of both parties. Such ritual acts of gift-giving also expose, however, the inherent instability of these curiosities. In the case above, an object from the Duke's private collection is transformed for Jones into a souvenir from the grand tour; something that was guarded previously as a secret is released into the public domain. By reproducing this particular incident of gift-giving in epistolary form, Oldenburg further extends the journey of the Duke's cabinet piece into the literary sphere. While Jones may possess the actual rarity,

the object also becomes the conceptual property of Oldenburg's addressee and reveals the special capacity of the correspondence network to transmute and multiply wonders.

"Broken Knowledge" and the Cento Genre

Oldenburg's private information exchange, shaped by the collecting culture he witnessed on the continent in the mid-seventeenth century, assumed its more public form in 1665 when he founded the *Philosophical Transactions*.[44] Generally considered the first periodical devoted to scientific knowledge,[45] this publication supplied its readership with accounts of experiments, natural history observations from all parts of the globe, excerpts from continental journals, and descriptive book reviews.[46] The inaugural issue of the periodical was dedicated appropriately to the Royal Society, the institution for

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[44] The full title of the journal was *Philosophical Transactions: Giving some Accompt of the Present Undertakings, Studies, and Labours of the Ingenious in many Considerable Parts of the World.* Oldenburg was editor from 1664/5 until the time of his death in 1677; it is this period with which I will be concerned in the thesis.

[45] The *Philosophical Transactions* are usually discussed in relation to three other scientific periodicals that appeared in the late seventeenth century: the French *Journal des Sçavans*, the Italian *Giornale de Litterati d'Italia*, and the German *Miscellanea Curiosa*. For the *Philosophical Transactions* as the first scientific periodical, see Adrian Johns, "Miscellaneous Methods: Authors, Societies and Journals in Early Modern England," *British Journal for the History of Science* 33 (2000): 159-86; David A. Kronick, "Notes on the Printing History of the Early *Philosophical Transactions*," *Libraries and Culture* 25 (1990): 243-68. See also the surveys of this genre by David. A. Kronick, *A History of Scientific and Technical Periodicals: The Origins and Development of the Scientific and Technical Press, 1665-1790*, 2nd ed. (Metuchen, NJ: Scarecrow, 1976) and A. A. Manten, "Development of European Scientific Journal Publishing before 1850," *Development of Science Publishing in Europe*, ed. A. J. Meadows (Amsterdam: Elsevier, 1980) 1-22.

[46] Subsequent issues of the journal followed the pattern set out in the first number. The following is a transcription of the table of contents of the inaugural issue of the *PT*: *An Introduction to this Tract. An Accompt of the Improvement of* | Optick Glasses *at* Rome. *Of the Observation made in* England, | *of a Spot in one of the Belts of the Planet* Jupiter. *Of the motion of* | *the late* Comet *praedicted. The Heads of many New Observations* | *and Experiments, in order to an Experimental* History of Cold; | *together with some* Thermometrical *Discourses and Experiments.* | *A Relation of a very odd Monstrous* Calf. *Of a peculiar* Lead- | Ore *in* Germany, *very useful for Essays. Of an* Hungarian Bo- | lus, *of the same effect with the* Bolus Armenus. *Of the New* Ame- | rican *Whale-fishing about the* Bermudas. *A Narative concerning* | *the success of the* Pendulum-watches *at Sea for the* Longi- | tudes; *and the Grant of a* Patent *thereupon. A Catalogue of the* | *Philosophical Books publisht by* Monsieur de Fermat, *Counsellour at* | Tholouse, *lately dead.* |, *Philosophical Transactions* (New York: Johnson Reprint Corp. / Kraus Reprint Corp., 1963). All references to the journal will be to this edition and hereafter cited as *PT* followed by the volume and page in the reprint.

which the *Philosophical Transactions* served as an enormously influential, if unofficial, mouthpiece.[47] Embodied in this dedicatory epistle is Oldenburg's vision of the journal as a dynamic structure for the communication of matters of fact: "In these Rude Collections, which are onely the Gleanings of my *private* diversions in broken hours, it may appear, that many Minds and Hands are in many places industriously employed..." (*PT* 1-2). In these lines, Oldenburg signals to his readership two key aspects of the journal: first, that it is not a finished product but rather, a sort of work-in-progress composed during short snatches of time; and, second, that it represents the discoveries of a far-flung network of curious individuals. In a later dedication to then President of the Royal Society, William Brouncker, Oldenburg continues this self-conscious construction of the journal as a preliminary and miscellaneous set of observations when he refers to the "rude" and "undigested" quality of the "communications" yielded by his "philosophical commerce" (*PT* 1-2).

In a letter of May/June 1666, Boyle expresses a similar epistemology in which tiny bursts of thought and matters of fact are valued as the building blocks of useful learning. He apologizes to Oldenburg for sending for the newly founded journal only "loos Papers" and "unfinishst & incoherent Memoirs" (*OC* 3: 145, 146):

> Yet the scruples I have upon your score, as well as my own, are somewhat lessen'd, when I remember, that Men are serv'd and accommodated, not only by those Husbandmen, that once a year bring in whole wain-loads of Corn & Hogsheads of Wine, but also by Gardiners that do not wait for Autumn nor bring in at some such great & mature productions of their labour as Harvest and Vintage afford, but content themselves to be ever & anon furnishing the Markets with Baskets of Roots & Herbs and Flowers and Grapes, and other fruit, and by the

[47] Several scholars have explored the ways in which the *Philosophical Transactions* was a private venture undertaken by Oldenburg rather than one of the Society's official enterprises. See, for example, Hunter, "Promoting the New Science: Henry Oldenburg and the Early Royal Society"; Hall, "The Royal Society's Role in the Diffusion of Information in the Seventeenth Century"; Johns, "Miscellaneous Methods: Authors, Societies and Journals in Early Modern England."

> frequency & variety of these supplys make amends for the small Bulk of what they bring at a time. (*OC* 3: 145)

It is not difficult to see how such passages illustrate Shapin's claims about the gentlemanly character of the new science; the credibility of such natural philosophers as Boyle depended upon their social identities as modest and disinterested gentlemen.[48] What is particularly relevant for our purposes, however, is the way in which Boyle's reflections upon the dynamics of the agrarian market relate both to the form and substance of Oldenburg's publishing project. It is telling that Boyle relies upon an economic metaphor in order to distinguish between the comprehensive, polished investigation of a subject offered by the scientific treatise and the miscellaneous scraps of paper that represent scattered inquiries. In this image of the marketplace, variety is privileged over quality and the act of consumption over the conditions of production. Boyle's theorization of the commodification of knowledge serves, then, as an apt commentary on the periodical genre itself.[49] His argument that "the frequency & variety of these supplys make amends for the small Bulk of what they bring at a time" is clearly adopted by Oldenburg, who furnishes his readers with the raw materials of knowledge rather than its distilled essence. By printing the latest natural knowledge, even in brief and fragmentary pieces, he, like the experimental gardener, satisfies the emerging demand for the new and the rare.

Advertised as his own modest contribution to the advancement of learning, Oldenburg's journal became a literary counterpart of the Society's museum which Sprat

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[48] See chapter four, "Who was Robert Boyle? The Creation of Presentation of an Experimental Identity," in Shapin, *A Social History of Truth*, 126-92.

[49] For an exploration of the ways in which journals like the *Philosophical Transactions* were more economically viable than single folio treatises in the period, see Johns, "Miscellaneous Methods: Authors, Societies and Journals in Early Modern England."

had described in the *History* as "a General Collection of all the Effects of *Arts*, and the Common, or Monstrous *Works* of *Nature*" (251).[50] In addition to the descriptor, "rude collections," Oldenburg uses several terms in his periodical's dedicatory epistles that evoke the model of the wonder cabinet and the epistemology underlying such collecting enterprises. Characterizing the journal's entries as "glimpses of light" and "parcels" from which "every man may perhaps receive some benefit" (*PT* 1-2: dedicatory epistle to the Royal Society), Oldenburg locates in the periodical form a capacity, often associated with the museum, to deliver to its audience digestible nuggets of knowledge. He imagines the *Philosophical Transactions* as an instructive and intriguing space where his readers, having encountered a multitude of fascinating objects, will be inspired to carry out their own researches. In his preface to the third year of the journal, Oldenburg underscores its discrete structure, relying here upon an organic metaphor to describe the generative effect he strives to achieve: "I think, I may safely assume, that in these *Fragments*, something hath been contributed to sowe such seeds, as may somewhat conduce to the illustration and improvement of Philosophy, and of all Laudable and Useful Arts and Practices" (*PT* 1-2: 409). Closely allied to the cabinet of curiosities were two other cultural institutions devoted to empirical inquiry: the botanical garden and the anatomy chamber. Oldenburg's use of the word "specimen" to describe his journal's entries (*PT* 3-4: 898) reinforces the link between the periodical's form and these early modern sites of investigation in which objects are isolated from their natural environments and subsumed into the model of the collection.

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[50] For the ways in which late seventeenth-century scientific journals became repositories for "strange facts," see Daston and Park, *Wonders and the Order of Nature*, 231-40. Here, Daston and Park are concerned primarily with how these publications reflected a taste for the more bizarre and anomalous instances of nature such as conjoined twins and auroras.

Falling somewhere between the encyclopedic collections assembled by the Renaissance naturalists (Kircher, Aldrovandi)[51] and the more systematic study of nature advocated by Bacon in the Great Instauration, the *Philosophical Transactions* functioned partly as a salvage mission – an attempt to recuperate lost knowledge. Milton articulates this formulation of education as a postlapsarian enterprise in his prose tract, *Of Education* (1664): "The end then of learning is to repair the ruins of our first parents by regaining to know God aright..."[52] Members of the Royal Society and its precursors, often as part of a rhetorical strategy, portrayed the investigation of nature as a devotional mission that would help to mitigate the loss of knowledge that resulted from the fall of mankind. Like the various schemes for universal languages proposed in the seventeenth century,[53] Oldenburg's periodical gave expression to the belief that Adam possessed a perfect knowledge of God's design of the material world. In one of his prefaces, for example, the editor replies to the often-repeated charge that the Royal Society practiced an unproven and merely fashionable kind of inquiry. Tracing for his readers the biblical genealogy of the Royal Society, he argues that this "new philosophy," as the critics call it, was actually the "Discipline in Paradise" and that Adam, "who from observing the kinds and differences of Animals gave them Names," was the first naturalist (*PT* 5-6: 2088). In this apology, Oldenburg also describes the grand scope of the Royal Society's scientific program:

> Is it *New Philosophy*, to inquire diligently *the things that are*; I mean, To know how the World was made, and the Operation of the Elements; the beginning,

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[51] For an investigation of these and other Renaissance collectors, see Findlen, *Possessing Nature*.
[52] Milton, *Of Education*, *John Milton: Complete Poems and Major Prose*, ed. Merritt Y. Hughes (New York: Macmillan, 1957) 631. This tract, which appeared anonymously in 1664, was dedicated to Hartlib.
[53] The most famous of these schemes was Wilkins' *An Essay Towards a Real Character* (1668). For explorations of this topic, see James Knowlson, *Universal Language Schemes in England and France, 1660-1800* (Toronto: U of Toronto P, 1975); M. M. Slaughter, *Universal Languages and Scientific Taxonomy in the Seventeenth Century* (Cambridge: Cambridge UP, 1982).

> ending, and midst of Times; the Alterations of the Turning of the Sun, and the Change of Seasons, The Circuit of Years, and the Position of Stars; The natures of Living Creatures, the Furies of Wild Beasts, and the Reasonings of Men; the Violence of Winds, and the Motions of the Seas; the diversities of Plants, and the virtues of Roots; And all such things, as either Secret or more Manifest? (*PT* 5-6: 2088-89)

Taking the whole of creation as their object of study, the Fellows of the early Royal Society laboured constantly to bridge the gap between their own limited and imperfect apprehension of God's works,[54] and Adam's prelapsarian understanding of the world, in which "words" were fitted naturally to "things."

In his preface to the *Advancement of Learning* (1605), Bacon circumscribes the limits of human knowledge using language that is especially relevant to an exploration of the genre of the *Philosophical Transactions*:

> If any man shall think by view and inquiry into these sensible and material things to attain that light whereby he may reveal unto himself the nature or will of God, then indeed is he spoiled by vain philosophy: for the contemplation of God's creatures and works produceth (having regard to the works and creatures themselves) knowledge; but having regard to God, no perfect knowledge, but wonder, which is broken knowledge.[55]

Not only was experimental science attacked in the period for its novelty, but it was also assailed on the grounds that it was presumptuous. By distinguishing between "perfect" and "broken" knowledge, and positing that the natural and divine worlds were penetrable to very different degrees, Bacon presents an epistemological model that is resolutely

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[54] Defenses of experimental science often adopted the battle of the "ancients versus the moderns" as a rhetorical framework and championed the great advantages of scientific instruments for the ocular inquiry of nature. See, for example, chapter seven, "That Useful Knowledge is to be aided by Instruments. Modern Instances of such. Of the Telescope, Microscope, and Thermometer," Joseph Glanvill, *Plus Ultra or The Progress and Advancement of Knowledge Since the Days of Aristotle*, introd. Jackson I. Cope (Gainesville, FL: Scholars' Facsimiles and Reprints, 1958). In his preface to the fifth year of the *Philosophical Transactions*, Oldenburg includes a section on these new mechanical "helps" for the senses, singling out for notice the air pump, barometer, hygroscope, thermometer, and the pendulum watch, *PT* 3-4: 894-95. Because of their exquisite workmanship, such instruments were considered desirable cabinet pieces. For a discussion of early collections devoted to scientific instruments, see Gerard l'E. Turner's essay, "The Cabinet of Experimental Philosophy," *Origins of Museums*, 214-22.

[55] *Works* 6: 95-96.

devout. As a defensive strategy, this particular formulation of scientific inquiry was obviously astute. Adopted enthusiastically by the members of the early Royal Society, this epistemology was also fully compatible with their ideal of the natural philosopher as modest Christian gentleman. What could be gained, then, by the methods of Baconian empiricism, while substantial and valuable, was consistently only an approximation of God's designs for nature; the proponents of the new science represented their discoveries as preliminary and modest attempts to probe the facets of creation.

The fragmentary quality of experimental science, expressed here by Bacon, is critical to an understanding of Oldenburg's project. In defining wonder as "broken knowledge," Bacon articulates the curious blend of optimism and belatedness that permeates much of the scientific literature of the seventeenth century. Oldenburg's task was to find a genre that would accommodate this postlapsarian vision of learning. Like the encyclopedic cabinets of the Renaissance, the *Philosophical Transactions* collected and displayed the traces of nature, samples of phenomena that testified to lost ages, distant places, and alien cultures. Taken together, the series of terms that Oldenburg uses to describe his journal – "rude collections," "gleanings," "undigested communications," "glimpses of light," "parcels," "specimens," and "fragments" – strongly suggests that he conceived of his periodical as a *cento* or literary patchwork. *Cento* is the Latin word for a garment of patchwork and denotes the process by which fabrics of different colours, textures, and patterns are stitched together to form one whole. An evocative term drawn from material culture, *cento* also came to refer to a genre of composition, in verse or

prose, which is made up of scraps from other authors.[56] In the *cento,* the definition of "text" as "that which is woven"[57] is forcefully articulated. The *cento* genre embodies several of the qualities normally associated with the museum collection: fragmentation, accumulation, and recontextualization. In its juxtaposition of various materials and images, the *cento* closely resembles the early modern cabinet of curiosities. The patchwork, like the encyclopedic collection, presupposes the existence of an original, coherent order that has broken apart. By reassembling its fragments, the creator of a *cento* exhibits both nostalgia for this previous order and confidence that it can be at least partially reconstructed through human ingenuity.

In the seventeenth century, two great works of scientific prose adopted the *cento* as a generic mode: Robert Burton's *Anatomy of Melancholy* (1621) and Thomas Browne's *Pseudodoxia Epidemica* (1646). Together, these works provide some literary context for the genre of the *Philosophical Transactions.* Burton's treatise, which probes the causes, forms, and cures of melancholy, is structured as a patchwork of quotations from classical and modern sources. In a self-conscious passage about his use of this particular genre, Burton writes: "As a good hous-wife out of divers fleeces weaves one peece of Cloath, a Bee gathers Wax and Hony out of many Flowers, and makes a new bundle of all...I have laboriously collected this *Cento* out of divers Writers...We can say nothing but what hath beene said, the composition and method is ours onely, and shewes a Schollar.[58] Here Burton is concerned primarily with the issue of originality and his

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[56] "Cento," *OED.* In Greek literature, the works of Homer were the source of most *centos*, while the Latin examples of the genre drew upon Virgil. For the literary history of this term, see "Cento" in *The Oxford Classical Dictionary*, ed. Simon Hornblower and Antony Spawforth, 3rd ed. (Oxford: OUP, 1996) 309.
[57] "Text," *OED.*
[58] Robert Burton, *The Anatomy of Melancholy*, ed. Thomas C. Faulkner, Nicolas K. Kiessling, and Rhonda L. Blair, 6 vols. (Oxford: Clarendon, 1989) vol 1. All references to Burton's *Anatomy* will be to this edition. The *Anatomy* went through six editions between 1621 and 1651.

authorial status. He locates creativity in the accumulation and skillful arrangement of materials; it is the design, rather than the substance of his work that is new and worthy of admiration. For Burton the polymath, the display of learning was paramount, something which is attested to by his citation of Thucydides's aphorism: "to know a thing and not expresse it, is all one as if he knewe it not" (7). In the *cento*, a weaving together of quotations from other writers, Burton discovered an ideal genre for "shewing [himself] a schollar." He uses this rather ostentatious literary form to communicate to readers his encyclopedic approach to knowledge or, as he puts it, his "roving humor" (4). The *cento* functions, however, not only as vehicle for Burton's endless curiosity but also as a response to the explosion of information witnessed by his age. In a famous section of the *Anatomy*, Burton presents an extended catalogue of the various "scenes" disseminated by the printing press:

> I heare new newes every day, & those ordinary rumors of War, Plagues, Fires, Inundations, Thefts, Murders, Massacres, Meteors, Comets, Spectrums, Prodigies, Apparitions,... Shipwracks, Piracies, and Sea-fights,... New bookes every day, Pamphlets, Currantoes, Stories, whole Catalogues of Volumes of all sorts, new Paradoxes, Opinions, Schismes, Heresies, Controversies in Philosophy, Religion, &c. Now come tidings of weddings, Maskings, Mummeries, Entertainments,... new Discoveries, Expeditions...(4-5)

Even for an individual imbued with Burton's desire "to have some smattering in all" (3), the perpetual stream of images, events, and ideas made available through the medium of print could be overwhelming. A syncretic genre such as the *cento* offered a means by which to collect and circumscribe the units of information produced in a period of increased mobility, colonial expansion, and voyages of discovery.

Almost three decades after the appearance of Burton's *Anatomy*, the first edition of Thomas Browne's natural history of error, *Pseudodoxia Epidemica*,[59] was published. This encyclopedic work answers Bacon's call in the *Advancement of Learning* for a "calendar of falsehoods and popular errors."[60] Composed of ancient and modern sources, the *Pseudodoxia* acts as a second famous seventeenth-century example of the *cento* genre.[61] Browne approaches his ambitious task in *Pseudodoxia Epidemica*, the investigation of the sources and transmission of error, as the creator of a patchwork garment.[62] He assembles a motley collection of errors perpetuated by ancient and early modern literary, material, and visual cultures. Included in his extended catalogue of errors are the assumption that forbidden fruit was an apple, the belief that porcelain dishes are buried in the earth for a hundred years before they are ready for use, the misconception that the elephant has no joints, the superstition that the rose of Jericho flowers every year at Christmas Eve, and the myth of the phoenix.[63] Like Burton,

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[59] The full title of Browne's work is *Pseudodoxia Epidemica: or, Enquiries into Very Many Received Tenets, and Commonly Presumed Truths.* The first edition was published in 1646, with subsequent editions appearing in 1650, 1658, 1669, 1672, and 1686.

[60] *Works* 8: 502.

[61] Elsewhere in his writings Browne demonstrates the versatility of the *cento* as a trope. A conventional image of poverty, the patchwork appears in a passage about charity in Browne's *Religio Medici* (1643): "There is under these *Centoes* and miserable outsides, these mutilate and semi-bodies, a soule of the same alloy with our owne, whose Genealogy is god as well as ours," Browne, *Works*, vol. 1, 92. In Browne's essay on ancient burial customs, *Hydriotaphia* (1658), the *cento* also becomes a metaphor for the process of self-fashioning: "'Tis opportune to look back upon old times, and contemplate our Forefathers. Great examples grow thin, and to be fetched from the passed world...We have enough to do to make up our selves from present and passed times, and the whole stage of things scarce serveth for our instruction. A compleat peece of vertue must be made up from the *Centoes* of all ages, as all the beauties of *Greece* could make but one handsome *Venus*," Browne, *Works*, vol. 1, 132. Here the patchwork functions as a recuperative and emulative strategy.

[62] Claire Preston, in her essay, "In the Wilderness of Forms: Ideas and Things in Thomas Browne's Cabinets of Curiosity," *The Renaissance Computer: Knowledge Technology in the First Age of Print*, ed. Neil Rhodes and Jonathan Sawday (London: Routledge, 2000) 170-83, also compares the *Pseudodoxia* to both a *cento* and a cabinet of curiosities. She is concerned, for example, with the ways in which the organization of Browne's text parallels the spatial arrangement of the early museum, 177-79.

[63] Browne, *Pseudodoxia Epidemica*, vol. 1, 536, 135-36, 149, 160, 202, 256. Marie Boas Hall has argued that Browne should be viewed as a naturalist, and examines the *Pseudodoxia* as a collection of facts,

Browne deploys the *cento* to respond to the influx of information in the period; the *Pseudodoxia* is particularly concerned with the diverse and often problematic ways in which individuals and groups map meanings onto objects and phenomena.

The author's commitment to tracing the genealogy of various errors should not be mistaken, however, as an attempt to resolve all obscurities. This human inclination, argues Browne, is responsible for generating countless superstitions. He points out, for example, that "there is no determination in the Text" (537) indicating that the forbidden fruit was actually an apple but, that "when things are left uncertaine men will assure them by determination" (539). In order to explore humankind's capacity for credulity, Browne uses a "miscellaneous method" in which he juxtaposes an immense range of interpretive traditions and voices. At the end of his rather lengthy "digression concerning Blacknesse," he writes: "[if] in this long journey we misse the intended end, yet are there many things of truth disclosed by the way: And the collaterall verity, may unto reasonable speculations, some what requite the capitall indiscovery" (530). Here, Browne privileges the discursive and the rhetorical over the strictly logical. This statement also serves as an apology for the *cento* genre of the *Pseudodoxia*. By compiling this richly textured work, Browne invites readers into a series of cabinets filled with the curious productions of both nature and the imagination. While his literary patchwork may not provide absolute knowledge of a topic, the wealth of strange facts that confront the reader will at least offer enhanced opportunities for making productive intellectual connections and for grasping tiny truths. The *cento*, like the cabinet of

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"Thomas Browne: Naturalist," *Approaches to Sir Thomas Browne*, ed. C. A. Patrides (Columbia: U of Missouri P, 1982) 178-87.

curiosities, is a genre of accommodation; a patchwork displays its creator's acknowledgement of and even delight in indeterminacies.

Another important seventeenth-century *cento* is Evelyn's encyclopedia of gardening, the *Elysium Britannicum, or The Royal Gardens*. The product of a lifetime of reading and engagement with material culture, this work treats almost every conceivable aspect of gardening.[64] Chapters were planned, for example, on the nature of the elements, the seasons, the generation of plants, and the parterre; Evelyn also intended to include in his work a catalogue of the most celebrated gardens in ancient and modern times. His extensive epistolary network functioned as a critical source for the project; his correspondents supplied him with both fresh information and rare seeds.[65] Through his imaginative stitching together of passages from his incoming and outgoing letters, and quotations from classical and modern writings,[66] he creates a textual patchwork that transcends time and space.

While Evelyn does not use the word *cento* in relation to the *Elysium*, it is evident from his correspondence that he viewed this work as just such a dynamic structure. The

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[64] The encyclopedic form of the *Elysium* is made clear by the broadside that announced its publication. What follows is a partial transcription of the chapter headings for book two of the work: "14. Of Verdures, Perennial-greens, and perpetual Springs. 15. Of Orangeries, Oporothecas, and Conservatories of rare Plants and Fruits. 16. Of Coronary Gardens, Flowers, and rare Plants, how they are to be propagated, govern'd, and improv'd; together with a Catalogue of the choicest Shrubs, Plants, and Flowers, with a touch at their Vertues, and how the Gardiner is to keep his Register. 17. Of the Philosophico-Medical Garden. 18. Of stupendious and wonderful Plants. 19. Of the Ortyard, and what Fruit-Trees, Olitory, and Esculent Plants may be admitted into a Garden of pleasure. 20. Of a Vinyard, and Directions about making Wine. 21. Of Watering, Pruning, Plashing, Nailing, Clipping, Mowing, and Rolling. 22. Of the Enemies and Infirmities to which a Garden is obnoxious, together with the Remedies. 23. Of the Gardiners Almanack, or *Calendarium Hortense*, direction what he is to do monthly, and what Fruits and Flowers are in Prime."

[65] For a discussion of the relationship between Evelyn's epistolary network and the *Elysium*, see Douglas Chambers, "'Elysium Britannicum not printed neere ready &c': The 'Elysium Britannicum' in the Correspondence of John Evelyn."

[66] Joseph M. Levine, in his chapter, "Evelyn between the Ancients and the Moderns," explores the ways in which the *Elysium* occupies a liminal position between classical models of learning and modern science, *Between the Ancients and the Moderns: Baroque Culture in Restoration England* (New Haven: Yale UP, 1999) 23-32.

account of the *Elysium*'s production which he offers to Browne – of chapters "which are so compleated...yet so written that [he] can at pleasure inserte whatsoever shall come to hand to obelize, correct, improve, and adorne it"[67] – evokes the idea of the *cento*. Like the cabinet collector, Evelyn assembles and arranges a diverse group of materials; he accommodates new acquisitions into the model of the collection, using them to interrogate the existing text. Two decades later, he again compares his encyclopedia to a patchwork; this time, however, he exhibits a degree of frustration with its open-ended form. On 11 July 1679, he addresses the following lamentation to Beale:

> When againe I consider into what an Ocean I am plung'd, how much I have written, and collected, for above these *20 yeares*, upon this fruitfull and inexhaustible Subject (I meane of *Horticulture*) not fully yet digested to my mind, and what insuperable paines it will require to insert the (dayly increasing) particulars into what I have already in some measure prepar'd, and which must of necessitie be don by my owne hand; I am almost out of hope, that I shall ever have strength and leasure to bring it to Maturity...[68]

Here, Evelyn's use of the term "fruitfull" and the phrase, "bring it to Maturity," in reference to the *Elysium*, shows that like Boyle, he too relies upon organic metaphors to describe his writings. In this passage, Evelyn also, however, provides us with what amounts to a definition of the *cento* genre. Essentially a collecting enterprise, the *cento* is a preliminary attempt to gather and sift through units of knowledge. Rather than a definitive treatment of a subject, the textual patchwork, he implies, is actually a mode of inquiry. Echoing Burton, Evelyn expresses anxiety about the explosion of information in the period – at the "dayly increasing particulars" that must be incorporated into the whole. A genre of accumulation, the *cento* demands that the author constantly reconfigure, revise, and amend his text. As is the case with many collections, there is a

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[67] Browne, *Works*, vol. 4, 276.
[68] BL Add. 78299, no. 409, Evelyn to Beale, 11 July 1679.

fetishistic element to the *cento*. The material features of the manuscript of the *Elysium* which include numerous pasted slips, marginalia, loose insertions, and bundles of additional notes amply testify to this obsessive aspect of the genre. Douglas Chambers has recently referred to the "transgressional genre" of the *Elysium*.[69] Perhaps an amalgam of all genres, it is clear that the *cento* offered Evelyn unique opportunities to create a dialogue between the past and the present, the literary and the scientific, and between the intellectual and the material. If, however, the patchwork gave expression to Evelyn's encyclopedic impulse, it also ensured that he did not sensibly limit the scope of his project, nor discover a final, publishable form for the work.

Although the *Elysium* did not appear in Evelyn's lifetime,[70] several Fellows of the early Royal Society were well acquainted with his great "hortulan" project, and its publication was eagerly anticipated. As early as 1658 the printed broadside prospectus of the work was circulated among Evelyn's friends, and Pepys describes in his diary how on 5 November 1665, Evelyn "read to [him] very much also of his discourse he hath been many years and now is about, about Guardenage; which will be a most noble and pleasant piece."[71] Joseph Glanvill's famous defense of the Royal Society, *Plus Ultra* (1668), contains an important reference to the *Elysium*. In his chapter about the contributions of the "moderns" to natural history, Glanvill writes: "Mr. *John Evelyn*, hath very considerably *advanced* the *History* of *Fruit* and *Forest-Trees*, by his *Sylva* and *Pomona*; and greater things are expected from his *Preparations* for *Elysium Britannicum*, a noble

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[69] Chambers, "'Elysium Britannicum not printed neere ready &c': The 'Elysium Britannicum' in the Correspondence of John Evelyn," 129.

[70] Evelyn did, however, publish two sections of the *Elysium*: the *Kalendarium Hortense: or, Gard'ners Almanac; Directing what He is to do Monethly, throughout the Year* was appended to the first edition of *Sylva*, 1664 and printed separately in several editions until 1706; and *Acetaria. A Discourse of Sallets*, was published as a small octavo in 1699. For a description of the editions of both these works, see Keynes, *John Evelyn: A Study in Bibliophily with a Bibliography of His Writings*.

[71] *The Diary of Samuel Pepys*, vol. 6, 289.

Design now under his hands" (74). Oldenburg, himself, drew attention to Evelyn's magnum opus in the 15 November 1669 issue of the *Philosophical Transactions*. The recent appearance of the second edition of Evelyn's popular treatise on arboriculture, *Sylva*,[72] prompted Oldenburg to compose a panegyric on the author of the *Elysium*. His review of *Sylva* is followed by a survey of Evelyn's earlier publications, in which he notes their specific contributions to the material and spiritual growth of England. In relation to Evelyn's encyclopedia of gardening, Oldenburg writes: "But thrice happy were all *England*, if every where, with united minds and affections we were as heartily inclin'd, and as active to cultivate this our kind Soil for an *Elysium*, as this Liberal Author is now busie and preparing for the Press another more August and Noble Work, bearing the Title of *Englands Elysium*" (*PT* 3-4: 1073). Here Oldenburg situates the *Elysium* within the context of earlier seventeenth-century writings about husbandry and gardening that called for the replanting of England as an economic, scientific, and devotional exercise.[73] The advertisement for the *Elysium* in the *Philosophical Transactions* serves as a public endorsement by the Royal Society; it also reveals Oldenburg's familiarity with Evelyn's *cento*.

Several aspects of the early *Philosophical Transactions* have earned it the title of "first scientific periodical": its focus on scientific rather than strictly "literary" and theological topics, its commitment to the communication of research, its ideals of civility and objectivity, and its role in establishing priority claims. While it cannot be disputed that Oldenburg's journal marks the beginning of a new phase in scientific publishing, it is

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[72] The first official publication of the Royal Society, Evelyn's *Sylva, or a Discourse Of Forest-Trees, and the Propagation of Timber in His Majesties Dominions* appeared in 1664.

[73] Like Bacon, who begins his essay, "Of Gardens," with the declaration, "God Almighty first planted a Garden," *Works* 12: 235, Evelyn uses the image of God as the first gardener to establish the dignity and value of his subject matter in the *Elysium Britannicum*, 33.

also crucial to recognize the degree to which it made use of existing generic modes. A consideration of less familiar genres like the *cento* illuminates some of the important continuities between earlier encyclopedic works of scientific prose in the century and the form assumed by the *Philosophical Transactions*. The examples of Browne, Burton, and Evelyn permit us to identify the key features of the *cento*: first, that it is a vehicle for displaying the breadth of one's learning; second, that it is strategy for dealing with an influx of information; and, third, that it may be used to generate interplay between ancient and modern writers, local and distant cultures, and printed and material sources. Evelyn's *Elysium*, itself the outgrowth of an extensive epistolary network, must also have served as an intriguing model to Oldenburg for transforming private letters into public documents and for creating a forum in which far-flung correspondents might engage in dialogue with one other. The *cento*, which requires that its maker constantly seek out and accommodate new materials into its structure, is always necessarily unfinished. In this way, the literary patchwork suggests a kind of periodicity. The multiple editions of the *Anatomy* and *Pseudodoxia*, and the incomplete state of the *Elysium* demonstrate each author's inability to fix the form of his respective work – to close off his collection of knowledge. This resistance to closure represents a dialectical approach in which opposing traditions, voices, and ideas are deliberately set against one another. When Oldenburg began publishing his journal in 1665, he clearly drew upon the literary conventions developed by these seventeenth-century encyclopedists for whom miscellaneous "fragments," "communications," "gleanings," "specimens," and "glimpses of light" were stock-in-trade.

