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17世纪的自然哲学猜想和植物移植项目:茜草的案例(染色茜草)

Natural Philosophical Conjectures and Projects of Botanical Transplantation in the Seventeenth Century: The Case of Madder (*Rubia Tinctorum*)

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摘要: 近些年, 科学史中的园艺学和植物园受到越来越多的关注。从博物学的角度看, 这是一种近十年来颇受关注的知识形态, 用于解释近代科学的、定性的、活力论的自然科学到18世纪机械物质观和生物分类议题的转变。许多研究18世纪的历史学家特别提出, 作为全球生物分类枢纽, 植物园为殖民科学和帝国管理而服务。本文论证了在早期现代的植物学项目中, 包括殖民地的植物学项目, 自然哲学持续的重要性以及自然法术和炼金术日益增长的重要性。本文强调, 在此期间自然哲学猜想的不确定性支持某种促进知识的观点, 即增加人类驾驭自然和世界的需要冒着巨大的风险。

关键词: 移植 炼金术 皇家学会 殖民主义 植物园

Abstract: Horticulture and gardens have received increasing attention in the history of science in recent years. Often this has been from the perspective of natural history, a form of knowledge that has been given a great deal of attention in recent decades as a way to explain a shift from qualitative and vitalist natural philosophies of premodern science to mechanical views of matter and taxonomic agendas of the eighteenth century. Many historians of the eighteenth century in particular have pointed to gardens as global taxonomic hubs in service to colonial science and the administration of empire. This essay argues for the continuing importance of natural philosophy – and to the increasing importance of natural magic and alchemy – within botanical projects, including colonial ones, of early modernity. It stresses that the lack of certainty concerning many natural philosophical conjectures served in the period to support a view of advancing knowledge in which ambitious risks might be taken in order to increase the powers of humankind over nature and the world.

Key Words: Transplantation; Alchemy; Royal Society; Colonialism; Gardens

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I. Horticulture, Colonial Ambition, and Natural Philosophy

In recent years, many Anglophone historians of science have recognized gardens in early modern Europe as an important scientific site, akin and often in close relationship to the laboratory and the museum.¹⁻⁴ The first public museum in London, the “Ark”, was established by two gardeners, John Tradescant Sr. and Jr., and located within their extensive garden of global specimens.⁵ Several larger historiographical trends have contributed to this interest in the garden as a scientific site. Gardens and the study of botany have enjoyed attention as part of the huge growth in attention that natural history and collective empiricism has received in accounts of early modern science.^{6,7} Gardens, as domestic and often utilitarian spaces, have also attracted attention from the “contextualist” trend in the Anglophone history of science of the past forty years that Bernard Lightman discussed in a previous issue of this journal.⁸ They have helped to expand notions of who investigated nature in the period to include both women and men in domestic settings and knowledgeable craftspeople such as gardeners and plant collectors. Historians of eighteenth-century science have highlighted the garden as a central node in colonial exchange of scientific specimens and information, as in the case of the Chelsea Botanical Garden and later Kew.⁹⁻¹¹ The study of tubers and seeds has also offered historians of science avenues towards global and decolonized histories of science, including stories of attempted colonial agendas such as bioprospecting and plant transfer that ended in frequent failure.¹²⁻¹⁴ As Sarah Easterby-Smith has written, “[w]hether one seeks to understand either the many cross-cultural influences that shaped what we now consider to be modern science, or to understand the diverse and globally disparate social worlds that surrounded and created multiple scientific practices, it is important to focus on contingencies-or, in other words, to give as much space to the history of failure as the history of success.”^①

This essay likewise focuses on an instance of failure in a grand agricultural project of transplantation. However, it argues that the failure can not only be located in microhistories of practice. In other words, failure was not only contingent upon the many practical difficulties of transferring plants and seeds reliably across long distances within what appear superficially and from afar to be relatively commonsensical botanical projects. Rather, failure can also be studied in relation to changing epistemic values and ambitions in early modernity which supported new kinds of conjectures.¹⁵ Such values and ambitions were informed by colonial practices that characterized the dynamics of advancing knowledge as ventures towards distant goals and targets and which positioned experimentation in relation to great unknowns. They encouraged epistemic risk-taking. Coupled with a belief in the power of advancing knowledge to transform human power over nature, they also spurred somewhat hasty extrapolation from epistemic conjectures to real-world applications. In short, new scientific values of early modernity undergirded ambitious projects that veered purposefully away from commonsensical and practical approaches and toward the seemingly impossible.

