

**'Benjamin Worsley (1618-1677):
Commerce, Colonisation, and the Fate of Universal Reform'**

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Summary of thesis.

This thesis is a biographical account of Benjamin Worsley, an individual whose wide-ranging interests touched on many dynamic areas of 17th-century English history. Best known as an expert in colonial and commercial government, Worsley was employed in this capacity both under the Commonwealth (as secretary to the 1650-51 Council of Trade), and the Restored monarchy (on the various councils of 1668-73). By tracing Worsley's career across these years, we see how the Commonwealth's positive approach to commerce, embodied by the Navigation Act of 1651, survived the Restoration, when the advancement of trade was increasingly identified as the national interest. This involves analysis both of the content of Worsley's ideas about trade and the colonies, and of how he used these ideas to gain employment, thus contributing to the institutional and intellectual development of the first British Empire.

As well as considering his public career, the thesis examines Worsley's attitudes to and interest in a broad range of areas. This is made possible by his association with the circle of Samuel Hartlib, whose papers provide the major source for this study. Beginning with the account provided by the historian Charles Webster, the study considers Worsley's interest in natural philosophy and especially alchemy (including his friendship with Robert Boyle), other activities such as his employment on the Down Survey of Ireland, and his religious and political opinions. In contrast to Webster, the degree to which these activities formed a coherent project aimed at building a utopian millenarian state, is questioned, and instead we see how Worsley was forced to reshape his goals in the face of frustration and discord, ultimately by denying the state a role in spiritual affairs. Thus Worsley's life reveals something of the fate of the Hartlibian ideal of 'universal reform' in a nation marked by dramatic political, intellectual, and commercial change.

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Abbreviations.

- A & O* Firth, C.H., & Rait, R.S. (eds.) *Acts and Ordinances of the Interregnum*, 2 volumes (London: Wyman & Sons, 1911).
- BL* British Library, London.
- Boyle: Correspondence* Boyle, R., *The Correspondence of Robert Boyle*, ed. M. Hunter, A. Clericuzio, & L. Principe (London: Pickering & Chatto, 2001) 6 vols.
- Culpeper: Letters* “The Letters of Sir Cheney Culpeper (1641-1657)”, ed. M. Braddick & M. Greengrass, *Camden Miscellany*, XXXIII, Fifth Series, Volume 7 (Cambridge: Cambridge U.P., 1996) pp.105-402.
- DNB* *Dictionary of National Biography*.
- CSPC* *Calendar of State Papers, Colonial*.
- CSPD* *Calendar of State Papers, Domestic*.
- CSPI* *Calendar of State Papers, Ireland*.
- CTB* *Calendar of Treasury Books*.
- Ephemerides* Samuel Hartlib’s ‘Ephemerides’, i.e. work-diaries (part of the Hartlib Papers).
- HMC* Historical Manuscripts Commission.
- HP* *The Hartlib Papers. Electronic Edition*, 2nd edition (Sheffield: HR Online, 2002).
- Plantations Journal, 1672-4* Journal of the Council of Trade and Plantations, 1672-1674. Bodleian Library Microfilm 496 (original copy possessed by the Library of Congress, Washington).
- PRO* Public Record Office, London.
- SHUR* Greengrass, M., Leslie, M., & Raylor, T., (eds.) *Samuel Hartlib and Universal Reformation* (Cambridge: Cambridge U.P., 1994).
- T & C* Thirsk, J., & Cooper, J.C., (eds.) *Seventeenth Century Economic Documents* (Oxford: Clarendon Press, 1972).

Note on citations from the Hartlib Papers Electronic Edition.

Documents prefixed by the abbreviation HP are taken from the transcriptions of the Hartlib Papers Electronic Edition (second edition). These include both the Hartlib Papers held at Sheffield University Library, and relevant additional material included with the second edition, from other archives. The former are noted as follows:

1. 'Propositions in the behalfe of the Kingdome'. HP 71/11/8B.

References from additional material include the original archive reference, with the prefix HP added to denote that they are taken from the transcriptions provided by the Hartlib Papers Electronic Edition, as the following examples demonstrate:

1. Letter, Worsley to Hartlib, 18 May 1649. HP: Royal Society Boyle Letters 7.1, fol. 2r.
2. Letter, Petty to Worsley, 14 March 1649. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 36, fol. 1r.

Dating and transcription conventions.

Dates are given old style, with the exception that the new year is dated from 1 January. The original spelling has been retained in manuscript transcriptions, with the exception that abbreviations and contractions have been expanded, with the expanded letters italicised, following the Hartlib Papers Electronic Edition convention (e.g. *y^e* becomes *the*).

Benjamin Worsley (1618-1677):

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Introduction.

The period c. 1640 to c. 1680 is a crucial one in English history, including not only the political Civil War and Revolution and the Restoration in 1660, but also intellectual and economic developments that would be of lasting importance. Thomas Hobbes' *Leviathan* stood out as a work of political and social theory published during the Interregnum, but his conclusions rested on an appreciation of mechanistic understandings of the natural world, at the forefront of what would become known as the 'scientific revolution'. The founding of the Royal Society of London in 1660 was the most visible symbol of the attempt to establish this 'new science' in England, building on the works of existing indigenous efforts, Baconian as well as mechanistic, and (it has been argued) fuelled in part by the energies of the Revolution, by which 'an intellectual revolution' was achieved.¹ By the 1670's, English science was entering a period of unprecedented achievement: Bacon's optimism about the potential of the 'moderns' seemed well founded. Equally, this was a decade of expanded trade, and England was well on the way to becoming the 'paradigm of economic success' which it could boast of at the turn of the century.² The previous three decades had seen hardship and instability as well as economic growth, with a major crisis in English trade

¹ C. Webster, "Introduction" to *The Intellectual Revolution of the Seventeenth Century*, ed. C. Webster (London & Boston: Routledge & Kegan Paul, 1974) p. 1. For the Royal Society, M. Hunter, *Establishing the New Science. The Experience of the Early Royal Society* (Woodbridge: Boydell Press, 1989).

² K. Wrightson, *Earthly Necessities. Economic Lives in Early Modern Britain, 1470-1750* (London: Penguin, 2002) p. 228.

occurring in the late 1640's. But the government's response to this, the Navigation Act of 1651, would become the corner-stone of a policy intended to cultivate and protect English shipping and foreign trade, centred on England's American plantations. These developments facilitated a shift in England's position in the world economy, as the Atlantic and re-export trades became increasingly important, in what has been described as a 'commercial revolution'.³ The concurrence of these three 'revolutions', political, intellectual, and commercial, guarantees the enduring interest of these turbulent decades, and of those individuals who lived through them.

This study considers the life of one such person. Born in about 1618, Benjamin Worsley was originally trained as a surgeon and served in this capacity in Ireland in the 1640's. However, he found most success as a state expert on colonial and commercial affairs, first as secretary to the Council of Trade founded in 1650, which played an important part in framing the first Navigation Act. He continued to serve the state throughout the 1650's, as surveyor-general in Cromwellian Ireland, and although his achievements were overshadowed by those of his rival William Petty, Worsley retained enough credit to resume his position as advisor and then secretary to the councils of trade of 1668-1673. He is therefore a key figure in understanding the development of commercial policy during these vital years, and the degree of continuity between the Commonwealth and the restored monarchy. Beyond his official employment, Worsley participated in the intellectual and scientific pursuits of his time, collaborating with the famed reformer and intelligencer Samuel Hartlib and his circle, amongst them the young Robert Boyle, whose scientific achievements would far surpass his own. Worsley

³ R. Davis, "English Foreign Trade, 1660-1700", in *The Growth of English Trade in the Seventeenth and Eighteenth Centuries*, ed. W.E. Minchington (London: Methuen, 1969) pp. 78-98; C. Wilson, *England's Apprenticeship 1603-1763*, 2nd edition (London & New York: Longman, 1984) pp. 160-184.

became involved in a changing intellectual climate, as continental mechanism challenged Aristotelian natural philosophy, in conjunction with alternative cosmologies drawn from alchemy and hermeticism, for example. Another model of scientific reform, Bacon's 'advancement of learning', proved especially attractive to those reformers who, like the Hartlib circle, saw the Puritan Revolution as providing the opportunity to create a new society. These hopes would be dashed by the Restoration, and so Worsley's life after 1660 thus tells us something of how the ideals of the Revolution fared under Charles II.

Benjamin Worsley's biography is of interest for a number of different reasons, therefore. Perhaps because of this, his historiographical identity has until recently been somewhat fragmented, as historians have considered him as an actor in various historical narratives without piecing together a full picture. Public activities tend to leave the deepest mark on the historical record, and therefore it is his career as a state employee which has aroused most historical interest. Although he generally avoided assuming too prominent a public face, his pursuit of state employment dictated that Worsley would have to account for his actions on occasion. Thus, following the Restoration, he presented the details of his career in 'publicke service' to the wife of the leading statesman, the Earl of Clarendon; this may serve to introduce Worsley in his own terms:

I was *the* first sollicitour for *the* Act for *the* encouragement of navigation, & putt *the* first fyle to it, and after writt *the* Advocate in defence of it/ In Ireland I held the place of chiefe Clarke or Secretary to the Councell There; of Commissioner *general* for all the Revenew There: of Surveyor *general* for all *the* forfeited lands, and last of all of Commissary generall of *the* musters; In all which places, as I never tooke one farthing fee, or one farthing gratuity from

any person, so I was never advantaged Twenty pound any way, above my bare sallary, and that moneyes I received out of *the Publicke Threasury*.⁴

Here, Worsley assumed the faceless role of a professional administrator uncommitted to any particular regime, and this is just the role that historians of commercial and colonial policy such as George Beer and Charles Andrews have tended to assign to him.⁵ Worsley emerged from these accounts as a key figure in colonial administration during the Interregnum and Restoration, and in the latter period as a notable advisor of the statesman Sir Anthony Ashley Cooper (later the Earl of Shaftesbury).⁶ The fact that a number of Worsley's papers were copied into the notebook of his successor as secretary to the 1672 Council, John Locke, similarly elevated his reputation.⁷ Whilst he was emerging as an important figure in the development of colonial administration, Worsley's Irish career was drawing less accolades.⁸ Fortunately R.W.K. Hinton's identification of Worsley's authorship of two important pamphlets published between 1651-2, justifying the Navigation Act (*The Advocate*) and calling for a system of customs free re-exports, to stimulate an entrepôt trade (*Free Ports*), cemented his significance in the formation of the Commonwealth's

⁴ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300r.

⁵ C. Andrews, "British Committees, Commissions, and Councils of Trade and Plantations, 1622-1675", *John Hopkins University Studies in Historical and Political Science*, Series XXVI, Nos. 1-2-3 (Baltimore: John Hopkins Press, 1908) p. 24; C. Andrews, *The Colonial Period of American History. Volume IV: England's Commercial and Colonial Policy* (New Haven: Yale U.P., 1938) pp. 11, 59-60; G. Beer, *The Old Colonial System, 1660-1754* (New York: Macmillan, 1912).

⁶ R.P. Bieber, "The British Plantation Councils of 1670-4", *English Historical Review*, XL (1925) p. 100; L.F. Brown, *The First Earl of Shaftesbury* (New York & London: Century Co., 1933) pp. 129, 140-142; E.E. Rich, "The First Earl of Shaftesbury's Colonial Policy", *Transactions of the Royal Historical Society*, 5th series, Vol. VII (1957) pp. 53-4, 61; K.H.D. Haley, *The First Earl of Shaftesbury* (Oxford, 1968) p. 255.

⁷ The notebook in question is discussed in P.H. Kelly, "Introduction" to *Locke on Money*, ed. P.H. Kelly (Oxford: Clarendon Press, 1991) pp. 6-7. My thanks to David Armitage for making me aware of these documents. Worsley's possible influence on Locke's economic ideas was considered in P. Laslett, "John Locke, the Great Recoinage, and the Origins of the Board of Trade: 1695-1698", *William and Mary Quarterly*, 3rd series, Vol. XIV, No. 3 (July 1957) p. 377.

⁸ Y.M. Goblet, *La Transformation de la Géographie Politique de l'Irlande au XVIIe Siècle* (Paris: Berger-Levrault, 1930), Tome 1, pp. 214-5.

commercial and colonial policy.⁹ In this context J.E. Farnell could consider the origins of the Navigation Act through the question ‘Who was Benjamin Worsley, the shadowy secretary of the Committee for Trade?’, concluding that he was the ‘picture of a bureaucratic careerist’, representing the merchants whom he saw as the real interests behind the Act (a conclusion expanded by Robert Brenner).¹⁰ His exemplary bureaucratic career ensured Worsley’s inclusion in the ‘social biography’ of the Interregnum civil service constructed by Gerald Aylmer, who suggested that ‘his career bridges the Restoration in a most interesting and- if we knew more about him- suggestive way’.¹¹

Alongside this bureaucratic portrait, however, another side to Worsley was present in the sources, adding flesh to the bones of his career. A letter written by one ‘Dr. Worsley’ had been included in Thomas Birch’s edition of the correspondence of Robert Boyle, suggesting a shared interest in experimental science with the celebrated natural philosopher.¹² More details about this aspect of Worsley’s life became apparent in Samuel Hartlib’s letters in that collection, where the German reformer and publisher described Worsley as ‘that noble and high soaring spirit’.¹³ Worsley’s possible influence on Boyle was considered by Ralph Maddison, who suggested that he was largely

⁹ R.W.K. Hinton, *The Eastland Trade and the Common Weal in the Seventeenth Century* (Cambridge: Cambridge U.P., 1959) pp. 89-94; and reprinted in Appendix B.

¹⁰ J.E. Farnell, “The Navigation Act of 1651, the First Dutch War, and the London Merchant Community”, *The Economic History Review*, 2nd series, Vol. 16, No. 3 (1963-4) p. 441. Robert Brenner’s article, “The Civil War Politics of London’s Merchant Community”, *Past and Present* No. 58 (February 1973) pp. 53-107, does not consider Worsley, but he figures in *Merchants and Revolution. Commercial Change, Political Conflict, and London’s Overseas Traders, 1550-1653* (Cambridge: Princeton U.P., 1993) pp. 588-90, 605.

¹¹ G. Aylmer, *The State’s Servants. The Civil Servants of the English Republic 1649-1660* (London & Boston: Routledge & Kegan Paul, 1973) p. 272.

¹² *The Works of the Honourable Robert Boyle*, ed. T. Birch, 2nd edition, 6 vols. (London, 1772). Vol. VI, pp. 635-6. This edition of Boyle’s works and correspondence has now been supplanted by a new edition which will be generally cited in this thesis, except for when Birch’s edition is specifically being referred to.

¹³ Letter, Hartlib to Boyle, 28 February 1654. Printed in *Ibid.*, p. 79.

responsible for stimulating Boyle's first interests in science.¹⁴ However, it was the historian of the Hartlib circle, Charles Webster, who was to state the full case for Worsley's importance in this respect, and in particular his role in the so-called 'Invisible College'- the institution which had apparently introduced Boyle to the pursuit of science. This has been a source of historical debate ever since Birch equated it with those natural philosophers who began meeting in London in 1645, before eventually gestating into the Royal Society, but Webster differentiated the Invisible College from this group, giving it a particular identity and ethos of its own, and a new importance in Boyle's biography.¹⁵ Thus he argued that 'the Invisible College was initiated in the summer of 1646 by Worsley and Boyle, as a means to propagate their conception of experimental philosophy among their immediate associates'.¹⁶ Concluding that his collaboration with Worsley 'provided the occasion for Boyle's first serious excursion into science', Webster was able to demonstrate the importance of a previously neglected figure in the intellectual development of one of the century's major scientific thinkers, and by extension in the scientific revolution itself.

Webster's purpose was not solely to reintegrate a forgotten figure into accounts of the emergence of modern science, however. Worsley and the Invisible College were merely part of a wider thesis that argued for the role of the Puritan Revolution, and Puritanism in general, in the rise of science in England. Through Worsley, Webster was able to reveal a 'third centre of intellectual organization' in 1640's London, which

¹⁴ R.E.W. Maddison, *The Life of the Honourable Robert Boyle FRS* (London: Taylor & Francis Ltd, 1969) p. 63. See also M. Boas, *Robert Boyle and Seventeenth-Century Chemistry* (Cambridge: Cambridge U.P., 1948) p. 23.

¹⁵ *The Works of the Honourable Robert Boyle*, ed. Birch, Vol. VI, p. xlii.

¹⁶ C. Webster, "New Light on the Invisible College. The Social Relations of English Science in the Mid-Seventeenth Century", *Transactions of the Royal Historical Society*, 5th series, 24 (1974) p. 33. For the early historiography of the 'Invisible College' see *Ibid.*, pp. 21-25, and the works cited there.

absorbed the revolutionary energy of that period.¹⁷ Moreover, Worsley was just one of a wider circle of religiously inspired reformers and intellectuals who sought to transform society in accordance with a divine plan, centred on the figure of Samuel Hartlib. The wider impact of the Puritan Revolution, and specifically of the millenarian world-view, on scientific developments in England, was the theme of Webster's momentous *The Great Instauration*, an account which moved the Hartlib circle from the margins to the centre of intellectual life in the mid-17th-century.¹⁸ This was made possible by the discovery of Hartlib's papers, an event which revealed the existence of an entire network of intellectual, political, and religious figures.¹⁹ Whilst he was barely mentioned by the discoverer of the papers, George Turnbull, Worsley became a major figure in Webster's work, exemplifying the activities and ethos of these Puritan reforming intellectuals perhaps more than any other figure.²⁰ He was the subject of Webster's last major piece of writing about the Hartlib circle, and by authoring his entry in the *Dictionary of National Biography*, Webster symbolically inducted Worsley into the cast of recognised 'actors' in British history.²¹

To Webster, Benjamin Worsley's principal importance was his commitment to a programme of integrated economic planning and scientific research, demonstrating that 'there was no necessary friction between experimental science and ambitious social

¹⁷ Ibid., p. 25.

¹⁸ C. Webster, *The Great Instauration. Science, Medicine and Reform 1626-1660* (London: Duckworth, 1975).

¹⁹ The rediscovery of Hartlib's papers is discussed in M. Greengrass, M. Leslie & T. Raylor, "Introduction" to *SHUR*, pp. 4-8. Webster's work on the Hartlib circle is discussed in Ibid., pp. 9-11.

²⁰ G. Turnbull, *Hartlib, Dury and Comenius. Gleanings from Hartlib's Papers* (London: Hodder & Stoughton, 1947). The importance Worsley occupies in *The Great Instauration* may be gathered by examining its index. Of those figures given more or equivalent space to Worsley here- Jans Amos Comenius, John Dury, William Petty, Gabriel Plattes, and John Wilkins as well as Boyle and Hartlib themselves- only Plattes equals Worsley in his previous obscurity (and much less detail is given of Plattes' life than of Worsley's).

²¹ C. Webster, "Benjamin Worsley: engineering for universal reform from the Invisible College to the Navigation Act", in *SHUR*, pp. 213-233; *DNB- Missing Persons*.

programmes'.²² Furthermore, the goals behind this enterprise were spiritual, aimed at building a utopian state with particular emphasis on 'the recovery of man's dominion over nature', through utilitarian reforms.²³ As Webster saw it, Worsley imparted this spiritually sanctioned ethos of social activism to the Invisible College, and from there to Boyle. The pursuit of science in revolutionary England was not merely a means to retreat from the disquiets of the age, therefore: for Worsley and Boyle it involved social transformation and political engagement. To Webster, the political Revolution presented reformers like Worsley with the opportunity to fulfil their spiritual goals, and to build the millennial state revealed by their eschatology.²⁴ In his wider thesis Webster was to argue at length that millenarian Puritanism, not just Protestantism, was the driving force behind English science in the mid-17th-century.

Webster's reformers did not passively wait for the approaching millennium, however. Instead, their expectations were directed into practical scientific, educational, or economic reforms (for example), all of which aimed to prepare the ground for Christ's return: for them 'the New Jerusalem was not conceived of in terms of minor religious changes, but as a dramatic leap forward which would achieve not only totally successful religious concord, but also social amelioration and intellectual renewal'.²⁵ Importantly, these were not isolated efforts but showed a high degree of organisation, and crucial in these respects were Hartlib's tireless efforts to promote co-operation amongst intellectuals and political patrons, creating a true 'spiritual brotherhood'.²⁶ Like Hartlib, Worsley's aspirations were broad ranging and eclectic, and Webster argued that

²² Webster, "New Light", p. 40.

²³ Ibid., p. 34.

²⁴ See especially Webster, *Great Instauration*, pp. 1-31.

²⁵ Ibid., p. 7.

²⁶ Ibid., pp. 32-99.

they were driven by an impulse to enact the 'universal reform' of society, knowledge, and religion. Spurred on by a faith in the coming rule of Christ, these reformers sought to rework the world into its pre-lapsarian state; their faith was projected externally into practical efforts, which in Worsley's case included the commercial policies of the Commonwealth. Since the publication of *The Great Instauration*, other historians have cast light on aspects of Worsley's life: T.C. Barnard on his career in Ireland in the 1650's, John Young on his visit to the Netherlands from 1648-9, and Antonio Clericuzio on Worsley's previously unrecognised authorship of a discussion of astrology once attributed to Boyle, for example.²⁷ Michael Hunter has presented a more critical assessment of Webster's account of the Invisible College, downplaying Worsley's influence on Boyle's intellectual development.²⁸ However Webster has restated his case for the importance of the millenarian world-view in the second edition of *The Great Instauration*, asserting that Worsley's 'role as the midwife to the Navigation Act demonstrates this puritan ideologue's confidence in the ability to advance towards rule of the saints on earth by means of economic and political will'.²⁹

This quotation shows how, for Webster, the goal of 'universal reform' united Worsley's various endeavours, public and private. Indeed, an ideal of universality marked many of the Hartlib circle's projects, ranging from Comenius' vision of universal knowledge, *Pansophy*, to the alchemical goal to restore the unity of the

²⁷ T.C. Barnard, *Cromwellian Ireland. English Government and Reform in Ireland 1649-1660*, 2nd edition (Oxford: Clarendon Press, 2000) pp. 219-222, 230-233; J.T. Young, *Faith, Medical Alchemy and Natural Astrology. Johann Moriaen, Reformed Intelligencer, and the Hartlib circle* (Aldershot: Ashgate, 1998) pp. 217-246; A. Clericuzio, "New Light on Benjamin Worsley's natural philosophy" in *SHUR*, pp. 236-246. For the latter, see also J. Henry, "Boyle and cosmical qualities", in *Robert Boyle Reconsidered*, ed. M. Hunter (Cambridge: Cambridge U.P., 1994) pp. 119-138.

²⁸ M. Hunter, "How Boyle Became a Scientist", in *Robert Boyle 1627-1691. Scrupulosity and Science* (Woodbridge: Boydell Press, 2000) pp. 22-23.

²⁹ C. Webster, "'Introduction to the Second Edition", *The Great Instauration*, 2nd edition (Oxford: Peter Lang, 2002) p. xxxii. See also *Ibid.*, pp. xxxviii-xxxix.

material and the spiritual, and John Dury's quest to unify the Protestant Churches.³⁰ However, in this they were flying in the face of powerful trends, in 'a period of unprecedented division and diversity of opinions and ideologies in all fields, the religious, the political, the philosophical and the scientific'.³¹ As well as being rich in intellectual change, this was a period of readjustment and instability, and the ideas of the new philosophy could appear to threaten a Europe already reeling from the divisions of the Reformation.³² The initiatives of the Hartlib circle were therefore formed in a context of intellectual instability, and were defensive as well as positive. Worsley was a part of the Hartlib circle but also of a younger generation to the 'three foreigners' Hartlib, Dury and Comenius: his experience reveals how their goal of 'further reform' fared in the maelstrom of the English Revolution and the intellectual shifts taking place at that time.³³ However, for Worsley mid-17th-century England was subject to other, equally powerful forces. These were the commercial changes that were transforming Europe, which were as important in informing Worsley's outlook as the intellectual and political revolutions with which they coincided.

In 1668, Worsley wrote a memorandum for the statesman Sir Anthony Ashley Cooper, outlining commercial ideas which he had begun to espouse during the

³⁰ Young, *Faith, Medical Alchemy and Natural Philosophy*, passim. For the latter, A. Milton, "The Unchanged Peacemaker"? John Dury and the politics of irenicism in England, 1628-1643", in *SHUR*, pp. 95-117.

³¹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 250.

³² For this intellectual background, see R. Popkin, *The History of Scepticism from Erasmus to Spinoza* (Berkeley, Los Angeles & London: University of California Press, 1979). For the response of natural philosophers to the threats of atheism and materialism, M. Hunter, "Science and heterodoxy: An early modern problem reconsidered" in *Science and the Shape of Orthodoxy. Intellectual Change in Late Seventeenth-Century Britain* (Woodbridge: Boydell Press, 1995) pp. 225-244.

³³ For the concept of the 'three foreigners', H. Trevor-Roper, "Three Foreigners: The Philosophers of the Puritan Revolution", in *Religion, The Reformation and Social Change* (London: Macmillan, 1967) pp. 237-293.

Interregnum. In particular, he reflected on that branch of commerce which had assumed paramount importance in England's commercial destiny- its colonial trade. The strategic importance of this trade to the nation was by now so great, he suggested, that:

the plantations considered in their present state do not more if soe much depend upon the interest of England, as the interest of England doth now depend upon them. For if the Ballence of our trade can now noe way be preserved or kept up without them It is not onely manifest how much we stand in need of them and how incapable wee are at present to subsist without the trade of them; But equally manifest; that the very interest of this nation & of the trade of it is now changed, and vastly different from what it was forty years since.³⁴

Worsley was of course alluding to the relative decline of English cloth exports since the 1620's, and the growth of colonial trade which (he believed) had been keeping England afloat ever since. For Worsley, this necessitated a new and proactive approach to governing trade by the state, and the progress of his career suggests that others in power shared his convictions.

The vehicles for Worsley's career were those councils of trade and plantations on which he served from 1650-1 and 1668-73. Prior to the establishment of the Board of Trade in 1696 such councils were sporadic and their effectiveness limited, but they were the principal location for debates concerning the appropriate approach of the early modern English state to trade.³⁵ Here the ideals of public good and social order, which had long underlain the state's response to economic change, were to be reconciled with an increasingly complex commercial world. The composition and aims of these bodies reflected a wider debate in 17th-century England about the relationship between foreign trade and the public interest, which itself reflected the commercial changes taking place.

³⁴ 'The peculiar advantages which this Nation hath by the trade', 14 August 1668. PRO 30/24/49 fol. 221v.

³⁵ On these councils, see Andrews, "British Committees"; P. Gauci, *The Politics of Trade: The Overseas Merchant in State and Society, 1660-1720* (Oxford: Oxford U.P., 2001) pp. 180-193.

Although the 1650 Council of Trade has been seen as a departure, the idea of such a body was by no means new. Most recently, the political crisis of 1640-1 had brought forth calls for more systematic government action to promote trade, a situation which Samuel Hartlib capitalised on by publishing Gabriel Plattes' *A Description of the Famous Kingdome of Macaria*. This pamphlet presented a utopian vision of a kingdom living in 'great plenty, prosperitie, health, peace, and happinesse', ordered at the centre by a set of five councils, for husbandry, fishing, trade by land and sea, and foreign plantations.³⁶ Over the following two decades, Hartlib and his associates unofficially followed the principles of *Macaria* through various projects for agricultural and technological innovation and poor relief, intending to improve trade and create a strong, wealthy nation.³⁷ *Macaria* was one of several reforming pamphlets which appeared at the same time, notably *Englands Safety in Trades Encrease* by Henry Robinson (an associate of Hartlib) and Lewes Roberts' *The Treasure of Trafficke*.³⁸ These outlined similar programmes to ease the burdens on commerce, improving the balance of trade by exploiting the fisheries and plantations, and emulating the epitome of commercial success of the time, the Dutch, through 'staples of trade' which would make England 'the *Emporium* or Warehouse from whence other Nations may bee furnished with forraine commodities of all sorts'.³⁹ Both authors envisaged these efforts being centrally directed by the state: for Robinson, by a 'Commission, ... advising and consulting all

³⁶ G. Plattes, *A Description of the Famous Kingdome of Macaria* (London, 1641) p. 2. See also C. Webster, "The Authorship and Significance of Macaria", *Past and Present*, no. 56 (1972) pp. 34-48; Webster, *Great Instauration*, pp. 47-51.

³⁷ See in general, Webster, *Great Instauration*, pp. 324-483.

³⁸ H. Robinson, *Englands Safety in Trades Encrease* (London, 1641); L. Roberts, *The Treasure of Trafficke, or a Discourse of Forraigne Trade* (London, 1641) printed in J.R. McCulloch (ed.) *Early English Tracts on Commerce* (Cambridge: 1856) pp. 49-113. The importance of these two authors to the Hartlib circle is discussed in Webster, *Great Instauration*, pp. 355-8. For Robinson, see also W.K. Jordan, *Men of Substance. A Study of the Thought of Two English Revolutionaries* (Chicago & Illinois: University of Chicago Press, 1942) pp. 215-258.

³⁹ Roberts, *Treasure*, p. 88; Robinson, *Englands Safetie*, p. 20.

advantages of commerce, amongst which some understanding Merchants will be necessarie', and for Roberts by a body of 'able and discreet Merchants, with power and sufficient priviledge, to examine the disorders of trafficke, and irregular Traders ... entituled as States-merchants'.⁴⁰ Thus by 1650 the idea of some sort of body to oversee trade was well established. Furthermore, the Council formed in that year had a particularly significant predecessor in the commission founded in 1622 to consider the decay of the cloth trade, but whose remit was much broader.⁴¹ The creation of this body demonstrated awareness that the traditional, indirect means by which the state governed domestic and foreign trade, through chartered companies, was no longer sufficient. Those councils formed over the following 50 years represented an extended attempt to meet this problem, but the same issue was as central when Worsley finally retired from state service in 1673 as it had been in 1622.

Unsurprisingly, therefore, many historians have stressed the continuities in commercial policy over this period, concluding for example that 'there was no fundamental change in the approach of the state to economic and social matters as a result of the political cataclysms of the mid century'.⁴² Partly, this is symptomatic of a reaction to teleological, and especially Marxist, accounts of the English Revolution which highlighted its modernising aspects, interpreting the Commonwealth's commercial policy as variously reflecting 'laissez faire' hostility to paternalistic or monopoly economic regulation; the aggressive promotion of commercial interests by the state; or more abstractly, an economic individualism derived from Puritanism.⁴³ The

⁴⁰ Robinson, *Englands Safetie*, p. 46; Roberts, *Treasure*, pp. 94-5.

⁴¹ See the instructions, printed in T & C, pp. 16-27; Andrews, "British Committees", pp. 11-12.

⁴² C. Clay, *Economic Expansion and Social Change: England 1500-1700. Volume II. Industry, trade and government* (Cambridge: Cambridge U.P., 1984) pp. 239-40.

⁴³ C. Hill, *The Century of Revolution 1603-1714*, 2nd edition (London: Routledge, 1980); R. Brenner, "Civil War Politics", & *Merchants and Revolution*; M. James, *Social Problems and Policy During the Puritan Revolution* (London: Routledge, 1930). See also C.B. Macpherson, *The Political Theory of*

reaction to such accounts can be summed up by Blair Worden's conclusion that 'the Rump's preoccupation with commerce reflected rather than created a trend. The government's economic concerns remained traditional'.⁴⁴ Furthermore, these conclusions may be applied to the commercial policy of the period generally, which may be seen as consistently based on 'the time-honoured concept of the proper relationship between trade and the public interest', rather than any 'progressive' goals.⁴⁵

Focussing on the career of Benjamin Worsley, this thesis will argue that the state responded to commercial expansion in a more dynamic way than this suggests. However, the degree to which this was part of a coherent strategy should not be overstated, and the state itself was not a single, reified entity, consistently pursuing fixed and stable goals. M.J. Braddick has suggested a definition of the state as 'a coordinated and territorially bounded network of agencies exercising political power' rather than a specific institution, and this is helpful in interpreting the formation of commercial policy.⁴⁶ Braddick's account shows how state power was diffused throughout the nation, but it still emanated from those centralised institutions and offices of state which also provided legitimacy through legal and constitutional formalities, as well as 'with reference to beliefs current in society at large'.⁴⁷ In terms of commercial policy, therefore, different agents sought to advance their own interests by arguing that they coincided with a particular 'interest of state', hoping to influence members of government whose own response was constrained by political and social ideals. Of course traditional goals of social order remained important, but equally

Possessive Individualism (Oxford: Clarendon Press, 1962). For an analysis of the relevant historiography, see A. Hughes, *The Causes of the English Civil War* (Basingstoke & London: Macmillan, 1991) pp. 117-154.

⁴⁴ B. Worden, *The Rump Parliament 1648-1653* (Cambridge: Cambridge U.P., 1974) p. 299.

⁴⁵ *Ibid.*, p. 258.

⁴⁶ M. Braddick, *State Formation in Early Modern England* (Cambridge: Cambridge U.P., 2000) p. 9.

⁴⁷ *Ibid.*, p. 47.

government was open to innovation, particularly given that commerce was seen as an area of expansion. The commercial councils on which Worsley served attempted to meet these demands, extending state power over trade; their varying composition and format demonstrates how this area stretched the existing structures for governance, which were often based on traditional social roles and duties which had little relation to the world of commerce.⁴⁸ Worsley's strategy was to exploit this by assuming a sort of ideological neutrality, his status as neither merchant nor statesman allowing him to discern the public interest in trade from an informed, but impartial, position, identifying his interests with those of the state.⁴⁹ Worsley's career may therefore serve as a sort of 'microhistory' of the making of commercial policy.

Commercial policy was the outcome of several negotiations between the state and interested parties, and amongst various agents claiming to speak on behalf of the state itself, therefore. These agents deployed ideas which were part of- to use the contemporary phrase- a 'discourse of trade' which was carried out both in print and in front of bodies like the councils of trade. This discourse, which Worsley both deployed and participated in, focussed on how international trade was changing the English nation and its place in the world, which in turn had ramifications for commercial policy.⁵⁰ Here, the state was called on to respond to the perpetual instability and danger faced by trading nations, which meant that prosperity could be lost at any moment. Thus

⁴⁸ Ibid.; M. Braddick, "Civility and Authority", in *The British Atlantic World, 1500-1800*, ed. D. Armitage & M. Braddick (Basingstoke: Palgrave Macmillan, 2002) pp. 93-112.

⁴⁹ This corresponds with Gauci's account of the impact of commerce on 17th-century English politics, in *The Politics of Trade*. Worsley's career may here be compared with his successors in colonial administration, such as William Blathwayt, whose individual interests were intrinsically tied to those of the state in the form of permanent, salaried posts: S.S. Webb, "William Blathwayt, Imperial Fixer: From Popish Plot to Glorious Revolution", *William and Mary Quarterly*, 3rd series, Vol. 25, No. 4 (October 1968) pp. 1-21.

⁵⁰ The phrase 'discourse of trade' was used as a title for books by Thomas Mun, Sir Josiah Child, Slingsby Bethel, Roger Coke and Sir Dudley North, for example. It is preferred here to the anachronistic term 'economic thought', which tends to encourage teleological interpretations of 17th-century commercial writings.

in 1641 Sir Thomas Roe warned parliament that England's current commercial success at the expense of the Dutch (who were at war with Spain) was 'changeable and depending more upon the iniquity or misery of the times, than upon our own foundation and industry ... for nothing stands secure but upon its own foundation'.⁵¹ Similarly Henry Robinson warned that 'unlesse wee show our selves sole Sovereaigne of the Sea, and with our Trident Scepter give lawes (whilst we may) to all Nations there, wee must receive them from others', sentiments which Worsley was to echo a decade later, by which time the feared revival of Dutch shipping had taken place.⁵² The commercial prowess of the United Provinces was a constant source of inspiration as well as concern for Englishmen throughout the 17th-century, but not all of them could claim to have witnessed the workings of Amsterdam's entrepôt as closely as Worsley, who was based there from 1648-9, just as Dutch merchants began to take full advantage of the problems facing English merchants to capture their markets. Aware of the possibilities of expanded commerce, Worsley was equally alive to the danger of dependence on a rival: success in trade was a *necessity*, not a luxury.

Amsterdam was something of an intellectual entrepôt as well as a commercial one, and his time there would influence Worsley on many levels. Its legacy may be seen in his lasting usage of the language of 'interest', a speciality of the mercantile politicians of the States General, which was based on specific circumstances rather than universal values.⁵³ To many English writers interest theory was able to capture the

⁵¹ T & C, pp. 43-4.

⁵² Robinson, *Englands Safetie*, p. 2.

⁵³ Although it found particular usage by Dutch Republicans such as Johann de Witt, the classical account of 'interest theory' was French: Henri duc du Rohan's *A Treatise of the Interest of the Princes and States of Christendome*, (London, 1641), which was included in Worsley's printed library catalogue. Particular examples of English commercial pamphlets using the idea of interest are S. Bethel, *The Present Interest of England Stated* (London, 1671); S. Fortrey, *Englands Interest and Improvement*, 2nd edition (London, 1673); W. Carter, *Englands Interest by Trade Asserted* (London, 1671); C. Reynel, *The True English Interest, Or an Account of the Chief National Improvements* (London, 1674). For the intellectual

transformative power of commerce, but equally it allowed the ideal of public good to be preserved in the face of commercial change: 'redefining the commonwealth', in Wrightson's words.⁵⁴ Private interests were still seen as 'often impediments of publick profit; for in what any single person shall be a loser, there, endeavours will be made to hinder the publick gain'.⁵⁵ Merchant writers had to defend themselves against charges of pursuing '*that many-headed Monster*', private interest, to which end Edward Misselden asked the rhetorical questions 'Is not gaine the end of trade? Is not the publique involved in the private, and the private in the publique?'.⁵⁶ This demonstrates the tensions which commercial expansion exerted on existing social preconceptions, and Craig Muldrew has shown how ideas about community relations were reworked as a consequence of the dramatic rise in market transactions of the 16th-century, which was built mainly on credit.⁵⁷ The resulting 'economy of obligation' generated a new sense of the competitive nature of society, seen 'not just as the positive expression of social unity through Christian love and ritual as had been the case in medieval England, but increasingly as the cumulative unity of the millions of interpersonal obligations which were continually being exchanged and negotiated'.⁵⁸ This implies that the early modern 'economy' was understood as simultaneously 'public' and 'private': commerce could

background, see J. Spurr, *England in the 1670's* (Oxford: Blackwell, 2000) pp. 118-9; R. Tuck, *Philosophy and Government, 1572-1651* (Cambridge: Cambridge U.P., 1993); A. Houston, "Republicanism, the politics of necessity, and the rule of law", in *A Nation Transformed. England After the Restoration*, ed. A. Houston & S. Pincus (Cambridge: Cambridge U.P., 2001) pp. 241-271; J.A.W. Gunn, *Politics and the Public Interest in the Seventeenth Century* (London & Toronto: Routledge, 1969); J. Scott, *Algernon Sidney and the English Republic, 1623-1677* (Cambridge: Cambridge U.P., 1988) pp. 207-221.

⁵⁴ Wrightson, *Earthly Necessities*, pp. 202-226.

⁵⁵ S. Fortrey, *Englands Interest and Improvement* (London, 1673) in McCulloch (ed.) *Early English Tracts*, pp. 8-9.

⁵⁶ [W. Petyt], *Britannia Languens, or A Discourse of Trade*, in McCulloch (ed.) *Early English Tracts*, p. 287; E. Misselden, *The Circle of Commerce, or, The Ballance of Trade, in defence of Free Trade* (London, 1623) p. 17;

⁵⁷ C. Muldrew, *The Economy of Obligation: The Culture of Credit and Social Relations in Early Modern Europe* (London & Hampshire: Macmillan, 1998).

⁵⁸ *Ibid.*, p. 123.

not exist outside of civil society, and civil society could not exist without a public authority to uphold contractual relations. Here, the role of government was to navigate between competing private interests in the name of the public good, representing and realising an imagined community of interests.

As private interest was increasingly described economically, so too the economic aspect of the public good was elaborated and stressed, as was the role of the state in defending or advancing it. It has been argued that Tudor reformers such as Sir Thomas Smith, author of *A Discourse of the Commonweal of this Realm of England*, 'began to weld politics to economics in such a way as the state was eventually conceived primarily as a mechanism through which diverse economic interests could be promoted and protected and their conflicts resolved'.⁵⁹ Already, the defence of overseas trade was seen as a responsibility of the state, and Smith's *Discourse* advised that 'we must always take heed that we buy no more of strangers than we do sell them; for so we should impoverish ourselves and enrich them'.⁶⁰ However, over the following decades commerce became increasingly complex, and although 'the established nexus of the cloth trade between London and north-west Europe continued', towards the end of the century 'English merchants ... were also venturing further afield- to the Baltic, Iberia, the Mediterranean, the East Indies and the New World'.⁶¹ In particular, the period 1550-1640 saw an expansion of luxury import trades from the south based on increased

⁵⁹ N. Wood, *Foundations of Political Economy. Some early views on state and society* (London & Berkeley: University of California Press, 1994) p. 2. For the economic policies of this period, see Wrightson, *Earthly Necessities*, pp. 155-158; J. Thirsk, *Economic Policy and Projects. The Development of a Consumer Society in Early Modern England* (Oxford: Clarendon Press, 1978); P. Ramsey, "The Tudor State and Economic Problems", in *State and Trade. Government and the Economy in Britain and the Netherlands Since the Middle Ages*, ed. S. Groneveld & M. Wimthe (Zutphen: Walburg Press, 1992) pp. 28-38.

⁶⁰ [Sir Thomas Smith], *A Discourse of the Commonweal of this Realm of England*, ed. Mary Dewar (Charlottesville: University Press of Virginia, 1969) p. 63.

⁶¹ Wrightson, *Earthly Necessities*, p. 177.

domestic demand, led by the Levant and East India Companies who increasingly displaced the Merchant Adventurers as London's trading elite.⁶² Whilst these efforts to establish direct trade with lucrative markets were promoted privately, they were encouraged by the state through corporate privileges, suggesting official recognition of the need to promote and regulate trade, on behalf of the public good.⁶³

The late 16th-century also saw a rise in interest in the New World, principally through privateering or fishing voyages rather than attempts at long-term settlements, but already some envisaged a more permanent presence in America based on producing 'Marchantable commodities'.⁶⁴ By the early decades of the 17th-century, colonial and commercial expansion were firmly associated, and company merchants initially sought to capitalise on the opportunities emerging in America.⁶⁵ However, the necessity to create permanent settlements meant that these merchants generally withdrew from the business of colonisation, allowing a number of non-company traders, often planters themselves, to dominate the emerging colonial trades of the 1620's-30's.⁶⁶ It has been suggested that the existence of two distinct groups involved in English trade, the company merchants who relied on crown privilege for their commercial success, and the 'new merchants' involved in colonial trade who did not, had ramifications for the

⁶² Brenner, *Merchants and Revolution*, pp. 3-50.

⁶³ Hinton, *The Eastland Trade and the Common Weal*; M. Braddick, "Government, War, Trade, and Settlement", in *The Oxford History of the British Empire. Vol. 1. The Origins of Empire*, ed. N. Canny (Oxford: Oxford U.P., 1998) pp. 293-4.

⁶⁴ For this period in general, K.R. Andrews, *Trade, Plunder and Settlement. Maritime enterprise and the genesis of the British Empire, 1480-1630* (Cambridge: Cambridge U.P., 1984). Commercial factors were highlighted in Thomas Hariot's *A Briefe and true report of the new found land of Virginia* (London, 1590), a compendium of New World commodities. Notable too was the Elizabethan colonial publicist Richard Hakluyt, whose *A Discourse Concerning Western Planting* (1584) presented the benefits of 'planting' in commercial terms: see M. Jensen (ed.) *English Historical Documents Volume IX. American Colonial Documents to 1776* (London: Eyre & Spottiswoode, 1955) pp. 103-4; N. Zahedieh, "Economy", in *The British Atlantic World, 1500-1800*, ed. Armitage & Braddick, pp. 51-2; D. Armitage, *The Ideological Origins of the British Empire* (Cambridge: Cambridge U.P., 2000) pp. 72-77.

⁶⁵ C. Shammas, "English commercial development and American colonization 1560-1620", in *The Westward Enterprise. English activities in Ireland, the Atlantic, and America 1480-1650*, ed. K. Andrews, N. Canny, P. Hair (Detroit: Wayne State U.P., 1979) pp. 151-174.

⁶⁶ Brenner, *Merchants and Revolution*, pp. 92-112.

course of the English Revolution.⁶⁷ This is a complex issue, and it has been argued that the merchant community was not clearly polarised between company royalists and free-trading parliamentarians: in fact, the merchant community in general had become alienated by Charles I's treatment.⁶⁸ Despite this, the fact that the new merchants were not reliant on crown privileges meant that they were better positioned to capitalise on the political developments of the 1640's and '50's than their company counterparts, whose royal privileges were inevitably threatened by the regicide. The new merchants were certainly able to use the aggressively competitive ethos on which they relied for commercial success when promoting their interests to government, and colonial trade came to be seen by many, including Worsley, as representing a new era in global commerce, which might sweep away the old order.⁶⁹

Thus in 1640 it was possible to envisage a transformation of England's commercial fortunes, and many hoped that parliament might bring about this change. However, this did not necessarily amount to a battle of conflicting economic ideologies, free trade versus regulation, and 'the Civil War was not fought between rival schools of economists'.⁷⁰ Parliamentary attitudes to the merchant companies had evolved since the 1604 campaign against monopolies, when parliament defended free trade as part of their claim to uphold English liberties and the economic interests of the localities.⁷¹ Ashton argued that after 1621 parliamentary criticisms of merchant companies declined,

⁶⁷ Ibid.

⁶⁸ R. Ashton, *The City and the Court 1603-1643* (Cambridge: Cambridge U.P., 1979) pp. 121-156. Brenner, in contrast, argued that having become strained in the late 1620's, the relationship between the crown and the companies was fully restored by 1640: *Merchants and Revolution*, pp. 199-239, 281-315.

⁶⁹ See D.H. Sacks, *The Widening Gate. Bristol and the Atlantic Economy, 1450-1700* (Berkeley, Los Angeles, & London: University of California Press, 1991).

⁷⁰ P. Corfield, "Economic Issues and Ideologies", in *The Origins of the English Civil War*, ed. C. Russell (London & Basingstoke: Macmillan, 1973) p. 198.

⁷¹ B. Supple, *Commercial Crisis*. p. 30. Here, the expansion of trade generally meant its expansion from the confines of London, to the outports: R. Ashton, "Parliament and Free Trade in 1604", *Past and Present*, xxxviii (1967) pp. 42-55.

revealing a greater awareness that they were not necessarily the commercial corollaries of the hated industrial monopolies.⁷² Indeed, attitudes to companies were not clearly polarised, and there were still good reasons to argue for their preservation, notably the need for protection against Dutch merchants. Thus, despite the danger of a revival of the free trade debate, company merchants like Roberts and Robinson welcomed the recall of parliament in 1640 as providing an opportunity not only to revive, but to expand trade, and 'there was a fresh economic orthodoxy on the eve of the Civil War which was willing to accept a decline in the importance of England's traditional industrial staple, and was busy planning a new equilibrium along the lines which ultimately proved most fruitful'.⁷³

Cloth remained the biggest English export over these years, but the depression of the early 1620's had shown the dangers of over-reliance, and Worsley was not alone in noting the its relative decline by 1668. He became a prominent advocate of the development of colonial trade in the protected environment provided by the Navigation Acts, based on diversification, expansion, and re-exports. This solution combined a sense of insecurity with one of optimism about commercial expansion, a mindset appropriate to a period of 'prolonged crisis arising from a radical readjustment of England's foreign trade'.⁷⁴ Although many contemporaries agreed that foreign trade was the means to prosperity and power, this was still a relatively stagnant economy in which labour was underemployed and trade was hindered by a chronic lack of circulating capital.⁷⁵ The goal therefore was to discover the key to unlocking the

⁷² Ashton, *The City and the Court*, pp. 123-9.

⁷³ B. Supple, *Commercial Crisis and Change in England 1600-1642. A Study in the Instability of a Mercantile Economy* (Cambridge: Cambridge U.P., 1959) p. 224.

⁷⁴ Wilson, *England's Apprenticeship*, p. 53.

⁷⁵ Supple, *Commercial Crisis*, p. 249.

unrealised potential of human industry and natural resources, to find a way to encourage the circulation of goods and money and quicken trade, and Worsley shared with John Locke the belief that colonial trade could perform this role.⁷⁶

One aim of this thesis, therefore, is to understand how Worsley's career as a state expert in affairs of trade was part of wider developments in commercial policy. I will argue that the English Revolution was instrumental in promoting a particular conception of the national interest of England in overseas trade, although not necessarily as a direct consequence of the conflicts of the Civil War. Although conflict was important, the discourse of trade was successful because it could serve the purposes of different regimes, as was shown by the conscious emulation of aspects of the Commonwealth's commercial policy by the Restored monarchy. Because it bridged the watershed of the Restoration, Worsley's career offers a particular insight into these developments.

This thesis is not only about developments in commercial ideas and policies, however. Thanks to Charles Webster we are aware of a far greater range of interests and ideas than Worsley's public career alone reveals: his scientific and other intellectual activities, as revealed in his correspondence with the Hartlib circle. These letters, too, reveal his complex and radical spiritual beliefs, which deeply influenced his response to the new scientific ideas he encountered: an intense spiritualism which became increasingly incompatible with the amoral world of commerce. Through Worsley, we see something of the fate of universal reform, the ideal so central to the aspirations of

⁷⁶ P. Kelly, "Introduction" to *Locke on Money*, pp. 52-3.

Samuel Hartlib and the Reformed Central European intellectual traditions which he represented.

This account of Worsley's career in commercial and colonial policy will therefore be encased within a more conventional biography describing his broader activities and perspectives. Broadly, I will combine a chronological and thematic analysis, across three parts- the 1640's (Part 1), the 1650's (Part 2), and the Restoration (Part 3). Chapter 1 looks at Worsley's early life, and how he progressed from a career in surgery to undertake various projects, notably to manufacture saltpetre, which established his reputation, showing also his early ideas about trade and colonisation. Chapter 2 then considers his intellectual and scientific activities of this period, in London and Amsterdam, including his early acquaintance with Robert Boyle. Chapter 3 moves onto the 1650's, and Worsley's employment on the Commonwealth's important Council of Trade, from 1650-1. Chapter 4 continues the narrative of Worsley's public career in the 1650's, considering his role in the Cromwellian administration of Ireland. Ireland also forms the location for the next 2 chapters, which consider the development of Worsley's scientific and religious ideas respectively. Chapter 6 concludes with the collapse of the English Commonwealth, and the final two chapters examine how Worsley adapted to this development. Thus chapter 7 focuses on his role in the commercial policy of the restored monarchy, and chapter 8 considers more broadly how the Restoration of Church and King affected Worsley as an individual who had thrived in the political and religious environment of the 1650's. In this way, I hope not only to offer a detailed and perceptive account of Benjamin Worsley's life and ideas in their historical context, but also to cast light on those broader historical developments through which he lived.

Part 1.

1618-1649.

[Mr. Worsley] traded only in slights to become suddenly rich, as by the
Universal Medicine, Making of Gold, Sowing of Salt-Peter, Universal Trade,
Taking great Farms, &c...

William Petty, *Reflections on Some Persons and Things in Ireland* (London, 1660) p. 107.

1. 'Corruption into Policy'.

From Surgery to Saltpetre, 1618-1646.

Our detailed knowledge of the life of Benjamin Worsley begins in 1645, with his introduction to the Hartlib circle and the subsequent preservation of several of his letters and papers, many concerning the project which brought him to Hartlib's attention, for the chemical manufacture of saltpetre. However, by then Worsley was already in his late 20's with one career behind him, as a surgeon in the army in Ireland. The details of Worsley's life before 1645 are obscure, but what we do know suggests that this was a formative period for him.