Trading Knowledge: The Royal Society's "Lists of Queries"

In the *cento*, Oldenburg discovered a "restoration" genre – a literary form that would permit him to stitch together the remnants of Adamic knowledge; the preface to the seventh year of the *Philosophical Transactions* stresses the recuperative quality of this publishing project: "The First Man lived a long age, and could not be so long idle as not to relate to his Posterity the Works of God or his Angels (at least for Gardens, Plantations of Vegetables, Flowry Walks, Prospects, Lands-capes, Arbors, Rocks, Mountains, Fountains, Channels of Rivers, and rich Materials) which he had seen in his lost Paradise" (*PT* 5-6: 2090). Oldenburg relies upon images of loss and dispersal to rouse his philosophical correspondents to action, calling upon curious readers to "assemble together Ingenuities, Observations, Experiments and Inventions, scattered up and down in the World" (*PT* 1-2: 414). It is not, however, simply that the units of solid knowledge must be collected from temporally and geographically distant places, explains Oldenburg; in many cases useful learning exists but is preserved in less accessible forms. The journal was a means by which to recover such information and to communicate it to a wider audience, its tracts "containing divers valuable Particulars, which perhaps had otherwise been lost, or drown'd in a worse crowd of Impertinencies, or scatter'd in more costly *Volumes*" (*PT* 3-4: 630).

In its early years, the Royal Society was keen to demonstrate its commitment to the democratization of knowledge. One of the ways in which it constructed itself as benefactor of the common good was to decry the formation of private collections and the guarding of scientific secrets. At one point, for instance, Oldenburg implores "the Noble Patrons of Learning, to bring into the publick Light the Treasures of Libraries, before

they be sacrificed to worms and putrefaction" (*PT* 5-6: 2093). In its attempt to show its public utility, the fledgling institution often distinguished its projects from the empirical investigations of professionals and private citizens. Sprat's *History of the Royal Society* identifies the "Closets of *Physicians*" and the "Work-houses of *Mechanicks*" (74) as spaces in which knowledge is produced, yet kept from the public's view. Although the author expects that "*Domestick Receipts*, and Curiosities, will soon flow into this *publick Treasure*"(74), if such "trade secrets" are not divulged,[74] the Royal Society will "purchase such extraordinary inventions, which are now close lock'd up in *Cabinets*" (75). In the period, the shops of apothecaries, the closets of physicians, the workshops of craftsmen, and the gardens of gentlemen were counterparts to our modern notion of the laboratory. Arguing that its discoveries alone would eventually improve the everyday lives of people, the Royal Society criticized experimental activities carried out purely for personal gain and those, such as the gentry's cultivation of exotics, for "a little *curiosity* and *delight*" (387). Because the Society's membership included many physicians, a large number of leisured gentleman, as well as apothecaries, merchants, and some tradesmen,[75] the distinctions that Oldenburg and Sprat draw between "private" and "public" learning, and between "curiosity" and "use" are somewhat artificial. The newly founded institution and these groups already exchanged "particulars" of all sorts, with the Society

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[74] According to Sprat, the most famous trade secrets (watches, locks, guns, and printing) were eventually divulged because of chance, friendship, treachery, or the desire for glory, 74.

[75] For a comprehensive account of the Society's composition, see Michael Hunter, *The Royal Society and Its Fellows 1660-1700: The Morphology of an Early Scientific Institution*, 2nd ed. (Oxford: Alden, 1994). In addition to Hans Sloane, such notable physicians as Walter Charleton, George Ent (President of the Royal College of Physicians), and Edmund King (physician to Charles II) joined the Society. James Petiver and Samuel Doody (also a gardener) were two London apothecaries who played an active role in the Society. Although the institution was not able to attract a large number of merchants and tradesmen, it did count among its members such figures as Ralph Thoresby (Yorkshire merchant and collector), John Bemde (merchant), Joseph Moxon (seller of mathematical instruments), and John Houghton (tea dealer).

relying heavily upon private collectors, for example, to establish its own repository of rarities.[76]

What is most striking, for our purposes, is the way in which the Royal Society's campaign to collect and communicate lost and hidden "particulars" is conceived of in commercial terms; the institution's periodical clearly relies upon systems of circulatory exchange. The title Oldenburg gives his journal, derived from the Latin word *transactio*, suggests a business deal – an exchange of goods for profit.[77] In this case, the commodities are units of scientific learning, and the editor's earlier reference to "costly Volumes" makes clear that the periodical represents a less expensive means by which to acquire such knowledge. Sprat's use of the term "treasure" testifies further to the Royal Society's appropriation of economic models to characterize its projects. The institution regarded knowledge as a form of capital, and Oldenburg, Boyle, and the members of the Society's Committee for Correspondence[78] devised effective mechanisms for augmenting their philosophical treasury. Fellows generated lists of "inquiries" for travellers that requested information about various matters of fact. Such queries figure prominently in Bacon's scheme for the natural history: "Questions (I do not mean as to causes but as to the fact) should be added, in order to provoke and stimulate further inquiry; as in the history of Earth and Sea, whether the Caspian ebbs and flows, and at how many hours' interval; whether there is any Southern Continent, or only islands; and the like."[79] Within the natural history, Bacon embedded a mechanism, the list of queries, which would

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[76] For a discussion of the formation of the Society's museum, see Hunter, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository.'"
[77] "Transactio," *Oxford Latin Dictionary* (Oxford: Clarendon, 1968).
[78] For an account of the Society's Committee for Correspondence, see Hunter, "An Experiment in Corporate Enterprise: The Royal Society's Committees of 1663-5, With a Transcript of the Surviving Minutes of Their Meetings," *Establishing the New Science*, 73-121.
[79] *Parasceve*, *Works* 8: 368.

ensure that it did not become a static document. The Royal Society's own sets of queries were designed to gather knowledge about the *naturalia* and *artificialia* of specific geographical regions.[80] As Oldenburg writes in his preface to the twelfth year of the journal, these lists "were intended to solicit a confirmation (after a severe examen) of such particulars as might seem to us strange, but were reported by Authors of good note" (*PT* 11-12: 555). Some of these queries were printed in the *Philosophical Transactions*,[81] and Oldenburg also circulating such directions among his correspondents.[82]

Like Bacon's "Merchants of Light" in the *New Atlantis* who "sail into foreign countries...[and] bring us the books, and abstracts, and patterns of experiments of all other parts,"[83] Oldenburg's correspondents were factors – agents commissioned to buy and sell intelligence. By distributing these lists of queries he aimed to weave a veritable spider's web which would ensnare the scattered "particulars" of scientific knowledge. This is made evident by one of his enthusiastic recruits: "methinks I could wish yu had so many philosophicall eyes, eares, & hands, at home & abroad, yt yu might take in even all yt is known, markd, done or driven at in ye world..." (*OC* 4: 125)[84]. The arachnoid metaphor is particularly applicable to Oldenburg's methods of gathering information

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[80] Daniel Carey, in his article, "Compiling Nature's History: Travellers and Travel Narratives in the Early Royal Society," also examines the institution's use of the list of queries; he suggests that the distribution of queries for research had its origins in the activities of the Hartlib circle, *Annals of Science* 54 (1997): 269-92, at 273.

[81] An issue from 1665/66 contains Boyle's "General Heads for a Natural History of a Countrey, Great or Smal," 1-2: 186-89, and an issue from 1667, some "Inquiries for Virginia and the Bermudas" 1-2: 420-21.

[82] In a letter of 10 February 1667/8 to Richard Norwood in the Bermudas, Oldenburg wrote: "You'l find here inclosed some printed Inquiries, both generall for all Countries and particular, for the West Indies, and the Island yu reside in, as also a good Number of such Directions as are proper for Seamen, going farr Voyages, to take notice off...All these are heartily recommended to your care to returne, what answers yu can, to them, either from your owne, or your intelligent and accurate friends Observations," *OC* 4: 166-67.

[83] *Works* 3: 164.

[84] This passage is taken from a letter of 29 January 1667/8 written by Nathaniel Fairfax of Woodbridge, Suffolk.

because it captures the predatory, aggressive nature of his surveillance operations. In an effort to extend his epistolary reach, he tried to ensure that at least some of the seamen, merchants, diplomats, and other travellers departing from England carried with them his lists of queries. His letters show the ways in which Oldenburg sought to attach his own information exchange to other communication networks like those maintained by trading companies and Italian missionaries.[85] Curiosity, then, was inseparable from other acts of control, in that Oldenburg attempted to direct the flow of scientific information to himself and to the Royal Society.

The institution's adoption of the list of queries as an investigative tool reveals much about its epistemology. The Baconian program of natural history pursued by the Society required that investigators assemble as complete a collection of "particulars" as possible before any attempts were made at systematization. As Sprat explains in the *History*, "a too sudden striving to reduce the *Sciences*, in their beginnings, into Method, and Shape, and a Beauty; has very much retarded their increase" (116). In this we hear the Royal Society's characteristic rejection of scholasticism.[86] Beale also exemplifies

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[85] On 30 June 1669, Oldenburg wrote to George Cotton, an English Jesuit in Rome. Oldenburg asks Cotton "to procure for the Royall Society such observations of a Philosophical nature, as have bin made by those persons, yt have bin and are still sent from Rome into the remotest parts of the world, the East- and West-Indies, Mogol, China, Persia, Turky, Aegypt, Arabia, Mexico, Peru, Brasil, Hispaniola, Cuba &c," *OC* 6: 79." For a further account of Oldenburg's attempts to establish a correspondence with Italian missionaries see his letter of 24 March 1667/8 to Boyle (*OC* 4: 274-76) and his letter to John Downes of 3 January 1668/9 (*OC* 5: 314-17). Missionary activity in Canada during the seventeenth century also yielded information about unfamiliar flora and fauna. While the compilation of natural history information was not the primary purpose of the *Jesuit Relations*, missionary reports first published in French (1632-73), they do contain passages about botanical and zoological curiosities, as well as reports about earthquakes and comets. For an account of these writings, see Claude Rigault, "Relations de Jésuites," *Dictionnaire des Oeuvres Littéraires du Québec* (Montreal: Fides, 1978) 637-49. For selections, see *The Jesuit Relations: Natives and Missionaries in Seventeenth-Century North America*, ed. Allan Greer (Boston: Bedford/St. Martin's, 2000).

[86] The hostility displayed towards scholasticism by some of the Fellows of the early Royal Society was probably due, at least in part, to their exposure at university to some of the neo-scholastic writers. For a recent discussion of the curriculum at Oxford in the seventeenth century, see the essays by Mordechai Feingold, "The Humanities" and "The Mathematical Sciences and New Philosophies," in vol. 4,

this stance in a letter of 8 July 1671 when he urges Oldenburg to "minde [his foreign correspondents] to adhere closely to Experiment & Matter of Fact. Not to make too much haste to notions, nor too long nor too boldly to insiste on them. Otherwise we shall do little better than ye Schoolemen. Who rayse hot animostityes, & endlesse contentions about uselesse Scepticismes" (*OC* 8: 141). In following the tenets of Baconian empiricism, the institution was self-conscious about reaching premature and inaccurate conclusions. Perhaps the clearest articulation of this encyclopedic approach, in which final judgment is deferred, is simply the institution's repository for rarities, with its juxtaposition of natural history specimens, mechanical contrivances, antiquities, and artifacts of exotic cultures. The objects in the museum occupied a liminal position – their original functions marginalized or erased. A New World plant, for example, no longer formed part of an ecosystem, while a string of Virginian money, like that preserved in the Society's repository,[87] lost its exchange value outside of its native economy. Heaped together upon museum's shelves, this jumble of curiosities had yet to be subsumed into a strict taxonomical scheme.[88] It was the model of the collection, then, that marked certain objects as "rare" and conferred upon them the status of self-contained evidence.

The Society's lists of queries may be viewed as textual cabinets of curiosities. Their miscellaneous form owes important debts to both Bacon's natural history, *Sylva*

"Seventeenth-Century Oxford," of *The History of the University of Oxford*, ed. Nicholas Tyacke (Oxford: Clarendon, 1997) 211-357, 359-448.

[87] Grew 370.

[88] As Hunter shows in his essay, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository,'" the organization of the museum was an on-going problem. In the *History*, however, Sprat tried to assure readers that the collection is not in a state of disarray: "This *Repository* [Robert Hooke] has begun to reduce under its several heads, according to the exact Method of the Ranks of all the *Species* of *Nature*, which has been compos'd by Doctor *Wilkins*, and will shortly be publish'd in his *Universal Language*..." 251.

Sylvarum (1627), and to Browne's *Pseudodoxia Epidemica.*[89] In the *Sylva*, Bacon arranges the "particulars" of natural history into ten "centuries," each one containing a series of itemized experiments. The eighth century, for example, offers accounts of sweet drinks in Turkey, the Turkish way of making marbled paper, glow-worms, and cuttlefish ink.[90] Within the more general divisions of his treatment of credulity, Browne also employs the catalogue form. Thus we find a chapter on minerals subdivided into such topics as: "Of white powder that kils without report," "That a Carbuncle gives a light in the dark," "Of the Aegle-stone," and "Of Fayrie stones."[91] We know that Bacon's *Sylva* relied heavily upon a several sources, including such books of wonders as Pliny's *Natural History*, Della Porta's *Natural Magic* (1558), and George Sandys's *Travels* (1615). Similarly, both the errors and the corrections in Browne's *Pseudodoxia* were derived from a wide range of texts; works by the Renaissance naturalist and collector Aldrovandi[92] and by the Jesuit polymath Kircher[93] were just some of the sources Browne consulted. Thus a diverse group of interpretive traditions and texts (many of which were encyclopedic in approach) generated the catalogues that we find embedded in Bacon and Browne. These catalogues served as a mechanism by which curiosity value was assigned to certain objects or phenomena.

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[89] Ann Blair's exploration of Artistotle's *Problems*, the series of questions and answers about the causes of natural phenomena, is also relevant here; as Blair points out, in the pseudo-Aristotelian *problemata*, "however bizarre the 'fact' may seem to us, the *problema* never includes discussion of its veracity but only of its cause," "The *Problemata* as a Natural Philosophical Genre," *Natural Particulars: Nature and the Disciplines in Renaissance Europe* (Cambridge, MA: MIT P, 1999) 171-204, at 173.

[90] *Works* 5: 10, 12-13, 29-30.

[91] Browne, *Pseudodoxia Epidemica*, vol. 1, x-xi.

[92] The following were among the works by Aldrovandi that Browne drew upon for his sections on natural history objects: *Musaeum Metallicum* (Bologna, 1648), *Ornithologia* (Bologna, 1599), and *De Animalibus Insectis* (Bologna, 1602).

[93] Browne's treatment of magnetism made use of Kircher's *Ars Magnesia* (Würzburg, 1631), while his exploration of Egyptian hieroglyphics refers to Kircher's research in this area, some of which was published in his *Obeliscus Pamphilius* (Rome, 1650) and *Oedipus Aegyptiacus*, 4 vols. (Rome, 1652-54).

The Royal Society's lists of queries were, themselves, mosaics of many different sources – textual and material. The "Inquiries for Turky" that Oldenburg printed in a 1666 issue of the *Philosophical Transactions*"[94] invite us to consider the range of texts and practices, "words" and "things," which gave birth to such lists. Oldenburg offers this rationale for including this document in the periodical: "Though many Relations and Descriptions of *Turky* be extant in Print, yet they leave in many a desire of fuller information in the following particulars..." (*PT* 1-2: 360). One function of these lists, then, was to assemble knowledge to fill in the lacunae of printed accounts – to answer such question as, for example, what sort of plant the tulip was. Published histories served as the primary source for the Society's directions for travellers. According to the minutes[95] of a meeting of the Correspondence Committee, held on 19 August 1664, a list was created of "some Books of Voyages, to be perused, for inquiries."[96] Among these titles were two treatises which described Turkey: Louis de la Haye's *Voyages du Levant* (1624) and *Viaggi di Pietro della Valle...cioè la Turchia, la Persia, e l'India* (1650-3). It was probably Sandys's *Travels*, however, that furnished much of the information contained in Oldenburg's queries for Turkey. Readers of the journal were asked to authenticate a host of curiosities associated with Turkey – their use of a mineral called "rusma" to remove their hair, their preparation and consumption of opium, the

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[94] The Royal Society's "Inquiries for Turky" appeared in *PT* 1-2: 360-62. The following is a partial transcription of these queries, printed in list form in the journal: 2. Whether the *Turks* do not only take *Opium* themselves for strength and courage, but also give it to their Horses, Camels and Dromedaries, for the same purpose, when they find them tired and faint in their travelling? What is the greatest *Dose*, any men are known to have taken of *Opium*? And how prepared? 3. What effects are observed from their use, not only of *Opium* (already mention'd) but also of Coffee, Bathing, shaving their Heads, using Rice; and why they prefer that which grows not unless water'd, before Wheat, *&c*? 4. How their Damasco-steel is made and temper'd? 5. What is their way of dressing and making Leather, which though thin and supple, will hold out water? 6. What method they observe in breeding those excellent Horses, they are so much famed for? 7. Whether they be so skilful in Poysoning, as is said; and how their Poysons are curable?

[95] Hunter appends a transcription of this document to his essay, "An Experiment in Corporate Enterprise: The Royal Society's Committees of 1663-5," 118-19.

[96] Hunter, "An Experiment in Corporate Enterprise," 118.

inconstancy of their weather, and the structure of the aqueducts in Constantinople designed by Solomon the Magnificent – many of which were treated by Sandys.[97]

Published histories were not, however, the only source of knowledge about Turkey in the period, and it behooves us to explore some of the other cultural activities and institutions through which Fellows of the early Royal Society gained access to this still exotic land. Dramatic entertainments probably supplied the inspiration for at least a few of the Society's queries. One of the curiosities that appears in Oldenburg's "Inquiries for Turky" may have a particularly intriguing origin. The Society asked travellers to Turkey to gather information about the tides of the Black Sea: "With what declivity the Water runs out of the *Euxine Sea* into the *Propontis*? With what depth? And if the many Tides and Eddies, so famous by the name of the *Euripi*, have any certain Period?" (*PT* 1-2: 361). Bacon had called for a "History of Ebbs and Flows of the Sea; Currents, Undulations, and other Motions of the Sea,"[98] thus it is not surprising to find the Society interested in the subject of tides. Anyone familiar with Shakespeare's *Othello*, however, would detect in this query an echo of Othello's famous simile:

> Like to the Pontic sea
> Whose icy current and compulsive course
> Ne'er keeps retiring ebb but keeps due on
> To the Propontic and the Hellespont:
> Even so my bloody thoughts with violent pace
> Shall ne'er look back, ne'er ebb to humble love

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[97] Sandys, *A Relation of a Journey begun in 1610...Containing a Description of the Turkish Empire, of Egypt, of the Holy Land, of the Remote Parts of Italy, and Ilands Adjoyning*, 2nd ed. (1615). References will be to the facsimile edition of Sandys's work published by Theatrum Orbis Terrarum (Amsterdam: 1973). See Sandys 69 (rusma); 66 (opium); 38 (inconstant weather); 33-34 (aqueducts). Richard Knolles's *The Generall Historie of the Turkes* (1631) was another important contemporary account of this empire. John Mandeville's *Travels*, a fanciful compilation of voyage narratives about the Holy Land, Turkey, Persia, and other Eastern countries, with its accounts of marvels and natural phenomena, might also have provided the basis for some of the Society's queries about Turkey. Appearing first in Anglo-Norman French in 1356-57, Mandeville's work went through numerous editions in many different languages; there were several seventeenth-century editions in English.

[98] *Works* 8: 375.

> Till that a capable and wide revenge
> Swallow them up. (3.3.456-63)[99]

Editors of *Othello* have traced this passage to Philemon Holland's translation of Pliny's *Historie of the World* (1601),[100] and it is certainly possible that the inclusion of this query about the tides of the Black Sea was generated from Pliny or published accounts of Turkey. What Othello's simile serves to remind us of, however, is that the Royal Society's projects did not exist in isolation from popular culture; the directions of the institution's research could be determined by something like the dramatic performance enjoyed by one of its Fellows the previous evening.

The continental itineraries followed by English gentlemen functioned as another critical source of information about exotic regions.[101] As John Stoye tells us in his investigation of the grand tour, eastward journeys in the seventeenth century constituted a "variation" on the *giro d'Italia.*[102] One of Evelyn's letters from 1645 shows what a strong appeal places like Turkey held for the inquisitive grand tourist who wished to extend his travels beyond the usual destinations. From Venice he writes to Henshaw of "being extreamely bent upon an Expedition into the Levant and having so faire an opportunity of a stout Vessel sailing hence to Alexandria, from whence we think of doing our devotions at Jerusalem, and to returne by Constantinople."[103] Letters from the grand

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[99] Shakespeare, *Othello*, ed. E. A. J. Honigmann (Surrey, UK: Thomas Nelson, 1997).
[100] See editor's introduction, *Othello*, 5.
[101] In his dedicatory epistle to Joseph Williamson (1633-1701), Oldenburg writes, "our English Nobility and Gentleman are pleas'd to bring home useful Arts and ingenious Discoveries of Nature from their Travels" (*PT* 9-10). Williamson, a statesmen and diplomat, was elected second president of the Royal Society in 1677.
[102] Stoye 119.
[103] BL Add. 78298, no. 2, Evelyn to Henshaw, 31 June 1645. We learn from Evelyn's diary that his hopes for this Eastern voyage were disappointed when political circumstances caused his ship to be recalled by the Venetian state: "after I was provided of all necessaries, laied in Snow to coole our drink, brought some Sheepe, Poultry, Bisquit, Spirits & a little Cabinet of Drouggs &c. in case of sicknesse; our Vessell (whereof Cap: Powell was Master) happnd to be press'd for the service of the State, to Carry Provisions to

tour supplied eyewitness accounts of Eastern antiquities and curiosities; seeds and bulbs from such travels were planted in English gardens, and souvenirs were preserved in cabinets of curiosities. The Tradescants's Ark at Lambeth, for example, boasted several items from Turkey, including a javelin, a toothbrush, and a fan made from Turkish feathers.[104] Botanic gardens provided opportunities for translating the natural productions of Turkey into England. The Tradescants's famous garden, which functioned as an extension of their museum, propagated numerous Turkish varieties such as the Constantinople lily (*Lilium Constantinopolitanum*), and meadow saffron of Constantinople (*Colchicum Bizantinum*)[105] – a flower then associated with rarity and mystery. The tulip, of course, is the most intriguing case study of the ways in which a curious flower originating in the East, with close ties to Turkey, became embedded in European culture.[106]

For those who did not undertake the grand tour, cabinets of curiosities and botanic gardens offered a means by which to experience the material culture of Turkey without ever leaving England. The objects assembled by collectors like the Tradescants communicated knowledge of the industrial processes and handicrafts of unfamiliar regions. Similarly, the exotic species cultivated in their garden at Lambeth and in the

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Candia, which now nuly attacqu'd by the Turkes; which altogether frustrated my designe, to my greate sorrow, it being but two or 3 daies before we hoped to set saile," 2: 451-42.

[104] These items are recorded in Tradescant's catalogue for the Ark, *Musaeum Tradescantianum*. See Tradescant 45 (javelin); 53 (toothbrush); 54 (fan).

[105] Tradescant, 135 (lily); 103 (saffron).

[106] For a recent account of the tulip, including a discussion of its Eastern origins, see Anna Pavord, *The Tulip* (London: Bloomsbury, 1999). "Tulipomania," the obsession in seventeenth-century Holland with tulips, especially variegated varieties, which generated a speculative market, has recently been the subject of much attention. For a discussion of tulipomania and novelty, see Marina Bianchi, "In the Name of the Tulip: Why Speculation?", *Consumers and Luxury: Consumer Culture in Europe 1650-1850*, ed. Maxine Berg and Helen Clifford (Manchester: Manchester UP, 88-102.

Oxford physic garden[107] exposed the limitations of existing botanical taxonomies. Several of Oldenburg's queries for Turkey were clearly inspired by these kinds of collections of wonders. Readers of the journal were asked to confirm a series of botanical rarities: whether there was a tree in Damascus called "mouslac" which every year in December "is cut down close by the root, and within four or five Months time shoots up again apace, bringing forth Leaves, Flowers, and Fruit also, and bearing but one Apple (and excellent Fruit) at once"[108]; whether there was in southern Arabia a species of seedless grapes; and whether "all Fruits, Herbs, Earth, Fountains, are naturally saltish in the Isle of *Cyprus*" (*PT* 1-2: 361). Together, these queries suggest the ways in which the growing appetite in the early modern period for the new and the curious often became expressed through an interest in botanical matters. By representing the Turkish mouslac tree as a mysterious secret, the list of queries transformed this object into both a rarity and the stuff of potential experiments.

The marked increase, in the seventeenth century, of activities such as seed-exchange, transplantation, and the cultivation of exotics speaks to this emerging fascination with botany. Stirring the imaginations of visitors, the rarities exhibited in cabinets and gardens encouraged people to consider what other wonders remained to be

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[107] The Oxford physic garden was founded in 1621. For an account of its history, see Blanche Henrey, *British Botanical and Horticultural Literature before 1800*, vol. 1 (London: OUP, 1975) 95-96.

[108] This query was probably a conflation of two botanical myths: the first with its origins in the desire to identify the forbidden fruit of paradise, and the second involving the cypress tree. According to Gerard's *Herball*, there was a tree called the *Musa* (Adams Apple) that grew in Egypt, Cyprus, and Syria; it was supposed "to be that tree of whose fruit *Adam* did taste; which others thinke it to be a rediculous fable of *Pliny*, *Opuntia*," John Gerard, *The Herball or Generall Historie of Plantes...Very much enlarged and amended by Thomas Johnson* (London, 1636) 1516. Browne mentions this tree in his treatment of the mistaken belief that the forbidden fruit was an apple, *Pseudodoxia Epidemica*, 536. In *Sylva*, Evelyn deals with the "popular error" that "the *Cypress* (being a *Symbol* of *Mortality*, they should say of the contrary) is never to be *cut* for fear of *killing* it. This makes them to *impale* and *wind* them about like so many *Aegyptian Mummies*; by which means the inward parts of the *Tree* being heated, for want of *Air* and Refreshment, it never arrives to any perfection...For the *Cypress* may be *cut* to the very *Roots*, and yet spring afresh..." *Sylva* (Menston, UK: Scolar, 1972) 59.

discovered; these objects and collecting enterprises appealed especially to those groups like the early Royal Society committed to experimenting with nature. A letter Oldenburg addressed on 21 January 1672/3 to a Captain Ernetly, then bound for Constantinople, illustrates the Society's investment in cultivating Eastern species.[109] The letter consists of some of the previously published queries for Turkey, supplemented by new requests for botanical information: "Sr, you will very much oblige us by procuring us several seeds of ye Levant; those of Platanus, Barba Jovis, Eschilus, Castanea Equina, Cedar-berries gather'd ripe in November, and sent in their Cones in perfectly baked sand"; Oldenburg also asks for reports of "all sorts of Weeds for Dying" and ripe seeds of the Egyptian cotton tree and the sycamore to raise in England (*OC*: 9: 422-23). From the species mentioned here, and elsewhere in the letter, it is evident that the botanical knowledge sought by the Society had multiple functions: accounts of the East's famous dyestuffs and the production of cotton had potential commercial value for England, while some of the other plants and shrubs to which Oldenburg refers could serve as ornaments in the landscape gardens of gentleman. What is emphasized in this letter and the Society's queries in general, however, is the contribution that such information could make to the institution's larger goal of compiling systematic natural histories; the economic and aesthetic values of botanical "particulars" are usually represented as being of secondary importance.

It was, of course, the activities of trade networks in the East that provided the most immediate knowledge of Turkey's industries and commodities. In his preface to the

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[109] On 28 November 1672, Oldenburg addressed a letter to Sir John Finch, the newly appointed English Ambassador to the Sublime Porte (the Ottoman court at Constantinople). The letter, in *OC* 9: 338-41, is an extended series of queries about Turkey (some drawn from the set Oldenburg published in the *PT* in 1666, some new). His letter to Ernetly is a reworking of much of this earlier letter, but with additional queries about botanical matters.

third year of the *Philosophical Transactions*, Oldenburg expresses his gratitude publicly to the governors of the East India and Turkish Companies for their contributions to his epistolary commerce (*PT* 1-2: 414). A report supplied by a trading company or one by of its associates was credible, asserts Boyle, precisely because it was "not written by a Philosopher to broach a *Paradox*, or serve an *Hypothesis*, but by a Merchant or Factor for his Superiors, to give them an account of a matter of fact..." (*OC* 10: 198). Because the profit of companies depended upon the accuracy of such reports, the Royal Society viewed these writings as a particularly valuable source of information. Reliant upon company ships for access to distant lands, the institution's projects were necessarily shaped by trading routes and the activities of commercial networks. We see how closely the Society allied its projects with commerce in a letter Oldenburg addresses to Boyle on 25 February 1667/8 to Boyle: "There are at this time 12. ships desseined for ye East-Indies, whereof 8. are already gone for ye Coast, & 4. are to follow in March for Suratte. You'l easily guesse, we let not ym go wthout our Philos. Commissions" (*OC* 4: 207). The image of Oldenburg's arranging with missionary zeal for the Society's lists of queries to accompany the outbound vessels of the East India Company collapses distinctions between trading for knowledge and trading for economic profit.

Scattered among his queries for Turkey were the following references to that country's trades: "How their Damasco-steel is made and temper'd?" and "What is their way of dressing and making Leather, which though thin and supple, will hold out water?" (*PT* 1-2: 360). Readers were also urged to investigate the Turkish people's use of coffee and to determine its effects (*PT* 1-2: 360). Information about the consumption of coffee in the East, the region that gave birth to the commodity, continued to be sought by

Europeans throughout the century. Like its sister commodities, tea and chocolate, coffee was associated in the period with fashion, civility, and medicine, with coffee houses operating in London by about the middle of the seventeenth century and the medicinal virtues of coffee the subject of much debate.[110] Merchants returning from the East flooded the English market with new goods – exotic foodstuffs and articles made from unfamiliar materials and little understood manufacturing processes. Marked by the Royal Society as curiosities, pieces of elaborately decorated steel and waterproof leather from Turkey underwent a second process of commodification. Lists of queries created an economy in which the natural and artificial productions of distant lands were traded between the Society and its correspondents. In this way, the objects that appeared in Oldenburg's "Inquiries for Turky" and other such lists became what might be called "virtual commodities."

The Royal Society's lists of queries were a genre of writing that, like the museum catalogue and the household inventory, articulates possession. By encouraging travellers to seek out the rarities of distant lands, these lists supplied the descriptive formulae for taking possession of unfamiliar regions like the East and the New World. As Findlen has demonstrated, each object in the cabinet of curiosities – whether a marvelous fish or an Indian bracelet – was implicated in a narrative of possession.[111] Arguably, Oldenburg's lists of directions and the accounts of rarities they generated reflect a similar impulse to own and discipline nature. Some important parallels exist between the Society's lists and

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[110] For a discussion of coffee in early modern Europe, see John E. Wills, Jr. "European Consumption and Asian Production in the Seventeenth and Eighteenth Centuries," *Consumption and the World of Goods*, 133-47. Edward Forbes Robinson's *The Early History of Coffee Houses in England* (London: Kegan Paul, 1893) also contains much useful information, especially about the medical history of this commodity.