This essay looks at the attempted application in a large-scale project of the ambitious notion that transplantation bore the power to change the species of a plant. Thus, this scheme relates to the area of botany that has not been emphasized in the recent historiography, that is, the role that gardens played not in natural history, but in the more abstruse theorizing of natural philosophy. This perspective has been largely ignored in the history of horticulture and agriculture since frequently the entire attraction of gardens as a topic in the history of science has been to offer a more “hands-on” and practical view of science. Yet, as Fabrizio Baldassarri has pointed out in a recent *Nuncius* issue, from the sixteenth-century onwards plants became increasingly central areas of grand philosophical investigation in topics such as generation, life, and change.¹⁶

These investigations often included intensive,

① Easterby-Smith, “Recalcitrant Seeds,” 241.

hands-on manipulation of plants in ways that went against the normal course of nature. More extreme garden experiments of the time included preternatural attempts to graft many types of trees together, to infuse soils and plants with many chemicals and elixirs, to grow plants without soil at all, to revive plants from their ashes (palingenesis), to investigate the relationship between plants and planetary influence, to explore apparent sympathies and antipathies or the apparent sensation of plants (such as exhibited by the herba mimosa that responded to touch) and to transform the size, shape, color, smell and taste of plants.¹⁷⁻¹⁹ These all fell under the rubric of “natural magic” in the period, a category of combined knowledge and practice that played a large role in views of experimentation in early modernity.²⁰

It may seem easy to dismiss such garden attempts as “pseudo-science.” However, the recent history of alchemy has shown us how much practices that have been dismissed in the past as superstitious were formative for experimental science. Moreover, what to our eyes might appear to be irrational, flighty, or ridiculously ambitious experiments might serve as an indication of skepticism concerning received knowledge. Those wishing to “enlarge the bounds of human empire, to the effecting of all things possible,” as was the stated aim of Salomon’s House in Bacon’s *New Atlantis*, aimed to test precisely those phenomena and abilities that were assumed to be beyond the edges of possibility.²¹

The relationship between gardening and empire, as pointed out above, has long been explored by scholars, but often in more apparently commonsensical and realizable projects, such as acclimatizing plants, selecting variants that might succeed agriculturally, global bioprospecting, or developing other practical agricultural techniques. Natural philosophical botanical speculation, I argue, situated often purposefully at the ends of the human ability to transform matter, also had a role to play in some concepts and practices that were central to colonial science. Gardens were prized as experimental spaces in England precisely because, in contrast to farm fields, for example, they were spaces of whimsy and imagination where some very odd things were tried that might challenge received ideas concerning the borders of human ability and thus advance human

power over nature.²²

Transplantation played an obviously central role in colonial plantations, which not only were often metaphorically related to the transplanting of plants, but which also actually transplanted people, animals and plants around the world on an enormous scale.²³ Ancient writers on plants, medieval and early modern travel narratives, and early modern natural philosophers offered views on the ways that transplantation might transform nature in ways that were more radical than the agricultural concepts, such as acclimatization, with which we might be most familiar today. They argued that the very act of transplantation itself was efficacious in transforming plants, regardless of the environment to which they were transplanted. Handling the plant in the process of transplantation could domesticate it, just as animals were tamed through handling. These notions of transplantation-which sources in the period framed as operating in changing the nature of plants, animals and humans - have largely been ignored in the literature on the large-scale movement of people and resources in the eras of global colonialism and enslavement.

By connecting horticultural investigations into transplantation with other forms of preternatural experimentation, such as natural magic and alchemy, this essay attempts to disrupt facile binary dichotomies between Renaissance magic and taxonomic Restoration science that botany and gardening have at times helped to construct. For instance, for Michel Foucault the garden offered a key site for the replacement of a cosmos shaped by emblematic significance and magical sympathies by “light spaces where things are juxtaposed: herbaria, collections, gardens.”²⁴ The major garden historian, Roy Strong, characterized a shift in garden design in the seventeenth century as a sign of how the “magical world of the late Renaissance, with its preoccupation with occult forces and influences, gives way to the age of experiment and of the Royal Society.”²⁵ In *Nature’s Government*, Richard Drayton saw pre-1650 gardens as part of an outdated alchemical world view, supplanted by the “successes of mathematics, astronomy, and the physical sciences in the hands of Galileo, Descartes, Huygens, Hooke, Boyle, and Newton,” who “encouraged the search for a ‘mechanical account’ of all natural processes” and

whose botanical colleagues in the late seventeenth century “pursued rational processes rather than occult powers.”^① Given that the alchemical interests of figures such as Boyle and Newton have been extremely well documented, this binary opposition between mechanical science on the one hand and alchemy and magic on the other can no longer be supported. Gardens, as sites of investigations into *living* nature, offer a premier site to explore how vitalism endured through the early modern period. They allow us to continue to investigate more precisely the developing contours of the relationship between vitalism and mechanism, as alchemy and corpuscular natural philosophy continued to evolve and inform one another in tandem with the latest laboratory and garden experiments.