From the few sources available, it appears that Worsley was probably born in 1618 in London, the eldest son of parents originally from Warwickshire of a prosperous farming family.¹ Worsley himself was trained as an apprentice to one Thomas Cooke, surgeon, and a Liveryman of the Worshipful Company of Barber-Surgeons of London. He was accepted to the Company on December 1639, presumably spending the years 1632-9 learning the skills of his trade in Cooke's surgeon's shop in the parish of St

¹ Worsley's inclusion in the 1664 London visitation records listed his parents as Francis Worseley of Kenton or Kington, County Warwick, and Mary, daughter of Shipman Hopkins of Coventry, gent. J.B. Whitmore & A.W. Hughes Clarke (eds.) "London Visitation Pedigrees 1664", *Harleian Society Publications*, Vol. XCII (1940) p. 154. The published entry lists the 'Worseley' family arms as 'a chief gules, a crescent on the field'. On entering Trinity College Dublin in 1643, Worsley described himself as a pensioner aged 25 from London, and an eldest son. G.D. Burtchaeli & T.U. Sadlier (eds.) *Alumni Dublinenses. A Register of the Students, Graduates, Professors and Provosts of Trinity College in the University of Dublin (1593-1860)* (Dublin: Alex, Thomson & Co., 1935) p. 895. Worsley's father Francis was an overseer of the will of Worsley's uncle, one Leonard Worsley, also of Kington, dated 18 April 1614. Leonard was able to leave £50 each to his two children, with an inventory of household goods and livestock amounting to over £600, and substantial livestock. John Worsley, his grandfather and Worsley's great-grandfather, was also a resident in Kington, described as a gentleman in his will dated 1558. These wills are included in J.B. Whitmore (ed.) *London Will Abstracts*, Vol. 13 (London: Society of Genealogists, 1961). Whitmore had already taken interest in Benjamin Worsley: having come across his name in the London Visitation Pedigrees of 1664, he authored a short article on him- "Dr. Worsley Being Dead", *Notes and Queries*, August 28 1943, pp. 123-128.

Mary Woolnoth, Lombard Street, at the heart of the City.² Socially, surgeons were recruited from a range of backgrounds, but the fact that they were able to put their eldest son into this reputable trade suggests that Worsley's parents, having left the country, were probably numbered amongst the capital's 'middling sort'. In the course of his apprenticeship Worsley would have learned the skills of surgery: dressing and treating wounds and burns, setting bones, and performing amputations, as well as more routine tasks like pulling teeth and letting blood, and the anatomical and physiological knowledge the practitioner required.³ He may also have encountered those other pursuits which surgeons, faced by the intense competition of the 'medical marketplace' of early modern London, often practised in their shops, and which identified them with the city's burgeoning consumer culture.⁴

Despite being trained in London, Worsley's first appointment took him far away from the city. By January 1642 he had reached the position of surgeon-general of the English army at Dublin, beginning an association with Ireland which would last until the Restoration. In that month he was issued two payments from the Lords Justices and Council, one of £9 for 27 days payment, and another of £40, £30 of which he was to allocate to the surgeon-majors of three regiments.⁵ Worsley's autobiographical letter to Lady Clarendon described how he arrived in Ireland in 1640 and was taken into the

² Worsley's admission to the freedom of the Company of Barber-Surgeons is recorded in the Register of Admissions, Guildhall Library MS 5265/1, fol. 94r. (Copy held on microfilm). Cooke cannot have been much older than Worsley, for he was apparently made free of the Company in 1627/8; he seems to have died in 1663. S.R. James, "A List of Surgeons in Practice in London and its Suburbs in 1641", *Bulletin of the History of Medicine*, 19 (1946) p. 284. For apprentices, see S. Young (ed.) *The Annals of the Barber-Surgeons of London* (London: Blades, East & Blades, 1890) pp. 259-260.

³ A. Wear, *Knowledge and Practice in English Medicine, 1550-1680* (Cambridge: Cambridge U.P., 2000) pp. 210-274; M. Pelling & C. Webster, "Medical Practitioners", in *Health, Medicine and Mortality in the Sixteenth Century*, ed. C. Webster (Cambridge: Cambridge U.P., 1979) pp. 173-177.

⁴ M. Pelling, "Medical Practice in Early Modern England: Trade or Profession?", in *The Professions in Early Modern England*, ed. W. Prest (London et al: Croom Helm, 1987) pp. 102-3. For the 'medical marketplace' in London, H. Cook, *The Decline of the Old Medical Regime in Stuart London* (Ithaca & London: Cornell University Press, 1986) pp. 28-69.

⁵ *CSPI, 1633-47*, pp. 216, 780.

household of the Earl of Strafford, although the Lord Lieutenant himself left Ireland for the last time that April.⁶ It appears that Worsley took up the post of surgeon-general following the outbreak of the Ulster rising in October 1641, when (he explained) the authorities 'were pleased to have that good opinion of me, as to commit to my sole Care *the* forming of an Hospitall with such officers and Conveniencies as were fitt, for *the* receiving the weake and wounded men of *the* whole Army'.⁷ Service in the army was common for young surgeons, who were required to serve as journeyman for one year before taking up shop, although the standard of those surgeons appointed by the Barber-Surgeons Company was a frequent source of complaint.⁸

Worsley soon experienced the hardships of war first-hand. During 1642 the royalist army under the Duke of Ormond had won several victories over the Catholic rebels, but the outbreak of the English Civil War had robbed the army of much of its material support from England.⁹ By March 1643 Worsley was complaining to his superiors about the 'extreme wants here of medicines and necessaries for the chyrurgions', pleading for new supplies. His request for £320 worth of medicines was passed on to the House of Commons, to be directed to the Company of Barber-Surgeons.¹⁰ However, in May the Council was still waiting for reply, complaining that 'the army is already very much distressed in the cures of wounded men'; probably such difficulties contributed to the mutiny of Ormond's troops in Dublin.¹¹ Unsurprisingly given this situation Ormond arranged a cessation with the Irish in September 1643,

⁶ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300r.

⁷ Ibid. The English army under Ormond in Leinster amounted to between 4,000-7,000 troops from 1642-3. S. Wheeler, "Four Armies in Ireland", in *Ireland from Independence to Occupation, 1641-1660*, ed. J. Ohlmeyer (Cambridge: Cambridge U.P., 1995) p. 50.

⁸ Young (ed.) *Annals of the Barber-Surgeons*, p. 119; Wear, *Knowledge and Practice*, p. 210; Webster & Pelling, "Medical Practitioners", pp. 174-5.

⁹ Wheeler, "Four Armies in Ireland", pp. 44-47.

¹⁰ HMC, *Ormonde*, Vol. II (London, 1903) pp. 256-7.

¹¹ Ibid., pp. 284-5.

although this was not to the liking of the more aggressive Protestants in Ireland and those exiled in London.¹² Worsley later reported his own dissatisfaction with the cessation, following which he left the post as surgeon-general in an attempt to follow an academic path, entering Trinity College Dublin on 15 October 1643.¹³

Although Worsley later claimed to have taken his 'degrees' in Dublin, prompted by his 'owne Genius', this appears to have been a brief spell in academia and he was still considering a return to university in 1649.¹⁴ In mid-1644, Worsley returned to London, recounting to Lady Clarendon that he had been captured by a parliamentary ship, en route to Flanders where he had planned to continue his studies.¹⁵ Pleading political impartiality, Worsley claimed to have refused the covenant, securing his and the other passengers' release with the help of Sir John Temple (who had been on the Irish Council in Dublin when Worsley was surgeon-general).¹⁶ However, if Worsley was deliberately avoiding association with the parliamentary cause at that stage, this would soon change. By summer 1645 Worsley was collaborating with Samuel Hartlib on a project for the chemical manufacture of saltpetre in London, offering to supply parliament's armies with this ingredient of gunpowder in its war against the King.

Before then Worsley had encountered difficulties which might explain his abrupt career change. The Barber-Surgeons had not forgotten about him in his absence- on return he lodged at Coleman Street, near Guildhall- and on 1 May 1645 he was called

¹² B. Fitzpatrick, *Seventeenth-Century Ireland: The War of Religions* (Dublin: Gill & Macmillan, 1988) p. 182; Wheeler, "Four Armies in Ireland", pp. 46-8.

¹³ Burtchaeli & Sadlier (eds.) *Alumni Dublinenses*, p. 895. Worsley mentioned his dissatisfaction with the cessation in his letter to Lady Clarendon.

¹⁴ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300r. In August 1649 Worsley wrote to John Dury from Amsterdam that his other activities were now standing in the way of 'The taking of my Degree'. HP 33/2/4A.

¹⁵ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300r.

¹⁶ *Ibid.*

before their Court to 'take the clothing' and become a Liveryman of the Company.¹⁷ This fairly small group numbered around 50 of the more substantial members, but the clothing was sometimes used by the Company as a fund raising expediency, and Civil War had placed their finances under particular strain: by the previous September they were £3000 in debt. The Livery could be burdensome and costly: members were eligible to be chosen as a warden, were called to take part in processions and other corporate activities, and were subject to additional charges.¹⁸ It was not unusual therefore for freemen to spurn this calling, for which they were subject to a fine, and Worsley himself secured a two-week respite to collect this sum. However, by the end of the month his situation had deteriorated, leading to his imprisonment in Newgate for failing to repay a bond of £30 taken in Ireland, owed to one William Davenport of London. On 30 May Worsley petitioned the House of Lords for release under his old title of surgeon-general, claiming that he was owed £400 in arrears, and on the following day the Lords ordered him to be released.¹⁹ Finally on 7 November Worsley paid his £5 fine to the Company.²⁰ Understandably, Worsley did not dwell on these events in any of his surviving letters: his account to Lady Clarendon explained how he was delayed in London 'partly by *the* death of some Relations, partly by some other Accidents'.²¹ Although he was still in a

¹⁷ Company of Barber-Surgeons Court Minute Books, Volume V. Guildhall MS 5257/5, fol. 338r (copy on microfilm). My thanks to Dr Ben Coates for informing me of this reference. The Barber-Surgeons own Company Hall was at Monkswell Street, north-west of Guildhall under the City walls. M Pelling, "Appearance and reality: barber-surgeons, the body and disease", in *The Making of the Metropolis. London 1500-1700*, ed. A.L. Beier & R. Finlay (London & New York: Longman, 1986) p. 86.

¹⁸ On the Livery, Young, *Annals of the Barber-Surgeons*, p. 253. On the Company's debts, *Ibid.*, p. 139.

¹⁹ *Journals of the House of Lords*, Vol. VII, pp. 401-2. In a strange twist, Davenport secured the imprisonment of the Keeper of Newgate Henry Wollaston, in Worsley's place, and Wollaston was himself forced to petition for release. *Ibid.*, p. 424.

²⁰ Company of Barber-Surgeons Court Minute Books, Volume V. Guildhall MS 5257/5, fol. 348r (copy on microfilm).

²¹ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300r.

position to resume his medical career, this episode marks Worsley's effective departure from surgery.²²

It seems probable that a combination of ambition and necessity encouraged Worsley to leave his primary trade. In the medicinal hierarchy of early modern London the College of Barber-Surgeons was inferior to that of the Physicians, as the latter frequently asserted. Whereas learned surgeons might assert that surgery was 'the most ancient & principle part of medicinal practice', the attitude of one physician who advised that 'the Chyrurgeon should confer himself with the limits of his profession and not usurpe the possession of the Physitian', was typical of his profession.²³ Worsley himself appears to have been aware of this supposed inferiority, and in the 1650's began to style himself as 'Dr', despite apparently not having taken a medical degree. In spite of this, the training he had received as a surgeon would come in useful in later life. Although this was officially a practical discipline concerned with caring for the outer-body, in practice surgery often deployed the knowledge that physicians were supposed to monopolise.²⁴ Equally, surgeons frequently crossed into the territory of the apothecary or physician, prescribing drugs and giving dietary advice, for example.²⁵ Furthermore, several 16th-century surgeons were at the forefront of advancing innovative alternatives to Galenic medicine, in particular Paracelsian chemical remedies, and Worsley may have been introduced to the principles of iatrochemistry

²² He nearly resumed his post as Surgeon-General to the Irish army in 1647, but did not do so: see chapter 2.

²³ J. Read, preface to translation of F. Arceus, *A Most Excellent and Compendious Method of curing wounds in the head* (London, 1586) sig. A2r; H. Croke, *A Description of the Body of a Man* (London, 1637) sig. A2v. For the efforts of surgeon authors to dispel the prejudices against their trade, see Wear, *Knowledge and Practice*, pp. 220-221; Pelling & Webster, "Medical Practitioners", pp. 175-6.

²⁴ Wear, *Knowledge and Practice*, p. 212.

²⁵ *Ibid.*, pp. 225-8.

through their works.²⁶ A record of Worsley's medical opinions noted in Hartlib's diary suggests his antipathy to certain aspects of Galenic medicine, which as a surgeon he would have been expected to perform:

Mr *Worsley* likes of 1. Absternsifs or depurations that the blood may bee kept pure. 2. of all diuretick's to drive out of sweate and vrin. 3. Cordials. 4. furthering of digestions. 5. outward Applications 6. in chronical diseases a continued good dyet. 7. specifiques of simples. 8. or vniversal Medecins. vtterly rejecting vomiting, Purging, bloodletting.²⁷

Theoretical knowledge was less important than practical experience and observation in early modern surgery, and surgeons often produced drugs and cordials to be sold to patients, which could easily be broadened to encompass the brewing of alcoholic drinks or preparation of perfumes.²⁸ Worsley would later show some expertise in these pursuits, and such knowledge may well have been learned in the environment of the surgeon's shop. These skills could be transferred to more 'scientific' pursuits, such as alchemy, which Worsley was to pursue sporadically in the following decades.

His time as a surgeon seems to have influenced Worsley in other ways. As has been noted, the 'medical marketplace' of 17th-century England was intensely competitive, as the highly medically conscious populace were faced with multiple courses of treatment for any malady. Practitioners had therefore to be willing to diversify their activities and operations, often infringing on the territory of other medical groups or branching beyond medicine altogether. Worsley served his apprenticeship near the commercial centre of the Royal Exchange, a popular location for surgeons.²⁹ Worsley appears to have absorbed some of this entrepreneurial drive,

²⁶ C. Webster, "Alchemical and Paracelsan Medicine", in *Health, Medicine and Mortality*, ed. Webster, p. 319.

²⁷ *Ephemerides* 1651, part 2. HP 28/2/15A.

²⁸ Wear, *Knowledge and Practice*, pp. 214-5, 233-6; Pelling, "Medical Practice", p. 103.

²⁹ Pelling, "Appearance and Reality", pp. 85-6.

and after leaving surgery he was to pursue numerous projects to establish his standing and finances, beginning with the saltpetre project. The competitive ethos and technical skills on which these projects were based were perhaps honed in the environment of early modern medical practice.

By embarking on his saltpetre project, Worsley was following a well-trodden path. Defoe's diagnosis of '*The Projecting Age*' in 1697 drew on over a century's debate about projects, which had considered the influence of innovation in a traditional society, the rights and duties of individuals within it, and the role of the state in defending the public good.³⁰ Defoe's defence of projects as 'of publick Advantage, as they tend to Improvement of Trade, and Employment of the Poor, and the Circulation and Increase of the publick Stock of the Kingdom', might have been made at any time in the century, and shows how the ideas of the discourse of trade were used to confer legitimacy on them.³¹

Defoe's *Essay* was ambivalent towards projectors, however; already by Worsley's time the designation suggested private interest and charlatanism, and was one to be avoided.³² Initially, projects were the business of 16th-century statesmen who aimed to cultivate domestic manufacturing; in doing so they encouraged the spread of low-technology industries, stimulating 'economic energies that filtered through to the very heart of the national economy, making it beat faster and more strongly'.³³ Over the

³⁰ D. Defoe, *An Essay upon Projects*, Facsimile of the first edition of 1697. (Menston: The Scholar Press, 1969) p. 1.

³¹ *Ibid.*, pp. 10-11.

³² *Ibid.*, pp. 11-12.

³³ Thirsk, *Economic Policy and Projects*, p. 7.

following century, these efforts saw the ideal of commonweal become translated into achievable material goals and state policies, embodied by the patents given to projectors.³⁴ However, the partnership between public and private which they represented was open to criticism, particularly as patents were increasingly used as money raising expediences or rewards for courtiers, and along with trading companies, projects became labelled 'monopolies'.³⁵ Claims of originality faced growing scepticism, and involvement with patentees drew criticisms onto the crown.³⁶ Industrial and commercial monopolies were attacked most strongly when parliament took it upon itself to defend the liberties of the subject under threat by corrupt government, as in 1621 and 1624, and it is no coincidence that one of the leaders of these attacks was Sir Edward Coke, who 'regarded free trade not only as a legal right of sorts, but also as a sound principle of economic policy that was, in some sense or other, part of the common law'.³⁷

Criticisms of monopoly reached a crescendo with the recalling of parliament in 1640, and persisted throughout the decade, resulting in the overturning of many industrial patents, whilst projectors were lambasted in numerous satirical pamphlets.³⁸ Although in the 1640's parliament tended to reserve its criticisms for industrial rather

³⁴ D.H. Sacks, "Parliament, Liberty, and the Commonweal", in *Parliament and Liberty from the Reign of Elizabeth to the English Civil War*, ed. J.H. Hexter (Stanford: Stanford U.P., 1992) pp. 85-121; D.H. Sacks, "The countervailing of benefits: monopoly, liberty, and benevolence in Elizabethan England", in *Tudor Political Culture*, ed. D. Hoak (Cambridge: Cambridge U.P., 1995) pp. 272-91.

³⁵ Thirsk, *Economic Policy and Projects*, pp. 51-77; J. Thirsk, "The Crown as Projector on its own estates, from Elizabeth I to Charles I", in *The Estates of the English Crown 1558-1640*, ed. R.W. Hoyle (Cambridge: Cambridge U.P., 1992) pp. 297-352.

³⁶ Braddick, *State Formation in Early Modern England*, pp. 40-42; J. Cramsie, "Commercial Projects and the Fiscal Policy of James VI and I", *Historical Journal*, 43, 2 (2000) p. 364; M. Zell, "Walter Morrell and the New Draperies Project, c.1603-1631", *Historical Journal*, 44, 3 (2001) pp. 651-675.

³⁷ S. White, *Sir Edward Coke and the Grievances of the Commonwealth* (Manchester: Manchester U.P., 1979) pp. 114-5.

³⁸ James, *Social Problems and Policy*, pp. 131-157. Examples of anti-projector pamphlets include T. Brugis, *The Discovery of a Projector* (London, 1641); *The Frogs of Egypt. Or The Caterpillars of the Common-Wealth* (London, 1641); *A Pack of Patentees. Opened. Shuffled. Cut. Dealt. And Played* (London, 1641), and *Hogs Character of a Projector* (London, 1642).

than commercial monopolies, the free trade campaigns of previous parliaments were taken up by the Levellers, who defined their own idea of freedom and justice against exclusive monopolies, religious and political as well as economic.³⁹ Typical was Thomas Johnson's attack on the Merchant Adventurers, who 'like Incubusses doe suck the very vitall spirits, and drive into one veine that masse of blood which should cherish the whole body'.⁴⁰ One of Worsley's Hartlibian associates, Sir Cheney Culpeper, also came to associate 'Monopolizinge Corporations of Merchantes' with the political and ecclesiastical monopolies of crown and established church, believing that 'nowe wee are pullinge downe of such monopolies wee shall starte a greate many which yet ly hid', until finally 'Babilon [will] tumble'.⁴¹ Although Culpeper was hasty in predicting the fall of the merchant companies, the economic arguments put forward by Johnson in favour of enlarging trade drew wider support.⁴² This was reflected in the *Declaration of the Parliament of England* of 1648, which asserted that 'Projects, Monopolies ... are altogether with the Court, the fountain of them, removed, and a Free Trade, with Incouragement of Manufactures and provision for the poor to be settled by the Commonwealth'.⁴³

In the face of such attacks, projectors sought to legitimise their requests for privilege by demonstrating the benefits they offered to the public good, and increasingly they came to do so in terms of the discourse of trade. Thus projects became associated with the commercial expansion taking place in the first half of the century. Defoe wrote

³⁹ A. Houston, " 'A Way of Settlement': The Levellers, Monopolies, and the Public Interest", *History of Political Thought*, Vol. XIV, No. 3 (Autumn 1993) pp. 381-420. For parliament's attitude to the various concessionary interests in the 1640's, Ashton, *The City and the Court*, pp. 149-156.

⁴⁰ T. Johnson, *A Discourse Consisting of Motives for the Enlargement and Freedom of Trade* (London, 1645) p. 4. He also attacked the Eastland Company, in *A Plea for Free-Mans Liberties* (London, 1646).

⁴¹ Culpeper: *Letters*, p. 139.

⁴² Johnson, *Discourse*, p. 25.

⁴³ Quoted in James, *Social Problems* p. 131.

that 'every new Voyage the Merchant contrives, is a Project', and one of his own proposals- for a national bank- also stemmed from the tradition of projecting.⁴⁴ Although their publicly-spirited performances can be seen as merely cloaking self-interest, projectors exploited wider perceptions about the responsibility of the state over public welfare, which encompassed the government of trade. Even Thomas Johnson believed that 'there bee Generall Lawes to regulate trade, and to preserve it from confusion; we desire still a government, but not a Monopoly'.⁴⁵ This allowed Henry Parker to defend the Merchant Adventurers by asserting that '*Freedome and restraint* are things opposite ... yet both admitting of severall degrees, and limitations, they are not so opposite but that some kinde of restraint may be reconciled to some kinde of freedome'.⁴⁶ The acceptance of commercial change entailed, therefore, an expanded role for the state in economic matters, and projectors like Worsley capitalised on this perception.

Defoe suggested that the rash of projects of the 1690's were a consequence of warfare, as merchants, 'prompted by Necessity, rack their Wits for New Contrivances, New Inventions, New Trades, Stocks, Projects, and any thing to retrieve the desperate Credit of their Fortunes'.⁴⁷ The 1640's brought similar problems for Worsley, his credit 'cracked' in the midst of another decade of war.⁴⁸ Given the importance afforded to social status and civility in determining the reliability of truth claims, particularly in the

⁴⁴ Defoe, *Projects*, pp. 8, 36-7.

⁴⁵ Johnson, *Discourse*, p. 25.

⁴⁶ H. Parker, *Of a Free Trade* (London, 1648) p. 7.

⁴⁷ Defoe, *Projects*, p. 6.

⁴⁸ For the importance of maintaining good credit, Muldrew, *Economy of Obligation*, pp. 286-7.

epistemologically insecure area of science, Worsley had to find alternative means to demonstrate the public credentials of his saltpetre project.⁴⁹ Association with the Hartlib circle was one means to do so.

Throughout the 1640's Samuel Hartlib was involved in promoting numerous inventors, incorporating their schemes into his wider vision of utopian reform, as would be the case with Worsley's saltpetre project.⁵⁰ It is unclear how the two met: Hartlib had many connections with the Protestant community of Ireland, whilst his closest associate John Dury was related to some of these individuals through marriage.⁵¹ Worsley apparently had dealings with one notable Irish Protestant, John Temple, at this time, and when in prison he had written a letter on behalf of another acquaintance from the Council at Dublin, Strafford's younger brother Sir George Wentworth, who was facing the sequestration of his estates.⁵² However, there is no evidence that he was introduced to Hartlib by these associates, and in fact Worsley seems to have been deliberately seeking to put his past as a surgeon behind him, and reinvent himself through the saltpetre project. Hartlib was well known as a promoter of such projects, and so Worsley probably approached him for this purpose.

The case of another projector whom Hartlib was negotiating with at this time, William Wheeler, illustrates the difficulty of encouraging and rewarding innovation without erecting a monopoly. Wheeler's main enterprise was a drainage wheel which, he claimed, could raise 500 tonnes of water to a height of 3 feet in an hour, and which

⁴⁹ For the role of civility and social status in the generation of 'truth', S. Shapin, *A Social History of Truth. Civility and Science in Seventeenth-Century England* (Chicago & London: University of Chicago Press, 1994).

⁵⁰ Webster, "Benjamin Worsley", pp. 214-5. This article covers the same period in Worsley's life as Part One: the reader should refer to the article for Webster's full account.

⁵¹ Dury's wife Dorothy Moore was particularly close to Katherine Jones, Lady Ranelagh, the sister of Robert Boyle and sister-in-law of Sir John Clotworthy. Webster, "New Light", pp. 28-9.

⁵² Entered into the Book of Orders for the Kent Committee of Sequestrations, 29 May 1645. PRO SP 28/210, fol. 71r. My thanks to Dr Jason Peacey for making me aware of this document.

he had patented in the Netherlands and England.⁵³ Wheeler had first achieved success in Holland under the patronage of Sir William Boswell, the virtuoso ambassador of Charles I, although they fell out and Wheeler published a tract accusing Boswell of fraudulently stealing his patent.⁵⁴ Worsley apparently became involved with Wheeler in 1645, and referred to him as a friend in correspondence, although Culpeper warned him not to ‘venter muche’ with such a disreputable figure.⁵⁵ Culpeper was as keen as Hartlib to encourage inventions, but doubted that projectors like Wheeler would willingly reveal their secrets without a patent. As a solution, he hoped that parliament might ‘(in this time of seekinge the Peoples love) ... appoint a Committee for the examining and Rewarding of Ingenuities and purchasing them for publick vse’.⁵⁶ Hartlib himself spent much of the late 1640’s in promoting such an institution, the Office of Address, and (as Webster suggested) Worsley was probably one of the individuals whom Hartlib hoped would benefit from this state-sponsored body.⁵⁷ One function of the Office of Address would be to offer institutional support to inventors, so that ‘the most profitable Inventions ... might be Publikely made use of, as the State should think most expedient’, freeing them from the need to seek patronage and profit.⁵⁸ However, this was only half the work of the projected Office of Address, as it was also to function as a sort of labour-exchange, bringing people together as ‘a Center of all Mens satisfactions

⁵³ Webster, *Great Instauration*, pp. 372-3. On the drainage mill, see W. Wheeler, *A List of Some Chief Workes Which Mr William Wheeler Offereth to undertake* (Amsterdam, 1651), p. 2.

⁵⁴ *Mr. William Wheelers Case from his own Relation* (London, 1644). This tract is sometimes attributed to the parliamentary pamphleteer, Henry Parker. The author alleged that Boswell had Wheeler beaten up, robbed, drugged, and imprisoned in a madhouse for 9 months, in terrible conditions.

⁵⁵ Letter, Culpeper to Hartlib, 31 October 1645. Culpeper, *Letters*, p. 247. Worsley would later visit Boswell in The Hague, with the intention of finding out the truth of his friend’s dealings: see chapter 2, below.

⁵⁶ Letter, Culpeper to Hartlib, 18 Jan 1648. Culpeper: *Letters*, pp. 318-9.

⁵⁷ Webster, *Great Instauration*, p. 68.

⁵⁸ [J. Dury], *Considerations Tending to the Happy Accomplishment of Englands Reformation in Church and State* (London, 1647) p. 47.

to gaine their Interest in each other for mutuall help'.⁵⁹ Hartlib eventually concentrated on the former part of the Office of Address (for Communications), relinquishing the Office for Accommodations to Henry Robinson.⁶⁰ However, the problem of the London poor was to remain a preoccupation for Hartlib, particularly during the depression that followed the end of the Civil War.⁶¹

Whilst Worsley became involved in an attempt to revive the Office of Address in the 1650's, his saltpetre project was closer to Hartlib's agenda for poor reform. It appears that their collaboration began in summer 1645, when Culpeper's letters to Hartlib referred to a project whereby the production of saltpetre would provide support for paupers.⁶² Saltpetre was an obvious choice for an aspiring projector, particularly as the Civil War had raised demand for this vital ingredient of gunpowder, as Worsley would have known from his military past. Saltpetre (potassium nitrate) had been extracted from artificial 'nitre beds' in England since at least the 15th-century, utilising various waste resources to create nitrous earth, although the chemical basis of saltpetre was still not understood and successful production depended largely on trial and error.⁶³ These efforts were fairly inefficient, and the commodity continued to be imported on a large scale, particularly from the East Indies, or extracted from places where it occurred naturally- usually pigeon lofts or privies- by the unpopular 'saltpetre men'.⁶⁴ Parliament

⁵⁹ Ibid., p. 41.

⁶⁰ Webster, *Great Instauration*, p. 69.

⁶¹ See for example S. Hartlib, *Londons Charity Inlarged* (London, 1650); Webster, *Great Instauration*, pp. 360-369; P. Slack, *From Reformation to Improvement. Public Welfare in Early Modern England* (Oxford: Clarendon Press, 1999) pp. 77-86.

⁶² Worsley's name first appears in the Hartlib papers in two of Culpeper's letters to Hartlib, from autumn 1645, in relation to Wheeler (31 October 1645 and 12 November 1645). However, during the previous summer Culpeper had been advising Hartlib on what was clearly Worsley's saltpetre project: letter, Culpeper to Hartlib, 17 July 1645. Culpeper: *Letters*, pp. 226-7, 246-8.

⁶³ A.R. Williams, "The Production of Saltpetre in the Middle Ages", *Ambix*, Vol. 22, Part 2 (July 1975) pp. 125-7.

⁶⁴ R.W. Stewart, *The English Ordnance Office. A Case-Study in Bureaucracy* (Woodbridge: Boydell Press, 1996) pp. 80-95.

had passed ordinances to encourage the domestic supply of saltpetre at regular intervals throughout the Civil War.⁶⁵ There was a strong incentive to discover a more effective method of production, therefore, attracting the interest of other associates of Hartlib such as Robert Child and George Starkey, and this 'stinking businesse' was included in one satirical list of common projects.⁶⁶

Saltpetre also interested scientists like Child and Starkey because of its potential for use as an agricultural fertiliser, a subject for which the Hartlib circle held great hopes. Culpeper was particularly interested in chemical writers such as Jacques de Nuysement, Blaise de Vigenère, and Michael Sendivogius who had developed Paracelsian ideas about the role of salt and saltpetre as the active spirit in vegetation.⁶⁷ Hoping that Worsley might collaborate with other like-minded 'spirits' in his project, Culpeper considered that 'yf saltepeeter be not that very spirit it selfe of the worlde, yet I am confidente from the harmony of chymicall writers that the ayre is that by which the spirite of the worlde begets & manifestes itselfe'.⁶⁸ Webster suggested that Worsley was thinking along similar lines in 1645, the chemical basis of his method being outlined in 'simple experimental terms' in a paper entitled 'De Nitro Theses quaedam'.⁶⁹ However, Newman and Principe have conclusively demonstrated that this paper was written in 1653, after Worsley had visited Amsterdam.⁷⁰ Although Worsley was flexible about his

⁶⁵ 'An Ordinance of the Lords and Commons...for the making of Salt-petre', 3 April 1644. *A & O*, Vol. 1, p. 418. See also similar Ordinances from 23 October 1643 (pp. 320-321), 7 December 1644 (pp. 578-9), 7 February 1646 (pp. 828-830). For problems of ordnance supply during the Civil War, P. Edwards, *Dealing in Death: The Arms Trade and the British Civil Wars* (Stroud: Sutton, 2000) pp. 91-115.

⁶⁶ W. Newman, *Gehennical Fire. The Lives of George Starkey, an American Alchemist in the Scientific Revolution* (Cambridge: Harvard U.P., 1994) pp. 81-2; Brugis, *Discovery of a Projector*, p. 25.

⁶⁷ Culpeper: *Letters*, pp. 135-6; S. Clucas, "The Correspondence of a XVII-Century 'Chymicall Gentleman': Sir Cheney Culpeper and the Chemical Interests of the Hartlib Circle", *Ambix*, Vol. 40, Part 3 (1993) pp. 147-170. For more details on 'agricultural chemistry', see Chapter 5, below.

⁶⁸ Letter, Culpeper to Hartlib, c. December 1645. Culpeper: *Letters*, p. 239.

⁶⁹ Webster, "New Light", p. 36.

⁷⁰ W. Newman & L. Principe, *Alchemy Tried in the Fire. Starkey, Boyle, and the Fate of Helmontian Chymistry* (Chicago & London: The University of Chicago Press, 2002) p. 240.

method of producing saltpetre, perhaps suggesting that it had little experimental basis, he did claim that the project would help to discover ‘the nature of Salt Peter’, indicating that some element of scientific research was anticipated.⁷¹

Worsley had been discussing the technical details of the project itself with Hartlib for about 7 months before he made his first petition, to the Court of the Lord Mayor and Aldermen of London, on 17 February 1646.⁷² The two documents used to support the project- ‘Propositions in the behalfe of the kingdome Concerning Salt-Peter’ and ‘Motions to the City’- therefore were the product of lengthy deliberations. No doubt conscious of anti-monopoly sentiments, Worsley’s ‘Propositions’ began by citing the ‘seuerall Complaints’ presented throughout the nation, about ‘abuses done and Committed by Salt-Peter-Men and their Ministers’.⁷³ Worsley offered to ‘free the whole Common-wealth of the trouble or injury sustyened in haueing their Houses Cellers yards and other places digged vp and spoiled’ through his innovative, but as yet unspecified, method. He was at pains to stress that he would not ‘intrench vpon the libertie or infringe the iust priuiledges of any subject whatsoever’, or require that other sources of saltpetre be suppressed.⁷⁴ Worsley did request the privilege of being granted a charter as ‘the Misterie or Corporation of Salt-Peter-Makers’, with the exclusive privileges this would guarantee.⁷⁵ However, to ‘discharge his Conscience and Duty to the publicke’, he offered the City authorities 60 pounds of saltpetre for every tonne produced in return for their support, which would be used in employing the poor. Furthermore, he offered to surrender the charter to the City following its expiry, keeping

⁷¹ ‘Motions to the City’, HP 71/11/10A.

⁷² Corporation of London Record Office, Guildhall. Records of the Court of Aldermen, Rep. 58 (1645-1647) fol. 65r. *Journal of the House of Lords*, Vol. VIII. p. 574.

⁷³ ‘Propositions in the behalfe of the kingdome Concerning Salt-Peter’, HP. 71/11/8A.

⁷⁴ *Ibid.*, HP 71/11/8B; ‘Motions to the City’, HP 71/11/9A.

⁷⁵ ‘Motions to the City’, HP 71/11/9A.

only a sixteenth part for himself or his successors, 'To invest or interest the said City wholly in it'.⁷⁶

In this initial stage of petitioning, it was arguably more important to demonstrate adherence to the public good than the efficacy of the method itself, the details of which would only be revealed in full following the granting of a charter. This was a bargaining process: in order to win support Worsley had to show the public benefits the project, and these were described in commercial terms. It being 'a Maxim ever observed by all, well seene in the Rules and pollities of State' to introduce any 'new Manufacture, or Invention, serving to the improvement of the Materialls of the Land', his project would employ the poor, and produce 'a Commodity in plenty that is now wanting, and of all others most necessarie in *the Common wealth*'.⁷⁷ This was particularly important given that 'wee have alwayes beene forced, to make vse of the favour of other Countreyes, There buying ... at greate prices, and running *the hazard of the sea for it*'.⁷⁸ These arguments proved successful, for a special committee reported that the proposals were beneficial to 'the publique good, and ... the interest of this City', on 7 April.⁷⁹

Unfortunately, it is difficult to discern the precise details of the method which eventually won approval, as Hartlib's papers suggest that a number of alternatives were being considered. For example, one paper described a workhouse that would at the same time function as a living saltpetre-factory, in a rather crude manner. Noting that the project rested on the willing involvement of both paupers and mercantile investors, Worsley argued that 'Neither of theis can be done: but by a complying with *the privat*

⁷⁶ Ibid., HP 71/11/9B.

⁷⁷ Ibid., HP 71/11/9A.

⁷⁸ 'Propositions in the behalfe of the Kingdome'. HP 71/11/8B.

⁷⁹ Corporation of London Record Office, Guildhall. Records of the Court of Aldermen, Rep. 58 (1645-1647) ff. 91v-92r. *Journals of the House of Lords*, Vol. VIII. p. 574. There is a copy of this report at HP 71/11/1.

interests of Both'.⁸⁰ This meant offering the beggar 'a better Condition then hee enjoyed by begging and idlenesse', whilst '*the Merchant* will not deposite part of his stok to be employed unlesse some gaine may acrew by it'. Whilst the labour of the poor would provide some profits, their waste products might prove even more lucrative. Noting that 'all sublunary things whatsoever are generable & Corruptible & That these 2 Generation and corruption doe *the one terminate/ in the other*', Worsley's method was to turn 'Corruption into Policy and into action'.⁸¹ Stripped free of its philosophical baggage, this entailed using the waste products of the labourers as raw material for saltpetre, collected in a trench 5 or 6 feet deep situated at the end of the workhouse, where it would be covered in lime and earth, and left for 2-3 years. Worsley predicted that this method would yield 10 tonnes of saltpetre a year from a workhouse of 150 people, which would then be sold for a total of £700.⁸²

Paul Slack has written that this proposal represents 'the most striking example of [the] intellectual shift which the Hartlib papers provide', epitomising their utilitarian attitude to maximising the profits of human labour.⁸³ Equally striking is Worsley's attitude to private interest, which he saw as inescapably ruling men's actions. However, this attitude did not prevent Worsley from presenting himself as publicly-spirited, as he went to considerable lengths to demonstrate. For example, the project might be used to provide for the education and housing of poor children.⁸⁴ Worsley also attempted to enumerate the benefits of the project in an early version of 'political arithmetic',

⁸⁰ 'About the poore Advertisements', HP 15/2/5A.

⁸¹ Ibid., HP 15/2/5A.

⁸² Ibid., HP 15/2/5B.

⁸³ Slack, *Reformation to Improvement*, p. 84.

⁸⁴ 'A newe waie for the making of Salt peeter & maintaining the poore', HP 53/26/7A. The attribution of this and the other documents discussed below to Worsley, apart from several general similarities, rests on the price of £70 per tonne of saltpetre, which Worsley had offered to sell to the state in his 'About the poore Advertisements'. The same figure is used in these documents.

although on a rather more modest scale than William Petty's vast surveys. Worsley offered to sell his saltpetre at the price of £70 per tonne, £10 cheaper than the present rate, which would save the state £8,000 per year.⁸⁵ To this saving could be added the combined cost of payments to the saltpetre men, and the destruction to corn caused by pigeons kept as a source of saltpetre, which was computed at £2,065,000 per year.⁸⁶

Several similar memoranda exist in the Hartlib papers, and it is difficult to know which were eventually used in petitioning the City and parliament. It appears that at one stage Worsley was hoping for a more exclusive privilege, requesting an Act 'prohibiting all others to make the old way'.⁸⁷ Similarly, alternative ways to raise revenue from assessments of land, and even a quarterly charge of 2d for every house previously subject to digging for saltpetre, were considered.⁸⁸ These details were not included in the final version which carefully showed that the project would not infringe on other methods of production, or cost public money. In fact Worsley was probably the author of a brief memorandum in which the author renounced his wish for a patent, merely requesting support 'to begin it if I can at my own charge'.⁸⁹ This new-found benevolence seems to have ingratiated him with the Hartlib circle, and soon Culpeper was offering advice on how to glean information about another saltpetre project proposed to parliament some years before, based on 'Enriching Earth' with various

⁸⁵ 'Divers services Involvd into one benefitall to the whole kindgome'. HP 53/26/1A.

⁸⁶ 'An Exact discovery of the charge & damadg to the kingdome in the making of Salt peeter'. HP 53/26/3. Worsley's derived his figures from 'An estimate of the greate quantitie of Corne that Pigeons doe eate spoyle and destroye in the countie of Cambridge', which was eventually published in the third edition of Hartlib's *Legacie of Husbandrie*, and which claimed that pigeons consumed £2,573,910 worth of corn per year. HP 25/3/4. S. Hartlib (ed.) *Legacie of Husbandrie*, 3rd edition (London, 1655) pp. 225-227.

⁸⁷ 'A Exact discouery of the charge & damadg to the kingdome'. HP 53/26/3A.

⁸⁸ 'Divers services Involved into one benefitall to the whole kingdome'. HP 53/26/1A. Untitled Memorandum for poor relief and saltpetre. HP 53/26/1. Untitled Memorandum on saltpetre. HP 53/26/2B.

⁸⁹ 'A Memorandum and Caution concerning the Observations and Animadversions about Saltpetre'. HP 39/1/24A.

industrial by-products.⁹⁰ By early 1646 Worsley was in negotiations with the mistress of one of these projectors, Francis Joyner, who demanded a payment of £200 followed by an annual payment of £50 and a partnership in the venture.⁹¹ Although such dealings appear rather underhand, Culpeper and his contemporaries would have seen nothing wrong with acquiring information by these means, believing that ‘all human knowledge was a public endowment from God to be used in the service of humankind’.⁹² However, the fact that Worsley was still looking for possible methods of production at this late stage perhaps explains why he apparently abandoned the project, despite successfully petitioning of the House of Lords on 21 November, until it was revived in Ireland in 1653.⁹³

Alternatively, it could be that Worsley’s ambitions were already pointing in other directions, and perhaps the saltpetre project had already served its purpose, allowing Worsley to establish his credentials to the Hartlib circle and the City authorities.⁹⁴ At the same time, Worsley drafted a proposal which integrated the project into a wide-ranging plan involving improvements in agriculture, fishing, and colonisation, which was framed in much more ambitious economic terms. Thus Worsley was already giving thought to those themes which he would pursue as secretary to the Council of Trade in 1650.

⁹⁰ See ‘A Copie of the Draught of an Act of Parliament for the making of a Corporation of Saltpeter-makers’. HP 71/11/5B.

⁹¹ ‘A Copie of the Propositions of Ioyner’s Mistresse’. HP 71/11/13B. See Culpeper’s letter to Hartlib of 11 February 1646. Culpeper: *Letters*, p. 261. Culpeper warned Worsley not to accept such exorbitant demands, although he did suggest means by which to involve her in the project: *Letters*, Culpeper to Hartlib, 17 February 1646, 4 March 1646. *Ibid.*, pp. 263-4, 270-1.

⁹² Greengrass, Rayler, & Leslie, “Introduction” to *SHUR*, p. 18.

⁹³ *Journal of the House of Lords*, Vol. VIII. p. 573. Worsley’s petition was supported by a certificate from the committee of the Court of Aldermen which had assessed his project. The Lords ordered that an ordinance be drawn up, but no further evidence for this exists.

⁹⁴ As well as Hartlib and Culpeper, Robert Boyle took an interest in this ‘pious powder-plot’- see chapter 2, below.

To Webster, 'Proffits humbly presented to this Kingdome' demonstrated Worsley's 'capacity to relate mundane technical activity to the sphere of universal values'.⁹⁵ As Webster noted, Worsley took as his template another project which Hartlib was promoting at the time, based on a colony in the New World financed by innovations in agriculture and fishing, to which Worsley appended his own saltpetre project.⁹⁶ Its designers were two Huguenots, Hugh L'Amy and Peter le Pruvost, who hoped by this means to elevate England to leadership of the Protestant cause in Europe.⁹⁷ L'Amy had begun negotiations with parliament from February to May 1645, with le Pruvost arriving in England to continue this work in about August. Although Hartlib laboured tirelessly on le Pruvost's behalf, the Huguenot was demanding more authority than parliament was willing to countenance, and left England unsatisfied in April 1646. At around this time Worsley had sought information about the project from John Dury, its other main supporter, particularly on le Pruvost's attitude to merchants (which was not favourable, because 'their interest of Profit will carye them astraye from a public good').⁹⁸ This, together with the close similarity between 'Proffits' and the Huguenots' own designs, suggests that Worsley was considering entering into a partnership, perhaps with merchant backing.

'Profitts humbly presented' integrated the saltpetre project, and L'Amy and le Pruvost's various innovations, into a sweeping programme of economic regulation

⁹⁵ Webster, "Benjamin Worsley", p. 221. 'Proffits humbly presented' is printed in Webster, *Great Instauration*, pp. 539-546.

⁹⁶ Webster, *Great Instauration*, p. 380.

⁹⁷ *Ibid.*, pp. 371-2.

⁹⁸ Letter, John Dury to Hartlib, c. May 1646. HP 3/3/19A.

intended to raise the nation to a position of commercial supremacy in Europe. Crucially, this rested on the effective exploitation of plantations, which were to provide 'those commodities wee now fetch from other partes'.⁹⁹ Colonial imports, Worsley explained, would prevent the drain of bullion overseas but also reduce domestic prices, preserving 'a vast expence of money within the Commonwealth of this Kingdome'.¹⁰⁰ These domestic profits, however, would also help to revive England's flagging fortunes in foreign trade, counterbalancing the commercial prowess of the Dutch, who were currently able to undersell English merchants due to 'the cheapnesse of his sayling'.¹⁰¹ Already by 1646 Worsley was aware of the key commercial problem that would face the victorious side in England's Civil War, namely dependence of Dutch shipping, and here he outlined a colonial solution to it. At this stage his ideas were fairly basic, relying on colonial production as the engine to revive English trade, employing more shipping to 'give a check to prevent *the* Hollanders overgrowing us'.¹⁰² At the same time that commercial and industrial monopolies were facing their strongest criticism by groups like the Levellers, Worsley presented a vision of national monopoly which prefigured the Navigation Act:

Our Nation receiving the wholl benefit both of *the* Commodities itselpe and monopolizing also *the* trading for *them* into their owne hands, it will be like as but somewhat more, then if Spaine Italy and those Countryes *which* now vent those Commodities wer ours by Conquest and possession.¹⁰³

⁹⁹ 'Proffits humbly presented to this Kingdome'. HP 15/2/6A.

¹⁰⁰ Ibid., HP 15/2/6B.

¹⁰¹ Ibid., HP 15/2/62A.

¹⁰² Ibid., HP 15/2/62A.

¹⁰³ Ibid., HP 15/2/62A-B.

Success in trade would ‘much spread *the* glory & add to *the* power & strength of this Kingdome’.¹⁰⁴ Colonial production would not harm domestic industry, because from a position of commercial strength the value of exports could ‘easily be inhaunced’.¹⁰⁵ Ultimately, bullion would flow into the nation, supporting higher duties on trade, providing revenues to finance the navy, whilst the plantations would provide a pool of men and shipping for war-time. Prosperity would finance international exploration and give England the advantage in the next stage of colonial settlement. It would encourage ‘all sorts of Artists & ingenious men’ to bring their skills to England, ‘by *which* we may ... deprive our neighbour *Kingdoms* of their rich manufactures or Arts’.¹⁰⁶ This commercial imperialism would be at the direct cost of England’s competitors, for ‘as wee shall and may thus daily raise and strengthen ours: so *the Kingdoms* about us will, and must necessarily as much decay and weaken’.¹⁰⁷ From this position of international dominance, the nation would be able to assume leadership of the squabbling Protestant nations:

By *which* meanes as wee shall bee secure from all feare off them soe wee shall bee able to give, and to dictate lawes to them, *which* advantage may bee turned to a most pious and Christian end in preserving peace Universally amongst them ... and soe wee may sitt as judge and Vmpire of all Christian differences, and may draw and ingross the blessings and promises to ourselves *that* are made to *the* Peace makers.¹⁰⁸

Webster remarked that Worsley had ‘effectively demonstrated how a co-ordinated programme of innovation and economic reform could be used to guide the nation towards a utopian goal’.¹⁰⁹ Indeed, Worsley concluded the treatise by declaring

¹⁰⁴ Ibid., HP 15/2/62B.

¹⁰⁵ Ibid., HP 15/2/63A.

¹⁰⁶ Ibid., HP 15/2/63B.

¹⁰⁷ Ibid., HP 15/2/63B-64A.

¹⁰⁸ Ibid., HP 15/2/64A.

¹⁰⁹ Webster, *Great Instauration*, p. 381.

the many benefits that would arise from such a position of commercial dominance, consisting of a prospectus of the aspirations of the Hartlib circle: reformation of laws, propagation of the gospel, the advancement of education and learning, the conversion of the Jews, and finally 'The indeavouring an Union and reconciliation throughout all the Christian at least all the Protestant Churches'.¹¹⁰ Such sentiments seem to align Worsley with the millenarian utopians of the Civil War. However, as J.C. Davis noted, early modern discussions of utopia tended to focus on the details of these timeless and perfect societies, paying little attention to the changes which would bring this condition about.¹¹¹ By contrast 'Proffits humbly presented' concentrated on the process of change itself, an amoral world of competition amongst nations that existed uneasily alongside any utopian pretensions. Worsley dressed his design with the trappings of a reformed society, but this does not mask the fact that it was a stark analysis of the determining role of power in human affairs, where any utopian ends were arrived at by mastering the currents of change and time, not transcending them.

This economic nationalism seemed to contradict the Protestant internationalism that was so central to Hartlib's endeavours. Dury's irenicism was the apogee of this, and already he and Hartlib had led calls for parliament to continue its crusade on the continent.¹¹² Such concerns had motivated Dury and Hartlib's support for L'Amy and le Pruvost's colonial project, which aimed 'not alone to benefitt us as wee are a state by ourselves, but to make us beneficiall to all the Protestants of Christendome, and to put in our hand the strength of their Cause against there enemies the Papists'.¹¹³ Of

¹¹⁰ 'Proffits humbly presented'. HP 15/2/64B.

¹¹¹ J.C. Davis, *Utopia and the Ideal Society. A Study of English utopian writing 1516-1700* (Cambridge: Cambridge U.P., 1981) pp. 37-8.

¹¹² J. Dury, *A Faithfull and Seasonable Advice* (London, 1643); S. Hartlib, *The Necessity of some Nearer Conjunction and Correspondency amongst Evangelicall Protestants* (London, 1644).

¹¹³ Letter, John Dury to Walter Strickland, 6 November 1646. HP 25/7/2A.

course 'Proffits humbly presented' placed England at the head of European Protestantism, but for Worsley this meant not just leadership of the Protestant international, but hegemony within it- sentiments potentially at odds with Dury's union of equals. Particularly ominous, given the events of the next decade, was Worsley's jealousy of Dutch commercial success and his aggressive response to it. However, this did not prevent Hartlib from circulating the proposal, eliciting a slightly critical response from Culpeper. Like Worsley, Culpeper hoped that colonial expansion would expand commerce, but with different consequences than those envisaged in 'Proffits humbly presented'. For Culpeper, the resulting abundance of riches would render all nations equal, paradoxically encouraging men to 'liue accordinge to the simplicity of the Patriarchs in the olde worlde'.¹¹⁴ Using as his biblical text Psalm 67 (which thanked God for blessing '*all peoples*' with his increase), Culpeper desired that 'God might be glorified throwghout the whole worlde', to the benefit not just of 'this family, Cownty, Nation', but 'whole mankinde'. Culpeper hoped that this was also Worsley's 'finall aime', but clearly suspected that it was not.¹¹⁵

Culpeper's reception of 'Proffits humbly presented' indicates how the spiritually-orientated universalism that infused Dury and Culpeper's political perspectives (in different ways) existed in uneasy balance with the relativistic world-view informing Worsley's colonial design. Equally significant are Worsley and Culpeper's divergent attitudes to commercial expansion, which is particularly interesting given that they would sit alongside each other on the Commonwealth's Council of Trade. In the early 1650's, and again after the Restoration, Worsley was to

¹¹⁴ Letter, Sir Cheney Culpeper to Hartlib, undated [Spring 1646?]. Culpeper: *Letters*, p. 244.

¹¹⁵ *Ibid.* My interpretation of this letter differs somewhat from Webster's: *Great Instauration*, p. 381.

return to the theme of colonial trade, but this time in the capacity of a salaried state expert. The saltpetre project should be seen as preparing the ground for this career, as Worsley began to assume a public face which would stand him in good stead when he sought employment, in 1649. However, before then he had already begun to follow other pursuits which would involve him in those momentous intellectual changes of his lifetime, and, through his acquaintance with the young Robert Boyle, with one of the 17th-century's major scientific figures.

2. 'The Compass of Human Wisdom'.

Intellectual and Financial Projects in London and Amsterdam, 1647-1649.

Whilst he was waiting on parliament to bestow its support to the Office of Address, Hartlib had been fulfilling its functions himself, particularly by encouraging collaborations between his associates. Worsley, having demonstrated his credentials with the saltpetre project, was an ideal candidate for such a creative synthesis, and one exchange proved particularly fruitful. John Hall was a talented Cambridge student who was associated with the Hartlib circle in the late 1640's, when he translated two of J.V. Andreae's utopian tracts and authored a work on the advancement of learning, before serving as a political journalist until his death in 1655.¹ No doubt prompted by Hartlib, Hall broached the subject of entering into correspondence with Worsley in December 1646, and although only one exchange of letters between the two survives, it was sufficiently interesting for Hall to suggest it be published.² Hall posed to Worsley the question 'Whether the Scripture bee an adæquate Iudge of Physical Controversies or no?', a subject which encapsulated the fraught relationship between the new science and religion.³ Galileo's famous answer, that 'in discussions of physical problems we ought to begin not from the authority of scriptural passages, but from sense-experience and necessary demonstrations', eventually led to his denunciation by the Catholic Church.⁴ This question, and Worsley's answer to it, aptly demonstrate the intellectual changes

¹ For Hall, see *DNB*.

² Letter, John Hall to Hartlib, 17 December [1646]. HP 60/14/3-4. See also his letters of 4 January 1647, HP 60/14/9-10; 25 January 1647, HP 60/14/14-15; 7 February 1647, HP 60/14/19-19. Although Hall was keen for Worsley to publish, Worsley was reluctant, and Hall hoped that Hartlib would encourage him to 'ouercome his modesty as that it might be more Publique'. Letter John Hall to Hartlib, [March 1647?]. HP 60/14/39A.

