



Citation: W. Maley (2023) Double Dutch. The Boate Brothers and Colonial Cosmography. *Jems*. 12: pp. 235-250. doi: <http://dx.doi.org/10.36253/JEMS-2279-7149-14393>

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Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Competing Interests: The Author(s) declare(s) no conflict of interest.

Editors: D. Pallotti, P. Pugliatti (University of Florence)

Double Dutch The Boate Brothers and Colonial Cosmography

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Abstract

The article focuses on two Dutch doctors – the Boate brothers, Arnold (1606-1653) and Gerard (1604-1650) – medical graduates of Leiden University who moved to London in 1630 to work as practising physicians. The brothers contributed to diverse forms of knowledge as part of the new science, including agriculture, anatomy, entomology, geography, industrial history, medicine, metallurgy, mineralogy and theology, but are known primarily for Gerard's posthumously published ground-breaking book, *Irelands Naturall History* (1652) for which Arnold did the spadework. The Boates collaborated on some of the most important intellectual enterprises of the seventeenth century, and worked alongside the leading intellectuals of the period, including innovative Irish thinkers James Ussher and Robert Boyle, and Samuel Hartlib, mainspring of a major knowledge network. The Boates' activities in Leiden, London, Dublin and Paris furnish a prototype for interdisciplinary engagement. The brothers were key members of multiple interlocking extra-institutional groupings. Active as part of a Baconian Office of Address and engaged both in the Hartlib Circle and the more shadowy Invisible College, they laboured in the seedbed of what would later become the Royal Society and the Dublin Philosophical Society. *Irelands Naturall History* is a model of the regional history that Francis Bacon saw as a vital branch of cosmography.

Keywords: *Arnold and Gerard Boate, Colonialism, Ireland's Naturall History, New Science, Research Networks*

1. Introduction: *The Small World of the Boate Brothers*

My title suggests a difficulty, one rooted in language and culture. The OED dates the phrase 'double Dutch' to C.H. Wall's 1876 translation of Molière's *Lovers' Quarrels* (1656):

My father was a very clear-headed man, but he never taught me anything but my prayers, and though I have said them daily now these fifty years, they are still double Dutch to me. (I, 116)

The phrase plays on an established view, evidenced in the Earl of Dorset's epistle to Edward Howard: 'thy Plays are such, I'd swear they were Translated out of Dutch' (Dryden 1727, 69).

The Dutch duo who are the subject of this essay present all kinds of difficulty. We know so little about the Boate brothers, Arnold and Gerard, because there is so much to know, and that comes down to the sheer range of their interests and activities. Discussing the versatility of a 'generall Artist', Thomas Fuller states: 'He is also acquainted with Cosmography, treating of the world in whole joynts; with Chorography, shredding it into countries; and with Topography, mincing it into particular places' (1642, 74-75). The Boates, as adept in dealing with whole joints as they were in shredding and mincing, were embedded in continental and archipelagic research networks during a period of cultural and political transformation, when inward examination, outward discovery and historical recovery mapped onto one another.

The obscurity of the Boates is bound up with language, publishing history, interdisciplinarity and collaborative research. 'Boot' is pronounced 'Boate' in Dutch and the brothers adopted the English spelling of the Dutch pronunciation upon arrival in London, but their surname is variously rendered Boodt, Boot, Boote, Boet, Boetius, Botius, de Boot and so on, making it difficult to keep track of their work. The Boates wrote and published in Dutch, English and Latin. Much of their work remains untranslated, and the nature of these texts – medical, philosophical and theological – means that their critical reception has taken different paths. The key text in English, and the chief subject of this essay, is *Irelands Naturall History*, posthumously credited to Gerard but clearly a collaborative effort. Single authorship remains the default understanding of a period marked by co-authorship and composite texts, making this Dutch double act appear more eccentric than they are. The Boates' work reveals the extent of Dutch and more broadly European input into ostensibly 'English' intellectual networks, which, considering the nationalities of their key collaborators – James Ussher (Irish), Robert Boyle (Anglo-Irish) and Samuel Hartlib (Anglo-Prussian/Polish), look increasingly archipelagic and continental.