Many seventeenth-century garden experimenters, including Fellows of the Royal Society, drew on often very ancient theories of transmutation in their experiments. Here I focus on one botanical concept (transplantation) and the role it played in one agricultural project (the development of a plantation for the red dye, madder or *rubia tinctorum*) by one figure (Sir Nicholas Crispe, ca. 1599-1666). Crispe, a global merchant and privateer, was an early member of the Royal Society and a very active participant in early English colonial efforts (via joint-stock companies) in Southeast Asia, West Africa, and the Caribbean. His trade often involved dyestuffs such as indigo, logwood, and redwood. Crispe attempted to establish his madder plantation domestically, but it would have had in the period an implicit relationship to colonial projects. The establishment of madder plantations was very frequently listed among the objectives of English colonies.^② Crispe often used his domestic estates (where he engaged in extensive dyeing, glass bead production, brick and tile-making and other industries) as an experimental ground for global empire. It was on his riverside estate in Hammersmith that he framed up the castle Kormantin that he built in Ghana, where it would serve as a

center of English and (after its capture) later Dutch slave-trading. Finally, in his efforts to establish an English madder industry, Crispe aimed at undercutting the Dutch madder industry. This was part of his and other English merchants' commercial antagonism with the Dutch that were playing out at the time both in business practices and in the Anglo-Dutch wars.²⁶

As discussed by economic historians such as Joan Thirsk, the Dutch dominated the madder industry because of their superior access to the capital necessary for this trade. Since madder roots stayed underground for at least three years before harvest, at any which point they might be subject to rot and crop failure, madder was a high-risk, long-term investment. The Dutch also maintained trade secrets, such as the development of the best varieties of madder for dyeing and of the best designs for the ovens required to dry madder roots in the creation of the dyestuffs. Commercial spies in the early seventeenth century, such as George Mynne and George Bedford, sought to secure this knowledge from the Netherlands in order to establish the industry in England.²⁷ Crispe, however, abjured this commonsensical approach. As an individual with pretensions to philosophical knowledge and experimental practice, Crispe sought a more epistemically ambitious means of competing with the Dutch made merchants' superior financial and intellectual capital.

The history of science and its attention to matter theory of the period can offer insights into the ways that garden experiments in phenomena of preternatural change supported Crispe's ambitions. Francis Bacon frequently argued that human powers over nature could only be expanded racially if well-beaten trails were abandoned and experimenters were willing to venture into less obvious paths. Guns, silk-making, and the compass all offered examples of inventions “of a kind that before their discovery the least suspicion of them would scarcely have crossed anyone's mind, but a man would simply have dismissed them as impossible.”²⁸ Likewise, wrote Bacon, many things stood “well off

① Drayton, *Nature's Government*, 20.

② Colonists frequently recommended the founding of madder plantations in Virginia. Thomas Harriot, *A Briefe and True Report of the New Found Land of Virginia*, London: 1588, [B4v]. One projector sought to establish a madder plantation on Providence Island in the Caribbean in 1633. W. Noel Sainsbury, ed., *Calendar of State Papers, Colonial Series, 1574-1660*, London: Longman, 1860, 159, 162-4.

the beaten track of fancy and are still undiscovered.”^①

II. The Ancient Sources on Transplantation

Ancient Greek and Roman philosophers and natural historians supported the power of small-scale transplantation. Theophrastus wondered about the causes of domestication. He suggested that this might be due to cultivation itself—such as through the act of transplanting—but he also debated whether this could be said to be truly a change in kind.

Plainly some wild things become cultivated and some cultivated things become wild: for the one kind of change is due to cultivation, the other to neglect—however it might be said that this is not a change but a natural development towards a better or an inferior form; (for that it is not possible to make a wild olive pear or fig into a cultivated olive pear or fig). As to that indeed which is said to occur in the case of the wild olive, that if the tree is transplanted with its topgrowth entire cut off, it produces “coarse olives,” this is no very great change^②.

Pliny the Elder was far less hesitant. For him it was clearly the case that transplantation could civilize wild plants in wonderful ways, although he left open several possible causes for this change; “removal” had “a marvelously civilizing effect even on wild trees, whether it be the case that, like human beings, trees also have a nature that is greedy for novelty and travel, or whether on going away they leave their

venom behind when the plant is torn up from the root, and like animals are tamed by handling.”²⁹

Neither Theophrastus nor Pliny advised long-distance transplantation. They argued that plants transplanted over a long distance often became infertile^③. Furthermore, other ancient authorities argued that transplanting always tended to reduce the vigor of a plant. In writing about inconstancy, the Stoic philosopher Seneca the Younger claimed that a plant which is often transplanted never grows strong, an idea which became a commonplace among NeoStoics in the early modern period^④.

III. Early Modern Sources

In contrast to Theophrastus and Pliny, early modern sources often emphasized the efficacy of long-distance transplantation. In particular, they stressed, against Seneca’s views, the idea that *frequent* transplantation could domesticate wild plants, even on a global scale. Early modern travel accounts turned to global transplantation to explain why overseas plants seemed similar to, but also different from, European species. According to José d’Acosta (circa 1540-1600), discussing fruits of Peru in 1590, they “seem to many, to be the same kinde of nuttes we have in Spaine; yea, they say, if they were *often* [emphasis mine] transplanted from place to place, they would carry nuttes altogether like to those of Spaine. And the reason why the fruite is so unpleasant, is, for that they are wilde.”^⑤

Notably, early modern European observers

① Francis Bacon, *The Oxford Francis Bacon, Vol 11*, 169.