[111] This is the central argument of Findlen's *Possessing Nature.*

its procedure of registering experiments and observations.[112] Of the institution's program, Sprat writes:

> In the order of their *Inquisitions*, they have been so free; that they have sometimes committed themselves to be guided, according to, the seasons of the year: sometimes, according to what any foreiner, or English Artificer, being present, has suggested: sometimes, according to any extraordinary accident in the Nation, of any other casualty, which has hapned in their way. [They follow a] roving, and unsettled course, their being seldome any reference of one matter to the next... (115)

The act of registering knowledge was a way of taking stock, of reducing nature into a method. Because the Society allowed its research to be shaped by such variable factors as the current season or the interests of a foreign visitor attending its meetings, it is not surprising that their registers, as Sprat suggests, had a very miscellaneous quality. The lists of queries circulated by Oldenburg were likewise symbolic of the Society's "roving, unsettled course." As we have seen, his "Inquiries for Turky" reveal an engagement with a broad range of cultural productions – published histories, theatrical performances, the grand tour, cabinets, gardens, and trade networks. Although it was anticipated that the list of queries would assist the Royal Society in compiling systematic natural histories, in a manner similar to that of the early modern museum, these lists necessarily reproduced much of the "clutter" they sought to organize.

Conclusion

In the *Religio Medici*, Browne treats the theme of resurrection and offers the following account of the birth and restoration of natural phenomena:

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[112] Of the Society's use of registers, Johns writes: "It embodied its propriety in a book called a 'register,' in which a matter of fact, experimental technique, theory, or paper could be 'entered' to record the name of its discoverer and the moment of its first discovery," *The Nature of the Book: Print and Knowledge in the Making* (Chicago: U of Chicago P, 1998) 476.

> As at the Creation of the world, all the distinct species that we behold, lay involved in one masse, till the fruitfull voyce of God separated this united multitude into its several species: so at the last day, when these corrupted reliques shall be scattered in the wildernesse of formes, and seeme to have forgot their proper habits, God by a powerfull voyce shall command them backe into their proper shapes, and call them out by their single individuals.[113]

In this chapter, I have investigated the ways in which some of the writing practices of the early Royal Society reflected a postlapsarian conception of nature as a series of "scattered" productions. As we have seen, Oldenburg used his private web of correspondence, shaped by the collecting culture, to reunite the "particulars" of nature that were dispersed around the globe. He viewed his *Philosophical Transactions* as a literary patchwork of "fragments," "gleanings," and "specimens" which reveals his adherence to the idea of a "broken" and incoherent nature that required reassembling. The journal was formulated as an instrument – to use Browne's terms – to "command the species back" into a prelapsarian state. The Society's adoption of the list of queries as an investigative tool also embodies this approach to knowledge. Generated from a variety of textual and material sources (encyclopedias, cabinets, gardens) which themselves articulated the assumption of a scattered creation, these lists ultimately perpetuated the fragmented image of nature that they tried to unify. Produced during a period of increased trade and consumption of new goods, the *Philosophical Transactions* also took on the characteristics of a commercial network; within the sphere of the Royal Society, units of natural knowledge were acquired and exchanged as commodities. In this way, the scientific institution began to negotiate emerging discourses of consumerism.

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[113] Browne, *Works*, vol. 1, 58-59.

Chapter Three
Building a "Theatre of Things": Bacon's History of Trades, Consumerism, and the Philosophical Transactions

Introduction

Apparent throughout the numbers of the early *Philosophical Transactions* is a taste for novelty – in both material objects and information. This appetite for the new must be situated in the broader economic and cultural contexts of the late seventeenth century, in particular, in relation to the origins of British consumerism – the subject of groundbreaking work by Joan Thirsk, Neil McKendrick, and Maxine Berg.[1] My investigation of the relationship between the new science and early discourses of consumerism focuses on the journal's representation of various consumer goods and demonstrates the way in which seventeenth-century curiosities such as the cochineal insect and Chinese porcelain mediated between the realms of science and commerce. The Royal Society's projected History of Trades, inspired by Bacon's plan in the *Advancement of Learning* and the *Parasceve* for a complete history of the mechanical arts, found expression in the *Philosophical Transactions*. The journal's reports on such topics as the staining of marble, leather tanning, and cloth dyeing suggest that Oldenburg astutely both perceived and stimulated the consumer impulses of his readership; the Society's research for the History of Trades was clearly embedded in the emerging consumer culture of the period. In this chapter, I show the ways in which the early

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[1] See Joan Thirsk, *Economic Policy and Projects: The Development of a Consumer Society in Early Modern England* (Oxford: Clarendon, 1978); Neil McKendrick, John Brewer, and J. H. Plumb, *The Birth of a Consumer Society: The Commercialization of Eighteenth-Century England* (London: Europa, 1982); and *Consumers and Luxury: Consumer Culture in Europe 1650-1850*, ed. Maxine Berg and Helen Clifford (Manchester: Manchester UP, 1999). Other important recent contributions to the literature on consumerism include, *Consumption and the World of Goods*, ed. John Brewer and Roy Porter (London: Routledge, 1993); and *The Consumption of Culture 1600-1800: Image, Object, Text*, ed. Ann Bermingham and John Brewer (London: Routledge, 1995). For the role of consumption in Renaissance culture, see Jardine, *Worldy Goods: A New History of the Renaissance* (New York: Norton, 1996).

modern culture of collecting formed part of the larger movement in the period to consume new material objects.

"Commodities of Matter": Scientific Culture and the Pursuit of Novelty

Oldenburg's journal, a paper museum of matters of fact, created new intellectual and material contexts for the *naturalia* and *artificialia* from distant lands. Bruno Latour's research on scientific networks is particularly useful in considering the ways in the *Philosophical Transactions* served as a "virtual" repository for empirical knowledge. According to Latour, "centres of calculation"[2] rely upon complex networks that bring back "traces" of unfamiliar lands and cultures. Lists of directions for travellers, he argues, help to generate the "cycles of accumulation" which ensure a steady flow of traces to a designated centre; at these centres traces of the foreign are probed and domesticated.[3] Not surprisingly, Latour examines the role of collecting in this process: "rocks, birds, plants, artifacts, works of art...can be extracted from their context and taken away during expeditions. Thus the history of science is in large part the history of the mobilization of anything that can be made to move and shipped back home..."[4] With its emphasis upon voyages of discovery, museums, and botanical gardens, Latour's work has proved appealing to scholars investigating such figures as Joseph Banks, who appear to crystallize the relationship between early science and imperialism.[5]

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[2] Latour's theorization of centres of calculation, spaces in which various forms of scientific data are synthesized as part of the "proof race," occurs in chapter six of *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, MA: Harvard UP, 1987) 215-57.
[3] Latour examines the role of instructions for travellers at 225. For his discussion of cycles of accumulation, see 219-223.
[4] Latour 225.
[5] See, for example, David Philip Miller's essay, "Joseph Banks, Empire, and "Centres of Calculation" in late Hanoverian London," *Visions of Empire*, 21-37.

The Royal Society has been termed a "centre of calculation" by at least one scholar,[6] and David S. Lux and Harold J. Cook have brought social network theory to bear upon Oldenburg's information exchange;[7] here, however, I wish to use Latour's notion of "cycles of accumulation" as a point of departure for exploring the links between collecting, consumerism, and the new science. As we saw in the last chapter, Oldenburg adopted several strategies for expanding his correspondence network: he printed lists of queries in the journal, enclosed copies in his private letters, and enlisted the help of travellers and trading ships to carry these directions to distant lands. The goal was the appropriation, and to use Latour's terminology, the "mobilization" of all unfamiliar phenomena. In his preface to the eleventh year of the journal, Oldenburg articulates this particular approach to knowledge when he expresses his gratitude to the correspondents who have "made diligent Researches into the Mysteries of Arts, and for all Rarities and singularities; that so what is worthy to be acquired, or to be imitated, and may be attain'd in any one part of the world, may, (as Arts grow, and as knowledge spreads abroad) be communicated for the benefit of all" (*PT* 9-10: 255). The drive to possess novelties, exhibited here by Oldenburg, must be situated within the broader economic and cultural contexts of the early modern period, specifically, in relation to emerging discourses of consumerism. I wish to argue that the "cycles of accumulation" initiated by Oldenburg and the Royal Society to collect evidence for their projects should not be viewed as entirely distinct from other patterns of consumption emerging in the

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[6] Robert Iliffe, "Foreign Bodies: Travel, Empire and the Early Royal Society of London. Part II. The Land of Experimental Knowledge," *Canadian Journal of History* 34 (1999): 23-50, esp. 43.

[7] In their article, "Closed Circle or Open Networks?: Communicating at a Distance During the Scientific Revolution," *History of Science* 36 (1998): 179-211, Lux and Cook show how Oldenburg served as a point of overlap between other correspondence networks, 192. For a survey of the literature on social network theory, see Stanley Wasserman and Katherine Faust, *Social Network Analysis: Methods and Applications* (Cambridge: Cambridge UP, 1994).

period; the mobilization of natural history specimens was closely connected to the circulation of new consumer goods in the economic spheres.

At one point in the *New Atlantis*, Bacon distinguishes sharply between science and commerce. While the Fellows of Solomon's House were sent abroad to compile knowledge "of the sciences, arts, manufactures, and inventions of all the world,"[8] the purpose of these journeys, Bacon asserts, was not material gain, but the systematic inquiry into God's works. Thus the College "maintained a trade, not for gold, silver, or jewels; nor for silks; nor for spices; nor any other commodity of matter; but only for God's first creature, which was *Light*."[9] Although the Fellows of the early Royal Society often elevated their own pursuits over the purely commercial, they also recognized that the empirical investigation of nature and the consumption of goods were complementary and interdependent activities. Both in its practices and its rhetoric, the institution allied itself with the networks of trade. Sprat gives this relationship concrete expression in the *History* when he writes of Oldenburg and the Society: "they have begun to settle a *correspondence* through all Countreys; and have taken such order, that in short time, there will scarce a Ship come up the *Thames*, that does not make some return of *Experiments*, as well as of *Merchandize*" (86)[10]. Thus, for the Society, both an account of the use of pendulum watches at sea[11] and a shipment of "Turkey carpets" were "commodities of matter." Intricately woven and richly coloured textiles were themselves

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[8] *Works* 3: 146.
[9] *Works* 3: 147.
[10] This is an echo of the title-page to Bacon's *Instauratio Magna*. Margery Corbett and Ronald Lightbown discuss the ways in which this title-page uses images of voyages of discovery to represent the expansion of human knowledge in the period, *The Comely Frontispiece* (London: Routledge, 1979) 186.
[11] The first number of the *PT*, dated 6 March 1664/5, contained an article on this subject entitled, "A Narative concerning the success of the Pendulum-watches at Sea for the Longitudes; and the Grant of a Patent thereupon." For a recent examination of longitude, see Dava Sobel, *Longitude: The True Story of a Lone Genius who Solved the Greatest Scientific Problem of his Time* (New York: Walker, 1995).

the stuff of experiments with dyes and production techniques. The accurate calculation of longitude had been a long-standing problem for early modern navigation, and trading companies stood to benefit from a solution. We must be cautious, then, about viewing the categories of "experiment" and "merchandize" as fixed in the period; it is the points of intersection between them that reveal much about the Royal Society's formulation of curiosity.

The genesis of one of the Royal Society's publications illustrates the ways in which the cargo aboard trading ships could impact its research. In 1674 Oldenburg wrote to the botanist and taxonomist John Ray about some curious East Indian birds he had recently observed, "brought thence with the last Return-Ships" (*OC* 11: 81). He encouraged Ray, who was currently compiling Francis Willoughby's *Ornithology*,[12] to include in the new volume descriptions and images of the unfamiliar creatures that formed part of the ship's cargo – a "curious speckled Indian hen," "East-Indian Pigeons, delicately shaped," and some smaller birds "with short Scarlet Beaks, and curiously speckled Feathers" (*OC* 11: 81). The *naturalia* aboard a trading ship, like the commercial commodities they accompanied (spices, textiles, porcelain), could potentially continue their journey in multiple ways. In this case, accounts of the East Indian birds became curiosities exchanged within the epistolary sphere. Through the medium of print, the creatures achieved an even wider circulation; their visual representations eventually consumed by readers of the *Ornithology*.

It is indeed difficult to make a clear distinction between the Baconian "particulars" sought by the Society and the commercial commodities flooding the

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[12] Willoughby (b.1635) died unexpectedly in 1672. Ray helped prepare his collaborator's projects, *The Ornithology* (1678) and *Historia Piscium* (1686), for publication.

European market in the period, especially when we consider that what underlay both scientific and economic enterprises was a fascination with nature. J.H. Plumb, in an essay entitled, "The Acceptance of Modernity,"[13] locates in the eighteenth century a growing interest in nature by "quite humble men and women, innocent of philosophical theory."[14] According to Plumb, it was this impulse to manipulate and consume nature that underpinned the explosion of the seed-trade and the dramatic increase of such pursuits as the breeding of songbirds and ornamental fish; the proliferation of museums and travelling circuses are two other cultural productions he discusses in this context. There can be little doubt, as Plumb argues, that in order for a consumer society to emerge in eighteenth-century England, large segments of the population had to be receptive to and engaged in the pursuit of novelty. What is equally important to realize, however, is that many of the Fellows of the early Royal Society, although of "philosophical heads,"[15] were no less immune to the four characteristics of objects which Adam Smith argued attracted consumers:

> These four distinctions of colour, form, variety or rarity, and imitation seem to be the foundation of all the minute and, to more thoughtfull persons, frivolous distinctions and preferences in things otherwise equall, which give in the pursuit more distress and uneasieness to mankind than all the others, and to gratify which a thousand arts have been invented.[16]

In this passage, mankind's insatiable appetite for new things is represented almost as a curse – a sort of fall from grace. The industries and crafts that have been developed to

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[13] This essay is published in *The Birth of a Consumer Society*, 316-34.
[14] Plumb 316.
[15] Sprat uses this term in the *History*, 397.
[16] Smith, *Lectures on Jurisprudence*, ed. R. L. Meek, D. D. Raphael, and P. G. Stein (Oxford: Clarendon, 1978) 336-37. It is, of course, Smith's declaration in *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776) that, "Consumption is the sole end and purpose of all production," which is often cited by historians of consumerism, as quoted in Neil McKendrick, "The Consumer Revolution of Eighteenth-Century England," *The Birth of a Consumer Society*, 15. For a recent exploration of the role of consumerism in Smith's system of political economy, see Neil de Marchi's essay, "Adam Smith's Accommodation of 'Altogether Endless' Desires," *Consumers and Luxury*, 18-36.

produce new goods, Smith suggests, are actually postlapsarian attempts to mitigate this loss of peace and simplicity. As we will see, Bacon, in the seventeenth century, also associates the creation of new commodities with the fall of mankind, but with a different purpose than Smith. It was, however, just this passion for material objects, described here by Smith, which likely drove many figures to participate in the Royal Society's projects. Oldenburg's account of the "curiously speckled" East Indian birds is a striking illustration of Smith's theory about consumer desires. It is precisely the "distinctions" in colour and form displayed by the unfamiliar creatures that caught Oldenburg's attention, and caused him to mark them as curiosities. Grew's catalogue for the institution's repository, *Musaeum Regalis Societatis*, also provides a rich record of the collecting interests of the Fellows. Under the rather broad category, "Of Artificial Matters," Grew includes a series of objects that complicate distinctions between the scientific and the commercial; his account of the museum shows that there is little justification for viewing the collecting habits of the Fellows of the early Royal Society as purely philosophical exercises, untainted by the dynamics of consumerism. He describes a host of artificial curiosities that testify to the Fellows's susceptibility to Smith's four characteristics of desirable consumer objects. The following were among the *artificialia* donated to the repository: a basket made of porcupine quills "wrought in Triangular *Chequer-Work*," a pair of deerskin gloves from Iceland with "the Tops faced with *Scarlet Serge*, Embroyder'd with *Flower-Work*," an Indian fan with "the *Handle* painted with *Japan* Varnish, black, red, and yellow," and a "sea-piece, consisting wholly of Inlay'd-Work, or several Colours, in *Stone*."[17] The curiosity value of these objects was determined largely

[17] Grew 373-74, 378. The Icelandic gloves were donated by the virtuoso and traveller, Thomas Henshaw (1618- 1700). A "sea piece" was any kind of picture representing a scene at sea, *OED*. The sea-piece in

by the amount of labour involved in their fashioning, their unfamiliar materials, and their aesthetically pleasing designs.

These were obviously not "the new household goods" consumed by the middle classes in the eighteenth century; rather, they were the products of distant cultures emptied of their use value, the souvenirs of travellers, and the cabinet pieces of private collectors. It is possible, however, to identify in these curiosities some of the features Maxine Berg has associated with the new commodities sought by the middle-classes in eighteenth-century England.[18] Berg investigates the ways in which a wide range of goods, such as printed calicoes, ceramics, glassware, and window curtains were marketed and consumed as novelties in the period. The appeal of many of these objects, she argues, lay in their imitation of ancient and exotic principles and their use of new production methods and new materials.[19] A passage from Evelyn's *Diary* makes clear the prominent place of Eastern imports in the wealthier households of the late seventeenth century and why substitutes for such objects were developed. On 30 July 1682, Evelyn paid a visit to one his neighbours in Deptford, Christopher Boone, a former member of the governing body of the East India Company. Not surprisingly, Boone's "whole house [was] a Cabinet of all elegancies, especialy *Indian*, and the Contrivement of the *Japan* Skreenes instead of Wainscot in the *Hall*...is very remarkable; and so are the Landskips of the Skreenes, representing the manner of living, & Country of the *Chinezes* &c..."[20] For Evelyn, the curiosity of the lacquered screens lay not only in their

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the Society's repository was likely made of *pietra dure* (Florentine mosaic).

[18] Berg explores this topic in her essay, "New Commodities, Luxuries and Their Consumers in Eighteenth-Century England," *Consumers and Luxury*, 63-85.

[19] Berg 81-82.

[20] Evelyn, *Diary* 4: 288. In the period, "Indian" was a general term that referred to objects from China, Japan, and South-East Asia. "Japan" here signifies varnish.

pleasing design and attractive finish, but also in the way they functioned as visual translations of an unfamiliar culture. Japanned tea trays and vases, varnished in imitation of oriental lacquer, are among the goods Berg discusses. Inspired by the material culture of an ancient and distant civilization, they were perceived by consumers as "modern novelties."[21]

What Grew's catalogue of the Royal Society's *artificialia* encourages us to examine is the significant relationship between the impulse to possess the new, essential for consumerism, and other forms of empirical inquiry pursued by early modern scientific practitioners. The objects preserved in the Society's museum do not fit neatly with our modern notions of "scientific evidence," nor do they exactly represent the new consumer goods found increasingly, in the eighteenth century, in English domestic interiors. The porcupine quill basket, with its unique material and chequered design, and the Indian fan with its striking oriental lacquered handle, speak to a particular moment in time when the boundaries between science and commerce were still permeable. One of the ways in which we can reconstruct this moment is by exploring the material and conceptual processes involved in the Royal Society's collection of curiosities. The meanings the Fellows assigned to these objects, though firmly rooted in Bacon's program for a systematic, empirical natural history, were at the same time connected to the much wider developments in material culture in the period.

Bacon's History of Trades and the *Philosophical Transactions*

The presence, in the Royal Society's repository, of an elaborately embroidered pair of gloves from Iceland and a glittering sea scene in mosaic work can be traced to

[21] Berg 78-79.

Bacon's call for a complete history of the mechanical arts. In the *Advancement of Learning*, he divides the subject of natural history into three parts: "the History of Generations, of Pretergenerations, and of Arts; which last I also call Mechanical and Experimental History."[22] According to his scheme, "the first treats of the Freedom of Nature, the second of her Errors, the third of her Bonds"(410). Bacon includes the History of Arts in his program because earlier natural histories have not adequately recognized the power of art "to change, transmute, or fundamentally alter nature"(410). The "Catalogue of Particular Histories"[23] he prepared as part of the Great Instauration shows just what a wide range of activities Bacon associated with man's "transmutation" of nature; numbers 81 to 128 correspond to his history of the mechanical arts. Some of the trades connected to national defense such as the making of ordnance and shipbuilding are listed, as well as those of agriculture, fishing, and gardening. Far more numerous, however, are the trades which generate household goods; these include wool manufactures, glassmaking, pottery, and papermaking. In the *Parasceve*, Bacon specifies which trades will shed the most light upon the elements of nature:

> Among the particular arts those are to be preferred which exhibit, alter, and prepare natural bodies and materials of things; such as agriculture, cookery, chemistry, dyeing; the manufacture of glass, enamel, sugar, gunpowder, artificial fires, paper, and the like. Those which consist principally in the subtle motion of the hands or instruments are of less use; such as weaving, carpentry, architecture, manufacture of mills, clocks, and the like...[24]

We should not be surprised, then, to encounter our group of *artificialia* in the Royal Society's repository. Each object functioned as a contribution to Bacon's History of Trades: the porcupine quill basket a "particular" for his history of basket-making; the

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[22] *Works* 8: 410.
[23] Bacon's "Catalogue of Particular Histories" is in *Works* 8: 373-81.
[24] *Works* 8: 363-64.

Icelandic gloves for his histories of leather-making and dyeing; the japanned fan for his history of chemistry; and the mosaic sea piece for his history of "artificial materials." If we rely upon the hierarchy of trades Bacon establishes in the *Parasceve*, these curiosities actually represent some of the trades he considers most crucial to the compilation of the natural history.

The *artificialia* contained in the Royal Society's museum are exemplary of the ways in which individuals and groups in the period attempted to answer Bacon's call for a history of the mechanical arts. A crucial passage from the *Advancement of Learning* makes clear why the History of Trades caught the imaginations of several prominent figures of the seventeenth century. Here Bacon argues that the "History Mechanical" alone had the potential to

> relieve the inconveniences of man's estate. For it will not only be of immediate benefit, by connecting and transferring the observations of one art to the use of others, and thereby discovering new commodities; a result which must needs follow when the experience of different arts shall fall under the observation and consideration of one man's mind; but further, it will give a more true and real illumination concerning the investigation of causes of things and axioms of arts, than has hitherto shone upon mankind.[25]

In this passage, we can discern an early justification of consumerism. Bacon rationalizes the production of new goods as a means by which to mitigate the losses of Eden. Such commodities, he suggests, are necessary in a postlapsarian world in which mankind is subjected to "inconveniences." The relationship between the new science and commerce is also crystallized in these lines: by uniting the scattered "particulars" of the trades (ancient and modern), asserts Bacon, the History of Trades would not only increase the range of goods available to consumers, but also reveal the properties of nature. With its utilitarian features, the project strongly appealed to the reformers associated with the

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[25] *Works* 8: 413.

Hartlib circle who strove to improve the material and spiritual conditions of English society. In his classic study of the History of Trades, Walter E. Houghton surveys the group of writings generated by Bacon's scheme in the seventeenth century[26]; these include Hartlib's utopia, *Macaria* (1641) which was modelled upon the *New Atlantis*, and William Petty's essay, *The Advice of W.P.* (1648), which outlined the construction of a *gymnasium mechanicum* or a college of tradesmen. While the Fellows of the early Royal Society produced more than one full-length treatment of individual trades, most notably Evelyn's treatise on arboriculture, *Sylva* (1664),[27] it was Oldenburg's journal that displayed a constant engagement with the mechanical arts. Like the Society's museum, the periodical served as a repository of knowledge about the trades.[28] The journal's accounts of, for example, stone cutting[29] and the cultivation of mulberry trees[30] were the textual counterparts of the material representations of these trades exhibited in the Society's museum.[31] Several mechanical inventions were donated to the collection, including a saffron kiln, a cider-press, and a box-hive,[32] and their processes and products treated in various articles in the *Philosophical Transactions*.

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[26] Houghton, "The History of Trades." Kathleen H. Ochs also provides an account of the History of Trades in her article, "The Royal Society of London's History of Trades Programme: An Early Episode in Applied Science," *Notes and Records of the Royal Society of London* 39 (1985): 129-158.

[27] Evelyn also contributed a history of etching and engraving, *Sculptura* (1662), to the project; Christopher Merrett's translation of Antonio Neri's treatise on glassmaking, *L'Arte Vetraria*, appeared during the same year as part of the Society's History of Trades.

[28] For a discussion of the ways in which Oldenburg's journal promoted technology, see Marie Boas Hall, "Oldenburg, the *Philosophical Transactions*, and Technology," *The Uses of Science in the Age of Newton*, ed. J. G. Burke (Berkeley: U of California P, 1983) 21-47.

[29] In *PT* 7-8: 6010-15, there appeared the following article: "Directions for Inquiries concerning stones and other Materials for the Use of Building; together with a suggestion for retriving the Art of hardning and tempering Steel for cutting Porphyre and other hard Marbles."

[30] The first volume of the *PT* contained the first of what would be many articles on this topic: "An Extract Of a Letter, sent lately to Sir Robert Moray out of Virginia, concerning an unusual way of propagating Mulberry trees there, for the better improvement of the Silk-Work; together with some other particulars, tending to the good of that Plantation," 1-2: 201-202.

[31] The Society's repository contained several textile and stone items including "two bags of the Virginian silk-worm," a piece of waterproof leather, and a pair of decorated stones, Grew 176, 372, 375.

[32] Grew 371.

The interest generated by Bacon's History of Trades among the Fellows of the early Royal Society must be situated in the context of the origins of British consumerism. As Neil McKendrick has argued,[33] eighteenth-century England experienced a consumer revolution in which "a greater proportion of the population than in any previous society in human history was able to enjoy the pleasures of buying consumer goods."[34] McKendrick locates the intellectual origins of these cultural developments in the late seventeenth century; he explores the revaluation of consumption from sinful self-indulgence to positive economic force, as well as the gradual recognition that home demand was elastic. With its representations of luxury and semi-luxury goods, as well as new mechanical and chemical processes, the Royal Society's journal offers us a unique record of the twin impulses associated with consumerism: the drive to experience novelty and an increasing curiosity about nature. The very genre Oldenburg uses to convey information about the trades – that of the periodical – mimicked the dynamics of consumerism. In contrast to the presumed completeness of the late medieval encyclopedia, the periodical did not imply closure; it grew out of an insatiable appetite for the new. The compressed accounts of new material objects with which he supplied his readers permitted them to take conceptual possession of these goods. In this way, the *Philosophical Transactions* formed part of the literary culture of consumerism.

In 2001-02, an exhibition at the Geffrye Museum of London, entitled "After the Fire: London Furniture 1666-1714," traced the demand for new furniture occasioned by the Great Fire of September 1666.[35] Increased trade with the Far East, the West Indies, and the New World, combined with an influx into London of highly skilled Protestant

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[33] See McKendrick, "The Consumer Revolution of Eighteenth-Century England," 9-33.
[34] McKendrick 9.
[35] This exhibition ran from 13 November 2001 to 3 March 2002 at the Geffrye Museum.

immigrants from the continent, gave birth to a host of innovative goods. With the passing of the Rebuilding Act of 1667, a new landscape of modern brick houses emerged that created a market for stylish furnishings.[36] Japanned corner cupboards, caned chairs, and floral marquetry tables were among the items developed for the middle and upper classes.[37] The Great Fire, and the opportunities it produced for innovation, also swiftly became part of the Royal Society's rhetoric of utility. In the following passage from the *History*, Sprat links the "raising" of the new philosophy to the rebuilding of London:

> A *New City* is to be built, on the most advantageous Seat of all *Europe*, for Trade, and command. This therefore is the fittest Season for men to apply their thoughts, to the improving of the *materials* of building, and to the inventing of better *models*, for *Houses*, *Roofs*, *Chimnies*, *Conduits*, *Wharfs*, and *Streets*: all which have been already under the consideration of the *Royal Society*: and that too, before they had such a sad occasion of bringing their *observations* into practice. (122-23)

These lines extend Sprat's earlier argument that London, as the head of an empire and a thriving commercial centre, was uniquely suited to foster the growth of experimental science.[38] The Great Fire allowed the author to be even more explicit about the kinds of material contributions the Royal Society envisioned itself making to the metropolis.

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[36] As T. M. M. Baker tells us, the Rebuilding Act required that new houses be constructed in one of four models: houses on the principal streets were to be four storeys with attics; houses on the "other streets and lanes of note" were to be three storeys; houses on the back lanes were to be two storeys, and "mansion houses" were to be four storeys. The Act also contained specifications regarding the facing materials of houses (brick or stone) and the thicknessess of walls, *London: Rebuilding the City after the Great Fire* (Chichester, West Sussex, UK: Phillimore, 2000) 11. T. F. Reddaway's *The Rebuilding of London after the Great Fire* (London: Jonathan Cape, 1940) also contains much useful information.

[37] In her essay, "Building, Buying, and Collecting in London, 1600-1625," Linda Levy Peck explores the ways in which continental influences had already begun to shape the material culture of England's aristocracy at the beginning of the seventeenth century, *Material London, ca. 1600*, 268-89.

[38] Sprat details the advantages of London for the new philosophy on 86-89 of the *History*, arguing that the city is "the head of a *mighty Empire*, the greatest that ever commanded the *Ocean*: It is compos'd of *Gentlemen*, as well as *Traders*: It has a large intercourse with all the *Earth*: It is...a City, where all the noises and business in the *World* do meet: and therefore this honour is justly due to it, to be the *constant* place of *residence* for that *Knowledg*, which is to made up of the Reports, and Intelligence of all Countreys," 87-88.

In the years before the destruction of much of the City by fire, prominent members of the Society had formulated plans for the redesign of London. In May 1666, for example, Wren drew up a report and some preliminary designs for the restoration of St. Paul's Cathedral.[39] Evelyn's proposal for improving the air quality of London, *Fumifugium* (1661),[40] had also identified some the problems with the City's infrastructure: "that the buildings should be compos'd of such a congestion of mishapen and extravagant houses; that the streets should be so narrow and incommodious in the very center and busiest places of intercourse; that there should be so ill and uneasie a form of paving under foot..."[41] When, just a few years later, the metropolis lay in ruins following the Great Fire, Evelyn hoped that the time had finally arrived for "this glorious and antient city, which from wood might be rendred brick, and (like another Rome) from brick made stone and marble..."[42] On 13 September 1666 he presented the King with a plan for the rebuilding of London.[43] In the context of the Great Fire, then, the "operative"[44] or practical part of Bacon's History of Trades took on new meaning. The burning of London created a genuine demand for innovations in industry and for new

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[39] Jardine discusses this report and plans for the redesign of Old St. Paul's in *Ingenious Pursuits*, 67-76.
[40] In order to mitigate the effects of pollution, much of it caused by the burning of sea coal, Evelyn recommends the planting of fragrant shrubs and flowers (jessamines, musk roses, bayes, junipers, lavender, and rosemary) about the City which "are aptest to tinge the Aer upon every gentle emission at a great distance," *Fumifugium: Or the Inconveniencie of the Aer and Smoak of London Dissapated*, *The Miscellaneous Writings of John Evelyn*, ed. William Upcott (London: Henry Colburn, 1825) 240.
[41] *Fumifugium* 210.
[42] *Fumifugium* 210. Evelyn's allusion here is to Suetonius's *Life of Augustus*, section 28: "For the Citie beeing not adourned according to the majestie of such an Empire and Subject to the casualties of Deluges and fires, hee beautified and set out so, as justly he made his boast, that where he found it built of bricke, hee left it all of marble," *The Historie of Twelve Caesars Emperors of Rome*, trans. Philemon Holland (London, 1606) 50.
[43] Evelyn's proposal was entitled *Londinum Redivivum*. Among his recommendations for the rebuilding were the following: the widening of the City's principal streets; the construction of piazzas, public fountains, and court-yards; the removal of some of the trades (such as brewing, dyeing, and sugar and soap-boiling) from the City, and uniform paving of the streets, *John Evelyn: London Revived, Consideration for Its Rebuilding in 1666*, ed. E. S. de Beer (Oxford: Clarendon, 1938).
[44] Bacon uses this term to describe the project in the *Advancement of Learning*, *Works* 8: 415.

commodities. Many of the new household goods were produced, exactly as Bacon had imagined, by finding new applications for existing arts. Caned chairs, for example, were based on techniques originating in the Far East. When Sprat writes of the Society's "bringing their observations into practice," he is alluding to plans like that produced by Wren for the improvement of London's architecture and that by Evelyn for replanting the City; probably foremost in his mind, however, was the Society's research for its projected History of Trades.