My subtitle – 'Colonial Cosmography' – is a reminder that cosmography emerged as a way of describing empire and claiming territory. Mapping the cosmos and mapping colonies were related projects. Far from revealing the harmony of the universe, cosmography was the cue for the most brutal colonial activities. Humanists and new scientists – often the same people – led the line in the pursuit of conquest. This was early modern globalisation. Colonisation offered earning and learning opportunities for intellectuals and professionals at every level. Biblical and classical sources were plundered for precedents. What does it mean to speak of the world 'as a whole' in the early modern period? How did emerging colonial powers view non-European peoples and those who inhabited the borders or supposed backwoods of their own countries? The translation of Ptolemy's *Geographia* as *Cosmographia* coincided with a revival of interest in Empire. The reconstitution of knowledge across Europe triggered overseas expansion. Nationally orientated cosmographies were geared towards exploration and exploitation of the so-called 'New World', which, like the 'known world' is a colonial concept. Its inhabitants were to be exploited alongside those parts of the 'Old World' deemed barbarous. A preoccupation with the so-called 'New World' overlooks the fact that new knowledge networks were also engrossed with the 'Old World': 'Why did England, on the verge of an Atlantic empire ... turn so resolutely toward both the East and the past during these early modern centuries?' (Archer 2001, 3). There is a reason why Sebastian Münster's 1540 edition of Ptolemy's *Geographia* bears the title *Geographia universalis, vetus et nova* (Universal Geography, Old and New). As well as foreign enterprises, the accumulation of knowledge focused renewed attention on familiar territories, including allegedly uncivilised 'interiors' like the Marches of Wales; the Scottish Borders, Highlands and Islands; and the English Pale in Ireland. Ulster, long a target of English expansion, was settled under a joint Anglo-Scottish enterprise in 1609.

While its origins lie in geography – human, political and earth science – and in the dialectic of global and local knowledge, the colonialism of cosmography has not been sufficiently examined. The age of ‘discovery’ was an age of invasion and occupation, but also resource extraction. Together with this fascination with the old went a focus on the world within, the world of mind and body. Thomas Browne speaks of ‘the Cosmography of my selfe’ because ‘wee carry with us the wonders we seeke without us’ (1643, 31-32). This sense of cosmography as bound up with everything under the heavens is not a diffusion; it is precisely what gave rise to its prominence in a period when global knowledge on a macro and micro level was being sought. Cosmography thus operated at the intersection of cartography and anatomy, geography and medicine, astronomy and mineralogy, chorography and philosophy. It explored the ground beneath as well as the sky above, mapped the mind as well as the land. It could be deployed as a way of understanding migration and the spread of Christianity, hence Noah’s ‘purpose to shew unto his children the devison of the world, and Cosmographically to instruct them in the situation of each severall countrey, as they stood and were inhabited before the fload’ was the prelude to parcelling out land and was bound up with debates around titles and entitlement in early modern colonial enterprises (Nanni 1601, F4r). The earliest gloss on cosmography given by Thomas Elyot in 1538 is ‘the descriptiō of the world’, and a cosmographer is ‘he that discribith the world’ (26v). The Boate brothers were world-describers to their boots, and they covered a lot of ground.

If for the Boates the inner and outer worlds were thoroughly enmeshed then they owed a debt to their alma mater, Leiden University, which was from its inception geared towards exactly such innovative and interdisciplinary research, making it an attractive proposition for international students as well as a fruitful producer of cross-disciplinary scholars (Prögler 2016). Some of the best minds of the Boates’ generation studied at Leiden, and more importantly networked there, including Thomas Browne and William Petty (McCormick 2006, 299-300; Barbour 2008; Beukers 2008). Universities were not uniform across Europe in their response to the new knowledge. Leiden, founded in 1575 in the wake of the lifting of the Spanish siege on that town, was a notable exception to broader institutional conservatism, an early nucleus for oriental studies and global colonial projects (Storms 2018). Dutch physician Willem Piso and German naturalist Georg Marcgraf, co-authors of *Historia naturalis* (1648), were Leiden alumni, and their fieldwork in Brazil in the 1640s foreshadows that of Arnold Boate in Ireland (Mendyk 1985, 5). The pattern established in Dutch Brazil of bringing in a team of interdisciplinary researchers provided the template for later English efforts in Ireland:

Dutch Brazil was governed from 1637 to 1644 by Count Johan Maurits of Nassau-Siegen, who assembled a group of scholars and painters to depict the local geography, biodiversity, indigenous population, tropical diseases, and traditional medicine. (Alcantara-Rodriguez, Françoço and van Anel 2019, 391)

Like the Boates, Piso and Marcgraf covered a series of disciplinary fields themselves, including astronomy, botany, cartography, medicine, ornithology and zoology. These Leiden graduates blazed a trail in establishing a colonial knowledge economy along the lines envisaged by Francis Bacon (Brienen 2001). Leiden emerged early on as a hub for Bacon studies, so much so that Bacon’s works ‘had more editions in the Netherlands than in England’ (Strazzoni 2012, 251). Leiden’s reputation as a crucible of the new science placed it in the frontline of European institutions engaged in internationalization (de Clercq 1997; Wiesenfeldt 2008). It also laid it open to satire. Dolores Palomo suggests that Swift’s model for the Academy of Lagado in Book III of *Gullivers Travels* was based on the Dutch institution (1977, 27).