② Theophrastus, *Enquiry into Plants*, trans. Arthur Hort (London: Heinemann, 1916), 2:12; p.119. Discussed in Jared Secord, “Overcoming environmental determinism,” *The Routledge Handbook of Identity and the Environment in the Classical and Medieval Worlds* (London: Routledge, 2016), 215.

③ L. M. V. Totelin, “Whose Fault is it anyway? Plant Infertility in Antiquity,” *The Palgrave Handbook of Infertility in History: Approaches, Contexts and Perspectives*, ed. Gayle Davis and Tracey Loughran, London: Palgrave Macmillan, 2017, 62. Theophrastus, *Enquiry into Plants*, 2:9; p.117. “So too is it when fruit-bearing trees become unfruitful, for instance the persion when moved from Egypt, the date-palm when planted in Hellas or the tree which is called poplar in Crete, if anyone should transplant it.”

④ Seneca, “Ad Lucilium epistolae,” *Opera Omnia*, vol. 1, amsterdam: Jan Jansson, 1633, 272. “Non conualescit planta quae saepe transfertur.” W. W., *Morall Observations*, London: Alde, 1616, [A4v]. “A Plant often transplanted, seldome prospers; and a multitude of bookes, distract the minde.”

⑤ José de Acosta, *The Naturall and Morall Historie of the East and West Indies*, London: Aspley, 1604), 280. This is found in the original *Historia Natural y Moral de las Indias*, Seville: Juan de Leon, 1590, 258. “y aun dizen, que si los traspusiessen de unas partas a otras a menudo, que vernian a dar la nuezes al mismo modo que las de Espana, porque por ser silvestres dan la fruta assi, q. apenas se pue de gozar.”

did not consider domestication via selection and transplantation as an exclusively European form of knowledge. In his 1516 *On the New World*, Peter Martyr D'Anghiera (1457-1526) had reported on the transplantation of wild plants and the transformation of them into a garden variety as a matter of long-term, indigenous Taino experimentation with domesticating wild plants in the Caribbean. d'Anghiera writes,

It is said that the first inhabitants of the islands lived for a long time upon roots and palms and magueys. ... but after the course of many years, a bovite, that is, an old wise man, saw a shrub similar to fennel growing upon a bank, and uprooting it from there, made a garden variety out of a wild one. ... In the same way, other roots and maize were selected by them from among the seeds of nature^①.

The Elizabethan alchemist and colonial promoter Richard Eden (circa 1520-1576) translated this passage from d'Anghiera in an English compilation of d'Anghiera's account of Americas and the account of Asia previously published by Ludovico de Varthema (circa 1470-1517) in Italian.³⁰ In Eden's translation of de Varthema's section on the "Fruits of Calecut," that is, present-day Kerala, Eden raised a natural philosophical question that was not found in de Varthema's original. Eden left it to the "natural Philosopher" to "consider... by which natural cause, & alteration, some fruites and seedes, by transplanting into a better soile, become more perfect in their kind, as bigger, fayrer, sweeter, and more frutifull: As also contrariwise, the contrary, by transplantyng into a worse soile, or colder region: which diversitie is seene, not only in plantes and hearbes, but also in beastes, and even in man kynd."^② Eden emphasized that this

transformation could be seen in animals and humans as well as in plants.

Thus, in such texts, not only could practices of transplantation be found around the world, but they were also efficacious across the world. The views of Theophrastus or Pliny that long-distance transplantation might lead to infertility make little appearance. For example, in his *Natural Magic*, the Neapolitan polymath Giambattista della Porta (1535-1615) cited one of Theophrastus's views on transplantation, namely that colorful plants that were not transplanted would turn white, not only in the case of cultivated flowers, but even wild plants "that grow in Woods and Forrests unregarded."³¹ Drawing as he often did upon della Porta, Francis Bacon likewise noted that it "is observed by some, that gilly-flowers, sweet-williams, Violets, that are Coloured, if they be neglected and neither watered, nor new Moulded, nor Transplanted will turne white."³² Yet neither della Porta nor Bacon cited Theophrastus's other views that transplantation might lead to infertility.