³ Letter, John Hall to Worsley, 5 February 1647. HP 36/6/1A.

⁴ Galileo, *Letter to Grand Duchess Christina* [1615], quoted in M. Oster (ed.) *Science in Europe, 1500-1800. A Primary Sources Reader* (Basingstoke & New York: Palgrave, 2002) p. 68.

that were reconfiguring the relationship between religion and natural philosophy at this time.⁵

Worsley began by considering the capacities required of a judge: firstly full and perfect knowledge of the question at hand, and secondly ‘that according to that truth, he will cleerly and determinately, speake to the thing controverted’.⁶ Therefore the question was whether Scripture contained ‘all manner of physicall-truths; at least in their primitives’, and whether they were ‘cleerly or distinctly’ shown. Of the first Worsley had no doubt: given that the Scriptures were the ‘immediate efflations of God himselfe’, they must therefore ‘beare his character, and as lively reflect his Image’.⁷ If the human mind was capable of reason, then Divine wisdom must be even deeper:

Wherefore if I shall find, so much; within the Compasse of humane wisdom (that is so inferiour) to be able in their discourses, to weave and intertex, many rules and precepts belonging even to diverse disciplines without any breath at all, or manifest abruption, either in matter or style; having all notwithstanding but one single respect and conspiring or looking together, at one grand and proper end; why should I not thinke, the wisdom of God able to effect the like, and that after a farr more excellent manner.⁸

Worsley was supremely confident in the ‘vniversality of the wisdom of Scripture’ and its ‘vn-Imaginable dephts’, even suggesting that Bible study would be a feature of the afterlife.⁹ However, this did not mean that it was the most suitable judge in physical controversies: the purpose of the Bible was not to account for natural phenomena, but to impart the message of God. Scripture had ‘left man a latitude’ to investigate nature, and Worsley concluded that:

⁵ Later denials of the literal truth of Scripture by philosophers like Spinoza would focus on this same question. J. Israel, *Radical Enlightenment. Philosophy and the Making of Modernity 1650-1750* (Oxford: Oxford U.P., 2001) pp. 200-202, 447-9.

⁶ Letter, Worsley to John Hall, 16 February 1647. HP 36/6/3A.

⁷ *Ibid.*, HP 36/6/3B.

⁸ *Ibid.*, HP 36/6/4A.

⁹ *Ibid.*, HP 36/6/4A-B.

... if any upon a probable phrase of scripture, shall build an axiome in physickes without thinking himsele afterwards obleiged (for the satisfaction of others) to hold strictly a Correspondency with the rules and lawes of Reason, and experience. I should not conceive my selfe tyed, by any rule, or law in Scripture, to believe or give creditt to his Assertion ... As apprehending it much more safe, to bend the words of Scripture to truth, then to writhe truth so, as it may speake to such or such a sense of Scripture.¹⁰

Furthermore, Worsley argued that dogmatic interpretations of Scripture had been responsible for dividing Protestants, and so 'a willingness to [bring] Scripture to the Truth', would help to end 'many other controversies amongst vs'.¹¹

As Young noted, Worsley was not advocating a secularised natural philosophy, although he distinguished it from scriptural exegesis; rather, the study of nature became an aspect of worship itself.¹² The use of science to promote religious concord, so important in promoting science following the Restoration, has been presented by Barbara Shapiro as the preserve of moderate Anglican 'latitudinarian' scientists, diametrically opposed to the socially engaged reformers described by Charles Webster, but Worsley shows that the two were not incompatible.¹³ Webster argued that the religious beliefs of the reformers and scientists of the 'spiritual brotherhood' encouraged them to look forward to the revival of knowledge and a return to dominion over nature. Theologically, this was accompanied by the hope that human reason, the *imago Dei* planted by God but fractured by the fall of man, would be restored to its original perfection, through philosophy and the advancement of learning, and Worsley's

¹⁰ Ibid., HP 36/3/5B-6A.

¹¹ Ibid., HP 36/6/6A.

¹² Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 223-5.

¹³ B. Shapiro, "Latitudinarianism and Science in Seventeenth-Century England", in *The Intellectual Revolution of the Seventeenth Century*, ed. Webster. See also B. Shapiro, *Probability and Certainty in Seventeenth-Century England* (Princeton: Princeton U.P., 1983).

optimistic account of human ability to understand nature may be seen in this light.¹⁴ These hopes were influenced by the Reformation, which seemed to mark the beginnings of a new age when God's message, finally freed from its papal captivity, would be revealed. However, by shattering the unity of Western Christendom, the Reformation had also introduced a more uncertain intellectual climate, as the capacity of men to understand the will of God was brought into question by Luther's assertion of papal fallibility, severing Western Christianity from its clerical anchoring. Thereafter, Protestants sought to find a basis of faith free from papal corruption, to separate the kernel of divine truth from the husk of human custom; one side of this was the investigation of Scripture to purify it from corrupt additions. Another was to search for divine truths in God's other works, His 'book of nature', and the faculty of reason placed in human nature, but these could lead to dangerous territory. In the later 17th-century, the study of Scripture led some to historicize Christianity, which many saw as tantamount to suggesting that religion was a human, and not a divine, creation.¹⁵ Similarly, the search for God's laws in nature could appear to have materialistic implications. This climate of metaphysical uncertainty formed the background for the emergence of the new science in England, and many of its promoters such as Robert Boyle were concerned to show that they were not making excessive claims for the

¹⁴ Webster, *Great Instauration*, passim. For the *imago Dei*, H. Hotson, *Johann Heinrich Alsted 1588-1638. Between Renaissance, Reformation, and Universal Reform*, (Clarendon Press: Oxford, 2000) pp. 66-74.

¹⁵ The historical study of religion, and the anti-clericalism with which it was sometimes related, have been seen as important in the early enlightenment in England: see J. Champion, *The Pillars of Priestcraft Shaken* (Cambridge: Cambridge U.P., 1992). See also the case of the 'three impostors' - the suggestion that Moses, Jesus, and Mohamet had created their religions for political reasons - which Hartlib and Henry Oldenburg were deeply concerned about in the 1650's. J. Champion, "Legislators, impostors, and the politic origins of religion: English theories of 'imposture' from Stubbe to Toland", in *Heterodoxy, Spinozism, and Free Thought in Early-Eighteenth Century Europe*, ed. S. Berti, F. Charles-Daubert, R. Popkin (Klower: Dordrecht, Boston & London, 1996) pp. 333-356.

capabilities of human reason.¹⁶ Thus the intellectual optimism which Webster saw as central to the enterprise of the spiritual brotherhood was set against an uncertain background, and we shall see in later chapters that Worsley's approach to the new science reflected these concerns.¹⁷

For now, however, Worsley was confident in the capacity of human reason to interpret God's book of nature, based on the 'law and order, that perfect nature hath planted in vs ...Which in things sensible, desumeth the primordia and certainty of knowledge; First, from the information of the senses, and so ascends by degrees, upwards, till shee terminate in that centre, where all things flow, and to which they all returne'.¹⁸ This neo-Platonic tinge may have encouraged Hall's Cambridge tutor to profess 'the Greatest liking to Mr Worsley's letter'.¹⁹ Worsley's ideas about the relationship between reason and revelation would develop over the next decade, but this letter shows how Worsley's interest in science went beyond the utilitarian, encompassing more abstract philosophical and ethical issues. This becomes important when considering his involvement in the famous Invisible College.

¹⁶ See M. Hunter, "Science and heterodoxy: An early modern problem reconsidered" in *Science and the Shape of Orthodoxy. Intellectual Change in Late Seventeenth-Century Britain* (Woodbridge: Boydell Press, 1995) pp. 225-244.

¹⁷ Relevant here is Popkin's inclusion of Hartlib, Dury and Comenius in what he terms a 'third force' in 17th-century intellectual history, one which reacted to the sceptical crisis through an appeal to Scripture, alongside scientific and other intellectual activities, and which was given a metaphysical basis by Henry More: R. Popkin, *The Third Force in Seventeenth-Century Thought* (Leiden: E.J. Brill, 1992) pp. 90-119; but see the points made in Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 249.

¹⁸ Letter, Worsley to John Hall, 16 February 1647. HP 36/6/5A.

¹⁹ Letter, John Hall to Hartlib, 5 April 1647. HP 60/14/28A. Hall's tutor was John Pawson, an obscure figure, but perhaps he shared the neo-Platonism of other Cambridge academics like Henry More and Ralph Cudworth, both of whom were known to Hall.

The direct references to the Invisible College in three of Robert Boyle's letters are familiar enough to be summarised here. Firstly, on 22 October 1646 he wrote to his tutor Isaac Marcombes from London about the 'other humane studies' he was pursuing after returning from his grand tour, which he listed as 'natural philosophy, the mechanics, and husbandry'.²⁰ Boyle claimed to be acting under the supervision of 'our new philosophical college, that values no knowledge, but as it hath a tendency to use', and went on to request that Marcombes send him information about husbandry practised in Geneva, which would make him 'extremely welcome to our *invisible college*'. Next came a letter to another tutor, Francis Tallents at Cambridge University, dated 20 February 1647, as Boyle was waiting to leave for his estate in Stalbridge, Dorset. Here, the young scholar mentioned his pleasure that 'the *invisible*, or (as they term themselves) the *philosophical college*, do now and then honour me with their company', cursing the fact that he could not spend more time in London, where the elusive 'college' was evidently based.²¹ Boyle's description was highly eulogistic:

... men of so capacious and searching spirits, that school-philosophy is but the lowest region of their knowledge; and yet, though ambitious to lead the way to any generous design, of so humble and teachable genius, as they disdain not to be directed to the meanest, so he can but plead reason for his opinion; persons that endeavour to put narrow-mindedness out of countenance, by the practice of so extensive a charity, that it reaches unto every thing called man, and nothing less than an universal good-will can content it. And indeed they are so apprehensive of the want of good employment, that they take the whole body of mankind for their care.

Finally, on 8 May 1647 Boyle wrote to Hartlib about the latter's interest in the Invisible College, adding that the 'whole society is so highly concerned in all the

²⁰ Boyle: *Correspondence*, Vol. 1. p. 42.

²¹ *Ibid.*, p. 46.

accidents of your life, that you can send me no intelligence of your own affairs, that does not (at least rationally) assume the nature of *Utopian*'.²²

These brief references have stimulated great debate about the identity of the Invisible College, its place in Boyle's intellectual development, and its role as a precursor to the Royal Society. Webster's interpretation differentiated it from Hartlib's diverse collegiate proposals, arguing that the last extract shows Hartlib's unfamiliarity with it before this date, and citing the apparent fact that he and Boyle were not acquainted until 1647.²³ London therefore possessed 'a third centre of intellectual organization' and (as discussed in the Introduction), Webster identified Worsley as its leading figure.²⁴ This conclusion rests on two letters written by Boyle to Worsley, dating from c. December 1646 and c. February 1647, suggesting a shared interest in experimental science.

In the first, Boyle congratulated Worsley on the successful passage of his saltpetre project through the House of Lords, proclaiming it 'a very justifiable avarice, that wishes not the possession of riches, but the employment'.²⁵ Boyle complained of the infringements of saltpetre-men on his estate, adding that he had found time to 'catechise my gardener and our ploughmen, concerning the fundamentals of their profession', and promising at the next opportunity to send his 'thoughts or experiments' which would aid Worsley's 'great design ... to do for the great world, what the chairmen of the physicians has done for the little, publish a discourse *de usu partium*'.²⁶ Boyle's boredom on his country estate was even more apparent in the second letter, where he

²² *Ibid.*, p. 58.

²³ Webster, "New Light", pp. 24-5.

²⁴ *Ibid.*, p. 25.

²⁵ Letter, Boyle to [Worsley], c. December 1646. Boyle: *Correspondence*, Vol. 1, p. 43.

²⁶ *Ibid.* This is a reference to the works of Galen- see note d, *Ibid.*

begged Worsley to send news from his laboratory.²⁷ Boyle noted the ‘Time & Paines I have spent in Chimistry, tho I had never deriv’d from them any other Benefit, then their having thus early radicated my Acquaintance with you’, although he hoped in future to contribute more positively to their ‘Philosophicall Trafficke’. Boyle’s lavish praise for Worsley makes him a likely candidate for leadership of the Invisible College, as does Boyle’s claim that he had been encouraged by their communications to ‘court Nature as eagerly as such a disaccomodated Solitude will permit me’, particularly in the ‘Vulcanian’ pursuit of chemistry.²⁸ However, for the moment Boyle was awaiting the instruments to embark on his chemical career, which would end only in 1649 with his successful erection of a working laboratory.²⁹

This, amongst other details, has persuaded Michael Hunter that Boyle’s scientific awakening dated from 1649 onwards. At the time of his letters to Worsley, Hunter suggests, Boyle’s main activity was drafting elegant literary discourses: ‘At this point, between c.1645 and c.1648, Boyle was a moralist, not a scientist’.³⁰ As well as placing Boyle’s induction to science beyond the lifetime of the Invisible College, Hunter suggested that Webster’s evidence is ‘much less conclusive than might be supposed’.³¹ These assertions have allowed him to argue that the Hartlib circle played a relatively minor role in Boyle’s development, relegating a figure like Worsley almost to the position of irrelevant ‘background noise’.³² Many of these criticisms are valid. Even accepting that Worsley is the most likely individual whom Boyle was referring to in his

²⁷ Letter, Boyle to [Worsley], late February 1647. *Ibid.*, p. 48.

²⁸ *Ibid.*, p. 49.

²⁹ Hunter, “How Boyle Became a Scientist” in *Robert Boyle. Scrupulosity and Science*, pp. 24-5.

³⁰ *Ibid.*, p. 20, and *passim*. Boyle’s ethical writings from this period are printed in *The Early Essays and Ethics of Robert Boyle*, ed. J.T. Harwood (Carbondale & Edwardsville: Southern Illinois University Press, 1991).

³¹ Hunter, “How Boyle Became a Scientist”, p. 22.

³² *Ibid.*, p. 15.

references to the Invisible College, Webster drew a far more complete account of the College itself than the evidence allows, endowing it with an organisational identity formed by Worsley to maintain contact with his scattered scientific associates; a social basis in the exiled Irish Protestants in London; a circle of likely members including Lady Ranelagh, Gerard and Arnold Boate, Miles Symner and John Sadler; and a programme of activity based around experimental, Baconian science, 'which differed strikingly from the 'new philosophy' of the precursors of the Royal Society'.³³ All of these points can be criticised on some level, and it is therefore necessary to reassess Webster's thesis in the light of Hunter's criticisms.

Boyle's letters to Worsley reveal that they first met in London, probably in 1646 when Worsley was promoting the saltpetre project, which Boyle received news of from his sister, Katherine Jones, Lady Ranelagh, who was probably the point of contact between the two.³⁴ Webster argued that Worsley probably became acquainted with the Boyles via his Irish connections, but they could equally have met through Hartlib's circle. John Dury was particularly close to the Boyles: his wife, Dorothy Moore, was related to Lady Ranelagh through marriage. Having made indirect contact with Dury through Hartlib about Peter le Pruvost in spring 1646, Worsley cemented their friendship by sending some liquor receipts for him and Dorothy, that August.³⁵ The Durys were away from London between March to December 1646, but they were clearly the main point of contact between the Boyles and the Hartlib circle.³⁶

³³ Webster, "New Light", p. 34 and *passim*.

³⁴ *Ibid.*, pp. 27-9.

³⁵ Letter, John Dury to Hartlib, 25 August 1646. HP 3/3/30-31. Worsley later testified to his high regard for the Durys, even suggesting that if he continued to be a bachelor, he hoped 'To live with them, and be advised as their sonne'. Letter, Worsley to Hartlib, 22 June 1649. HP 26/33/1B.

³⁶ Turnbull, *Hartlib, Dury and Comenius*, p. 253. Boyle probably knew Dury before either Worsley or Hartlib. R.E.W. Maddison, "Studies in the Life of Robert Boyle, F.R.S. Part VI. The Stalbridge Period, 1645-1655, and the Invisible College", *Notes and Records of the Royal Society*, Vol. 18, No. 2 (1963) p. 105. The impression that Worsley owed his acquaintance with Ranelagh to the Durys is given by

If there is little to connect the Invisible College to the exiled Irish community in London, it is equally difficult to draw firm conclusions about its nature and activities, and Hunter has found little evidence that Boyle was involved in any actual scientific practice before 1649. Boyle was certainly enthused by his meetings with Worsley, and the references to the Invisible College may be a manifestation of this youthful enthusiasm- his comment to Worsley that ‘Chymist’s Acquaintance is of age at a Day-old’ could suggest that their own collaboration was at a similarly juvenile stage.³⁷ They would have had limited opportunities to meet during Boyle’s visits to London, and the term ‘Invisible College’ perhaps described their personal correspondence, an informal arrangement rather than an effort at scientific institutionalisation. Worsley appears to have preferred this sort of communication: after all, he had only just freed himself from the confines of one institution, the Barber-Surgeons Company.

Thus we may concur with Hunter that the evidence for the Invisible College is too scant to give as detailed an account as Webster and previous historians did. However, in context of the wider intellectual milieu he encountered in London in 1646-7, Boyle’s references to the Invisible College cast some light on his and Worsley’s activities at this time, and the nature of their association, which remains of interest. Of particular importance is Boyle’s identification of Worsley as a chemist. One dimension of this was probably agricultural in nature, tying in with Worsley’s saltpetre project. This ‘agricultural chemistry’ had the advantage of being relatively accessible to the part-time practitioner, as simple experiments could be conducted in the garden (as in Boyle’s ‘catechizing’ of his gardener), and it would form the basis of Worsley’s natural

Culpeper, who jointly presented his services to Worsley, the Durys, and ‘that excellent Lady at Westminster’. Letter, Culpeper to Hartlib, 23 February 1647. Culpeper: *Letters*, p. 292.

³⁷ Letter, Boyle to Worsley, late February 1647, in Boyle: *Correspondence*, Vol. 1, p. 48.

philosophy in the following decade.³⁸ Boyle also referred to the experimental findings Worsley was producing in his laboratory, and although Worsley's competence in metallic alchemy has been questioned, here Boyle may have been referring to other chemical pursuits.³⁹ It was suggested above that Worsley's training as a surgeon probably furnished him with skills in brewing and distilling techniques, and there is substantial evidence that such activities were his main scientific pursuits at this time. A laboratory suited to such ends would have involved distillations and infusions of various herbs and spirits in glass alembics, heated in a 'balneum' or basin filled with water, rather than in the heavy furnaces of the alchemist. During his visit to Amsterdam from 1648-9, Worsley offered John and Dorothy Dury advice about the possibility of the latter making a living from distilling spirits, although he doubted whether such a 'mechanicke trade' would be suitable given that this was such a 'hard and hazardous a Trade to make profit of'.⁴⁰ Worsley cited as an unusually successful example 'one Phyllips', whose recipes he had sampled at Boyle's house, amongst other places.⁴¹ But Worsley was not just a consumer of such distillations, and his writings on the subject represent the most extensive evidence of his actual scientific practice for this period.

Worsley proceeded to advise the Durys on how to produce spirits which would be 'much more rich, & excellent, & perfect' and 'more healthfull & commendable then any whatsoever'.⁴² The first recipe he supplied was for the distillation of the spirit of 'July Flowers', suggesting means to produce large amounts by tending several balnea together, and shrewdly advising that the resultant product be sold not by the gallon, but

³⁸ See chapter 5, below.

³⁹ Newman & Principe, *Alchemy Tried in the Fire*, pp. 236-256.

⁴⁰ Letter, Worsley to Hartlib, 22 June 1649. HP 26/33/1B.

⁴¹ *Ibid.*, HP 26/33/1B.

⁴² *Ibid.*, HP 26/33/2A.

by the ounce.⁴³ Another option was making perfumes, and Worsley had apparently considered retiring to the country to make a living by producing rose spirits and oils. Worsley offered further advice about how to distil spirits from cider, the best type of alembics and vessels to use and how to preserve them from breakage, how to keep these vessels airtight by use of starched paper, and various other techniques.⁴⁴ He also drafted a more theoretical paper on the subject of ‘the destilling or drawing of spirits’.⁴⁵ Although distillations of herbs and simples in wine had been praised by ‘Physitians, Chymists, & Phylosophers’ for their properties in ‘repaying or cherishing our naturall spiritts’, they had become corrupted by ‘the vulgar, & comon Artists’.⁴⁶ Particularly contemptible was the tendency to still spirits in copper vessels heated by fire, rushing what should be a drawn-out process. In reaction, Worsley had developed a way to distil wines in larger glasses and at a lower heat, which produced a purer spirit.⁴⁷ Other experiments were economical, to strengthen glasses, to ‘save the charge of my fire’ with a more efficiently designed balneum, and to recycle unused wine.⁴⁸ With typical enterprise Worsley concluded by suggesting how his methods could be put into practise on a large scale, perhaps in the plantations, with an investment of £50-60 producing an annual profit of £200.⁴⁹

Such activities may seem far from Boyle’s later scientific pursuits, or the intensive labours of the alchemist, but Boyle himself appreciated the positive symbiosis between science and technology, as in his book *Of The Vsefulness of Natural*

⁴³ Ibid., HP 26/33/2A-B.

⁴⁴ Letter, Worsley to John Dury, 27 July 1649. HP 33/2/19A-B.

⁴⁵ ‘Of the destilling or drawing of spirits some Animadversions’. HP 26/33/9-10.

⁴⁶ Ibid., HP 26/33/9A.

⁴⁷ Ibid., HP 26/33/9A-B.

⁴⁸ Ibid., HP 26/33/9B.

⁴⁹ Ibid., HP 26/33/9A-10B.

Philosophy.⁵⁰ This work considered the use of distillation in the production of medicines, and the first evidence for Boyle's scientific activities in his 'Diurnall Collections', the work diaries which he had begun in 1647, were a series of medical brewing receipts derived mainly from Worsley.⁵¹ Worsley also contributed other medicinal recipes which he perhaps used as a practising surgeon: a plaster against toothache, another remedy for 'Breeding of Teeth' in children, a poultice for fevers, an ointment for rickets, and an 'oleum febripellens' which could be used in 'Agues, the Mother, & Small Pox'. The exchange of such receipts, albeit not an unusual practice for the time, was probably a shared pursuit.⁵²

Worsley may also have introduced Boyle to some of those scientific authors whom he was interested in at the time. Natural history was an important preoccupation, and Worsley recommended Samuel Purchas' vast travel anthologies, along with other naturalists like Johann Eusebius Norimbergius and Joannis de Laet.⁵³ Similar praise was reserved for those scientists who were willing to advance the experimental and observational arts, including Athanasius Kircher, Pierre Gassendi, and Nicolas-Claude Fabri de Peiresc. In Amsterdam, Worsley introduced Gassendi's biography of the latter to the physician William Rand, who went on to translate it from Latin.⁵⁴ Worsley would

⁵⁰ See in particular Chapter VII of Essay V, which included technical advice on distillation techniques in the preparation of medicines. R. Boyle, *Some Considerations touching the Usefulness of Experimental Philosophy* (1663) in *The Works of Robert Boyle*, ed. M. Hunter & E. Davis (London: Pickering & Chatto, 1999) Vol. 3, pp. 395-404.

⁵¹ 'Memorials Philosophicall Beginning in the New Year 1649/50'. Royal Society, Boyle Papers 28, pp. 309-12. Transcription online at <http://www.bbl.ac.uk/Boyle/WD6Clean.html> (accessed 07/01/02).

⁵² Although Worsley communicated these particular receipts after his return to London in late 1649, Boyle had requested that Worsley send him some remedies against smallpox and the stone in 1647. Letter, Boyle to Worsley, late February 1647, in Boyle: *Correspondence*, Vol. 1, p. 49.

⁵³ Letter, Worsley to Hartlib, 27 July 1648. HP 42/1/1B. Works by each of these authors were listed in Worsley's library catalogue: a five volume set of *Purchas his Pilgrims and Pilgramage* (1626), de Laet's *America Utriusq: Descriptio* (1633) and Norimbergius' *Historia Naturæ* (1635).

⁵⁴ Letter, Worsley to Hartlib, 22 June 1648. HP 42/1/1A. P. Gassendi, *The Mirrour of True Nobility & Gentility. Being the Life of The Renowned Nicolaus Claudius Fabricius Lord Peiresk*, trans. W. Rand (London, 1657). Rand noted in his 'Epistle Dedicatory' that 'my learned friend Dr. Benjamin Worsley brought me first acquainted with the name and fame of Peireskius, and knowing that I delighted to busie my self in that kind, wished that I would render his History into English'. For Rand, see C. Webster,

have had the opportunity to discuss these and other authors with associates such as William Petty, whom he met in late 1647, when they discussed Petty's acquaintance with Thomas Hobbes in Paris; other acquaintances included Hall, Culpeper, Gerard Boate, John Sadler, Robert Child, and Cressy Dymock.⁵⁵ There may even have been a degree of crossover with the 1645 London group of experimental scientists: in Amsterdam, Worsley received news about Jonathan Goddard and John Wilkins from Hartlib, and intended to 'propose certain Experiments' to the latter, in order to 'produce a better resolution in some material points of Philosophy and Medicine'.⁵⁶

The scientific interests of these individuals were broad, from Culpeper's literary interest in alchemy to Child's practical experience in chemistry and mining in New England, and the medical training of Petty, Boate and Goddard. But their interests were not confined to science, and Boyle and Worsley probably absorbed some of this eclecticism. Hunter argued that between 1645-8 Boyle was more interested in writing moral treatises than in performing science, and even when he did take up natural philosophy, his scientific aims were less utilitarian than Worsley's.⁵⁷ However, Worsley's letter to John Hall shows that he was willing to consider natural philosophy

"English Medical Reformers of the Puritan Revolution: A Background to the "Society of Chymical Physicians"", *Ambix*, Vol. XIV (1967) pp. 16-42. Worsley's attraction to Gassendi ahead of Descartes (whom he distrusted- see chapter 5) is perhaps telling: theologically, he was much closer to Gassendi's voluntarism than to Descartes' intellectualism. M. Osler, *Divine Will and the Mechanical Philosophy. Gassendi and Descartes on contingency and necessity in the created world* (Cambridge: Cambridge U.P., 1994).

⁵⁵ Webster suggested Child and Boate as possible members of the Invisible College- "New Light", pp. 31-3. Boate was appointed as physician to the Irish army at the same time as Worsley's reappointment to the post of surgeon-general, and was closely linked to the Boyle family. Worsley became acquainted with Sadler, who was also close to Ranelagh, before his visit to Amsterdam. Symner however does not seem to have met Worsley until the 1650's, and even then did not hold him in high esteem- see chapter 5, below. For Petty, see letter, Worsley to Hartlib, 22 June 1648. HP 42/1/1A. Worsley promised to write to Child in his letter to Hartlib, 4 February 1648, HP 36/8/6A. Child may have arrived in London from New England just before Worsley's departure to the Netherlands. M. Newell, "Robert Child and the Entrepreneurial Vision: Economy and Ideology in Early New England", *The New England Quarterly*, Vol. LXVIII, No. 2 (June 1995) p. 252.

⁵⁶ Letter, Worsley to Hartlib, 1 June 1649. HP: Royal Society Boyle Papers. 7.2. fol. 2r. Worsley praised Goddard's adherence to experimental science, particularly 'the Optikes & Chymia', in his letter to Hartlib, 27 July 1648. HP 42/1/1A.

⁵⁷ Hunter, "How Boyle Became a Scientist", p. 47.

in speculative terms that were similar to Boyle's own digressions, as Hunter conceded, and there is evidence that their correspondence touched on these matters.⁵⁸ Another of Boyle's early interests was the study of Scripture, as well as Jewish culture and language.⁵⁹ Worsley later collected numerous books on these subjects, and in 1661 he wrote to Hartlib about a new translation of the New Testament into Hebrew by an associate of his, William Robertson, who was in prison as a nonconformist; Robertson was also patronised by John Sadler and Lady Ranelagh, to whom he dedicated a book in 1654.⁶⁰ Worsley's interests were less strictly utilitarian than Webster conveyed, therefore, and rather closer to those of the young Boyle. However, there may still be some truth in Webster's suggestion that Worsley was instrumental in awakening Boyle's early interest in the subject, although his actual practice of science was limited at this point. This was something of a formative period for Worsley, too, as he pursued various projects in London and Amsterdam. Boyle himself visited the Netherlands between late February and early April 1648, where Worsley was engaged in more intensive and sophisticated scientific activity than in London; given that Boyle's own interest in experimentation blossomed thereafter, it seems possible that this visit was

⁵⁸ *Ibid.*, pp. 45-6. Hunter highlighted a passage in Boyle's draft treatise, 'The Doctrine of Thinking', where the author reflects on the value of mental exercises, which he appears to have linked to the Invisible College: 'The Experiments of this I haue of late Seen in those I haue had the Happines to be acquainted with of the Filosoficall Colledge: who all confess themselue to be beholding for the better part of their rare and New-coyned Notions to the Diligence and Intelligence of their Thoughts'. Harwood, *Early Essays and Ethics of Robert Boyle*, p. 186. Boyle and John Hall were certainly corresponding with such matters: see Boyle's letter to Hartlib, 8 April 1747. In Boyle: *Correspondence*, Vol. 1, pp. 54-6.

⁵⁹ Hunter, "How Boyle became a Scientist", p. 33.

⁶⁰ W. Robertson, *The Second Gate, or The Inner Door to the Holy Tongue* (London, 1654). Hartlib reported Robinson's translation of the New Testament to Hebrew in a letter to Dr. John Worthington on 26 August 1661. Another letter to Worthington quoted Worsley's opinions on the finest Hebrew linguists, where he praised Johann Buxtorf, Marcus Marinus, John Fosterus, Anthony Cevellerius, David de Pomis and others- all of whom were represented in his library catalogue. *The Diary and Correspondence of Dr. John Worthington*, ed. J. Crossley. Vol. I. (Chetham Society Vol. XIII: Manchester, 1847) pp. 365-6, Vol. II pp. 43-4.

influential, whilst Worsley kept him informed about his alchemical progress throughout.⁶¹

The role of Worsley and the Hartlib circle in Boyle's intellectual development should not be exaggerated, and there is much truth in Hunter's suggestion that 'the bane of our understanding of the history of ideas in this period has been a proclivity to lump thinkers into groups'.⁶² However, this does not mean that the social context of the Hartlib circle was not important in transmitting to Boyle some of those 'shared structures in the thought of the day, in the form of the ideal types of intellectual activity which thinkers either reacted against or adopted to their own use', on which Hunter has based his intellectual history.⁶³ Hartlib was particularly preoccupied with the problem of how to reconcile individual rewards for scientific or technological innovation with the public good, bridging the divide between the ethical issues which Boyle was initially preoccupied with and his later scientific pursuits. His interaction with the Hartlib circle would encourage Boyle to consider in more depth the 'social purpose' of learning, which was the subject of his first published work (probably part of the 'Treatise of Publick Spiritidness' mentioned in Hartlib's *Ephemerides* in connection with Worsley), and it is perhaps significant that Boyle's interest in Worsley's 'pious powder-plot', the saltpetre project, was framed in just these terms.⁶⁴ Although Worsley can no longer be

⁶¹ Hunter, "How Boyle became a Scientist", p. 44. One of Boyle's earliest scientific writings, 'Of the Study of the Booke of Nature' (written c.1650), included chemical ideas derived from the German alchemist J.R. Glauber, whom Worsley had journeyed to Amsterdam to learn from, and Newman and Principe concluded that this 'reflects Worsley's early influence'. Newman & Principe, *Alchemy Tried in the Fire*, p. 213. (For more on Worsley's adherence to this particular alchemical 'school', see chapter 5). For the visit, Maddison, "Studies in the Life of Robert Boyle...VI", p. 111.

⁶² Hunter, "How Boyle became a Scientist", p. 50.

⁶³ *Ibid.*, p. 49.

⁶⁴ *Ephemerides* 1648, part 1. HP 31/22/8B. For Boyle's interest in the 'social purpose' of science, see J.R. Jacob, *Robert Boyle and the English Revolution. A Study in Social and Intellectual Change* (New York: Burt Franklin & Co., 1977) pp. 28-38. Boyle's first published work was 'An Invitation to a free and generous Communication of Secrets and Receipts in Physick', in Hartlib's *Chymical and Medicinal Addresses* (London, 1655). Boyle's reflections on the ethics of the saltpetre project are included in his letter to Worsley, c. December 1646, Boyle: *Correspondence*, Vol. 1, p. 43. For Boyle's later efforts to

seen as scientific mentor to the young Boyle, he was still an influential figure in this formative period for Boyle, as he contemplated his future vocation. Worsley must have offered a rather different example to most of Boyle's other acquaintances, a projector who nonetheless aspired to more philosophical considerations, living in revolutionary London amidst the sectarians of 'heretical [Coleman] street'.⁶⁵ Boyle was clearly interested in these aspects of Worsley's life, and perhaps this tells us more about the nature of their relationship than any influence which Worsley may or may not have exerted on Boyle's intellectual development.

Worsley left the intellectual scene in London, however, at the start of 1648, returning only in late 1649. Having established himself within the Hartlib circle, by 1647 he was looking to broaden his horizons, and to achieve this he looked away from weary London, to a city which pulsed with the intellectual and commercial energy of the time: Amsterdam.

The details of Worsley's visit to the Netherlands, where he stayed at the house of the German Johann Moriaen, Hartlib's main correspondent in Amsterdam, have been discussed in detail by John Young and so can be to an extent passed over here.⁶⁶ The main purpose of this visit was to meet the German alchemist Johann Rudolf Glauber, whose *Furni Novi Philosophici*- 'new philosophical furnaces'- had attracted the interests of members of the Hartlib circle in the mid 1640's. However, Worsley was

uphold the public benefits of science, M. Hunter, "The Reluctant Philanthropist: Robert Boyle and the 'Communication of Secrets and Receipts in Physick'", in *Robert Boyle(1627-91). Scrupulosity and Science*, p. 202-222.

⁶⁵ Letter, Boyle to Worsley, c. December 1646. *The Correspondence of Robert Boyle*, ed. M. Hunter, A. Clericuzio, & L. Principe, p. 43.

⁶⁶ Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 217-246.

continually frustrated throughout his visit, and even before departure an offer of financial support from Culpeper had been withdrawn.⁶⁷ Arriving in Amsterdam in February, Worsley did not meet Glauber until about August, and progress was hindered by both men's weak grasp of spoken Latin.⁶⁸ Eventually Worsley became disillusioned, and left Amsterdam in about November 1649. Therefore much of his time there was spent exploring alternative projects, which will be the focus of this account.

The possibility of one of Hartlib's associates visiting Amsterdam to collaborate with Glauber was in discussion throughout 1647, with Worsley being mentioned as a candidate by August.⁶⁹ As well as showing that Worsley was by then well-respected by the Hartlib circle, the timing of the visit suggests that he was actively seeking a new vocation. On 16 July 1647 he had been re-appointed to his old post of surgeon-general to the Irish army, but he did not take up the commission, and thereafter conclusively turned his back on surgery.⁷⁰ In comparison with Glauber, who was 'among the most historically significant practical chemists of his day', Worsley was a novice, with little practical experience in the manipulation of metals, but his visit was clearly intended to set him on the path of the adept.⁷¹ As Young has shown, alchemy was seen by many as an area of sanctified knowledge which might 'cure' the material world of its fallen state, to 'rewrite Creation in better accord with the original divine intention', and was therefore a spiritual as well as technical task.⁷² However, Worsley also faced more pressing material concerns throughout this visit, leading him to consider many alternative ways to make a living. In fact, he seems to have become well known for his

⁶⁷ *Ibid.*, p. 219.

⁶⁸ *Ibid.*, p. 220.

⁶⁹ Preparations for Worsley's visit are discussed in *Ibid.*, pp. 217-9.

⁷⁰ *Journal of the House of Commons*, Vol. V. p. 247.

⁷¹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 183.

⁷² *Ibid.*, p. 174 and *passim*.

‘useful suggestions for earning one’s bread’, as Hartlib’s Polish correspondent Cyprian Kinner put it.⁷³

Worsley’s first assignment after leaving for the Netherlands was to find information about the drainage mills of his projector friend William Wheeler. Reporting back to Hartlib in February 1648, Worsley described how he arrived in Rotterdam under the guise of ‘a man curious in novelties, especially in matters of Art, and Invention’.⁷⁴ Worsley travelled covertly around the countryside unsuccessfully looking for examples of the drainage mills which Wheeler had secured a patent for nearly 10 years earlier. By way of Delft, he travelled next to The Hague, delivering letters on behalf of Dury and Culpeper to their patrons Sir Robert Honywood and Sir William Boswell. At The Hague we have the bizarre spectacle of Worsley dining at the house of the royalist ambassador Boswell with Honywood, brother-in-law to Sir Henry Vane junior, a fervent parliamentarian, only 15 months before the assassination of Isaac Dorislaus by royalist agents, demonstrating how social and intellectual ties could transcend ideological differences.⁷⁵ Here Worsley discussed the allegations made against Boswell in Wheeler’s libellous pamphlet, but he found that the ambassador was not in ‘that agony and passion’ he expected, and instead gave a balanced account of his dealings with Wheeler.⁷⁶ Although Boswell verified the effectiveness of Wheeler’s drainage mill, he explained how Wheeler had defaulted on his Dutch creditors: since then the invention had fallen into disuse, and Wheeler’s remaining ‘Interest’ in the Netherlands was ‘not worth 6. pence’.⁷⁷ Worsley advised that there was little hope of Wheeler raising any

⁷³ Letter, Cyprian Kinner to Hartlib, 23 July 1648. HP 1/33/39-42. (Translation by W.J. Hitchens).

⁷⁴ Letter, Worsley to Hartlib, 4 February 1648. HP 36/8/1A.

⁷⁵ Ibid., HP 36/8/2A; J. Peacey, “Order and Disorder in Europe: Parliamentary Agents and Royalist Thugs 1649-1650”, *Historical Journal*, 40, 4 (1997) pp. 954-7.

⁷⁶ Letter, Worsley to Hartlib, 4 February 1648. HP 36/8/2B.

⁷⁷ Ibid., HP 36/8/4B.

money from the Netherlands, which for Culpeper confirmed his pessimistic judgements about the projector.⁷⁸

This was not quite the end of Worsley's association with the dubious engineer. In June 1649, Wheeler came up with a proposition to produce tarris cement, which Hartlib's allies John Sadler and his father-in-law John Trenchard were interested in sponsoring.⁷⁹ Wheeler himself returned to Amsterdam shortly before Worsley left, in October 1649, and Worsley drafted a letter on his behalf to Hartlib.⁸⁰ However, Worsley's main purpose was still to engage with Glauber and so he headed for Amsterdam, arriving in late February 1648. He demonstrated his abilities to his host Johann Moriaen, himself a chemical practitioner, by analysing an 'Alexipharmacum, against stinking Watter' which was being touted by one of Moriaen's associates.⁸¹ Initially Worsley hoped that this remedy against the putrefaction of waters could have medicinal and philosophical uses, but after analysis he found it to be merely 'an infussion upon a hurtfull or unwholesome minerall', less valuable than urine.⁸² Having shown his competence to Moriaen and another new associate, the Dutch Collegiant Adam Boreel, Worsley was able to undertake other experiments with his hosts whilst they awaited Glauber's return to Amsterdam. An early project of Worsley and Moriaen, himself an occasional tradesman, involved various new methods of dying.⁸³ Despite his inability to deal with Glauber, Worsley was therefore able to absorb something of the vibrant atmosphere of Amsterdam, encountering a number of inventors who had been drawn to this crossroads of intellectual and commercial traffic.

⁷⁸ See Letter, Culpeper to Hartlib, 11 March 1648. Culpeper, *Letters*, p. 323.

⁷⁹ Letters, Worsley to Hartlib, 1 June 1649. HP: Royal Society Boyle Letters 7.2, fol.1v; 22 June 1649, HP 26/33/3A; 3 August 1649, HP 33/2/2B.

⁸⁰ Letter, Wheeler, to Hartlib, 29 October 1649. HP 34/3/3.

⁸¹ Letter, Worsley to Hartlib, 4 May 1648. HP 71/15/1B.

⁸² Letter, Worsley to Hartlib, 18 May 1648. HP 71/15/2B.

⁸³ Letters, Worsley to Hartlib, 4 May 1648, HP 71/9/2A; 1 June 1648, HP 71/9/3A.

The most important of these was Ahasuerus Fromanteel, a clockmaker born in Norwich to Dutch parents, whom Worsley first encountered in June 1648.⁸⁴ He proceeded to secure a catalogue of Fromanteel's several inventions, but what particularly caught his eye were his microscopes.⁸⁵ Showing all the delight of a Restoration virtuoso, Worsley noted his 'pleasure & satisfaction at spare howre by looking at small & minute bodies in these glasses'. Additionally, Worsley claimed to have discovered two original uses for microscopes. The first was 'a Maxim which ... more settts out the immensity of the wisdom of God then any other, & proves that nothing was done by chance or occasion', as the infinite variety revealed by the microscope in apparently identical objects demonstrated that 'not every man only but every beast or fowle of the same species, yea, every sand is known by its name'.⁸⁶ Of greater practical application was their use in investigating the signatures of plants. Extending this analysis from the little to the great world, Worsley praised the observational arts of 'Optikes & Chymia':

For I now having abdicated much reading of Bookes, vulgare received Traditions & common or Schoole opinions, have divided knowledge into Divine & humane. For divine I acknowledge none to be *the* necessary Rule of fayth but what the spiritt of god hath sett doune plainely, in symple & univocall tearmes & easy to *the* vnderstanding of any, looking vpon the points controverted, as *the* opinions but at best, if not the Inventions & pryde of men ... For humane knowledge I honour only that *which* is immediately deduced from, or built vpon Reall, & certayne Experiments; & those so many, as to make an infallible vniversall; seing according to *the* Schooles science is not of particulars.⁸⁷

⁸⁴ For Fromanteel, see *DNB- Missing Persons*.

⁸⁵ Letter, Worsley to Hartlib, 22 June 1648. HP 42/1/1A.

⁸⁶ Letter, Worsley to Hartlib, 27 July 1648. HP 42/1/1A.

⁸⁷ *Ibid.*, HP 42/1/1B.

As well as endorsing a minimalist approach to worship ('The Spirit of god being wee know but one & must always the same'), Worsley recommended natural history as the best means to appreciate God's works, listing a conspectus of observations ranging from air quality and weather, geographical features, natural resources, and flora and fauna, to anthropology. Such an all-encompassing vision stressed dominion over nature, but this was framed by a concern to understand God through the study of nature. In this, as in his stress on experimentation, Worsley was prefiguring Boyle's version of natural philosophy, and he was certainly corresponding with Boyle during his stay.⁸⁸ This approach was deeply stimulated by the instruments of the new science, which seemed to allow the familiar to be rediscovered, the hand of God revealed in unexpected places.

Fromanteel was not Worsley's only source for these inventions. In one letter he reported a 'very wittily contrived' technique used to cure a looking-glass maker suffering from mercury poisoning, which comprised of a sort of one-man sauna called a 'sweating chaire'.⁸⁹ Worsley was probably author of a letter to Hartlib describing a globe witnessed at the house of the printer and geographer Joan Blaeu, an associate of Moriaen, which was destined to be given to an East Indian King.⁹⁰ The telescope was the other pillar of observational science, and Worsley had received one from a master instrument-maker, Johann Wiesel of Augsburg, costing £50, through which he observed the city of Harlem from 10 miles distance, the moon, and the satellites of Jupiter.⁹¹

⁸⁸ For Boyle's idea of the 'Christian virtuoso', R-M. Sargent, *The Diffident Naturalist. Robert Boyle and the Philosophy of Experiment* (Chicago & London: University of Chicago Press, 1995) pp. 87-93.

⁸⁹ Letter, Worsley to [Hartlib], 26 May 1648. Royal Society Boyle Letters 7, No. 50, fol. 1v-2v.

⁹⁰ Letter, [Worsley?] to Hartlib, 19 March 1649. HP 53/35/2A.

⁹¹ Letter, Worsley to Hartlib, 18 May 1649. HP: Royal Society Boyle Letters 7.1. fols. 1v-2r. See also Letter, Worsley to Hartlib, 27 July 1648. HP 42/1/1A-B.

Worsley became a regular customer of Wiesel, and Henry More for one was keen to see his 'tube' when he returned from Amsterdam.⁹²

Amsterdam had much to offer in Glauber's absence, therefore, but the alchemist remained the main purpose of Worsley's visit. Their first meetings in late summer of 1648 were apparently cagey, Glauber being reticent about giving away his valuable secrets.⁹³ In August Culpeper was giving advice to Moriaen and Worsley which suggests that they were carrying out research independently, and had produced a 'Menstruum vniversale'.⁹⁴ However, by the following spring Worsley and Moriaen had turned their attention to developing new furnaces, probably from Glauber's designs: on 18 May Worsley asked that Hartlib give Boyle news of 'the businesse of our new furnace for the melting of Lead Oare without Bellow's, which may prooue not the least profitable Invention'.⁹⁵ Worsley was hopeful that this innovation would 'recompence the charge, waiting and expence' of his journey.⁹⁶ Further news of this 'Metallicke Worke' came in the following month, although progress was temporarily halted after Moriaen scalded his legs.⁹⁷ Shortly before his departure from Amsterdam Worsley was still noting that 'some thing is still further expected in our metallicke Busynesse'.⁹⁸

⁹² Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 50-1. Letter, More to Hartlib, 9 October 1649. HP 18/1/32-33. Worsley carried this instrument, the first recorded terrestrial telescope made by Wiesel, back to London in December 1649, when the virtuoso Sir Paul Neile examined it at Hartlib's house. Neile and his client the optician Richard Reeve continued to take an interest in Wiesel's instruments for several years. See I. Keil, *Augustanus Opticus. Johann Wiesel (1583-1662) und 200 Jahre optisches Handwerk in Augsburg* (Berlin: Akademie Verlag, 2000) p. 379; I. Keil, "Technology Transfer and scientific specialization: Johann Wiesel, Optician of Augsburg, and the Hartlib circle", in *SHUR*, pp. 268-278. Worsley also encountered individuals such as the inventor Johann Sibbertus Küffler (son-in-law of Cornelius Drebbel), and the iatrochemist Johann Unmussig- for which, see Young, *Faith, Medical Alchemy and Natural Philosophy*.

⁹³ Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 220-1. Young discusses Glauber's career and his rather abrasive and inconstant character in *Ibid.*, pp. 183-216.

⁹⁴ Letter, Culpeper to Hartlib, 16 August 1648. Culpeper: *Letters*, p. 342. Culpeper also wrote to Worsley concerning his ideas about the role of cold in the 'generation and multiplication of that vniversall Spirit of Nature' (again referring to the organic alchemy of Sendivogius and Nuysement). Letter, Culpeper to Worsley, 9 May 1648, in *Ibid.*, pp. 335-6.

⁹⁵ Letter, Worsley to Hartlib, 18 May 1649. HP: Royal Society Boyle Letters 7.1, fol. 1r.

⁹⁶ *Ibid.*, fol. 2r.

⁹⁷ Letter, Worsley to Hartlib, 1 June 1649. HP: Royal Society Boyle Letters 7.2. fol. 1r.

⁹⁸ Letter, Worsley to Dury, 27 July 1649. HP 33/2/19B.

However by then Moriaen was reporting that Worsley was at last ready to collaborate with Glauber.⁹⁹

Worsley's furnace experiments were supported by John Sadler, who visited Amsterdam from August to October 1648, writing to Hartlib that 'I have reall hopes that our Good Friend Heere, will goe beyond your expectations'.¹⁰⁰ After returning to London Sadler sent Worsley a letter of credit for £300.¹⁰¹ Further backing came from John Dury, although not in the form of direct investment. Dury had sent a letter over to Worsley with Hartlib's son Samuel, a rather wayward youth who had been sent to stay with Worsley in Amsterdam in January 1649.¹⁰² Worsley replied by directing some religious scruples concerning 'the true aim of Christian' to Dury, who in return asked Worsley to investigate some Hebrew books available from the Jewish scholar Menassah ben Israel, whom Dury hoped to deploy in his efforts to see the Jews readmitted to England.¹⁰³ Another of Worsley's contacts, Adam Boreel, was also interested in the possibilities of converting the Jews, and Dury directed a number of queries to him about Jewish arguments for 'discovering the falshood of the Mahumetan Religion'.¹⁰⁴ He also

⁹⁹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 225.

¹⁰⁰ Letter, Sadler to Hartlib, 16 August 1648. HP 46/9/4A.

¹⁰¹ Letter, Sadler to Hartlib, [1649]. HP 46/9/20A. Worsley was keen to demonstrate that the furnace he and Moriaen were developing would 'amount to more then the Interest of his money at 30. or 40 lb per Cent'. Letter, Worsley to Hartlib, 1 June 1649. HP: Royal Society Boyle Letters 7.2, fol. 1r. Somewhat confusingly, Worsley apparently referred to Sadler several times as 'Monsieur Amy', leading to an easy confusion with the Huguenot inventor Hugh L'Amy whom Hartlib had been in touch with in 1645. Biographical evidence suggests that the 'Amy' Worsley referred to in his letters could not have been the latter; that Worsley was referring to Sadler is suggested by the fact that 'Amy' is often mentioned in connection with John Trenchard, Sadler's father-in-law; it is confirmed by a letter where Worsley appears to have started writing Mr. Sadler, only to cross it out and write 'Our friend Mons. Amy'. Letter, Worsley to Dury, 17 August HP 33/2/4A. Why Worsley used this codename is unclear.

¹⁰² Letter, Dury to [Worsley], 26 January 1649. HP 1/7/1A.

¹⁰³ Letter, Dury to Worsley, 14 March 1649. HP 1/2/1A. For the Hartlib circle's interest in Jewish conversion, R. Popkin, "Hartlib, Dury and the Jews", in *SHUR*, pp. 118-136.

¹⁰⁴ Letter, Dury to Worsley, 2 May 1649. HP 4/2/26B. See also R. Iliffe, " 'Jesus Nazareus legislator': Adam Boreel's defence of Christianity", in *Heterodoxy, Spinozism, and Free Thought in Early-Eighteenth-Century Europe*, ed. S. Berti, F. Charles-Daubert, R. Popkin (Kluwer: Dordrecht, Boston & London, 1996) pp. 375-396.

requested that Worsley discover the opinions of the Amsterdam Jewish community about the possibility that the natives in America were in fact a lost tribe of Jews.¹⁰⁵

In return for this service, Dury offered to assist Worsley in his 'metallic business' by putting him in touch with his uncle, a Scot named David Ramsay, who 'had a Patent for all the Mynes of England & Wales'.¹⁰⁶ Worsley responded with interest, and in May Dury revealed that he had discussed the 'operation upon Mars' with Ramsay, who was interested in employing Worsley as a technician.¹⁰⁷ By June Dury was calling Worsley over to England, with Ramsay offering him 'a mine of Antimony and another of Iron in the B. of Durham'.¹⁰⁸ By then, however, Worsley's hopes were pinned on gaining employment in Virginia. The possibility of a career in America had arisen in early 1649, when Worsley considered relocating to Barbados to set up some sugar-grinding mills.¹⁰⁹ Worsley's machines would apparently have been based on similar technology to Wheeler's drainage mills, and at this point many of Hartlib's circle were interested in the possibilities of using 'engines of motion' for land and mine drainage, in particular Trenchard and Sadler who hoped to secure the services of a Dutch engineer to help in draining the English fens, repeating the feats of Cornelius Vermuyden in the 1630's.¹¹⁰ Worsley approached one of Moriaen's kinsmen, the engineer Jacob Pergens, for this purpose, but he doubted that any Dutchmen would work in England, for 'feare of civill warrs, from the Royall or Levelling party'.¹¹¹

¹⁰⁵ Letter, Dury to Worsley, 12 July 1649. HP 26/33/5A. Worsley, who was at that time outlining his plan for the parliamentary reduction of Virginia, replied in typically pragmatic fashion: 'If they be There, The prosperity of Virginia will not harme them'. Letter, Worsley to Dury, 27 July 1649. HP 33/2/19B.

¹⁰⁶ Letter, Dury to Worsley, 14 March 1649. HP 1/2/1A. See also 'A Memorandum for Mr Worsley', HP 1/2/2B.

¹⁰⁷ Letter, Dury to Worsley, 2 May 1649. HP 4/1/25A.

¹⁰⁸ Letter, Dury to Worsley, 12 July 1649. HP 26/33/5A.

¹⁰⁹ *Ephemerides* 1649, part 1. HP 28/1/7B.