Brazil was the blueprint, Leiden the locus of learning, natural history the nexus of knowledge, but in order to understand how cosmography, guided by colonialism and commerce, actually operated ‘on the ground’ in the period, we need to look to Ireland, where Ussher, in one of his earliest contributions to learning, *A Discourse of the Religion Anciently Professed by the Irish and Brittish* (1631), draws on Book 2 of Sebastian Münster’s *Cosmographia* (1544) in order to challenge Roman and papal claims to Ireland and assert English sovereignty (Ussher 1631, 122). Münster treats Ireland in a familiar fashion: good climate, pity about the people (McLean 2007, 219 and 260). In *The Advancement of Learning* (1605) Bacon declared the Book of Job to be ‘pregnant, and swelling with ... Cosmographie, and the roundnesse of the world’, and he linked ‘the history of cosmography’ (I, H2v) to ‘Naturall History in respect of the Regions themselues’ (II, Dd3r). A year later, in his essay on Irish colonisation on the eve of the Ulster Plantation, Bacon spoke of the ‘Confluence of Commodities’ such settlement afforded, which relied on ‘the Information of Persons expert, and industrious [who] know the *Region*’ (1657, 258).

The links between geography, cosmography and regional history have been obscured, but for historical geographer Frank Emery, Boate brought ‘the classical viewpoint of natural history – personified by Pliny – to bear upon regional description’ (1958, 265). Bacon’s own writings on empire, plantation and Ireland opened the door to a way of thinking about settlement as not merely a displacement of social tensions or a means of accommodating the landless younger sons of the lesser gentry but as a laboratory of learning. Regional history, informed by fieldwork, was the kind of engaged enquiry those ‘shvt up in the Cells of Monasteries and Colledges’ spinning ‘Copwebs of learning’ could never achieve (Bacon 1605, I, E4v and F1r). Bacon’s allusion to Job reminds us that divinity was at the heart of reflections on the nature of the world. In the first such use of the word ‘global’, speaking of ‘the comminge of the sonne of man ... out of the East in respect of *England*’, William Prynne refers to ‘the worlde beinge plainly *Circular*, & *globall*, havinge no angles nor squares, & so no East, West, North, or South if simplie considered in it selfe’ (1637, 36-37). What does it matter which way you face in a global world?

As a measure of the disorientation that accompanied discovery, witness the fourteenth-century cartographic error that led to the mapping of a mythical island called Brasil ‘upon the Coast of *Ulster*’, giving rise to colonial fantasies throughout the period which came to a head in the seventeenth century when Dutch activities in Brazil conjured up a whole world of commercial possibilities that English writers looked upon with envy (Head 1675, 4; Freitag 2015). The short-lived experiment of the Dutch West India Company took on a mythical aspect of its own, leaving ‘a legacy of financial failure and a nostalgia for ... missed opportunities’ (Pijning 2002, 120). The English experiment in Ireland was to prove more sustainable, if no less problematic.

2. *The Boates as Knowledge Networkers*

Charles Webster calls the Boates ‘obvious candidates for the Invisible College’ (1974, 31). In London, Gerard served as physician to the Boyles, a prominent planter family, whose leading lights included Robert Boyle, who became a hugely influential figure in science. The ‘Invisible College’ was first mentioned by 19-year-old Robert Boyle in a letter from London dated 22 October 1646 (Birch 1744, 66). Less noted is the fact that this letter is largely about Irish affairs – in the context of the civil wars – and that Boyle mentions James Ussher, likening him to Augustine of Canterbury: ‘I was yesterday in company with our Irish St. *Austin*, the archbishop of Armagh’ (64). This contradicts claims that ‘Boyle’s commentaries provide no

evidence as to membership' (Kassell 2010). Boyle later distinguished between cosmography as an overarching universal scheme and more manageable and practical knowledge of the kind that preoccupied the Boates:

To discern particular Truths is one thing, and to be able to discover the Intercourse and Harmony between all Truths, is ... a far more difficult one; as a Traveller may upon the English Shoar know that he sees the Ocean, and upon the Coast of *Affrick* be made to do the like, and at the *East Indies* also he may know that he sees the Ocean; and yet not know how those so distant Seas communicate with each other, tho that may be manifest enough to a Cosmographer. (1681, 89)

Boyle goes on to imply that God is the one true cosmographer.

Dissenting groups who functioned outside of official institutions were at the heart of the new all-encompassing cosmography. Discussing the 'Office of Address' in 1647, Hartlib envisages 'a Certain Place ... whereunto all Men might freely come to give Information of the Commodities which they have to be imparted unto others', commodities here being all kinds of useful knowledge (1647, 37). The Boates were hard-wired into exactly such knowledge exchange, and they remind us that early modern culture was marked by groupwork, something the ODNB is recognizing with new entries on the Invisible College and the Royal Society (Hunter 2006; Kassell 2010). Anglocentric frameworks are being extended through a growing realization that 'English' thinkers moved in Archipelagic, Atlantic, European and international milieux, while disciplinary boundaries are being called into question by an increasing acceptance that early modern knowledge exchange cuts across modern institutional borders.