Across many works, Bacon consistently praised the virtues of transplantation for imparting vigor, writing, "Plants live longer being removed and transplanted," and "no Tree is so good first set, as by transplanting, and Grafting."³³⁻³⁴ The poet John Donne expressed a strong cultural view of the time linking transplantation to increased vigor when he wrote, "A single violet transplant,/ The strength, the colour and the size, (all which before was poore, and scant,)/ Redoubles still, and multiplies."^③

While some gardeners warned about the risk to plants from transplantation, and while Neo-Stoic moralists continued to cite the Senecan commonplace that frequent transplantation prevented the flourishing of trees, other argued that multiple

① Peter Martyr d'Anghiera, *De Orbe Novo*, Alcalá: Arnald Guillén de Brocar, 1516, [hiiiiiv]. "Primos aiunt habitatores contentos vixisse diu radicibus his: palmarum puta Magueiorum.... Boitium idest sapientem senem aiunt post multa annorum curricula in unius fluminis ripa fructicem vidisse ferulae similem: inde evulsam radicem ex agresti fecit hortensem.... Idem de caeteris radicibus & maizio inter naturae semina ab ipsis electo."

② *The History of Travayle in the West and East Indies*, trans. Richard Eden, London: Jugge, 1577, This passage is not found in de Varthema's original account. Compare *Itinerario de Ludovico de Verthema*, Milan: Scinzenzeler, 1523, XXIII.

③ Donne, "The Extasie," *Poems*, 1633, 278-9. For a warning about the large percentage of die-off to expect in transplantation, see John Parkinson, on the highly valuable gilliflower. If the earth would "fall away from the roote in the transplanting, it would hazzard and endanger the roote very much, if it did thrive at all. ..." Transplanting was a last resort if the gilliflower was on the verge of death. If "the roote is infected with some cancker or rottennesse. ... [so slips must be cut off and transplanted] and although many of them may perish, yet shall you have some of them that will grow to continue the kinde againe." John Parkinson *Paradisi in Sole Paradisus Terrestris*, 1629, 18

acts of transplantation could increase a plant's vitality and were especially critical to the domestication of wild kinds^①. In a postscript to a 1622 publication sent to settlers in Virginia commanding them to set up silkworks, colonial propagandist John Ferrar, in the voice of "Nature" herself, urged colonists to repeatedly transplant wild plants, suggesting that if "every planting or removing of wild plants.. is worth halfe a grafting," then "two remoooues.. are worth a whole grafting." Ferrar also cited Pliny that "this remooouing and transplanting of wild plants, doeth wonderfully mitigate and ingentle them, whether it bee (saith he) because that the nature of plants, as of men, is desirous of nouelty and peregrination, or because that at their parting (from the former grounds) they leave there that ranke wildnesse, virulence, and ill quality that is in them, and as wild beasts, so they become gentle by handling, whilst the Plant is pluckt up by the roote."^② Likewise, later in the seventeenth century fellow of the Royal Society John Evelyn (1620-1706) attributed a civilizing influence to frequent transplantation; "By the oft removal of a *Wild-stock*, cutting the ends of the *Roots*, and dis-branching somewhat of the *Head* at every *change* of *place*, it will greatly abate of its natural *wildness*, and in time bring forth more *civil* and *ingenuous* Fruit: thus *Gillyflowers* do (by oft removals, and at *full-Moon* especially) increase and multiply the leaves."^③

Francis Bacon discussed how one might achieve the curiosity of making a double-flowering variety, "by *Oft* Remouing them into *New Earth*; As on the contrary Part, *Double Flowers*, by neglecting, and not Remouing, proue *Single* [emphasis original]."^④ Bacon

had an explanation for why frequent transplantation was effective that had nothing to do with Pliny's theory of taming through handling; he thought it might be possible that frequent transplanting gave rise to a greater crop in fruit trees or a larger size in flowers because in the act of transplanting, the soil around the plant was loosened, and so the plant could reach nourishment more easily^⑤. This, however, countered the practical advice of many gardeners that frequent transplantations could damage roots^⑥.

While transplantation to us might seem to us to be a fairly simple operation, transplantation in the period could also mean the transplantation of one natural kind into another by transplanting a specific form^⑦. The transformation of plants from one kind to another offered chief examples for this view of transplantation. Thomas Browne, in discussing "transmutation, or (as Paracelsians term it) Transplantation," saw the "transplantations" in plants as providing the most obvious examples, as in the cases of "Barley into Oats, of Wheat into Darnel; and those grains which generally arise among Corn, as Cockle, Aracus, Aegilops, and other degenerations which come up in unexpected shapes, when they want the support and maintenance of the primary and master-forms."^⑧ Views concerning the possibility of effecting a transmutation by transplanting a specific form supported medical theories concerning the possibility of transplanting diseases from humans to animals and even to plants^⑨. Samuel Hartlib recorded the views of the alchemist Johann Unmüßig on the "transplantations of strange effects in medicine."^⑩ Chymists applied these theories to their own actual transplantation of plants in order to

① Thomas Jackson, *A Treatise Containing the Originall of Unbeliefe, Misbeliefe, or Misperswasions*, London: Clarke, 1625, 462. "as crabs or wilde apples by often transplanting or engraffing grow more milde and pleasant." Obadiah Walker, *Of Education*, Oxford: 1673, "they must be (as wild Trees) often transplanted and removed into strange company."