Bacon's plan for a history of the mechanical arts, like the other parts of his scheme for a systematic, empirical natural history, was indebted to earlier, encyclopedic models of knowledge. He urged his readers to create an archive of "particulars" about the trades. The Fellows of the early Royal Society responded to Bacon's call for the History of Trades in much the same way they conceived their other projects – as a collecting expedition. They struck a committee,[45] studied published accounts of the trades, exchanged letters about mechanical and chemical curiosities, called upon members to bring in histories of various arts, and printed preliminary reports in the *Philosophical Transactions*. We have already seen how curiosities representing the trades were also donated to the Society's museum. On 28 September 1669, Oldenburg compiled and sent another Fellow, the Dorset gentleman John Newburgh, a catalogue of some of the papers registered by the Society.[46] In addition to providing a wonderful

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[45] For an account of the Society's Committee for the History of Trades, see Hunter, "An Experiment in Corporate Enterprise: The Royal Society's Committees of 1663-5."

[46] This document is reproduced in *OC* 6: 251-52. With its encyclopedic quality, this catalogue resembles Evelyn's plan for the *Elysium*. The following is a transcription of Oldenburg's list for Newburgh: 1. Inquiries Concerning Vegetables. 2. Inquiries of Agriculture and Meadows. 3. Inquiries of a Kitchen-garden. 4. Inquiries and Directions for Seamen. 5. General Heads for making ye Natural History of a contry. 6. Queries for ye East-Indies, and for most other parts of ye World. 7. The way of making Allum, Coperas; Iron; Saltpeter, Gunpowder; Marbled paper; Pitch and Tarr; Parchment and velum. 8. Accompt of Saffron. 9. Accompt of ye Tyn-mynes, and working of Tyn in Cornwal. 10. A Method for ye making a

snapshot of the institution's activities during in its early years, this list shows the ways in which the interests and experiences of individual Fellows shaped the Society's research on the trades. Evelyn, the virtuoso and grand tourist, for example, contributed accounts of paper marbling and of the French ways of making bread.[47] Petty, the son of a clothier, prepared a paper on the history of dyeing in which he explored the ways of making the fixative alum.[48] The donor of the saffron kiln to the Society's repository, the aristocrat Charles Howard, offered an account of the cultivation of saffron,[49] while the physician Martin Lister compiled a series of observations about the kermes, the parasitic insect on Mediterranean evergreen oaks which yielded bright reds for dyeing cloth.[50] Various trades associated with national defense (the production of iron, saltpeter, and gunpowder) are also represented in Oldenburg's catalogue, along with several papers about gardening and agriculture.

History of ye Weather. 11. Observations about Eggs. 12. Observations upon May-dew. 13. Observations about Frog-spawn. 14. Considerations for setling an Universal measure. 15. The several manners of making Bread in France. 16. Observations concerning Ants or Emmets. 17. Of Mastick made by Ants. 18. Observations about Alkermes. 19. Observations about ye Uniting ye Barks of Trees cutt, to the Tree itself. 20. An Observation concerning a Blemish in an Horses Eye, of great use in the Choice of Horses. 21. The manner of Hatching Chickens at Cairo. 22. An Observation very curious about Mosse-seed. 23. The Rules of Motion by Dr Wallis, Dr Wren, Monsr Hugens Mr Neile. 24. Accoumpts concerning the way of Agriculture used in part of Glocestershire and Somersetshire, Yorkshire, Devonshire, Dorsetshire, Suffolk, Kent. 25. Plants cultivated in England. 26. Queries concerning ye Breeding of Horses.

[47] Evelyn read his account of paper marbling to the Society on 8 January 1661/2, Thomas Birch, *The History of the Royal Society of London*, 4 vols. (New York: Johnson Reprint Corp., 1968) vol. 1, 69; he presented his study of bread making, "Panificium, or the Several Manners of Making Bread in France," to the institution on 1 March 1664/5, Birch, vol. 2, 19. Evelyn's "Panificium" was published in John Houghton, *A Collection of Letters for the Improvement of Husbandry & Trade*, vol. 1 (London, 1681)127-36.

[48] Petty's paper, "An Apparatus to the History of the Common Practices of Dying," was published in the Sprat's *History*, 284-306.

[49] Howard's paper, "An Account of the Culture, or Planting and Ordering of Saffron," was published in *PT*: 11-12: 945-49.

[50] Some of Lister's research on the subject of kermes was published in Oldenburg's journal. See, for example, *PT* 5-6: 2165-66, *PT* 5-6: 2196-97 and *PT* 7-8: 5059-60. Another article appeared in the journal on the use of kermes for dyeing, based on observations made by a French apothecary at Montpellier, *PT* 1-2: 362-63. Richard Reed of Herefordshire also sent to Oldenburg an account of the chemical processes of dyeing, *PT* 5-6: 2132-36.

It is, of course, difficult both to chart the diffusion of information about specific trades and to measure the precise amount of interchange between practicing tradesmen and the Fellows of the early Royal Society. While the Society made attempts to attract tradesmen to its membership, the evidence suggests that it was ultimately unsuccessful on this front.[51] Because of the time involved in bringing a full-length treatment of a specific trade to print, and the fact that some of the Society's published accounts of trades were actually translations of continental works, one would tend to agree with Hunter's assertion that "change generally occurred at the level of artisans and entrepreneurs, and books were probably largely irrelevant to processes that were often very complex and hard to describe."[52] There were, however, some points of connection between the innovations occurring in the workshops of London furniture makers in the late seventeenth century, documented by the Geffrye exhibition, and the gentlemanly conversations and epistolary transactions about the trades that took place under the auspices of the Royal Society. What the articles of the early *Philosophical Transactions* permit us to explore is the way in which knowledge itself about the trades was commodified in the period – the complex processes by which accounts of, for example, dyestuffs and decorated paper became objects of intellectual exchange.

In order to generate interest in Bacon's History of Trades, Evelyn and Oldenburg attempted to give such knowledge of the mechanical arts a social currency. Acting as an advisor to young Englishmen on the grand tour in the late 1650s, Evelyn urged his correspondents to collect information about the trades. In a letter from the late 1650s, for

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[51] For the percentages of merchants and tradesmen in the early Royal Society, see Tables five to seven in Hunter, *The Royal Society and Its Fellows 1660-1700.* Hunter's data indicates that this group rarely formed a substantial part of the institution's membership.
[52] Hunter, *Science and Society in Restoration England* 109.

example, he replied to a request by Francis Carter for assistance in devising an itinerary for travels in Italy:

> I would reccommend to your notice whatsoever you thinke may hereafter be of use and for Ornament in our owne Country at your returne...Learne by some faithfull and ocular Processe how they extract their Essences of Orange, Jassmine, Hyacinths, Violets and other esteemed perfumes...Keepe Memoires of all these Experiments in a booke...To perfume leather after the Frangipani manner...Also to make Cements, artificial marbles, stone, Pasts; the red floores of Venice, To make Vernishes, Colours, dies, and tinctures for stone, wood, leather, haire...Visite the Mechanics, and Manufactures; Collect all Curious Bookes upon any of these Subjects.[53]

Clearly Evelyn had more than one motive in outlining such a Baconian course of study for Carter, in which published sources about the trades are supplemented by first-hand observations.[54] By calling upon his grand tour correspondents to assemble "particulars" of continental trades, Evelyn ensured a fresh supply of knowledge for his own histories of such arts. His catalogue of celebrated Italian arts is an example of the ways in which the experiences and interests of individual Fellows often informed the Society's research for the History of trades. On the grand tour in 1645, Evelyn had visited St. Mark's Basilica where "you see nothing, & tread on nothing but is precious, The floore all inlayed with Achats, Lazulis, Calcedons, Jaspers, Porphyrie and other rich marbles."[55] His instructions to Carter, then, to discover the secret of inlaying floors in Venetian mosaic or *terrazzo*, an art that sought to imitate the ancient *opus tessellatum* (mosaic of small cubes

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[53] BL Add. 78298, no. 266, Evelyn to Carter, 24 November 1665 (misdated).
[54] While Evelyn encouraged his correspondents to collect information from the "shops of mechanics," he himself found difficulties with this kind of interchange. See note 118 in this chapter. In his own essay on the trades, Boyle elevates the tradesman's knowledge over that furnished by texts, especially those of the ancients: "I learn'd more of the Kinds, Distinctions, Properties, and consequently of the Nature of Stones, by conversing with two or three Masons, and Stone-cutters, than ever I did from *Pliny* or *Aristotle*, and his Commentators," "That the Goods of Mankind may be much encreased by the Naturalists Insight into Trades," 5.
[55] Evelyn, *Diary* 2: 437.

of coloured marble) of the flooring of St. Mark's,[56] had their origin in Evelyn's own experiences on the grand tour. In representing the trade secrets of Italy as social attributes, as a means of self-fashioning for English gentlemen, Evelyn laid the groundwork for support of the new scientific institution he was helping to found – a body for which Bacon's History of Trades would be a central project.

In another letter from this period about the grand tour, Evelyn advises Benjamin Maddox to acquaint himself with the trades of Montpellier: "procure to see Experiments, furnish your Selfe with receipts, models, and Things which are rare,"[57] he tells his correspondent. A knowledge of chemical curiosities (perfumes, pomanders), explains Evelyn, "though they are indeede but Trifles in comparison of more solid things; yet, if ever you should affect to live a retired life hereafter; you will take more pleasure in those Recreations then you can now imagine." The association that Evelyn makes here between the trades and retirement is crucial. Defending the Royal Society's History of Trades against charges of dilettantism, Evelyn and other prominent Fellows such as Sprat and Boyle argued that the "free state" of gentlemen was particularly conducive to experiments in the trades.[58] Whereas practicing artisans and tradesmen are necessarily concerned with securing their livelihood, disinterested gentlemen, writes Evelyn, "have

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[56] Elena Bassi, in her introduction to Tudy Sammartini's *Decorative Floors of Venice*, discusses the ways in which Venetian *terrazzo* tried to replicate the wonders of the *opus tessellatum* of St. Mark's, Sammartini, *Decorative Floors of Venice* (London: Merrell, 2000) 11.

[57] BL Add. 78298, Evelyn to Maddox, no. 129, 10 January 1658.

[58] See Shapin, *A Social History of Truth*, for a comprehensive examination of the disinterested gentleman, truth claims, and the progress of the new science. For Sprat on the ways in which gentlemen could improve the trades, see *History* 390-93. Boyle's argument that "the Naturalist may oftentimes observe in Shops divers considerable Phaenomena, that the Trades-man regards not; because they neither further, nor hinder him in his work," in contained in the essay "That the Goods of Mankind may be much encreased by the Naturalists Insight into Trades," in his treatise, *Some Considerations Touching the Usefulnesse of Experimental Naturall Philosophy*, vol. 2 (Oxford, 1671) 1-28, at 9.

both the meanes, and leasure to improve and cultivat"[59] the mechanical arts. Such apologies for the gentleman's pursuit of the trades were predicated upon the belief that one did not actually have to possess any expertise in an art in order to play a role in improving it. This argument regarding the lack of experience necessary to participate in the Society's endeavours can be traced in part to Bacon's statement in the *Parasceve* about the materials of the natural history being "so widely spread, that one must employ factors and merchants to go everywhere in search of them and bring them in."[60] Recognizing that the natural history or "royal work"[61] he planned would require the assistance of many individuals, he represented the project as an inclusive enterprise, one in which individuals of all abilities and backgrounds could make a contribution. The Royal Society's use of lists of queries, soliciting information from travellers, is one the best illustrations of the "democratic" aspect of the new science.

The lists of queries that Oldenburg published in the *Philosophical Transactions* constructed trade secrets as a category of wonders. While correspondents were pressed for details about the Turkish ways of decorating steel and dressing leather, travellers to Persia in 1665 were asked, "what other Trades or Practices, besides *Silk*-and *Tapistry*-making, they are skilled in" and how they make the plaster that "shines like Marble" which they use to line their cisterns (*PT* 1-2: 420). The "Inquiries for Virginia and the Bermudas" which appeared in the same issue of the journal sought accounts of roots that produce good red "tinctures," of a waterproof glue made from hartshorn, and of a spider in the Bermudas "said to be large and beautiful for its colours; weaving a Web betwixt several Trees, which is affirmed to be for substance and colour like perfect raw Silk..."

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[59] BL Add. 78298, no. 129, Evelyn to Maddox, 10 January 1658.
[60] *Works* 8: 354.
[61] Bacon uses this phrase to describe the natural history in the *Parasceve*, *Works* 8: 353.

(*PT* 1-2: 420-21). The more general sets of queries that were printed in the *Philosophical Transactions*, such as "Inquiries concerning the Use and Culture of the Kitchin-Garden and Winter-greens"[62] and Boyle's "General Heads for a Natural History of a Countrey," also requested information about handicrafts and industrial processes. The queries regarding kitchen gardens, compiled by Charles Howard, strongly emphasized the conversion of nature into household goods: "Of what Roots, Stalks, Barks, Leaves, Flowers, Fruits, seeds, Downs, may be made either Cups, Boxes, Baskets, Matts, Calicoes, Cloaths (as Netle-cloath) and the like? All which will be most useful for the life of Man from the Garden" (*PT* 3-4: 801).[63] Similarly, Boyle urged travellers to supply reports of "Fullers-earths" and "Earths for Potters wares" (*PT* 1-2: 189).[64]

These examples show that curiosity value, on the basis of several criteria, was assigned to various trades and objects. The fine workmanship involved in producing damascene steel and Persian carpets, as well as their exotic associations, caused these Eastern goods to achieve the status of curiosities. Queries about the Persian plaster with a marble-like finish, and the Bermuda spider with a silken web highlight both the durability and the aesthetic qualities of these materials; the latter query also reflects the desire to identify alternate sources for such lucrative commodities as silk. Certainly the queries regarding dyestuffs in Virginia and the Bermudas testify to this commercial spirit, since the search for New World sources of red dyes to compete with those of the Mediterranean continued to be of crucial importance to England's economy in the

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[62] The list of queries about kitchen gardens was printed in a 1668 issue of the *PT*.
[63] This particular query was probably based on Bacon's call for a "History of Plants, Trees, Shrubs, Herbs; and of their parts, Roots, Stalks, Wood, Leaves, Flowers, Fruits, Seeds, Gums, &c.," *Works* 8: 376.
[64] England's interest in producing substitutes for Chinese porcelain will be discussed later in this chapter.

seventeenth century.[65] Both the list about kitchen gardens and that compiled by Boyle are concerned with the ways in which natural materials may be transformed by art into ordinary household goods like calicoes and earthenware. In the *Parasceve*, Bacon stresses that the sole purpose of the History of Trades is not the improvement of the mechanical arts: "it would be an utter mistake to suppose that my intention would be satisfied by a collection of experiments of arts made only with the view of thereby bringing the several arts to greater perfection."[66] The queries about kitchen gardens embody the twin aims of Bacon's History of Trades – the generation of new commodities and the investigation of nature's properties. By examining the processes by which these and other commodities are extracted and fashioned from the earth, Bacon suggests, we will better understand the causes of nature. The tiny catalogue of goods embedded in the kitchen garden list illustrates the economy of nature – how it can provide the raw materials for innumerable goods. At the same time, this inventory also underscores the human ingenuity involved in altering the bodies of nature.

Devices of Wonder: The Commodification of Curiosity

Bacon's alternate name for the History of Trades was the "History of Nature Wrought."[67] Because "nature exhibits herself more clearly under the trials and vexations of art than when left to herself,"[68] he argues, we must compile a catalogue of the "particulars" of the mechanical arts. The trades, then, were a means by which to exert

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[65] For a recent discussion of textile production and the use of dyestuffs in sixteenth- and seventeenth-century England, see Jane Schneider, "Fantastical Colors in Foggy London: The New Fashion Potential of the Late Sixteenth Century," *Material London, ca. 1600*, 109-25.
[66] *Works* 8: 364.
[67] Bacon refers to the history of the mechanical arts as the "History of Nature Wrought" in the *Advancement of Learning*, *Works* 8: 413.
[68] *Works* 8: 415.

control over nature and to force it to confess its secrets. Several articles in the journal treated what might be called "devices of wonder"– objects designed to provoke astonishment by blurring the boundaries between art and nature.[69] An exhibition in 2001-02, at the J. Paul Getty Museum of Los Angeles, entitled "Devices of Wonder: From the World in a Box to Images on a Screen," traced the history of objects of this kind.[70] Among the curiosities displayed in the exhibition, many of which had their origin in the seventeenth century, were the following: a model of the human eye, a magic lantern, a portable orrery,[71] a dissecting microscope,[72] and a miniature scrolling panorama designed for a cylindrical case.[73] These objects, whose seventeenth-century versions were preserved in cabinets of curiosities, demonstrate some of the means by which an interplay between art and nature could be achieved. The fine workmanship and mechanical ingenuity of the orrery, for example, resulted in a device that closely replicated the workings of the solar system. Similarly, the painted panorama also reduced its subject to a more portable and accessible form and enabled its audience almost to participate in the voyage that unfolded before them. It is, perhaps, the model of the human eye and the

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[69] I will be limiting my discussion to only two of these articles – one contributed by Evelyn about wax figures and wooden maps, and another by Hooke about an optical experiment. In the early years of the *Philosophical Transactions* accounts also appeared about such objects as Newton's reflecting telescope (later donated to the Society's repository), microscopes, and burning mirrors. For a discussion of these and other articles about devices of wonder, see Marie Boas Hall, "Oldenburg, the *Philosophical Transactions*, and Technology," 35-36.

[70] This exhibition ran from 13 November 2001 to 3 February 2002. See the accompanying exhibition catalogue, *Devices of Wonder: From the World in a Box to Images on a Screen*, by Barbara Maria Stafford and Frances Terpak (Los Angeles: Getty Research Institute, 2001).

[71] An orrery was a clockwork model of the solar system. The device owes its name to Charles Boyle, fourth Earl of Orrery (1678-1731), for whom the instrument-maker John Rowley designed one of these objects, *OED*.

[72] As Terpak explains, this instrument was devised in the eighteenth century to study of the circulation of blood in small animals. The live animal was held on the microscope's main plate by hooks while the investigator, using a lens on a pivoting arm, viewed the animal through an aperture, *Devices of Wonder*, 210.

[73] The Getty exhibited a panorama painted in 1823 which depicted an imaginary voyage between Hamburg and one of its suburbs, *Devices of Wonder*, 320-21.

dissecting microscope that articulate most forcefully the impulse to discipline nature through art. Like the early museum, devices of wonder were strategies by which to contain and interrogate nature.

We can identify in such objects as the orrery and the panorama a microcosmic function similar to that of the cabinet of curiosities. Devices of wonder were theatres in which curious objects and phenomena were assembled and presented to audiences. The crucial ties between these devices and the process of commodification are suggested by the following passage from Evelyn's *Diary* in which he recounts being shown in London on 5 February 1656, "a prety Perspective & well represented in a triangular Box, the greate Church at *Harlem* in Holland, to be seene thro a small hole at one of the Corners, & contrived into an handsome Cabinet: It was so rarely don, that all the Artists & Painters in Towne, came flocking to see & admire it."[74] This device was similar to the perspective boxes created by Samuel van Hoogstraten (1627-78),[75] famous also for being one of Rembrandt's students in the 1640s. In this instance, the perspective box acted as a portable grand tour, providing Englishmen with a view of one of Haarlem's finest pieces of architecture.[76] Of course, the grand tour was itself the primary institution responsible for commodifying continental landmarks; this particular perspective box simply extended

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[74] Evelyn, *Diary* 3: 165. One of the functions of these boxes was to instruct artists in the use of perspective. In his preface to the sixth year of the *PT*, Oldenburg describes the invention of an instrument for drawing in perspective, explaining that this particular skill is "a pleasant Companion to the Travaylor, and enables him to give a lively History of his Travels for the information of others" (*PT* 5-6: 1148). The Royal Society's museum contained two such objects: one was an instrument designed by Wren and the other was an "optique box," Grew 376.

[75] The Getty exhibited one of Hoogstraten's perspective boxes, showing the interior of a Dutch house, itself decorated with a Dutch still life. See *Devices of Wonder*, 238. The National Gallery of London holds another one of Hoogstraten's boxes. For seventeenth-century ideas about perspective, see Pierre Descargues, *Perspective*, trans. I. Mark Paris (New York: Harry N. Abrams, 1976) 76-127. The perspective box anticipated such eighteenth-century devices as Claude glass. Named for the French landscape painter Claude Lorrain (1600-82), these convex glasses were used by travellers to create perspective views of the landscape.

[76] Evelyn had actually visited this church in 1641. For his description of the building, see *Diary* 2: 50-51.

this process. The peep show also exposed viewers to the Dutch realist style, showcasing developments in the nation's visual culture. Evelyn's use of the term "cabinet" to describe the perspective box reinforces the link between these devices and early modern museums; both were cultural productions that, paradoxically, sought to enclose and circumscribe the curious, while at the same time bringing rare phenomena to a wider audience.

Another contemporary account illustrates the ways in which some of these seventeenth-century devices of wonder functioned as early forms of "virtual reality." John Bargrave (1610-80), a canon of Canterbury Cathedral, assembled a collection of curiosities while acting as a travelling tutor to several young English gentlemen during the 1640s and 50s.[77] He subsequently donated the collection to Canterbury Cathedral[78]; the catalogue[79] he prepared of the objects is a rich record of the grand tour and the collecting culture of the period. At Nuremberg, Bargrave recalls being shown "wonderful strange glasses, some oval, some round, some square, some convex, some concave, which produced strange deceptions of the sight, unspeakable."[80] In the following passage, Bargrave tells of being captivated by one of these optical devices:

> [A] large glass...which, being hanged at one side of the room, and a fair perspective picture of the inside of a church, with its arches and pillars, hanged at the other, at a due distance, the species do so strangely come out from the glass that you seem to be walking in a church. Remove that picture, and place in its

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[77] In 1646-47, Bargrave accompanied his nephew John Raymond and Alexander Chapman of Kent to Italy; in 1650 he returned to Italy as tutor to Philip Lord Stanhope (later second Earl of Chesterfield) and another young gentleman. For an account of Bargrave's and Raymond's travels, see John Raymond, *An Itinerary Contayning a Voyage, Made Through Italy, in the Yeare 1646, and 1647* (1648).

[78] The collection remains in the Canterbury Cathedral Library today, preserved in two of Bargrave's own cabinets and one that was constructed later about the time that the objects came to the Library in 1685. For a detailed account of Bargrave's curiosities, see David Sturdy and Martin Henig, *The Gentle Traveller: John Bargrave, Canon of Canterbury, and his Collection* (Abingdon, UK: Abbey Press, 1983).

[79] This catalogue is published in Bargrave, *Pope Alexander the Seventh and the College of Cardinals*, ed. James Craigie Robertson, vol. 92 (London: Camden Society, 1867).

[80] Bargrave 134. Here, "unspeakable" signifies "indescribable."

> room a fair garden, with oranges and lemon trees, and fountains and walks, &c., and by the reflex of that glass, in the middest of the room, one seemeth to walk in a garden, and so in a grove, &c.[81]

Like Evelyn's perspective box that depicts the church interior at Haarlem, this mirror was a means by which to place viewers in the middle of a scene, permitting them to experience an alternate reality. Both the peep show and the glass took the realism of architectural painting and landscape painting a step further; they tried to bridge the gap between the viewer and the object by rendering almost invisible the image and the image-making process.

The effect Bargrave experiences when the mirror reflects a painting of an ornamental garden – that of "seeming to walk in a garden" – evokes the paradisal metaphors that underpinned the collecting enterprises of his day.[82] Essentially salvage missions, early modern gardens and museums became spaces in which the scattered objects of creation were preserved and investigated. The optical device that Bargrave describes, which reduces, if not eliminates, the distance between the viewer and the object, also embodies this desire to recover lost Adamic knowledge. Such devices tried to replicate the kind of heightened sensory perception displayed by Adam in Eden, which allowed him to assign to the creatures names that captured their essential natures. As Milton's Adam in *Paradise Lost* remarks of the birds and beasts: "I nam'd them, as they pass'd, and understood / Thir Nature, with such knowledge God endu'd / My sudden apprehension" (352-54).[83] A parallel exists, then, between the Royal Society's efforts to

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[81] Bargrave 134-35. He notes that he would have acquired this device if his "quality and purse had had a proportion suitable for such a purchase," 135.
[82] See Bennett and Mandelbrote, *The Garden, the Ark, the Tower, the Temple.*
[83] Milton, *Paradise Lost, John Milton: Complete Poems and Major Prose.*

fit words more closely to things and devices of wonder that, through their imitation of nature, sought to make the image indistinguishable from the object.

The intense interest in the period in discovering new ways to represent nature is illustrated by the following article that appeared in the *Philosophical Transactions* in 1665: "An Advertisement of a way of making more lively Counterfaits of Nature in Wax, then are extant in Painting: And of a new kinde of Maps in a low Relievo; both practised in France" (*PT* 1-2: 99-100). By indicating to readers that this account was "communicated by the Ingenious Mr. *John Evelyn*, to whom it was sent from *Paris* in a Letter" (*PT* 102: 99), Oldenburg establishes the credibility and novelty of the information contained in the piece. The term "ingenious" testifies to Evelyn's status as a connoisseur of the curious, while the reference to Paris signals that what follows is an account of the latest continental techniques in these arts. The first part of the article tells of a Frenchman who fashions life-like wax sculptures; this artist has "an extraordinary address in modelling the Figures, and in mixing the Colours and Shadows; making the Eyes so lively, that they kill all things of this Art [Evelyn's correspondent] ever beheld" (*PT* 1-2: 99). Bacon had called for histories of modelling and of wax,[84] and this article supplied some "particulars" of these trades. Like automata and bronze casts, wax figures were frequently found in cabinets of curiosities.[85] In the second half of Evelyn's article, a kind of three-dimensional map is discussed. Built inside a large wooden frame, these maps or "sculptures" reproduced the geographical features and man-made constructions of a particular region. A map of Antibes

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[84] *Works* 8: 378, 380.

[85] Among the objects mentioned in Tradescant's museum catalogue are the following: "several sorts of imbost Wax-works curious" and "*Phaëton* with his Chariot and Horses, excellent wax-works," 40. The Royal Society's own museum boasted a wax model of Sir Robert Moray's head, Grew 379.

> represented the Sea, with Ships and other Vessels Artificially made, with their *Canons* and Tackle of Wood fixed upon the surface, after a new and most admirable manner. The Rocks about the Island exactly form'd, as they are upon the Natural Place; and the Island it self, with all its Inequalities, and Hills and Dales; the Town, the Fort, the little Houses, Platform, and the Canons mounted; and even the Gardens and Platforms of Trees, with their green Leaves standing upright, as if they were growing in their Natural Colours: In *fine*, Men, Beasts, and whatever you may imagine to have any protuberancy above the level of the Sea. (*PT* 1-2: 99-100)

Because they "consist principally in the subtle motion of the hands," Bacon considered the trades described in this article, woodworking and modelling, to be less crucial to the compilation of the natural history. Nonetheless, he did urge readers to examine these arts,[86] and Oldenburg could justify his publication of the report on these grounds. The editor, however, also no doubt recognized that an account from Paris of this strange kind of map or "Wooden Country" (*PT* 1-2: 100) would satisfy the appetite of his readers for the new and the curious.

In the same way that the perspective box and the panorama served as microcosms, three-dimensional cartography offered a means by which to view nature in miniature. The act of representing an object or phenomenon in miniature is essentially one of control; the account of the map of Antibes exemplifies the rhetoric of discipline sometimes associated with miniaturization. An art closely tied to national defense, cartography reduces nature's expanses to pieces of paper and models; mountain ranges and great forests become circumscribed and portable.[87] When, in the passage above, the author writes of the ships being "fixed upon the [sea's] surface," and of the island's rocks being "exactly form'd," he points to the connections between such curiosities as low relief maps and other discourses of control. The objective of some of these devices of

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[86] Bacon suggests compiling a history of woodworking, *Works* 8: 379.

[87] In his discussion of centres of calculation, Latour explores cartography, which represents a change of scale, as a means by which to "dominate the world," *Science in Action*, 224.

wonder was clearly that of pinning nature down. In the author's description of "the Gardens and Platforms of Trees, with their green Leaves standing upright, as if they were growing in their Natural Colours," the map's wooden trees and flowers are compared to soldiers standing at attention; an image expressed poetically in Marvell's "Upon Appleton House": "See how the Flow'rs, as at *Parade*, / Under their *Colours* stand displaid: / Each *Regiment* in order grows, / That of the Tulip Pinke and Rose."[88] Finely crafted wooden maps and ornamental flower gardens, then, represent material attempts to establish dominance over nature.

The sense of play created by devices of wonder is highlighted in an article that Oldenburg published in a 1668 issue of the *Philosophical Transactions*. Contributed by Hooke, this piece described a new optical experiment similar in principle to the camera obscura.[89] The article was entitled, "A Contrivance to make the Picture of any thing appear on a Wall, Cub-board, or within a Picture-frame, &c. in the midst of a Light room in the day-time; or in the Night-time in any room that is enlightned with a considerable number of Candles," and it furnished instructions for performing this experiment to astonished audiences. In a lecture on light that he delivered to the Royal Society in 1681, Hooke offered an account of a portable camera obscura[90] and, later in 1694, he presented a paper demonstrating the ways in which this kind of device could assist one in producing an accurate drawing of an object; the camera obscura, he argued, should be used to

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[88] *The Poems and Letters of Andrew Marvell*, ed. H. M. Margoliouth, 3rd ed., vol. 1 (Oxford: Clarendon, 1971) 72.

[89] This article by Hooke appeared in *PT* 3-4: 741-43. For the history of the camera obscura, see Helmut and Alison Gernsheim, *The History of Photography*, rev. ed. (London: Thames and Hudson, 1969) 17-29.

[90] This part of Hooke's lecture on light is entitled, "The Description and use of a Perspective Box, instead of a dark Room, which will explicate all the Phenomena of Vision as they are represented in the bottom of the Eye," and is published in *The Posthumous Works of Robert Hooke*, ed. Richard Waller (London, 1705) 127-28.

improve the quality of illustrations in herbals and travel books.[91] His article in Oldenburg's journal is an early example of his interest in optical devices. Images of virtually anything (pictures, statues, even living creatures), Hooke explains, may be projected onto a wall using a mirror and a convex lens. With the apparatus safely hidden, "Spectators, not well versed in *Opticks*, that should see the various Apparitions and Disappearances, the Motions, Changes, and Actions, that may this way be represented, would readily believe them to be super-natural and miraculous..." (*PT* 3-4: 742). For those who understand the optical principles behind the experiment, its effect is "delightful," while those ignorant of the science find the projected images instead to be "wonderful" (*PT* 3-4: 742). In this formulation, wonder is subordinated to informed curiosity.[92] To reinforce his point about the fallibility of the human senses, Hooke speculates about the countless "miracles" that people would have thought they had witnessed "had the *Heathen* Priests of old been acquainted with [this device]" (*PT* 3-4: 742).

Hooke's account stresses the theatrical effect of the experiment, rather than its contribution to optical theory. In the sixteenth and seventeenth centuries, the camera obscura and other optical instruments were closely associated with cabinets of curiosities

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[91] See, "An Instrument of Use to take the Draught or Picture of any Thing. Communicated by Dr. Hook to the Royal Society, Dec. 19, 1694," *Philosophical Experiments and Observations of the late Eminent Dr. Robert Hooke*, ed. W. Derham (London, 1726) 292-96. Here Hooke laments how "imperfectly the Colours of Plants are represented by Herbals, which are wash'd, or colour'd, only from the Descriptions which are made of those Colours in the Books," and how the illustrations in such travel accounts as those of Theodore de Bry and John Ogilby are executed only by "some Picture-drawer, or Engraver, here at Home, who knows no more the Truth of the Things to be represented, than any other Person, that can read the Story, could fancy of himself, without that Help." Hooke's "small Picture-box" would enable "any Person that can but use his Pen, and trace the Profile of what he sees ready drawn for him, shall be able to give us the true Draught of whatever he sees before him, that continues so long Time in the same Posture, as while he can nimbly run over, with his Pen, the Boundaries, or Out-Lines of the Thing to be represented; which being once truly taken, 'twill not at all be difficult to add the proper Shadows and Light pertinent thereunto," 293-96.