Evan Bourke locates and dates the Hartlib circle to London in 1641, but its origins can be traced back to the correspondence between Arnold Boate and James Ussher established in the 1630s and overseen by Samuel Hartlib (2017, 1). Using network analysis on the Hartlib papers, Bourke affirms the peripheral status of Arnold and Ussher (11-12). Yet as Bourke notes, 'the vast majority of the network was on the periphery' (12). The Boates may be outliers according to Bourke's analysis of its 766 members but quality counts and in the nexus of knowledge and know-how they proved integral to this versatile transnational epistolary coterie. Innovative, collaborative and interdisciplinary, they turned their hands to a panoply of challenges, from the global trade in precious stones to the mapping of coastlines, drainage of bogs and economic analysis of ironworks and timber mills in Ireland. Arnold's advice on beekeeping recorded by Hartlib (1655b, 3) and Gerard's treatment of kidney stones noted by Boyle (1663, II, 78-79) are not sidelines – they are the very stuff of cosmography, which entailed knowledge of everything under the sun, of a verifiable sort, fully informed and evidenced.

The Hartlib hivemind never stopped pollinating. Pathways to impact embraced engagement, examination, experiment and exploration, leading to what Comenius called 'pansophy', the cosmography of knowledge, a word that, like cosmography, had a short lifespan. Comenius piloted the term in *Pansophiae prodromus* (1639), prefaced by Hartlib. It resurfaced in English three years later in a work published by Hartlib, where Comenius declared it to be 'nothing but the glasse or mirrour of the Universe' (1642, 18). Pansophy, as Comenius conceives it, 'takes all things in generall into its consideration' (1651, 16). This philosophy of everything called for collaborative networks of diverse talents, and as Mark Greengrass observes: 'This vision of a "Universal Learned Corresponding Intelligency" preoccupied Hartlib and his circle of associates until the end of his life' (1993, 47). The Boates' contribution to cosmography was part of 'pansophy', and in this respect, their myriad interests cohered into a single aim: the advancement of knowledge on all fronts. Their diverse works and multiplicity of interests offer exemplary instances of the circulation of knowledge.

3. *Forms of Knowledge and Knowledge of Forms*

The Boates were as curious about forms of knowledge as they were about knowledge of forms. *Philosophia naturalis reformatata*, their co-authored critique of Aristotelian philosophy dedicated to Robert Sidney and James Ussher appeared in Dublin in July 1641. Written in Latin, it remains untranslated. Ian Campbell calls it ‘surely the strangest book ever dedicated to James Ussher’, proposing ‘a complete refutation of Aristotelian philosophy’ (2013, 166). Roger Ariew places the Boates among those ‘writers who helped to shatter the traditional reliance on form as an explanatory concept’ (2011, 141). The brothers’ joint study of Aristotle is ‘the one book to champion the new learning published in Dublin before the civil war’ (Barnard 1972, 133). Clearly impactful, it has been overlooked, perhaps because a Latin work by Dutch siblings published in Ireland proved too much for parochial sensibilities. So-called ‘regional publication’ challenged a London monopoly. That the Boates published in Leiden, Dublin and Paris as well as London indicates their determination to reach different audiences and constituencies.

It is easy to see why scholars get lost in a warren of works and fail to make connections. Medical historians refer to Arnold’s pioneering observations on rickets in his Latin text of 1649 but overlook the section on that subject in *Irelands Naturall History*. Irish historians discuss the treatment of Charles Coote’s industrial entrepreneurship in *Irelands Naturall History* without mentioning Arnold’s earlier letter from Dublin to his brother detailing the death of Coote, whom he accompanied on his Irish expeditions (Boate 1642, A4v; Barnard 1994, 283). Michael Hunter upbraids Charles Webster for treating Arnold ‘as if his interests were exclusively medical and technological, whereas in fact his priorities seem to have been primarily concerned with scriptural learning’ (1995, 101 n. 137). In the same vein, E.C. Van Leersum sees Arnold caught between specialisms: ‘Though by profession he was a physician and an excellent one too, his heart inclined to the classical and oriental languages of which he is said to have known Hebrew, Chaldee and Syrian to perfection’ (1927, 483). This is what happens to interdisciplinary scholars – they get claimed by competing disciplines even as they huddle under a multidisciplinary umbrella.

4. *Arnold Boate’s Correspondence with James Ussher*

Arnold was the smarter younger brother. A prolific polymath, his pattern of publications, including those co-authored with Gerard, testifies to his wide-ranging interests and expertise, and to ‘the vital role that he played in the consolidation of an Irish wing of the Hartlib circle’ (Boran 2004). From the mid-1630s Arnold began a long correspondence with James Ussher, providing texts and translations for the latter’s major publishing projects around biblical and church history, and procuring, lending, translating and gifting books and manuscripts. The background to this was Ussher’s appeal for assistance in the major work of theology he had in hand. According to Stephen Clucas:

As early as 1634 Hartlib notes “An Invitation or tendry for the perfecting of the Worke of Protestant Divinity by Usher” ... Usher is noted as a source of manuscripts, but also as a target. (Clucas 1991, 39, citing Samuel Hartlib, *Ephemerides* 1635. The Hartlib Papers, Sheffield University Library, 50H. 29/3/11B, 1634, 29/2/198)

Ussher was not only an author but an enabler of others’ work, since he ‘provided the financial aid to enable Hartlib to publish’ the Boates, among others (Clarke 1973, 289). Ussher left Ireland for good in 1640 and was resident thereafter in London. Arnold was briefly back in

England in 1644 before moving to France, so his letters to Ussher are dated variously from Dublin and later Paris.