② Ferrar, postscript to *His Maiesties Gracious Letter to the Early of Southampton, Treasurer, and to the Councell and Company of Virginia Heere: Commanding the Present Setting up of Silke Works, and Planting of Vines in Virginia*, London: Kyngston, 1622, [Mr-Mv].

③ Francis Bacon, *Sylva Sylvarum*, 134.

④ Bacon, *Sylva*, 116 and 119.

⑤ eg. William Lawson, *A New Orchard and Garden*, London: Alsop, 1618, 16 and 21.

⑥ On Petrus Severinus's views of the transplantation of species, see Jole Shackelford, *A Philosophical Path for Paracelsian Medicine: The Ideas, Intellectual Context, and Influence of Petrus Severinus (1540-1602)*, Copenhagen: Museum Tusulanum Press, 2004, 184.

⑦ For medical cures via transplantation, see Andreas Tentzel, *Medicina Diastatica, hoc est Singularis illa et Admirabilis ad Distans, & Beneficio Muliais Transplantationis Operationem & Efficaciam Habens*, Jena: Birkner, 1629. Robert Boyle, *Some Considerations of the Usefulness of Natural Philosophy*, Oxford: Hall, 1664, 224-231.

⑧ HP 31/22/22B. 31/22/25B.

produce more potent versions of medical simples^①. Alchemical views of transplantation were also deployed in agricultural projects of the period, such as in experiments with fertilizers imbued with various tinctures and "transplanted" powers. As John Beale wrote to Hartlib, it was worth trying "that mysticall operation of Paracelsus his Transplantation. .. The triall is easy by any poore persone, That can be entrusted with emptying the urine [into which specific virtues had been infused] at the rootes of these plants, eyther in field-hedges or gardens."^②

Such views were what Bacon meant when he put "Transplanting of One Species into another" on his list of *Magnalia Naturae*, that is, a wish list of the greatest aims in natural magic to which humans might aspire^③. As he extrapolated in the *Sylva sylvarum*, "This worke of the Transmutation of Plants, one into another, is inter Magnalia Naturae: For the Transmutation of Species is, in the vulgar philosophie, pronounced Impossible: And certainly, it is a thing of difficultie, and requireth deepe Search into Nature: But seeing there appeare some manifest Instances of it, the Opinion of Impossible is to be reiected; And the Meanes thereof to be found out."^④

IV. Transplantation in The Madder Project

Madder is easy to identify, grow and use for dyes; it is native to England where it had been used for dyeing since Anglo-Saxon times, and it was often grown in early Stuart gardens for medical use.³⁷⁻³⁸ However, attempts to grow it on a large scale as a dye-stuff continually failed outside the Netherlands. The knowledge surrounding madder seems to be shrouded in mystery and difficulty to a strange extent. John

Moore, writing from Ireland in 1645 noted "there are some heer which would fain plant some Madder if they knew the way of using it."^⑤ When Moore asked Hartlib for advice, Hartlib suggested that he turn to Benjamin Worsley who was also attempting to grow madder in Ireland at the time. In response, Moore complained, "I thought you had better known, then to think he would impart his secrets to any one."^⑥ It was curious that madder, an easy to grow native plant, should be the subject of such secretive knowledge. As John Ferrar noted, madder, like woad and indigo, was an easy to grow weed, and thus it should be easy to establish in global plantations^⑦. As Worsley told Hartlib, planting and growing madder was quite easy, although harvesting and milling it was not.^⑧ After it was planted, it just needed to be weeded^⑨. One professor of botany at Cambridge and fellow of the Royal Society suggested that madder's difficult reputation might even be a false rumor propagated by growers of madder in order to prevent competition^⑩.

What made Crispe-and Worsley's-madder project more difficult than it had to be was that they were opting for a particularly ambitious way of establishing a madder plantation. They did not seek to acquire expertise or proven selections of plants. Rather, they sought to deploy the transformative abilities of transplantation. Crispe's project, like many of the period, sought to identify profit in a wasted resource. He wished to send beggars around the countryside to hunt for wild madder to be transplanted to his property, where it might be transformed into dyer's madder.

As the apothecary and royal botanist John Parkinson (1567-1650) wrote in his 1640 herbal, there were two main types of madder, the "manured" or

① eg. Joseph Du Chesne, *The Practise of Chymicall, and Hermeticall Physicke*, trans. Thomas Timme, London: Creede, 1605, [P3v].

② HP 51/30A. October 15, 1658. John Beale to Samuel Hartlib.

③ "Magnalia naturae" in Bacon, *Sylva sylvarum*, unpaginated page.

④ Bacon, *Sylva Sylvarum*, 176.

⑤ M. Greengrass, M. Leslie, and M. Hannon, *The Hartlib Papers*, Sheffield: The Digital Humanities Institute, University of Sheffield, 2013, <https://www.dhi.ac.uk/hartlib> [henceforth HP], 22/27/1A.