[92] For an investigation of the distinctions, in the early modern period, between wonder and curiosity, see chapter eight, "The Passions of Inquiry," of Daston and Park, *Wonders and the Order of Nature*, 303-28.

and the staging of wonder. Della Porta popularized the camera obscura in his *Natural Magic* and entertained visitors to his museum in Naples with the device,[93] while Kircher provided an account of a portable camera obscura,[94] and with his ingenious optical experiments dazzled spectators at his museum at the Jesuit College in Rome.[95] The place of the camera obscura in the collecting culture of the seventeenth century is made evident by a passage from Bargrave's museum catalogue in which he describes encountering the device for the first time while on the grand tour:

> As I happened to see it set against a large market place at Vienna, in Austria (the Emperor's court), where I bought it, the busy people in the market, and all their several coloured clothes, both of men and women, made me stand still and wonder what it meant. I went by the shop several times on purpose to see it, and at last I went into the shop and bought it, the owner showing me the use of it. With this instrument you may see the jackdaws fly about Bell Harry steeple, when the sun shines, in any room of your house that hath a window that way.[96]

The image of Bargrave's returning to gaze at the camera obscura in the shop window testifies to the insatiable appetite in the period for new representations of nature. Rather than simply offering a static portrait of a scene, in which objects are frozen in one particular moment in time, this optical device allows the viewer to experience nature in motion. When Bargrave tells of using the instrument to make "the jackdaws fly about any room of your house," he suggests the process of commodification inherent in such devices of wonder. The camera obscura transforms the jackdaws (birds noted for their own inquisitiveness) into goods to be consumed by the curious. This instrument permitted the cabinet collector to project nature's images in a private space creating, in

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[93] For della Porta and the camera obscura, see Gernsheim and Gernsheim, 20-22.
[94] Gersheim and Gersheim, 23.
[95] Findlen describes Kircher's use of catoptric machines in which he multiplied images of the pope on one occasion, and of an elephant on another, *Possessing Nature* 46-47, 81.
[96] Bargrave, 133. Bell Harry is the central tower of Canterbury Cathedral.

the words of the epitaph of Tradescant the elder, "a world of wonders in one closet shut."[97]

The early *Philosophical Transactions* acted, then, as a shop window for new artificial curiosities and contrivances. By publishing accounts of such objects as wax figures, wooden maps, and optical instruments, Oldenburg satisfied his readership's taste for novelties. Considering this, we may want to revise Plumb's account of scientific lectures and "toys," some of the cultural institutions and objects that he associates with the development of a consumer society in eighteenth-century England. Lectures about natural philosophy, he explains, "were principally concerned with the wonders of nature, displayed through the use of telescopes, orrerys, microscopes, air pumps, and simple but dramatic electrical experiments."[98] Plumb assigns particular importance to the production in the eighteenth century of devices for children such as inexpensive microscopes and telescopes,[99] and argues that these toys, which offered new pleasurable and instructive means of exploring God's handiwork, helped to create a culture that constantly sought novelty. Oldenburg's journal, with its accounts of various devices of wonder, provides an early record of this desire for novelty in material things, especially objects that furnished alternate views of nature. It is true that the new wax figures and wooden maps described in the *Philosophical Transactions* were contributions to the Royal Society's History of Trades, and that Hooke's optical devices were tools for the empirical investigation of nature; in the seventeenth century, however, these curiosities

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[97] In Arthur MacGregor, "The Tradescants: Gardeners and Botanists," *Tradescant's Rarities*, 15.
[98] Plumb 328. For the development of such cultural forms of entertainment as public exhibitions, travelling circuses, fairs, and demonstrations of mechanical ingenuity, see Richard D. Altick, *The Shows of London* (Cambridge, MA: Harvard UP, 1978). For a more recent treatment of these subjects, see Benedict, *Curiosity*.
[99] Plumb 332.

also functioned as collection pieces and social ornaments – objects to be displayed in one's museum or library. What Oldenburg's periodical reveals is that these items had never been simply "objects of science"; the delight with which they supplied their owners shows that, already in the seventeenth century, they were also objects of consumption.

Subterranean Curiosities: The Royal Society Discovers Ancient and Exotic Trades

The objects explored in the last section, models and devices which complicated distinctions between art and nature, were of special interest to the Fellows of the early Royal Society who were assembling cabinets and conducting experiments. Other articles in the *Philosophical Transactions* examined new building materials and decorative objects for the English household. These accounts permit us to trace the developments in which new versions of certain objects, formerly preserved in private and institutional cabinets, began to be acquired by broader segments of the population. In the mid to late 1660s, Oldenburg published accounts of marble staining, red glass, and Chinese porcelain. According to Bacon's hierarchy of trades, arts that "exhibit, alter, and prepare natural bodies and materials of things" provided the greatest knowledge of nature. The histories of stone cutting, porcelain, and glass-making which he asked readers to compile,[100] then, were among the most critical to the natural history. One of Oldenburg's objectives in printing accounts of these arts was clearly that of publicizing the Royal Society's research for the History of Trades, one of the institution's more utilitarian projects. Mediating between the scientific and economic spheres, these articles also encouraged innovations in industry and, by representing various objects as new and desirable, fostered consumer demand.

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[100] *Works* 8: 379-80.

In a 1665 issue of the *Philosophical Transactions*, Oldenburg published a descriptive book review of Kircher's encyclopedic work, the *Subterranean World* (1664).[101] In order "to give the *Curious* a taste of the *Contents* of this *Volume*, and thereby to excite them to a farther search into the recesses of Nature" (*PT* 1-2: 109), Oldenburg outlines the contents of each of the twelve books of the treatise. The editor follows this summary with a list of some of the volume's "particulars" – one of which is an experiment about "a way of preparing such a Liquor, that shall sink into, and colour the whole Body of Marble, so that a Picture made on the surface thereof, shall, the stone being cut through, appear also in the inmost parts of the same" (*PT* 1-2: 116). Oldenburg complied with requests from his readers for a fuller account of this experiment, and published in the journal's next number[102] a more detailed description from Kircher about this technique of decorating marble; Oldenburg supplemented the piece with a notice about an Oxford stonecutter, a Mr. Bird, who had apparently discovered some years earlier a method of preparing marble similar to that discussed by Kircher.[103] This particular topic continued to excite the imaginations of the Fellows of the early Royal Society, and when, in 1673, Oldenburg printed some "Inquiries concerning Stones and other Materials for the Use of Building," he urged readers "to advance the Art of tinging white Marbles...and to endeavour to bring this way of colouring to as great perfection, as Enamelling is, by Painting faces and Stories, and all kind of Landskips and Perspectives upon white Marble with colours not delible by any thing" (*PT* 7-8: 6011).

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[101] This book review is in *PT* 1-2: 109-17. *Kircher's Subterranean World* is one of the works Glanvill singles out in *Plus Ultra* in his chapter, "Our Advantages for Knowledge, from Modern Improvements of Natural History," 73.
[102] *PT* 1-2: 125-27.
[103] Bird also appears in Plot's *Natural History of Oxfordshire*, 277.

This episode in the history of the *Philosophical Transactions*, in which Oldenburg satisfies his readers's demand for more information about the marble experiment, serves not only as an illustration of his editorial practices but also functions as an index of the interests of the early Royal Society. Oldenburg's appending of a list of "particulars" to his review of the *Subterranean World* shows the ways in which he consciously constructed his journal as a repository of rarities. The editor's catalogue from Kircher included accounts of the following: Mounts Vesuvius and Etna, the maelstrom upon the coast of Norway, earthquakes, hot baths, fossils, a "whole Vilage in *Africa* turned into Stone," and "Forrests of Coral at the bottom of the *Red Sea*" (*PT* 1-2: 115-16). As we have seen, these are the kinds of phenomena that also appear in book six of Lucretius's *De rerum natura*. A textual cabinet of curiosities, this list from Kircher's *Subterranean World* points to some of the connections between the journal and the collecting culture of the period. For readers of the periodical, such catalogues must have seemed the equivalent of the grand tour; they were instantly transported to distant lands, and they could imagine themselves ascending a famous volcano or wandering among celebrated collections like that assembled at Rome by Kircher. The lists of curiosities that Oldenburg embedded in issues of his journal allowed his readers to take possession of these objects of wonder; when readers urged the editor to supply them with a more detailed account of a certain rarity, this indicated that they sometimes pulled an object off the shelf of his paper museum and paused to admire it.

It is not difficult to see why Kircher's account of imprinting images upon marble, a technique that plays with the boundaries between art and nature, caught the attention of Oldenburg's readers. Stones that were "painted" by nature with various scenes were a

stock cabinet rarity in the period. The collector Robert Hubert, for example, exhibited to visitors one of these *lusus naturae* (jokes of nature): "a white stone that does represent a tree, as if it was made by art with a pen."[104] Tradescant's museum also contained "severall Landskips, Beasts, Cities, Rocks, naturally wrought in stones."[105] The use of such terms as "perspective" and "landskip,"[106] which denote pictures of natural scenery, in relation to these stones establishes an interesting priority of representation: these lapidary curiosities were sometimes, then, interpreted as examples of nature imitating artists imitating nature. What we encounter here is a redefinition of nature. In Oldenburg's second article about the marble experiment, we learn that Kircher viewed his own technique as a means by which to duplicate "nature's skill in painting of stones."[107] Kircher had seen "some stones reputed to be *natural* that had most lively Pictures, not only upon them, but passing *thorow* their whole substance," and he found "an *Artist*, skilful to perform such rare workmanship, [who pronounced] such stones to be *artificial*"; however, because this artist refused to divulge the secret of this technique, Kircher had set about to discover it himself (*PT* 1-2: 125-26).

By including an account of an Oxford stonecutter in this article, Oldenburg naturalizes Kircher's marble wonders. One need not look to the continent for such curiosities, suggests the editor, when "divers pieces" resembling those fashioned by Kircher "may be dayly seen [in Oxford and London], by any who is curious, or desirous" (*PT* 1-2: 127). In order to highlight Mr. Bird's ingenuity, Oldenburg tells how some of

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[104] Robert Hubert, *A Catalogue of Many Natural Rarities* (London, 1664) 49. The Royal Society purchased Hubert's collection in 1666 for its own repository. For the incorporation of Hubert's cabinet into the institution's museum, see Hunter, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository.'"

[105] Tradescant 38.

[106] "Landscape," *OED*.

[107] Oldenburg indicates in his review of Kircher that this was one of the topics treated in the *Subterranean World*, *PT* 1-2: 116.

these intriguing stones "being shewed to his Majesty, soon after his happy restauration...were broken in his presence, and found to answer expectation" (*PT* 1-2: 127). The early *Philosophical Transactions* were a vehicle for promoting local industry, with Oldenburg's seizing every possible opportunity to advertise the products of English tradesmen as viable alternatives to continental novelties. After the Great Fire and the passing of the Rebuilding Act in 1667, stone was used to decorate frontages of new brick houses.[108] A demand arose, then, for such unique materials as tinged marbles that were both functional and ornamental; these marbles would also have been used in the interiors of new houses. Oldenburg's articles about painted marble help to support Sprat's assertion that, prior to the Great Fire, new building materials were "already under the consideration" of the Royal Society.

At the conclusion of the list of queries about stones and other building materials that he published in 1673, Oldenburg discusses the recovery of ancient industries by the moderns. He urges readers, for example, to "endeavour to retrive the Art of hardning and tempering Steel for cutting of Porphyre, &c; which the Egyptians were master of, of old, and after them the Greeks and Romans" (*PT* 7-8: 6014).[109] Oldenburg demonstrates that, in the late seventeenth century, the industrial techniques of the ancients remained something of a category of wonders: "the neat and curious hewing and carving of Obelisks, Colosses, Statues, Pots, Urns, as also Porphyre and other hard Marbles, is now the Object of admiration to the most skilful workmen, who know not which way to

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[108] Baker, *London: Rebuilding the City after the Great Fire*, 11.

[109] In a letter of 27 July 1666, Oldenburg had asked Henry Howard, later the sixth Duke of Norfolk, to investigate the rumour that there were "now some persons in Italy, yt know ye old Roman way of plaistering, and ye art of tempering tools to cutt Porphyry (ye hardest of marbles)"; Oldenburg also adds in that the Society had heard of "a certain Artificiall Marble, adorning ye Elector of Bavaria's whole Pallace at Munchen, wch we should be glad to learn the preparation of," *OC* 3: 200.

roughhew Stones of that untractable hardness" (*PT* 7-8: 6014-15). Monuments to the ingenuity of the ancients, these stone works should inspire the moderns to discover comparable techniques – a process Oldenburg believes is already unfolding. He informs his readers that "curiosities of workmanship begin [now] to recover," and that "eminent persons" have stepped forward to patronize those who are attempting to unlock the trade secrets of the ancients and to improve upon them (*PT* 7-8: 6015). Alluding to the Royal Society's research for the History of Trades, Oldenburg writes of "some curious and intelligent persons [who] have of late already taken laudable pains" (*PT* 7-8: 6015) to investigate the arts of classical civilizations and to find new applications for these trades.

Behind Oldenburg's call for the recovery of the trade practices of the ancients[110] lies Bacon's argument in the *Advancement of Learning* that a systematic History of Trades will generate new commodities. Bacon's view – that knowledge of earlier mechanical arts will lead to improvements in seventeenth-century trades – is also restated by Boyle and Sprat. In his essay on the trades, Boyle urges the naturalist to "revive" ancient trades such as "the makeing incombustible Cloath of Lapis Amiantus, the Tyrian Purple, [and] the Makeing of Mosaick work"; he also suggests compiling a catalogue of such lost arts.[111] Similarly, in the *History*, Sprat advocates "handling the old subjects of *Manufactures* after a new way" (381) and asserts that "the greatest part of all our *New Inventions* have not bin rais'd from Subjects before untouch'd...but from the most studied and most familiar things, that have bin always in mens hands and eies." (387-88). In 1668, Oldenburg published an account of the recovery at Haarlem of the art of making

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[110] In his preface to the seventh year of his journal, Oldenburg refers to Cowley's plea in his *Proposition for the Advancement of Experimental Philosophy* (1661) "to recover the lost Inventions, and, as it were, drown'd Lands of the Ancients," *PT* 5-6: 2088.

[111] Boyle, "That the Goods of Mankind may be much encreased by the Naturalists Insight into Trades," 10.

red glass.[112] While this article does not treat an art linked to ancient civilizations (apparently the technique of producing red glass had been lost for only a decade), it serves as another example of the Royal Society's interest in compiling information about and resurrecting old trades. As we have seen, Bacon conceived of the History of Trades as a means by which to encourage innovations in industry, facilitating the "connecting and transferring [of] the observations of one art to the use of others." By assembling the "particulars" of different trades, a repository was created which subsequently furnished materials for new goods.

In the seventeenth century, "invention" denoted the process of coming upon or discovering; a rhetorical term, it also signified the finding or selecting of topics or arguments.[113] As we have seen, the *cento* genre, a composition made from the remnants of other authors, articulates this particular meaning of invention. Similarly, the Society's adoption of the list of miscellaneous queries as an epistemological tool reveals its adherence to this concept of invention. While in current usage invention is virtually synonymous with originality, this was not always the word's primary sense. Dryden, in his poem, "To Dr Charleton,"[114] invokes the idea of invention as a form of renovation when he writes, "Whatever truths have been, by art or chance, / Redeemed from error or from ignorance, / Thin in their authors, like rich veins of ore, / Your works unite, and still

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[112] This piece appeared in *PT* 3-4: 743-44; the account about red glass was excerpted from a letter Samuel Colepresse of Devonshire, a rural virtuoso, had recently sent Oldenburg from Leiden.

[113] "Invention," *OED*. Especially relevant for our purposes is Findlen's examination of invention as a form of self-fashioning practiced by Renaissance collectors. See chapter seven, "Inventing the Collector," *Possessing Nature*, 293-345. Lévi Strauss's theory of intellectual "bricolage" also incorporates the idea of the inventor as a sort of mosaic-maker – one who collects and arranges materials. See Lévi Strauss, *The Savage Mind* (Chicago: U of Chicago P, 1962) 16-36.

[114] "To Dr Charleton" was first published as a commendatory poem to Charleton's *Chorea Gigantum* (1663); Inigo Jones had argued that Stonehenge was constructed by the Romans whereas Charleton believed that it was built by the Danes.

discover more" (36-40).[115] Here, the poet treats the process by which pieces of useful knowledge are extracted from the works of the ancients; when combined with each other and set in the context of modern learning, the value of these units of information is significantly enhanced.

In the articles that Oldenburg published about the trades, then, one can already identify the formulation of invention as imitation that Berg associates with the producers of new consumer goods in eighteenth-century England. As she demonstrates, attention became focused upon creating substitutes for such continental and Eastern imports as delftware and Chinese porcelain.[116] Classical and Renaissance arts also found expression in this new class of English goods, Berg shows; patents were issued in the eighteenth century for techniques for staining earthenware to look like marble and porphyry.[117] The premise of Bacon's History of Trades, that the "particulars" of individual trades, past and present, when assembled and sifted through, would produce new desirable goods, was fully adopted in the following century. Although the ultimate goal of his natural history program was the systematization of knowledge, Bacon's trades project also underlined the randomness of finding things – the novelty of commodity. When applied to the creation of new goods, this idea of invention reveals the artificiality of the distinctions we draw between conditions of production and consumption. If a "new" good is actually a translation of an ancient or exotic design principle, the production of the item has been preceded by an act of intellectual consumption. What the articles in the *Philosophical Transactions* about stamping marble with "landskips" and the recovery of the art making of red glass illustrate particularly well are the ways in which accounts of ancient and

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[115] *The Poems of John Dryden*, ed. Paul Hammond, vol. 1 (London: Longman, 1995).
[116] Berg 79.
[117] Berg 80. See also, table two, "Patents specifying imitations, UK, 1627-1825," in this article, 81.

exotic trades were themselves consumed as novelties in the second half of the seventeenth century.

One of the ways in which Oldenburg heightens his representation of these objects as curiosities is by reminding readers of the difficulty often involved in obtaining such information about the trades. In the journal's narrative about Kircher's marble experiment, for example, the jealous artist in Italy who was unwilling to reveal the secret of his craft is contrasted with the "industrious and communicative Jesuit" (*PT* 1-2: 126). Similarly, at the conclusion of Oldenburg's discussion about recovering the ancient technique of cutting stone, he adds that, "some Masters in Italy pretend even to have hit upon the old Art, or inventions as good; but they, it seems, envy the world the knowledg of it" (*PT* 7-8: 6015). Artisans and tradesmen, of course, could hardly be faulted for not wishing to divulge the knowledge upon which their livelihoods depended. Although Sprat asserts that "there has been as large a communication of Forein *Arts*, and *Inventions*, to the *Royal Society*, within this small compass of time, as ever before did pass over the *English* Channel since the very first transportation of *Arts* into our *Island*" (128), for diverse reasons, the relationship between the institution's Fellows who were compiling trade histories and practicing craftsmen was sometimes an uneasy one.[118] It was to Oldenburg's advantage, however, to underline the mystery and secrecy of artisan

[118] In a letter of 9 August 1659, Evelyn laments to Boyle: "In the History of Trades, I am not advanced a step; finding (to my infinite grief) my great imperfections for the attempt, and the many subjections, which I cannot support, of conversing with mechanical capricious persons, and several other discouragements...", *Diary and Correspondence*, vol. 3, 115. In the *Advancement of Learning* where he discusses the History of Trades, Bacon perhaps anticipates some of the difficulties with the project of which Evelyn writes: "For it is esteemed a kind of dishonour upon learning for learned men to descend to inquiry or meditation upon matters mechanical; except they be such as may be thought secrets of art, or rarities and special subtleties...But the Truth is, that they are not the highest instances, which give the best or securest information;...mean and small things discover great better than great can discover small," *Works* 8: 413-14. The discomfort Evelyn expresses at interacting with tradesmen should not be attributed solely to class issues or, as Houghton argues, to his preference for the fine arts rather than the manual arts; Evelyn was probably wary of pursuing an information exchange with artisans in which he would have to divulge his own knowledge of the trades. For Houghton's argument about Evelyn, see "The History of Trades," 48.

culture; in this way, the articles he published about the trades assumed the quality of intelligence reports.

In 1665, Oldenburg included in the *Philosophical Transactions* an account about a particular trade secret of the East that had obsessed Europeans for centuries – Chinese porcelain. Entitled, "An Intimation of a Way, found in Europe to make China-dishes," the article itself was only a fragment:

> Notice was lately given by an inquisitive *Parisian* to a friend of his in *London*, that by an Acquaintance he had been informed, that Signor *Septalio*, a Canon in *Millan*, had the Secret of making as good *Porcelane* as is made in *China* it self, and transparent; adding that he had seen him make some. This as it deserves, so it will be further inquired after, if God permit. (*PT* 1-2: 127)

The language of the title of the article – an "intimation" – and the anonymity of the source suggest that the account may be a rumour. The fragmentary quality of the article is underscored by the lack of detail about the actual technique practiced by the great collector, Manfredo Settala (1660-1680).[119] By describing the ways in which accounts of this ceramic experiment had been circulated among curious individuals from three different countries, Oldenburg invites his readers to participate in a miniature international intrigue. It would not be until the eighteenth century that true porcelain was produced in Europe,[120] and Oldenburg's notice of Settala in the periodical reveals the interest generated by attempts to replicate this Eastern trade. Not surprisingly, some of Europe's earliest experiments at making porcelain grew out of the collecting culture of the Renaissance. Porcelain items had always figured prominently in European

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[119] For an account of Settala's museum in Milan, see Antonio Aimi, Vincenzo de Michele, and Alessandro Morandotti, "Towards a History of Collecting in Milan in the Late Renaissance and Baroque Periods," *Origins of Museums*, 24-28.

[120] For an account of the production of true porcelain in Europe, see Pietro Raffo, "The Development of European Porcelain," *The History of Porcelain*, ed. Paul Atterbury (London: Orbis, 1982) 79-125. In his *Natural History of Oxfordshire*, Plot writes that John Dwight of Christ Church college "hath found out *ways* to make an *Earth* white and transparent as *Porcellane*," 250.

collections,[121] Eastern exotica being among the most desirable curiosities in the period. Better known than Settala's work in ceramics is the Medici family's invention of a soft paste, glass-like porcelain in Florence in the late sixteenth century.[122]

The method by which the Chinese produced their envied hard paste porcelain was the subject of much, often fanciful, speculation. Browne's *Pseudodoxia Epidemica* offers us a record of some the various myths that were invented to explain the exquisite blue and white objects that entered early modern collections:

> We are not thorowly resolved concerning Porcellane or Chyna dishes, that according to common beliefe they are made of earth, which lyeth in preparation about an hundred yeares under ground, for the relations thereof are not onely divers, but contrary, and Authors agree not herein. Guido Pancirollus will have them made of Egge shells, Lobster shells, and Gypsum layed up in the earth the space of 80. yeeres: of the same affirmation is Scaliger, and the common opinion of most. Ramuzius in his Navigations is of a contrary assertion, that they are made out of earth, not laid under ground, but hardened in the Sunne and winde, the space of fourty yeeres. (135-36)

Contained in this passage are two of the most popular errors about this ancient art. The idea that the Chinese produced their porcelain by burying earths appears in Bacon's *Sylva Sylvarum*,[123] as well as in the *New Atlantis* where the Father of Solomon's House informs visitors to the College that it has "burials in several earths, where we put divers cements, as the Chineses do their porcellain. But we have them in greater variety, and some of them more fine."[124] It is telling that one of the features of Bacon's Utopia is a thriving porcelain industry. That in his scheme for an ideal society the secret of this art has been discovered shows how, by the seventeenth century, the production of porcelain to rival

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[121] John Ayers, in his essay, "The Early China Trade," discusses the presence of porcelain in Renaissance collections, *Origins of Museums*, 259-66.
[122] Raffo examines the Medicis's creation of soft paste porcelain, 80-81.
[123] Bacon mentions the making of porcelain in his "Experiments in consort touching burials or infusions of divers bodies in earth," *Works* 4: 342.
[124] Bacon, *Works* 3: 157.

that of the East had become a preoccupation of European nations. The origin of the so-called "shell fable" associated with porcelain was probably, at least in part, linguistic: Marco Polo, widely considered the first to describe Chinese ceramics, gave to them the name *porcellana* that denoted a type of white shells.[125] As a counter argument to these mistaken beliefs, Browne cites Gonzales de Mendoza, sent to China by Philip II of Spain,[126] who "upon enquiry and ocular experience," discovered that porcelain pieces were made from a combination of chalky earth and water – vessels which the Chinese "gild or paint, and not after an hundred yeares, but presently commit unto the furnace"(136). In order to interrogate further the porcelain myths, Browne refers to a report provided by a Jesuit who resided in China, and to an account of a voyage, published in 1665, of the Dutch ambassadors in Batavia to the Emperor of China (136); the activities of missionaries and the Dutch East India Company provided some of the most reliable information about the East in the period.

Browne's catalogue of errors about porcelain is woven out of scraps from oral and printed accounts; sifting through his sources, the author privileges the more recent and probable reports. The imaginative explanations, however, which assert that these ceramic objects are centuries in the making, have their own key function in Browne's epistemological project. In addition to ascribing rarity to pieces of porcelain, they testify to the curiosity value of the author's subject; they illustrate the ways in which a particular type of material object from the East could excite intense and sustained debate.[127] The

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[125] For Marco Polo's description of porcelain, see Raffo 79. In his article, "Exotica from Islam," Julian Raby recounts how the shell fable found expression in some collectors in which clays were displayed next to shells, *Origins of Museums*, 251-58, at 253-54.

[126] An inventory of the King's possessions compiled in 1611-13 shows that he had amassed a substantial collection of porcelain, Ayers 262.

[127] Of course, porcelain also captured the poetic imagination. To take but two seventeenth-century examples: In Donne's "Elegie on the Lady Marckham" (1609), the poet uses the following simile: "As

rumour that Oldenburg published about Settala's soft paste porcelain experiment could easily have appeared in Browne's work. The complete history of porcelain that Bacon urged his readers to compile, for which Oldenburg's article served as a "particular," and Browne's literary treatment of the trade were both essentially collecting enterprises. What the presence of Settala's experiment within the *Philosophical Transactions* crystallizes for us, however, is the relationship between the new science and commerce.

Investigations of the history of consumerism often point to porcelain, which could be produced in a variety of forms and patterns, as the kind of object that satisfied the emerging appetite for novelty in material things.[128] Increased trade with the East in the seventeenth century resulted in large shipments of porcelain to Europe; the availability of these objects meant that a wider segment of the population could purchase such items. When, in the eighteenth century, viable substitutes for Chinese porcelain were developed in Europe, this trend simply continued. The article about porcelain that Oldenburg published in his periodical permits us to examine the process by which a curiosity becomes a commodity. Collections of wonders, whether material or literary, have a dual effect – they both enhance the curiosity value of particular objects and naturalize the wonders they have singled out for notice. The appearance of Settala's porcelain experiment in the *Philosophical Transactions* exemplifies this feature of the collection. Because Settala has apparently developed a substitute for Chinese porcelain, the rarity of

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men of China, 'after an ages stay / Do take up Porcelane, where they buried Clay; / So at this grave, her limbecke, which refines / The Diamonds, Rubies, Saphires, Pearles, and Mines, / Of which this flesh was, her soule shall inspire / Flesh of such stuffe, as God, when his last fire / Annuls this world, to recompence it, shall, / Make and name then, th'Elixar of this All" (21-28), *The Complete English Poems of John Donne*, ed. C. A. Patrides (London: J. M. Dent, 1985); Samuel Butler, in his poem "Antiquity," also uses the porcelain analogy: "As if Books, like a China-Potters Clay, / Prepard for th' use of After-ages lay," *Samuel Butler: Satires and Miscellaneous Poetry and Prose*, ed. René Lamar (Cambridge: Cambridge UP, 1928) 169.

[128] See, for example, Berg and McKendrick.

these eastern objects is already somewhat diminished. The dissemination of this information by the periodical extends this process of naturalization. A parallel can be drawn between Oldenburg's publication of Settala's ceramic secret and the influx of porcelain from the East into Holland in the seventeenth century that resulted in its being used as tableware.[129]

Chinese porcelain, like the tulip, is a striking example of the ways in which an object from the East could permeate early modern European culture. A rich passage from Evelyn's *Diary*, in which he recounts being shown a collection of rarities assembled by Jesuits in China and Japan, testifies further to the strong allure of the material culture of the East for seventeenth-century England. The curiosities had arrived in London in 1665 with the ships of the East India Company:

> The chiefe things were very large *Rhinoceros's* hornes, Glorious Vests, wrought & embrodered on cloth of Gold, but with such lively colours, as for splendor & vividnesse we have nothing in Europe approches: A Girdill studdied with achats, & balast rubies of greate value & size, also knives of so keene edge as one could not touch them, nor was the mettal of our Couler but more pale & livid: *Fanns* like those our Ladys use, but much larger, & with long handles curiously carved, & filled with Chineze Characters: A sort of paper very broad thin, & fine like abortive parchment, & exquisitely polished, of an amber yellow, exceeding glorious & pretty to looke on, & seeming to be like that which my L: *Verulame* describes in his *Nova Atlantis*...[Also] pictures of Men, & Countries, rarely painted on a sort of gumm'd *Calico* transparant as glasse: also Flowers, Trees, Beasts, birds &c: excellently wrought in a kind of sleve-silk very naturall. Divers Drougs that our Drougists & physitians could make nothing of...Also severall booke MSS. A grammar of the Language writen in *Spanish*, with innumerable other rarities.[130]

The connections Evelyn forges here, between the new science and commerce, and between curiosity and consumerism, are critical. In the Renaissance, pieces of rhinoceros

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[129] Ayers discusses the Dutch importation of porcelain in the seventeenth century and the loss of its curiosity value, 265.

[130] Evelyn, *Diary* 3: 373-74. Clearly, these curiosities originated in various parts of the Far East; the rhinoceros's horn was perhaps from India (or even Africa) while the painting on "gumm'd *Calico*" would have certainly been from India.

horn, ceremonial garments, and Chinese and Japanese paper, were cabinet objects.[131] As Evelyn's miniature catalogue of curiosities demonstrates, Eastern exotica were highly prized by the collecting culture because of their attractive, unfamiliar materials, fine workmanship, and brilliant colours. The great labour and high technical skill involved in such items as the silk embroidery marked these objects as rare. While the naturalistic quality of the silk images intrigued Evelyn, it was the puzzling Chinese characters decorating the handles of the fans that created a similarly pleasing, curious effect. Evelyn's reference to the Chinese grammar also puts us in mind of such prominent collectors as Kircher who were interested in deciphering this and other ancient languages.[132] The inclusion of drugs among the Jesuits's collection points to the association between early museums and medicine[133]; medical therapies from the East constituted a particularly desirable category of curiosities in the period.

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[131] It was expected that one's cabinet should contain at least some representation of the famed unicorn's horn, and the tusk of the rhinoceros often served this purpose. In the period, it was also reputed that the unicorn's horn had medicinal virtues. In a letter of 12 October 1668, Beale wrote to Oldenburg about "the Old reputation of ye Unicorn's horn, whether fish-bone, or minerall, or some Monster out of Affrica." He expresses dismay at the commodification of the unicorn's horn by the curiosity trade and at the gullibility of consumers: "Truly tis to ye reproach of Physicians, Philosophers, Practicall Scholars, & Gentlemen, yt they suffer Merchants to cheate our Country wth so many of their reputed Medicall, but really costly rarityes, ye Unicorn's-horn, ye Toad-stone, ye Bezoar-stone, &c," *OC* 5: 82. For a discussion of the unicorn's horn as a cabinet rarity, see David Murray, *Museums: Their History and their Use*, vol. 1, 40-45. Browne also treats the myth of the unicorn's horn and the objects which pass for unicorn's horn in early modern collections in *Pseudodoxia Epidemica*, 256-61. Ceremonial garments were an important component of many collections in the period. For examples in The Ark at Lambeth, see Tradescant, 47-51. Even a more modest collection like that assembled by Bargrave, usually contained some pieces of Chinese paper or even books. In the catalogue he compiled of his collection, Bargrave describes "a rare antiquity and curiosity: two Chinese books, in quarto, printed in the Chyna language upon I know not what material, -- I think either silk, or rather on the barks of trees, every leaf being double, and having in every page an ill-favoured design or drauft of picture. They were left me as a legacy and curiosity by one that had formerly binn my fellow traveller," 135.

[132] Kircher's investigation of ancient languages formed part of his project for a universal language, see Findlen, *Posessing Nature*, 86-88.

[133] For an exploration of the relationship in Italy between early modern collections and medicine, see chapter six, "Museums of Medicine," in Findlen, *Possessing Nature* 241-87. In England, the museums of Sloane, the prominent physician and naturalist, and Petiver, the London apothecary, exemplify such ties.