Anthony Turner, discussing Hartlib's interest in Théophraste Renaudot's *Bureau d'adresse* states that 'efforts to get more information were successful in 1647 or 1648 when Gerard Boate supplied copies of some of Renaudot's printed pamphlets about the Bureau' (2017, 140). We know from a letter of Arnold's to Ussher from Paris in April 1648 that Gerard acted as a pick-up point for their post, so both brothers were involved in this cross-channel traffic in texts (Parr 1686, 533). The Arnold-Ussher correspondence is a model of collaborative research, networking and knowledge exchange. Arnold was part of a European research network processing bibliographical queries and translation requests. He read Greek and Hebrew, and where he lacked a language he outsourced or subcontracted Ussher's requests to another contact. This was not a book trade, a book borrowing and consulting industry, or a scholarly lending library. It was rather an extensive informal research institute. William O'Sullivan calls Arnold 'Ussher's Paris agent' while acknowledging Arnold's own expertise as a Hebrew scholar (1956, 50). O'Sullivan demonstrates that Arnold's role as translator, retriever and interpreter of texts exceeded that of other Ussher correspondents (51-52). What has been said of Ussher's correspondence with Gaelic scholar Conall Mageoghegan applies to Arnold Boate: 'Their relationship was not a financial one but rather they were bound together by exchanges of information and manuscripts' (Cunningham and Gillespie 2004/2005, 99).

5. Irelands Naturall History: *The Jewel in the Colonial Commonwealth*

Irelands Naturall History, hatched in Ireland, written and published in London, is a product of Leiden, a nursery for natural history in the period and a magnet for mavericks (the full title captures the scope and ambition of the book).¹ It is a landmark publication, one with a complicated genealogy, having been researched by Arnold, composed during conversations between the two brothers, and published under Gerard's name after his death. Arnold supplied a preface explaining the attribution and the odd genesis of the book, based as it was on several months of conversations the two brothers conducted in London in 1644 between Arnold's return from Ireland and his departure for France. Arnold acknowledges that the scientific method may appear compromised by the fact that Gerard wrote the book before going to Ireland: '*You say you wonder, & others may justly concurre with you in that your wonderment, how a Countrie could bee so accurately described by one, who never was in it*' (Boate 1652, A6v). To add another layer of complexity to the volume's authorship, the dedication to Cromwell and Fleetwood in Hartlib's name was penned by John Durie (Fradkin 2017, 282 n. 31).

Arnold lived in a royalist household in Paris with his Irish wife Margaret Dungan, whose brother died fighting for Charles I. It was perhaps convenient that his late brother's name be attached to a text licensed by the English commonwealth. What was originally a royalist

¹ *Irelands Naturall History. Being a True and Ample Description of its Situation, Greatness, Shape, and Nature; Of its Hills, Woods, Heaths, Bogs; Of its Fruit- Full Parts and Profitable Grounds, With the Severall Ways of Manuring and Improving the Same: With its Heads or Promontories, Harbours, Roads and Bays; Of its Springs and Fountains, Brooks, Rivers, Loghs; Of its Metalls, Mineralls, Freestone, Marble, Sea-coal, Turf, and Other Things That Are Taken Out of the Ground. And Lastly, of the Nature and Temperature of its Air and Season, and What Diseases It Is Free From, or Subject Unto. Conducing to the Advancement of Navigation, Husbandry, and Other Profitable Arts and Professions. Written by Gerard Boate, Late Doctor of Physick to the State in Ireland. And Now Published By Samuell Hartlib, Esq; For the Common Good of Ireland, and More Especially, For the Benefit of the Adventurers and Planters Therein.*

enterprise had become a gift to the new republic. The dedication was a political necessity that perhaps made it awkward for Arnold to take fuller credit. At the bottom of the titlepage is the line: 'For the Common Good of Ireland, and more especially, for the benefit of the Adventurers and Planters therein' (Baigent 2004). Gerard's English widow, Katherine Menning, inherited an Irish estate in Tipperary, so the benefit was real (*ibid.*). Cromwell's name may have kept the book out of circulation after the Restoration. Reprinted twice in Dublin in 1726, shorn of its prefatory material, it re-entered Irish bibliography under a different guise, and Arnold's name slipped into oblivion (Forbes 1932, 18).

The classical view of Ireland as the edge of the known world exemplified by Strabo, Pliny and Ptolemy has been well-documented (Tierney 1976). *Ireland's Naturall History* is aware of its ambiguous status as a study of the old world through exploration and explanation enabled by the new science. The aim throughout is to situate Ireland within a larger frame, so that 'it is to be reckoned among the chief Ilands of the whole World' (Boate 1652, 4); its havens 'are so many in number, and ... so fair and large, that ... hardly any land in the whole World may be compared with this' (10); 'The Sea which environeth Ireland, is as free from Shelves, Sands, or Grounds, as any in all the world' (40); 'No country in the world is fuller of Brooks' (57); and it is 'among the fruitfulest countries of the world' (87).