¹¹⁰ Wilson, *England's Apprenticeship*, p. 31. On 29 May 1649, Sadler and Trenchard were named as commissioners in 'An Act for draining the Fens'. *A & O, II*, p. 137.

¹¹¹ Letter, Worsley to Hartlib, 22 June 1649. HP 26/33/1A. See also Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 221. Sadler wrote to Worsley complaining that the English were also too reluctant

However, potentially more fruitful machines were being developed by two more willing sources: the Netherlands-based inventor Caspar Kalthof, and William Petty, who were simultaneously developing machines to 'raise water'. Worsley attempted to encourage an ultimately unsuccessful collaboration between the two inventors, and although Young suggested that Petty obstructed its fruition for his own interests, Worsley's role may not have been entirely altruistic.¹¹²

Worsley was originally concerned that Petty had designs on setting up business in Barbados, thus rivalling his own plans. Petty wrote to reassure him that this was not his purpose, denying that he was being 'courted by the Men^r of thes world, ... for my credit is to small with them, that they scarce believe my performance to be reall'.¹¹³ In return for this guarantee, Petty requested that Worsley 'fish out' information about Kalthof's rival machines.¹¹⁴ The next exchange of letters is lost, but in June Worsley wrote to Petty thanking him in rather exaggerated terms for his 'generous offer' to collaborate with Kalthof.¹¹⁵ Meanwhile Worsley had visited Kalthof in Dortmund, and discovered the details of both methods, having 'accidentally' read Petty's letter.¹¹⁶ Worsley went on to request that Petty send further details of his invention, which might seem a perfectly reasonable exchange of information. However, he neglected to provide information about Kalthof's method, and seems to have been strategically posing as a go-between for the two inventors, thus placing himself in a position to benefit from

to drain lands with engines, preferring the hard labour of spadework instead. Letter, Sadler to Worsley, 7 [July?] 1649. HP 46/9/14.

¹¹² For this affair, as well as the letters cited below, see Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 221-2.

¹¹³ Letter, Petty to Worsley, 14 March 1649. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 36, fol. 1r.

¹¹⁴ *Ibid.*, fol. 1v.

¹¹⁵ Letter, Worsley to Petty, 15 June 1649. HP 8/50/1A.

¹¹⁶ *Ibid.*, HP 8/50/1B.

whichever discovery proved successful.¹¹⁷ Probably he saw this as a fair reward for his efforts, but Petty was uneasy and avoided giving out any further details by stating that ‘some of them cannot be solved without actual Experience’.¹¹⁸ Evidently he felt that he was being made to give more information than he was receiving, a valid concern given that Kalthof was rumoured to have set fire to his own engine to avoid its flaws being discovered.¹¹⁹

This episode shows the disjunction between the ideal of free communication espoused by the Hartlib circle, and the reality of competition between projectors. Although he did his fair share of scheming, Worsley was probably right to be wary of Petty (who was disparaging about Worsley and Kalthof’s engines to Hartlib) and here we see the roots of their later enmity.¹²⁰ However, Petty was not the only one to be suspicious of Worsley’s motives, and it was suggested by some of Moriaen’s acquaintances in Amsterdam that he had been taking advantage of his credulous host.¹²¹ But even if this was the case, Worsley had failed to gain any great rewards from his projects. In June he wrote of his disillusion: ‘I am much convinced of the vanity of proposing any invention to *the* world of any kind if they see he have not a purse of his owne at least to ioyne in it, eyther wholly sleighting a man, or thinking all he moves is out of selfe designe, or requiring very high Conditions from him’.¹²² Instead, he began to look for ‘a place of settled employment’, and in the following month such an opportunity appeared to arise. By then, Worsley was approached by certain English

¹¹⁷ *Ibid.*, HP 8/50/1A.

¹¹⁸ Letter, Petty to Worsley, 28 [June?] 1649. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 34, fol. 1r.

¹¹⁹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 221.

¹²⁰ See *Ephemerides* 1649 part 1. HP 28/1/5A.

¹²¹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 220.

¹²² Letter, Worsley to Hartlib, 22 June 1649. HP 26/33/2B.

colonial merchants who brought news of the royalist revolt in Virginia, encouraging him to consider taking up a post in the government of that colony.

This episode will be explored in the next chapter: for now it may remind us that in Amsterdam Worsley would have been observing the workings of the Dutch entrepôt. His surviving letters make little direct comment about this, but one letter almost certainly written by him commented on the Dutch East India Company, which caused ‘the very flourishing of Amsterdam’.¹²³ However, it was a ‘great Secret of State’ that the Company was resented by many merchants who were excluded by the high rate of its stock, and Worsley suggested that ‘a New *East India* Company’ erected in England would attract much Dutch investment. More widely, Worsley counselled that parliament should consider the subject of trade:

... if *England* could settle and would thinke fit to make Merchandise and Trading the incouragement of it the Great Interest of the State, as many Commonwealths (j say not Kindgoms) haue lately done. As of Venice Florence (when it was a *Common Wealth*) Genoa and Holland; I say there would very many, even out of spight and discontent withdraw their Stockes from hence.¹²⁴

In his absence, of course, England had become a republic, and Worsley’s own sympathy with the regicide (if not a doctrinaire republicanism) was shown by his response to a letter written to Moriaen by Prince Augustus of Arnhalt mentioning ‘the busines of *England*’. The Prince apparently observed that ‘it should bee a warning to all Princes and Persons in chiefe Authority, that they bee Fathers not mere Rulers and Tyrants over their People And that *God* had called them to an opportunity of doing good, and providing for the happines and blessing of their subjects’, and Worsley considered that ‘from a Prince’ this judgement was ‘not more excellently divine then rare’.¹²⁵

¹²³ Letter, [Worsley] to Hartlib, 10 August 1649. HP 43/35A-B.

¹²⁴ *Ibid.*, HP 43/35B.

¹²⁵ Letter, Worsley to Hartlib, 18 May 1649. HP: Royal Society Boyle Letters 7.1, fol. 2v.

Worsley's thoughts may have been turned to the colonies by Hartlib's attempts to revive le Pruvost's colonial project, which he took an interest in.¹²⁶ He also asked to see a copy of William Bullock's *Virginia Impartially Examin'd*, which outlined a programme to reform that colony.¹²⁷ Another source of information was Robert Child, who had returned from New England in 1647, although his dealings with the Massachusetts authorities put that colony in bad light: Child had been imprisoned for remonstrating against the repressive religious laws which had hindered his economic projects and conflicted with his conscience.¹²⁸ For Worsley too New England would only be a peripheral interest, and his main hopes focussed southwards on Virginia and the West Indies. But it was not as a private adventurer that Worsley profited from the New World, as he had originally anticipated: for him, a state salary offered more security than the unpredictable fortunes of the projector.

It would be an exaggeration to say that Worsley was to take no interest in scientific or technological projects after 1649. On his return to London Moriaen had sent Worsley a 'declaration' from Glauber, which Young has shown was 'an offer to reveal a process of extracting gold from tin scoria'.¹²⁹ Moriaen and Worsley apparently joined a consortium to purchase Glauber's secret, and they corresponded about this venture from 1650-1. Worsley at one point sought to involve the American alchemist George Starkey, who had arrived from New England in late 1650, and Starkey later wrote that 'Some Gentlemen sollicite me to follow extractions of [gold] & [silver] out of [antimony] & [iron], among whom Mr Worsley an ingenious Gentleman did much

¹²⁶ Letter, Worsley to Hartlib, 3 August 1649. HP 33/2/2B.

¹²⁷ Letter, Worsley to Hartlib, 1 June 1649. HP: Royal Society Boyle Letters 7.2, fol. 1v.

¹²⁸ Newell, "Robert Child".

¹²⁹ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 226. The account of this enterprise given here is taken from *Ibid.*, pp. 226-232.

persuade'.¹³⁰ Ultimately, however, Starkey was unwilling to 'imbrace a life ... wch might be Compared with yt of a Millhorse running around in a wheele'.¹³¹ This did not stop Worsley from touting some of Starkey's alchemical claims to Moriaen as his own, and Newman and Principe have charged him with attempting to plagiarise the more talented practitioner.¹³² Certainly Moriaen became disillusioned with Worsley's minimal contributions, and he must take some of the blame for the financial losses Moriaen accrued as a result of this ill-fated venture.¹³³

Worsley's interest in natural philosophy remained: Hartlib noted in early 1650 that he was hoping to 'make a Club for the perfecting of Mechanical Arts' along with two future Fellows of the Royal Society, Doctors Christopher Merret and Daniel Whistler, although there is no evidence that this possible successor to the Invisible College ever actually met.¹³⁴ Soon Worsley was busily employed as secretary of the Council of Trade, and science was relegated to a side-interest. However, this did not lead to him abandoning natural philosophy or alchemy altogether, and he returned to the subjects with even greater zeal in the 1650's, although with less emphasis on making a living through science. Worsley's science became more speculative, a direction which he was already moving in during his Dutch visit. Although he complained about the place 'not perfectly agreing with my health, & as litle, or lesse, with my affection', there is no doubt that Amsterdam influenced Worsley's intellectual development.¹³⁵ As the most tolerant city in Northern Europe Amsterdam saw a collision of numerous religious opinions, and the circle in which Worsley himself mixed was far from orthodox:

¹³⁰ Quoted in W. Newman, "Newton's *Clavis* as Starkey's Key", *Isis*, 78 (1987) p. 567.

¹³¹ *Ibid.*, p. 568.

¹³² Newman & Principe, *Alchemy Tried in the Fire*, pp. 245-7.

¹³³ Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 229-231.

¹³⁴ *Ephemerides*, 1650, part 1. HP 28/1/77A.

¹³⁵ Letter, Worsley to Dury, 27 July 1649. HP 33/2/19B.

Moriaen's piety was broadly irenic, verging at times on the mysticism of Jacob Böhme.¹³⁶ Another associate, Adam Boreel, was a member of the Collegiants, a group which recognised no church standing between God and man.¹³⁷ Less orthodox still were the opinions of the Socinian authors whose works were widely available in Amsterdam. Worsley commended the writings of Johann Crell, who had 'collected all the commands and precepts almost in Scripture that concerne the doing of any moral duty, or abstaining from any moral evil' in a book which gave Worsley 'much pleasure'.¹³⁸ Although not necessarily subscribing to the views of these anti-trinitarians himself, he was certainly interested in them, and his library catalogue listed numerous Socinian works.¹³⁹ Worsley was possibly introduced to these by William Rand who wrote that, whilst he did not count himself a Socinian, 'yet I see no reason but one, why, the men or their doctrine should disturbe *the* mind of your selfe or any rationally ingenuous christian; & that is the Inchantment & Sorcery of *the* reverend Clergie, who being movd by their Interest to make a lamentable noise of heresy blasphemy & what not, doe terrifie the minds of men'.¹⁴⁰ Although Socinianism has been lauded by its modern commentator for its 'progressive' approach to religion, it was based on a desire to reform Christianity on moral lines which had a distinctly anti-clerical bias, and these very features could make it attractive to those supposedly on the opposite side of the religious spectrum.¹⁴¹

¹³⁶ Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 16-21, 81-92.

¹³⁷ *Ibid.*, p. 85; Iliffe, "Jesus Nazarene Legislator".

¹³⁸ Letter, Worsley to Hartlib, 18 May 1649. HP: Royal Society Boyle Letters 7.1, fol. 1v.

¹³⁹ Worsley's catalogue listed 13 works by Faustus Socinus himself as well as his biography (making him one of 6 best represented authors in the whole library), 6 by Crell, 2 each by Johann Völkel and Jonas Schlichting, 1 by Joachim Stegmann, and John Biddle's *Two-fold Catechism* (1654).

¹⁴⁰ Letter, Rand to Worsley, 11 August 1651. HP 62/21/1A-B.

¹⁴¹ H. John McLachlan, *Socinianism in Seventeenth-Century England* (Oxford: Oxford U.P., 1951) pp. 1-22.

Worsley was attracted to Crell for his ethical and anti-formal interpretation of Christianity, and elsewhere Worsley considered how religion could be purified from its worldly encumbrances. On the occasion of the death of Cyprian Kinner in 1648, Worsley reflected that men must 'break ourselves of this custome to take care only to get estates for ourselves, or our mere families, and meditate more of our privat Interest, then of the Interest of God's Church, and of Mankind in the general'.¹⁴² Considering the subject of morality, he wrote that 'there is nothing lesse or worse taught in the Vniversitys', recommending the classical authors 'Epictetus and Antoninus'.¹⁴³ Worsley also sought spiritual counsel from John Dury, who advised that 'till we learne the ways of Christ experimentally, and be inabled to utter them demonstratiuely and rationally, we are not sufficiently taught in the mystery of his life within us'.¹⁴⁴ Worsley was to take this call to heart, and his religion became increasingly experimental in the following decade, although perhaps not in the manner that Dury anticipated.

However, although he decried private interest and acquisitive behaviour, Worsley did not go on to advocate withdrawal from such worldly concerns, and he was highly conscious of the ways in which power determined the course of politics and trade. How Worsley came to balance the differing concerns and interests which we have seen in the previous two chapters, having finally achieved some of the success he strove for in government service, shall be considered in Part 2, when the proclamation of a republic in England opened new opportunities for ambitious men like him.

¹⁴² Letter, Worsley to Hartlib, 28 May 1649. HP: Royal Society Boyle Letters 7.1, fol. 1r.

¹⁴³ Ibid. Worsley presumably referred to Marcus Aurelius Antoninus, Roman Emperor from AD 161-180 and author of the *Meditations*. Two editions of Meric Causabon's translation of the latter, as well as three editions of the stoic Epictetus' *Enchiridion*, were included in Worsley's library catalogue.

¹⁴⁴ Letter, Dury to Worsley, 2 May 1649. HP 4/1/27A.

Part 2.

1650-59.

3. 'Enriching the Commonwealth'.

The Council of Trade, 1650-1651.

On 1 August 1650 the Rump Parliament passed 'An Act for the Advancing and Regulating of the Trade of this Commonwealth', creating a Council of Trade of 15 commissioners. Benjamin Worsley was named as secretary, with a yearly salary of £200 plus £300 to employ clerks and messengers.¹ Although this commission only lasted until the end of 1651, it would establish his administrative reputation. Worsley was named as prospective secretary as early as 16 March when the Act was debated in parliament, and had probably been consulted when parliament discussed regulating trade on 11 January 1650, shortly after his return from the Netherlands.² It was in Amsterdam, in the summer of 1649, that Worsley became acquainted with those English colonial merchants who informed him of events in Virginia, opening the possibility of following a career in colonial administration. The subjection of Virginia to parliamentary control would allow its trade to be reformed in line with English interests, one dimension of what was intended to be a thorough reformation of commerce to suit the aspirations of the new regime, directed by the Council of Trade.

This Council, and the commercial policy of the Commonwealth in general, have a complex historiography which cannot be covered fully here. The purpose of this chapter is to examine Worsley's role in its making, a task which nonetheless requires a wider assessment of the Commonwealth's commercial policy, the context in which it was fashioned, and its historiography. Rather than drawing on any major newly

¹ *A & O*, II. p. 406.

² L.F. Stock (ed.) *Proceedings and Debates in the British Parliaments respecting America. Volume 1. 1542-1688* (Washington: Carnegie Institute, 1924) pp. 214-6.

discovered sources, I will place Worsley's activities on the Council of Trade in context of his intellectual development, and in particular his account of Dutch commercial success.³ The nature of Anglo-Dutch relations in the 1650's, encompassing the proposal for a union of the republics, the Navigation Act of 1651, and the subsequent descent to war, dominates the historiography of the period.⁴ Alongside this, historians have considered whether the aims of the Council of Trade were traditional or progressive, whether its approach was reactive or proactive, and the extent to which it reflected the interests of merchants (company or interloping) or of the state. Underlying these issues is the question of whether the English Revolution precipitated or was based on any sort of social or economic change. Many recent interpretations have reacted against teleological perspectives placing the Revolution at the centre of social, economic and political developments, thus emphasising continuity above change. Perhaps the central issue here is that of 'free trade', and J.P. Cooper has shown that the Commonwealth was not attempting to forge a modern capitalist order through laissez-faire policies in poor relief or the regulation of industry, for example. In particular, the failure of the Rump to abolish the trading companies has been seen as important, and Cooper found 'no evidence of doctrinaire hostility to chartered companies' on the Council of Trade.⁵

³ The sources for the Council of Trade are sparse. No journal of its proceedings survives, and only fragments of the work it produced have been found. Undoubtedly it did collect much important material however- Thomas Violet reported that 'In many particulars of this business I delivered the Councell Papers. There is one Master Hartlibe which was a Clark to Master Worsly the Secretary for Trade; I understand Master Worsly hath left many Papers with him concerning this business'. *Mysteries and Secrets of Trade and Mint-affairs* (London, 1653) p. 178.

⁴ For a classic statement, C. Wilson, *Profit and Power. A Study of England and the Dutch Wars*. Second edition. (The Hague: Martinus Nijhoff, 1978); for a new account, D. Ormrod, *The Rise of Commercial Empires. England and the Netherlands in the Age of Mercantilism, 1650-1770* (Cambridge: Cambridge U.P., 2003). See also J. Israel, "England's Mercantilist Response to Dutch World Trade Primacy, 1647-1674", in *State and Trade. Government and the Economy in Britain and the Netherlands Since the Middle Ages*, ed. S. Groenveld & M. Wintle (Zutphen: Walburg Press, 1992) pp. 50-61.

⁵ J.P. Cooper, "Social and Economic Policies under the Commonwealth", in *The Interregnum: The Quest for Settlement, 1646-1660*, ed. G. Aylmer (London: Macmillan, 1972) p. 132.

There is a tendency to conclude that, because it did not abolish the companies, Commonwealth commercial policy was therefore essentially conservative, a conclusion which arguably endorses the teleological framework which it purports to debunk.⁶ However Worden is not alone in highlighting the ‘time-honoured concept of the proper relationship between trade and the public interest’: Cooper too saw considerable continuity between the period before and after Civil War.⁷ An allied issue is the relative significance of commerce in relation to the other pressing concerns facing the Commonwealth. Even if the Council of Trade did have a clear agenda (which Cooper doubted) its life-span was limited, and overall ‘the Rump’s conservatism and reluctance to override corporate privileges or vested interests appear in prolonged failures to act’.⁸

Historians have been more willing to endorse the importance of the Navigation Act in marking a move to national, statutory policies, although they rarely go as far as Charles Andrews in discerning ‘the first attempt to establish a legitimate control of commercial and colonial affairs, and ... the beginnings of a policy which had the prosperity and wealth of England exclusively at heart’.⁹ Cooper conceded that ‘in the long run the 1651 Act may be the beginning of a change to national statutory regulation of foreign trade, instead of regulation through chartered companies’.¹⁰ Although he argued that the Navigation Act served the purposes of the merchant companies, Harper emphasised the move to national regulation, but nonetheless saw ‘no significance in the

⁶ Worden, *Rump Parliament*, p. 258.

⁷ Cooper, “Social and Economic Policies”, p. 124.

⁸ *Ibid.*, p. 139.

⁹ Andrews, “British Committees”, p. 25. However, note that Andrews contrasted the ‘open, broad-minded, and progressive’ Council of Trade to the ‘restrictive, coercive, and monopolistic’ terms of the Navigation Act. *Colonial Period of American History*, IV, p. 40.

¹⁰ Cooper, “Social and Economic Policies”, p. 135. See also Braddick, “Government, Wars, Trade, and Settlement”, pp. 294-5, 301-3.

fact that the Act of 1651 followed the Puritan accession to power'.¹¹ Similarly for Israel, the Act was 'essentially a response to the post-1647 English shipping slump and the merchants' demand that regime step in to halt the burgeoning influx into England of commodities from the Baltic, Spain, the Canaries, Italy, Turkey, and the Caribbean via the Dutch entrepôt'.¹² This raises the issue of whose interests the Act intended to serve, and Hinton argued that 'it is a complete mistake to suppose that the Navigation Act was evolved as a result of the pressure of interested groups', suggesting instead that it had the defensive strategic goal of increasing shipping.¹³ The alternative view, stressing the primacy of commercial interests, was advanced by Farnell and Brenner, who both highlighted Worsley's apparent connection with key colonial merchants like Maurice Thomson.¹⁴ This chapter will therefore consider the nature and extent of these putative connections, and the relationship between the state and merchants.

Brenner's full thesis, that the English Revolution encompassed a conflict between royalist company merchants and the 'new merchants', a closely integrated group of colonial interlopers who supported parliament to fulfil their economic ends, is too large to examine here.¹⁵ However, his contention that the new merchants were the key interest behind republican commercial policy, which provided both state support and freedom from corporate constraints, demands attention. Through the Council of Trade the new merchants 'sought to influence the government so as to further their own immediate interests', whilst the republican politicians aimed 'to make commercial policy serve the goal of enhancing English world power, especially in order to validate

¹¹ L.A. Harper, *The English Navigation Laws. A Seventeenth-Century Experiment in Social Engineering* (New York: Columbia U.P., 1939) p. 39.

¹² Israel, *Dutch Supremacy*, p. 208.

¹³ Hinton, *Eastland Trade*, p. 90.

¹⁴ Farnell, "Navigation Act"; Brenner, *Merchants and Revolution*.

¹⁵ For one critique of Brenner's approach, see J. Morrill, "Conflict Probable or Inevitable?" (review of *Merchants and Revolution*), *New Left Review*, 207 (Sept/Oct 1994) p. 118.

their own leadership, to give legitimacy to the Commonwealth, to prove the superiority of the republican form of rule, and, not least, to protect the republic from its many enemies abroad'.¹⁶

In placing commercial policy at the centre of accounts of the English Revolution, Brenner has gone against the historiographical tide, which had tended to turn towards religion as the determinant factor in the course of Civil War and Revolution. This trend has been extended to Anglo-Dutch relations and the Navigation Act by Steven Pincus.¹⁷ Focussing on the failed attempt to secure union between the republics in 1651, Pincus argued that the Navigation Act was passed not to revive trade or shipping, but 'in order to punish the Dutch for apostatizing, for abandoning the Protestant and republican cause'.¹⁸ Again, Worsley figures prominently, but here as an advocate of 'apocalyptic economics' rather than sober, rational calculations.¹⁹ Whilst I will argue that the Navigation Act is unintelligible without reference to the discourse of trade, the religious and ideological contexts which Pincus unearthed must be integrated into this discussion.

Ironically, Pincus' recent work has drawn attention to supporters of the republic who invented 'a new ideology applicable to a commercial society, an ideology that valued wealth but also the common good'. Naming Worsley as one prominent advocate, Pincus identified this as a liberalism that 'melds elements of the republican tradition- especially the republican commitment to the promotion of the public good- with a commitment to commercialization'.²⁰ Brenner, too, saw the Rump as advancing a distinctively republican commercial policy, distinct from the political economies of both

¹⁶ Brenner, *Merchants and Revolution*, p. 580.

¹⁷ Pincus, *Protestantism and Patriotism*, Part 1.

¹⁸ *Ibid.*, p. 50.

¹⁹ *Ibid.*, p. 48.

²⁰ S. Pincus, "Neither Machiavellian Moment nor Possessive Individualism: Commercial Society and the Defenders of the English Commonwealth", *American History Review*, Vol. 103, No. 3 (June 1998) p. 708.

the merchant companies and the Levellers, and focussed on a strong state advancing the nation to world power through trade.²¹ This chapter will therefore also consider whether the Council of Trade and Navigation Act did indeed represent a characteristically republican political economy, and if so, what role Worsley may have played in it.²² When fashioning commercial policy, the Commonwealth could follow the example of a republic which had achieved fabulous commercial success. This, of course, was the United Provinces, and so Worsley was well placed in 1649, when the groups and forces that would shape these policies began to coalesce.

I. Contesting the Atlantic.

The Navigation Act of 1651 intended to create a protected system of trade centred on England's colonies in America and the West Indies. Its passage reflects the growing importance attributed to colonial trade at the time, and yet parliament's hold on the colonies was far from secure, as several of them, notably Virginia, remained loyal to the Stuarts. Worsley learned of these developments in Amsterdam in summer 1649, from English merchants who complained also that the tobacco trade had fallen into Dutch hands. He would go on to play an important part in the Commonwealth's reduction of these rebellious colonies, and in order to understand these events it is necessary to examine Virginia's political and commercial history up to that date.

²¹ Brenner, *Merchants and Revolution*, pp. 558-560, 577-8.

²² Worden's account of the 'classical republicans' of the Commonwealth also notes their commitment to assertive foreign and commercial policies, a 'commonwealth for expansion', although he sees their inspiration as classical and therefore backwards looking. B. Worden, "Classical Republicanism and the Puritan Revolution", in *History and Imagination. Essays in Honour of H.R. Trevor-Roper*, ed. H. Lloyd-Jones, V. Pearl, & B. Worden (London: Duckworth, 1981) pp. 196-7.

The government of Virginia had developed in a piecemeal fashion, but nonetheless certain principles of empire had emerged. Despite occasional assertions of autonomy, the 'underlying reality' of empire was 'colonial dependence', and there was an established consensus that colonies were a part of the English polity and should be governed like it.²³ However, the different groups and ideals involved in the colonisation movement could sometimes clash, and there remained an unresolved tension between the idea that colonies should benefit the nation that had founded them, and the recognition that they could not simply be treated as commercial factories to be exploited.²⁴ Originally, Virginia had been settled as 'a national endeavour in pursuit of national glory and power', aimed principally against Spain, and this purpose was reflected in the initial form of government.²⁵ From 1607-9, Virginia had been administered by a dual-council system, whereby a royally-appointed council in England appointed a corresponding governor and council resident in Virginia.²⁶ Only with the failure of this system was government 'farmed out' to the Virginia Company, who made the resident governor their direct representative in the colony, supplemented by an appointed council and later a representative assembly.²⁷ This did not stop the crown from attempting to reinstate the original, centralised form of government, following the withdrawal of the Company's charter in 1622.²⁸ However, the crown could not ignore Virginia's dominant social groups, and in 1639 the colonists succeeded in gaining recognition for the triadic format of their government.²⁹

²³ R. Bliss, *Revolution and Empire: English Politics and the American Colonies in the Seventeenth Century* (Manchester: Manchester U.P., 1990) pp. 2-5.

²⁴ *Ibid.*, p. 21.

²⁵ Y. Man, 'English colonization and the formation of Anglo-American polities, 1606-1664', unpublished PhD dissertation (The John Hopkins University, 1994) p. 31.

²⁶ *Ibid.*, pp. 17-61.

²⁷ *Ibid.*, pp. 69-72, 122.

²⁸ *Ibid.*, pp. 60-1.

²⁹ *Ibid.*, p. 265.

By then, however, the situation had been complicated by the opening of a fissure between the majority of colonists, and a small group of landowners who dominated trade in conjunction with English merchants: the new merchants. Brenner argued that the decline of the Virginia Company and the unwillingness of London's company merchants to become involved with colonial trade led to the emergence of a new colonial-merchant leadership, who did not rely on crown privilege.³⁰ As well as coming from relatively humble origins, these merchants were often involved in colonial settlement themselves.³¹ This resulted in a proliferation of merchants trading to Virginia, but they were dominated by a group of planter-traders led by one Maurice Thomson, connected by a series of business and familial ties linking merchants and ship-owners in England and Virginia with tobacco producing colonists.³² These individuals came to dominate Virginian society and politics, promoting expanded production, opposing the regulation of prices, upholding the headright system, excluding Dutch merchants, and seeking to erect a new trading company for Virginian tobacco. Politically, Brenner discerned 'the emergence of a special *merchant-councilor interest* distinct from, and in important ways directly opposed to, the interest of the generality of planters'.³³ The latter tended to bear the brunt of falling prices caused by overproduction, and had the most to gain from a more open trade, pitting them against the dominant mercantile planter-councillors.

In response to these grievances, the smaller planters increasingly called for a lower house distinct from the governor and council, which beforehand had met in a

³⁰ Brenner, *Merchants and Revolution*, pp. 116-120.

³¹ *Ibid.*, p. 112.

³² *Ibid.*, p. 116.

³³ *Ibid.*, p. 117.

single General Assembly.³⁴ This was achieved due to political factors. In 1642, Sir William Berkeley had been appointed as governor by the crown, with particular instructions to counter the growth of Puritanism in that colony, which had been promoted by many of the leading councillors.³⁵ In order to counter-balance the dominance of this group, Berkeley proclaimed a separate house of burgesses, in 1643.³⁶ Measures were also taken against the new merchants' dominance over colonial trade, with the passage of an 'Act against the Company' to ensure there would be no return to regulation of trade from London, and legislation allowing open trade with Dutch merchants.³⁷ By the late 1640's the Dutch were able to capitalise fully on this opportunity, following the conclusion of peace on the continent. Meanwhile political polarisation within Virginia reached a head in 1648, when Berkeley expelled two prominent Puritan ministers.³⁸ At the same time, the regicide had apparently destroyed the basis of the colonies as royal creations, and presented parliament with the opportunity to refashion the English colonising enterprise. Thus political and religious conflicts were embroiled in economic contests, and the political fate of Virginia came to depend on the state of its trade with Europe.

Worsley's ideas about reforming Virginia's government were developed in a number of letters to John Dury and Hartlib written in July-August 1649, as well as others to John Sadler which do not survive. Worsley had been encouraged to turn to this

³⁴ Man, 'English colonization', pp. 268-281.

³⁵ Brenner, *Merchants and Revolution*; K. Butterfield, "Puritans and Religious Strife in the Early Chesapeake", *Virginia Magazine of History and Biography*, Vol. 109, No. 1 (2001) pp. 17-19.

³⁶ Man, 'English colonization', p. 281; J. Kukla, "Order and Chaos in Early America: Political and Social Stability in Pre-Restoration Virginia", *American Historical Review*, Vol. 90, No. 2 (April 1985) p. 289.

³⁷ Bliss, *Revolution and Empire*, p. 30; Brenner, *Merchants and Revolution*, p. 586.

³⁸ Namely William Durrant and Thomas Harrison. Butterfield, "Puritans and Religious Strife", p. 29.

subject, he explained to Dury, by 'Diverse Merchants' who had approached him with their concerns.³⁹ Thus he presented Dury and Hartlib with an account of Virginia's recent history:

...not only Civill, & Industrious men, but good men, began to increase There./ And a church 2 or 3 of the Independent, & Presbyterian way, were gathered./ some coming thither from the Bermudas, or sommers Island, some from new=England./ And very great Expectation that Debaushery, & sensuality, so reigning, there./ would quickly in a great measure have beene discountenanced, might they have beene countenanced, or at least permitted to stay there./ But some of the ministers, & some other heads of Churches, were Banished, as men schismaticke & factious./ And an oath or Covenant pressed to mainteyne the Governour and the Interest of the Crowne, against the parliament.⁴⁰

Berkeley's deposition was legitimate because the regicide had invalidated his commission, and Worsley claimed that his mercantile contacts were willing to advance 'A very considerable stock', on the condition that parliament pass an Act placing the colony's government into a commission able to represent their interests. For his own 'future settlement & Relation to the World' Worsley envisaged employment in Virginia, presenting himself as one who 'may assist in *the* furtherance of Trading incourage Industry & may contribute to *the* flowrishing of the plantation'.⁴¹ Meanwhile the parliamentary administration of Virginia would encourage new investment and commerce, and the introduction of a plethora of new commodities (aniseed, sweet fennel, rice, flax, woad, hogs and beef) and industries (leather and soap, distilling, flax-spinning, weaving linen and producing dyes).⁴² Virginia would follow Barbados, which 'hath within 10 yeares raysed its land from almost nothing; to be as deare ... or dearer

³⁹ Letter, Worsley to Dury, 27 July 1649. HP 33/2/18A.

⁴⁰ Ibid.

⁴¹ Ibid., HP 33/2/18A-B.

⁴² Ibid., HP 33/2/18B.

then in England'.⁴³ With these ends in mind, Worsley exhorted Dury, Hartlib and Sadler, to pass on his suggestions to their political patrons.

Accordingly, Dury approached John Bradshaw, the President of the Council of State, John Milton, its Latin secretary, and probably Gualter Frost, the Council's secretary, who believed it to be 'very sutable to their Aime in the Letter which they haue written to bee sent to all the forraigne Plantations' (referring to the letter of 26 July demanding political obedience to parliament).⁴⁴ However, given 'the natural slownes of the Parliament', Dury suggested that more concrete plans were needed.⁴⁵ Worsley had already written to Hartlib explaining the proposal in more detail, allowing Dury to draw up 'A Memorandum Concerning the Plantation in Virginia' which he probably used to promote the project.⁴⁶ Worsley argued that parliament's sovereignty over Virginia derived from the colony's strategic importance to England: 'It being if not simply & positively Theirs; yett at least Relatively, As the good or harme of that plantation, & manner of the Government There; may reflect at present or futurely vpon the Common=wealth of England; vpon the good of Trading, vpon merchants, & vpon the freinds & Interest of the Parlaiment'.⁴⁷ He then detailed the means by which the Governor had taken power against the wishes of the majority, claiming that a faction of planters had allied with Berkeley for their own interests. Berkeley had encouraged the planters to trade with the Dutch, arguing that 'They cannot expect a worse market in a place of peace, & full Trading, as Holland Is, Then in a place full of confusions, & Troubles as London & England are'.⁴⁸ But Berkeley had a hidden agenda: 'To Bring the

⁴³ Ibid., HP 33/2/19A.

⁴⁴ Letter, Dury to [Hartlib], 30 July 1649. HP 1/2/9A; Brenner, *Merchants and Revolution*, pp. 587-8.

⁴⁵ Letter, Dury to [Hartlib], 30 July 1649. HP 1/2/9B.

⁴⁶ Letter, Worsley to Hartlib, 3 August 1649. HP 33/2/1-2. Copies of Dury's adaptation of this letter are at HP33/2/22 and 61/5/1-2.

⁴⁷ Letter, Worsley to Hartlib, 3 August 1649. HP 33/2/1A.

⁴⁸ Ibid., HP 33/2/1A.

Planter to a lesse dependance vpon London & her Merchants' and to 'tye them with the lesse Trouble to his Intrest'.⁴⁹

In order to bring Virginia back under parliamentary control, Worsley suggested the creation of a commission comprising two parliamentarians and two merchants, to manage the colony from London, which would appoint a government in Virginia itself. As well as being able to license those departing for Virginia, these commissioners would have power 'To debar the Trading of the Hollander and of all strangers There'. The Virginian commission would be chosen from amongst the planters, 'That ioyning these *Gentlemen* their power interest, & Relations to the former Comissioners, The Governour might be made yet *the* more vnable to make any considerable Party There'.⁵⁰ This was in fact similar to the conciliar model of government for Virginia which the crown had put forward in 1606 and 1623, and it took no account of the existence of the assembly. To this extent it was conservative: Virginia seemed to be drifting away from the metropolis, and unsurprisingly Worsley saw it as necessary to reaffirm English control. The merchants would serve the national interest by bringing Virginia back into English dependency, severing the colony from the Dutch.

At this point, however, a misunderstanding between Worsley and Dury almost led to the withdrawal of mercantile backing. Dury had suggested that Worsley 'get Propositions Authentically drawn vp by the Adventurers' which would allow the Council of State to offer them a commission.⁵¹ Worsley was disturbed by this, writing to Dury that he hoped he had not 'vndertaken more on my behalfe, then I can be able in all circumstances to bring to passe'.⁵² He explained that the merchants were willing to

⁴⁹ Ibid., HP 33/2/1B.

⁵⁰ Ibid., HP 33/2/2A.

⁵¹ Letter, Dury to Worsley, 8 August 1649. HP 1/2/12A-B.

⁵² Letter, Worsley to Dury, 17 August 1649. HP 33/2/3A.

invest their money only as ‘a secondary motive ... which would follow, if the *Parliament* would please in altering that present Governement (which did concerne them for their owne Interest).’⁵³ Realising the offence he had caused, Dury replied by agreeing that ‘if the State will not owne their owne Interest, it cannot bee expected that Privat men should engage for them without some assurance to bee able to proceed with countenance and protection’.⁵⁴ His concerns assuaged, Worsley wrote to enlist the support of Walter Strickland, parliament’s envoy in The Hague.⁵⁵ In turn, Strickland wrote to a leading Commonwealth politician, Sir Henry Vane junior, arguing that Worsley’s plans had ‘the same Reason which goeth through the change of Governement established in England’.⁵⁶ Strickland’s commendation of Worsley as a man ‘of very high parts, both naturall & Acquired’ helped him win the patronage of Vane, an important figure who became President of the Council of Trade in 1650.

In the weeks before he returned to England, probably in November 1649, Worsley was corresponding with Hartlib and Dury about the choice of commissioners, ‘the main hinge and ... great strenght of the thing’.⁵⁷ Dury had recommended Vane as one of the parliamentarians, and the colonial merchant William Willoughby as a representative of the City.⁵⁸ Worsley was relatively flexible as long as it comprised ‘men well interested and related well affected to the imploiment’, suggesting Nicolas Corsellis, an Anglo-Dutch merchant associated with Hartlib, the prominent colonial merchants Maurice Thomson and William Pennoyer, the London Alderman Thomas Andrews, and Martin Noell, ‘a great Plantation and Parliament-man’, who would attain

⁵³ *Ibid.*, HP 33/2/3B.

⁵⁴ Letter, Dury to Worsley, 31 August 1649. HP 1/2/14A-B.

⁵⁵ Letter, Worsley to Walter Strickland, c. September 1649. HP 61/8/1-3.

⁵⁶ Letter, Strickland to Sir Henry Vane, 2 September 1649. HP 61/9A.

⁵⁷ Letter, Worsley to [Hartlib?], undated. HP33/2/20A.

⁵⁸ Letter, Dury to Worsley, 31 August 1649. HP 1/2/14A.

prominence as an advisor to Cromwell in the 1650's.⁵⁹ Thomson, Pennoyer and Andrews were three of the leading new merchants whom, Brenner claimed, would soon be working closely with Worsley.⁶⁰ However, it appears that at this point Worsley knew them by reputation only, and they were unlikely therefore to have been the same merchants who approached him in summer 1649.⁶¹ Perhaps the latter were collaborators of Thomson, but given that Thomson already had close contacts with the regime, including his brother George, an MP, it seems unlikely that he would have relied on Worsley to represent him. Another possibility is that Worsley was exaggerating his mercantile contacts, in order to promote his own suitability for an official post (which would also explain his reticence about guaranteeing their investment).

Whatever the precise details, Worsley was indeed working with the new merchants shortly after his return from Amsterdam. Already his approaches to Strickland and Vane had encouraged the Council of State to consider Virginia, on 13 October 1649.⁶² Then on 29 November Vane's Committee of the Admiralty ordered that Maurice Thomson and other colonial merchants present their ideas for the settlement of the colony. This meeting was delayed by Thomson's illness, but in the meantime Worsley was permitted to search in the state records for information about Virginia.⁶³ The conclusion of the eventual meeting, on 9 January, adopted Worsley's proposals by suggesting that parliament should nominate commissioners to govern Virginia on its

⁵⁹ Letter, Worsley to [Hartlib], undated. HP 33/2/20A-B.

⁶⁰ Brenner, *Merchants and Revolution*, p. 589.

⁶¹ As Brenner has shown, many of these figures were prominent in London politics throughout the 1640's, and had connections with Worsley's Coleman Street parish. One way which Worsley may have heard of them, for example, was through the Tower Hamlets militia commission of 1647, which included Thomson, Pennoyer, Willoughby, and Noell. *Ibid.*, p. 514.

⁶² *CSPC, 1574-1660*, p. 331.

⁶³ *Ibid.*, pp. 331-2. Copies of some of the records seem to have come into Hartlib's hands: a copy of a speech to the Virginia committee, HP 61/2/1-14; a treatise on the development of Virginia, HP 61/3/1-25; 'A Breviat of the Records of Virginia', HP 61/4/1-2.

behalf, although it was not until May that Worsley was ordered to draw up this commission alongside the Attorney-General.⁶⁴ By then, news of Virginia's proclamation of Charles II of October 1649 had arrived in England, only to be followed by further royalist declarations in 1650 from Barbados, Bermuda, Antigua, and Maryland.⁶⁵ The problem now required a more extensive remedy, which eventually came with 'An Act for prohibiting Trade with the Barbadoes, Virginia, Bermuda and Antego', ferried through parliament on 3 October 1650 by George Thomson. For Brenner, this 'gave the colonial merchants just about everything they had requested', namely 'the restoration of English merchant hegemony throughout the British empire'.⁶⁶

To a degree this was the case. The Act legislated for a fleet to be raised to suppress the rebellions, whilst trade to the colonies, especially in foreign ships, was to be licensed from England. However, it did not fully realise Worsley's original plans, which would have subjected colonial trade to license by a London-based commission dominated by the new merchants, disadvantaging not only their Dutch merchant rivals, but also other English traders. Perhaps in response to complaints from the latter, Worsley drafted a memorandum warning that 'Parlaiment may command their owne merchants to forbear Trading There', deriding Virginia's claims to independence:

They of Virginia are no more then an English Colony./ They are no State/, or politick Body/, & consequently in no Capacity of being received into Protection by any forreigne nation/, or of making a Confederacy or Alliance with any other state, or Prince/, nor of contracting any League with Any eyther for their defence; or for their being supplied with things necessary; or for having their Commodities taken from them.⁶⁷

⁶⁴ *CSPC, 1574-1660*, pp. 332, 339.

⁶⁵ Bliss, *Revolution and Empire*, pp. 86-88.

⁶⁶ Brenner, *Merchants and Revolution*, p. 592.

⁶⁷ 'Further Animadversions about Virginia'. HP 61/6/1A.

However, despite this rhetoric, Worsley was forced to recognise the need to offer the colonists some say in choosing their immediate governors, through a representative assembly.⁶⁸ There would be no attempt to govern Virginia through an appointed council based in London. Similarly, the principle of commercial regulation by license was rejected even before parliament's commissioners left for Virginia. The new merchants had previously launched numerous attempts to reintroduce an exclusive trading company dealing in tobacco, and the Virginian colonists feared that the 1650 Act would be used for such purposes.⁶⁹ The Navigation Act, however, superseded this, and although it excluded the Dutch from the import trade into the colonies, it did allow the export trade to remain open- terms which were more generous than the Restoration laws.⁷⁰ Furthermore, the articles of surrender offered to Virginia included provision for 'free trade', a clear blow to the new merchants.⁷¹

Thus, although the four-man commission sent to Virginia was dominated by new merchants, two of whom were made governor and secretary respectively after Berkeley's surrender in 1652, the new merchants did not regain hegemony within Virginia.⁷² In fact, the Assembly founded by Berkeley in 1643 was even allowed to elect its governor and councillors. Although Brenner saw the new merchants as ascendant during the 1640's and '50's, in Virginia itself- which was much more crucial to their economic interests than any commercial struggle against English company merchants- they were on the defensive, unable to effectively dominate the growing colony, as reflected in the settlement reached in 1652. Thereafter, despite occasional

⁶⁸ Ibid., HP 61/6/1A. Letter, Worsley to Strickland, c. September 1649. HP 61/8/2B.

⁶⁹ Brenner, *Merchants and Revolution*, p. 131; Bliss, *Revolution and Empire*, pp. 61-2.

⁷⁰ Cooper, "Social and Economic Policies", p. 135.

⁷¹ Bliss, *Revolution and Empire*, pp. 90-91; W.F. Craven, *The Southern Colonies in the Seventeenth Century 1607-1689* (Louisiana: Louisiana U.P., 1949) p. 256.

⁷² Bliss, *Revolution and Empire*, p. 89; Craven, *Southern Colonies*, pp. 255-257.

crises, for the rest of the 1650's Virginia was able to continue producing tobacco and profit relatively harmoniously, as shown by the underlying continuity of office-holders from the 1640's to '60's.⁷³

As well as showing the delicate balance of power within Virginia, the surrender of the royalist colonies to parliament reveals the limited degree of direct control which the English government was able to exert over its nascent empire, allowing the Virginian planters to resist both the state's centralising impulses and the new merchants' attempted hegemony.⁷⁴ However, although it was difficult to erect the political settlement Worsley originally envisaged, the Council of Trade (formed shortly before the passage of the Act for reducing Virginia) was instructed to consider how England's plantations 'may be best managed, and made most useful for this Commonwealth'.⁷⁵ In fact the Council expired before the royalist colonies had surrendered, but colonial trade fell under the sweeping provisions of the Navigation Act, which sought to guarantee that the commercial benefits of the colonies would not redound to the Dutch. It thus provided the protection demanded by those merchants who had approached Worsley two years previously, but in context of a national monopoly which transcended any particular commercial interest, rather than the specific commercial regime which the 1650 Act threatened to create. In fact, the new merchants were but one interested party with which the Commonwealth dealt, albeit a particularly influential and powerful one. Thus, although they were able to influence government in many ways, the Council of

⁷³ Craven, *Southern Colonies*, p. 265-7; Kukla, "Order and Chaos", p. 293. Conflict between different merchant-planter interests in Virginia persisted at a low level throughout the 1650's, resurfacing on occasions, but the new merchants were apparently unable to regain their dominant position over the assembly: Bliss, *Revolution and Empire*, pp. 92-3.

⁷⁴ For a long-term perspective on the problems of defining the colonial-metropolitan relationship, and the conflict between notions of colonial dependence and colonists' rights, J.P. Greene, *Peripheries and Center. Constitutional Development in the Extended Politics of the British Empire and the United States, 1607-1788* (Athens & London: University of Georgia Press, 1986).

⁷⁵ *A & O*, II, p. 405.

Trade did not aim to fulfil a specifically new merchant programme, and its activities rarely overlapped with the commercial interests of the new merchants. Before considering the activities of the Council itself, therefore, it is necessary to consider the commercial demands facing the new Commonwealth at its inception, part of a discourse of trade energised by revolution.

II. The Discourse of Trade in Revolutionary England.

The nation Worsley returned to in November 1649 had undergone dramatic changes in his absence, as the execution of the King was followed by the proclamation of a Commonwealth. Shocking as these events were, they did at least confirm parliament's victory over Charles I, and its supporters were beginning to venture optimism that the goals they had fought for might be realised. But these hopes were dampened by the need to win wider support for this insecure regime.⁷⁶ This situation was mirrored in the nation's commercial situation: the end of Civil War brought hope of commercial revival, but the reality saw economic depression and an ominous revival of Dutch shipping. The discourse of trade reflected these concerns, but also offered a way which the Commonwealth might ease some of its political difficulties, by supporting commerce.

A decade earlier, pamphleteers like Lewes Roberts had welcomed the recalling of parliament as an opportunity to disburden trade from its 'many fetters'.⁷⁷ Roberts went on to demand that trade be returned to the 'first lustre' of 40 years ago, exhorting

⁷⁶ For the problems faced by the regime, and the ways in which its supporters responded by symbolically presenting the Republic as a return to legitimate civil government, see S. Kelsey, *Inventing a Republic. The Political Culture of the English Commonwealth 1649-1653* (Manchester: Manchester U.P., 1997).

⁷⁷ Roberts, *Treasure of Trafficke*, in McCulloch, *Early English Tracts*, p. 51.

parliament to ensure that 'so excellent a Jem, and so hitherto profitable and eminent a renews', would not 'die in your dayes'.⁷⁸ Such hopes, however, were dashed by the outbreak of Civil War; far from being relieved from customs and taxes, trade was encumbered by the excise, and disrupted by war. The merchant John Battie diagnosed how civil war had caused the decay of trade, 'as the fire that's kindled within doores, and in the bed-straw, as it were, rageth more violently: so *civill* War ruines *Trade* faster than any other, and makes poverty and desolation post in one after the other, wheresoever it is kindled'.⁷⁹ The regimes of the 1640's and '50's faced similar complaints, along with numerous suggestions for how trade might be revived. Prominent amongst these was the call for 'free trade', against commercial and industrial monopolies. Thomas Johnson's censure of the Merchant Adventurers asserted that their monopoly had artificially restricted the number of buyers of cloth, so depressing the clothier's profits and diverting wealth into privileged hands:

The strength of a Kingdome consists in the riches of many Subjects, not of a few, in so much that were this Trade enlarged, it would tend to the multiplying of able and wealthy Merchants, it would disperse it to a greater latitude, and further ennobling the Trade, and prevent the encrease of poore men & beggars up and downe the Land: for it is one of the maine reasons why there are fewer beggars seene in Commonwealths then in Kingdoms, because of community and freedome of trading.⁸⁰

As long ago as 1604 Sir Edwin Sandys had called for free trade in similar terms, arguing that it would lead to 'The increase of the wealth generally of all the land, by the ready vent of all the commodities to the merchants at higher rate; for where many buyers are, ware grows dearer; and they that buy dear at home, must sell dear abroad'.⁸¹ Such arguments rested on the sense that more traders would lead to a greater volume of

⁷⁸ *Ibid.*, p. 52.

⁷⁹ [J. Battie], *The Merchants Remonstrance* (London, 1644) pp. 2-3.

⁸⁰ Johnson, *Discourse ... for the Enlargement and Freedome of Trade*, pp. 22-3.

⁸¹ Sandys' report from the Committee on Free Trade, 1604, quoted in T & C, p. 437.

trade, domestic and foreign. According to Muldrew, the early modern economy was characterised by crippling crises of credit, as goods were unsold in the shops and hands lay unemployed.⁸² Contemporaries did not doubt the potential of the nation, but this demanded something further than Adam Smith's 'invisible hand' of the market to put into motion the buying and selling on which prosperity was based. 'Free trade' hoped to achieve this by speeding up everyday exchanges, increasing the number of merchants and allowing this unrealised potential to be unlocked by commerce, 'the arme and hand that must distribute'.⁸³ Overseas trade was strategically important, providing a market for domestic labour, a source of goods which were unavailable at home, and the bullion which would stimulate the cash-starved economy.⁸⁴ The abolition of merchant companies would therefore stimulate both foreign and domestic trade. The free trade debate was about more than asserting the native rights of Englishmen, therefore, and relied on an understanding of the commercial nature of society, although based on the economic conditions of 17th-, and not 18th-century England.

This is not to say that those who defended merchant companies were rooted in the pre-commercial past. Supporters of the companies like Robinson and Roberts were just as committed to enlarging trade as their enemies, but they argued that this required order and protection. Robinson agreed 'that our trade may bee enlarged wherein we have advantage over all the world' by 'free trade', but he defined this as paying 'little or no custome, especially for goods outward, or such inward are to bee againe exported'.⁸⁵ However, he actually advocated extending merchant companies to cover all trades, arguing that only through such organisations could merchants avoid 'under-selling one

⁸² Muldrew, *Economy of Obligation*.

⁸³ Roberts, *Treasure of Trafficke*, in McCulloch, *Early English Tracts*, p. 65.

⁸⁴ Supple, *Commercial Crisis*; Kelly, "Introduction", pp. 40, 68-9.

⁸⁵ Robinson, *Englands Safetie*, pp. 2, 6.

another in our native commodities'.⁸⁶ Although he accepted that allowing anyone to trade would 'much encrease it for the present', in the long run it would be 'unto our utter ruine'.⁸⁷ Robinson had his own interest in defending companies, but his fears were grounded in assumptions that were more widely held. Given the interdependent nature of the economy, based on mutual trust between buyers and sellers, it was hard to see how individuals freely competing for profits could benefit the whole, without falling into disorder.⁸⁸ The discourse of trade transposed these concerns onto international trade, which was seen as an aggressive competition for markets and prices between rival merchants. Thus the companies could argue that foreign trade had to be carried out as a corporate exercise, whereby merchants of the same nation worked together to compete with foreign rivals rather than amongst themselves. Calls for free trade did attract support, and even Robinson conceded that companies had 'now become the great obstruction, through the private interests and over swaying of particular men', but neither he nor the Council of Trade adopted a universally hostile attitude to them.⁸⁹ Indeed, the Council's attitude seems to have been similar to Robinson's, who hoped that 'both the setting open at liberty all Trad free alike to all men, and the inclosing of it by Charter and Corporations, may be seriously debated and agreed on, that it may neither be quite ruined, for want of good Government, nor yet obstructed, no less then if monopolized, by colour of a Corporation'.

The particular danger of abolishing the companies in the 1640's was that this would be exploited by England's main commercial rival, the Dutch. The dominance of

⁸⁶ Ibid., p.45. Roberts called for the same expediency: *Treasure of Trafficke*, in McCulloch, *Early English Tracts*, pp. 85-6.

⁸⁷ Robinson, *Englands Safetie*, pp. 45-6.

⁸⁸ Muldrew, *Economy of Obligation*.