In the passage just quoted, the arts and handicrafts of the East are held up as models of ingenuity. Evelyn emphasizes the inferiority of European goods in such phrases as "for splendor & vividnesse we have nothing approches," and in his references to the pale colour of the knives and to the "curiously carved" handles of the fans. His comment about the ignorance of English physicians regarding the medical remedies in the Jesuit collection further establishes the sophistication of the East. Evelyn's construction of the East as the seat of enviable, mysterious trades is undermined, however, by his invocation of Bacon. At the scientific college in the *New Atlantis*, the Chinese art of making porcelain and other celebrated Eastern trades have been emptied of their curiosity value. As the guide informs visitors to Solomon's House, "We have also divers mechanical arts, which you have not; and stuffs made by them; as papers, linen, silks, tissues; dainty works of feathers of wonderful lustre; excellent dyes, and many others..."[134] Here Bacon anticipates the movement by which such objects, once preserved only in cabinets of rarities, would become consumed by larger segments of the population. At Solomon's House, where they have discovered not only how to replicate the trades of China, Japan, and Turkey, but also to improve upon them, the transformation of curiosities into commodities has already occurred. Although their goal was the implementation of Bacon's plan for a systematic, empirical natural history, the Fellows of the early Royal Society recognized that, at best, their own institution would be a much scaled-down version of Bacon's "College of the Six Days Works."[135] What

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[134] *Works* 3: 161.

[135] On 3 September 1659, Evelyn addressed a letter to Boyle that contained his own scheme for a scientific college. Complaining about the inhospitable times for founding such an institution, Evelyn writes: "since we are not to hope for a mathematical college, much less, a Solomon's house,...why might not some gentlemen, whose geniuses are greatly suitable, and who desire nothing more than to give a good example, preserve science, and cultivate themselves, join together in society..." *Diary and Correspondence*, vol. 3, 116.

Evelyn's reference to the *New Atlantis* suggests, however, that he viewed Bacon's program, and the Royal Society's attempts to fulfill it, as a means by which to rival the trades of the East. While Evelyn does not specifically mention the Society's research for the History of Trades, a project for which he had already been collecting materials for about a decade, it seems likely that the sight of the Chinese and Japanese rarities would have confirmed for him the value of compiling such trade histories.

Conclusion

In this chapter, I have examined the ways in which various objects – East Indian birds, porcupine quill baskets, and japanned fans – demonstrate in the period the linking of collecting, consumerism, and the new science. The culture of collecting, I argue, permits us to define some of the critical features of early modern consumption. Focusing upon Bacon's projected History of Trades and the ways in which this scheme underpinned Oldenburg's *Philosophical Transactions*, I help to establish the relationship between seventeenth-century methods of empirical inquiry and the pursuit of novelty. The journal's accounts of various devices of wonder (three-dimensional cartography, cameras obscura), which were closely associated with cabinets of curiosities, testify not only to the desire to possess ingenious contrivances but also to the wider movement to redefine nature. I investigate the Royal Society's accumulation of knowledge about ancient and exotic trades and show how its periodical served as a repository for such learning. The institution's Fellows interpreted Bacon's formulation of invention as the finding and arranging of existing materials largely as a call to assemble textual accounts of the trades – collections of "particulars" about such arts as marble stamping and

porcelain. Bacon's arguments about the creation of new commodities through the imitation and adaptation of different design principles anticipate the processes by which new consumer goods were actually produced in the eighteenth century. Oldenburg's periodical, with its encyclopedic quality, served as a literary translation of this view of knowledge and invention.

Chapter Four
Cabinets of Nature: Possessing the Material Globe

Introduction

The elaborate frontispiece to John Parkinson's botanical treatise, *Paradisi in Sole* (1656), articulates the seventeenth-century belief that gardening and the study of nature were the means by which to restore Eden. As John Prest has shown, early modern botanic gardens reflected the prelapsarian goal of reassembling the plant species scattered around the globe.[1] In its depiction of different species of flowers, shrubs, and trees, what Parkinson's engraving also embodies is the value of variety. In his essay, "Of Gardens" (1625), Bacon proposed a scheme for achieving *ver perpetuum* (perpetual spring)[2] and demonstrated how the cultivation of nature could produce novelty. The miscellaneous arrangement of the natural productions in the *Paradisi*'s frontispiece evokes the model of the cabinets of curiosities; this engraving serves as a visual translation of the tension between plenitude and containment which was characteristic of the encyclopedic collection.

In this chapter, I trace the connections in the period between natural history and empire-building. Several of the features of the collection – fragmentation, appropriation, and naturalization – are embodied in the activity of botanical transplantation. Underlying the collection and exchange of botanical specimens was a complex web of motives – scientific, economic, social, and political. The early issues of the *Philosophical Transactions* are filled with "intelligence" about exotic botanical species, accounts of grafting experiments, and reviews of horticultural treatises. Recent scholarship about

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[1] Prest, *The Garden of Eden.*

[2] Bacon calls for the planting of gardens "for all months of the year" and supplies catalogues of the species appropriate to particular months. In September, for example, "come grapes; apples; poppies of all colours; peaches; melocotones; nectarines; cornelians; wardens; quinces," *Works* 12: 237.

such prominent figures as Joseph Banks and the naturalist-artist Mark Catesby has addressed some of the crucial links between botany and empire-building during the eighteenth century.[3] Scholars have largely ignored, however, the significant role played by the *Philosophical Transactions* in encouraging this discourse of horticulture. A host of correspondents in Europe and in the New World supplied Oldenburg with both seeds and information about botanical experiments. Notable among these figures was the Somerset clergyman and natural philosopher John Beale (1608-83); his endless ideas about transplantation, particularly in regard to New World species, were regularly printed in the *Philosophical Transactions*. The journal's representation of botanical experiments, informed by the seventeenth-century's reception of Virgil's *Georgics*, is symbolic of the Royal Society's formulation of science. While Oldenburg carefully underscored the scientific, national, and economic benefits that would come with the wholesale replanting of the British Empire, he also firmly associated botany with novelty, luxury, and aesthetic pleasure. Drawing upon the work of such scholars as Joan Thirsk, I establish the relationship between the "hortulan" reports published in the *Philosophical Transactions* and early discourses of consumerism. The Royal Society's interest in transplanting into England such species as the nutmeg tree from the Molucca Islands and the kermes oak (*Quercus coccifera*) from the Mediterranean testifies to the links between curiosity, consumerism, and other seventeenth-century discourses of control.

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[3] For Banks, see the essays in *Visions of Empire: Voyages, Botany, and Representations of Nature*, ed. David Philip Miller and Peter Hanns Reill (Cambridge: Cambridge UP, 1996). For Catesby, see the essays in *Empire's Nature: Mark Catesby's New World Vision.*

"A Kind of Other World of Nature": Transplantation, Grafting, and Virgilian Variety

Increased contact with the East through trade and missionary activity and the exploration and colonization of the New World exposed, in the period, the inadequacy of existing taxonomical schemes. In the *Pseudodoxia*, Browne examines the human impulse to assign priority or rarity to certain phenomena and cautions that in an age of exploration, this tendency is especially "dangerous" (497). To illustrate his argument, he cites that seventeenth-century ornithological curiosity – the hummingbird: whereas "all Ages conceaved...[that] the Wren is the least of birds, yet the discoveries of America, and even of our owne Plantations have shewed us one farre lesse, that is, the Hum-bird, not much exceeding a Beetle" (497). Bacon, in the *Novum Organum*, had expressed his hope that such counter-examples or "disruptions" to received taxonomies would bring about a full-scale revolution in thought. Urging a re-mapping of the geography of the human mind, he writes:

> by the distant voyages and travels which have become frequent in our times, many things in nature have been laid open and discovered which may let in new light upon philosophy. And surely it would be disgraceful if, while the regions of the material globe, -- that is, of the earth, of the sea, and of the stars, -- have been in our times laid widely open and revealed, the intellectual globe should remain shut up within the narrow limits of old discoveries."[4]

Bacon's concern here is the reverence for antiquity, as well as the degree to which the modern age, particularly in the sciences, has remained unduly "enchanted" by the works of classical authors. Just as voyages of discovery have broken geographical bounds, so too, he argues, should modern thinkers challenge the paradigms set down by Aristotle and the rest of the ancients. We encounter a similar theme in Dryden's "To Dr Charleton," where the poet writes of Columbus's being "the first that shook [Aristotle's]

[4] *Works* 8: 117.

throne" (9).[5] In the two examples above, the authors make reference to exploration and colonial expansion in order to underline the limitations of classical texts.[6] While the writings of the Royal Society's two greatest apologists, Sprat and Glanvill, extend these arguments, they also explicitly connect such developments as voyages of discovery to consumerism. In addition to yielding new objects for empirical inquiry, they assert that increased contact with distant regions also promises materials for new consumer goods. In his section on improving the mechanical arts, Sprat writes: "if ever any more *Countrys* which are now hidden from us, shall be reveal'd, it is not to be question'd, but there will be also opened to our *observation*, very many kinds of *living Creatures*, of *Minerals*, of *Plants*, nay of *Handicrafts*, with which we have been hitherto unacquainted" (381). According to the author, "there was never yet any *Land*, discover'd...[which] has not supply'd us with some new artificial *Engine* and *Contrivance*" (382).[7] The Tradescants' museum and garden at Lambeth serve as material representations of Sprat's argument. Among the kinds of curiosities they accumulated were, "Outlandish Fruits from both the *Indies*, with Seeds, Gummes, Roots, Woods, and divers Ingredients, Medicinall, and for the Art of Dying."[8] Included in the museum's catalogue are lists of the various minerals and plants that produce blacks, yellows, reds, blues, and whites for dyeing and painting.[9] In the Tradescants' collections – of objects and plants – the relationship between

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[5] Here Dryden refers to the voyages of Columbus to the West Indies which revealed, contrary to Aristotle's assertion, that the torrid zone was habitable, *The Poems of John Dryden*, vol. 1.

[6] For the ways in which exploration in the Renaissance undermined the authority of classical texts, see Anthony Grafton, *New Worlds, Ancient Texts: The Power of Tradition and the Shock of Discovery* (Cambridge, MA: Harvard UP, 1992).

[7] In Sprat, America, under British rule, is represented as the greatest potential source of wonders: "If ever that vast Tract of *Ground* shall come to be more familiar to *Europe*, either by a *free Trade*, or by *Conquest*, or by any other *Revolution* in its Civil affairs: *America* will appear quite a new thing to us; and may furnish us with an abundance of *Rarities* both Natural, and Artificial; of which we have bin almost as much depriv'd by its present *Masters*, as if it had still remain'd a Part of the *unknown World*," 383-84.

[8] Table of contents, *Musaeum Tradescantianum.*

[9] Tradescant 34-36.

exploration, science, and consumerism is given concrete expression. For Sprat, the discovery of unfamiliar lands and cultures not only exerted pressure upon taxonomies inherited from the ancients, it also furnished new arts and inventions that, coming under the view of his institution, stood to benefit English society.

Glanvill, in *Plus Ultra*, also captures his age's excitement at encountering and possessing unfamiliar species and phenomena: "In the *Earth*, *New Lands* by *Columbus*, *Magellan*, and the rest of the Discoverers; and in these, *new Plants*, *new Fruits*, *new Animals*, *new Minerals*, and a kind of *other World* of *Nature*, from which *this* is supplied with numerous *conveniences* of *Life*, and many thousand Families of our own *little one* are continually fed and maintained" (73). Here, the author links the new science with commerce in some crucial ways. As we have seen, the "other world of nature" was brought back to England in fragments – natural history specimens, cultural artifacts, commodities, oral accounts, and epistolary exchanges. Glanvill associates the Royal Society's accumulation of these fragments from unfamiliar lands with the more widespread desire for novelty in the period. His use of the phrase "conveniences of life,"[10] should be situated in the context of both Bacon's call for the History of Trades and early discourses of consumerism. Bacon, as we know, conceived of his trades project as a mechanism by which to "relieve the inconveniences of man's estate," and here Glanvill also implicates the trades in a postlapsarian narrative. The consumer revolution that McKendrick locates in eighteenth-century England was the result of a large segment of the population's buying "not only necessities, but decencies, and even

[10] In the period, "conveniences" signified "material arrangements or appliances conducive to personal comfort, ease of action, or saving of trouble," *OED*.

luxuries."[11] While obviously these categories were not fixed, what this formulation of consumption speaks to is the growing recognition of the economic benefits and private pleasures of non-essential goods. Writing in the second half of the seventeenth century, Glanvill already articulates this kind of hierarchy of consumption when he represents the New World as the source of both conveniences and necessities. The dynamism of the period and the processes of empire building, he argues, have provided the Royal Society with the knowledge necessary to assemble a systematic natural history; the flow of materials from the New World has also created new consumption opportunities for Europeans.

Glanvill uses the phrase, "a kind of other world of nature," to describe the unfamiliar botanical and zoological species confronted by Europeans in the late sixteenth and seventeenth centuries.[12] The Royal Society's own museum contained many examples of these "new" natural objects that had called into question the taxonomies inherited from the ancients. Preserved in the institution's repository were such curiosities as the head of a toucan from Peru, a cocoa bean from New Spain, some heads of maize donated by the Governor of Connecticut, John Winthrop, and bread made from the cassava root.[13] At the same time, however, in Glanvill "the other world of nature," also signified the new world of commodities promised by voyages of discovery and colonial settlement. [14] The institution's queries for Virginia and Bermuda, for example, asked

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[11] McKendrick 9.

[12] As Henry Lowood points out in his essay, "The New World and the European Catalog of Nature," Leonhart Fuchs's herbal, *De historia stirpium* (Basel, 1542), listed only about five hundred plants, while John Ray's late seventeenth–century botanical work, *Historia Plantarum*, 3 vols. (London, 1686-1704), described twenty thousand, *America in European Consciousness, 1493-1750*, ed. Karen Ordahl Kupperman (Chapel Hill, NC: U of North Carolina P, 1995) 295-323, at 295.

[13] Grew 59, 204, 222, 371. Winthrop was elected to the Royal Society in 1662.

[14] As we have seen, the Society was keenly interested in gathering knowledge about New World dyestuffs. In a letter of 16 November 1668, Oldenburg asked a correspondent in the Bermudas, Richard Stafford, for

correspondents to determine "how the silk-grasse is prepared" (*PT* 1-2: 421). In 1670, a reply to this particular query came in a letter that Winthrop sent to Oldenburg from Connecticut, extracts of which were published in the *Philosophical Transactions*.[15] Winthrop had apparently given the Society's repository some curiosities from New England including "Pods of a Vegetable, we call *Silk-grass*, which are full of a kind of most fine down-like Cotton-wool…'Tis used to stuff up Pillows and Cushions; being tryed to spin, it proves not strong enough. The Seeds 'tis like may grow with you, if set in some Garden; whereby the whole Plant may be seen" (*PT* 5-6: 1152).[16] This passage illuminates for us the Society's interest in the trades and in the role that the cultivation and transplantation of New World plants might play in developing new crafts and industries. Sprat includes in the *History* a section entitled "Mechanics Improvable by Transplantations" in which he urges "conveying the Eastern *Spices*, and other useful *Vegetables*, into our Western *Plantations*," "transplanting *living creatures* and *Vegetables* from one Climat to another,"[17] and "removing the *Plants* and the productions of the same Country from one part of it into another" (385-86). It is telling that Sprat refers to these

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"particulars" of "ye summer Island red weed, wch berry is said to be as red as the Prickle pare, and give much ye like tincture: we desire particularly to receive your information about it, and the quality's thereof, that are mentioned in the printed book, here annexed. If it were so, as is therein related, it were very Philosophicall, and might prove very usefull…" *OC* 5: 174-75. A report on this particular plant appeared in the *PT* at same time that Oldenburg sent his request to Stafford; the editor was attempting to obtain confirmation of some of the characteristics of the red weed with the hope of eventually cultivating the species in England, *PT* 3-4: 796-97.

[15] Winthrop's article was published in *PT* 5-6: 1151-53.

[16] For Winthrop's account of the rarities he sent to the Royal Society, see *OC* 6: 256-57. In addition to the silk-grass, there were the following: a "strang kind of fish" taken from the Bay of Massachusetts, pieces of bark from a tree in Nova Scotia which contained "liquid matter like turpentine," and some limestone. In a letter of 26 March 1670, Oldenburg thanks Winthrop for his "American curiosities" and writes that the objects were carried to Whitehall so that the King could view them himself, *OC* 6: 594.

[17] The Society's interest in "transplanting" living creatures and in cross-breeding of animals, some of the practices that Plumb associates with modernity, is expressed by Oldenburg in a letter that he sent on 1 March 1668/9 to Winthrop in New England. Here, Oldenburg inquires about the "staple-commodities" of the region and inquires "what Animals are there, either Naturall or Exotick…For 'tis no slight point of Philosophy to know at certainty what other Animals may be tam'd for human use, and what commixture wth other Animals may be advanced?" (*OC* 5: 423). Oldenburg advises Winthrop that the Society is particularly keen to collect information about the "wolf-dogs" of the natives in New England.

experiments as forms of "communication" (386); Oldenburg's journal, by facilitating the exchange of information about new botanical and zoological species, functioned as what might be called a "virtual" community. The articles about transplantation that he published in the *Philosophical Transactions* provide a window on the activities of this community, which was fascinated with experimenting and manipulating nature; these accounts permit us to chart the processes by which the natural productions from distant lands became implicated in emerging discourses of consumerism.

That knowledge of the trades, particularly those of agriculture and gardening, could act both as a social ornament and as a form of service to one's country is an argument that Oldenburg puts to his readers in 1675. In his preface to the eighth year of the *Philosophical Transactions*, he writes:

> The *Ingenuous* Arts do furnish Employments for the younger Descendents of generous Families; as Limming, Painting, Sculpture, Chalcography, Calligraphy, Architecture, Navigation, the Breeding of the best races of horses for all services, the Cicuration of Animals; the Hortulan and all the other noblest kinds of Agriculture, as Vine-yards, Hop-yards, Mulberry-groves, Saffron, Liquorice, Woade, Madder, &c. That so all our Gentry may be good Examples to the Vulgar, both in vanquishing laziness, and luxury also... (*PT* 9-10: 255-56)

In this appeal, Oldenburg includes the kinds of "polite arts," painting miniature portraits and engraving, traditionally pursued by leisured gentlemen. The other trades to which he refers in the passage, the growing of mulberry trees for feeding of silkworms, and the cultivation of woad and madder for dyestuffs, suggest the "projects" of the late sixteenth and early seventeenth centuries that Thirsk associates with the origins of consumerism.[18] Such projects, Thirsk demonstrates, provided employment for the poor and diversified

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[18] See, Thirsk, *Economic Policy and Projects*. Thirsk provides a list of the "new" industrial and agricultural projects; they included stocking-knitting, button-making, soap-making, tobacco-pipe-making, ribbon and lace-making, flax and hemp-growing for oil, thread, linen, and canvas; and tobacco-growing, 6-7.

wares; while not all of these enterprises succeeded in becoming actual industries, they pointed to the value of domestic production and to the appetite for novelty in material things.[19] Writing almost a century after this great "age of projects," one of Oldenburg's primary concerns here is the Royal Society's research for the History of Trades, and the ways in which it might assemble such knowledge. If the institution were to succeed in encouraging the English gentry, who provided its staple membership, to embark upon new industrial and agricultural projects, the Society's hopes for a "History of Nature Wrought" would be assured. Oldenburg's catalogue of suitable trades for the gentry – arts that produce variety and diversity (in fabrics, colours, and foodstuffs) – illuminate for us some of the connections among the new science, novelty, and consumerism.

We can locate in the articles about agricultural and horticultural experiments that Oldenburg published in the *Philosophical Transactions* a survival of the public-spirited "projecting humour" that Thirsk examines. The projectors of the late-sixteenth and early-seventeenth centuries had usually displayed at least some concern with alleviating poverty,[20] and much of the agricultural literature generated by the Hartlib Circle in the 1650s certainly embodies this theme of public utility.[21] Some of the articles that appeared in the *Philosophical Transactions* about transplantation and the cultivation of new species present a similar line of argument – that the diversification of foodstuffs and plants will improve the conditions of English society. This set of concerns is particularly visible in the pieces contributed by Beale, who was an associate of Hartlib's. At the same

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[19] Thirsk 8.
[20] Thirsk writes that "the motives of every projector mixed public and private interest in different proportions," *Economic Policy and Projects* 18.
[21] Among the agricultural works "encouraged" by Hartlib were Cressy Dymock's *A Discovery for Division or Setting Out of Land* (London, 1653) and Richard Weston's *Discours of Husbandrie Used in Brabant and Flanders* (London, 1650).

time, however, the journal's accounts also anticipate the more aesthetic developments in the eighteenth century that were associated with agriculture such as the *ferme ornée* or ornamental farm: a kind of landscape garden that also functioned as a working farm. Integrating horticulture and agriculture, the *ferme ornée* was composed of such features as grottoes, walks, temples, menageries, and pasture and grain fields. As Douglas Chambers has demonstrated, these elaborate gardens were material "translations" of Virgil's *Georgics*.[22] The "hortulan" reports in Oldenburg's journal testify, then, to the interpenetration of scientific and commercial discourse in the second half of the seventeenth century.

The ennoblement of agriculture and gardening in the early modern period, the process of revaluation by which these manual trades achieved a new respectability, can be traced to a renewed interest in such classical writers as Virgil, Varro, Cato, and Columella.[23] Ancient texts about agriculture provided a justification for the gentleman's pursuit of farming and the cultivation of his estate.[24] Oldenburg articulates this argument in the dedicatory epistle he addresses to Joseph Williamson in 1674: "The *Rural* Arts were the serious business, and the maturest, if not the Master-piece of learn'd *Varro*; and they founded the Roman Empire..." (*PT* 9-10). In order for England also to prosper, Oldenburg asserts, readers must adopt the proposals described in the current issue of his

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[22] Chambers, *The Planters of the English Landscape Garden: Botany, Trees, and the Georgics* (New Haven: Yale UP, 1993). For the classical genealogy of these gardens, see chapter two, "The Translation of Antiquity: Pliny and Virgil," 12-32. The most famous *ferme ornée* of the period was Wooburn Farm in Surrey, created by Philip Southcote. For Chambers' account of Wooburn, see 156-63. Pope's engagement, in such poems as the "Epistle to Burlington," with contemporary developments in landscape design is also discussed by Chambers. See also chapter four of Peter Dixon's *The World of Pope's Satires* for an exploration of Pope's writings and the *ferme ornée* (London: Methuen, 1968) 63-89.

[23] Varro's *De Re Rustica*, Cato the Elder's *On Agriculture*, and Columella's *De Re Rustica*.

[24] Thirsk investigates the influence of classical texts upon sixteenth-century landowners in her essay, "Making a Fresh Start: Sixteenth-Century Agriculture and the Classical Inspiration," *Culture and Cultivation in Early Modern England: Writing and the Land*, eds. Michael Leslie and Timothy Raylor (Leicester: Leicester UP, 1992) 15-34.

journal which include the "fertilizing [of] barren lands," the "cultivating [of] waste grounds," and the "raising of Nurseries of Fruit-trees and Gardens of rare and exotic Vegetables, as far as our Soyl and Climat will entertain them" (*PT* 9-10). It is not surprising that classical writers on agriculture, particularly Virgil, would find a new audience in seventeenth-century England.[25] Composed in the wake of his own country's Civil Wars, Virgil's *Georgics* called for the reparation and renewal of the land. In the first book of the poem, for example, Virgil laments: "war through all the world / So many shapes of Wickednesse hath hurl'd. / None to the scorned Plough due honour yields, / Swains prest for Souldiers, have neglected fields."[26] In her investigation of agricultural innovations in the early modern period,[27] Thirsk points out that after the English Civil Wars, many royalists, some of whom had witnessed new agricultural practices while on the continent during the Interregnum, set about improving their estates both for income and for pleasure.[28] Evelyn's extensive replanting of Sayes Court in the 1650s is perhaps the best example of an attempt to realize the Virgilian ideal of rural labour by drawing upon knowledge (of botany and landscape design) acquired while on the grand tour.[29]

Oldenburg used the *Philosophical Transactions* to publicize recent works about horticulture and agriculture. During his tenure as editor, descriptive book reviews

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[25] For the seventeenth-century of reception of the *Georgics*, and the ways in which this text became implicated the political and scientific discourses of the period, see Anthony Low, *The Georgic Revolution* (Princeton: Princeton UP, 1985).

[26] *The Works of Publius Virgilius Maro*. Trans. John Ogilby, 2nd ed. (London, 1668) 67. All quotations will be to this edition. Ogilby's edition of Virgil was first published in 1649; a handsomely illustrated edition appeared in 1654.

[27] Thirsk, "Agricultural Innovations and their Diffusion," *The Agrarian History of Wales*, vol. 5, 1640-1750, part 2, "Agrarian Change," ed. Joan Thirsk (Cambridge: Cambridge UP, 1985) 533-89.

[28] Thirsk, "Agricultural Innovations and their Diffusion," 561.

[29] For Evelyn's later redesign of Sayes Court, in which the georgic elements were less visible, see Prudence Leith-Ross, "The Garden of John Evelyn at Deptford," *Garden History* 25 (1997): 138- 52.

appeared of such treatises as the second edition of Evelyn's *Sylva*, John Rose's *The English Vine-yard Vindicated*, Hugh Platt's *The Garden of Eden*, Moses Cook's *The Manner of Raising, Ordering and Improving Forrest Trees*, and John Worlidge's *Systema Horticulturae*.[30] The intense appetite in the seventeenth century for agricultural literature, ancient and modern, is brought home in Oldenburg's account of Joseph Blagrave's *The Epitome of the Whole Art of Husbandry* (1675). As part of the review, the editor furnishes a catalogue of other notable early modern contributions to this classical genre:

> Books of Husbandry are sold off as fast as the Press can print them. Sir *Hugh Plats Garden*, and *Jewel House*; *Hartlibs Legacy*, *Bees*, a part, and *Silkworms*; Gab. Plats; Sir *Rich.Weston's Husbandry of Flanders*; Capt. *Blith*; Any thing that seem'd new and probable: And all our Old Georgical Writers are called to a New accompt. *Tussers* old rimes are fetch't out of the grave and dust...*Albyterio* the Spaniard, and *Grylli* the Italian; all revived, and enlarged by *Markham*. The next, in old esteem, was *Googes* noble *Heresbachius*, and many Writers of Gardens, Orchards and Bees. (*PT* 9-10: 321)[31]

Oldenburg's characterization of the public's eagerness for "any thing that seem'd new and probable," illuminates for us the connections among cultivation, science, and the quest for novelty in the period. Experiments with unfamiliar crops, grafting, and transplantation were methods by which to produce variety, and husbandry manuals provided detailed instructions for transforming one's estate into a sort of laboratory. Virgil devotes the second book of the *Georgics* to horticulture where he treats the arts by which nature can be altered:

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[30] *PT* 3-4: 1071-74 (Evelyn); *PT* 1-2: 262 (Rose); *PT* 9-10: 302-4 (Platt); *PT* 11-12: 644-46 (Cook); *PT* 11-12: 922 (Worlidge).

[31] The works of England "old georgical writers" included the following: Thomas Tusser's hugely popular *A Hundreth Good Pointes of Husbandrie*, first published in 1557 and then passing through twenty three editions; Gervase Markham's *The English Husbandman. The First Part* (London, 1613); and Barnaby Googe's translation of Conrad Heresbach's *Foure Bookes of Husbandrie* (London, 1577). For a discussion of sixteenth-century husbandry manuals and the agrarian discourse of the period, see Andrew McRae, "Husbandry Manuals and the Language of Agrarian Improvement," *Culture and Cultivation*, 35-62.

> More wayes are found, which Use and Custom vaunt;
> This from the tender Mother cuts a Plant,
> Then in a Furrow sets; that buries Stocks
> Of antient Trees, Pales, Posts, and cloven Blocks...
> And oft without impairing we may see
> The boughs of one, chang'd to another Tree,
> And Apples graffed turn'd into a Pear,
> And stony Cornel purple Damsons bear;
> Therefore you skilful Gard'ners all means try
> T'improve wild Fruit, lest wast your Orchards lye. (70)

Later on in this book of the poem, Virgil supplies readers with a catalogue of some wines, but then breaks off for, "their names and kinds innumerable are" (73). It is not difficult to see why, in the seventeenth century, the *Georgics*, which celebrate the diversity that can be created through experiment,[32] became implicated in the emerging discourses of science and consumerism. In Virgil, Evelyn and other Fellows of the early Royal Society discovered an apologist for a rural retirement spent in the close observation of nature. We see in the *Philosophical Transactions* the tenets of Baconian empiricism grafted onto the Virgilian values of variety and rural labour, and Oldenburg's using the journal to encourage gentlemen "t'improve [the] wild fruit" of their estates. In the passage above, Virgil underscores the wonder associated with such processes as grafting that can "[change] the boughs of one [tree into] another." This sense of wonder is not, however, exclusive to the gardener performing the experiment; in the *Georgics*, the trees, themselves, experience a curiosity and delight "when sprouts with fruitful boughs / A mighty Tree to Heav'n, at leaves unknown / Admiring, and strange Apples, not her own" (72). For Virgil, then, the arts of the gardener produce wonder by disciplining nature – or

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[32] Because some of the grafts that Virgil suggests would not "take," there has been considerable argument about whether grafting functions in the *Georgics* as an elaborate literary device. See, for example, Richard F. Thomas's commentary on book two of the poem, *Virgil: Georgics I-II* (Cambridge: Cambridge UP, 1988) at 19-21, 170. See also, Christine G. Perkell, *The Poet's Truth: A Study of the Poet in Virgil's Georgics* (Berkeley: U of California P, 1989).

to use Bacon's terms, by putting nature in "bonds." According to Virgil, even unfruitful trees, "if any sow, or shall with Toyl / Transplant, and then in cult'rd Ort-yards set, / Their wilder disposition they forget; / With often pruning, they not slowly will / Answer thy Labour, and obey thy skill" (71). The *Georgics* do not represent transplantation and grafting as violations of any natural order; instead, the poet constructs these arts as useful and pleasurable means by which to transform nature. Virgil teaches that the taming of nature is actually a mutually beneficial exercise: it will supply the gardener with richer varieties of trees and, by "answering [the gardener's] labour," the trees will realize unknown potential, amazed at the curious offspring they are able to issue with the gardener's assistance.

The engineering of nature is, of course, the subject of Bacon's *New Atlantis*. Visitors to Solomon's House learn that the College's Fellows are engaged in a host of experiments to improve existing types of trees and plants and to discover new species. Bacon's utopian fiction was composed as Europe began to experience an influx of botanical specimens, seeds, and roots from distant lands. This was also the time when such celebrated botanic gardens as those at Padua, Leyden, and Montpellier were established.[33] Together, preserved specimens, travellers' reports about new flora, and the unfamiliar trees and flowers cultivated in continental gardens testified to the incredible diversity of nature's productions. In the *New Atlantis*, the dynamism of the age and concomitant enlargement of scientific knowledge found literary expression. It is not surprising, then, that in Bacon's treatment of grafting and transplantation we encounter a much more aggressive tone than in Virgil:

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[33] For the early modern botanic garden, see Prest, *The Garden of Eden*.

> We have also large and various orchards and gardens, wherein we do not so much respect beauty, as variety of ground and soil, proper for divers trees and herbs: and some very spacious, where trees and berries are set whereof we make divers kinds of drinks, besides the vineyards. In these we practise likewise all conclusions of grafting and inoculating, as well of wild-trees as fruit-trees, which produceth many effects. And we make (by art) in the same orchards and gardens, trees and flowers to come earlier or later than their seasons; and to come up and bear more speedily than by their natural course they do. We make them also by art greater much than their nature; and their fruit greater and sweeter and of differing taste, smell, colour, and figure, from their nature. And many of them we so order, as they become of medicinal use. We have also means to make divers plants rise by mixtures of earths without seeds; and likewise to make divers new plants, differing from the vulgar; and to make one tree or plant turn into another."[34]

A reformulation of the themes treated in book two of the *Georgics*, this passage sets the Virgilian values of variety and rural cultivation in the context of seventeenth-century discourses of science and consumerism. Bacon's privileging of a "variety" of grounds and soils over beautiful orchards and gardens echoes the extended catalogue of the "several kinds of ground" that we find in Virgil (76-78). The Latin poet dwells in the *Georgics* upon different soils and their suitability to particular natural productions; he explores the covenants between, for example, stony clayey earth and olive trees, and between brittle black soil and corn (76, 77). Bacon, however, moves more swiftly from the subject of soils to the kinds of commodities (drinks, foodstuffs, medicines) that can be produced through the arts and sciences of the gardener. Like Virgil, he represents grafting and transplantation as means by which to discipline nature, but in the *New Atlantis*, the references to interrupting the "natural course" take on additional meaning. In recounting to the visitors how the Fellows of Solomon's House have found techniques to alter virtually all the qualities of trees and flowers, the guide reveals the system of values which underpins the College's research. Variety, above all else, is championed,

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[34] *Works* 3: 158-59.

and all horticultural experiments are directed to this single end. In the *New Atlantis*, nature is shown being interrogated and transformed through such practices as hybridization. The passage from Bacon serves, then, as another early articulation of Smith's theory of consumer desires: it is distinctions in colour and form, or more generally, novelty, that Bacon's Fellows labour to create through their experiments.