According to Malcolm Oster, 'the regional economic survey of Ireland by Boate' encapsulates 'the broader direction of scientific research of the Invisible College' (1992, 263). Emblematic of the Boates' scientific approach is a passage on St Patrick's Purgatory, 'one of the few places in Ireland to regularly appear on medieval world maps' (Byrne 2016, 73). The cave entrance at Lough Derg is famously the only Irish landmark of note – the 'Fégefeuer' – on German cosmographer Martin Behaim's 1492 terrestrial globe or 'earthapple' (*Erdapfel*). The Boates were determined to undermine what they saw as mere superstition. Richard Boyle, earl of Cork, father of the dynasty that powered the key intellectual developments of the period, is credited with debunking the myth of what was 'nothing els but a little cell, digged or hewen out of the Rockie ground, without any windowes or holes, so as the doore beeing shut one could not see a jot within it' (Boate 1652, 74). Upon further examination, visionary experiences are attributed to sensory deprivation, exploited by 'those kind of men that knew how to abuse the blind devotion of ignorant and superstitious people to their own profit and filthy lucre' (78, pagination irregular). By contrast, the kind of excavation undertaken by Richard Boyle and his fellow industrial entrepreneurs is both scientific and profitable. Discussing Richard Boyle's investment in mining elsewhere in Ireland, Boate declares that this planter-patriarch 'hath profited above one hundred thousand pounds clear gain by his said Iron-works' (137).

J.H. Andrews noted that the records of colonial activities, though 'fragmentary ... deserve attention: they reveal a thriving industry of the seventeenth and eighteenth centuries, linked by an interesting commercial relationship with its English counterpart, and controlled by location factors somewhat different from those familiar in the larger island' (1956, 139). According to Andrews: 'Most of the characteristic features of the historical geography of the Irish iron industry derive from the commercial immaturity of plantation Ireland' (*ibid.*). Ireland's status as a site of settlement and resource extraction proved key to its comparative industrial development and exploitation: 'Most symptomatic of the "colonial" character of Ireland's economy was the abundance of natural woodland and the speed with which its resources were exhausted' (*ibid.*). *Ireland's Naturall History* is concerned with sustainability. In a section entitled 'Diminishing of the Woods during the last Peace', the third of a chapter headed 'Of the Woods in Ireland', Boate offers an account of deforestation for the varied purposes of security – depriving the Irish of hiding places; industry – supplying charcoal for the mines; and merchandise – 'whole

ship-loads sent into forreine countries yearly' (Boate 1652, 120-121). A little further on, in a passage alluding to Richard Boyle, Boate remarks: 'In Munster where the English, especially the Earl of Cork, have made great havock of the Woods during the last Peace, there be still sundry great Forests remaining in the Counties of Kerry, and of Tipperary; and even in the County of Cork, where the greatest destruction therof hath bin made, some great Woods are yet remaining, there being also store of scattered Woods both in that County, and all the Province over' (124). Bacon remarked on the quality of Irish wood for 'Ship Timber' in his own *Naturall historie* (1627, 164).

Attention to detail is a strength of the Boates. They excelled in topography and small-scale geography. Geologist John de Witt Hinch pondered the depth and detail of data displayed in *Irelands Naturall History*, speculating that Boate's 'knowledge of the Irish coastline was the harvest of friendly intercourse with [Dutch mariners] rather than a bookish acquaintance with charts and pilot books' (1928, 43). Hinch's surmise is borne out by several Dutch references in the text: 'On both sides of the Old-head of Kinsale, by the Dutch Mariners called Cape Velho, ships may Anchor as deep or shallow as they will' (Boate 1652, 32); 'Betwixt Wexford and Dublin there bee five Heads: That of Glascarick, which the Dutch Mariners call the Blew-point' (37); 'the point at the North-side of the Haven of Strangford, which the Dutch Mariners by a notable mistake call the point of Arglas' (38). Indeed, Boate's allusion to his countrymen's knowledge of Ireland's coasts is a reminder that they were part of the plantation process – Dutch workers are among the labour pool of Tipperary's silver and lead mines (144). For Hinch a notable feature of Boate's book was 'the very excellent English in which it is written ... an English which may have been produced because the author was a foreigner, and would either avoid, or be unable to write the cumbrous, involved English so popular with many of the native writers of the period' (1928, 54). Hinch praises the book's positive attitude to the Irish language, and its 'modern and objective outlook ... for we are spared both the geography of Ptolemy and the history of Egypt' (55).