⁸⁹ H. Robinson, *Briefe Considerations, Concerning the Advancement of Trade and Navigation* (London, 1650) p. 9.

the Dutch entrepôt and shipping had concerned Englishmen for decades, but Civil War brought this fear to new heights, as Worsley had already found with regards to colonial trade. Underlying this were a number of related tensions about foreign trade, which persisted throughout the century. Although Englishmen looked enviously at how Holland had raised itself to prosperity and strength through trade, their example aroused concern as well as admiration. Amsterdam's entrepôt suggested that wealth came from drawing in trade and traders from throughout Europe, becoming the 'warehouse of the world' through which international commerce was channelled. However, the fear was that in emulating this, England would be vulnerable to exploitation by the more efficient and competitive Dutch shipping, so that English merchants would be forced to use their shipping, the nation eventually becoming dependent on Dutch merchants who would then dictate the terms of trade. Although foreign trade was seen as the only means for nations to become rich, they could lose as well as gain by it, and commerce was described simultaneously as a sort of warfare and as a reciprocal exchange, at once conflict and collaboration.⁹⁰

Both perspectives tended to be voiced by the same writers, although occasionally they advanced a purely pacific view of trade, whereby the world was 'joynd together by Commerce, which is that great link of humane society, that golden chain which unites all Nations'.⁹¹ John Battie was unusual in seeing commercial depression in one nation as tending to harm, rather than benefit, its neighbours: 'For, *as in the Body naturall, there is such a sympathy and connection of the parts, that if any of them be distemperd, the rest hath a sense thereof: so it may bee said of the Body of*

⁹⁰ In this, the nation as a whole faced precisely the same dilemma of the individual merchant in seeking simultaneously to compete and collaborate with their rivals in an economy based on credit and mutual trust- Muldrew, *Economy of Obligation*, pp. 188-195.

⁹¹ Johnson, *Discourse...for the Enlargement and Freedom of Trade*, p. 1.

Trade, one Part hath such a dependencie upon another, that if any one faile in any remarkable manner, the rest in time suffer thereby'.⁹² However, even he saw that England's straits would be capitalised on by the Dutch, who 'watch all opportunities to Ingrosse all the *Trade* they can into their owne hands', and 'will make no little use of our distractions ... wee shall not so soone be *out*, as they will be *in*'.⁹³ These concerns led to suspicion about the benefits of foreign investment in England, and Robinson argued that it was 'better to have a little trade with a greater profit to bee divided amongst our selves, than a larger trade with lesse benefit on it, and that chiefly to goe to strangers'.⁹⁴ Henry Parker also suspected that 'Forrein Nations easily become greater gainers by trading into *England*, then the *English* can by trading abroad'.⁹⁵ An apparent solution was to naturalise foreign merchants, which would ensure that their profits redounded to the nation.⁹⁶ Ralph Maddison saw this as the only means by which to open English trade to the Dutch, who threatened otherwise to 'make our Ports their store houses; and become thereby Huxters amongst us, which were too much unless they were incorporated one Nation with us'.⁹⁷ Thus he argued that 'those that had the benefits of our Ports as free natural subjects, should become our own subjects and plant their children amongst us, and not to come hither to glean or gather our thyme, and make their hives in another place or country then ours'.⁹⁸ Perhaps reflecting the transitional state of their economy, 17th-century Englishmen were caught between competing impulses to enlarge or confine the market in foreign trade.

⁹² [Battie], *Merchants Remonstrance*, p. 9.

⁹³ *Ibid.*, pp. 6-7.

⁹⁴ Robinson, *Englands Safetie*, p. 7.

⁹⁵ Parker, *Of a Free Trade*, pp. 4-5.

⁹⁶ For naturalisation, Cooper, "Social and Economic Policies", p. 130.

⁹⁷ R. Maddison, *Great Britains Remembrancer, Looking In and Out* (London, 1654) p. 38.

⁹⁸ *Ibid.*, p. 39.

There was no clear answer to this quandary, but it was universally agreed that the solution lay with some form of state action. In the context of a severe economic depression in the aftermath of the Civil War, the Commonwealth was faced with several calls to take care of the poor and revive trade, but there was a persistent strain of criticism in these pamphlets. *The Soap-Makers Complaint* argued ‘That one of the greatest means (under God) of the comfortable subsistence of this Island in all ages, hath been the giving encouragement to the industrious managers of Trade’, but the burdens of Civil War had caused ‘consumption in the Trade of the Nation’.⁹⁹ The parliamentarian Captain Samuel Chappel complained of the ‘cheating and couzening by some in Office, pretending good husbandry to the State, who eat the poor as bread, ... making it their Trade to deceive and devoure one another’.¹⁰⁰ Most radical of all was Gerrard Winstanley’s denunciation of buying and selling as ‘the law of the Conqueror’ and his assertion that ‘True Commonwealths Freedom lies in the free Enjoyment of the Earth’.¹⁰¹

Despite widespread scepticism about the Rump, it was still the focus of numerous commercial proposals. Chappel balanced his grievances with a number of petitions addressed to the Council of Trade, to attract foreign coin into the nation by allowing it to pass as current, to erect a bank, and to convert all trading companies into joint-stocks, for example. The time-honoured project to promote an English fishery was revived by Thomas Jenner as a solution to London paupers.¹⁰² As well as demanding law and electoral reform, one anonymous author called for ‘care be taken for the

⁹⁹ *The Soap-Makers Complaint* (London, 1650) p. 3.

¹⁰⁰ S. Chappel, *A Diamond or Rich Jewel* (London, 1651) sig. A2v.

¹⁰¹ G. Winstanley, *The Law of Freedom in a Platform or, True Magistracy Restored*, (1652) ed. R.W. Kenny (New York: Schocken Books, 1973) pp. 59, 66.

¹⁰² T. Jenner, *Londons Blame, if not its Shame* (London, 1651).

encouragement and encrease of Trade throughout the Common-wealth'.¹⁰³ Samuel Hartlib's growing interest in agricultural improvement was a response to the foundation of the Commonwealth and the Council of Trade.¹⁰⁴ Hugh Peter synthesised many of these proposals as part of his efforts to establish 'great quiet' for the new regime, believing that the '*Increas of Merchandise*' was 'a special means to inrich anie Nation'.¹⁰⁵ Even Winstanley aimed his proposals for the erection of 'publicke Store-houses' to replace private buying and selling, at the state.¹⁰⁶

Generally, these complaints and proposals were not completely novel to the 1640's. Indeed, a perfect example of continuity in the discourse of trade over this period was the popularity of the writings of the Jacobean projector John Keymer, several editions of which were reprinted in the 1650's. The publisher of one of these, 'I.D.', complained that 'For these thirty yeares past, it hath been observed, That those in publique Place or Trust have plotted and contrived little, but how to enrich themselves; Whether you look upon *Protestant, or Puritane*', even comparing them to the biblical Egyptians forcing the Hebrews to gather straw for bricks, so halting their passage to Canaan.¹⁰⁷ That nation had been delivered from bondage by God's will, but 'Knowing that miracles are ceased', 'I.D.' argued England would have to look to its own devices to find 'a nearer way to the *Land of Promise*'. For this purpose, he recommended Keymer's projects, which showed how 'Countries make themselves powerful & rich in

¹⁰³ *Severall Proposals for the Generall Good of the Commonwealth* (London, 1651) p. 8.

¹⁰⁴ T. Raylor, "Samuel Hartlib and the Commonwealth of Bees", in *Culture and Cultivation in Early Modern England: Writing and the Land*, ed. T. Raylor & M. Leslie (Leicester: Leicester U.P., 1992) pp. 94-5.

¹⁰⁵ H. Peter, *Good Work for a Good Magistrate. Or, A short Cut to great quiet* (London, 1651) p. 82.

¹⁰⁶ Winstanley, *Law of Freedom*, pp. 73, 142.

¹⁰⁷ *A Cleare and Evident Way for enriching the Nations of England and Ireland* (London, 1650) sig. A2r-v (the biblical allusion is to *Exodus 5*). Keymer's writings were also published as *Sir Walter Raleigh's Observations, Touching Trade & Commerce* (London, 1653).

all kinds of all Merchandizing, Manufacture, & fulnesse of Trade, and yet have no Commodities in their own Country growing'.¹⁰⁸

This was a clear allusion to the United Provinces, and their remarkable achievement of rising to wealth and power by trading with the goods of other nations, including England, 'out of which they draine and still covet to exhaust our wealth and coyn, and with our own Commodities weaken us'.¹⁰⁹ Keymer's popularity demonstrates how 'Dutch commercial prowess acted more forcefully upon the English imagination than any other economic development in the seventeenth century'.¹¹⁰ Dutch society was seen as uniquely adapted to trade, drawing in 'multitudes of Merchants to trade with them, and many other Nations to inhabite amongst them'.¹¹¹ Added to this was the strength of their shipping, which enabled the 'Hollander' to rob fish from under the noses of the English and dominate foreign trade. This situation was just as apparent under the Commonwealth as under James I, and in the late 1640's Dutch trade had returned to the unrivalled position it enjoyed when Keymer was writing, as freight rates tumbled in the aftermath of the Treaty of Münster in 1648. Worsley was able to see the fruits of this first hand in Amsterdam, but the incursions of Dutch ships into England's colonies was but one example of a resurgence of Dutch shipping in all of England's overseas markets, contributing to a cataclysmic trade depression coinciding with the Commonwealth's foundation. 1649 was the first year in which more cloth was exported eastwards into the Baltic Sound in foreign than English ships, in the century.¹¹² English trade to Italy and the Levant, which had benefited from Spanish-Dutch war, suddenly

¹⁰⁸ *A Cleare and Evident Way*, p. 1.

¹⁰⁹ *Ibid.*, p. 2.

¹¹⁰ Appleby, *Economic Thought and Ideology*, p. 73.

¹¹¹ Keymer, *A Cleare and Evident Way*, pp. 2-3.

¹¹² Hinton, *Eastland Trade*, p. 85.

collapsed.¹¹³ Keymer's depiction of the Dutch design 'to get the whole Trade of Christendome into their hands, not only for Transportation, but also the Command of the Seas', would have struck a chord with many in 1650.¹¹⁴

Although fear of dependence on the Dutch entrepôt, and the sense that government had a responsibility to rectify this, were not novel to the 1640's, the context of a new regime needing to justify its existence meant that they carried greater weight. Indeed, the Dutch example was particularly important in showing a powerful republic whose commercial strength had enabled it to defeat the Spanish monarchy, and a society where trade and liberty of conscience flourished together.¹¹⁵ Robinson's *Englands Safety in Trades Encrease* established a trend which was still being followed after the Restoration (notably by Sir Josiah Child), listing proposals drawn from Dutch practice ranging from a new customs regime, to the development of the plantations and the fishery, the improvement of inland navigation, and business reforms.¹¹⁶ What these writers advocated was the imitation not just of Dutch commercial practice, but aspects of Dutch society itself, which was uniquely suited to commerce. The goldsmith Thomas Violet was a particularly vocal advocate of what he saw as the model of free trade offered by Holland and other trading republics: '*Genoa, Legorn and Amsterdam, have raised their greatness onely by giving Merchants Strangers, equal privileges with their Natives, and in levying smal duties upon goods*'.¹¹⁷ Directing his proposals to the

¹¹³ Israel, *Dutch Supremecy*, pp. 203-4.

¹¹⁴ Keymer, *Cleare and Evident Way*, p. 17.

¹¹⁵ For a discussion of how the United Provinces provided an example of a 'model polity' to early modern Englishmen, see W. Speck, "Britain and the Dutch Republic", in *A Miracle Mirrored. The Dutch republic in European perspective*, ed. K. Davids & J. Lucassen (Cambridge: Cambridge U.P., 1995) pp. 173-195.

¹¹⁶ Robinson, *Englands Safety*, pp. 4-5; J. Child, *Brief Observations concerning Trade and Interest of Money* (London, 1668). For Child's reliance on works including Robinson and Worsley, see Letwin, *Origin of Scientific Economics*, pp. 15-16; Child admitted as much in a letter to William Petty of 15 October 1673, where he described *Brief Observations* as 'the Labours of other men'. BL Add. MS 72850, fol. 132r.

¹¹⁷ T. Violet, *The Advancement of Merchandize* (London, 1651) p. 2.

Council of Trade as ‘the Master-workmen ... for the building of the trade of this Common-wealth’, Violet launched a broad critique of merchant companies and demanded that foreign merchants be freely allowed to trade in England.¹¹⁸ These, he argued, were the means by which commercial nations became ‘Warehouses and Shops for all the Merchandizes of the world’, and England could only overcome its dependence on the Dutch by following their course:

Wee must match the *Dutch* at their own weapons, and give them as great privileges, as they have given to our Clothiers in *Holland*; it will invite them hither, for our Harbors are better then theirs, and they are straitned for want of room, and by this waie you will make *England* truly the *Empress of the Sea*, when everie *Sea-Port-Town* will bee an *Amsterdam*.¹¹⁹

Violet thus argued that ‘if wee had *free trade*, we should have all our Ports full of their goods’.¹²⁰ This might seem to mark him as a predecessor of laissez-faire economics, but he also claimed to have drafted the Navigation Act, and his vision of international trade was as belligerent and reliant on regulation as Henry Robinson’s.¹²¹

It was easier to determine the nature of Dutch commercial success than to find a way to apply their example to England. However, it was recognised that increasingly the benefits of foreign trade were coming in the form of shipping charges, a diversification of markets which mirrored the oft called for diversification of domestic production. This was in part a reaction to England’s own commercial situation, as the relative decline of cloth exports encouraged a search for alternatives. This is not to say that cloth ceased to be seen as important, and there were numerous attempts to promote

¹¹⁸ *Ibid.*, p. 5.

¹¹⁹ *Ibid.*, pp. 10-11.

¹²⁰ *Ibid.*, p. 22.

¹²¹ This claim was made in his *Mysteries and Secrets of Trade and Mint-affairs* (London, 1653) p. 178: ‘This Act I dayly attended and drew the draft of it; it hath been the bane of the Dutch greatness, and will reduce them to reason’. Violet supported stronger government regulation over manufacturing, particularly against the ‘abuses’ of gold and silver-thread makers, the exportation of gold, and the exchange rate (all of which directly affected him as a goldsmith).

domestic finishing so that the major benefits of English wool would not accrue to the Dutch. William Walwyn summed up the free trade case against the Merchant Adventurers' monopoly, which was 'to the great abridgement of the liberties of the people and to the extreme prejudice of all such industrious people as depend on clothing or other woollen manufacture'.¹²² Many still continued to pin their hopes on England's 'Golden Fleece', believing that 'Wooll is the Flower and Strength, the Revenue and Bloud of England'.¹²³ Indeed, Englishmen could hardly abandon their staple export, as the Council of Trade recognised. However, it was far less focussed on this than previous bodies, seeming to reflect an acceptance that commerce was too complex to be supported by wool exports alone.¹²⁴

The Council itself will be discussed below, but this section has intended to show that the Commonwealth faced a number of pressures to act to revive trade, a discourse which was independent of any particular mercantile interests, although they could be represented within it. At heart this reflected a traditional sense that government had to act to protect the welfare of the people and uphold the public good, and in this sense the Commonwealth faced the same pressures that previous regimes had done. Indeed, although its efforts were focussed on fighting the Civil War, parliament in the 1640's had not forgotten trade, restating traditional policies to prevent the export of unwrought wool and bullion in 1648, for example.¹²⁵ It had recognised the need to attract foreign merchants back to English shores by passing an Ordinance for free trade to friendly

¹²² W. Walwyn, *Gold Tried in the Fire* (4 June 1647), in A. Sharp (ed.) *The English Levellers* (Cambridge: Cambridge U.P., 1998) p. 79.

¹²³ W.S., *The Golden Fleece, Wherein is related the Riches of English Wools in its Manufactures* (London, 1656) p. 2.

¹²⁴ See, for example, T & C, pp. 13-24, 27-33.

¹²⁵ 'An Ordinance for prohibiting the Transportation out of this Kingdom...of all Wooll, Woollen Yarn, Wooll-Fells, Fuller Earth, Clay &c', 19 January 1648. *A & O*, 1, pp. 1059-1061. 'Ordinance to prevent the Exportation of Bullion', 23 September 1648. *Ibid.*, pp. 1218-9.

strangers, announcing itself 'very willing, that Foreigners, and Strangers should receive all incouragement for Trade, and commerce with the City of London and other Ports'.¹²⁶ However, a year later in 1645 parliament had prefigured part of the terms of the Navigation Act by forbidding the import of whale-oil in foreign bottoms.¹²⁷ At the same time, parliament had vacillated about whether to uphold the merchant companies, or attack their royal monopoly privileges. These varying responses show that at its inception the Commonwealth was faced with conflicting means to gain the maximum benefits from foreign trade, whilst avoiding the dangers which the commercial nation faced. The rest of this chapter considers how its Council of Trade responded to this dilemma.

III. The Council of Trade.

In January 1650 the Council of State informed parliament of the petitions it had received from the East India, Levant, and Eastland companies, requesting that their privileges be confirmed. In response, the Commons decided to form a special committee to consider how best to regulate trade.¹²⁸ Those issues which dominated the discourse of trade in the 1640's, namely the legitimacy of corporate privileges and the need to promote re-exports, were therefore to be resolved by the Council of Trade, and 'it was recognized from the start that the question of free trade, as well as free ports, would centrally preoccupy this council'.¹²⁹ Over the next two years the Commonwealth's

¹²⁶ 'An Ordinance Declaring, That it shall and may be lawfull for all Forraigners and Strangers, in amity with this Kingdome, to have free Trade and Commerce, to, and from the City of London...', 30 August 1644. *Ibid.*, pp. 498-501.

¹²⁷ 'An Ordinance prohibiting the Importation of Whale-Oyle, Fin or Gills, but by Ships set forth from hence, and by English Subjects', 6 May 1645, *Ibid.*, pp. 679-680.

¹²⁸ Brenner, *Merchants and Revolution*, pp. 602-3; Cooper, "Social and Economic policies", p. 131.

¹²⁹ Brenner, *Merchants and Revolution*, p. 603.

commercial policy charted a course between the need to become an international entrepôt, and the fear that this would deliver English trade into the hands of its main commercial rival.

The Act for regulating trade was read for the first time on 14 March, and again two days later when the number of commissioners was fixed at 15, including the MPs Thomas Chaloner, Richard Salway and Sir Henry Vane. On the same day Worsley was named by parliament as secretary.¹³⁰ Later in the summer Sir Cheney Culpeper was chosen as a member of the Council, although John Sadler was rejected.¹³¹ Finally on 1 August 1650 'An Act for the Advancing and Regulating of the Trade of this Commonwealth' was passed.¹³² As well as the individuals named above, the Act listed a diverse range of commissioners, and although some were representatives of Brenner's 'new merchants', namely Maurice Thomson, the Dartmouth merchant and East Indian interloper Thomas Boone, and another opponent of the East India Company, Alderman John Fowke, they were not dominant.¹³³ In fact, the Council seems to have deliberately included representatives from the whole commercial nation, including the Somerset clothier MP John Ashe, alderman Henry Thompson of York, and William Greenwood of Yarmouth. Currency issues were a speciality of Sir Ralph Maddison, an old ally of Gerald de Malynes, whilst the established leadership of the East India Company was represented by William Methwold. His association with Vane and Culpeper probably assured Sir Robert Honywood of a place, ensuring that the Hartlib circle was well represented, whilst Worsley took on Samuel Hartlib junior as a clerk.¹³⁴

¹³⁰ Stock, *Proceedings*, pp. 214-6.

¹³¹ *Ibid.*, pp. 216-7.

¹³² *A & O, II*, pp. 403-6.

¹³³ Brenner, *Merchants and Revolution*, p. 607. Captain John Limbrey was added in April 1651, along with the master of the mint Dr Aaron Gurdain.

¹³⁴ Cooper, "Social and Economic Policies", p. 133.

The Act setting up the Council of Trade announced that parliament was 'taking into their care the maintenance and advance of the Traffick Trade, and several Manufactures of this Nation' so that 'ye poore people of this Land may be set on work, and their Families preserved from Beggary and Ruine, and that the Commonwealth might be enriched thereby'.¹³⁵ This was based on the principle that 'the Trade of this Nation both at home and abroad, being rightly driven and regularly managed, doth exceedingly conduce to the Strength, Wealth, Honour and Prosperity thereof'.¹³⁶ Security was therefore a key aim, and *The Impartial Scout* reported the Council's foundation in just these terms: 'the Parliament of *Englands* actions and results are both swift and effectual, leaving no means unattempted for the preservation of the Commonwealth'.¹³⁷ However, although the relationship between trade, prosperity and power was clear, the role of the state in advancing these goals was less so. The instructions to the Council of Trade were therefore broad ranging, whilst it was empowered to summon officers of the exchequer, mint and excise, and consult all official records. Although it was appointed as a standing body, the Council was initially commissioned only until 29 September 1651, meeting in Whitehall.

Of the 12 instructions, the first three dealt with the organisation of domestic trade, whilst the next seven concentrated on different aspects of foreign trade, with final instructions to consider fishing and plantations. Foreign trade was most important, and the council was to 'consider how Commodities of this Land may be vented, to the best advantage thereof, into Foreign Countreys, and not undervalued by the evil management of Trade'. To this end it was instructed to keep an account of the balance of trade, and to

¹³⁵ *A & O, II*, p. 403.

¹³⁶ *Ibid.*

¹³⁷ *The Impartial Scout*, Number 59 (2-9 August 1650) p. 265.

consider the effect of customs. Currency and the exchange rate were also covered, but most important were those instructions concerning free ports and free trade.¹³⁸

Something of the spirit in which the Council of Trade was intended to deliberate may be seen by a memorandum from Hartlib's papers apparently written by Worsley for the Council's benefit, setting out 'The ends of Forraigne or Outland Trade'.¹³⁹ The five ends began with the provision of a market for domestic labour through exports. However, the import trade was also important, 'that wee may be the more plentifully supplied & stored with such Commodities as we want from other Countries and that at the best & cheapest hand, ... Whether they be Commodities for pleasure or necessitie'.¹⁴⁰ Commerce between nations was grounded in their mutual needs 'to furnish others or themselves always with something or other that they desire', and the state should use diplomatic means to ensure that no nation became dominant.¹⁴¹ Further 'ends' of trade were to gain bullion and to increase shipping (vital to 'the power, strength and repute abroad of this nation').¹⁴² Only then did customs come into consideration. All commercial laws and charters should be framed with these ends in mind.¹⁴³ In the absence of a full set of its papers, it is difficult to determine whether the Council of Trade followed these principles for its 17 months of existence. A list of reports made on the eve of its dissolution tells us that it reported 15 times in total, 8 times to the Council of State and 7 to parliament.¹⁴⁴ Having had its initial commission

¹³⁸ *A & O, II*, pp. 404-5.

¹³⁹ 'The ends of Forraigne or Outland Trade state and asserted', HP 66/1/1/2. The copy is in a secretary hand, but with corrections by Worsley. Its tone and content suggests that it was intended to be addressed to a deliberative body like the Council of Trade.

¹⁴⁰ *Ibid.*, HP 66/1/1A.

¹⁴¹ *Ibid.*, HP 66/1/1A-B.

¹⁴² *Ibid.*, HP 66/1/1B.

¹⁴³ *Ibid.*, HP 66/1/2A.

¹⁴⁴ 'A List of Items on the Agenda of the Council for Trade, 1651', PRO SP 18/16, no. 138, printed in T & C, pp. 64-5. An almost identical list is also printed in Violet, *Mysteries and Secrets of Trade*, pp. 177-9.

extended until the end of the year, at the year's close the Council claimed to have 6 more reports prepared, with 'great progress' made on 8 further issues. For convenience the work of the Council of Trade can be divided into 3 general areas: internal trade and manufacturing, reform of the merchant companies, and regulation of overseas trade in general. The last of these encompassed the problem of commercial relations with the Dutch, which will be considered separately. Although this section will focus on the activities of the Council of Trade, this is not a departure from Worsley's biography, for as secretary he would have been its most regular attendant.

Apparently the Council did not devote much time to controversial monetary or exchange issues. Perhaps in recognition of the complexity of these 'mysteries', the Council seems to have left them to the Committee of the Mint, concentrating instead on means by which to encourage trade besides currency manipulation or regulating the exchange. The Council did report on encouraging the import of bullion on 20 December 1650, precipitating the passing of 'An Act touching the Importation of Bullion', and supported allowing the East India Company to export specie, but these were part of its remit to consider foreign trade.¹⁴⁵ Therefore Ralph Maddison probably had little opportunity to promote his policies for legally fixing the exchange rate at the Council of Trade, which left it to others to debate the relative merits of enhancing and debasing the coinage, allowing foreign coins to pass current, raising the mint rate for bullion, introducing new ways of coining to avoid the problem of clipping, and all the other issues involved in this infinitely complicated area of the early modern economy.¹⁴⁶

¹⁴⁵ *A & O, II*, p. 495. Thomas Violet claimed to have made this report: Violet, *Mysteries and Secrets of Trade*, p. 177. Violet's arguments against the export of bullion are made in *The Advancement of Merchandize*, pp. 29-32, for which, see below.

¹⁴⁶ For Maddison's policies, see his *Great Britains Remembrancer*. Henry Robinson repeated some of Maylnes' policies in *Certain Proposals*, pp. 15-16. Hartlib himself supported one attempt to introduce machine-coined currency that would be resistant to clipping, by the Frenchman Pierre Blondeau. Webster, *Great Instauration*, pp. 404-411. Such initiatives were accompanied by suggestions for a decimal

Although the Council was focussed on foreign trade, this was seen as inseparably linked to domestic trade: success in the former rested on the effective organisation of inland traffic, whilst a profitable foreign trade would in turn help to speed up this domestic economy and encourage employment.¹⁴⁷ The Council of Trade therefore devoted much time to internal trade, in accordance with its first 3 instructions, which ordered it to consider how native commodities might ‘well and truly wrought, to the Honor and Profit of the *Commonwealth*’; how to distribute trade and manufacturing throughout the nation; and ‘how the Trade may most conveniently be driven from one part of this Land to another’.¹⁴⁸ The latter principally involved improving inland navigation, to which end the Council issued reports on cutting the river Wey or Wye in Surrey, and considered the Derwent in Derbyshire.¹⁴⁹ Another domestic matter was the Newcastle coal trade, which was subject to bitter disputes between ship-owners and members of the city corporation.¹⁵⁰ The Council’s final report to parliament, on 26 September 1651, attacked the restrictive practices pursued by the latter, although still in 1655 one opponent of the Newcastle magistracy was complaining that this report had ‘lyen dormant ever since, to the great detriment of the Commonwealth in the excessive prizes of Coals’.¹⁵¹

currency, for example by Hartlib’s associate Robert Wood. *Ibid.*, pp. 416-420. For the complexities of the early modern currency system, Kelly, “Introduction” to *Locke on Money*.

¹⁴⁷ For the ways in which the development of an English entrepôt was based on the integration of the domestic economy into foreign trade, Ormrod, *The Rise of Commercial Empires*, pp. 15-16.

¹⁴⁸ *A & O, II*, p. 404.

¹⁴⁹ *T & C*, pp. 64-5. Parliament acted on the former in passing ‘An Act for making Navigable the River of Wye’, 26 June 1651. *A & O, II*, pp. 514-517.

¹⁵⁰ R. Howell, *Newcastle Upon Tyne and the Puritan Revolution* (Oxford: Clarendon Press, 1967) pp. 305-7; Cooper, “Social and Economic Policies”, p. 138.

¹⁵¹ R. Gardner, *Englands Grievance Discovered, in relation to the Coal-Trade* (London, 1655) p. 59. The report is published in *Ibid.*, pp. 55-7. In addition, in April 1651 Worsley was petitioned by two bailiffs of the Corporation of Linne near Scarborough who requested his aid in securing a more open market for purchasing coal for sale, the petitioners having already experienced his ‘fauour in the furtherance of their iust Requests, for the takeing off, the greuious Oppression, and Discouragements of their Coale Trade’. Letter, John Harrison & John Burton to Worsley, 24 April 1651. HP 43/40A.

Just as controversial was the effective regulation of domestic manufacturing.¹⁵² As in foreign trade, Civil War had disturbed the usual corporate regulation of manufacturing, exacerbating the disputes between various parties.¹⁵³ The cloth trade was particularly divided between wool growers, clothiers, fellmongers, and the staplers who acted as middlemen, and throughout the summer of 1651 the Council of Trade was attempting to persuade these groups to discuss their differences.¹⁵⁴ From the traditional cloth trade, the Council turned its attention to the new draperies, issuing a report on dornix weaving in East Anglia.¹⁵⁵ Further reports were issued on the production of heavy dyed silk, Colchester bays, cloth-dyeing, the making of tin, and gold and silver thread.¹⁵⁶ The Council clearly accepted the view that manufacturing demanded increased supervision to uphold quality, particularly for exported goods, echoing the 1622 committee which argued that ‘the sleight and deceitful making of those stuffs hath brought them out of request, and exceedingly hindered their sales in foreign parts where they were in good estimation’.¹⁵⁷ Although such sentiments may be criticised as failing to recognise how cheaply produced commodities aided economic expansion, in early modern eyes such poor manufacturing undermined the competitiveness of English exports, damaging their ‘credit’ in foreign markets and hindering English merchants and manufacturers alike.¹⁵⁸ Worsley presented further justification for regulating

¹⁵² J.P. Cooper, “Economic Regulation and the Cloth Industry in Seventeenth-Century England”, *Transactions of the Royal Historical Society*, 5th series, no. 20 (1970) pp. 73-99.

¹⁵³ Cooper, “Social and Economic Policies”, pp. 123-4.

¹⁵⁴ Andrews, “British Committees”, pp. 26-7. For an attack on the abuses of the Staplers’, see a Report by the City of London trade committee to the Council of Trade, June 26 1651. *CSPD, 1651*, pp. 270-271.

¹⁵⁵ Andrews, “British Committees”, p. 64.

¹⁵⁶ *Ibid.*, p. 65. Violet petitioned the Council of Trade about regulating the trade of gold and silver-thread in December 1650, his arguments being heard on 17 January 1651. *The Advancement of Merchandize*, pp. 93-104. The Council of Trade appears to have made serious efforts to enquire about the methods in practice in these industries: see for example a memorandum by silk-producers issued to the Council of Trade concerning methods to produce heavy dyed silk, responding to an order of 6 November, probably 1651. HP 53/19.

¹⁵⁷ T & C, p. 19.

¹⁵⁸ Thirsk, *Economic Policy and Projects*, p. 135.

manufacturing in his pamphlet *The Advocate*, which noted ‘The singular and prudent care’ of the Dutch, ‘in preserving the Credit of most of those Commodities which are their own proper Manufactures; By which they keep up the Repute and Sale of them abroad, taking hereby a very great advantage of the contrarie Neglect in us’.¹⁵⁹ Thus Worsley blamed ‘the Carelessness of this Nation’ in failing to settle ‘a Regulation, Government, and Superspection’ of manufacturing, for bringing ‘Ruine and Decaie’ to English wool.¹⁶⁰

There was nothing new in the desire to institute effective regulation of manufacturing, therefore, but the Council’s proposed method may have proven more innovative, if put into practice. On 22 September 1651, it reported on abuses in manufacturing, which were ‘to the great detriment and cozenage of the Commonwealth’, and resulted from companies being ‘unskilful and negligent in the managing of the affairs of their government’.¹⁶¹ It therefore recommended that parliament institute its own regular inspection of the companies. As Cooper concluded, ‘The aim was regulation through corporate bodies themselves subject to review and regulation’, a domestic version of the Navigation Act.¹⁶² Having already reported to the Council of State on the need for ‘reforming and settling all the inland trade and manufactures of the nation under a certain way of government’, Vane and Salwey repeated these pleas on 15 October.¹⁶³ However, by then the Council’s extended commission was coming to its end and the prospect of these plans being put into effect was declining. In December the Council again reported that without such action ‘whole

¹⁵⁹ Worsley, *The Advocate*, p. 7.

¹⁶⁰ *Ibid.*, pp. 8-9.

¹⁶¹ PRO SP 18/16, fol. 54. Printed in T & C, pp. 255-6.

¹⁶² Cooper, “Social and Economic Policies”, p. 133.

¹⁶³ T & C, p. 64. PRO SP 18/16, fol. 76r.

trades and multitudes of men depending upon them' would 'be ruined and beggared, and our stock ... more and more lessened'.¹⁶⁴ As important as this issue was, it was not enough to secure an extension of the Council into 1652.¹⁶⁵

It was difficult to encourage a government facing numerous pressures to act in the proactive way the Council of Trade desired. However, this hides the fact that the aftermath of the Civil War saw a surge of interest in innovative social and commercial policies and new technologies, of which the Hartlib circle were leading supporters.¹⁶⁶ Worsley wrote in *The Advocate* that Dutch success rested in part on 'The Constant Reward and Incouragement given to persons bringing in Inventions; making of new Discoveries, and propounding things profitable for publick and common interest', whilst Hartlib continued to hope that the state would offer its support to inventors.¹⁶⁷ As well as technological innovations, the 1650's saw a growth in interest in financial projects copied from the United Provinces, and again the Hartlib circle were leading advocates.¹⁶⁸ Only one of those expediciencies being advocated by pamphleteers like Robinson, namely cutting the legal rate of interest to 6%, was expressly legislated for by parliament.¹⁶⁹ However, beyond parliament there was a growth in interest in such

¹⁶⁴ PRO SP 18/16, no. 139. Printed in T & C, p. 257.

¹⁶⁵ It is perhaps important that when the Barebones Parliament attempted to regulate the making of stuffs in Norfolk its response was local and specific, and not the national remedy called for by the Council of Trade: 'An Act for regulating the making of Stuffs in Norwich and Norfolk', 12 November 1653, *A & O, II*, pp. 775-780. The Rump parliament had passed a very similar Act on 14 November, 1650. *Ibid.*, pp. 451-455.

¹⁶⁶ Webster, *Great Instauration*, pp. 369-384.

¹⁶⁷ *The Advocate*, p. 10. Particular projects which Hartlib promoted at this time included the new spindle invented by one William Cooper, a linen-weaver, which he recommended to Worsley, Culpeper and Robinson, and the agricultural improvements of Thomas Ducket. Letter, Cooper to Hartlib, 26 November 6 1650. HP 71/13/1-2. Printed copy of Ducket's petition to Parliament, 20 May 1651. HP 26/60/1-4. Although Hartlib's hopes were, as ever, over-optimistic, parliament did at least offer its support to a handful of inventors at this time- see 'An Act for George Manby to prohibit any to make use of his Invention for the boyling of all sorts of Liquor', 27 November 1650. *A & O, II*, pp. 490-2; 'An Act concerning the new Invention of Melting down Iron, and other Metals, with Stone-Coals', 2 April 1651. *Ibid.*, pp. 509-510.

¹⁶⁸ J. K. Horsefield, *British Monetary Experiments 1650-1710* (London: G. Bell & Sons, 1960) pp. 93-5; Webster, *Great Instauration*, pp. 455-7

¹⁶⁹ 'An Act for prohibiting any person to take above Six pounds for Loan of One hundred pounds by the year', 8 August 1651. *A & O, II*, pp. 548-550.

matters which set the pattern for the following decades, and the Council of Trade itself considered 'the assignation of bills and court merchant'.¹⁷⁰ The latter was intended to resolve business disputes quickly so as to avoid clogging trade.¹⁷¹ Assigning bills of debt was a way to overcome money shortages and the insecurity of credit, so that 'a man that hath neither money, nor credit to be trusted at time, may yet follow trading with the debts that others owe him'.¹⁷² This was linked to the formation of a national bank, which the Dutch had shown to be highly useful in 'facilitating' trade, and which allowed people to trade on the cumulative credit of the nation.¹⁷³ Banks were described in the same terms as technological inventions, the 'Engines or Instruments' to quicken trade, 'the *Elixir* or *Philosophers Stone*, to which all Nations, and every thing within those Nations must be subservient'.¹⁷⁴ A national bank would be the means to support full employment and trading, 'as if all the money of the world were *effective* brought into that one Nation'.¹⁷⁵

The most original banking proposal came from an associate of Robinson and the Hartlib circle, William Potter, and although Worsley himself was sceptical, Culpeper offered his support.¹⁷⁶ Potter's projects included a water-raising machine, but he was also interested in economic reforms, and this was the subject of *The Key of Wealth* (London, 1650), a proposal for a group of tradesmen to pool their credit and issue bills

¹⁷⁰ T & C, p. 65. Violet claimed to have advised them on the latter- *Mysteries and Secrets of Trade*, p. 180.

¹⁷¹ Robinson, *Englands Safetie*, pp. 25-26, 33-34. See also Violet, *Advancement of Merchandize*, pp. 25-28.

¹⁷² Robinson, *Englands Safetie*, p. 37.

¹⁷³ Worsley, *The Advocate*, p. 10.

¹⁷⁴ H. Robinson, *Certain Proposals in order to the Peoples Freedome and Accomodation* (London, 1652) p. 18.

¹⁷⁵ *Ibid.*, p. 19.

¹⁷⁶ Hartlib became acquainted with Potter in mid-1650, describing him as a 'a very ingenious Gentleman of Mr H. Robinsons acquaintance'. *Ephemerides* 1650, HP 28/1/68A. Hartlib noted in 1653 that 'The chiefest difficulty in the bank of Lands is how to make the multitude of soe many banks practicable. which Mr Robinson never did shew the way, and which was the maine objection made by Mr Worsley against it. and which now affordes the greatest study to Mr Potter'. *Ephemerides* 1653, HP 28/2/75A.

of exchange, to be accepted by specially designated shops.¹⁷⁷ Potter presented his 'invention' as comparable to a 'MYNE of GOLD discovered in this Land', providing an inexhaustible source of wealth created through everyday commercial transactions.¹⁷⁸ The secret relied on speeding up 'the revolution of commodities' by increasing the stock of money, allowing traders to make quick returns on their purchases, 'whereby men might put off their Commodities for valuable consideration, even as fast as they could prepare them'.¹⁷⁹ He argued that 'If Mens Credit may be transmitted each to other in Bills, and settled upon such firm Security ... it must needs follow, That the Revolution of such Bills should Increase Trade as much, as if the same were ready Money'.¹⁸⁰ Potter denied that this would cause inflation, for the greater supply of money would be balanced by faster trade, depressing prices whilst increasing profits.¹⁸¹ Although his suggestion was that this paper money would initially be only used by a select group of merchants, its success would soon encourage others to take up this way of trading, leading to 'the multiplying of the rich, and the diminishing of the poor (which is effected by a quick Trade)'.¹⁸² Thus, Potter demonstrated a way in which the nation could multiply its trade simply by transferable bills of debt.¹⁸³

Potter also advocated a land bank, whereby credit would be extended on this productive resource rather than specie. This was described in 'An Essay upon Mr. *W. Potters* Designe concerning a Bank of Lands', published as an appendix to one of

¹⁷⁷ Potter repeated his proposals in summarised form in two other pamphlets: *The Trades-Man's Jewel* (London, 1650), and *Humble Proposals to the Honorable the Councell for Trade* (London, 1651).

¹⁷⁸ W. Potter, *The Key of Wealth* (London, 1650) p. 21.

¹⁷⁹ *Ibid.*, pp. 5, 7, 2.

¹⁸⁰ Potter, *Trades-Man's Jewel*, p. 7.

¹⁸¹ Potter, *Key of Wealth*, p. 18.

¹⁸² *Ibid.*, p. 5.

¹⁸³ *Ibid.*, p. 57.

Hartlib's agricultural manuals and probably written by Culpeper.¹⁸⁴ Citing the weaknesses of regular banks which still relied on bullion, Culpeper called for an alternative which would hold the same 'intrinsick value' as specie but could 'be raised by this Common wealth, within it self'.¹⁸⁵ A land bank could work in tandem with the agricultural improvements being promoted by Hartlib.¹⁸⁶ Potter himself insisted that 'there is not at all any true worth ... in the best money or metall that this Earth can afford', except the provision of 'security for obtaining some other Commodity of like or greater value'.¹⁸⁷ Potter's ideas particularly interested William Petty, who would develop his own ideas about how the amount and velocity of currency needed to support the nation's trade.¹⁸⁸

The Council of Trade did not officially support Potter's designs, although Worsley wrote an 'an Exercitation concerning the Conveniencies and Inconveniencies of a Lumbard or Mons Pietatis', now lost.¹⁸⁹ However, the following decades saw many similar schemes for land banks and paper credit put into practice, culminating in the foundation of the Bank of England in 1694.¹⁹⁰ In the 1650's, the institution of a bank offered the possibility of reorganising the domestic economy, which would have ramifications for foreign trade, allowing the nation to 'engrosse and monopolize the

¹⁸⁴ The pamphlet in question was Cressy Dymock's *A Discovery for New Divisions, or, Setting out of Lands* (London, 1653). For Culpeper's authorship, see Braddick & Greengrass, "Introduction" to Culpeper: *Letters*, pp. 132-3.

¹⁸⁵ C. Culpeper, *An Essay upon Mr. W. Potters Designe* (London, 1653) p. 30.

¹⁸⁶ *Ibid.*, pp. 32-3.

¹⁸⁷ Potter, *Key of Wealth*, p. 38; Webster, *Great Instauration*, pp. 450-453.

¹⁸⁸ See *Ephemerides*, 1660. HP 29/8/13B; W. Petty, *A Treatise of Taxes and Contributions* (London, 1662), in *The Economic Writings of Sir William Petty*, ed. C.H. Hull (Cambridge: Cambridge U.P., 1899) p. 36: 'the proportion of money requisite to our Trade, is to be...taken from the frequency of commutations, and from the bigness of the payments'. For such discussions, Kelly, "Introduction" to *Locke on Money*, pp. 71-86.

¹⁸⁹ *Ephemerides*, 1650 Part 2. HP 28/1/54A. 'Lumbards' were originally conceived as a sort of pawn-broker which were especially intended to provide charity for the poor, but were increasingly suggested as means by which merchants could raise trading credit. Horsefield, *British Monetary Experiments*, p. 104.

¹⁹⁰ Horsefield, *British Monetary Experiments*.

whole Trade of the world unto themselves'.¹⁹¹ The regulation of foreign trade was, of course, the main purpose of the Council of Trade, and the most problematic issue.

Its first two reports to the Council of State, calling for the setting up of convoys to defend ships trading southwards and into Holland, Zealand and Flanders, resulted in the passage of 'An Act for settled Convoys for securing the Trade of this Nation'.¹⁹² Another means for the state to support trade was through diplomacy, which was cited by Worsley as another reason for Dutch success:

*A fourth Cours taken by our Neighbors, Is, The Improvements of Trade that they have made by their Treaties or Articles of Confederations with other Princes; and by making this their Care and Protection of Trade abroad in all places their Interest of State.*¹⁹³

Such confident pronouncements helped promote a conception of state power which led to more direct state action in defence of commercial interests overseas from the 1640's onwards, supported by the naval build-up and fiscal initiatives of that decade, part of a long-term reorientation of the uses of state power.¹⁹⁴ In the short-term, the Council of Trade was faced with calls for free trade and the problem of economic depression, which the trading companies used to excuse their privileged status, complaining to the Council of State throughout 1649-50 about the resurgence in Dutch competition. This was particularly the case for the Eastland Company, whose petition noted that it had been formed precisely to 'vindicate the trade out of the usurped power of strangers', specifically by encouraging English shipping.¹⁹⁵ However, this had been

¹⁹¹ Robinson, *Certain Proposals*, p. 19.

¹⁹² T & C, p. 64; 'Act for settled Convoys', 31 October 1650. *A & O, II*, p. 444.

¹⁹³ *The Advocate*, p. 9.

¹⁹⁴ R. Conquest, "The State and Commercial Expansion: England in the Years 1642-1688", *Journal of European Economic History*, 14, No. 1 (1985) pp. 155-172; Brenner, *Merchants and Revolution*, pp. 580-584; Braddick, *State Formation in Early Modern England*, pp. 213-221; D. Loades, *England's Maritime Empire. Seapower, Commerce and Policy 1490-1690* (Longman: Harlow, 2000).

¹⁹⁵ Petition dated 10 December 1649. Printed in Hinton, *Eastland Trade*, pp. 188-9.

undermined 'by the loose trading of unskilful persons, who taking advantage of this liberty and our want of power to restrain them', tended to trade at a loss and thus 'give away our native commodity'.¹⁹⁶ The consequence was a decline in English shipping caused by 'the stranger and interloper aiming only at their present gain, and finding the advantage of an easier freight paid in Flemish bottoms'.¹⁹⁷ A new Eastland charter would 'rescue this trade out of the hands of strangers, ... hinder the making of foreign draperies and advance the reputation of our own, ... prevent foreign shipping, and promote the English navigation'- aims which the Commonwealth would eventually seek to advance not by new charters, but through the Navigation Act.¹⁹⁸

This reluctance to actively issue new charters shows that the Commonwealth was lukewarm about supporting the companies against their interloping rivals, but it was at least listening to their complaints, and did not launch a direct assault on their privileges. However, in some cases the companies were not only facing competition, but were having their corporate status challenged on a more fundamental level, as was the case with the East India Company. This was led by Maurice Thomson and the new merchants, who preferred to trade outside of the joint-stock framework and whose aggressive plans for the Far Eastern trade involved the foundation of colonies.¹⁹⁹ The failure of the Commonwealth to abolish the East India Company has been interpreted as a sign of its conservatism, but Brenner argued that the eventual settlement suited the new merchants 'by requiring a complete break from the traditional modes of carrying on the trade precisely so as to achieve the effects generally intended by the demand for free

¹⁹⁶ Ibid., p. 190.

¹⁹⁷ Ibid., p. 191.

¹⁹⁸ Ibid., p. 194.

¹⁹⁹ Brenner, *Merchants and Revolution*, pp. 168-181; E.B. Sainsbury (ed.) *A Calendar of the Court Minutes etc. of the East India Company. 1644-1649* (Oxford: Clarendon Press, 1912) p. xi.

trade'.²⁰⁰ We have seen that the new merchants had used every means possible to control commerce with Virginia, and their support for a regulated East India Company over a joint-stock hardly shows principled adherence to free trade. However, Thomson's ambitious plans undoubtedly posed a serious challenge to the Company.²⁰¹ Despite this, the settlement reached in December 1649, whereby Thomson's faction joined with members of the Company to set up a new United Joint Stock, can be seen as a hostile corporate take-over, following which many members of the old board joined the new company, rather than the victory of one commercial ideology over another.²⁰²

In any case, the matter had been settled before the Council of Trade was formed. Had it not been, the Council probably would have counselled compromise, given that it included members of both factions.²⁰³ Thereafter Worsley's own dealings with the East India Company were on a private level, as he negotiated to purchase its dockyard at Blackwall, which had become a burden ever since the Company had begun to freight rather than build ships.²⁰⁴ On 10 December 1651, it accepted an offer from Worsley for £5,600, which was conveyed by Thomas Andrews (by now a leading member of the United Joint Stock).²⁰⁵ Later that month Worsley perused the relevant papers; his request to move some timber into it before the deal was completed suggests that he planned a ship-building venture.²⁰⁶ Unfortunately, this project soon ran into problems, and on 28 February 1652 Worsley appeared before the Court himself, equivocating

²⁰⁰ Brenner, *Merchants and Revolution*, pp. 608-9.

²⁰¹ 'The Assada Merchants' Propositions', November 10 1649, printed in Sainsbury, *Calendar...of the East India Company*, p. 369.

²⁰² *Ibid.*, p. xxiii; Brenner, *Merchants and Revolution*, pp. 516-7, 608-613.

²⁰³ Namely Methwold of the old company, and Thomson and Fowke of the interlopers. The East India Company was attacked in a petition to the Council of Trade by Thomas Violet, but for its privilege of transporting bullion rather than for its company status, and the Council in fact defended the Company. Violet, *Advancement of Merchandize*, pp. 29-40.

²⁰⁴ E.B. Sainsbury (ed.) *A Calendar of the Court Minutes etc. of the East India Company, 1650-1654*. (Oxford: Clarendon Press, 1913) p. xxix.

²⁰⁵ *Ibid.*, p. 140.

²⁰⁶ *Ibid.*, p. 145.

about raising the necessary fine.²⁰⁷ One of his backers had left Worsley high-and-dry and the Company realised that it would be better to find a new buyer: Worsley's venture into business was short-lived, and he soon returned to the security of a state salary.

Although it had little to do with the East India Company specifically, the Council of Trade was instructed to respond to calls for free trade on a wider scale. Thus it is surprising that it only appears to have considered three specific trades: to Guinea, Greenland, and 'the Bilbao or Spanish trade'.²⁰⁸ This suggests that it dealt only with those disputes brought before it, in general preferring to find national based solutions like the Navigation Act. The contents of the Council's unfinished report about the Spanish trade are unknown, but its approach to dealing with the African slave trade and the Greenland fishery were pragmatic. The Guinea Company had been facing competition from interlopers throughout the 1640's, and the Council reported on 'settling the Guinea trade for fourteen years' in November 1650, apparently suggesting that an area of the West African coast be reserved exclusively for the Company with the rest left open.²⁰⁹ A similar attitude prevailed with regards to the Muscovy Company at Hull, which had petitioned against the presence of interlopers fishing for whales in the Greenland sounds, complaining of 'the great inconveniences and prejudice which would ensue, if several Stocks were permitted to Fish in one and the same Harbour'.²¹⁰ The Council's first report on this subject decided in the short term to allow the Company to fish two sounds exclusively, with the interlopers to fish the others in a joint stock.²¹¹ By

²⁰⁷ Ibid., pp. 157, 159.

²⁰⁸ T & C, pp. 64-5.

²⁰⁹ W.R. Scott, *The Constitution and Finance of English, Scottish and Irish Joint-Stock Companies to 1720*, Vol. II (Cambridge: Cambridge U.P., 1910) pp. 15-16.

²¹⁰ *The Proceedings at the Council for Trade, Between the Muscovia Company, Monopolizers of the Trade to Green-Land, and others, Adventurers thither, For a Free-Trade* (London, 1652) p. 1; Scott, *Constitution and Finance of...Joint-Stock Companies*, pp. 72-4. The Muscovy Company's monopoly had been singled out for criticism as far back as 1603. Ashton, *The City and the Court*, p. 89.

²¹¹ *The Proceedings at the Council for Trade, Between the Muscovia Company...*, p. 2.

November 1651 this deal had still not been put into practice, however, and both parties were in negotiation with the Council of Trade.²¹² Eventually the issue had to be settled by the Protectorate, which placed the regulation of the trade into the hands of a committee.²¹³

The subject of fishing warranted attention by itself, and the Council claimed to have made progress in considering 'several encouragements fit to be given to promote our fishery'.²¹⁴ It wrote to the local authorities of Aldeburgh in Suffolk, near Ipswich, for their opinion about 'promoting the ymprovement of the sayd Fishing Trade', in January 1651.²¹⁵ Complaining that 'the cheapnes & not venting of Fishe' had caused their fleet to fall from 50-60 barques to just 12, the corporation responded with measures to increase demand for fish by constraining the eating of meat, as well as advising that 'all Forreners may be debarred from bringing into this Common Wealth any kinde of Fishe whatsoever'. The Navigation Act would eventually fulfil part of their suggestions by prohibiting both the import and export of fish, except in English vessels.²¹⁶

As well as these particular trades, the Council considered 'the drawing of a yearly balance of the general export and import of this nation'.²¹⁷ Besides this, its digressions about foreign trade were preoccupied with free ports, and the problems facing the shipping industry in the face of increased Dutch competition, which had been considered as early as March 1650 by the Council of State.²¹⁸ These matters would

²¹² Ibid., p. 9.

²¹³ Scott, *Constitution and Finance of...Joint-Stock Companies*, pp. 72-4; Cooper, "Social and Economic Policies", p. 132.

²¹⁴ T & C, p. 65.

²¹⁵ Reply of the Corporation of the Borough of Aldeburgh to the Council of Trade. Ipswich Record Office, Aldeburgh Borough Records. EE1/P4/9.

²¹⁶ *A & O, II*, p. 560.

²¹⁷ T & C, p. 65.

²¹⁸ *CSPD, 1650*, p. 31.

dominate the activities of the Council of Trade throughout 1651, and would become closely tied to political relations with the Dutch, as will be considered below. As for its other work, it is fair to say that the Council of Trade did not quite fulfil the ambitious terms of its instructions, and was not as proactive in certain issues as might have been expected. However this does not necessarily mark it as essentially conservative: its proposals for the standardised inspection of manufacturing, for example, were potentially sweeping.