As we have seen, Bacon considered agriculture and gardening to be among the trades most crucial to the compilation of the natural history because they "alter and prepare natural bodies." In his own essay on the trades, Boyle singles out grafting as an art that sheds light upon the workings of nature: "Scarce any man will think, that when a Pear is grafted upon a white Thorne, the fruit it bears is not a Natural one, though it be produc'd by a Coalition of two Bodies of distant Natures put together by the industry of Man, and would not have been produc'd without the Manual and Artificial Operation of the Gardener."[35] Here, Boyle uses grafting to show that the line between nature and art is not always obvious. The success and curiosity of the gardener's trade lies, in this case, in its invisibility. Because they create conditions in which nature may act upon itself in new ways, he argues, grafting and other like arts (brewing, baking) have much to teach the naturalist.[36] One can discern in Boyle's account of grafting the view of invention as the "finding" or "arranging" of existing materials. While his description of the grafted pear stresses the scientific causes of such objects, he is not able to naturalize entirely this kind of horticultural wonder. Although scientific principles may underlie the process of grafting, the person who encounters the curious fruit, and probably the gardener himself, will often perceive that the two species were united by some kind of alchemy.

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[35] Boyle, "That the Goods of Mankind may be much encreased by the Naturalists Insight into Trades," 2.
[36] Boyle, 2.

In the *Georgics* II, Virgil also negotiates the ambiguous boundary between the scientific and the mystical. In a passage that echoes book six of Lucretius's *De rerum natura*, the Latin poet prays to the Muses to reveal to him the "hidden causes" (87) of nature: "They shall to me Heav'ns Starry Tracts make known, / And strange Eclipses of the Sun and Moon; / Whence Earthquakes are, why the swoln Ocean beats / Over his Banks, and then again retreats: / Why winter Suns hast so to touch the Main, / And what delayes the tardy Night restrain" (86). "If these Gifts of Nature I not find" (86), Virgil continues, "Then I'le delight in Vales, near pleasant Floods, / And unrenown'd, haunt Rivers, Hills and Woods; / ... he is blest who knows our Countrey Gods, / *Pan*, old *Sylvanus*, and the Nymphs aboads" (86-87). The Latin poet represents scientific, rational explanations of natural phenomena and the more mystical knowledge that is imparted by the "Countrey Gods" to be equivalent and compatible paradigms. An understanding of causes, he suggests, does not diminish the wonder of nature – an argument that finds expression in the Royal Society's apologies for the new science. As Daston has shown, the interpretive frameworks of the institution's Fellows, the schemes into which curious natural objects and phenomena were subsumed, often incorporated both scientific and mystical elements.[37]

Two articles about grafting that appeared in the *Philosophical Transactions* illuminate for us the cluster of values ascribed to such processes by the Fellows of the early Royal Society. In 1667, Oldenburg published an article entitled, "Some Hortulan Communications about the curious engrafting of Oranges and Lemons, or Citrons, upon one anothers Trees" (*PT* 1-2: 553-54). In both its form and substance, the account

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[37] In her article, "Marvelous Facts and Miraculous Evidence in Early Modern Europe," Daston writes that Evelyn and others "believed that comets were due to natural causes *and* foretold the death of kings. Since God controlled the natural and moral orders, there was no reason for him not to synchronize them," 113.

closely resembles the report he had printed two years earlier about Settala's porcelain experiment. Like the rumour about making "China-dishes" in Europe, Oldenburg's article about grafting is also fragmentary and full of mystery. The piece is presented in point-from:

> 1. We have here *Orange-trees*, (*saith the Intelligence* from *Florence*) that bear a fruit, which is *Citron* on one side, and *Orange* on the other. They have not been brought hither out of other Countries, and they are now much propagated by Engrafting. 2. This was lately confirmed to us by a very ingenious *English* Gentleman, who asserted, that himself not only had seen, but bought of them *An.* 1660. in *Paris*, whither they had been sent by *Genoa* Merchants; and that on some Trees he had found an *Orange* on one branch, and a *Lemon* on another branch; as also (consonantly to the *Florentine* information) one and the same Fruit half *Orange* and half *Lemon*; and sometimes *three quarters* of one kind, and *one quarter* of the other." (*PT* 1-2: 553-54)[38]

Oldenburg received the account of the strange orange-lemon in the same way that he had learned of Settala's soft paste porcelain – through his extensive intelligence network. The description of the wondrous tree was an object of exchange – a secret passed between inquisitive gentlemen from two nations. By informing readers that an Englishman had acquired some of the grafted fruit in Paris from Italian merchants, Oldenburg not only confers upon the Florentine fruit the status of "matter of fact," he also underscores the commercial dimension of the article. While accounts of the grafting experiment were traded between interested parties, the fruit itself was exchanged between merchants and consumers. In both the epistolary and the economic spheres, then, the grafted fruit is commodified.

Oldenburg also enhances the curiosity value of such knowledge when he indicates to readers that the grafting experiment originated in Florence. In the seventeenth century,

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[38] The third part of the article describes a Parisian who "pretends to keep *Orange-trees* in that Town all the Winter long *without* any *Fire*," followed by a query about the likelihood of such an experiment succeeding in London, *PT* 1-2: 554.

the stately gardens of Florence and of other continental cities formed part of the itinerary of the grand tour; these elaborate gardens furnished a multitude of wonders for travellers. Evelyn, for example, visited the Grand Duke of Tuscany's palace in Florence in 1644 and provides the following account: "The Garden is full of all Variety, hills, dales, rocks, Groves, aviaries, Vivaries, fountaines...& what ever may render such a Paradise delightfull; & to this the Duke has added an ample Laboratorie...I saw in this Garden a rose grafted on an Orange Tree."[39] In this passage, the biblical metaphors of collecting – those of recreating paradise and of assembling an ark – are shot through with the Virgilian values of variety and cultivation, as well as with the spirit of empirical enquiry. Evelyn's description of the palace's garden also suggests the dialogue between the ancients and the moderns that was so characteristic of these horticultural enterprises; his reference to the art of grafting calls to mind *Georgics* II, while his account of the Grand Duke's laboratory evokes the early modern culture of scientific experiment. If some of Oldenburg's readers were not able, like Evelyn, to witness first-hand the kinds of horticultural marvels produced at such continental sites, they could at least experience them at one remove through the journal. Together, the compressed form Oldenburg gives the "hortulan" report from Florence, its continental associations, and its status as a "trade secret" help to construct the tale of the orange-lemon as a novelty – a literary object of consumption.

Several years after the initial notice of the curious orange-lemon tree appeared in the *Philosophical Transactions*, Oldenburg published a second and lengthier account of the Florentine fruit. Contributed by a physician from the Italian city in 1675, this report furnishes details about the shape, texture, and taste of the fruits produced from the tree

[39] *Diary* 2: 187.

that "was, about 30 years since, first met with in a Grove near *Florence*" (*PT* 9-10: 313). The author of the report, his credibility guaranteed by his professional status, supplies an explanation for one of the most "remarkable things" about these fruits – "they have either none, or very few, or empty seeds"; "since this Tree is of the insititious kind, nor can be repaired or propagated by seed, therefore nature was not at all sollicitous in the generation of the seed" (*PT* 9-10: 313). The orange-lemon was created through inoculation, he continues, whereby "the mixed nature of both Trees was grown together" (*PT* 9-10: 314). At the end the physician's account, Oldenburg adds the phrase, "And thus according to *Virgil* 2. *Georgic*," and quotes in Latin some of the passage we have already explored: "when sprouts with fruitful boughs / A mighty Tree to Heav'n, at leaves unknown / Admiring, and strange Apples, not her own." The report provides a series of "particulars" about the tree and its fruit that would assist the institution's Fellows in compiling a history of gardening. Grafting offered opportunities to probe some of the questions related to plant generation, including the replicability of artificially engineered varieties, and this article addresses some of these issues. While the account of the orange-lemon tree has empirical value, the article also negotiates the discourse of wonder. By citing Virgil's *Georgics* at the conclusion of the article, Oldenburg traces for his readers the literary genealogy of grafting and offers them a classical apology for the experimental practice. The passage from Virgil also enables the editor to highlight the sense of curiosity and novelty attendant upon such horticultural practices. In this way, the journal depicts grafting as an honourable and pleasurable pursuit for gentlemen with scientific interests.

"Relief, Medicine, Accommodation, and Wonder": John Beale and Horticultural Discourse

The letters that Beale addressed to Oldenburg about horticultural matters, some of which were published in the *Philosophical Transactions*, constitute one of the richest sources for investigating the cultural meanings assigned to grafting, transplantation, and other such experimental practices.[40] In recent years Beale's writings on agriculture and gardening have received renewed attention from scholars[41]; I am concerned here with the ways in which he gave expression to the relationship between horticulture, the new science, and consumerism. In a letter of 4 January 1662-63, Beale presents Oldenburg with a series of suggestions for transforming the Royal Society into "a Centre & fountaine" of knowledge (*OC* 2: 4).[42] If the institution were thus to extend its intelligence network, argues Beale, it

> might bring ye Caupha-beane,[43] The,[44] or any other drinke, as much in use, as Tobacco now is, wch in my memory was lesse knowne than thiese now are Yet nowe wee see hundreds of thousands of familyes in England Scotland Ireland and foreine plantations thereby susteind. And thus yu may make not only yr Metropolitan City but thiese three nations throughout the Emporium of ye World. In a fewe yeares a paradyse, the very ayre epidemically purifyed & sweetened, & contending wth all ye world for exchanges of all kinds of accomodations. (*OC* 2: 4)

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[40] For the collection and exchange of botanical knowledge in the period, see Jardine, chapter six, "Strange Specimens," *Ingenious Pursuits*, 223-72.

[41] For a comprehensive account of Beale's life and writings see the articles by Mayling Stubbs, "John Beale, Philosophical Gardener of Herefordshire Part I. Prelude to the Royal Society (1608-1663)," *Annals of Science* 39 (1982): 463-89, and "John Beale, Philosophical Gardener of Herefordshire Part II. The Improvement of Agriculture and Trade in the Royal Society (1663-1683)," *Annals of Science* 46 (1989): 323-63. Particularly relevant to our discussion is Stubbs' examination of the impact of mercantilist thought upon Beale, 347-49. For an exploration of Beale's ideas about gardens and landscape, see Peter H. Goodchild, "'No Phantasticall Utopia, but a Reall Place': John Evelyn, John Beale and Backbury Hill, Herefordshire," *Garden History* 19 (1991): 105-27. Beale's reformulation of Virgilian precepts is investigated by Chambers in his essay, "'Wild Pastorall Encounter': John Evelyn, John Beale and the Renegotiation of Pastoral in the Mid-Seventeenth Century, *Culture and Cultivation*, 173-94. See, also, Michael Leslie, "The Spiritual Husbandry of John Beale," *Culture and Cultivation*, 151-72.

[42] These suggestions include the Society's forging closer associations with such institutions as the Inns of Court and the universities.

[43] Coffee.

[44] Tea.

What this passage makes clear is that for such individuals as Beale, the Society represented a means by which not only to increase scientific learning, but also to shape and strengthen the British economy. The promotion of experimental philosophy, in the minds of many of the institution's Fellows, was intimately bound up with the production and distribution of new commodities. In Beale's formulation of consumerism, like that in Bacon, the invention of new goods was closely connected to the prelapsarian ideal of recreating paradise. In his letter, Beale invokes the triumvirate of early modern commodities (coffee, tea, tobacco)[45] to show the ways in which London may fashion itself as a sort of Eden for consumers. The passage above also embodies the strain of public utility that one often encounters in the Society's writings about the trades. By writing of the "hundreds of thousands" of British families "sustained" by the growing of tobacco, and of "purifying and sweetening" the air of London through the planting of new crops,[46] Beale stresses the social benefits of cultivation.[47]

The image of London or even of Britain as the "emporium of the world" recurs throughout the early *Philosophical Transactions*; Beale, Oldenburg, and other Fellows

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[45] For an examination of these commodities and their impact upon British culture in the period, see James Walvin, *Fruits of Empire: Exotic Produce and the British Taste, 1660-1800* (London: Macmillan, 1997).

[46] Like Evelyn, Beale was also concerned with the issue of pollution and saw in horticulture a partial solution to such environmental problems. On 30 September 1659, Beale addressed a letter to Oldenburg in which he called for the planting of hedgerows "of double wood Vindrayed upon poles or poplars, like hops, at certain beautifull distances, that they may perfume a whole province." According to Beale, it was "time for London...to accepte of a sweete & easy remedy agst ye corrosive Smoake of their Seacoale, yt cuts off more than halfe their dayes," *OC* 1: 318-19.

[47] The ways in which the cultivation of new species of plants and trees could improve the English diet was, of course, one of Beale's preoccupations. In 1676, Oldenburg published a review by Beale of John Worlidge's *Vinetum Britannicum*. The first part of the review includes an appeal, expressed in Virgilian terms, for gentlemen to "[turn] our waste Grounds, Heaths, barren Lands and Downs (which contain a great part of *England*) into Gardens, and Modern Vineyards." Beale underscores the medicinal benefits of horticulture: "Acute and Learned Writers do maintain it, that a good choice of Diet, duly order'd, is the surest remedy against many of the most obstinate maladies, and the best preservative of firm health: And *Liquids* have a potent insinuation, by their nearer affinity to our Blood, Humors and Spirits...And *Flora* freely offers to the Intelligent all her copious Wardrobes at hand, with infinite variety for all palates, humors, and occasions." According to Beale, Worlidge's directions for cultivating and making tea and chocolate – "healing" and "reviving" drinks – are particularly useful, *PT* 11-12: 583, 587-88.

sketch out the role that the Royal Society was expected to play in achieving this lofty economic goal. In the dedicatory epistle that he addressed to Joseph Williamson in 1674, Oldenburg draws a sharp distinction between the more theoretical sciences (physiology, geometry, optics, astronomy) and such manual arts as agriculture and gardening: "These Abstrusities give good satisfaction and sincere delight to the deeply Intelligent and truly Reasonable. On the other hand, Rural diligence and Trade bring-in to the Multitude a sensible reward, with numberless varieties of emoluments and accommodations" (*PT* 9-10). Here, Oldenburg's representation of the theoretical sciences as valuable, yet somewhat arcane, was motivated in part by his desire to enlist the support of the English gentry for the Royal Society's projects. Like the collecting of curiosities, the "hortulan" arts were a means by which gentlemen could contribute to the institution's Baconian program without necessarily engaging in rigorous intellectual labour. The practical benefits of "rural diligence" for the wider population are also underlined in the above passage; Oldenburg stresses the range of commodities and goods that can be generated by such trades. In the seventeenth century, "emolument" signified not only a profit from employment or office, but also an advantage, benefit, or comfort.[48] In agriculture and gardening, then, Oldenburg rightly locates the potential to create Smith's "distinctions in things otherwise equal." The dedicatory epistle to Williamson serves as an apology not only for rural labour but also for consumerism – the pursuit of novelty in material objects.

Beale's writings about horticulture display a tension between the invention of goods for luxury as opposed to those for necessity. While the so-called "luxury debates"

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[48] "Emolument" *OED*.

of the eighteenth century were still a few decades away,[49] in Beale we encounter some early theorizations of these concepts in relation to the rural trades; his correspondence reveals some ambiguity about the ultimate purpose of multiplying and transmuting species. Two of Beale's contributions to the *Philosophical Transactions* from 1677 are particularly useful in interpreting the ways in which the Royal Society negotiated the emerging discourses of consumerism. Extending over two issues of the journal,[50] Oldenburg published a series of "rural advertisements" that Beale had communicated to him. Among the topics examined in these two articles were the potential benefits of cultivating mulberry trees. The planting of mulberry trees for the feeding of silkworms, a project promoted by James I, was a subject that continued to excite the imaginations of the Society's Fellows in the second half of the seventeenth century. In addition to the letter sent from Virginia in 1665/6 to Moray about the propagation of mulberry trees there, an extract of which Oldenburg published, there also appeared in the journal a piece about the breeding of silkworms in France.[51] In the first article, Beale's treatment of mulberry trees resembles a miniature *cento*. Juxtaposing ancient and modern sources on horticulture, he composes an apology for cultivating this particular species. He laments

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[49] The eighteenth century generated a considerable literature about the role of luxury within moral, political, and economic frameworks. One of the central texts in this debate was Bernard de Mandeville's *The Fable of the Bees, or Private Vices, Public Benefits* (1714, 1723) in which acquisitiveness and the love of luxury are represented as positive economic forces, creating employment and encouraging trade. Among the other writers who made important contributions to the luxury debates were Voltaire, Rousseau, Hume, and Smith. For a recent account of the eighteenth-century luxury debates, see chapter six of Christopher J. Berry's work, *The Idea of Luxury: A Conceptual and Historical Investigation* (Cambridge: Cambridge UP, 1994) 126-76. See also, John Sekora, *Luxury: The Concept in Western Thought, Eden to Smollett* (Baltimore: Johns Hopkins UP, 1977). In 1661, Evelyn contributed to the debate about luxury by publishing his *Tyrannus or the Mode* that argued in favour of sumptuary laws.

[50] The first of Beale's observations were printed in *PT* 11-12: 816-20, with the second set appearing in *PT* 11-12: 846-52.

[51] "Of the designed Progress to be made in the Breeding of Silkworms, and the Making of Silk, in France," *PT* 1-2: 87-91. Oldenburg advises his readers that his objective in publishing this piece, which describes the contents of a French treatise, is to revive the design of James I for establishing a silk industry in England, 91.

the current "aversness" to planting mulberries and he points to such recent successes as the making of mulberry-cider in Devonshire and the production of enough silk in some other English counties for gentlemen "to knit for themselves gloves, stockins, and wastcoats of silk" (*PT* 11-12: 816-17). Citing Columella, Palladius, and other classical writers, Beale assembles a catalogue of the commodities, including but not limited to silk, which have been generated from the mulberry tree. Apparently the ancients made marmalade, honey liquors, and other delicious "junkets"[52] from the mulberry. Like Virgil, here Beale underscores the economy of nature – the ways in which various species furnish the materials for a multitude of goods.[53] Even the "barren" trees native to the Caucasus, writes Virgil, can be commodified: "There Pines for Masts are fell'd, / And Cypres and tall Cedars, Tow'rs to build. / Here coverings for their Carrs, and spoaks for Wheels, / Husbandmen get, and Ships find crooked Keels" (85). In Virgil, then, nature's plenitude, coupled with human ingenuity, can supply both necessities and decencies. In order for England to revive the old trades involving the mulberry, Beale argues, it must "send for the most delicious Mulberies, which may be had in *Naples*, *Sicily*, *Virginia*, or any of the *East* or *West-Indies*"; he cautions, though, that they must not "trust to the seed," but endeavour "to have young Plants of the best sorts, sent in boxes, containing some of the connatural soyl" (*PT* 11-12: 818). Beale directs readers to Evelyn's *Sylva* for an elegant defense (coupled with instructions) for cultivating mulberry trees.

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[52] In the seventeenth century, "junket" could signify a variety of delicacies including cream cheeses, dishes of sweetened and flavoured curds, dainty sweetmeats, cakes, and other confections, "Junket," *OED*.

[53] We also see this commodification of nature in a letter that Oldenburg addressed to Hartlib on 21 January 1659/60. Here, Oldenburg urges the merchants of the East India Company to gather more knowledge about the date tree: "whether also they make hony thereof by decoction, & draw olye of ye kernels of ye dates wch authors say to be good to eat, to serve for lamps, and for a gentle purgative. That ye body of those Trees serveth for timber of ships, ye rind for cables, ye leafes for sailes & hats; ye pith for paper which is written upon green, & being grown dry, keepeth its caracters altogether indelible; all those things are generally asserted & beleeved..." (*OC* 13: 392-93).

After having enumerated the desirable commodities that can be extracted from the mulberry, and calling upon Englishmen to import trees for transplantation, Beale betrays a self-consciousness about the enterprise he is promoting. He distinguishes between the replanting of England with mulberry trees from the continent and from the New World and the cultivation of tender plants. Anticipating charges that his mulberry scheme is costly and frivolous, Beale writes:

> If it be objected, That 'tis a tedious curiosity to send so far for the sweetest Mulberies and the most vinous: I answer, that...every year we have many Exotics (at great charges, and of much less worth) imported; too many, meerly to be consumed here, and to excite and foment luxury: whereas these are permanent amongst us, and to be propagated in all parts for the great benefit of all *England.* (*PT* 11-12: 819)

Given Beale's evident fascination with the delicacies associated with the mulberry, his contrast between this specific tree and the introduction of other foreign fruits and flowers into England is somewhat artificial. Clearly, it was more difficult to make a case for the ways in which the botanical experiments of gentlemen (to propagate unusual varieties of flowers and fruit trees) would actually improve English society.[54] His country's importation of textiles from the East and from the continent already demonstrated how lucrative the silk trade was for the producing nations and its obvious potential as a labour-intensive industry for creating employment. In this article, Beale points to both the textiles that would follow from the planting of mulberry trees, as well as to the delicacies that could be made from its fruit. His entire mulberry enterprise, then, is predicated, at least in part, upon the values of luxury and novelty – in items of clothing and foods.

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[54] We find Beale's distaste for the cultivation of exotics also expressed in a letter he addressed to Oldenburg on 1 April 1664: "Wee doe yet seeme to be but novices in ye transmutation of Vegetables, & rather to have wasted ourselves upon ye vanity of gaudy flowers, than upon ye more usefull for foode, sauce, or medicine" (*OC* 2: 158).

The boundary that Beale attempts to delineate between his own horticultural projects and those that merely "excite and foment luxury" is a variation upon the paradigm that Virgil constructs in which rural life is contrasted with the luxury of the city. The "happy swains" of *Georgics* II should rejoice,

> Although from high Roofs through proud Arches come
> No Floods of Clients early from each Room;
> Nor Marble Pillars seek, which bright shells grace,
> Gold woven Vestments, nor Corinthian Brass;
> Nor white Wooll stain'd in the Assyrian juice,
> Nor simple Oyl corrupt with Casia's use:
> But rest secure, a fraudless life in Peace,
> Variously rich, in their large Farms at Ease. (86)

In these lines, we find the Virgilian values of variety and experiment set in an urban context. Taken together, the marble pillars decorated with shells, the intricately woven robes, the brass vessels, the wool garment dyed with Tyrian purple,[55] and the olive oil seasoned with cassia all testify to a culture whose elites sought novelty in all manner of material objects. The shell ornamentation and the use of dyestuffs were only some of the means by which the ancients created – to use Smith's terminology – "distinctions" in form and colour. It is tantalizing to speculate that when Smith wrote of the "distress and uneasiness" that the pursuit of novelty had brought mankind he may even have had in mind this particular passage from the *Georgics*. The opposition that Virgil sets up here, between the frivolous and ultimately unhappy life of the city-dweller and the noble, peaceful existence of the farmer, begins to collapse when he characterizes the latter as "variously rich." Virgil's encouragement in *Georgics* II of the farmer to practice the arts of grafting and transplantation – to discover new combinations of species and to improve

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[55] The famous crimson dye extracted from molluscs in ancient Tyre. In his examination of the ways in which the mechanical arts have been improved "by others besides Tradesmen," Sprat writes that "the ancient *Tyrian Purple* was brought to light by a *Fisher*," 391.

the fruitfulness of existing ones – hardly suggests a life in which contentment is derived from uncultured nature. His treatment of horticultural experiments serves as an apology for the pursuit of novelty and variety – precisely the same values that he condemns in the wealthy citizens of Rome.

In Virgil's fourth *Eclogue*, the issue of novelty is also negotiated. Here, however, the poet eliminates the role of mankind as producer of new goods. We encounter a striking image in this poem in which nature actually commodifies itself. With the return of the Golden Age,

> Sea-men shall leave the boysterous Ocean;
> Nor Merchants shall transport exchanged Ware,
> But all Commodities grow every where;
> Nor Earth shall Harrows feel, nor Vine the Hook,
> And hardy Plow-men shall their Steers unyoke;
> Nor Wooll deceive with artificial dye,
> But, in the Meadows, Rams in scarlet ly,
> Or else their silver Fleeces turn'd to gold,
> And Princely purple simple Lambs infold.[56]

The treatment of textiles with dyestuffs and the trading of such manufactured goods are represented as curses – necessities of the Iron Age. Virgil's grounding of the merchants signifies the cessation of economic cycles of exchange that had been created and sustained by mankind's desperate pursuit of novelty in artificial objects. In the poet's rustic paradise, the lambs would change their own colours, themselves supplying the variety that had been sought through such trades as cloth dyeing. Within the world of this pastoral poem, then, commerce, agriculture, and the altering of nature actually signify a fallen state.

Beale's second piece about mulberry trees and other horticultural topics that appears in the *Philosophical Transactions* helps to clarify his own stance regarding

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[56] *Eclogues*, *The Works*, 17-18.

novelty and luxury. What Beale objects to, is not the consumption of new vegetables and fruits, but rather, his country's importation of them from rival nations. Englishmen would do well, he urges, to cultivate such "underground granaries" as the Spanish and Jamaican potato and the "Bohemian" turnip from Prague, and to propagate "the best *Chestnuts*, *Wall-nuts*, *Figs*, [and] *Almonds* (*PT* 11-12: 851-52). As he does in his earlier article, Beale asserts that the purpose of his proposals is not to encourage "consumption for consumption's sake." Again, however, his text implicates him in the culture of novelty: "But I am not at leisure to serve Luxury; yet 'tis better, we should have the best at home, than be always at the charges to send for them" (*PT* 11-12: 852). In a letter of 29 August 1668, Beale make a similar argument to Boyle about England's reliance upon foreign imports when he puts forward a scheme for the cultivation of olive trees in the American colonies so that "wee may in tyme have as Good Oyles from thence, as from Italy, or Greece" (*OC* 5: 30-31). Apologists for the Royal Society were often at pains to show that their projects were motivated solely by the desire to increase scientific knowledge and to improve the lives of ordinary Englishmen. In Sprat's *History* we find a grudging acknowledgement of the role that luxury has played historically in the improvement of the trades.[57] Because "the one part of men would not be content to live according to the first plainess of *Nature*," he writes, "thence sprung all the *Arts* of *convenience*, and *pleasure*" (380-81). "Delicacies of *Food*" and "Curiosities of *Clothing*" are among the luxuries Sprat mentions in this context (381). The critiques of luxury that we encounter in Beale and Sprat, undermined by their accounts of the new commodities they envision the Royal Society discovering, show the ways in which the

[57] According to Sprat, most of the arts currently practiced were invented "either by *Luxury*, or *chance*, or *necessity*: all which must be confess'd to be mean, and ignoble causes of the *Rational Mechanics*," 393.

"vice" of luxury began to be accommodated into early modern scientific and economic frameworks. These writings constitute, then, part of the prehistory of the eighteenth-century luxury debates, and should be considered in conjunction with the more famous revaluations of luxury of Mandeville, Hume, and Smith.

In Beale, the Society found a knowledgeable and enthusiastic contributor to the horticultural and trades projects pursued by its so-called "Georgical Committee"[58] At roughly the same time that Sprat's *History* called for the transplantation of Eastern spices and vegetables into England's Western colonies, Beale composed a lengthy letter on the subject that he addressed to Oldenburg.[59] In this piece, Beale asserts that "wee have not often enough exchanged Vegetables in due manner wth ye Americans, eyther from our native solyes or from other parts of ye old world" (*OC* 2: 158); he urges the cultivation of, among other species, coleworts, hops, junipers, and cypresses in the American colonies.[60] Similarly, in a letter about the horticulture of Scotland that appeared in the *Philosophical Transactions*, Beale proposes that seeds from the hemlocks, spruces, and cedars in New England and Newfoundland be sown in Scotland (*PT* 9-10: 362). With his evident fascination with redistributing the botanical species of the "old world" and the New through transplantation and seed-exchange, one of Beale's intellectual heirs is surely the gardener and artist Mark Catesby.[61] For Beale, the "natural order" was simply

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[58] The Society's Georgical Committee was formed in 1664 and counted among its members Beale, Evelyn, Cowley, and Oldenburg. For this committee, see Hunter, *Science and Society in Restoration England*, 92-93.

[59] On 1 April 1664, Beale sent Oldenburg a letter entitled, "Disposalls & Considerations or rather Enquyryes Concerning the Transplanting East Indian Spices, & other their Usefull Vegetables in our Weste Indyes," *OC* 2: 151-61.

[60] For the relationship between natural history and empire in the eighteenth century, see David Mackay, "Agents of Empire: The Banksian Collectors and Evaluation of New Lands," *Visions of Empire*, 38-57.

[61] For Catesby's role as an experimental horticulturist, see the following articles in *Empire's Nature*: Therese O'Malley, "Mark Catesby and the Culture of Gardens," 147-83; Mark Laird, "From Callicarpa to

a construction, one that could be endlessly reinvented through botanical experiments. As he did for the Society's other members, Virgil supplied Beale with a justification for his horticultural ambitions. In Beale's article about Scotland's horticulture, we find a passage, indebted to the *Georgics*, in which the relationship between botany, empire-building, and consumerism is crystallized: "'Tis as well the Honour as the Wealth of a people to plant and till their land with the richest and most useful commodities it will bear; and where nature is difficult, there to surmount it with Art, and Industry. And 'tis better to improve our own Countrey, than to conquer another. And a little Farm well tilled is better than a Mannor of a large waste" (*PT* 9-10: 366). Here, Beale recontextualizes Virgil's precept, "A large Farm commend; A little, Till," (84) in order to encourage the replanting and renewal of British land. By engaging in fruitless wars with other nations, he argues, England will merely be distracted from this ultimate goal. Of course, Beale's "hortulan" scheme depended upon the flow of natural productions from the British colonies; empire-building, voyages of discovery, and colonial settlement, were crucial to the establishment of the dominion over nature which Beale envisions.

What Beale's writings illuminate for us, then, is the way in which the discourse of horticulture incorporated economic, political, and social ideals. For Beale, the cultivation of new species represented a means by which to increase the variety in consumer goods, to bolster the English economy, and to improve the health of the population. The difficulty he has in drawing a boundary between his "hortulan" projects and the wider pursuit of novelty and luxury in the period reveals how, in the seventeenth century, multiple values came to be embedded in natural objects. Writing to Oldenburg in 1664

Catalpa: The Impact of Mark Catesby's Plant Introductions on English Gardens of the Eighteenth Century," 184-227.

about the naturalization of some varieties of gourds and melons in America, Beale captures for us the adaptability of horticultural discourse: "Such changes constantly devised, & pursued, may in a shorte time increase reliefe, medicine & accommodation as well as Wonder" (*OC* 2: 157).

"New Visible World": Consumerism, Empire, and Robert Hooke's Micrographia

In Robert Hooke's (1635-1703) exquisitely engraved treatise, *Micrographia* (1665), we find expressed through literary and visual language the kinds of links that Beale forges between nature, commerce, and imperialism. The first major work in English devoted to microscopy,[62] Hooke's treatise consists of a series of miscellaneous observations made with a microscope, accompanied by illustrations. A vehicle for promoting the Royal Society's experimental philosophy and the use of new scientific instruments, the *Micrographia* proved instantly appealing to Restoration virtuosi. Pepys, for example, tells us that in January 1665, he "sat up till 2 a-clock in my chamber, reading of Mr. Hookes Microscopicall Observations, the most ingenious book that ever I read in my life."[63] Because of the diverse roles that Hooke assumed in his career – natural philosopher, scientific author, inventor of scientific instruments, Curator of Experiments to the Royal Society, City Surveyor, and Gresham Professor of Geometry – he has received much scholarly attention, especially in recent years as historians have

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[62] Henry Power's *Experimental Philosophy* (London, 1664) contained a series of observations made with the microscope, but his accounts of phenomena are not of the same quality as those of Hooke, and Power's work does not contain any microscopical drawings. For a recent exploration of role of the microscope in the period, see Catherine Wilson, *The Invisible World: Early Modern Philosophy and the Invention of the Microscope* (Princeton: Princeton UP, 1995).