Frank Emery sees *Irelands Naturall History* as a breakthrough book, 'a parting of ways not only for Irish geography but for a wider field in Britain and the rest of Europe' (1958, 264-265), and he attributes Boate's clarity and rigour to his medical training at Leyden, and to comparative work in the Dutch equatorial colonies, particularly Brazil: 'though on a smaller scale, Boate's survey of Ireland was of the same type and quality' (*ibid.*). Stan Mendyk sees Boate's book as 'amongst the first to exclude accounts of local marvels, colourful digressions, supernatural occurrences and citations from classical authors in regional study' (1985, 5). Boate's book was shorn of the adornments of his English contemporaries: 'Genealogy and heraldry had virtually no place here' (Mendyk 1985, 6). Mendyk calls Boate 'a pioneer observer of the face of the earth long before studies in earth-sculpture – or geomorphology, as the science is today known – became common in regional description' (7). What preoccupied the Boates were issues like climate and resources. According to Brant Vogel, *Irelands Naturall History* 'celebrated the elimination of bogs and reduction of rains' and was 'essentially a manual for colonial management' (2011, 127).

Irelands Naturall History has attracted a range of opinion, mostly favourable. Nicholas Canny was an early advocate of the Boates as historians recording the recent past rather than projectors promoting a future vision of plantation: '*Ireland's Natural History* ... accepted by historians as the classic exposition of the new science, devoted much attention to describing the exemplary measures taken by the pre-1641 planters to exploit Ireland's natural resources' (1982, 146). According to Charles Webster:

Boate's success was due to various factors, including a Baconian orientation, acquaintance with recent Dutch descriptions of the natural history of Brazil, practical involvement in Irish resettlement, and the selection of a region small enough for comprehensive investigation. Thus he was induced to break with the miscellaneous, antiquarian and anecdotal chorographical tradition, to produce a well-ordered preliminary survey of the economic geography of Ireland. (1974, 35)

K. Theodore Hoppen considers it 'the only scientific book in the modern manner relating to Ireland, written before the restoration' (1964, 100). For Toby Barnard it is 'the first accurate and unsensational enquiry into Irish resources and potential' (1994, 282). Roy Foster acknowledges that it 'had its own proselytizing motivation – to attract settlers – but it was an exacting and distinguished intellectual achievement' (1988, 106). Patricia Coughlan, a dissenting voice, detects a familiar subtext beneath the apparent objectivity, arguing that 'the informative descriptions of physical features and material conditions are everywhere shot through with vituperative condemnations of Irish behaviour' (1994, 305).

6. *Planting the Seeds of the New Science*

Ireland doubled as a testing-ground and a fruitful source of funding for the new science. Thus *Irelands Naturall History* was both a blueprint for plantation and a scientific examination of Irish land and resources. This 'Baconian natural history of Ireland ... was destined to act as a major stimulus to the Cromwellian settlement and exploitation of the country by English newcomers in the later part of the decade' (Elmer 2019, 87). The complex political history of early modern Ireland can be summed up briefly: the descendants of the 'Old English' twelfth-century settlement, largely Catholic and thoroughly intermarried with the native Irish, were gradually displaced by 'New English' post-Reformation Protestant planters many of whom were committed to the new science. But this is too neat; the boundaries were blurred. Ussher was from a prominent Old English family while Boyle belonged to a formidable New English dynasty. What they shared was a commitment to the reformed religion and the pursuit of learning. The Boates' interest in Ireland both mirrors their countrymen's preoccupation with other colonies like Brazil and cements their relations with key intellectuals of the same faith whose fortunes were bound up with England's first colony. Ussher and Boyle were heavily invested in Ireland through appointments, property and family connections, while Irish plantation was viewed as one way to fund the experimental work of Samuel Hartlib. As Jeremy Fradkin observes, the Boate book was part meticulous report, part modest proposal:

Historians have treated *Irelands naturall history* as both a major development in Baconian economic geography and as a manifesto for the Anglo-Irish Protestant lobby in London ... The text appealed especially to the many social, intellectual, and scientific reformers in the Hartlib circle, centered in London, who regarded Ireland as a country to be remade. (2017, 282)

Hartlib had Irish interests of his own, and his circle saw plantation as a form of external grant capture. Roy Foster notes that Hartlib's 'admirers and disciples wanted him to be supported by a grant of Irish lands' (1988, 106). According to Patrick McCabe, Hartlib 'was the author of an unfulfilled project for settling members of the Czech Brethren branch of Protestantism in Ireland' (2003, 74). J.J. O'Brien furnishes valuable information on moves made by Hartlib's son, also called Samuel, to secure land for intellectual and cultural advancement rather than agricultural improvement. O'Brien points to a petition of 11 December 1655 which proposed that a group of interested entrepreneurs 'be allowed to buy up certain debentures, to the value

of ten or twelve thousand pounds ... issued to cover back-pay due to soldiers back from active service in Ireland in 1649' (1968, 36):

The debentures were to be used to purchase undisposed forfeited land and houses in certain parts of Ireland ... and the profits from the transactions were to be placed in the hands of trustees appointed by Oliver Cromwell. These were to appoint an agent, to correspond abroad with men interested in the advancement of learning, and also one or more Latin translators. Rewards were to be given to learned correspondents in foreign countries, and men were to be encouraged to experiment and invent. (*ibid.*)