⑥ HP 21/3A.

⑦ John Ferrar, *The Reformed Virginian Silk-worm*, ed. Samuel Hartlib, London: John Streater, 1655, 23-24.

⑧ Benjamin Worsley to Samuel Hartlib. HP 70/7A.

⑨ Charles Estienne, *Maison Rustique, or the Countrie Farme*, London: Norton, 1600, 391.

⑩ Richard Bradley, *A Survey of the Ancient Husbandry and Gardening*, London: Motte, 1725, 227. "Some say, that 'tis the Effect of Policy among those who have got the Culture of it at present, who give out, that 'tis an uncertain and expensive Crop; but for all that, are ready enough to run the Hazard of it themselves."

cultivated variety and “wild Madder.”³⁹ Both of these were “knowne that to the ancients.” Besides those, “there are at this time many other sorts found out, not knowne to them, as well of the greater as lesser kinde, some growing on mountaines, some in Medowes and pastures, and some by the seaside.” These included varieties such as “Sea Madder,” whose roote was “more red on the outside than within” and whose leaves were “more white in the naturall places, then being transplanted.” Then there were all the “smaller madders,” including “many that have been lately found out, by the diligence of painefull Herbarists or lovers of herbes, some in one Country, some in another.” Furthermore, a range of other madder-looking plants, like cleavers or bedstraw, could also be used for dyeing^①.

Walter Blithe, in his 1652 *The English Improver Improved*, identified only one kind of cultivated madder which he contrasted not with wild madders such as *rubia peregrina* or *sylvestris*, but with “many things like thereto, as goose-grass, soft Cliver, Ladies Bedshaw, Woodroof and Croswort, all which are like to Madder leaves, and are thought to be wild kinds thereof.”⁴⁰ Parkinson and other botanical authorities would in fact have identified all these not as wild madders, but as members of the *Galium* family. Blithe here speaks to an expanding conception of what might be considered wild madder, and he did so in the context of noting Crispe’s plan for a madder plantation; Blithe had heard that “Sir Nicholas Crisp is erecting a Plantation of it” at Deptford in Greenwich^②.

Writing from Dublin in 1654, Benjamin Worsley informed Samuel Hartlib about his plan to imitate Crispe’s plantation. This is the earliest source describing Crispe’s project as consisting in the gathering of wild madder in the countryside by poor people and the hoped-for transplantation of the roots to a garden.

Hearing vpon Inquiry that there was Madder grew in this Country wilde of itselفة, and that the

Rootes were very faire and good in compliance to the Example of Sir Nicholas Crispe j employed poore People abroad to gather what they could finde of it and have got a small Nursery of the Rootes in my Garden^③.

Thomas Fuller, a preacher whose biographies of “English worthies” was printed after his death, referred even more explicitly to the theory of taming through transplantation that was at play in Crispe’s project. Against those who doubted the possibility of Crispe’s success, Fuller thought his project might succeed “because *wild Madder* growes here in abundance; and why may not *Tame Madder* if *Cicurated* [tamed or broken] by Art?”^④

Crispe’s project was very large in scale. As he later claimed in a 1660 printed remonstrance to Parliament, “above a thousand persons are every day employed and fed” in his madder plantation and other projects.⁴¹ However, the practical difficulties of a large-scale project of plant transplantation alone were not the only obstacles that this project faced. Crispe designed the project based on a view of transplantation’s ability to transform wild madder into tame madder not over a long period of domestication, but instantly through the very act of transplantation itself. Furthermore, this project does not appear to have been based on a very rigorous practice of botanizing from among a selected group of varieties, such as *rubia sylvestris*. When beggars roamed the countryside searching for madder for Crispe, what were they bringing back, exactly? And could it be possible that they physically attempted to “tame” the roots in handling them, or attempted multiple transplantations?

The idea that wild madder could be transformed into garden madder through transplantation was widespread at this time. As a fellow of the Royal Society, the botanist John Ray (1627-1705) wrote in 1670, he believed that the wild and the garden variety of madder differed only in their culture, and not in

① Parkinson, *Theatrum*, 564-565.

② Blithe, 235.

③ Benjamin Worsley to Samuel Hartlib. HP 70/7A.

④ Thomas Fuller, *History of the Worthies of England*, London: Williams, 1662, 58. See also, Edward Chamberlayne, *The Present State of England*, London: Whitwood, 1683, 37, which drew on Fuller.

their species^①. Sixteen years later, he had changed his mind. As Ray wrote in his *History of Plants*: “We used to think that wild madder [*Rubia sylvestra*] differed from the cultivated madder [*sativa*, also known as *tinctorum*] through cultivation alone and the accidents to which it gave rise; now, however, having been better taught by Mr. [James] Newton [1639-1718], in a change of opinion, we recognize it as a different specificies. For *rubia sativa* dies entirely down to the ground whereas the former (as we have said) survives the winter^②.”