Ultimately, the problem was a lack of power and time: although some legislation resulted from its reports, the Council remained an advisory body, and was discontinued after 1651. State power was limited by many constraints in this period, making the Council reliant on commercial interests to approach it, even if it had wished to be more interventionist. But it does seem to have been busily employed, apparently absorbing most of Worsley's time.²¹⁹ Robinson reported that 'the Council of Trade are sayd to have prepared severall Bills' for the 'Recovery and Advancement of Trade'.²²⁰ Violet wrote that 'if all the Reports of the Council of Trade, and those I delivered in to the Council, had been timely put in execution, it had prevented much damage that hath, and is likely every daie more and more to befall this Nation'.²²¹ He put this down to the character of the times, when 'little went on, or was countenanced, by some men then in power, but what tended to the making particular Members and their friends rich and the general good being by many neglected'.²²² Many saw the Rump Parliament as a discredited regime, hindered by its narrow social and political basis, but this does not

²¹⁹ William Rand wrote to Hartlib that he was 'glad the Councell for trade is so employed, that Mr Worsley has no leasure to write to me'. 29 July 1651. HP 62/30/4A. William Wheeler apologised for writing to Worsley having been expressly forbidden to do so. Letter, Wheeler to Worsley, 25 August 1650. HP 34/3/5A.

²²⁰ Robinson, *Certain Proposals*, p. 7.

²²¹ Violet, *Mysteries and Secrets of Trade*, p. 160.

²²² *Ibid.*, p. 181.

necessarily mean that the Council of Trade was insignificant.²²³ In fact, as Cooper argued, it was probably sufficiently important to have 'alienated or threatened a variety of London and provincial interests'.²²⁴ The order to consider how to redistribute trade throughout the nation could raise opposition from London, whilst provincial interests like the Newcastle Corporation could be threatened by its approach to reforming inland trade.²²⁵ The Council itself was made up of various different commercial interests as well as statesmen, and perhaps it was decided that such a body was incapable of reaching resolution, leading to commercial affairs being placed in the hands of a non-mercantile committee of the Council of State on 17 December 1651, even before the Council of Trade had officially expired.²²⁶ All of these probably contributed to the decision not to continue the Council, but perhaps most controversial of all was the matter of trade with the Dutch: Violet was particularly aggrieved by the failure to introduce free ports, by which 'wee might have reduced the Dutch to reason, without ever striking one blowe'.²²⁷ The spectre of the 'Hollander' loomed over all considerations of commercial policy in these years, and ultimately any judgement of the significance of the Council of Trade must depend upon its role in the passage of the legislation which was intended to rescue English shipping from Dutch hands: the Navigation Act.

²²³ On the difficulties faced by the Rump, Brenner, *Merchants and Revolution*, pp. 561-3.

²²⁴ Cooper, "Social and Economic Policies", p. 138.

²²⁵ *Ibid.*, p. 137.

²²⁶ *CSPD, 1651-1652*, p. 67. The succeeding committee for trade and foreign affairs consisted of 16 members, statesmen rather than merchants, but including Vane and Salwey from the Council of Trade, with Challoner added later- the outstanding reports of the Council of Trade, such as that concerning inland trade, were referred to them. The State Papers reveal this to have been a fairly active body.

²²⁷ Violet, *Mysteries and Secrets of Trade*, p. 181.

IV. *The Advocate and Free Ports: Commercial Republicanism?*

We have seen that in the mid-17th-century, 'the Dutch Republic, commonly regarded as a commercial rival, was also admired as the prototype for a new kind of mercantile state'.²²⁸ These tendencies would manifest themselves, during the Commonwealth, in the policies of the Navigation Act and free ports, the occasion for Worsley's pamphlets *The Advocate and Free Ports*, which will be the focus of this section.

The Council of Trade was faced with the problem of the growing dominance of Dutch shipping at its inception, from colonial and company merchants alike. Some sort of protection was being demanded, although for the companies this would have been in the form of reinforced privileges: that the Commonwealth did not take this course reflects the impact of the free trade arguments of the 1640's. Equally, however, Dutch success appeared to show the need to draw in multinational trade to English ports, and so the Council was instructed to consider free ports, a simple idea based on manipulating the customs regime to encourage an entrepôt trade by allowing the storage of goods for re-export at little or no cost, at designated ports. The problem was finding a balance between opening trade and protecting shipping, but the need for this seemed about to disappear following the death of the pro-Stuart Stadholder, William II of Orange, in late 1650, allowing the anti-Orangist Hollanders to re-assert their republican principles.²²⁹ This presented the Commonwealth with an apparently providential opportunity to draw closer to a natural ally, surmounting commercial rivalry. Pincus has described the mood of expectation this created amongst parliament's supporters, who

²²⁸ Ormrod, *The Rise of Commercial Empires*, p. 33.

²²⁹ Pincus, *Protestantism and Patriotism*, pp. 15-17.

now hoped to unite with the other leading Protestant power, which was the goal of a parliamentary mission to The Hague, conducted by Oliver St John and Walter Strickland, and supported by Vane. Negotiations for 'a more strict and intimate alliance' took place in May and June, and it is no coincidence that this was the period when the Council of Trade was most intensively considering free ports, the commercial corollary to political union.²³⁰

The Council's original 'Considerations on Free Ports' began by stating that 'Experience hath shewed that a Free Scale is and will be beneficiall to any Common wealth', citing Amsterdam, Genoa and Legorn.²³¹ English writers could look closer to home, however, as Dover had enjoyed considerable benefits from such a system in the 1630's.²³² With this in mind, the Council gathered mercantile opinions about those features necessary for a successful free port, and in particular whether they should be open to foreign shipping or restricted to English ships. As Brenner noted, the Council considered both positions, suggesting first that foreign goods should be admitted 'if Imported in English Bottoms', but then concluding 'that all Nations in Amity be admitted the benefit of this Free Scale in their own vessells'.²³³ This proved to be the most divisive issue for those merchants consulted in April 1651. Only two groups were named- one consisting of leading members of the major London trading companies, the other a selection of foreign merchants partly based in England (including Nicolas Corsellis)- but Brenner's assertion that the third, unnamed group, were probably leading new merchants, is convincing.²³⁴ The responses of all three groups were broadly

²³⁰ Instructions to the embassy, quoted in *Ibid.*, p. 26. For this mission in general, *Ibid.*, pp. 24-35.

²³¹ The results of these deliberations were copied in the 18th-century, and are at the BL Add. MS 5138, fol. 145-164. Quote on fol. 145r.

²³² J.S. Kepler, *The Exchange of Christendome. The international entrepôt at Dover 1622-1651* (Leicester: Leicester U.P., 1976); Violet, *Advancement of Merchandize*, p. 3.

²³³ BL Add. MS 5138, fol. 145r; Brenner, *Merchants and Revolution*, p. 614.

²³⁴ Brenner, *Merchants and Revolution*, p. 618.

favourable, the company merchants arguing that ‘Merchants will be encouraged to enlarge their Trading when with their goods exported they may go so cheap to Forreign marketts’, whilst the strangers hoped free ports would create a ‘Universal Magazine’.²³⁵ They were likewise in broad agreement about the conditions necessary for a successful free port, but when it came to the question of admitting foreign merchants, this concord disappeared. The company merchants, aware of Dutch competition in the re-export trade, were clear that free ports would ‘increase the shipping navigation and Trade of the Nation especially if all goods so to be exported may be exported in English Shippis’.²³⁶ Unsurprisingly, the stranger merchants supported ‘it being at the Liberty and choice of the merchant to export the goods either in English or Foreign Shippis’.²³⁷ Brenner argued that the new merchants took the latter position, and indeed their answers and those of the strangers were very similar, whilst Thomson and his collaborators had been involved in several commercial partnerships with Dutch merchants. However, in fact they were not quite as equivocal as the latter about admitting foreign ships, as opposed to foreign merchants freighting English ships.²³⁸ Brenner is right that these merchants were seeking to capitalise on circumstances to further their own interests, but this does not mean they were orchestrating events; neither did the Council transparently reflect their interests, instead listening to both interlopers and company merchants. Similarly, when it came to choosing suitable ports, the Council was open to petitions from the outports. As would be expected, Dover petitioned most vigorously, the town

²³⁵ BL Add. MS 5138, fols. 146r-v, 149v.

²³⁶ *Ibid.*, fol. 146r.

²³⁷ *Ibid.*, fol. 150r.

²³⁸ Brenner, *Merchants and Revolution*, pp. 618-24. The new merchants did advise that strangers should be offered ‘some City favours and Priviledges’, but this probably only referred to naturalisation. Elsewhere, they suggested that foreign merchants should pay the same duties as English ones, as ‘the Stranger ... must be the First and greatest storer of Commodities’. However, there is no mention of allowing foreign merchants free access to English ports *in their own shipping*. BL Add. MSS 5138, fols. 147v-148r.

authorities joining with merchants to argue for its ideal situation for an entrepôt trade, but the Council also received petitions from Plymouth, Barnstable, the Isle of White, Southampton, and Portsmouth.²³⁹

This seems to have concerned London's authorities, who feared that free port privileges could be used to draw trade away from the capital, and in June the Court of Alderman ordered that John Fowke, their representative on the Council of Trade, keep them informed.²⁴⁰ In December they petitioned to make London a free port. By then, however, union proposals with the Dutch had broken down, and the problem of Dutch competition had returned to the fore. The Council of Trade had in fact not forgotten this issue: it reported on 'restraint of goods of foreign growth to be imported in foreign bottoms' to the Council of State on both 4 April and 31 July 1651, with the Navigation Act being put to parliament only a few days later.²⁴¹ Passed on 9 October 1651, this Act was important for marking an attempt to regulate trade on a national and legislative basis, rather than through company charters.²⁴² Imports into England, Ireland and its other plantations from 'Asia, Africa or America' were therefore to be made only in ships owned and manned (in the majority) by Englishmen, and European goods were to be imported into England and its colonies either in English ships or in ships owned by the country of production, or from where they were usually first shipped for transportation.²⁴³ Clearly the main object was to bar imports in Dutch ships, although

²³⁹ BL Add. MS 5138, fols. 152r-164r

²⁴⁰ Andrews, "British Committees", p. 29.

²⁴¹ T & C, p. 64; Stock, *Proceedings*, p. 223.

²⁴² Bliss, *Revolution and Empire*, pp. 58-9; Cooper, "Social and Economic Policies", p. 135; Braddick, *State Formation in Early Modern England*, pp. 411-414.

²⁴³ Harper, *English Navigation Laws*, p. 48. The Act is printed in *A & O, II*, pp. 559-562. Further clauses provided that fish and fish-products were to be both imported and exported in English vessels, with the fish to be cured by Englishmen, whilst English ships carrying Levant and East Indian goods were allowed to lade in other European ports. The Act exempted bullion imports, and Italian silks purchased with the proceeds of English commodities were allowed to be imported from Northern Europe.

the export trade was left open, leaving some possibility of foreign mercantile involvement. By imposing a simplified framework on a complex commercial situation, the Act inevitably attracted criticisms, which the Council of Trade's final report responded to.²⁴⁴ Those merchants who had relied on freighting Dutch ships, probably Merchant Adventurers, would have suffered most immediately.²⁴⁵ Another complaint was that the Act favoured London over provincial merchants, 'for most of the out ports not capable of Foreign Trade to Indies and Turkey, the Londoners having the Sole Trade, do sett what price they please upon their Comoditys'.²⁴⁶ Worsley's pamphlet *The Advocate* was published in defence of such criticisms, and as such represents the clearest exposition of the 'commercial logic' behind the Act.

The Advocate, editions of which were published in late 1651 and 1652, was subtitled 'A Narrative Of the state and condition of things between the *English* and *Dutch* Nation, in relation to Trade', and comprised a report 'presented in *August* 1651'.²⁴⁷ Possibly this was the Council of Trade's report of 31 July to the Council of State, which provided immediate justification for the Navigation Act, although its terms were somewhat broader. Whatever the case, the pamphlet was published bearing the official logo of the Council of State, and defended the Navigation Act by appealing to the following principle:

It is by Trade, and the due ordering and governing of it, and by no other means, that Wealth and Shipping can either bee encreased, or upheld; and consequently by no other, that the

²⁴⁴ T & C, p. 64.

²⁴⁵ Ormrod, *The Rise of Commercial Empires*, p. 35.

²⁴⁶ Captain John Limbrey's 'Propositions concerning the Advice of Trade'. BL Add. MS 5138, fol. 165v.

²⁴⁷ Worsley, *The Advocate*, p. 1.

power of any Nation can bee sustained by Land, or by Sea: It beeing not possible ... according to the Cours of humane affairs, for anie Nation (having no Mines to supplie it self) to make it self powerful in either of these (this is, either Monies or Shipping) without Trade, and the Cours of it.²⁴⁸

The tract went on to offer a detailed account of Anglo-Dutch commercial relations. It began with a preface, however, whose millenarian intonations seem far from the cool economic reasoning that followed. Pincus used this text to support his contention that the Navigation Act was motivated by religious, not commercial, grievances, describing it as ‘apocalyptic economics’.²⁴⁹ Indeed, here Worsley declared that ‘I dare not but own the Belief of the Coming of his Appearance, and the breaking forth, very shortly, of his Glorie’.²⁵⁰ The preface concluded by stating that ‘nothing ... hath presented it self in this Commonwealth, of more Import to bee looked after, or to bee very heedfully taken into Consideration, then Matters of Trade’, seeming to suggest that the Navigation Act did indeed fit into some apocalyptic scheme.²⁵¹ However, a more detailed reading suggests that Worsley was ambivalent about the relationship between international trade and the coming Kingdom of Christ. Rather than describing in detail the utopian state that the Navigation Act would help to achieve, the preface to *The Advocate* lingered on the process of apocalypse itself. Worsley warned that this would be ‘a sight very strange, and very unexpected to men; ... in som measure even contrarie (and perhaps, very unwelcom) unto the most enlarged and raised thoughts wee have yet prepared out selvs with, to receiv it’.²⁵² This ‘Coming’ would be signified by ‘the laying of all things low, naked, and mean before him; the stripping men of that Honor, Credit, and Repute’ which lay behind ‘the whole Indeavors, Practice, Studie and

²⁴⁸ Ibid., p. 12.

²⁴⁹ Pincus, *Protestantism and Patriotism*, p. 48.

²⁵⁰ *The Advocate*, sig. B1r.

²⁵¹ Ibid., sig. B2r.

²⁵² Ibid., sig. B1r.

Wisdom (if not Religion) of All States, Ages, Nations and Men'.²⁵³ The future rule of God would bring this to an end, but even here Worsley found no easy consolation, questioning the ability of fallible men to discern the will of God in temporal affairs:

... not knowing what the Councils of God intend to bring forth for the settlement of this Nation; Nor how hee hath resolved in his Wisdom to dispose of it, (as to its outward Condition,) whether Hee intends wee shall bee oppressed by other Nations about us, that hee may the more manifest his Power and Protection over us: Or that wee shall bee advanced in Prosperitie above others, that so hee may perhaps shew us our vanitie ... I say, not knowing this, I can as little judge what means Providence will pleas to use in order to the bringing to pass these his purposes, whether hee will chuse This, or reject That.²⁵⁴

The commercial policies of the Rump were framed in this uncertain context. The Commonwealth was unable to see clearly its providential destiny, but this did not preclude it from taking care of its 'outward Condition'. Worsley counselled prudence, drawing on the advice of Solomon in *Ecclesiastes* 11, 5-6.²⁵⁵ In the absence of clear guidance from above, the Commonwealth had to concentrate on establishing itself through means which were resolutely of this world.

International trade, as described in *The Advocate*, was divorced from spiritual or ethical considerations, an amoral world of competition and power. Worsley did not advise the Commonwealth to transcend corrupt human affairs: this role was reserved for the inscrutable hand of God. In the meantime, the regime had to care for itself, to navigate a course through mutable human affairs, until God's will became clearer. Thus although the apocalypse loomed over the Commonwealth, *The Advocate* and the Act it defended had an entirely secular logic, appropriate to its secular cause. This, of course,

²⁵³ *Ibid.*, sig. B1v.

²⁵⁴ *Ibid.*, sig. B2r.

²⁵⁵ 'You do not know now a pregnant woman comes to have a body and a living spirit in her womb; nor do you know how God, the maker of all things, works. In the morning sow your seed betimes, and do not stop work until evening, for you do not know whether this or that sowing will be successful, or whether both alike will do well'.

was the state of trade between England and Holland, the main subject of the text. Worsley's account began by citing the recurring fear of zealous English Protestants before the Civil War, namely 'the Design of *Spain* ... to get the Universal Monarchie of Christendom'.²⁵⁶ Of equal danger, however, were Dutch designs 'to laie a foundation to themselvs for ingrossing the Universal Trade, not onely of Christendom, but indeed, of the greater part of the known world'. Their hope was to 'poiz the Affairs of any other State about them, and make their own Considerable, if not by the Largeness of their Countrie; yet, however, by the Greatness of their Wealth; and by their potencie at Sea, in strength and multitude of Shipping'.²⁵⁷ For evidence of these designs, Worsley drew on the complaints of various commercial interests, for example the Eastland Company, who had complained that their shipping had fallen from 200 sail a year to 'scarce twenty'; *The Advocate* gave similar figures (200 ships to just 16), noting also that the Dutch fleet had risen to 600.²⁵⁸ Worsley had long been aware of Dutch infringements in the plantation trade, where he claimed Dutch shipping outnumbered the English by 3 or 4 to 1, but the complaints of Company merchants stood behind his assertion that the Dutch also dominated in the Indies and the Mediterranean, 'where they formerly rarely laded hither one ship of Goods'.²⁵⁹

This domination was supported by 'the great number of Shipping they have constantly built; and ... the manner of managing their Trade and Shipping, in a conformitie and direction to their Grand End'.²⁶⁰ Worsley therefore presented an account of the efficiency of Dutch shipping, which benefited from state-sponsored

²⁵⁶ *The Advocate*, p. 1.

²⁵⁷ *Ibid.*, pp. 1-2.

²⁵⁸ Hinton, *Eastland Trade*, pp. 189, 191; *The Advocate*, p. 6.

²⁵⁹ *Ibid.*, p. 7.

²⁶⁰ *Ibid.*, p. 3.

convoys and was often craftily insured in England. By such means, Dutch freight rates were able to undercut English ones by as much as 20%, providing a similar advantage over English merchants in foreign markets. Ultimately, they had ‘Compelled our Nation ... to hire and freight the *Holland* shipping’, a practice which had quickly spread amongst English merchants.²⁶¹ Although freighting Dutch ships allowed them to continue to trade overseas, this was at great cost to English shipping, introducing the possibility of an alarming downward spiral to dependency:

For this method and manner of managing their affairs, daily adding to *their* stock, and answerably diminishing the Stock and Treasure of *this Nation*: and by laying it so, as it *run* thus in a Circle, each part of it ... strengthening another part: it would unavoidably have tended to a greater and greater disabling us to hold anie Trade with them: and to have made themselvs, for Wealth and Shipping, the Masters over us.²⁶²

Thus the Navigation Act, ‘so happily and timely established by the Parliament’, was intended to rescue the nation from a dangerous condition of dependency.²⁶³ *The Advocate* reveals an aggressive response to this fear, appropriate to a new regime seeking to establish its security and prosperity. The Dutch Republic was seen as the exemplar of such an approach to commerce, and this was also the case with the entrepôt system which free ports intended to stimulate. Although the failure of Anglo-Dutch union scuppered these plans, the publication of Worsley’s pamphlet *Free Ports* in 1652 shows that at least some of the Council of Trade still hoped to see them introduced. The pamphlet probably contained the Council’s report on the subject, whilst the fact that, like *The Advocate*, it bore the official logo of the Council of State, provides a hint of official legitimacy.²⁶⁴

²⁶¹ *Ibid.*, p. 4.

²⁶² *Ibid.*, p. 6.

²⁶³ *Ibid.*, p. 13.

²⁶⁴ B.W[orsley], *Free Ports, The Nature and Necessitie of them Stated* (London, 1652).

Nations, Worsley began, were divided into those which relied on others for their shipping, and those which provided this service: from this situation 'doth arise the wisdom of som Nations in fetching Commodities from the places of their Growth at that fit and seasonable time, and storing them up till the Necessitie of other Nations to call for them'.²⁶⁵ By mastering this trade, the United Provinces had become 'a rich and general Magazine or Store ... for other Nations'.²⁶⁶ Carrying the commodities of northern and north-east Europe into England, France, and Portugal, and then bringing back goods from southern Europe and the East and West Indies northwards, the Dutch were able to place 'their whole Interest in the encouragement and sagacious Managerie of this Cours and Circle of Traffique'.²⁶⁷ But the Dutch were no better situated to perform this re-export trade than England, which had the advantage of far greater stores of native commodities (multiplied by its colonies), as well as 'the Freedom and Independencie that our Shipping have upon the Ports of any other State, or Nation', and its excellent coasts and harbours.²⁶⁸ Unfortunately, the current basis of English trade was 'onely for Consumption', and therefore 'confined to a Stock, and such a Stock as must not exceed its own expence or Consumption'.²⁶⁹

In order to 'move this Nation to undertake the like general Mart, as hath the Hollander', Worsley recommended the opening of free ports.²⁷⁰ This would have multiple benefits: 'to the Quickning of Trade; to the Imploiment of the poor throughout the whole Common-wealth: to the making of all Forreign Commodities more cheap, and more plentiful ... to the raising the Exchange, and bringing in of Bullion: to the

²⁶⁵ Ibid., p. 1.

²⁶⁶ Ibid., p. 2.

²⁶⁷ Ibid., p. 3.

²⁶⁸ Ibid., p. 5.

²⁶⁹ Ibid., p. 7.

²⁷⁰ Ibid., p. 3.

augmenting of the Revenue of the State: and to the making other Nations more dependent upon this'.²⁷¹ Like the Navigation Act, free ports would increase 'the Power and Strength of this Nation, both by Land and Sea'. However, Worsley specifically rejected the most literal interpretation of the balance of trade, arguing that trade was more complex than this:

Wherefore all Consultations whatsoever about Trade if *Free Ports* bee not opened, and this Whole-sale or General Trade bee not encouraged, do still but terminate in som Advice or other about Regulating our Consumption, and have no other good at farthest, but preventional; *that our Balance of Import exceed not our Export*: which to confine our selvs to alone, is, on the other side, a Cours so short, as it will neither serv to rais the Strenght of this Nation in Shipping, or to Govern the Exchange abroad; nor yet to avoid the Damage and Mischief the Subtiltie of the foreign Merchant will hereby bring upon us.²⁷²

This was no narrow 'mercantilist' orthodoxy, therefore, and for Worsley free ports would introduce a dramatic change in commercial base of the nation:

For a Nation to deal or traffique in Wares and Merchandizes for its own expence and consumption, as countrie Gentlemen, or ordinarie Trades-men; And for a Nation to make its self a shop, and to buy and sell for the furnishing and provision of other Nations; as a man that keep's a Ware-hous, or Store-hous; which latter Trade is that wee speak of.²⁷³

Here Worsley presented the Commonwealth with a method of commerce which was as different from England's traditional, bilateral trades, as republic was from monarchy. Was this, therefore, a specifically republican political economy, equitable to that of Pincus' commercial republicans? To a degree this was the case: Worsley's pamphlets may be seen as epitomising the two main features of a distinctive approach to commercial policy which was specifically geared towards the needs of the new republic, although not entirely original or exclusively republican. The first, represented by *The*

²⁷¹ Ibid., p. 4.

²⁷² Ibid., p. 8.

²⁷³ Worsley, *Free Ports*, p. 7.

Advocate, was the idea of trade governed by the state. This was distinct both from the demands of the free traders and the merchant companies, for whilst it recognised that monopolies elevated private interests over the public good, it acknowledged the company argument for corporate organisation. But rather than leaving this to the companies, the state sought to erect its own national monopoly; thus the Rump's supposed failure to actually abolish the companies was not necessarily a sign of conservatism, because the passage of the Navigation Act intended to supersede these companies. Ormrod has recently restated the significance of the Act as 'staggeringly ambitious', seeking to 'create an overarching national monopoly within which English shipping and long-distance trade could develop', although less successfully than its Restoration successors.²⁷⁴ However, the first Navigation Act certainly established the principle of internal free trade complemented by external protection.²⁷⁵ Thus it created a bulwark for English shipping, allowing commerce to increase free from the fear of dependence on a rival, encouraging Child to later described that Act as 'one of the choicest and most prudent Acts that ever was made in England'.²⁷⁶

The Navigation Act also hoped to fulfil the second distinctive feature of the Rump's approach to commerce, namely the cultivation of an entrepôt trade, as epitomised by *Free Ports*. However, free ports, the 'ambitious superstructure that was to have been fitted on to the foundation of the Navigation Act', were not founded by the

²⁷⁴ Ormrod, *The Rise of Commercial Empires*, p. 32.

²⁷⁵ *Ibid.*, pp. 310-314, 337-343.

²⁷⁶ J. Child, *A New Discourse of Trade* (London, 1693) p. 91. The Navigation Acts could still of course attract criticism. Roger Coke argued they 'exclude the Trading Part of the World from Trading with us'. *A Discourse of Trade* (London, 1670) p. 28. Carew Reynel, who believed manufacturing was the main basis of national prosperity, likewise argued that the Navigation Acts were harmful by restricting exports and reducing the vent of English goods. *The True English Interest* (1674) pp. 14-15. Child argued that these disadvantages were worthwhile because English shipping required protection against its Dutch counterpart- to the objection that the Dutch themselves had no need of a Navigation Act, Child argued that this was because they were 'Masters of the Field in Trade, and therefore have no need to build Castles, Fortresses and places of Retreat'. *New Discourse of Trade*, p. 92.

Commonwealth: the Council of Trade did not have the chance to issue its report on this subject.²⁷⁷ Fiscal reasons were an obvious obstacle, but in any case the outbreak of the Anglo-Dutch war relegated commercial policy to a secondary concern.²⁷⁸ In fact, it can be argued that commerce was never the over-riding concern of the regime, despite the passage of the Navigation Act. Any republican ideology of trade was fleeting and fragmentary, never finding form under the Republic itself. Certainly the Restored monarchy was not put off by any residual hint of republicanism when passing its own Navigation laws, encouraging Worsley to claim credit for being the ‘first sollicitour’ of the 1651 Act to Lady Clarendon, whilst later laws included provisions to encourage an entrepôt trade by channelling colonial trade through England, allowing ‘drawbacks’ on re-exported goods.²⁷⁹ By adopting such policies the monarchy was able to successfully counter the idea that commerce thrived best under a republic, although paradoxically this ensured that the commercial policies of the Commonwealth were not forgotten, by those who looked back on England’s experiment with republicanism as a time of prosperity and power which might one day be revived.

²⁷⁷ Hinton, *Eastland Trade*, p. 93; T & C, p. 64.

²⁷⁸ No record of Worsley’s opinion about the war survives. The relationship between commercial rivalry and the outbreak of war was complex, as it would be in 1664: see S. Groenveld, “The English Civil Wars as a Cause of the First Anglo-Dutch War, 1640-1652”, *Historical Journal*, 30, 3 (1987) pp. 541-566; J.R. Jones, *The Anglo-Dutch Wars of the Seventeenth Century* (London & New York: Longman, 1996); P. Seaward, “The House of Commons Committee of Trade and the Origins of the Second Anglo-Dutch War, 1664”, *Historical Journal*, 30, 2 (1987) pp. 437-452; Pincus, *Protestantism and Patriotism*, pp. 237-255. See also Braddick, “Government, War, Trade, and Settlement”, pp. 303-4.

²⁷⁹ Letter, Worsley to Lady Clarendon. Bodleian Library, Clarendon MS 75, fol. 300r. N. Zahedieh, “Economy”, in *The British Atlantic World, 1500-1800*, ed. D. Armitage & M. Braddick (Basingstoke: Macmillan, 2002) p. 53. See also the 18th-century system of warehousing for re-exports: Ormrod, *The Rise of Commercial Empires*, p. 184. Free ports continued to be called for- Peyps, for example, owned a scribal copy of Worsley’s pamphlet (Bodleian Library, Rawlinson MS A473, pp. 53-64) and the term remained in use well into the next century: F. Armytage, *The Free Port System in the British West Indies. A Study in commercial policy, 1766-1822* (London et. al: Longmans, Green & Co, 1953).

In 1668, Slingsby Bethel published an anonymous critique of Cromwellian rule which was also a veiled attack on monarchical government. Bethel accused the late Protector of precipitating 'the low condition that we are now (in relation to Trade) reduced to'.²⁸⁰ This was all the more criminal given that under the Commonwealth, England had been 'at the highest pitch of Trade, Wealth, and Honour, that it, in any Age, ever yet knew'.²⁸¹ In particular, Bethel noted how 'Our Honour, was made known to all the world, by a Conquering Navie, which had brought the proud *Hollanders* upon their Knees, to begg peace of us'. But Cromwell, acting in his own private interest, had failed to press home this victory and 'immediately after, contrary to our Interest, made an unjust Warr with *Spain*, and an impolitick League with *France*' which had devastated trade.²⁸² Thus Bethel was an early exponent of the opinion that Cromwell, and implicitly the monarchy of Charles II, had sacrificed the national interest for his own ambitions.

But the Protectorate did not disregard trade entirely. Throughout the 1650's commerce was considered by a variety of committees of the Council of State, and the acquisition of Jamaica in 1655 although not an intended outcome of war with Spain, would prove of vital importance to English commerce in future. In these years the merchants Thomas Povey and Martin Noell attained prominence as Cromwell's commercial advisors, and Worsley himself later drew on the programme of integrated colonial trade which they developed.²⁸³ Just as there was continuity in commercial policy between the pre-Civil War period and the Commonwealth, so 'There was more

²⁸⁰ [S. Bethel], *The World's Mistake in Oliver Cromwell* (London, 1668) p. 2.

²⁸¹ *Ibid.*, p. 3.

²⁸² *Ibid.*, p. 4.

²⁸³ Andrews, "British Committees", pp. 36-60; Bliss, *Revolution and Empire*, pp. 66-71.

consistency in the intentions of foreign and especially of the domestic economic policies between Commonwealth and Protectorate than the Commonwealthmen allowed'.²⁸⁴ Ultimately the commercial patriotism which Worsley purveyed in *The Advocate*, under the pseudonym 'Philopatris'- lover of his country- proved to be politically malleable.²⁸⁵ Thus despite its republican influences (derived both from English and Dutch experiences), the Restored monarchy was able to consciously emulate the Commonwealth in founding its own councils governing trade and the plantations. The way in which Worsley himself would deploy the discourse of trade to gain a place on these bodies, will be discussed in Part 3.

By then, the language of 'interest' as well as 'improvement' was a pervasive feature of polite English culture.²⁸⁶ John Evelyn's transition from associate of Hartlib to Restoration virtuoso typified how Hartlib's utopian-tinged projects became the pursuits of the civilised and patriotic royalist gentleman.²⁸⁷ Worsley shared many of the sentiments and aspirations of the Hartlib circle: for him, technology and agriculture could work hand-in-hand with commercial expansion to bring national wealth and power. And yet there was undeniably a tension between Hartlib's ideal of free communication in trade as well as learning, and the unforgiving world of commercial competition which Worsley portrayed. Ideologically, unity was fundamental to the Hartlib circle, most of all in religion: union with the United Provinces would have fulfilled one of Hartlib and Dury's long-term goals, and they supported Oliver St John's mission by addressing a millenarian tract to him on the eve of his departure, exhorting

²⁸⁴ Cooper, "Social and Economic Policies", p. 142.

²⁸⁵ Bethel, *World's Mistake*, p. 3; Pincus, "Neither Machiavellian Moment nor Possessive Individualism".

²⁸⁶ Spurr, *England in the 1670s*, pp. 117-145.

²⁸⁷ M. Hunter, "John Evelyn in the 1650s: a Virtuoso in Quest of a Role", in *Science and the Shape of Orthodoxy*, pp. 67-98.

that 'there bee a reciprocation of love in the gifts of the Spirit, between us and others the Members of Jesus Christ abroad'.²⁸⁸ Probably Worsley shared their hopes, but he was aware that the forces of commercial competition could be too strong even for religious sympathies to surmount. The preface of *The Advocate*, and its denial that the Commonwealth could shape its policies in accordance with any millenarian dream, was a step away from Hartlib's hopes of universal reform, shattered by the moral relativism of commercial rivalry. Such an amoral portrait of international affairs stood in the way of the Protestant internationalism which Hartlib espoused.

Throughout the 1650's, the Puritans in power had to contend with a similar gulf between their aspirations and the reality of holding power over an unsympathetic nation. For Worsley, public service took him back to Ireland, where he would experience something of the life of a colonist as well as colonial administrator. But the disappointments he suffered there would encourage him to turn away from the worldly issues of trade and empire, and inwards to the spirit. This journey, and the intellectual pursuits which it involved, will be charted in the three chapters that follow.

²⁸⁸ Hartlib's preface was dated 27 February 1651. [A. von Frankenburg], *Clavis Apocalyptica: Or, A Prophetical Key* (London, 1651) sig. A3v.

4. 'The Changeableness of Things'.

Surveying Ireland, 1652-1656.

The Ireland that Benjamin Worsley left in 1644 seemed to have little to offer to Protestant settlers, with prospects of re-conquest looking slim. By 1652 this situation had changed, as Cromwell's military victories in Ireland opened new opportunities of employment in the reconstruction of Protestant rule. Worsley was one of those who descended on Ireland to capitalise on this situation; fatefully, on the same voyage was another ambitious Englishman who would soon become Worsley's intractable rival, William Petty.

Petty and Worsley were both attracted by the potential of Ireland, where (as Petty later recalled), 'many endeavours' were underway 'to regulate, replant, and reduce that cuntry to its former flourishing condition'.¹ However, Petty was to prove much the more successful in exploiting this situation, establishing himself as a major landowner with his earnings from the land survey. Intellectually, Petty used the 'Down Survey' to develop what he would later call 'political arithmetic', his Hobbesian science of government based on statistical information, of which Ireland would become a model example.² But for Worsley the experience was far less positive. Following the humiliation of being supplanted by his former collaborator, Worsley turned to increasingly mystical reflections, under the influence of those radical army sectarians

¹ W. Petty, *History of the Cromwellian Survey of Ireland, A.D. 1655-6, Commonly Called the 'Down Survey'*, ed. T.C. Larcom (Dublin: Irish Archaeological Society, 1851) p. 1.

² For the role of the Down Survey in Petty's intellectual development, see L. Sharp, 'Sir William Petty and some aspects of Seventeenth-Century Natural Philosophy', unpublished D.Phil. thesis (Oxford, 1977) p. 137; Webster, *Great Instauration*, pp. 438-442; Goblet, *La Transformation de la Géographie Politique de l'Irlande*. See also P. Buck, "Seventeenth-Century Political Arithmetic: Civil Strife and Vital Statistics", *Isis*, Vol. 68 (1977) pp. xx

who would eventually overthrow Henry Cromwell's rule in Dublin in 1659, which Worsley participated in by assisting the attempt to impeach Petty. He became somewhat intellectually isolated in Ireland, distant from his former collaborators in the Hartlib circle and alienated from Petty's circle, who were laying down the roots of the new science in Ireland.³ Ireland thus brought disappointment and frustration for Worsley, and Barnard argued that 'service there was an unimportant episode in his life'.⁴ Indeed the experience had little positive impact, but in terms of understanding the direction which Worsley's ideas would take in this decade, the disillusionment he experienced there was significant.

Worsley arrived in Ireland, in October 1652, as secretary to the parliamentary commissioners led by Fleetwood, a senior position to Petty, who was the chief physician.⁵ Clearly Worsley had acquitted himself well enough as secretary to the Council of Trade to continue his ascent in the state's service, his annual salary now reaching £400.⁶ No doubt the Council's more important members aided this progress; although Vane had retreated from active politics from June to November 1652, Richard Salwey retained some influence in Irish affairs.⁷ Worsley also had pre-existent contacts amongst the 'Old Protestant' settlers of Ireland, principally through the Boyle family, but their influence was waning in the early 1650's, although Worsley had some dealings with them as secretary to the commissioners at Dublin Castle.⁸ They would have to wait

³ The activities of the Hartlib circle with regard to Ireland are covered in detail in Barnard, *Cromwellian Ireland*, pp. 213-248; T. Barnard, "The Hartlib circle and the origins of the Dublin Philosophical Society", *Irish Historical Studies*, Vol. XIX (1974-5) pp. 56-71.

⁴ Barnard, *Cromwellian Ireland*, p. 222.

⁵ Fleetwood was proclaimed commander in chief of the army in Ireland on 24 August 1652, joining Edmund Ludlow, John Jones, John Weaver and Miles Corbet as a parliamentary commissioner. *Ibid.*, pp. 17-18.

⁶ The commission appointing Worsley to this role has not been located. But he was paid £200 on 20 March 1653, about 6 months after beginning the job. J. O'Hart, *The Irish and the Anglo-Irish Landed Gentry* (Dublin: Irish U.P., 1969) p. 244.

⁷ Barnard, *Cromwellian Ireland*, p. 17.

⁸ HMC, *Egmont*, Vol. 1 (London, 1905) pp. 515, 522.

for the rule of Henry Cromwell in the second half of the decade to return to power, when they were opposed by religious and political army radicals. Petty's association with the former led Worsley naturally to lean to the latter, although he did not sever his links with the Boyles. The land settlement would be one theatre for these factional struggles, and so Worsley and Petty became drawn into a contest over the future direction of English rule over Ireland itself.

Before then, however, Worsley appears to have been keen to leave Ireland altogether. In April 1653 he was nominated by the Committee for Trade and Foreign Affairs for the post of secretary to Viscount Lisle's embassy to Sweden, a commercially important location.⁹ Worsley quickly crossed back to London to take this commission, only to find that Lisle had been replaced by Bulstrode Whitelocke and he had been replaced as secretary.¹⁰ In June he was granted £50 as compensation for his wasted journey, but this still left Worsley without employment, since the post he had left back in Dublin had been filled.¹¹ Fortunately, a potentially more rewarding opportunity had arisen just as he returned to London. During summer 1653, parliament was in the process of laying down the legislative framework intended to redistribute that land confiscated from Irish rebels. The basis of this settlement stretched back to 1642, when parliament had sought to enlist private capital to pay for re-conquest by offering a share of Irish land to those 'adventurers' who invested in this venture.¹² Implementation of

⁹ *CSPD, 1652-3*, p. 272. Worsley's choice was announced by Walter Strickland, who in 1649 had introduced him to Vane: see chapter 3.

¹⁰ John Dury, however, joined this embassy. He carried over copies of Worsley's pamphlets *The Advocate* and *Free Ports*, reporting from Stockholm that 'his Aduocate is here extremely well liked, & ... I have imparted it to the Lord Chancelour Oxenstiern who finds it a solid peace; the Queene also spoke of it yesterday unto me; & told me that shee had seene it transcribed into the Swedish tongue'. Letter, Dury to Hartlib, 14 May 1652. HP 4/2/19A. Hartlib probably circulated translations of these pamphlets around his circle, which would explain the existence of a German translation of *Free Ports* in the Hartlib papers. HP 31/23/32-5.

¹¹ *CSPD, 1652-3*, p. 395.

¹² K. Bottigheimer, *English Money and Irish Land. The 'Adventurers' in the Cromwellian Settlement of Ireland* (Oxford: Oxford U.P., 1971) p. 40.

this began in July 1653, when a committee of adventurers at Grocers' Hall in London began their lottery to determine the distribution of land.¹³ The principle that land confiscated from Catholic rebels should pay for re-conquest was extended to the military through in June 1653, allowing the arrears owed to members of the Irish army to be settled by land grants. On 26 September 1653, it was enacted that confiscated land was to satisfy these two debts, to be divided equally between soldiers and adventurers.¹⁴ Whereas the adventurers were to have considerable freedom in choosing how to measure and allocate their moiety, the army's share was under the supervision of the parliamentary commissioners, and the Act gave further instructions to this effect. Thus the commissioners were empowered to make 'a gross survey' of all available lands, prior to an 'exact and perfect survey and admeasurement', to be conducted by a surveyor-general.¹⁵ This officer was to oversee the measurement of all forfeited lands 'by their qualities, quantities, names, situation, parish or place ... with their meets and bounds, the bogs, woods, and barren mountains'. Worsley appears to have taken the post of surveyor-general in October 1653, enjoying a yearly salary of £400, half of which to be paid in lands.

Worsley held this post until January 1658. However, after December 1654 the land survey was effectively administered by Petty, although Worsley fought a war of attrition to maintain his influence.¹⁶ Petty was meticulous in documenting his administration of the survey, but this distorts our knowledge of the course of the survey under Worsley's stewardship, evidence for which is sparse, a problem exacerbated by

¹³ Petty, *History of the Cromwellian Survey*, pp. 368-370.

¹⁴ 'An Act for the Satisfaction of the Adventurers for Lands in Ireland, and of the Arrears due to the Soldiery', printed in *Ibid.*, pp. 353-368.

¹⁵ *Ibid.*, p. 370.

¹⁶ E. Strauss, *Sir William Petty. Portrait of a Genius* (London: Bodley Head, 1954) pp. 58-60.

confusion between the various 'gross', 'civil' and 'down' surveys. Undoubtedly Worsley faced a complex task: firstly it was necessary to determine the extent of confiscated lands available for allocation, which required intelligence from local inhabitants.¹⁷ Worsley's main task was to survey the soldier's lands, but it was necessary first to determine the total amount of forfeited land which would then be divided between the soldiers and adventurers. Only then could the more detailed survey commence, from which individual parcels of land would be allocated. Considerable difficulty arose from co-ordinating the different stages of survey, which was complicated by the need to settle the division as quickly as possible. The instructions which Worsley was following until April 1654 demonstrate only a partial awareness of these difficulties.¹⁸ The first step was to assemble a register of forfeited lands, which would be done by commissioners holding courts throughout the country. Following this there was to be a rough survey of forfeited lands 'mentioning only in gross' the contents of lands, which would then be sent to Worsley in Dublin, who would forward a copy to the adventurers at Grocers' Hall for their lottery. Meanwhile, the surveyor-general was to consider means to produce a 'gross survey', with 'less expence, and in a shorter time', postponing 'a more exact admeasurement' until the 'allotment of each person's respective proportion'.¹⁹

This emphasis on speed, in fact, led to the initial 'Gross Survey' being conducted even before proper information about forfeited estates had been gathered. Eventually this would be the subject of a separate survey, the 'Civil Survey' which was

¹⁷ Petty himself would complain about the complexity of the enterprise: Petty, *History of the Cromwellian Survey of Ireland*, pp. 119-125.

¹⁸ Printed in *Ibid.*, pp. 370-1. See Goblet, *La Transformation de la Géographie Politique de l'Irlande*, pp. 170-1.

¹⁹ Petty, *History of the Cromwellian Survey of Ireland*, p. 371.

undertaken from June 1654 to 1656. Petty would later complain about delays in being supplied with the 'terriers', the books of information about the proprietorial and economic status of individual baronies compiled from the Civil Survey, showing how reliant he was on this detailed source of local knowledge. The fact that Worsley's surveyors had to work without this information can explain much of the weaknesses of the Gross Survey, which was carried out from November 1653 to April 1654, and was intended both to gather information about confiscated lands and to estimate (but not accurately measure or map) their size.²⁰ Very little information survives of this stage of survey; a rare example suggests that it provided only minimal information.²¹ Unsurprisingly, it was soon recognised to be unsatisfactory, although a copy of the survey was sent to Grocers' Hall for the adventurers to use in their allocation.²² The original instructions had always envisaged a progression from the Gross Survey to a survey by admeasurement, but these problems hastened the demise of the former as it was realised that no division could take place on such inaccurate grounds.

On 14 April 1654 Worsley was given the order to terminate the Gross Survey and put the survey by measurement into action.²³ Over the following months he issued payments to the surveyors of the Gross Survey.²⁴ Goblet condemned this stage of the survey as a waste of money, but it is harsh to blame Worsley for its failings: he was

²⁰ R. Simmington, "Introduction" to *The Civil Survey AD 1654-1656* (Dublin: Irish MSS Commission, 1931) pp. iii-x; J.G. Simms, "The Civil Survey, 1654-6", *Irish Historical Studies*, Vol. IX, No. 35 (March 1955) pp. 257-261.

²¹ Printed in W.H. Hardinge, "On Manuscript Mapped and other Towndland Surveys in Ireland of a Public Character, embracing the Gross, Civil, and Down Surveys, from 1640 to 1688", *Transactions of the Royal Irish Academy: Antiquities*, 24 (1873) pp. 39-40. For the uncertain nature of the Gross Survey: Petty, *History of the Cromwellian Survey*, p. 313; Goblet, *La Transformation de la Géographie Politique de l'Irlande*, p. 171.

²² R. Dunlop (ed.) *Ireland Under the Commonwealth*, Vol. II (Manchester: Manchester U.P., 1913) pp. 510-511.

²³ *Ibid.*, pp. 418-9.

²⁴ Hardinge, "On Manuscript Mapped and other Townland Surveys", pp. 11-12; E. MacLysaght (ed.) "Commonwealth State Accounts 1653-56", *Analecta Hibernia*, No. 15 (Dublin: Irish MSS Commission, 1944) p. 246.

following flawed instructions, which Petty would probably have struggled with.²⁵ Worsley remained in control of the surveying process throughout spring 1654 as instructions for the next stage were drawn up, and indeed retained enough prestige to be granted state funds to pursue his revived saltpetre project in May.²⁶ Petty would wait for nearly 6 months after the termination of the Gross Survey to launch his attack, whilst Worsley was working with Petty's collaborators Sir Anthony Morgan and Miles Symner on drawing up plans for a new survey throughout the summer.²⁷ Petty was to reserve his criticisms for the survey that resulted from these deliberations, rather than for the Gross Survey.

If the nature of the Gross Survey is obscure, the survey by measurement which followed from May-September 1654 is even more so. It has been confused with the Civil Survey (which commenced in June 1654), but in fact they were two entirely different enterprises.²⁸ Following the Gross Survey it was decided to separate the jobs of reconnaissance and measurement, the former being conducted by commissioners gathering information in Courts of Survey from local inhabitants, which would then be used by the surveyors conducting the latter.²⁹ Worsley was to concentrate on organising the survey by measurement, which would provide detailed enough information to allow full allocation of the soldiers' lands, 'the exact and perfect admeasurement' envisaged in the Act of September 1653. Worsley was instrumental in ensuring that new

²⁵ Goblet, *La Transformation de la Géographie Politique de l'Irlande*, p. 173.

²⁶ See Chapter 5, below.

²⁷ Morgan chaired the Committee which issued instructions for Worsley's survey in May 1654. In June, Worsley and Symner had perused Strafford's survey of Tipperary in order to discern whether a re-survey was necessary, reporting that a new survey would be best. Petty, *History of the Cromwellian Survey*, pp. 6, 54-7.

²⁸ Goblet appears to make this mistake. *La Transformation de la Géographie Politique de l'Irlande*, pp. 173-180.

²⁹ Simmington, "Introduction", pp. viii-ix.

instructions were drawn up on 11 May 1654 by a special committee, which presented clearer rules for distinguishing between profitable and unprofitable lands.³⁰

It appears that Worsley administered a full measurement survey on these grounds for the next 4 months. Again, the evidence is scant, although it seems that several baronies in County Cork had been fully surveyed by the end of August.³¹ But the survey was halted prematurely in September when Petty launched his attack. Petty later claimed that before then he had tried to inform Worsley of the faults of his method of survey, only to be dismissed with 'contemptuous smiles'.³² To Goblet, Worsley's suspicions about Petty were paranoid delusions, but Petty was undoubtedly ambitious: he had already ruthlessly supplanted a fellow medical officer in the Irish administration, whilst he and Morgan were experimenting with surveying methods.³³ It also seems that their early rivalry as projectors had already developed into competition for political patronage, and shortly after arriving in Ireland, Petty complained to Hartlib that Worsley had 'done mee wrong by aspersing mee to Sir H. Vane, our frends at St Iames', although he added that the two were 'now very fairely vnited'.³⁴ However, Worsley's suspicions can hardly have been alleviated as Petty doggedly followed the progress of his survey throughout 1654.

³⁰ Although Petty argued that they were 'clogged with unnecessary instructions, things done *pro virili*', he did concede that they were superior to the previous ones. Petty, *History of the Cromwellian Survey*, p. 7.

³¹ Payment was issued to three surveyors for surveying these territories in that month. MacLysaght (ed.) "Commonwealth State Accounts", pp. 266-7.

³² Petty, *History of the Cromwellian Survey*, p. 3.

³³ Goblet, *La Transformation de la Géographie Politique de l'Irlande*, p. 218; Sharp, 'Sir William Petty', pp. 114-5, 119-122.

³⁴ Letter, Petty to Hartlib, 23 October 1653. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 23. Petty had been serving many prominent political figures as a physician immediately before leaving for Ireland, including Sir Henry Vane- Sharp, 'Sir William Petty', p. 91. Petty was still concerned that Worsley had succeeded in turning Lady Ranelagh against him by his 'heartburnings', in March 1653. Letter to Hartlib, 1 March 1653. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 24.

Petty's criticisms of the 'absurd and insignificant way of Surveying then carrying on by Mr *Worsly*' focussed mainly on weaknesses in organisation and payment.³⁵ By measuring the boundaries of estates only, the survey was 'a meer vitiating of the Countries estimate'; the 'Grossness' of the survey would make subdivision 'tedious and litigious' with most lands having to be re-surveyed, whilst the method of paying surveyors encouraged fraud.³⁶ The fact that these criticisms were accepted by the commissioners suggests that they were accurate, but by the time Petty repeated them in print in 1660 his 'vituperation for Worsley knew no bounds'.³⁷ Petty's description of Worsley's progress in Ireland should be understood in this light:

having been often frustrated as to his many severall great designes and undertakings in England, hoped to improve and repaire himselfe upon a less knowing and more credulous people. To this purpose he exchanged some dangerous opinions in religion for others more merchantable in Ireland, and carries also some magnifieing glasses, through which he shewed, *aux 'espirits mediocres*, his skill in severall arts, soe as at length he got credit to be employed in managing the Geometrical Survey of Ireland.³⁸

Some historians have been too ready to accept this caricature, and Petty's criticisms of Worsley's survey, uncritically.³⁹ In fact Petty had the advantage of being able to watch Worsley's progress from the sidelines and take note of his mistakes, whilst devising what would undoubtedly be a superior plan of action. Therefore even if Petty made no

³⁵ Petty, *Reflections*, p. 13.

³⁶ This was because the method of payment encouraged surveyors to falsely return unprofitable lands as profitable, because they were only paid for the latter despite in effect having to measure the former. *Ibid.*, pp. 13-14.

³⁷ Sharp, 'Sir William Petty', p. 121.

³⁸ Petty, *History of the Cromwellian Survey of Ireland*, p. 2.

³⁹ For example, Goblet portrayed the struggle between Worsley and Petty as the dark forces of superstition being overcome by the light of reason and the new science; he seemed irritated that Worsley 'the alchemist' could have been a correspondent of the future *Sceptical Chymist* Boyle. Goblet, *La Transformation de la Géographie Politique de l'Irlande*, pp. 215-216.

use at all of the actual results of Worsley's survey, he would have benefited from observing the difficulties it encountered.

No doubt Petty capitalised on this when, on 8 September 1654, he directed his concerns to a specially convened commission of officers, which reported in Petty's favour later in the month.⁴⁰ It was becoming increasingly likely that yet another survey would be necessary, and therefore Petty's offer to measure all lands 'according to naturall, artificiall, and civill bounds', by October 1655, was welcomed.⁴¹ Throughout September Worsley engaged in a counter-attack- he 'secretly laboures with severall of the chief officers of the army, and particularly Sir Charles Coote, and such of the members of the councill as he has most interest with, to obstruct the further consideration of the Drs proposalls'.⁴² However Coote, a leading figure amongst the Old Protestants, soon switched his allegiance to Petty, helping his proposals to be accepted on 27 October, when it was agreed that Petty would perform an exact survey of lands in their smallest denominations, paid by acre and employing his own surveyors.⁴³ What had begun as a state-controlled enterprise was therefore to be contracted out to a private individual, who promised to save time as well as public funds, but who would make huge profits from doing so.

The huge wealth and estates that Petty acquired from the Down Survey would attract suspicion throughout the decade, culminating in an attempt to impeach him for corruption. Probably Petty was innocent of this, but the protest of Worsley's surveyors at being 'disposed to the insatiable desire of a covetous monopoler' shows their unease

⁴⁰ Petty, *History of the Cromwellian Survey of Ireland*, pp. 4, 8-10.

⁴¹ *Ibid.*, p. 9.

⁴² *Ibid.*, p. 10.