In October 1657 Robert Boyle wrote to Henry Oldenburg, future secretary of the Royal Society, about this scheme:

I am hugely pleased, that the council hath granted your desires for the promotion of knowledge; which I suppose to be those that were couched in a certain petition you were pleased to impart unto me at *Oxford*; wherein, if I remember well, a matter of twelve thousand pounds sterling was offered to purchase confiscated lands and houses with in *Ireland*, and to commit the profit thereof into the hands of certain trustees, for to employ it in the entertainment of an agent, secretary, translators, for keeping intelligence, distributing rewards, &c. in order to the end aforesaid. (quoted in O'Brien 1968, 37)

Toby Barnard sees the Boates as instrumental in shaping Hartlib's interest in and understanding of Ireland:

The Boates's work had turned Hartlib's attention to Ireland, and it was Hartlib who presided over and co-ordinated his friends' activities in Ireland during the interregnum ... Hartlib's interest stimulated science in mid-seventeenth century Ireland. There were ... other factors to cause an upsurge of scientific activity ... The war and subsequent resettlement of Ireland acted as a forcing-bed for scientific talents, and gave opportunities for English scientists to test their techniques and theories in useful and profitable enterprises. (1974, 60)

It could be said that Ussher turned Hartlib's attention to Ireland, but Barnard makes a strong case for seeing the Hartlib Circle as organically linked to the germinal Dublin Philosophical Society by drawing attention to the planter roots of the Boyles (70-71). What can be said with certainty is that colonial culture fostered the cultivation of learning as well as land. As Alexandra Walsham remarks: 'In Ireland, the endeavours of the [Boates] laid the foundations for the Dublin Philosophical Society ... officially founded in 1683' (2011, 359-360). Founding figures of the emerging learned societies of the time including – Robert Boyle, Robert Child, John Durie, Myles Symner, William Petty, Robert Wood and Benjamin Worsley – were forged in the crucible of Ireland and profoundly influenced by the Boates. What Michael Hunter says of the Royal Society applies to the activities of the Hartlib Circle: 'From the outset it aspired to combine the role of research institute with that of a clearing house and repository of knowledge' (2006). The discussion of industrial activity in *Ireland's Naturall History* is focused on export and the profit accruing therefrom. The larger point is that Irish resources fueled the scientific advances of the Boyles, and vice versa. The foundry was a funding body.

7. Conclusion

This contribution has demonstrated why we know so little about the Boates and why we should know much more. The brothers exemplify the new scientific emphasis on eye-witness experience, practical knowledge and the systematic extraction of raw materials. Their work on

scriptural sources and authority coupled with their labours on natural history demonstrate the fusion of supposedly separate discourses. But it is their work on Ireland as an exemplar of the new regional history that marks them out as key cosmographical innovators. The Boates were engaged in learning, thinking and conceptualizing *terra incognita*, and, crucially, in reconfiguring and reorienting what was considered familiar ground. Their horizons were pan-European, and their Irish focus drew on continental and intercontinental models of knowledge exchange.

Discussing settled wealth versus aspiration, Jeremy Collier draws on Francis Bacon's *Novum organum*:

So that what my Lord *Bacon* mentions in reference to Notions and Inventions, may be sometimes applicable to Families; where he tells us, that Time is like a River, in which Metals and solid Substances are sunk, while Chaff and Straws swim upon the Surface. (1689, 58-59)

This metaphor fits the Boates in a double sense, first because they made a substantial contribution to Baconian improvement that has yet to be taken fully on board, and second because Arnold's light has been hidden under his brother's book, which he had ghost-written. Arnold's spectral presence hangs over the finest intellectual achievements of the mid-century. In their fusion of medicine, philosophy, natural history, poetry, agriculture, theology and translation, the Boate brothers, nimble polymaths engaged in practical knowledge on several fronts, afford us new ways of thinking about the latticework of synergies that hummed and sparked throughout the seventeenth century, lacing together the medical humanities with colonial ecology. Yet they exist mainly in fragments and fissures, disappearing into the cracks of intellectual and cultural history.

In *Ireland's Natural History* Gerard recalls a story 'related to my Brother' of Irish ingenuity in crossing the swollen River Lagan:

a country fellow ... that ... stayed three days in hope that the water would fall, and seeing that the rain continued ... resolved to pass the Brook whatever the danger was; but to doe it with the less peril, and the more steadiness, he took a great heavy stone upon his shoulders, whose weight giving him some firmness against the violence of the water, he passed the same without harm, and came safe to the other side, to the wonderment of many people, who had been looking on, and given him all for a lost person. (1652, 59)

This 'country fellow', a latter-day Atlas worth his weight in ingenuity, knew when ballast mattered more than buoyancy. Knowledge, including global knowledge, is accessed locally, and sometimes the heavy stuff keeps us afloat. Practical wisdom is often submerged beneath dogma. In the field of universal knowledge, the Boates – advanced practitioners, interdisciplinary scholars, collaborative innovators – deserve to be double-weighted.

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