V. Conclusion

Newfound confidence in the transformative abilities of transplantation encouraged ambitious, large-scale and sometimes long-distance projects. These projects abjured known advice about madder cultivation in search for some more ambitious, and potentially more profitable, ways of producing the valuable dyestuff from wild weeds and the work of untrained beggars. Such views derived not from natural history nor from an appreciation for practical expertise. Rather, they were informed by natural philosophical conjectures and epistemic risk-taking. Colonial epistemic values supported the desire to reach beyond mundane practice and commonsensical approaches in order to probe the boundaries of the impossible, as Bacon had suggested.

Often, philosophically-informed, ambitious experiments at the edge of the impossible involved trials upon plants in ways that the current focus upon natural history and practical expertise has obscured. A case in point are the publications of Sir Kenelm Digby (1603-1665), Crispe’s business partner in the West African trade, fellow privateer, fellow member of the Royal Society, and an alchemist. Digby published the first work authorized by the Royal

Society, his *Discourse concerning the Vegetation of Plants*, a treatise which moved from *palingenesis*, or the resurrection of plants from their ashes, to the possibility of the resurrection of human bodies. Many other Fellows published similarly ambitious works on horticultural philosophy.^{42, 43} Such works show that gardens were the subject not just of natural historical, but also of natural philosophical study in the period. These studies undercut claims made by Roy Strong and Richard Drayton, cited above, that the treatment of gardening in the second half of the seventeenth century in general and in the Royal Society in particular effected a change from a magical to a mechanical worldview. Rather, those who published their natural philosophical investigations of plants under the aegis of the Royal Society posed their subject as a matter of philosophical conjecture and of probabilistic argument, as opposed to other naturalists who rejected certain theories a priori as impossible^③.

Fellows of the Royal Society frequently justified their uncertain and merely probabilistic attempts to broach the furthest reaches of nature. They argued that the vast extent of Nature that remained to be explored meant that all investigations must be uncertain, but that should uncertainty should not stymie efforts to advance knowledge. As Grew wrote,

the Way is long and dark: and as Travellers sometimes amongst Mountains, by gaining the top of one, are so far from their Journeys end; that they only come to see another lies before them: so the Way of *Nature*, is so impervious, and, as I may say, down Hill and up Hill, that how far soever we go, yet the surmounting of one difficulty, is wont still to give us the prospect of another. ... The greatest Designs that any Men undertake, are of the greatest uncertainty, as to their Success. To conclude, if but little should be effected, yet to design more, can do us no

① John Ray, *Catalogus Plantarum Angliae*, London: Martyn, 1670, 267. “Puto enim has duas non differre specie, sed culturâ tantum.”

② John Ray, *Historia Plantarum*, vol. 1, London: Faithorne, 1686, 480. “Nos olim Rubiam sylvestram à sativa culturâ tantum & accidentibus inde ortis differe existimavimus; nunc tamen à D. Newton meliùs edocti, mutatâ sententiâ, specie diversam agnoscimus. Rubiae enim sativae tota superficies ad radicem usque quotannis emoritur, cum hujus (ut diximus) per hyemem durat; nè alias distinctionis notas superiùs adductas repetam.”

③ For instance, Nehemiah Grew noted in his *Philosophical History of Plants*, that the “Specific Virtue of Medicines, which some Physicians positively deny, and most dispute. . . may seem, at least, to be probable.” Grew, *Anatomy*, 292.

harm: For although a Man shall never be able to hit *Stars* by shooting at them; yet he shall come nearer to them, than another that throws at *Apples*.”^①

Kenelm Digby justified at length the extension of scientific ambitions given that the final horizons of knowledge were unknown. Sailing in the “immense Ocean” of knowledge, one might make “new discoveries of regions, far out of the sight and belief of them, who stand upon the hither shore.” Digby claimed that “knowledge hath no limits; nothing escapeth the toyles of science; all that ever was, that is, or can ever be, is by them circled in their in; their extent is so vast, that our very thoughts and ambitions are too weake and too poore to hope for or to ayme at what by them may be compassed.” Those who never raise their thoughts “above the pitch of the outward objects he converseth dayly with, should suspect that what I have now said; is rather like the longing dreames of passionate lovers, whose desires feed them with impossibilities.” However, he believed that eventually these critics would absolve him from “aiming at the reach of this all grasping power.”⁴⁴

At the moment when global colonialism amplified the ambitions of transplantation, a variety of sources, ancient and more contemporary, converged to stress its powers. Such authorities overrode occasional warnings about the hazards of transplantation or the moral risks of seeing everything as open to change and manipulation. The very eclecticism of these many arguments on behalf of transplantation dramatized how little understood a phenomenon it was. Far from functioning as a warning not to venture down the road of transplantation, the lack of knowledge concerning transplantation served at the time as an index to the vastness of knowledge’s ocean and as an invitation to go *plus ultra*.

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