⁴³ *Ibid.*, pp. 13-14.

at a private individual profiting from this public business.⁴⁴ Petty himself did little to avoid these criticisms: at the same time as he was negotiating his contract, he made an agreement with one of the officers responsible for deciding in his favour, Sir Hardress Waller, who would take a share of the profits for helping in the surveying of Munster, leading to accusations of bribery.⁴⁵ Similarly, as a private individual Petty was not bound by the same rule which forbade the surveyor-general from purchasing the soldiers' land-debentures, which Petty exploited adroitly.⁴⁶ Much of his wealth, however, was gained by skilful utilization of the terms of his contract, settled on 11 December 1654, by which Worsley and Petty agreed that the latter would perform an accurate survey of within 13 months.⁴⁷ Having had to perform the humiliating task of writing to his surveyors to discontinue their work, Worsley then drew up the instructions for his replacement, marking the beginning of the Down Survey.⁴⁸

This survey is justly famous as a landmark in geography, the maps that Petty produced from it providing a lasting and remarkably accurate record. Most innovative was Petty's administration of the survey, involving a division of labour allowing him to deploy numerous hands without relying exclusively on professionally trained surveyors.⁴⁹ Although there is no doubt that Petty had rescued what was looking likely to have been a long-drawn out and expensive process, we can conclude in Worsley's defence that he was acting under imprecise orders and facing a great deal of pressure to

⁴⁴ *Ibid.*, p. 19.

⁴⁵ *Ibid.*, pp. 32-34.

⁴⁶ Employees of the survey were expressly forbidden from purchasing land to be surveyed by the Act setting up the office, of September 1653. *Ibid.*, pp. 353-568.

⁴⁷ *Ibid.*, pp. 23-29.

⁴⁸ *Ibid.*, pp. 36-38. Larcom saw these instructions as carefully considered, showing that Worsley was more competent than Petty allowed (*Ibid.*, p. 320), although Goblet refuted this (*La Transformation de la Géographie Politique de l'Irlande*, p. 215).

⁴⁹ On Petty's method of administering the survey, Petty, *History of the Cromwellian Survey of Ireland*, pp. xiv-xvi, 322-3; Barnard, *Cromwellian Ireland*, pp. 226-229; Strauss, *Sir William Petty*, pp. 67-73; Sharp, 'Sir William Petty', pp. 126-133.

produce a rapid survey, without the benefit of the Civil Survey; more positively, he had been instrumental in instituting the first major revision of the survey in spring 1654, whilst his stage of the surveying process was a necessary preliminary to Petty's greater achievements, even if only by exposing problems that the venture would face.

Petty completed his survey by March 1656. He initially faced intractable opposition from the surveyor-general, but over the course of 1655 an uneasy truce emerged between the two men.⁵⁰ As surveyor-general Worsley still had a role in co-ordinating the surveying process, seemingly necessitating a degree of co-operation: by October 1655 Petty claimed to Hartlib that 'There is not that Distance between us that you may imagine'.⁵¹ Furthermore, Worsley had the chance to repair some of his damaged reputation by being appointed to several administrative committees: hearing complaints from the adventurers and the army, letting out houses and lands owned by the Commonwealth, and regulating Dublin schools, for example.⁵² These seem to have busied Worsley enough to allow Petty to get on with the Down Survey relatively unhindered, at least until 1656.

The occasion was Petty's attempt to submit the final draft of the Survey, which reawakened Worsley's animosity. Of course Worsley's professional pride was at stake, but by then the conflict between the two had become enmeshed with an increasingly factionalised political situation. The main cause of the politicisation of the Down Survey was the problem of the presence of a large army in Ireland, which was in the process of demobilisation. The army officers had already begun to pressure Petty into

⁵⁰ On Worsley's obstructions, Petty, *History of the Cromwellian Survey of Ireland*, pp. 43-44.

⁵¹ Letter, Petty to Hartlib, 17 October 1655. HP: The James Marshal and Marie-Louise Osborn Collection, Beinecke Rare Book and Manuscript Library, Yale University. Document 28.

⁵² Dunlop, *Ireland Under the Commonwealth*, II, pp. 487, 529, 538-9; T. Corcoran (ed.) *State Policy in Irish Education AD 1536 to 1816* (Dublin, 1916) p. 76.

finishing the survey, in July 1655.⁵³ At that point they were merely impatient to get hold of their promised lands, but by the following year Petty's survey was subject to criticisms for political reasons. In the intervening period, Henry Cromwell, son of the Protector, had arrived in Dublin as commander of the Irish army, whilst the lord deputy Fleetwood had returned to England.⁵⁴ Under Fleetwood, the army in Ireland had been the dominant political force, leading to resentment amongst the existing Protestant settlers in Ireland, the Old Protestants.⁵⁵ This was exacerbated by the rise of Baptism within the army, which disturbed the religious sensibilities of the latter but which Fleetwood was reluctant to suppress.⁵⁶ As well as dividing the Protestant interest in Ireland, this development was alarming to Oliver Cromwell because several of the leading Baptist officers were also hostile to the Protectorate.⁵⁷ Henry Cromwell had been sent to Ireland to counter this, but although Fleetwood left Ireland, he remained 'a convenient and dangerous focus for Henry Cromwell's opponents'.⁵⁸ Cromwell increasingly favoured the Old Protestants, laying 'the foundation of the Protestant "ascendancy" over Irish land and politics', but this attracted considerable opposition against both him and his allies, the most notable of whom being Lord Broghill (Robert Boyle's elder brother), and William Petty, a trusted advisor who became his secretary in 1658- 'politiques who shared his approach'.⁵⁹

In early 1656, when Petty was seeking to have the Down Survey accepted, this opposition was at its height, and the land settlement was one theatre of conflict. It was

⁵³ Petty, *History of the Cromwellian Survey of Ireland*, pp. 66-67.

⁵⁴ Barnard, *Cromwellian Ireland*, p. 20.

⁵⁵ T. Barnard, "Planters and Policies in Cromwellian Ireland", *Past and Present*, 61 (1973) p. 42.

⁵⁶ Barnard, *Cromwellian Ireland*, pp. 98-106; P. Kilroy, "Radical Religion in Ireland", in *Ireland from Independence to Occupation 1641-1660*, ed. J. Ohlmeyer (Cambridge: Cambridge U.P., 1995) pp. 201-217.

⁵⁷ Barnard, *Cromwellian Ireland*, p. 105.

⁵⁸ *Ibid.*, p. 21.

⁵⁹ Barnard, "Planters and Policies", pp. 31, 45.

then that Worsley began to ally with Petty's most intractable opponent amongst the Baptist officers, Sir Hierome Sankey. Sankey would lead the attempt to impeach Petty in 1659, and had already figured prominently in army discontent about the delay in payment, in the previous summer.⁶⁰ Petty was wary of an alliance between Worsley and Sankey, writing to his brother on 6 March 1656 that they were 'all at work' against him.⁶¹ Petty must have been relieved, then, when on 11 March 1656 Worsley and Sankey were excluded from the committee which had been considering his survey, leaving it dominated by Petty's allies. However, Worsley was presented with another opportunity in May when he was called on to formally examine the Survey.⁶² He eventually reported on 18 August 1656, a month late, summoning the remnants of his influence to launch an attack on the standards of the Down Survey.⁶³ Thus Worsley cited numerous minor instances of negligence, for example where lands were not measured in their lowest denominations or where profitable and unprofitable lands had not been distinguished. Although the survey committee accepted Petty's answers, Worsley had nonetheless prevented him from finishing his work by several months. Meanwhile, Petty's opponents had been stoking up objections amongst the soldiers who were finally beginning to be granted their estates, which inevitably provoked some complaints.⁶⁴ This was an uncomfortable situation for Petty, but his supporters amongst the soldiery ensured that his name was put forward to the Irish Council as a trustee to oversee distribution of their lands.⁶⁵ The creation of a commission comprising Petty,

⁶⁰ Barnard, *Cromwellian Ireland*, p. 232. On Sankey, A. Shirren, "Colonel Zanchy" and Charles Fleetwood", *Notes and Queries*, Vol. CXCVIII (Jan.-Dec. 1653) pp. 431-5, 474-7, 519-24; Petty, *History of the Cromwellian Survey of Ireland*, pp. 78-79.

⁶¹ Petty also named one of his surveyors, John Humphreys, as an ally of Sankey and Worsley. Letter, William to John Petty, 6 March 1656. BL Add. MS 72850, fol. 1r.

⁶² Petty, *History of the Cromwellian Survey of Ireland*, pp. 111-112.

⁶³ *Ibid.*, pp. 111-115.

⁶⁴ *Ibid.*, pp. 80-102.

⁶⁵ *Ibid.*, pp. 85-7.

Vincent Gookin and Miles Symner put this process firmly in the hands of Henry Cromwell's supporters, but Cromwell was not yet in absolute control and thus, when the Council ordered that the Down Survey be extended to the adventurers' lands, this was jointly entrusted to Worsley and Petty (on 3 September 1656).⁶⁶

The adventurers at Grocers' Hall in London had already begun a disorganised allocation of lands based on the Gross Survey, which was causing much argument. Accordingly, Worsley was sent over in October to negotiate with the adventurers, and Petty exploited his rival's absence to secure his payment and amass the majority of his estates.⁶⁷ However, far from rushing to get back to Ireland, Worsley deliberately sought to extend his visit to London. Oddly, he enlisted the help of Petty's ally Vincent Gookin to write to the Protector and his secretary Thurloe 'to dispense with his longer stay'.⁶⁸ His extended visit gave Worsley the chance to renew his acquaintance with members of the Hartlib circle, whilst he claimed in a letter to Henry Cromwell that the continued divisions amongst the adventurers were preventing his return to Dublin.⁶⁹ However, Worsley had another reason not to return, as he explained to Cromwell: 2 ½ years previously he had been granted the estate of one Gerard FitzGyrald in Queens County, but on an insecure lease. Fearing that 'this may be Prised away from me', Worsley explained that without his estate 'I have really very little my Lord that I can propound to my selfe in Ireland'.⁷⁰ He clearly had no intention of returning back to Ireland unless his lands were confirmed.

⁶⁶ Ibid., pp. 184-5, 390-392.

⁶⁷ Ibid., pp. 126-7, 155, 211-214.

⁶⁸ Letter, Vincent Gookin to John Thurloe, 3 February 1657, in T. Birch (ed.) *A Collection of the State Papers of John Thurloe*, vol. 6 (London, 1742) p. 37.

⁶⁹ Letter, Worsley to Henry Cromwell, 17 March 1657. BL Lansdowne MS 821, fol. 352r.

⁷⁰ Ibid., fol. 352v.

This petition was evidently successful, for in 1657 Worsley was granted a 21-year lease of these lands as arrears for payment as surveyor-general.⁷¹ Meanwhile the matter of the adventurers' lands was the subject of an Act dated 9 June 1657 which provided for a re-survey. Fearing that he would be replaced as surveyor-general, Worsley enlisted the help of Lady Ranelagh and Robert Boyle, who apparently used their influence with Broghill to prevent this from happening.⁷² This only delayed the inevitable, however: Henry Cromwell's grip on power was strengthened when he became lord deputy in November 1657, and the following January Worsley was replaced by Vincent Gookin as surveyor-general.⁷³ Following the Restoration, when he was keen to show his opposition to Oliver Cromwell, Worsley explained that 'upon *the* passing of *the* Petition and Advise I declared so much dissatisfaction as that upon his sonnes being made Deputy of Ireland ... my place of surveyor generall was given to another privattly, without any Exception brought against me, or any knowledge had of it by *the* Councill'.⁷⁴ Worsley still had some support amongst the regime, therefore, but when he returned to Ireland at the end of July 1657, he had lost much of his influence, although he still had a sting in his tail, as Petty would find out.⁷⁵

The estate Worsley acquired in Queens County was in the village of Tymogue, in the barony of Stradbally, conveniently located near to Dublin, allowing him to fulfil his official capacity whilst enjoying something of the life of a landowner.⁷⁶ His property

⁷¹ *CSPI, 1663-5*, p. 472.

⁷² See Ranelagh's letter to Boyle, whereby she requested that he be 'Mr Worsley's advocate to Broghill' in the matter: 5 June 1657. Printed in Boyle: *Correspondence*, Vol. 1, p. 216.

⁷³ T. Barnard, "Lord Broghill, Vincent Gookin and the Cork elections of 1659", *The English Historical Review*, Vol. 88, No. 347 (Apr., 1973) p. 357. On Cromwell's replacement of Fleetwood, Barnard, *Cromwellian Ireland*, pp. 21-22.

⁷⁴ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300v.

⁷⁵ Worsley was still in touch with his ally, and Petty's enemy, Sankey, during his long stay in London. On 30 May 1657 both he and Sankey were deponents in a Chancery suit regarding a dispute about lands in the barony of Goran, county Kilkenny, supporting the claims of one Sir John Burlace against Isaak Troughton. PRO C 24/812, part 2.

⁷⁶ S. Pender (ed.) *A Census of Ireland, Circa 1659* (Dublin: Irish Manuscripts Commission, 1939) p. 504.

was extended during his return to London in October 1656, when Worsley married.⁷⁷ His wife was Lucy Cary, the daughter of a Dartmouth merchant whose family had invested much money in the Irish adventure.⁷⁸ By marriage, Worsley acquired land in the parish of Churchtown in Rathconrath, County Westmeath.⁷⁹ In addition, Petty alleged that Worsley had unjustly acquired an estate in Balleen in the barony of Galmoy, County Kilkenny, and had also attempted to persuade Petty to withhold a nearby parcel of land from the army's moiety for him, in Clontubbrid.⁸⁰ These accusations of corruption were intended to deflect attention from those made against Petty, and there is no additional evidence to support them. However, it does seem that during his time as surveyor-general, Worsley was acquiring land throughout Leinster.

Worsley's estates provided a retreat from Dublin, where he could conduct those experiments and trials in 'agricultural chemistry' which formed the basis of his natural philosophy.⁸¹ In doing so he participated in the 'planting' of Ireland, a colonial endeavour by which English Protestants sought to demonstrate their superiority over the Irish Catholics as the bringers of prosperity and godliness to a godforsaken wilderness.⁸² Such claims to cultural dominance found their intellectual corollary in the Hartlib circle's proposals for improving Ireland, epitomised by Gerard Boate's *Irelands Natural*

⁷⁷ The wedding took place at the Church of St. Mary's in Aldermary, on 9 November. J.S. Chester (ed.) "The Parish Registers of St Mary Aldermary, London, 1558-1751", *Harleian Society Register*, Vol. 5 (London, 1880) p. 26. The following March, bans were published for the marriage in the parish of St Olaves, Hart Street. W. Bannerman (ed.) "Registers of St. Olave, Hart Street, London, 1563-1700", *Harleian Society Registers*, Vol. 46 (London, 1916) p. 274.

⁷⁸ Lucy Cary's name is given in Worsley's entry in the London Visitation of 1664: *Harleian Society Publications*, Vol. XCII (1940) p. 154. A total of 143 citizens of Dartmouth had originally invested £2,398 but only 44 were eventually granted land, and the Cary family including Lucy were particularly active in buying up shares. Bottigheimer, *English Money and Irish Land*, p. 158. *CSPI: Adventurers, 1642-1659*, pp. 255-256.

⁷⁹ Pender (ed.) *Census of Ireland*, p. 521.

⁸⁰ Petty, *Reflections*, pp. 27, 32.

⁸¹ See chapter 5, below.

⁸² See N. Canny, *Making Ireland British 1580-1650* (Oxford: Oxford U.P., 2001).

History.⁸³ Worsley's attitude was typically dismissive of the local population: in his letter to Henry Cromwell, he described how he had found his estate 'wholly waste; and without any Tennant save a very few Cabbins of Irish', who he preceded to 'turne off' before putting in 'a Plough, and some little stocke'.⁸⁴ However, English attitudes to the Irish varied- the newer influx of settlers tended to harbour more extreme utopian (or distopian?) aspirations to reshape Irish society than the Old Protestants who preferred the status quo (although they happily acquired land from expelled Catholics). These conflicting attitudes surfaced most sharply over the transplantation to Connaught, which Worsley claimed to have supported 'with that vigour on *the* behalfe & for *the* security of *the* English Plantations There'.⁸⁵ By then he had been made a Justice of the Peace, and came into conflict with leading Old Protestants, notably Sir Charles Coote, whom he alleged had protected several of the Irish and thus became his 'Avowed and professed Adversary'; on his part, Worsley claimed to have brought several 'Tories' to 'Trayall; ... when some other of the Justices of the peace ... would scarce be seene in it'.⁸⁶ Thus he shared the attitude of the army radicals towards the Irish, although like most of them, Worsley failed to lay down deep roots in Ireland, and left the nation for good in 1659. The colonial 'expert' proved to have little capability in the actual business of colonisation.

⁸³ T. Barnard, "The Hartlib circle and the cult and culture of improvement in Ireland" in *SHUR*, pp. 281-297; P. Coughlan, "Natural history and historical nature: the project for a natural history of Ireland", *Ibid.*, pp. 298-317.

⁸⁴ Letter, Worsley to Henry Cromwell, 17 March 1657. BL Lansdowne MS 821, fol. 352v.

⁸⁵ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300v. For the objections of one of Petty's allies to the transplantation, P. Coughlan, "Counter-Currents in colonial discourse: the political thought of Vincent and Daniel Gookin", in *Political Thought in Seventeenth-Century Ireland. Kingdom or Colony*, ed. J. Ohlmeyer (Cambridge: Cambridge U.P., 2000) pp. 56-82.

⁸⁶ Letter, Worsley to Lady Clarendon, 8 November 1661. Bodleian Library, Clarendon MS 75, fol. 300v. Worsley was keen to remind the Irish Council of 'care for clearing the country of Tories and other dangerous persons' in 1659. Dunlop, *Ireland Under the Commonwealth*, II, p. 692.

If for Worsley the 1650's was a decade of professional disappointment, for those who had supported parliament in the Civil War it was one of bewildering political shifts and, ultimately, disillusion. Worsley was by no means unusual, therefore, when he reflected on the unexpected obstacles facing the godly in 'the choice of our happinesse' in a letter to an unnamed Lady, dated 24 September 1654.⁸⁷ Doubtless Worsley was still reeling from Petty's assault earlier in the month, but his sense of anxiety was exacerbated by an uncertain political climate. He first found prominence under the Rump Parliament, but since its dismissal in April 1653 there had followed the brief rule of Barebones Parliament and then the proclamation of Cromwell as Lord Protector in December 1653; as he wrote, the Protector's first, toothless, parliament was sitting.⁸⁸ Worsley purported to be baffled by 'the changeableness of things', leading him to question his political assumptions:

For though wee were at length convinced there was much willfullnesse arbitrarinesse Injustice, tyranny, partiality, favour oppression in a king. Yet a *Parliament* how glorious did wee call that Institution; how full, how comprehensive, for power, for wisdom, for authority, & all things requisite to make up A Government It was therefore fitt by so long a continuance of one *Parliament* & the issue of *that* together with the quicke succession & transactings of 2. more. That wee should experimentally see, *that* in *Parliament* may bee selvisshnesse, partiality, height of oppression, vnmercifullnesse, folly & weakenesse, both in Counsell, authority & power.⁸⁹

Perhaps his own personal setbacks contributed to this pessimistic assessment of politics under the Protectorate, but many others had viewed the foundation of this regime as a

⁸⁷ Letter, Worsley to [the Countess of Leicester?] 27 September 1654. HP 65/15/1A. This letter is discussed in J. Scott, *England's Troubles. Seventeenth-Century Political Instability in European Context* (Cambridge: Cambridge U.P., 2000) p. 243.

⁸⁸ See A. Woolrych, *Britain in Revolution 1625-1660* (Oxford: Oxford U.P., 2002) pp. 601-615; I. Roots, "Cromwell's Ordinances: The Early Legislation of the Protectorate", in *The Interregnum*, ed. G. Aylmer, pp. 143-164.

⁸⁹ Letter, Worsley to [the Countess of Leicester?] 27 September 1654. HP 65/15/2B.

betrayal of the parliamentary cause. In the light of these confusions, Worsley had been moved to look more deeply at ‘the Principles & foundation of Government ... both from scripture & reason’, but this brought little comfort.⁹⁰ All Worsley could discern was ‘A cleare & wide difference between *the* ends of Government & *the* manner of administration & execution of those ends’. These ends were ‘alwaies one & necessary’, but there was no ‘Rule, Law or Prescript either in scripture or in nature’ for any particular form of government.⁹¹ Such a disdain for formality in politics as in religion was a conspicuous feature of the English Revolution, but for Worsley this was based on an understanding of the determining force of power, and not principle, in human affairs.⁹² The forms of government throughout the ages, he explained, emanated from ‘*the* sole free & arbitrary pleasure of such who laying hold vpon *the* opportunities offered them haue in all ages, seized & assumed *the* Government’, so:

That *the* formes of Government were all a long in all ages imposed vpon *the* people with more & lesse of Power from & by *which* they received their essence: though offered vnder other consideration. That vnder all formes as well *the* more eminent as *the* more subordinate Ministers were constrained to Act according to *the* mind & intention of those who first calculated & produced *that* forme. And therefore noe new thing.⁹³

Government was beset by ‘vnaoideable & almost necessary Tendencies to be corrupted’, and the only hope was that it might be exercised by those who held the best ‘qualifications & fitnessse’, although even these were prone to ‘*the* temptation of power’.⁹⁴ This somewhat Machiavellian perspective informed Worsley’s judgement of both the Barebone’s Parliament (which owed its existence to Cromwell and therefore

⁹⁰ Ibid., HP 65/15/2B-3A.

⁹¹ Ibid., HP 65/15/3A.

⁹² J.C. Davis, “Against Formality: One Aspect of the Puritan Revolution”, *Transactions of the Royal Historical Society*, 6th series, 3 (1993) pp. 265-288.

⁹³ Letter, Worsley to [the Countess of Leicester?], 27 September 1654. HP 65/15/3B.

⁹⁴ Ibid., HP 65/15/3B-4A.

was 'irrationall & absurd' to challenge him) and the current one, 'seing *what* they can doe for *the* people doth not at all appeare'.⁹⁵ England under the Protector had yet to emerge from that spiritual darkness which Worsley had described in the preface to *The Advocate*, and he was left wondering 'how ill ... it testifies our beleefe of *the* Lords coming'.⁹⁶

Generally, Worsley's allegiances lay with a strong state, which might take precedent over individual liberties: already in 1647 he had written a letter 'concerning the Intereste of the People' (now lost), and Culpeper considered that whilst 'hee hathe moste excellently described the Intereste', he was less successful in demonstrating 'the Peoples title to it'.⁹⁷ To Worsley, power dominated politics, but only in the 1650's, when he found himself out of sympathy with the ruling regime, did this become problematic. But if he was sceptical about the course of political affairs, this was not outright opposition, and he would successively serve the Long Parliament, the Rump, Barebones, the Protectorate, the restored Rump, and the army-backed regime that expelled it, before eventually resurfacing under Charles II.

Worsley's loyalties, if he had any, were split in the 1650's. We have already seen that he continued to rely on his friendship with Robert Boyle and Lady Ranalegh, members of a leading Old Protestant family, even as he was moving towards opposition to Henry Cromwell.⁹⁸ His willingness to cross political boundaries is shown by the help

⁹⁵ Ibid., HP 65/15/4A-B.

⁹⁶ Ibid., HP 65/15/4B.

⁹⁷ Letter, Culpeper to Hartlib, 10 November 1647. Culpeper: *Letters*, p. 311. One political theorist particularly well represented in Worsley's library was Thomas Hobbes, who perhaps influenced his perspective. William Rand certainly thought that Worsley might find some things to his 'palate' in *Leviathan*, although he recognized too that other parts would 'procure a gentle vomit, where *the* contemplation of royall majesty had dazeld *the* good Gentlemans senses'. Letter, Rand to Worsley, 11 August 1651. HP 62/21/1A.

⁹⁸ For evidence that Worsley was on good terms with Old Protestants such as Sir John Clotworthy and Sir William Parsons in 1653, see a letter, possibly to Lady Ranelagh, 29 July 1653. BL Add. MS 4106, fol. 224-5. This was written shortly after his return to Dublin that summer; it appears that he had been entrusted with the son of Dury's wife, Dorothy- Charles Moore- who had proved to be something of a

he gave to no less a figure than the wife of Duke of Ormond, in retaining her Irish estates (in 1655).⁹⁹ Meanwhile many members of the Hartlib circle, notably Dury and Hartlib, were committed to the Protectorate and to Cromwell, a long-standing patron whom they hoped would reunite the Protestant cause at home and abroad. A division threatened to open between Worsley and his former allies, therefore, but both seemed willing to avoid controversy in the interests of preserving unity.¹⁰⁰ Worsley's standing was not so great that he had to take sides publicly, allowing him to oscillate between various groups, as when he acted, in 1655, as a go-between for Fleetwood and Colonel Edmund Ludlow, by then an enemy of the Protectorate.¹⁰¹ Another 'Commonwealthman' whom Worsley seems to have retained some loyalty for was the former chairman of the Council of Trade, Sir Henry Vane, whose mystical religious digressions combined with a steadfast commitment to the 'Good Old Cause' marked him as a figurehead of opposition to Cromwell.¹⁰² Years later, Petty explained that the enmity between he and Worsley arose because 'I was for a single person, he for an other forme, or for *the* single person Sir Hen: Vane'.¹⁰³ In early 1656, Worsley drafted a discourse responding to Vane's controversial spiritual reflections, *A Retired Man's Meditations*, and Dury cautioned Worsley to 'walke very warily in giuing it'.¹⁰⁴ Worsley was certainly associated with Vane during the turmoil that followed Cromwell's death.

handful. Worsley therefore committed him to the recipient, offering 'the direction of the Lord in your preserving him, and attoning him to his mother'.

⁹⁹ HMC, *Ormond*, Vol. 1 (London, 1902) p. 322.

¹⁰⁰ It is perhaps telling that the scribe had noted the words 'R.W's canting letter' on Hartlib's copy of the letter discussed above. Letter, Worsley to [the Countess of Leicester?] 27 September 1654. HP 65/15/4B.

¹⁰¹ *The Memoirs of Edmund Ludlow 1625-72*, ed. C.H. Firth, Vol. 1 (Oxford, 1894) p. 408.

¹⁰² For Vane's politics, see for example R. Mayers, "Real and Practicable, not Imaginary and Notional: Sir Henry Vane, *A Healing Question*, and the Problems of the Protectorate", *Albion*, 27, 4 (1995) pp. 37-72; D. Parnham, "Politics Spun out of Theology and Prophecy: Sir Henry Vane on the Spiritual Environment of Public Power", *History of Political Thought*, Vol. XXII, 1 (2001) pp. 53-83.

¹⁰³ Letter, Petty to Mr Tomkins, 7 December 1672. BL Add. MS 72858, fol. 57v.

¹⁰⁴ Letter, Dury to Hartlib, 22 January 1656. HP 4/3/147A.

As well as these groups, during the 1650's Worsley was exposed to the influence of the army, and in particular Baptist officers. Religiously, this was already apparent in the letter discussed above, when Worsley prefaced his discussion of the uncertain state of English politics with a similarly questioning diagnosis of mankind's spiritual condition. Truth, he explained, was obstructed by custom, and man's perceptions were

like seing of things thorough water or any other cleare & transparent medium; through *which the* light coming refracted to us, though wee see with much clearnesse every thing yet they are in an Inverse posture to us, to *what* they are in themselves; & so is *the* truth of all things to our naturall vnderstandings as long as we are induced to judge of them by *the* dictates of sense. And how few are brought into a higher light. How hard to get *ourselves* above this earth, & *the* corrupt manners & customes of it they can best tell, (& how best also to pittie others) who lye most vnder *the* Burthen of it.¹⁰⁵

Worsley would return to this epistemological problem- how to discern God's truth when it comes refracted through custom and the fallen senses- again. Typically, Worsley veered between confidence- that '*the* Lord hath beene pleased to discover himselfe more neerely to me then ever'- and crippling doubt- that 'it is by our Pride only ... & our indulging of it: That wee are kept from discerning him'.¹⁰⁶ Fearing that 'custome doth soe prevail over mee', Worsley found his tongue 'faltering & stammering' from proclaiming the truth, 'that *the* Lord is in us'- words that would have struck a chord with the Quakers who would shortly arrive in Ireland.¹⁰⁷

The original copy of this letter is now held as part of the Sidney family manuscripts, calendared as being written to the wife of Sir Philip Sidney, Dorothy Sidney, the Countess of Leicester, and although it is hard to see how Worsley would have been acquainted with her the letter certainly has some of the neo-Platonic tinge

¹⁰⁵ Letter, Worsley to [the Countess of Leicester?] 27 September 1654. HP 65/15/1A.

¹⁰⁶ Ibid., HP 65/15/1B.

¹⁰⁷ Ibid., HP 65/15/2A.

associated with that family.¹⁰⁸ We have already seen Worsley's name connected with the elder son of the family, Philip Sidney, Viscount Lisle, but the letter is perhaps more reminiscent of his brother, Sir Algernon Sidney- another supporter of Sir Henry Vane- whose political thought blended 'extreme relativism and scepticism about the variety and mutability of particular worldly things, with an emphasis on a small core of immutable moral values standing outside this changeability, represented by the law of nature, discernible by reason, and anchored finally in the only perfect and unchangeable being: God'.¹⁰⁹ But whilst Sidney sought to translate these eternal values into political practice, believing that they could be preserved by republican virtue, for Worsley religious truths needed to be protected from the corrupting force of politics. Increasingly throughout the 1650's, in order to reach the 'higher light' of God's truth, Worsley looked not outwards to public affairs, which offered only personal disappointment and disillusion, but inwards to the spirit. This would eventually lead him to make some religiously unorthodox claims, but paradoxically Worsley's digression into the spiritual began with the scientific.

¹⁰⁸ HMC, *Dudley and de L'Isle*, Vol. VI. (London, 1966) pp. 496-8.

¹⁰⁹ J. Scott, *Algernon Sidney and the English Republic, 1623-1677* (Cambridge: Cambridge U.P., 1988) p. 17. The Sidney family had long-standing connections with Ireland, and both Philip and Algernon served in the Irish army in the early 1640's when Worsley was surgeon-general. *Ibid.*, p. 82.

5. 'The Vanity of an Impostor'.

Benjamin Worsley's Natural Philosophy in the 1650's.

On 8 May 1654, Benjamin Worsley was granted £250 by the Irish Council in Dublin, allowing him to conduct a trial in the production of saltpetre, in return for eventually supplying the army with a total of 10,000 lb.¹ In Part One, we saw that Worsley had left his first career as a surgeon to undertake various 'projects' which, he hoped, would establish him financially and intellectually, beginning with saltpetre. Although he had little success, his interest in natural philosophy remained, and during his visit to Amsterdam from 1648-9 he was practising science on a fairly intensive level. Although his ambitions to master alchemical techniques from Glauber were frustrated, Worsley had learned enough of the 'chemical philosophy' to harbour aspirations to complete his training as an adept. Thus, despite spending much of the 1650's in full-time state employment, Worsley still had the potential to return to the pursuit of science. In 1654, thanks to state sponsorship, this possibility seemed about to be realised.

However, Worsley's reputation as a scientist fared little better than his professional career in Ireland, and by the time of the founding of the Royal Society in 1660 he was a marginal figure within the scientific community. Partly status and political reputation ensured that he did not join several members of the Hartlib circle on this institution, but neither had Worsley successfully fashioned a secure scientific identity which would allow him to participate in Restoration science. In the intervening years, Robert Boyle had cultivated his intellectual standing, eventually assuming the

¹ This sum comprised £50 payment and an advance of £200. E. MacLysaght (ed.) "Commonwealth State Accounts", *Analecta Hibernica*, 15 (Dublin: Irish MSS Commission, 1944) p. 249.

public face of English experimental natural philosophy. Whereas his scientific interaction with Worsley in the 1640's was apparently confined to fairly low-level experimentation, over the next decade Boyle was conducting increasingly sophisticated experiments, most famously in the rich intellectual environment of Oxford from 1655 onwards.² Even before then, in London, Boyle's experimental sophistication was growing in an area of scientific practice long excluded from the official story of the 'scientific revolution': alchemy. Thanks especially to the works of William Newman and Lawrence Principe, we now know much about intensive laboratory experimentation involved in alchemy, as the composition of metals and other bodies was scrutinised.³ In the early 1650's Boyle was being tutored in this pursuit by the American alchemist George Starkey.⁴ Along with other figures such as Hartlib's son-in-law Frederick Clodius, these would form the chemical centre of the Hartlib circle.⁵ Boyle participated in two scientific centres in the 1650's, therefore, but Worsley was far removed from both, and struggled to maintain the credit of his ideas in front of more serious practitioners.

As Barnard has shown, Ireland did see a growth in scientific interest in these years, but this was mainly associated with William Petty's circle. Robert Child arrived in northern Ireland in 1651 and later corresponded with Worsley, but he died in 1654.⁶ Boyle visited Ireland during 1652-1654 and was apparently in touch with Worsley

² For this environment, see R.G. Frank, *Harvey and the Oxford Physiologists: a Study of Scientific Ideas and Social Interaction* (Berkeley and Los Angeles: University of California Press, 1980).

³ Newman & Principe, *Alchemy Tried in the Fire*; Newman, *Gehennical Fire*; L. Principe, *The Aspiring Adept. Robert Boyle and his Alchemical Quest* (Princeton: Princeton U.P., 1998); L. Principe & W. Newman, "Some Problems with the Historiography of Alchemy", in *Secrets of Nature: Astrology and Alchemy in Early Modern Europe*, ed. W. Newman & A. Grafton (Cambridge, Mass: MIT Press, 2001) pp. 385-431.

⁴ Newman & Principe, *Alchemy Tried in the Fire*, pp. 213-236.

⁵ Along with Sir Kenelm Digby, Clodius and Boyle were part of the so-called 'Chemical Council', although evidence for this putative body is even more sparse than for the Invisible College. *Ibid.*, p. 259.

⁶ See, for example, his letters to Hartlib, 9 October 1652, HP 15/5/18-19; 23 November 1652, HP 15/5/16-17; 8 April 1653, HP 15/5/20-21; 28 October 1653, HP 15/5/24-25.

towards the end of his visit.⁷ At this point Hartlib enlisted Worsley into his efforts to complete the natural history of Ireland, which he hoped would be assisted by the land survey.⁸ However, the Worsley-Petty schism undoubtedly hindered Hartlib's efforts. Child reported in October 1653 that the two were 'about a physick garden', but this concord did not last long.⁹ Worsley continued to pursue agricultural research on his estate, where he claimed to have planted 'above a thousand young setts of Roses', hoping to become 'the Greatest Master of them of any Man in this Countrey'.¹⁰ However, now his associates were members of the army rather than intellectuals. On Culpeper's recommendation he and his army associates planted clover-grass seed, but without success- 'and my friends here have sufficiently abused me for it'.¹¹ On being told of this by Hartlib three years later, Robert Wood testified that he had been informed by Miles Symner that although Worsley 'was very earnest about it at first, yet afterwards he scarce ever tooke any care thereof'.¹² Both Wood and Symner were friends of Petty, but Worsley himself frequently complained that his public responsibilities were hindering his scientific efforts.¹³ Such obstacles severely limited his capacity to fulfil his ambitions, but nonetheless Worsley's scientific writings tell us much about the changing scientific climate of the period.

⁷ See Hartlib's letter to Boyle, 8/9 May 1654, in Boyle: *Correspondence*, Vol. I, p. 190.

⁸ Hartlib reported to Boyle that he was glad that 'Mr. Worsley also is like to engage in the prosecution of these affairs, and this kind of surveying of lands'. *Ibid.*, p. 170.

⁹ Letter, Child to Hartlib, 28 October 1653. HP 15/5/25B.

¹⁰ Letter, Worsley to Hartlib, 16 May 1654. HP 70/8/1B. Worsley also planted madder- HP 70/7A.

¹¹ *Ibid.* Extract printed in S. Hartlib (ed.) *Samuel Hartlib his Legacie of Husbandry*, 3rd edition (London, 1655) p. 248. Culpeper gave a disgruntled reply to this snub, and Worsley acknowledged his error in the way of planting- the exchange is printed in the *Legacie*, pp. 249-250. The soldiers in question - 'Col. J', 'Col. H' and 'Capt. V', were perhaps the parliamentary commissioner Colonel John Jones, Colonel John Hewson, and Captain John Vernon, the latter two being prominent Baptists.

¹² Letter, Wood to Hartlib, 3 March 1657. HP 33/1/12A. Wood, however, was more cordial to Worsley than Symner: see his letters to Hartlib, 8 December 1658, HP 33/1/36; 4 January 1659, HP 33/1/39-40; 11 May 1659, HP 33/1/56-7.

¹³ See his complaint to Boyle that his 'optical experiments' had been hindered, 'partly in regard I grugged *the* time it ingrossed from other exercises; partly & mainly, because I wanted those workemen that were necessary; & no person either to assist mee, or to exercise mee in those Tryalls'. Letter, [Worsley] to [Boyle], early 1659. HP 42/1/28B.

Worsley was encouraged to return to his 'Vtopian designes' to produce saltpetre having been asked by the Irish Council to examine the proposals of a soldier 'for an Artificiall way of breeding et increasing of Salt-Peter', in summer 1653.¹⁴ Without a hint of irony, Worsley described how this soldier 'understood nothing of it further then the Common Projectors of making it, with Dung Vrine and the like stufte'.¹⁵ There was little to distinguish this from Worsley's original saltpetre project, but now he claimed to offer a method of production without urine or dung, based on understanding 'the whole mystery of it'. This new-found confidence derived from theories about the life-giving propensities of saltpetre which Worsley probably learned of from Glauber.¹⁶

Although his original interest in saltpetre was not merely utilitarian, now Worsley hoped 'not only to give a very good account of Peter and the nature of it, but something also of vegetation'- a subject which preoccupied him for the rest of the decade.¹⁷ This rested on his belief that 'Salt is the seate of life et vegetation, et so the subject of nutrition', which in turn reflected a well-established tradition in early modern 'chymistry'. Although the central goal of alchemy was to transmutate base metals into gold by means of the philosopher's stone, as far back as the 13th-century corpus of [pseudo-]Geber, alchemical writings had considered the elemental composition of metals. In order to transmute metals, it was necessary to alter this composition, and this was done by a 'philosophical', purified mercury which Geber explained in corpuscular terms, referring to two inherent qualities, bearing the characteristics of mercury and

¹⁴ Letter, Worsley to Hartlib, 16 May 1654. HP 66/15/1A. Part of this letter, which discussed the theories underpinning his new saltpeter project, was printed in Hartlib (ed.) *Samuel Hartlib his Legacie of Husbandry*, pp. 217-9, as 'a Philosophical Letter concerning Vegetation and the Causes of Fruitfulness'.

¹⁵ *Ibid.*, HP 66/15/1A.

¹⁶ Newman & Principe, *Alchemy Tried in the Fire*, pp. 241-2.

¹⁷ Letter, Worsley to Hartlib, 16 May 1654. HP 66/15/1B.

sulphur.¹⁸ Over time, this corpuscular alchemy acquired sexualised motifs as metals were understood as growing in the earth from different seeds, culminating in the organic cosmology of Paracelsus, who also added a third principle- salt.¹⁹ Paracelsians tended to elevate the importance of salt as the life-giving principle in all of nature, which allowed the concepts of alchemy to be extended into what Debus termed ‘agricultural chemistry’.²⁰ This tradition was perhaps best represented by the Polish adept Michael Sendivogius, who held that saltpetre grew naturally in the earth, containing within itself a *semina* (a seed bearing its nature) which penetrated other matter and passed on its virtues, converting it into nitre. Such ideas were incorporated into a sweeping cosmology, whereby the energising ingredient found in saltpetre, sometimes called *sal nitrum*, combined with sulphurous soil to produce metals and minerals, ultimately nourishing plants on the earth’s surface. This ‘philosophical’ nitre was also found in the atmosphere, where it joined with celestial rays from the sun, becoming an *aerial nitre* which cherished life. This explained the unique qualities of saltpetre, as a fertiliser as well as an ingredient in gunpowder: ‘obtained from the heavens and transmitted by rain to the earth, the fertilizing agency was acquired by terrestrial saltpeter to a greater degree than any other substance’.²¹

Worsley’s understanding of saltpetre was steeped in this tradition. Thus his ‘Observations about Saltpeter’ explained that he had ‘found out by Experience a ferment, *which* mixt among fit Matter, will cause the whole at length to turne into the

¹⁸ Newman, *Gehennical Fire*, pp. 95-8 (quote on p. 97).

¹⁹ *Ibid.*, p. 106; A. Debus, *The Chemical Philosophy. Paracelsan Science and Medicine in the Sixteenth and Seventeenth Centuries*, Vol. 1 (New York: Neale Watson Academic Press, 1977) pp. 79-80.

²⁰ Debus, *Chemical Philosophy*, II, pp. 410-440; see also A. Clericuzio, *Elements, Principles and Corpuscles. A Study of Atomism and Chemistry in the Seventeenth Century* (Dordrecht, Boston & London: Kluwer, 2001) pp. 36-47.

²¹ Newman, *Gehennical Fire*, pp. 87-9 (quote on p. 89); see also A. Debus, “The Paracelsian Aerial Nitre”, in *Man, Nature and the Renaissance* (Cambridge: Cambridge U.P., 1978) pp. 44-61.

nature of nitrium'.²² This ferment was simply 'the best and richest earth, that can be got of Saltpetre, which being impregnated with its owne nitrous Spirit will Multiply & increase it selfe vpon first matter'.²³ To speed up the process, Worsley suggested using grass cuttings mixed with lime and wood-ash, which would also contain 'that nitrous Vniversal spirit'. Together, these would be laid in open pits, bottomed with clay to prevent the nitrous matter being swept away by rain, and would soon ferment into good saltpetre. Thus his method sought to replicate and speed up the conditions by which saltpetre multiplied, forming a 'perpetual mine of salt-Peter' like the one envisaged by Boyle.²⁴

The theory underpinning this method was expanded in another discourse, 'De Nitro Theses'.²⁵ This blended Sendivogian ideas with common observations from agriculture in a number of related theses, the key one being that 'Natures intent in the breeding of Salt-Peter in the Vpper Surface of the Earth is for the generation of Plants and by them for the præseruation of Animals'.²⁶ To demonstrate this, Worsley cited the fertilising properties of 'Seedes steeped in Water mixed with Salt-Peter'.²⁷ Such observations led Worsley to conclude (as Glauber had) that 'all Plants likewise containe in them a Salt', in the form of *sal nitrum*.²⁸ This explained various observations from husbandry, which seemed to suggest the existence of an energising substance or property which was found in vegetables and was ingested by animals. As well as

²² 'Observations about Saltpetre'. HP 39/1/11A. For the attribution of this document to Worsley, see Newman & Principe, *Alchemy Tried in the Fire*, p. 240.

²³ Ibid., HP 39/1/11B.

²⁴ R. Boyle, *The Sceptical Chymist*, quoted in Webster, *Great Instauration*, p. 380.

²⁵ 'De Nitro Theses, quædam'. HP 39/1/16-20. Newman and Principe have conclusively shown that this paper was written after Worsley visited Amsterdam, as it contains a claim which relied on Glauber's experiments in saltpetre, which were not available before then: 'that Salt-Peter hath Parts Volatill, inflammable and spirituou and parts fixed exceedingly causticke fiery and wonderfully detersive'. Ibid., HP 39/1/17B. See Newman & Principe, *Alchemy Tried in the Fire*, pp. 241-3.

²⁶ 'De Nitro Theses, quædam'. HP 39/1/16A.

²⁷ Ibid., HP 39/1/16B-17A.

²⁸ Ibid., HP 39/1/17B; Newman & Principe, *Alchemy Tried in the Fire*, p. 242.

finding an effective means to produce (or rather breed) saltpetre, Worsley therefore believed he had identified the life-spirit which nourished all living things.²⁹

The theoretical dimension allowed Worsley to extend his discussion from vegetation to the transmutational alchemy from which these ideas originated. Following his announcement of the revived saltpetre project, Worsley engaged in a protracted debate about the composition of metals with Hartlib's son-in-law Clodius, but whereas his earlier discussions about saltpetre were full of confidence, here Worsley's comparative inexperience in laboratory alchemy was exposed.

Worsley's attitude to alchemy was ambivalent. His experiences in Amsterdam demonstrated the impenetrability of the art, whilst his official employment precluded any serious labour over the furnace, and yet he found it hard to disregard the special status which alchemy held as the 'key to nature'.³⁰ Whereas Moriaen complained that Worsley had lost faith in the possibility of transmutation in 1651, by late 1653 this had changed.³¹ In a letter which Hartlib quoted to Boyle, Worsley explained that 'the truth is, I have laid all considerations in chemistry aside, as things not reaching much above common laborants, or strong-water distillers, unless we can arrive at this key, clearly and perfectly to know, how to open, ferment, putrify, corrupt and destroy (if we please) any mineral, or metal'.³² By breaking down metals into their constituent parts, it would be possible to build up new substances, which would be 'the carrying on of a higher

²⁹ Ibid., HP 39/1/19A.

³⁰ For chemistry as 'key to nature', Newman, *Gehennical Fire*, p. 72; Webster, *Great Instauration*, pp. 384-402.

³¹ Newman & Principe, *Alchemy Tried in the Fire*, p. 247; Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 232-3.

³² Quoted in letter, Hartlib to Boyle, 28 February 1654. In Boyle: *Correspondence*, Vol. 1, p. 155.

work in nature'. Worsley had written to Clodius about this subject in 1653, hoping 'either to be an assistant towards it, or assisted in it', and the letters they exchanged in the following year were widely circulated around the Hartlib circle. This debate has been analysed by Newman and Principe, who see it as demonstrating 'an often neglected facet of early modern chymistry, namely the disparate schools, with strong differences of opinion, that coexisted even within one branch of the discipline'.³³

At the same time as he was considering saltpetre, Worsley drafted a treatise which applied *sal nitrum* theories to the structure, growth and transmutation of metals. Although this discourse is now lost, three replies exist from July 1654: from Clodius, a correspondent from Hamburg (probably Frederick Schlezer), and Culpeper, who had similar ideas about the 'vegetative Life in Mettals'.³⁴ However, Clodius' response was less sympathetic, as he accused Worsley of failing to state clearly his method of producing the philosopher's stone, which Clodius (following Geber) believed should be produced from a *sophic* mercury extracted from quicksilver.³⁵ Worsley responded by questioning alchemical terminology, asserting that 'names are imposed vpon things, att the meare pleasure and fancye of such whoe first impose them'.³⁶ Alchemists tended to 'speake doubtfully, mystically, & enigmatically, for the better clouding their discription of things'. Names such as 'mercury' or 'sulphur' applied only indirectly to the nature of the bodies being described, 'by reason onely of some aptnes or resemblance *that* their matter hath to those other boddyes whose names are improperly transferred to them',

³³ Newman & Principe, *Alchemy Tried in the Fire*, p. 248.

³⁴ Culpeper's notes on Worsley's discourse, 10 July 1654. HP 39/2/14A, 15A. The reply from Hamburg, dated 25 July 1654, is as HP 39/2/131-134.

³⁵ Letter, [Clodius] to [Worsley], 4 July 1654. HP 16/1/7. The author and recipient of this letter, which was written in Latin, were identified by Newman and Principe, who have provided an authoritative reading. *Alchemy Tried in the Fire*, p. 249.

³⁶ Letter, Worsley to [Clodius], c. July 1654. HP 42/1/26A.

and should not be taken literally.³⁷ Worsley thus denied that the ‘philosophical mercury’ which alchemists discussed was in any way the same as common quicksilver- those who laboured to ‘torture’ this substance out of metals were ‘greatly mistaken’. The identity of the philosophical mercury was doubly important because, it was commonly claimed, this substance would be identical with the ‘*prima materia* or basic ingredient of metals in general’.³⁸ Worsley therefore ventured that ‘[mercury] currens is not the most simple or proper substance *which* the mettalls are vltimately resolved into by nature, but Nature doth by a proper Colliquation of her owne yeild another simple liquid, pure and spermaticke substance’.³⁹

In identifying this liquid, Worsley betrayed his sources:

for as much as in all minerals & mettalls there is a participation of the same lyfe, blessing vegetatiue & multiplicatiue virtue, as was given in the creation to plants & other seed bearing boddyes by reason the said vigitatiue virtue or spiritt is to *the* outward sence imprisoned, & not to bee discerned vntill brought forth in or by this Mercuriall substance hence the same substance ... is cal’d Sperma or Anima cuiuslibet Metalli.⁴⁰

This, as Clodius noted, was very similar to Sendivogius’ *sal nitrum*, identified as the energising ingredient of all mineral and organic bodies, as well as the philosophical mercury necessary to transmute metals.⁴¹ It was acquired by means of a ‘Phylosophicall putrefaction’, which would at once effect ‘a total & irreducible distruction, and att *the* same tyme an Animation’ of the spirit of a particular body.⁴² Another letter explained the Sendivogian dimension even more explicitly. In the process of putrefaction, ‘*the* vertue & life of those things *which* were before shutt, are now not only made manifest,

³⁷ Ibid., HP 42/1/26B.

³⁸ Newman, *Gehennical Fire*, p. xiii.

³⁹ Letter, Worsley to [Clodius], c. July 1654. HP 42/1/26B.

⁴⁰ Ibid., HP 42/1/26A. The Latin phrase at the end means something like ‘the spirit whose libation is in the metals’.

⁴¹ Newman & Principe, *Alchemy Tried in the Fire*, p. 251.

⁴² Letter, Worsley to [Clodius], c. July 1654. HP 42/1/27A.

but have a great addition & increase of their energy', and the resulting 'rich Sulphur' would contain not only '*the* life of mettals', but also would be 'the same body with *the* true Mercury & Salt of Mettals'.⁴³ His conclusion was clear: 'you must know *the* meaning of Sal Centri terræ. I say you are to study to gett Sal centri terræ. for in salt is all energy'.⁴⁴

However, as Clodius recognised, these claims were vague, speculative, and lacking experimental evidence, and his reply demanded that Worsley substantiate his theories.⁴⁵ Worsley's answer is lost, but a letter to Hartlib reveals that he had been rather stung by Clodius' stance. Already he had been forced to present himself as 'soe great a novice in matters of this nature', but by now Worsley was backing away further, claiming to 'abhorre the vanity of an Impostor, in vaunting myselfe as a master of this, or that rare or great secrett'.⁴⁶ He feared that his reputation had been damaged, and asked Hartlib to 'blaze not my name for a foolosopher'.⁴⁷ However, rather than withdrawing his claims, Worsley attempted to re-define the purposes of his 'greate worke' to downplay the importance of transmutation. His interest, by contrast, was in understanding natural operations, so that he might practice a 'further & higher light & direction in nature'.⁴⁸ Rather than being a 'Master of any particular great secrett', Worsley claimed his skill was 'putting nature on worke by other kinde of media, & after another manner then common operators dreame of'. Most audaciously, Worsley argued

⁴³ Letter, Worsley to Hartlib, c. 1654. HP 42/1/38B.

⁴⁴ Ibid., HP 42/1/39A.

⁴⁵ Letter, Clodius to Worsley, c. August 1654. HP 42/1/36-37. For which, see Newman & Principe, *Alchemy Tried in the Fire*, p. 251.

⁴⁶ Letter, Worsley to [Clodius], c. July 1654. HP 42/1/26A. Letter, Worsley to Hartlib, 31 October 1654. HP 42/1/3A.

⁴⁷ Letter, [Worsley] to [Hartlib], c. 1654. HP 42/1/39A.

⁴⁸ Letter, Worsley to Hartlib, 31 October 1654. HP 42/1/3A.

that although he had little practice in laboratory alchemy, yet ‘if I should apply my selfe to it my error can not be great in it’.⁴⁹

Newman and Principe have scorned this ‘armchair’ alchemy, and indeed Worsley’s chymical ambitions far outstripped his capabilities.⁵⁰ This was apparent to his correspondents, and Hartlib’s *Ephemerides* of 1655 noted an anonymous scholar known to Boyle, well ‘versed in all Chymical Writings’, who was ‘more vsed in the practical part then Mr Worsley’.⁵¹ However, this does not necessarily mean that Worsley was ‘content to rest assured in the superiority of theory and let others descend to the harsh world of laboratory practice’, although his letters sometimes give that impression.⁵² Rather, the rhetorical stance of the outsider was defensive- by denying that he claimed the full status of an adept, Worsley hoped to preserve the integrity of his ideas and his capability to pursue his own ‘great work’. Worsley consistently advocated an experimental approach to natural philosophy, but he lacked the time and resources to follow the intensive labour demanded by alchemy. But he seems to have been far from ‘content’ with this situation, which bred a degree of self-doubt beneath his veneer of intellectual arrogance. On the subject of alchemy, he wrote ‘I see already so much in it, as to prefer it before any other natural knowledge, or, perhaps, employment; yet I can find nothing very valuable or very desirable, either in myself, or others. And when I have once a while considered things, I find myself as much inclined to fear or suspect them, as I do to wish them’.⁵³

⁴⁹ Ibid., HP 42/1/3B.