[63] *The Diary of Samuel Pepys*, vol. 6, 18.

sought to reconstruct the various facets of early modern scientific culture.[64] Here, I open up the *Micrographia* to a new reading by situating it within the context of the culture of collecting and early discourses of consumerism. While scholars have discussed some of the ways in which Hooke's treatise was a product of the Royal Society's "philosophical commerce,"[65] and traced his relationship with instrument makers, craftsmen, and tradesmen in Restoration London,[66] the *Micrographia*'s representation of the relationship between the new science and other developments in the period's material culture has remained largely unexplored. In this section, I examine the work's negotiation of the model of the early museum as well as its connections with the Society's projected History of Trades; the imaginative comparisons that Hooke draws between natural phenomena and consumer goods shows his viewing of nature through the lens of commerce.

Hooke begins the *Micrographia* with the customary appeal to English gentlemen to participate in the new experimental philosophy. Because the microscope, he suggests, requires only "a *sincere Hand*, and a *faithful Eye*,"[67] it offers a suitable and pleasurable

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[64] Margaret 'Epinasse's 1956 study, *Robert Hooke*, remains a valuable source of information about Hooke's life and works (Melbourne: William Heinemann, 1956). Among the more recent treatments of Hooke are the following: the 1989 volume of essays edited by Michael Hunter and Simon Schaffer, *Robert Hooke: New Studies*, appeared which explores many aspects of Hooke's career including his work on scientific instruments, optics, and geology (Woodbridge: Boydell, 1989); Jardine's examination of Hooke in *Ingenious Pursuits*; for Hooke's activities as surveyor and his architectural work, see also, Jardine's article, "Monuments and Microscopes: Scientific Thinking on a Grand Scale in the Early Royal Society," *Notes and Records of the Royal Society of London* 55 (2001): 289-308. Lotte Mulligan, in her article, "Robert Hooke and Certain Knowledge," *The Seventeenth Century* 7 (1992): 151-69, takes up the problems of Hooke's epistemology and methodology.

[65] Michael Aaron Dennis, in his article, "Graphic Understanding: Instruments and Interpretation in Robert Hooke's *Micrographia*," argues that the treatise was implicated in economic discourse because it suggested "the circulation and exchange of representations among practitioners" of the new science and was predicated upon the commercial transactions of purchasing scientific instruments, *Science in Context* 3 (1989): 309-64, at 349, 351.

[66] Robert Illife offers an excellent account of Hooke's interactions with, for example, London glassmakers, the producers of textiles, and potters in "Material Doubts: Hooke, Artisan Culture, and the Exchange of Information in 1670s London," *British Journal for the History of Science* 28 (1995): 285-318. Here, Illife also explores Hooke's participation in London's coffee house culture.

[67] Hooke, *Micrographia: or some Physiological Descriptions of Minute Bodies made by Magnifying Glasses* (London, 1665) sig. a2^{v}. All subsequent references will appear parenthetically.

means by which the gentry can contribute the Society's projects. "So vast is the *variety of Objects* which will come under their Inspections," he continues, that gentlemen will derive "material and sensible pleasure" (sig. $d2^r$) from using their microscopes. It is the instrument's capacity to produce novelty – to make the familiar strange – that Hooke stresses. As we have seen, the new science and, in particular, scientific instruments were viewed, in the seventeenth century, as tools by which to recover lost Adamic knowledge. Hooke implicates his treatise in this rhetoric by suggesting that through the use of "mechanical helps for the Senses" (sig. $d2^r$), some "reparation [may be] made for the mischiefs, and imperfection, mankind has drawn upon it self" (sig. $a1^r$). Like Sprat and Glanvill, Hooke also explicitly connects the new experimental philosophy with voyages of discovery and empire-building. The microscope furnishes opportunities, he argues, to "[establish] our command over things" (sig. $a1^r$); by deploying such an instrument, "a new visible World [will be] discovered to the understanding" (sig. $a2^v$). Hooke's *Micrographia*, then, is an elaborate cartographical exercise – an attempt to map the geography of natural objects; without the microscope, such phenomena as moss, mould, and mites would have remained "*Terra-Incognita's*" (sig. $d2^v$).

According to Hooke, the microscope was a means by which to "quietly peep in at the windows" of nature, in contrast to the violent "prying into her secrets by breaking open the doors upon her, and dissecting and mangling creatures whil'st there is life yet within them" (186). What his language makes evident, however, is that Hooke's textual and visual representations of, for example, the blue fly and the eggs of the silkworm were comparable acts of control and dominance. His microscopical observations constituted miniature acts of mapping; they should be connected to other attempts in the period to

appropriate and contain nature. The *Micrographia* evokes the collecting enterprises of the seventeenth century in three ways: first, by presenting a random sampling of nature that was characteristic of the cabinet of curiosities; second, by incorporating references to the celebrated collections of the day and to public exhibitions; and, third, by entering into the "art versus nature" debate that was played out in the space of the early modern museum. In Hooke's preface, we find a re-articulation Bacon's argument in the *Novum Organum* about the Idols of the human mind – the false notions that infect the understanding. The obstacles to learning, asserts Hooke, "proceed either from the narrowness and wandring of our *Senses*, from the slipperiness or delusion of our *Memory*, [and] from the confinement or rashness of our *Understanding*" (sig. a2^{r}). Like Bacon, Hooke calls for the assembling of "particulars"; the memory should be stored with observations in such a way that they are "ready and convenient, to be at any time *produc'd* for use, as occasion shall require (sig. b1^{v}). The understanding, he continues, when approaching the materials of the memory "must be sure to make *distinction* between the *sober* and *well collected heap*, and the *extravagant Idea's*, and *mistaken Images*, which there it may sometimes light upon" (sig. b2^{r}). Hooke's discussion here is of a piece both with Evelyn's view of the commonplace book as a "magazine" of knowledge and with Oldenburg's construction of the *Philosophical Transactions* as an archive of "matters of fact." The author of the *Micrographia* conceived of his treatise as a textual specimen cabinet, an incomplete repository of knowledge from which others might draw for their own experiments. In its miscellaneous arrangement, the treatise resembles a museum catalogue. Observations are assigned a number and presented in the following manner: "Of the curious texture of *Sea-weeds*"(140), "Of the *Shepherd*

Spider" (198), and "Of the *Eels* in Vinegar" (216)[68]. A series of discrete units of information, the fragmentary genre of *Micrographia* recalls the catalogue form of Bacon's *Sylva Sylvarum* and Browne's *Pseudodoxia Epidemica.*

Throughout the *Micrographia*, Hooke gestures to the collecting culture in which he and other members of the Royal Society participated; from about 1663 to 1676, he served as Curator of the institution's repository of rarities.[69] In a now famous passage, Hooke stressed the empirical value the museum: "the use of such a Collection [was] not for Divertisement, and Wonder, and Gazing, as 'tis for the most part thought and esteemed, and like Pictures for Children to admire and be pleased with, but for the most serious and diligent study of the most able Proficient in Natural Philosophy."[70] The extent to which the *Micrographia* provoked astonishment in its readers is clear and it would be perilous to interpret the treatise as simply a "scientific document," untainted by contemporary discourses of wonder. It was the cabinets of collectors and the culture of curiosity that supplied Hooke both with information and objects for his work. In his preface, he implicitly connects his treatise with the collecting culture of the day: "The footsteps of Nature are to be trac'd, not only in her *ordinary course*, but when she seems to be put to her shifts, to make many *doublings* and *turnings*, and to use some kind of art in indeavouring to avoid our discovery" (sig. a2^{r}). Echoing Bacon's formulation of natural history,[71] this passage articulates the aesthetic of rarity out of which cabinets of

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[68] On 8 April 1663, "Mr. Hooke...was desired...to have ready, the microscopical appearance of the little fishes in vinegar," Birch, *History*, vol. 1, 449.

[69] For Hooke's involvement with the Society's museum, see Hunter, "Between Cabinet of Curiosities and Research Collection: The History of the Royal Society's 'Repository.'"

[70] Hooke, "Discourse of Earthquakes," *The Posthumous Works of Robert Hooke*, ed. Richard Waller (London, 1705) 338.

[71] As Bacon writes in the *Parasceve*, nature is either "free, and develops herself in her own ordinary course; or she is forced out of her proper state by the perverseness and insubordination of matter and the violence of impediments; or she is constrained and moulded by art and human ministry," *Works* 8: 357.

curiosities arose. The image of nature attempting to flee the experimental scientist is, of course, also at odds with Hooke's later statement praising the microscope as a non-aggressive means by which to search out the secrets of nature and more in keeping with his formulation of the microscope as an instrument of empire.

Instances of nature "put out of course" were sought by encyclopedic collectors, and the *Micrographia* clearly incorporated such "cabinet knowledge." In his observations about the curious figures observable in sand, Hooke writes of "viewing a small parcel of *East-India* Sand (which was given me by my highly honoured friend, Mr. *Daniel Colwall*)" (80). By referring here to the individual who helped to establish the Royal Society's repository of rarities, Hooke associates his treatise with the institution's museum. That the parcel of sand came from the East Indies suggests the networks of exchange by which Englishmen received rarities from distant lands.[72] Similarly, while presenting his observations of charcoal, Hooke describes "some trials [that he made] on a piece of *Lignum fossile* shewn to the Royal Society, by the eminently Ingenious and Learned Physician, Doctor *Ent*, who receiv'd it for a Present from the famous *Ingenioso Cavalliero de Pozzi*, it being one of the fairest and best pieces of *Lignum fossile* he had seen" (105-6). Cassiano dal Pozzo's Paper Museum at Rome was one of the period's most celebrated collections of art,[73] and he was also a member of the Accademia dei Lincei, a scientific academy founded at the beginning of the seventeenth century to study natural history.[74] In recounting the impressive origin of the natural object upon which he

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[72] Hooke also describes having received a specimen of the cow-itch plant from a sea captain returning from the East-Indies, 146.

[73] A catalogue raisonné of dal Pozzo's "Museo Cartaceo" or Paper Museum is currently being published; this project is based at the British Academy.

[74] For an account of the Accademia dei Lincei and its connections to museums in early modern Italy, see Findlen, *Possessing Nature*.

conducted his microscopical experiments, Hooke's work is connected with the early modern museum and, at the same time, he identifies for readers one of the Royal Society's continental precursors. In his treatment of zoophytes, Hooke describes a sponge preserved in the Musaeum Harveanum at the College of Physicians in London,[75] (138) and in his series of observations about the beard of the wild oat, he notes that della Porta also includes an account of this vegetable curiosity in his *Natural Magic* (149). Taken together, Hooke's allusions to the encyclopedic projects of dal Pozzo and della Porta, and his reliance upon cabinet objects for his observations tie the *Micrographia* to the early modern culture of collecting.[76]

If, on the surface, Hooke was critical of the ways in which the museum was emerging as a form of popular entertainment, the *Micrographia* testified to its author's own participation in the culture of wonder. Included in the treatise are several references to travelling circuses and public exhibitions. In his observations about different kinds of hair, for example, Hooke discusses animal fur: "I observ'd...the hair of a *Greenland* Deer, which being brought alive to *London*, I had the opportunity of viewing; its hair was so exceeding thick, long and soft, that I could hardly with my hand, grasp or take hold of his skin, and it seem'd so exceeding warm, as I had never met with any before" (160).

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[75] For this collection, see C. E. Newman, "New Light on the Musaeum Harveianum," *Journal of the Royal College of Physicians* 12 (1978): 262-71.

[76] Hooke underscores the relationship between natural history and the great collecting enterprises of the period when, in his exploration of fossils, he writes: "It were therefore very desirable, that a good collection of such kind of figur'd stones were collected; and as many particulars, circumstances, and informations collected with them as could be obtained, that from such a History of Observations well rang'd, examin'd and digested, the true original or production of all those kinds of stones might be perfectly and surely known; such as are *Thunderstones*, *Lapides Stellares*, *Lapides Judaici*, and multitudes of other, whereof mention is made in *Aldrovandus*, *Wormius*, and other Writers of Minerals," 112. In fact, Robert Plot was to answer Hooke's call and to assemble at Oxford a comprehensive collection of such figured stones out of which he produced his discussion of the topic in his *Natural History of Oxfordshire*. However, whereas Hooke concludes that such stones were the remains of organisms, Plot argues that they were formed by some "sportive *plastic power* of the Earth," 132. For an account of Hooke's geological theories, see David R. Oldroyd, "Geological Controversy in the Seventeenth Century: 'Hooke vs Wallis' and Its Aftermath," *Robert Hooke: New Studies*, 207-33.

Hooke's obvious delight in encountering this strange creature and his incorporation of the knowledge he gained by witnessing this spectacle show the ways in which the experimental philosophy practiced by the early Royal Society was a combination of what we would term "high" and "low" culture. Later in the *Micrographia*, when writing of the structure of the teeth of snails, Hooke makes the following comparison: "I have never met with any kind of Animal whose teeth are all join'd in one, save onely that I lately observ'd, that all the teeth of a Rhinocerus, which grow on either side of its mouth, are join'd into one large bone, the weight of one of which I found to be neer eleven pound *Haverdupois*" (181). While Hooke does not mention that he saw the rhinoceros at a travelling circus, we know from Evelyn's diary one of these creatures was brought to London in 1684 by merchants of the East India Company.[77] Hooke's calculation of the weight of the rhinoceros tooth may have been simply an estimate or determined by examining one of the many objects preserved in cabinets with this label.[78] A third example of Hooke's engagement with the more popular culture of curiosity comes in his account of the gnat. The upside-down posture that these insects assume when at rest, he explains, "put [him] in mind of a certain creature [he saw] in *London*, that was brought out of *America*, which would very firmly suspend it self by the tail, with the head downwards, and was said to sleep in that posture, with her young ones in her false belly, which is a Purse, provided by nature for the production, nutrition, and preservation of her young ones" (187). In one of his letters from the late seventeenth century, Evelyn thanks a correspondent in Virginia for an account of the opossum and indicates that he also had

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[77] *Diary* 4: 389. Evelyn mentions that on this occasion in October 1684, he also observed a "living Crocodile, brought from some of the W. Indian Ilands, in every respect resembling the Egyptian Crocodile," 390-91.

[78] For a survey of museum specimens preserved in early collections associated with Oxford, see R. T. Gunther, *Early Science in Oxford*, vol. 3 (Oxford: Printed for the Subscribers, 1925).

been present when one of these "extraordinary" creatures was exhibited in London "with her young, running in and out, of the bag, under their Mothers belly."[79] What Evelyn's letter and Hooke's opossum analogy point to is the Royal Society's characteristic accommodation in their projects of the knowledge acquired through popular forms of entertainment.[80] While Evelyn and Hooke may have looked upon such shows as opportunities to collect evidence for Baconian natural histories, it would be a mistake to assume that the pleasure they experienced at observing unfamiliar creatures was substantially different from that felt by the broader segments of the population who attended such events. At the moment that they gazed upon an animal from the New World or Africa, members of both groups were foremost consumers in the curiosity market.

Another way in which Hooke negotiates the model of the museum is by actually depicting the physical features of certain natural phenomena as devices of wonder. We know that Hooke developed various cameras obscura and delivered a series of lectures on light to the Royal Society; a substantial part of his career was also spent creating and improving upon existing optical instruments.[81] It is not surprising, then, to find the author theorizing, throughout the *Micrographia*, about the properties and effects of light. What is striking, for our purposes, however, is the way in which Hooke anatomizes and then recontextualizes his natural specimens, transforming them into the kinds of artificial devices usually found within the early modern cabinet of curiosities. Hooke begins his

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[79] BL Add. 78299, no. 178, Evelyn to John Walker; this letter is misdated in Evelyn's letter copybook and is probably from the 1680s. For an exploration of the opossum in the early modern period, see Susan Scott Parrish, "The Female Opossum and the Nature of the New World," *William and Mary Quarterly*, 3rd ser. 54 (1997): 475-514.

[80] For travelling circuses, see Altick, *The Shows of London* and Benedict, *Curiosity*.

[81] For Hooke's work on optics see, for example, A. D. C. Simpson's essay, "Robert Hooke and Practical Optics: Technical Support at a Scientific Frontier," *Robert Hooke: New Studies*, 33-61.

account of the grey drone-fly in the following manner: "I took a large grey *Drone-Fly*, that had a large head, but a small and slender body in proportion to it, and cutting off its head, I fix'd it with the forepart or face upwards upon my Object Plate" (175). The fly's decapitation by Hooke (it hardly needs pointing out) is far from the image he presented earlier in the treatise of the microscopist "quietly peeping in at the windows" of nature; in fact, the author's "object plate" functions as a site of dissection. Covering the head of the fly, observes Hooke, is "a multitude of small hemispheres" (175); each one of these "hemispheres" or "pearls" functions as a "perfect eye" (178). Hooke's narrative about the optical properties of these structures, which forcefully communicates the theme visual empire, also forges yet another link between his project and the cabinet of curiosities:

> So was the surface [of each of the fly's hemispheres] exceeding smooth and regular, reflecting as exact, regular, and perfect an Image of any Object from the surface of them...much like the reflection from the outside of Water, Glass, Crystal, &c. In so much that in each of these *Hemispheres*, I have been able to discover a Land-scape of those things which lay before my window, one thing of which was a large Tree, whose trunk and top I could plainly discover, as I could also the parts of my window, and my hand and fingers, if I held it between the Window and the Object." (175-76)

Later in the *Micrographia*, Hooke provides an account of the hunting spider that echoes his description of the drone fly. The surface of the spider's eyes, he writes, "was very black, sphaerical, purely polish'd, reflecting a very cleer and distinct Image of all the ambient objects, such as a window, a man's hand, a white Paper, or the like" (200). For Hooke, then, the optical organs of these insects could be used to satisfy the emerging appetite for the curious. Like the portable camera obscura that he constructed and the similar device that Bargrave purchased at Vienna, and with which the canon entertained visitors in his rooms at Canterbury, the reflecting "hemispheres" of the fly furnished surprising and pleasing views of objects; they permitted the microscopist to create optical

illusions, manipulate perspective, and to "bring the world inside." The allusions that Hooke makes here to the devices of wonder associated with cabinets formed part of his attempt to enlist the support of the English gentry for the Royal Society's projects. By demonstrating the ways in which the eyes of such common creatures as the drone-fly and the hunting spider could provide the naturalist with an endless source of curious images, Hooke reinforced his argument about the experimental use of the microscope as a form of gentlemanly recreation.

Hooke's representation of the eye of the drone-fly as a device of wonder and his ingenious comparison of the gnat to the American opossum both serve as apt illustrations of the way in which he made the familiar exotic. In his preface, Hooke implies that his treatise will illuminate some of reasons why his "*little Objects*, are to be compar'd to the greater and more beautiful *Works of Nature*, A Flea, a Mite, a Gnat, to an Horse, an Elephant, or a Lyon" (sig. g2^{v}). The monstrous size of the images in the *Micrographia* suggests such a change in scale. His spectacular engraving of a flea[82] literally overwhelms the accompanying text. One of the primary aims, then, of the *Micrographia* was to produce wonder by disturbing existing hierarchies. Hooke admits that the Royal Society has demontrated an appetite for collecting curiosities, but he stresses that it is the familiar instances of nature that are the most instructive: "[The Society's Fellows] do indeed neglect no opportunity to bring all the *rare* things of Remote Countries within the compass of their knowledge and practice. But they still acknowledg their *most useful* Informations to arise from *common* things" (sig. g1^{r}). Seeking to establish the importance of ordinary phenomena for the study of nature, Hooke interrogates the conceptual processes by which one determines the beauty of an object. What the

[82] *Micrographia*, Flea, scheme 34.

microscope reveals, he explains, are the many imperfections of art: "For the Productions of art are such rude mis-shapen things, that when view'd with a *Microscope*, there is little else observable, but their deformity" (8). Taking as an example the point of a needle, Hooke details the numerous "inequalities" (2) in the object's construction that are exposed by the microscope. There is little purpose in applying the power of the microscope to such artificial productions because they were "design'd for no higher a use, then what we were able to view with our naked eye" (8). The objects of nature, however, writes Hooke, "some so small, and so curious, and their design'd business so far remov'd beyond the reach of our sight, that the more we magnify the object, the more excellencies and mysteries do appear" (8).[83] Here, Hooke puts forward the familiar argument that a closer investigation of nature – "reading the book of nature" – was a devotional exercise, a means by which to appreciate God's handiwork. He also situates the *Micrographia* in relation to the doctrines of Epicurus whose followers, asserts Hooke, must not have closely examined natural bodies when they "ascrib'd those things to the production of chance" (177). Echoing through Hooke's treatise is the refrain "Nature does nothing in vain" (112); the microscope served as a tool to acquaint oneself with the providence of nature.

In addition, the passages above are crucial because they embody an attitude towards artificial objects that is severely undermined in the course of the treatise. Hooke is convinced that figur'd stones could not possibly be the result of a "Plastick virtue" because it would be "contrary to that Great Wisdom of Nature, that these prettily shap'd bodies should have all those curious Figures and contrivances...generated...for no higher

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[83] Swift, however, read magnified nature as disgusting and flawed. See, for example, Gulliver's description of the Brobdingnagian women's skin, *Gulliver's Travels*, Book 2, chapter 5.

end then onely to exhibite such a form" (112). After having illustrated the wonderful intricacies of various natural phenomena in the *Micrographia*, Hooke's mission was that of demonstrating the function of such curious designs; it is the utility of these contrivances, he argues, that renders them so admirable. He remarks about the scales of the sole fish: "[Here] Nature follows its usual method, framing all parts so, as that they are both usefull and ornamental in all its composures, mingling *utile* and *dulce* together" (162). Hooke's critique of the objects fashioned by human ingenuity is based upon their inherent imperfections in form. What his discussion of formed stones also points to, however, is an ambivalence about the merely aesthetic. While he will not concede that any of the objects of nature were created simply to please the eye and to delight the curiosity, mankind's desire to multiply the range of goods available finds expression in his treatise. The comparisons that Hooke relies upon to communicate the "excellencies" of nature are rooted in the material culture of the later seventeenth century. When portraying nature's handiwork, he returns continually to the new consumer goods invented to satisfy the taste for novelty. In his preface, he rehearses the Royal Society's commitment to the improvement of the trades and makes reference to the Lectureship on the mechanical arts that Sir John Cutler endowed for him (sig. g1^{v}). While the *Micrographia* is not normally associated with the Society's History of Trades, I would argue that it should be situated in this context, especially when we consider the sections of the treatise that Hooke devotes to such trades as the manufacturing of silk and cloth dyeing.

As we saw in the last chapter, the Society's research for a Baconian history of the mechanical arts was shaped by the emerging discourses of consumerism. Oldenburg's

journal served as a repository for knowledge about ancient and exotic trades – an archive of materials out of which, it was hoped, new consumer goods would be invented. In filling the pages of the *Micrographia* with images of material culture, Hooke connects his treatise with the Society's research into the trades. Despite his assertion that it is not worth subjecting the productions of art to the microscope, Hooke presents his readers with a series of observations of textiles.[84] With the microscope he examines pieces of fine linen, taffeta, and silk (5-10). He also advances what was probably one of the earliest proposals for the production of artificial silk[85]; with the benefits of inventing such a substance so obvious, Hooke hopes that "some Ingenious inquisitive Person" (7) will soon conduct experimental trials in this area. The dyeing of materials is a subject to which he returns frequently in the treatise, telling readers that he has compiled many observations on this topic. It is, he explains, the finding of a "fluid *vehicle* that has some congruity, both to the body to be insinuated, and to the body into whose pores you would have the other convey'd...[that is] the great mystery of staining, several sorts of bodies, as Marble, Woods, Bones, &c. and of Dying Silks, Cloaths, Wools, Feathers, &c." (145). These examples help to establish the *Micrographia*'s ties to the Society's History of Trades; they also speak to the quest, in the period, for novelty in material things. What Hooke wishes to project in his treatise is the image of nature as an endless source of curiosities; as he phrases it, "so prodigiously various are the works of the Creator..."

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[84] In her study of Hooke, 'Epinasse discusses Hooke's numerous visits to the Moorfields factory of Barret, a textile producer, *Robert Hooke*, 149.

[85] Of this project, Hooke writes the following: "I have often thought, that probably there might be a way found out, to make an artificial glutinous composition, much resembling, if not full as good, nay better, then that Excrement, or whatever other substance it be out of which, the Silk-worm wire-draws his clew," 7.

(135). The author's focus often shifts, however, to the ways, such as dyeing, that mankind has discovered to produce diversity.

In order to translate the "excellencies" of nature to his readers, Hooke makes reference to the kinds of commodities that we closely associate with the origins of consumerism. Searching for a way to capture the texture of a type of English mushroom, Hooke offers the following analogy: "I found it to be made of an exceeding delicate texture: For the substance of it feels, and looks to the naked eye, and may be stretch'd any way, exactly like a very fine piece of *Chamois* Leather, or wash'd Leather..." (139). Similarly, when describing the tiny feathers which cover the wings of several species of flies, we find the author makes this comparison: "those feathers are likewise so admirably and delicately rang'd, as to compose very fine flourishings and ornamental paintings, like *Turkie* and *Persian* Carpets, but of far more surpassing beauty" (174). We encounter a further instance of Hooke's drawing upon the productions of visual art to represent his specimens when he writes of the seeds of thyme: "The Grain affords a very pretty Object for the *Microscope*, namely, a Dish of Lemmons plac'd in a very little room" (153). By noting the resemblance between these seeds and dried lemons or oranges (153), and by presenting a magnified image of them,[86] Hooke alludes here to Dutch still-life painting – a genre that negotiated commodity culture in complex ways.[87] Embedded in the *Micrographia*, then, are not only a host of actual consumer goods, but also the values that drove this emerging propensity to acquire new material objects. Given that his treatise was intended to appeal to the English gentry, it is understandable

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[86] *Micrographia*, Seeds of Thyme, scheme 18.

[87] For the relationship between Dutch still-life painting and the culture of consumption, see Simon Schama, "Perishable Commodities: Dutch Still-Life Painting and the 'Empire of Things,'" *Consumption and the World of Goods*, 478-88. Here, Schama examines the ways in which the Dutch "pronck" still-life painting becomes one of the luxuries it seeks to "anthologize," 478.

that Hooke would scatter through his treatise images of desirable goods; new kinds of textiles and productions of visual art from the continent provided the author with a convenient frame of reference for promoting the use of the microscope among the leisured classes.

While Hooke's account of the feathers of flies depicts art as merely an imitation of nature, in other places in the treatise we find, as was the case in Virgil's fourth *Eclogue*, images of nature derived from the world of commerce. In his discussion of the poppy, Hooke reveals his difficulty with performing a reading of a natural object that is not somehow implicated in the discourse of consumerism. Invoking the doctrine of signatures, he speculates that "Nature does seem to hint some very notable virtue or excellency in this Plant from the curiosity it has bestow'd upon it. First, in its flower, it is of the highest Scarlet-Dye, which is indeed the prime and chiefest colour, and has been in all Ages of the world most highly esteem'd..." (155). What Hooke suggests here is that nature signaled to mankind, through the poppy's bright hue, that this species had medicinal virtues. The reference to the value that societies have historically ascribed to red dye violates, however, the chronology of his narrative. The author of the *Micrographia* is, in essence, mapping commodity culture upon natural objects. Before their images appear in the leaves of his treatise, his natural specimens have already been subjected to multiple readings; they have been viewed as "particulars" for Baconian natural histories, anatomized through the microscope, and interpreted using economic frameworks. Neither is their visual representation the final stage of their recontextualization and commodification. Within the literary sphere, these textual and visual representations of nature are multiplied, circulated, and consumed by readers.

Hooke concludes his description of thyme seeds by speculating further about the ways in which knowledge of such "mechanisms" and "contrivances" might enable one to attain an Adamic apprehension of nature: "And who knows, but the Creator may, in those characters, have written and engraven many of his most mysterious designs and counsels, and given man a capacity, which, assisted with diligence and industry, may be able to read and understand them" (154). While reinforcing his representation of the microscope as an instrument by which to reverse the Fall, Hooke also self-consciously underscores his own intellectual and mechanical ingenuity. His reference to the Creator's occult "engravings" foregrounds the technical brilliance of the *Micrographia*.[88] Readers are urged by Hooke to interpret his treatise as a work of almost divine revelation.

Conclusion

In this chapter, I have explored the ways in which some of writings of the early Royal Society focused upon the inscription of nature. The grafting of the pear upon the white thorn, the transplantation of spices, and the mapping of the geography of the blue fly were, in the seventeenth century, the micro-acts of empire-building. In order to demonstrate the links between the new science and the origins of consumerism, I considered how Virgil's *Georgics* served as an authority for the Royal Society's horticultural experimentation. In Beale's "hortulan" reports and in the articles in the *Philosophical Transactions* about gardening, we find the Virgilian value of variety becoming associated with the wider pursuit of novelty in material things. Beale's lesser-

[88] The above passage in Hooke, which draws attention to the artistic medium through which he presented his observations, may also have been intended to interest gentlemen in the art of engraving. Three years before the *Micrographia* was published, Evelyn brought out his treatise on engraving, *Sculptura* (1662), as part of his work for a history of trades.

known writings about transplantation and Hooke's famous *Micrographia* must be regarded, then, not only as attempts to establish an empire over nature, but also as unique contributions to the literary culture of consumerism.

Conclusion

In this thesis, I have attempted to demonstrate the interdependence of objects and texts in the seventeenth century. A crucial relationship exists between the genre of writings produced by members of the early Royal Society and the emerging discourses of consumerism. Various textual forms – the *hortus siccus*, the correspondence network, the list of queries, and the periodical – were developed in response to this growing taste for novelty. In his "Discourse of Earthquakes," Hooke crystallizes for us this textual negotiation of the early modern culture of collecting:

> It were therefore much to be wishht for and indeavoured that there might be made and kept in some Repository as full and compleat a Collection of all varieties of Natural Bodies as could be obtain'd, where an Inquirer might be able to have recourse, where he might peruse, and turn over, and spell, and read the Book of Nature, and observe the *Orthography*, *Etymologiae*, *Syntaxis*, and *Prosodia* of Natures Grammar, and by which, as with a *Dictionary*, he might readily turn to and find the true Figure, Composition, Derivation and Use of the Characters, Words, Phrases and Sentences of Nature written with indelible, and most exact, and most expressive Letters, without which Books it will be very difficult to be thoroughly a *Literatus* in the Language and Sense of Nature."[1]

What Hooke stresses here is the unique function of the collection for producing "readings" of nature. In the works of Evelyn, Oldenburg, and Hooke we encounter this interplay between the object and the book. By focusing upon some of the less familiar pieces of seventeenth-century prose, I tried to recover aspects of a culture that are usually reduced to an editorial footnote. In treating Beale's "hortulan" reports about transplantation and grafting and illustrating the ways in which they reformulated Virgilian values of variety, I have provided some context in which to interpret such literary examples as Marvell's image of the "curious peach."[2] My examination of Bacon's scheme for a History of Trades and the various texts it produced would, I hope,

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[1] *Posthumous Works*, 338.
[2] In his poem, "The Garden."

assist us in understanding why, for example, Milton chose to compare the flowers of Eden to "wrought mosaic."[3] His description of the "Violet, Crocus, and Hyacinth with rich inlay / [Broidering] the ground, more color'd than with stone / Of costliest Emblem"[4] clearly recalls the *pietra commessa* with which Evelyn became fascinated on the continent. This passage from *Paradise Lost* functions, then, at least in part, as a poetic translation of knowledge about the trades – the kind of information that became circulated and consumed within the sphere of the early Royal Society. Hooke's apology for cabinets of curiosities, in which the museum is championed as a tool for investigating God's handiwork, urges us to consider the textuality of objects. What I have argued in the course of the thesis is that collecting culture was also created and sustained by such encyclopedic genres as the *cento*; without private epistolary networks and publications like the *Philosophical Transactions*, individuals and institutions would not have had repositories in which to preserve and display their newly acquired goods – material and intellectual.

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[3] *Paradise Lost* 4: 699-700, *John Milton: Complete Poems and Major Prose.*
[4] *Paradise Lost* 4: 700-3.

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