⁵⁰ Newman & Principe, *Alchemy Tried in the Fire*, p. 250.

⁵¹ *Ephemerides*, 1655, part 4. HP 29/5/52A-B.

⁵² Newman & Principe, *Alchemy Tried in the Fire*, p. 251.

⁵³ Quoted in letter, Hartlib to Boyle, 28 February 1654. In Boyle: *Correspondence*, Vol. 1, p. 155.

Part of the reason why Newman and Principe highlighted Worsley's relative inexperience in practical alchemy appears to have been to show that his branch of alchemy- the *sal nitrum* 'school'- was 'antithetical to the highly technical operations' which characterised the work of George Starkey, whom they see as Robert Boyle's key chemical tutor.⁵⁴ Whether this was the case is beyond the scope of this study, but the example of one of Worsley's main influences- Glauber- suggests that a *sal nitrum* perspective was not irreconcilable with serious experimental alchemy. However, Worsley's own practice of metallic alchemy was limited, although one letter almost certainly written by him to Hartlib, in 1656, provides evidence that he was producing chemical medicines in Dublin. This described a 'Mechanicall Experiment of Regulis Antimonij Diaphoreticus', whereby salt of tartar was repeatedly melted with antimony, and then infused in wine and used as a medicine to induce sweating.⁵⁵ The letter also mentioned the 'stupendious effects' of medicines produced by the 'common Antimonycall Cup', and Worsley had described such a receipt, to cure 'Horses of the most desperate diseases', in a letter written from Amsterdam.⁵⁶ Worsley described antimony as a 'great a restorer of the Liver, or so great a purifier or refiner of the masse of Blood', and even repeated this receipt in a letter to Boyle of 1659.⁵⁷ Thus it would be unfair to conclude that Worsley's furnaces were unlit during the 1650's, but nonetheless the occasional production of chemical medicines was a long way from his lofty ambition to discover the 'philosophical putrefaction' of metals.

⁵⁴ Newman & Principe, *Alchemy Tried in the Fire*, p. 238.

⁵⁵ Letter, [Worsley] to [Hartlib], 1656. HP 26/58/1B.

⁵⁶ Letter, Worsley to Hartlib, 13 May 1649. HP: Royal Society Boyle Letters, 7.1, fol. 1r. This remedy, which involved stewing ale and spices in the antimony cup, was published in the 3rd edition of Hartlib's *Legacie of Husbandrie* (1655), p. 267.

⁵⁷ Letter, [Worsley] to [Boyle], c. early 1659. HP 42/1/29B.

Instead, Worsley's scientific experimentation in the 1650's took him out of the laboratory and into the field and garden, as he delved more deeply into the question of vegetation. Although they did not encourage much serious practice in metallic alchemy, Worsley's *sal nitrum* ideas did provide a framework for investigations into organic chemistry which were much more suitable for the part-time practitioner. Before he arrived in Ireland, Worsley had already taken an active interest in the science of agriculture; for example in 1651 Hartlib reported that he had 'an Experiment of the highest Philosophy viz How to make out of Apples very good sugar which would bee to turne England into Barbados'.⁵⁸ His circumstance in Ireland, however, meant that Worsley increasingly turned to this area as an outlet for his scientific aspirations, and during his first stay (c. August 1652-spring 1653) he was studying fruit preservation.⁵⁹ As well as its practical uses, this might cast light on the processes of growth and decay in nature in general and therefore deserved more philosophical consideration, and Worsley also noted how fermented mother of saltpetre could be used to preserve and cool water.⁶⁰ When he returned to the subject of saltpetre in 1654, this was likewise subordinated to 'higher' questions about vegetation. However, Worsley recognised that his claims had to be grounded in experiment and observation, and so he set out a programme to investigate the effects of different salts on plants, to discover 'where any salt doth vniversally nowrish all Plants ande make them thrive'.⁶¹ In order to do this, it was necessary to consider the other variables- 'water to dissolve et make fluid the particles of Salt, whereby the pores of the Plant or seed may ... admitt it' and 'Earth as

⁵⁸ *Ephemerides* 1651, part. HP 28/2/2B.

⁵⁹ *Ephemerides* 1653, part 2. HP 28/2/57A.

⁶⁰ *Ephemerides* 1653, part 3. HP 28/2/63B.

⁶¹ Letter, Worsley to Hartlib, 16 May 1654. HP 66/15/1B.

a fitt Vterus or matrix to keepe the thing planted steady'.⁶² Thus Worsley's considerations turned to the composition of earth, 'For my imbitions signify nothing if my Earth bee before hand impregnated with an other Salt'. Similarly, Worsley considered whether 'raine-water hath life in it selfe', which the apparently spontaneous appearance of minute insects in putrefied water seemed to indicate.⁶³ Therefore this 'great subject of promoting vegetation' would be based on knowledge of 'what things are principalia, what minus principalia, tamen necessaria, and what part to attribute to each'.

Although he was only able to return to science at intervals, it appears that Worsley followed this framework throughout the decade. During the 1650's, members of the Hartlib circle had become increasingly interested in the subject of husbandry, both for its practical value and for more speculative reasons. The centrepiece of Hartlib's agricultural publications was his *Legacie of Husbandry*, and the third edition included Worsley's letter of 16 May 1654, as 'A Philosophical Letter concerning Vegetation or the Causes of Fruitfulness'.⁶⁴ As well as much practical information concerning agricultural techniques (including a letter by Worsley on the technique of 'rowling' to spread roots), the *Legacie* included several other 'philosophical' enquiries, notably Robert Child's long letter on defects in the practice of husbandry.⁶⁵ Like Worsley, Child was concerned to base his knowledge on sound natural principles, to which end he posed the questions 'whether all things are nourished by Vapours, Fumes, Atoms, Effluvia? or by Salt, as Urine, Embrionate, or *Non specificate*? or by Ferments,

⁶² Ibid., HP 66/1/2A.

⁶³ Ibid., HP 66/1/2B.

⁶⁴ *Samuel Hartlib His Legacie of Husbandry*, 3rd edition (London, 1655) pp. 217-219.

⁶⁵ Ibid., pp. 105-7. References in Hartlib's *Ephemerides* suggest that this letter dated to spring 1651. HP 28/1/7B, 8B, 9A.

Odours, Acidities?'.⁶⁶ Worsley was evidently inspired by Child's enquiries, for he later explained that his thoughts 'vpon the whole subject of vegetation' were merely 'a Comment' on these 'ingenious, large, & comprehensive Qveries'.⁶⁷

Worsley became acquainted with another of Hartlib's correspondents with similar interests, the 'philosophical gardener' of Herefordshire John Beale, during his extended visit to England from 1656-7.⁶⁸ At Beale's request, Hartlib sent Worsley a copy of Beale's chapter headings for his planned work on gardening, 'A Physique Garden'.⁶⁹ Worsley responded favourably to this 'Treasure', replying with his own methodical programme of research based on agricultural observations, such as how 'all Earth, that had a competent vigor & lust, was perpetually conceiving & spawning, though noe way assisted, sollicited, or imprægnated, by the care ... of Man'.⁷⁰ Worsley next turned his attentions to the plants themselves, considering their natural properties and their 'improvement or alteration' by artificial means. Each plant would be analysed methodically to compare fertility in a range of climates and different soils. These findings would provide the 'Substrata to the intended discourse', on 'the true causes of vegetation'.⁷¹ A second branch of enquiry would consider the 'Oecomonicall' uses of plants, in manufacturing, dying, or for food, as well as medicine. Thus Worsley posited a thorough Baconian natural history of plants, although his exemplar was another natural historian, the botanist Petrus Lauremberg.⁷²

⁶⁶ Ibid., p. 38. This passage is discussed in Debus, *The Chemical Philosophy*, II, pp. 422-3.

⁶⁷ Letter, [Worsley] to Hartlib, c. spring 1657. HP 8/22/1A.

⁶⁸ On Beale, M. Stubbs, "John Beale, Philosophical Gardener of Herefordshire", *Annals of Science*, 39 (1982) pp. 463-489 (part 1); 46 (1989) pp. 323-363 (part 2); M. Leslie, "The Spiritual Husbandry of John Beale", in *Culture and Cultivation*, ed. Leslie & Rayler, pp. 151-172.

⁶⁹ Letter, Beale to Hartlib. HP 55/21/3-4.

⁷⁰ Letter, [Worsley] to Hartlib, c. spring 1657. HP 8/22/1B. Hartlib entitled this 'a Phytologicall Letter'.

⁷¹ Ibid., HP 8/22/2B.

⁷² Lauremberg came from a noted family of natural historians from Rostock. His *Apparatus Plantarius* (Frankfurt, 1632) was on the subject of bulbous and tuberosc plants, and Worsley may have used it as a model for his own natural history (a copy was included in his library catalogue). He also coined the term

Such considerations would not have been out of place at the Royal Society's Committee on the History and Improvement of Agriculture, whose leading member, Dr Daniel Coxe, was known to Worsley and likewise considered salt to be the main principle in vegetation: his first paper to the Royal Society was on the subject of 'the vegetation of Plants'.⁷³ Worsley certainly influenced Beale, a later fellow of the Royal Society, who tailored his research in horticulture, sylviculture, and fruit preservation, to Worsley's 'acute enquiryes & proposalls'.⁷⁴

Worsley's planned natural history of vegetation was also the occasion for his only well-known scientific treatise. One part of the research programme would consider experiments to preserve fruits, and his 'Phytologicall Letter' to Hartlib recounted a trial to conserve gooseberries which, after 9 months, were found to be fully restored to their original colour and taste when immersed in hot water.⁷⁵ This appears to have been the 'strange way of preserving Fruits, whereby even *Goos-berries* have been kept for many Moneths', included in part 2 of Boyle's *Of the Vsefulness of Natural Philosophy*, which was based on 'a new and artificial way of keeping them from the Air'.⁷⁶ Worsley had certainly been passing on to Boyle his experiments 'about a more perfect way of conserving of green flowers and fruit' at this time.⁷⁷ The question of corruption, Worsley recognised, depended in some way on atmospheric conditions, and so his

Pansophia, later deployed by Comenius. L. Thorndike, *A History of Magic and Experimental Science. Vol. VIII: The Seventeenth Century* (New York: Columbia U.P., 1958) p. 7.

⁷³ Clericuzio, *Elements, Principles and Corpuscules*, pp. 154-161. Coxe's ideas about salt paralleled Worsley's: in 1674, he wrote in the *Philosophical Transactions*, '[Air] is impregnated with a Volatil Salt, partly sublimed by Subterraneous, and extract by Celestial Fires; partly expired from animals during their life; and both from them and Vegetables upon the dissolution or dissociation of their constituent parts in rarefactions and Fermentations'. Quoted in *Ibid.*, p. 161. For the Royal Society's interests in 'agricultural chemistry', Debus, *The Chemical Philosophy*, II, pp. 424-5.

⁷⁴ Letter. Beale to Hartlib, 18 April 1657. HP 52/15/1A. See also his letters of 4 May 1657, HP 62/23/1-4; 9 April 1658, HP 52/73-85.

⁷⁵ Letter, [Worsley] to Hartlib, c. spring 1657. HP 8/22/3B.

⁷⁶ Boyle described this method as being from an 'eminent Naturalist'. Printed in *The Works of Robert Boyle*, ed. Hunter & Davis, Vol. 3 (London: Pickering & Chatto, 1999) p. 358.

⁷⁷ Letter, Worsley to Boyle, 14 October 1657. Printed in Boyle: *Correspondence*, Vol. 1, p. 242.

enquiries into vegetation led him to consider the effects of meteorological events such as thunder and rain, and their relationship with ‘The Operation & influence of the Sun ... the Moone’, and ‘the other Coelestiall bodyes’.⁷⁸ Consideration of these astral influences led Worsley to the controversial subject of astrology, and he hoped that through experimentation, ‘we may bee assisted to bee at a greater Certainty in these Principles then yet we are’.⁷⁹ Having returned to Ireland in summer 1657, Worsley wrote a long ‘Physico-Astrological Letter’ which, as Antonio Clericuzio discovered, was eventually published anonymously in Boyle’s posthumous *The General History of the Air* (1692), entitled ‘Of celestial Influences or Effluviiums in the Air’.⁸⁰

Worsley’s original premise was that the decay of organic bodies was in some way related to atmospheric conditions, which themselves relied on planetary motions. Whilst he never claimed to be an astronomer himself, Worsley had become an enthusiastic purchaser of telescopes in Amsterdam, and later procured information from Boyle about the three ‘systems of Saturn’ of Huygens, Gassendi, and Hevelius, as well as the telescopes of Boyle’s fellow Oxonian, Christopher Wren.⁸¹ Of the current astronomers, Worsley hoped that Thomas Street and the German Nicolas Mercator, both known to Hartlib, might together perfect the ‘Theory of *the* Plannetts’ and surmount those ‘Errors and disagreements in opinion’ which had so far plagued the discipline.⁸² Worsley however saw little value in calculating the motions of the planets for their own sake, unless ‘Wee cann propound noe end benefitt vse or Advantage, That may

⁷⁸ Letter, [Worsley] to Hartlib, c. spring 1657. HP 8/22/2B-3A.

⁷⁹ Ibid.

⁸⁰ Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/1-4. See A. Clericuzio, “New light on Benjamin Worsley’s natural philosophy”, in *SIUR*, pp. 236-246.

⁸¹ Letter, [Worsley] to [Boyle], c. spring 1659. HP 42/1/28A. Hartlib recorded the names of Worsley’s favourite ‘optical Workemen’ in his *Ephemerides* of 1657: Baily, Smethwick, and Straiter. HP 28/6/16A, 16B, 17A.

⁸² Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/1B.

recompence *the* Trouble & pains bestowed vpon them’, and the particular end he had in mind was to experimentally test astrological predictions. Although the Interregnum saw an explosion of interest in astrology, judicial astrology in particular was already encountering some of the scepticism which would hasten its decline following the Restoration. Worsley was therefore wary of being branded with the same ‘superstition & Paganisme’ which astrology commonly attracted, when practised by persons of ‘Imposture, ignorance and want of Learning’. However, he remained convinced that the stars exercised some influence on the earth:

... these Cælestiall bodyes (according to *the* Angles they make one vpon another but especially with *the* Sunn or with *the* Earth in our Meridian or with such and such other points in *the* Heauens) may haue a power to cause such & such Motions Changes and alterations (stronger or weaker according to *the* Nature of *the* Angle) as *the* Extremityes of which shall at Length be felt in every one of vs, And this may be evidenced first by vndeniable experiments not only from things inanimate & vegetate but from *the* vndoubted observations of Physitians as well in seuerall Chronicall as Acute distempers & more eminently in all Lunaticke Epilepticke Paraliticke or Lethargicke Persons.⁸³

In order to purify astrology of superstition, Worsley suggested a Baconian programme of natural history based on observing and recording various meteorological and atmospheric conditions as they related to the position of the stars. By accurately recording these variables, it would be possible to test planetary influence on the weather.⁸⁴

Worsley attached particular importance to air-pressure, which he understood as determined by two opposite ‘motions’, rarefaction and condensation, which were related to the ‘Extreame Motions’ of generation and corruption.⁸⁵ Whereas the philosophy of

⁸³ Ibid.

⁸⁴ Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/2A-4B. For this, and other, attempts to ‘reform’ astrology, see P. Curry, *Prophecy and Power. Astrology in Early Modern England* (Cambridge & London: Polity Press, 1989) pp. 61-67.

⁸⁵ Ibid., HP. 26/56/2B.

Descartes reduced natural phenomena to matter and motion in a mechanical manner, Worsley's understanding of motion was biological, something which he shared with many alchemical authors.⁸⁶ This perspective avoided the apparently materialistic implications of Cartesian physics, as the final cause of all movement was determined by an inherent biological force, which could be identified with *sal nitrum* or, as Worsley increasingly termed it, energy. Worsley's ideas about celestial influences were steeped in the alchemical cosmologies of Paracelsus' followers, and Clericuzio has identified Jean d'Espagnet's *Enchiridion phisicae restitutae*, which Worsley in fact owned, as a possible source.⁸⁷ Thus, the planets and the sun and moon had their 'owne Proper light', which was 'accompanied further with some power virtue or Tincture that is proper to it'.⁸⁸ Together these planetary bodies transmitted their lights to earth, exerting powerful effects on the planet and its atmosphere. Weather conditions were one product of these astral influences, but the sun's rays also awakened forces latent in the earth:

Not only the Ayre by reason of its Thynnes & subtlety is capable of being thus penetrated moved and altered by these planatary virtues and Lights. But for asmuch alsoe as our spirits and *the* spiritts likewise of all mixt bodyes are really of an Aerious ætheriall Luminous production & Composition these spiritts therefore of ours and *the* spiritts of all other Bodyes must necessarily noe Less suffer an impression from *the* same Lights and Cannot be Lesse subject to an Alteration, Motion, Agitation, and infection through them and by them ... these spiritts being *the* only Principles of Energy, power, force, & life in all bodyes wherein they are, and *the* immediate Causes through which all alteration Comes to *the* bodyes themselves.⁸⁹

The sun was clearly able to 'rayse excite awaken and stir vp' properties in earthly bodies, and the earth was 'enlightened, warmed, Cherished and Frucified by the power vertue and Influence of the Sunn'.⁹⁰ Worsley explained how solar rays awoke the

⁸⁶ Debus, *The Chemical Philosophy*, II, p. 316.

⁸⁷ Clericuzio, "New light", p. 241. This work is listed in Worsley's library catalogue.

⁸⁸ Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/3A.

⁸⁹ *Ibid.*, HP 26/56/3B.

⁹⁰ *Ibid.*, HP 26/56/2A.

'seminall dispositions, Odors and ferments' residing in terrestrial bodies. Just as the philosopher's stone penetrated base metals to act on their inward 'spirits', or the *semina* in saltpetre transmitted its virtues into neighbouring matter, interplanetary rays penetrated the atmosphere, stimulating vegetative growth and, ultimately, decay. These were the astral effects which Worsley hoped analyse with the methods and instruments of the new science.

Worsley's treatise apparently impressed Hartlib, who circulated copies around his circle, procuring a Latin translation from Mercator so that it might be sent abroad to scholars like Joachim Hübner, Johann Hevelius, and Joachim Jungius.⁹¹ Beale gave a favourable response, and this encouraged Worsley to seek the opinions of other learned authorities such as Elias Ashmole, but particularly from 'our frinds & correspondents at Oxford'.⁹² He also wrote a shorter 'Problema Physico-Astrologicum' which considered the influence of the moon, '*the* Laboratory workehouse or shop of *the* rest of *the* Planets'.⁹³ Unfortunately, Worsley found the Oxford academics to be unsympathetic, sadly noting that 'our vniversity Professors are resolved to stand to the Doctrine & Tradition of their Fathers, without further doubt or question'.⁹⁴ Just as was the case with his alchemical debate with Clodius, Worsley was forced onto the defensive, denying that he intended 'a positive prooffe or assertion of the Planetts Influences', although he reaffirmed his belief that astrology was 'an antient, a great, a vsefull, a necessary, & a certaine truth' without which 'noe man shall ever vnderstand the Antient Philosophers', or 'finde out their great secret'.⁹⁵ But the response from Oxford persuaded Worsley to

⁹¹ Clericuzio, "New Light", p. 238. The Latin copy is at HP 42/1/18-25.

⁹² Letter, Worsley to Hartlib, 14 October 1657. HP 42/1/9A. For Beale's response, see his letter to Hartlib, 15 September 1657. HP 31/5/51-60.

⁹³ HP 42/1/16A.

⁹⁴ Letter, Worsley to Hartlib, 20 October 1657. HP 42/1/11A.

⁹⁵ *Ibid.*, HP 42/2/11B.

have his name removed from Mercator's translation, and once again he retreated into scientific anonymity.⁹⁶

This episode seems to emphasise Worsley's intellectual distance from Boyle and his Oxford milieu. However, Boyle evidently valued the letter enough to include it amongst the material for his *General History of the Air*, and Clericuzio and Henry have suggested that he probably agreed with its general approach.⁹⁷ Thus it might be that Boyle took seriously some of Worsley's claims, inherited from the *sal nitrum* tradition of Sendivogius and Glauber, about astral influences. Boyle covered this subject in his *Tracts about the Cosmical Qualities of Things* of 1671, which considered the possible existence of effluvia with special properties which were projected by the stars, whilst his natural philosophy was eclectic enough to incorporate numerous chemical qualities.⁹⁸

Boyle consistently sought to preserve complexity in accounts of the natural world against the claims of mathematical reductionism, and one unpublished essay noted that 'There are a great many things which ... cannot with any convenience be immediately deduced from the first and simplest principles; namely matter and motion; but must be derived from subordinate principles; such as gravity, fermentation, springiness, magnetism etc'.⁹⁹ Worsley had ventured a very similar position during his debate with Clodius. Against Worsley's claims about salt, a friend of Clodius had put

⁹⁶ Clericuzio, "New Light", p. 238.

⁹⁷ *Ibid.*, p. 239; Henry, "Boyle and cosmical qualities", p. 127.

⁹⁸ Henry, "Boyle and cosmical qualities"; A. Clericuzio, "A Redefinition of Boyle's Chemistry and Corpuscular Philosophy", *Annals of Science*, 47 (1990), pp. 561-589; Clericuzio, *Elements, Principles and Corpuscles*, pp. 103-148.

⁹⁹ Quoted in Henry, "Boyle and cosmical qualities", p. 123.

forward van Helmont's belief that water was the *prima materia*.¹⁰⁰ In response, Worsley suggested that:

though we must according to this analysis at length determine our thoughts into deCartes principles of not onely of water, but of atomes. yet as these things have their commendation, so *the* knowledge of other bodyes which may ... be principia sub alterna; though Atomes or water maye said to be principia generalissima, are often times very vsefull.¹⁰¹

Worsley's 'principia sub alterna' reminds us of Boyle's 'subordinate principles', and Newman and Principe too have noted a similarity with Boyle's use of 'intermediate explanations' not immediately reducible to matter and motion.¹⁰² For Worsley, 'vegetation' was one such principle and, although he consented to mechanism, he believed that this did not preclude the existence of other processes in nature. Worsley's natural philosophy was much more preoccupied with discovering the nature of 'energy', the life-giving force which he believed united all of Creation, than with the *minima materia*. In this, he was not so far from contemporary natural philosophers who were inspired by Harvey's discovery of the circulation of the blood to investigate what ingredients were necessary to sustain life, culminating with John Mayow's conclusions about the role of aerial substances in respiration.¹⁰³ Thus, whilst the cosmologies of writers like Paracelsus and Sendivogius were increasingly rejected as holistic

¹⁰⁰ For Helmont's beliefs about water, Newman, *Gehennical Fire*, p. 111; C. Webster, "Water as the Ultimate Principle of Nature: The Background to Boyle's Sceptical Chymist", *Ambix*, Vol. XIII, No. 2 (June 1966) pp. 96-107.

¹⁰¹ Letter, Worsley to Hartlib, c. autumn 1654. HP 42/1/38A.

¹⁰² Newman & Principe, *Alchemy Tried in the Fire*, pp. 254-6.

¹⁰³ Debus, "The Paracelsan Aerial Nitre". Frank, *Harvey and the Oxford Physiologists*, discusses the pervasiveness of the idea of aerial nitre in scientific discussions in the mid-17th-century, as well as the ways in which these ideas were transformed by individuals like Mayow.

explanations, for example by Boyle in *The Sceptical Chymist*, they had a residual influence which continued to stimulate research.¹⁰⁴

At about the same time that Worsley was investigating the nature of saltpetre, Boyle himself was pursuing research into the very same subject, which would eventually be published as his famed 'Physico-Chymical Essay ... touching the differing Parts and Redintegration of Salt-Petre'.¹⁰⁵ This essay repeated Glauber's experiment to separate saltpetre into its fixed and volatile parts, which Worsley had included in his own 'De Nitro Theses', and it may be that Boyle learned of this experiment via Worsley.¹⁰⁶ Although Boyle's 'Essay on Nitre' was much more technically sophisticated than Worsley's, it seems possible that he was encouraged to turn to this subject by Worsley's digressions about saltpetre.¹⁰⁷ Similarly, the Worsley-Clodius debate perhaps exerted some influence on Boyle's own attempts to provide a firm corpuscular grounding to chemistry in publications like *The Sceptical Chymist*.¹⁰⁸ Like Boyle, Worsley was reluctant to assign a simplistic universal structure to matter, considering instead:

Whether all this may bee sufficiently cleared from Aristotles Hypothesis of the 4. elements: Or from Paracelsus his 3. Principles of salt, Sulphur, & Mercury, or from Dr Cartes Doctrine of body figure or Motion; or whether by some Magnetick or Astrologicall supposition, Or whether without all these, by a plaine, direct, Analyticall Consideration & Examination of all & every particular body, concurring to Vegetation, & of the share, that each of them beareth

¹⁰⁴ See, for example, Isaac Newton's use of the idea of 'aethereall Spirits' in explaining numerous physical phenomena. A. Gabbey, "Newton and Natural Philosophy", in *The Compendium to the History of Modern Science*, ed. R.C. Olby et. al. (London: Routledge, 1990) pp. 256-62.

¹⁰⁵ This was included in *Certain Physiological Essays* of 1661, printed in *The Works of Robert Boyle*, ed. Hunter & Davis, Vol. 2, pp. 93-149.

¹⁰⁶ Newman & Principe, *Alchemy Tried in the Fire*, pp. 252-3.

¹⁰⁷ *Ibid.*, p. 254. See also Frank, *Harvey and the Oxford Physiologists*, pp. 117-128.

¹⁰⁸ A copy of one of Clodius' letters to Worsley was owned by Boyle. Newman & Principe, *Alchemy Tried in the Fire*, p. 251, note 149. On *The Sceptical Chymist*, Principe, *The Aspiring Adept*, pp. 35-52.

from the very first Motion or Conception of Vegetation, to its ultimate Maturity or perfection.¹⁰⁹

Worsley clearly leaned to the last position, but he would not have considered himself a doctrinal adherent to any ‘school of thought’, least of all an ‘epigone’ of Sendivogius.¹¹⁰ On the subject of alchemy, Worsley concluded ‘That this great worke is like *the* body of Philosophy, it is distributed into many parts ... & many men have talked of Robin hood, that never shott in his Bow’, citing Sendivogius as only one influence after Basil Valentine, van Helmont, Paracelsus, and others.¹¹¹ Although he certainly relied on Sendivogian ideas, Worsley’s usage of them did not prevent him from maintaining the primacy of experiment over theory, which the explanatory systems of some mechanists seemed to deny.¹¹² His findings about saltpetre were based on ‘common et familiar Experiments’; Helmont’s conclusions about water were refuted by ‘common experience, which is *the* Mistresse of Phylosophers’; he submitted his ‘Physico-Astrological Letter’, ‘to *the* Iudgement of Comon experiense’, asserting that ‘things of *the* greatest consequence doe oft tymes depend vpon *the* most Comon observations’.¹¹³ Indeed, he blurred the division between experience and experiment, and introduced his discovery of a luminous piece of wood by explaining that ‘here happened a pretty odd Experiment to me’.¹¹⁴ This providential Baconianism suited his part-time status, and such attention to the smallest details of nature could be justified by the principle that ‘God or Nature doth nothing in vaine’- something which Boyle would not deny.¹¹⁵

¹⁰⁹ Letter, [Worsley] to Hartlib, c. spring 1657. HP 8/22/2B.

¹¹⁰ Newman & Principe, *Alchemy Tried in the Fire*, p. 251.

¹¹¹ Letter, [Worsley] to [Hartlib], 14 February 1655/6? HP 42/1/5A.

¹¹² For Descartes’ assessment of the role of experiment in natural philosophy, in comparison with that of Bacon, Sargent, *The Diffident Naturalist*, pp. 27-35.

¹¹³ Letter, Worsley to Hartlib, 16 May 1654. HP 66/15/1B; ‘De Nitro Theses’, HP 39/1/19A; Letter, [Worsley] to [Hartlib], c. autumn 1654. HP 42/1/38A; Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/2A, 2B.

¹¹⁴ Letter, Worsley to Boyle, 30 October 1665. Printed in Boyle: *Correspondence*, Vol. 2, p. 569.

¹¹⁵ ‘De Nitro Theses’. HP 39/1/16A. For Boyle on experiment, Sargent, *The Diffident Naturalist*.

Boyle, of course, raised experimentation to a higher level than simple empiricism, but Worsley too developed a characteristic approach to natural history, whereby 'common experiments' would provide the basis of more 'philosophical' investigations, in a Baconian manner. Both his 'enquiries about Vegetation' and his proposed natural history of astrology took this form. Another example is a proposed investigation of colours which he wrote to Beale shortly after the Restoration, partly as a commentary on Boyle's similar enquiries. Here, Worsley began by analysing colours by their opacity or transparency, 'Lustre' or 'fixtnesse', and whether artificial or natural.¹¹⁶ Focussing on artificial dyes or paints, Worsley considered how the depth of colour depended on the 'glutinousnesse' of the substance, and went on to discuss various common methods of dying, depending on the different materials being used. Turning next to natural, opaque bodies, Worsley considered the texture of the superficies, noting the infinite variety in shades and complexion in bodies like plants. Experiments were only to be framed once these observations had been noted.

The 17th-century of course saw great advances in those technologies which allowed the natural world to be observed with new accuracy, and Worsley afforded these an elevated place in his natural histories, at one point outlining a 'history of Opticall Experiments' for the improvement of telescopes.¹¹⁷ In the same letter (to Boyle) he posed a series of questions about the new clocks developed by Christiaan Huygens, considering for example whether they were affected by the weather 'as it is supposed all other motions are'.¹¹⁸ Elsewhere, Worsley subjected thermometers to

¹¹⁶ Letter, Worsley to [Beale], May-June 1660. BL Sloane MS 427, fol. 65r.

¹¹⁷ Letter, [Worsley] to [Boyle], c. 1659. HP 42/1/28A.

¹¹⁸ *Ibid.*, HP 42/1/28A.

similar trials to find the best proportion between length and diameter.¹¹⁹ Although he recognised the value of these instruments, Worsley believed they offered only an approximate view of nature, which the naturalist should be wary of accepting uncritically. On thermometers, he warned that ‘no man must expect another will ever be accurate in mechanical matters, upon a bare direction, without we take pains’.¹²⁰ This seems to reflect an underlying unease with the mathematicisation of nature, so that even an apparently unproblematic abstraction such as the division of time into hours, seconds, and minutes, was seen as a human construct, and Huygens’ clocks needed to be intensively scrutinised. Another time-keeping device which Worsley commented on, this time a water-clock or clepsydra, aroused similarly ambivalent feelings. Whilst Worsley considered ‘*that* figure weight & motion are *the* affections of all visible quantities & *that* noe Idea can be conceived rightly of figure without a supposition of commensurableness or Proportion’, he also believed that no certain standards had been found for motion, weight, or size.¹²¹ This was because ‘All motions *that* are made’, such as those of the clepsydra, were ‘made in Imitation only of other motions’, and failed to accurately match the rhythms of nature. This consideration led Worsley to doubt the principles of the mechanical philosophy more broadly:

... though some of our late Philosophers have told us much of Motion, & have beene earnestly desirous to resolve all *the* Phenomena of nature into it, viz. either into circular hyperbolicall, ellipticall or rectilineall motion, yet they seeme very defective in describing to vs the cheefe Agent or cause ... to this motion. And sometimes *the* very motions *that* they do suppose or imagine to be in bodyes are altogether as intoxicate & absurd as *the* absurdities they by this new Philosophy strive to avoid. See Hobbs about *the* Magnett. Lett any man also examine

¹¹⁹ Letter, Worsley to Hartlib, c. autumn 1657. HP 26/56/4A. Letter, Worsley to Hartlib, 14 April 1658. Extract in letter, Hartlib to Boyle, 27 April 1658, printed in Boyle: *Correspondence*, Vol. 1, p. 267.

¹²⁰ *Ibid.*

¹²¹ Letter, [Worsley] to Hartlib, c. early 1658. Extract in letter, Hartlib to John Pell. HP: British Library Add. MS 4279, fol. 48r.

Cartes opinion how *the* minde itselfe comes to discerne or perceive colors as he hath deliverd it in his Dioptricks.¹²²

Worsley found atomic explanations of colour to be ‘deficient, & that *which* stands in need of another solution, then that of Cartes’, for example noting how the sun and air could change the colour of terrestrial bodies, which ‘strickt Cartesians’ would not accept.¹²³ To Worsley, mathematics was only a manmade simplification of the world and, as such, could not fully encompass the complexity of God’s Creation, a perspective rather similar to Boyle’s.¹²⁴ With a typical sense of relativism, Worsley considered that ‘all Commerce whatsoever even throughout the whole world & almost all Artes’ rested on ‘a supposition of something to be certaine in measure bignesse or length, or in weight’. But these standards were not ‘found in nature. Consent only giving *the* Being to that certainty there is & this consent growing into a use or law by continuance of time or Custome’. Worsley was reluctant, therefore, to attribute to mathematical constructions the status of natural laws, and this also made him ‘exceeding vigilant in all new mechanicall Production’.

Worsley’s response to mechanism reflects the transitional nature of this period, as the new science impacted on existing intellectual structures.¹²⁵ Descartes’ philosophy

¹²² Ibid.

¹²³ Letter, Worsley to [Beale], May-June 1660. BL Sloane MS 427, fol. 66r, 65v.

¹²⁴ According to Shapin, ‘Boyle understood mathematics to encompass an abstract, esoteric, and private form of culture ... If experimental philosophy was to secure legitimacy and truth by implementing a public language, then the incorporation of mathematical culture might threaten a new privacy’. *Social History of Truth*, p. 336. However, whereas Boyle’s reluctance to fully mathematize nature is seen here as deriving from the needs of the ‘ideal experimental community’ which he sought to promote, for Worsley spiritual principles were more important. His concern was about elevating human laws to the status of natural ones, infringing on the territory of the divine, and his natural philosophy was intended to leave room for the miraculous.

¹²⁵ For a perspective on this ‘critical period’ of the scientific revolution, when scholastic natural philosophy was under challenge by alchemical and hermetic as well as mechanistic alternatives, see J. Schuster, ‘The Scientific Revolution’, in *Companion to the History of Modern Science*, ed. R. Olby, G. Cantor, J. Christie, M. Hodge (London & New York: Routledge, 1990) pp. 217-240.

could appear to relegate the role of God in nature to that of a distant figure, and as an antidote to this Worsley elevated the importance of natural history, which to him demonstrated the full complexity of Creation.¹²⁶ Similar concerns may have influenced his attachment to *sal nitrum* explanations of nature. With their organic motifs, these ideas lent themselves particularly well to spiritualistic accounts of the natural world, a tradition going back to Paracelsus' evocation of a chemical universe, in which the act of Creation itself was a chemical process recurring throughout nature.¹²⁷ Culpeper seems to have been attracted to the science of *sal nitrum* precisely because it accorded with his religious principles, and perhaps the same can be said of Worsley.¹²⁸ As the principle of life residing in all living things, this 'philosophical salt' could be equated with the Neoplatonic *anima mundi* or the world-soul, and thus acquired the status of a spiritual principle. For Worsley, salt was the source of energy which was necessary to sustain life, a force which united all of Creation from the stars into the depths of the earth, causing all movement, biologically conceived, in this living cosmos. From energy, it was easy to progress to the idea of an identifiable 'spirit of life' itself which showed the presence of God throughout nature much more vividly than the mathematical world-view of Descartes, and indeed, Worsley's natural philosophy increasingly became fixated on the idea of the spirit throughout the 1650's.¹²⁹

¹²⁶ Thus he leaned (as did Boyle) towards the model of natural philosophy staked out by Gassendi, empirical and maintaining a voluntarist theology- rather than that derived from Descartes, stressing mathematics, a priori knowledge, and an understanding of the natural world as necessarily created in one particular manner. Osler, *Divine Will and the Mechanical Philosophy*.

¹²⁷ Debus, "The Paracelsan Aerial Nitre", p. 52; Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 169.

¹²⁸ For example, Culpeper wrote that 'in philosophy as well as Christianity, it is the inward fire or Spirit, to which we ought principally to looke, this inward fire yf incited into motion will make life diffuse from the centre'. Letter, Culpeper to Hartlib, 4 July 1649. HP 13/254-5. See also Clucas, "Correspondence of a 'Chymicall Gentleman'", p. 152.

¹²⁹ Compare with Isaac Newton's conclusion that 'some other Principle was necessary for putting Bodies into Motion' than the force of inertia, namely the 'active Principles' which caused gravity, fermentation, generation and vegetation. As Gabbey concludes, 'For Newton these active (and passive) principles were God's intermediaries in his governance of Creation ... a sign of God's existence and a proof of His

Worsley's cosmology principally derived from alchemical authors, and traditionally alchemy has been seen to possess a strong spiritual or mystical dimension, which involved transforming the self as much as the material world. However, Newman and Principe have argued that this interpretation ignores the strongly practical and scientific dimension to early modern 'chymistry'.¹³⁰ Certainly their studies have confirmed the existence of the latter, but Worsley seems to belong to the vitalistic and illuminist tradition of alchemy which they have downplayed. Writing to Clodius, he concluded by noting that 'A minde willing to bee crucified & made wholly conformable to *the* Lord Christ is ten thousand tymes dearer ... then all this knoweledge of the Lapis'.¹³¹ Perhaps Worsley was using this pious rhetoric to hide the weaknesses in his argument, but even so he was evoking a prevalent sense that the aspiring adept had to possess spiritual gifts as well as practical knowledge, in order to perform this most exalted work. Worsley presented himself in this light to Hartlib, when he described his progress in the art. Having considered some of Glauber's writings, 'it pleased god to discover *the* thing so clearely to me, that I sett downe *the* very thing in my Adversaria, as a matter further to be weighed & experimented, & yet understood it not, nor was *the* better for it'. Only since coming to Ireland did Worsley begin to reach a higher understanding:

nor should have beene ever able to have applyed any of these hynts, so as to have made any vse of them vnlesse God had (as he did) further as it were imposed the consideration of it upon me, by bringing my observation to a non plus, upon a kind of fortuitous experiment made by me, *which* I speake even to this End to shew; that the Lord hath his seasons, & that it

management of the world of the natural philosopher'. Gabbey, "Newton and Natural Philosophy", in *The Compendium to the History of Modern Science*, pp. 261-2.

¹³⁰ Newman & Principe, "Some Problems with the Historiography of Alchemy".

¹³¹ Letter, Worsley to Clodius, c. summer 1654. HP 42/1/27A.

is not of him that wills, or of him that runnes, but of God only who in this as in more higher things enlightens whom he will.¹³²

As Young noted, Worsley ‘cast his younger self in the role of a competent technician who had not received insight into the hidden mysteries of his own knowledge’, until he received divine illumination.¹³³ Young has perceptively shown that the attraction alchemy held to the Hartlib circle owed much to its ability to ‘cure Creation’ of its fallen state, by accessing metaphysical truths through the physical world, and mastering the fabric of nature itself.¹³⁴ Of course, this does not mean that a mystical appreciation of alchemy precluded serious experimental work; however, in order to understand the profound value attached to this ‘great work’ in the early modern period, it is necessary to recognise its spiritual significance. To ignore mainly speculative practitioners like Worsley would actually be to underestimate the contemporary cultural significance of alchemy, which extended far beyond the laboratory. Even Boyle, we should remember, appeared to seriously believe in the possibility that men could communicate with angels through the workings of the philosopher’s stone (although this concerned, as well as captivated him).¹³⁵

¹³² Letter, Worsley to Hartlib, 14 February 1655/6? HP 42/1/5B.

¹³³ Young, *Faith, Medical Alchemy and Natural Philosophy*, p. 233.

¹³⁴ *Ibid.*, pp. 151-181.

¹³⁵ Principe, *The Aspiring Adept*, pp. 191-200; M. Hunter, “Alchemy, Magic and Moralism in the Thought of Robert Boyle”, in *Robert Boyle (1627-91) Scrupulosity and Science*, pp. 93-118. In relation to Boyle’s interest in angelic communication, Principe cited a letter which considered the possibility of a ‘Lapis Angelicus & Evangelicus’, which might allow communication with angels and spiritual enlightenment respectively, written in the hand of a Hartlibian scribe and dated 19 October 1660. Passages about the ability of the philosopher’s stone to correct and purge aerial, as well as metallic, corruption, and spiritualistic digressions about ‘the exquisit beauty & structure of the true Pansophicall Temple, the true ends, ordinations, series & orders of all things, as proceeding from the Divine minde of the Father...’ accord very much with the direction of Worsley’s own scientific and religious ideas at the time, and suggest that he may have been the author. Similarly, the author’s request that the recipient (probably Hartlib) only communicate the letter anonymously would fit in with Worsley, as he was keeping a low profile in the aftermath of the Restoration. BL Sloane MS 648, fol. 99-100.

All of the ingredients of Worsley's natural philosophy in the 1650's are apparent in a remarkable letter which he wrote to Boyle, shortly before leaving Ireland for the last time, in late 1658 or early 1659.¹³⁶ The recipient has only recently been identified, on the basis that the letter was clearly written to an Oxford-based scientist, and also because it mentions a receipt to cure the 'red water' in cattle which Boyle mentioned elsewhere.¹³⁷ Worsley's authorship is confirmed by a number of factors. As well as fitting in precisely with the direction of his natural philosophy and theology at the time, and mentioning a number of individuals with whom he had already taken an interest (including Fromanteel, Huygens, and Gassendi), the author offered his old remedy for the rot in sheep, based on stewing ale in the antimony cup.¹³⁸ But this letter, the surviving extracts of which amount to nearly 10,000 words, covered a range of subjects.¹³⁹ Worsley began by thanking Boyle for his 'great care & mindfullnes of me in that Businesse to Sir K. Digby', and although the nature of this business is unclear, we may note that the Catholic nobleman shared Worsley's belief in a philosophical salt which was the 'spirit of life'- an opinion which he would express before the Royal Society in January 1661.¹⁴⁰ Next, Worsley commented on Huygens' new clocks, noting his pleasure in hearing of 'anything growing to a perfection, That being the State to which I expect the sudden motion or concentration of all things'.¹⁴¹ In response to an observation passed on by Hartlib, from the physician Jacob Bontius, about the ocular

¹³⁶ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. Two parts: HP 42/1/28-33, 60/2/1-4.

¹³⁷ The letter is printed in Boyle: *Correspondence*, Vol. 1, pp. 301-318.

¹³⁸ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 42/1/29B.

¹³⁹ Two scribal extracts survive in the Hartlib papers: it is likely that at least one section is missing.

¹⁴⁰ Frank, *Harvey and the Oxford Physiologists*, pp. 126-7.

¹⁴¹ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 42/1/28A.

benefits of consuming fish liver, Worsley noted that his likely source was the Dutchman Petrus Forestus, whose works he had no doubt encountered in Amsterdam.¹⁴²

Whereas 12 years earlier Boyle had requested scientific intelligence from Worsley's laboratory, now their positions were reversed, and Worsley depended on Boyle for the latest news of natural philosophy. In the commerce of ideas, Worsley was struggling to maintain parity with a Boyle intellectually energised by the fertile Oxford environment.¹⁴³ Perhaps aware that they were by now distant intellectually as well as physically, Worsley nonetheless wrote that he hoped they might some day be 'at a lesse distance then wee are at present', claiming that 'you have the power (if ever the Lord bring us to meete) to challenge from mee the free discovery & plaine demonstration of those principles which I have acquainted you with in generall'.¹⁴⁴ These were his 'medicinall & Philosophicall Principles', and in particular his 'thoughts to begin a solid & practicall foundation of medicine upon'.

Worsley proceeded to outline a characteristically methodical programme of medicinal research. Principally, Worsley considered it necessary to base medicine on 'a diligent inquisition of the nature & essence of Health', which was broken down into a series of related questions concerning 'those particulars which are necessarily requisit for the constitution of Health', and which factors 'may dissolve this naturall & well

¹⁴² *Ibid.*, HP 42/1/29A-B.

¹⁴³ It is difficult to ascertain the regularity of Worsley's correspondence with Boyle throughout the 1650's- clearly sometimes they were communicated via Hartlib, and only two letters from Worsley to Boyle survive for the decade. One of these begins by noting that the latter had recently written two letters to Worsley which he had yet to reply to. Boyle was evidently still communicating his experiments to Worsley for his judgement- in this case, some to do with copper and antimony, and another which Worsley cryptically referred to as 'the plot, that was laid at the *Rhenish* wine-house'. Worsley reflected that 'it is in part real experiment; the grounds of it solid; the law of it nature; the method of it certainty, or rather necessity... a real door, a key, a light to things visible, and to the harmony between them and other things invisible'. This suggests that some of their intimacy from the late 1640's remained, and it would be interesting to know more about this unidentified experiment. However, Worsley could offer little experimental knowledge in return. Letter, Worsley to Boyle, 14 October 1657. Printed in Boyle: *Correspondence*, Vol. 1, pp. 241-2.

¹⁴⁴ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 42/1/29B.

constituted Oeconomy of nature'. It was necessary to establish the aetiology of disease, determining how causes related to symptoms or 'distempers'. Worsley was open-minded about the 'sects of Physitians', whether 'Galenistarum, IatroAstrologorum, Paracelsitarum, vel IatroCHymicorum, Helmontistarum & Adeptorum', for each contained 'something that is certaine & experimentall'.¹⁴⁵ Thus, although the Galenic explanation for cathartic medicines was absurd, nonetheless experience had shown their benefits in some cases.

As well as being subordinate to experimental evidence, methods of treatment would have to be based on an understanding of the true causes of distempers, and Worsley suggested that up till now the latter had been flawed, citing 'the Plague, in spotted & pestilentiall fever, in poisons & venomous bytings of serpents, & in whatsoever manifestly commeth by contagion or Infection'.¹⁴⁶ The 'infinite variety of symtomes' in these illnesses was clear proof of the inadequacy of Galenic physiology. In order to 'lay true & sure grounds for the reformation or augmentation of the Art of Medicine', Worsley asserted that it would be necessary to submit the progress of diseases to more careful examination. Thus, Worsley suggested collecting 'Hystories' which would 'more purely observe the course, way & method of nature'. Not all remedies worked in the same way for all people, and Worsley noted the allergic reaction of one Lady of their acquaintance to honey of roses. Such maladies could be of great value in understanding physiology, revealing that 'there is a sense not only in the mouth of the stomack but even in other parts of the body much more subtile'.¹⁴⁷

¹⁴⁵ Ibid., HP 42/1/30A.

¹⁴⁶ Ibid., HP 42/1/30B.

¹⁴⁷ Ibid., HP 42/1/31A.

Up to this point, Worsley's discourse has all we have come to expect from his natural philosophy, with its methodical outline, its willingness to consider the findings of conflicting schools of thought, and a stress on natural history which prefigured somewhat Thomas Sydenham's approach.¹⁴⁸ At this point, however, the tone of the discourse changed. Moving to the fourth consideration in the reformation of medicine, Worsley identified this as understanding 'what is the Roote of death in every man', meaning not just individual causes of death, but the universal cause of mortality itself, a subject which might seem to go beyond the compass of the physician. In fact, it could be argued that this subject was not for the consideration of men at all: given that mortality had been the divine punishment for the Fall, to question its causes might be seen as idolatrous and beyond the understanding of human reason. Worsley acknowledged that death was 'a subject that is barely Physicall', and perhaps 'that which is necessarily laid upon all men; and that which wee finde to depend upon a fatality or decree; ... & that therefore all the Philosophy that can be spent about it ... is but a meere vaine & empty speculation'.¹⁴⁹ This, however, did not prevent him from venturing 'another manner or solution then is perhap commonly given':

For it may be did wee rightly know all the Gates & Avenues of death wee should not thincke it either Enthusiasticke or Ridiculous either to affirme or to expect a freedome or Liberation from the common state of mortality & corruption: which state there are some perhap in the earth also (though not knowne save unto some few) who presume & that not without ground they shall see.¹⁵⁰

¹⁴⁸ In the 1650's, Sydenham was indirectly connected to members of the Hartlib circle. A. Cunningham, "Thomas Sydenham: Epidemics, experiment and the 'Good Old Cause'", in *The Medical Revolution of the Seventeenth-Century*, ed. R. French & A. Wear (Cambridge: Cambridge U.P., 1989) pp. 164-190. For Boyle's own unpublished tract on medical reform, which has some similarities with Worsley's, M. Hunter, "Boyle versus the Galenists: a suppressed critique of 17th-century medical practice", in *Robert Boyle (1627-91). Scrupulosity and Science*, pp. 157-200.

¹⁴⁹ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 42/1/32A.

¹⁵⁰ *Ibid.*, HP 42/1/31B.

By understanding the root of death, it might be possible to overcome death itself, and even more contentiously- Worsley suggested the existence of some who were close to proving that death itself is not 'made absolutely fatal & necessary by God'.¹⁵¹ Boyle was likely to need some convincing about this for, although many alchemical authors had suggested that the philosopher's stone could be used as a medicine which would greatly extend the human lifespan, perhaps by hundreds of years, to actually assert that death itself could be avoided was a radical statement. To understand how Worsley came to make this claim, we must look at the direction which his religion had taken in the 1650's, to see how he came to link natural philosophy and theology in an experimental theosophy, and to speculate about the identity of the 'candidati' whom, he claimed, were ready to throw off the shackles of mortality and return to the state of Adam in Eden.

¹⁵¹ *Ibid.*, HP 42/1/33A.

6. 'A Permanent Dream'.

Spiritual Principles and Political Actions, 1657-1659.

Benjamin Worsley's religiosity presents us with certain ambiguities. Although an adherent to parliament in Civil War, in the late 1640's we have seen him pronouncing a theology almost 'latitudinarian', willing to elevate experience above Scripture in accounts of natural phenomena, trusting 'reason' to discern the truth, even to the extent that he found some succour in Socinian writings in Amsterdam. His letters disdained the convoluted spiritual outpourings of the sects, but equally he showed little taste for religious discipline, preferring an irenic and anti-formal Protestantism. This perspective was underpinned by an anti-materialistic morality, which nonetheless did not prevent him from taking a robust stance towards worldly affairs. Indeed, it is sometimes hard to see how Worsley's conscience related to his actions at all.

All this seems to change in the 1650's. Surrounded by religious radicals in the army, Worsley appeared to absorb their mysticism, so that the division which he once erected between divine and human learning collapsed entirely. Little wonder that William Petty judged that in religion, Worsley was 'apt to be any thing that will make him great'.¹ It will be argued that there was more continuity in Worsley's religion than Petty allowed: his later radicalism merely accentuated the same principles as his apparently more moderate earlier self, as he sought to directly access divine truth free of human encumbrances. However, this makes it difficult to relate Worsley's religion to his wider enterprise in any direct sense. In Charles Webster's account, Worsley was one of the 'spiritual brotherhood' whose Puritanism and millenarianism, projected externally

¹ W. Petty, *Reflections upon some persons and Things in Ireland*, p. 89.

into numerous projects, became a template for 'universal reform'. However, we have seen that the connection between Worsley's religion and his worldly projects was not necessarily so direct. Although his preface to *The Advocate* looked forward to a coming millennial age, commerce was too corrupt to directly bring this about, and he advocated a policy of pragmatic survival until God's will for the Commonwealth became clear. We shall see that Worsley would eventually base his political stance on the approaching millennium, but this does not mean that for him *Revelation* offered a consistent guide to public action, much less a manifesto.

In *The Advocate*, Worsley had shown an ambivalence towards commerce which, although being too important for the state to overlook, nonetheless epitomised the corrupt nature of society. Worsley showed a similar anti-materialism shortly after arriving in Ireland, having been sent a copy of a tract published by Hartlib outlining the means to make Virginia prosperous through cultivating silkworms, which also proposed the monetarisation of Virginia's economy. Worsley commented that whilst he liked the information about silkworm husbandry, 'their Proposition about Money to be carried to Virginia j vtterly dislike even so much as if it were possible j would banish money from here in Ireland'.² Similarly, in his debate with Clodius two years later, Worsley asserted that a humble spirit was 'ten thousand tymes more to bee preferred then even the disposal of a whole commonwealths revenue'.³ It was in this context, too, that Worsley apparently began to discuss his spiritual principles in writing, and this is no coincidence because the intensive self-examination demanded of the alchemist was similar to the

² Letter, Worsley to Hartlib. 24 November 1652. HP 61/7/9B. The tract in question was Virginia Ferrar's *Glory be to God on High* (London, 1652). This extract was published in the second edition of the tract, which was included with Hartlib's *The Reformed Commonwealth of Bees* (London, 1655) re-christened *The Reformed Virginian Silk-Worm*, p. 30.

³ Letter, Worsley to Clodius, c. summer 1654. HP 42/1/27A.

Puritan impulse to directly experience God. Nigel Smith has shown that the spiritual seeking of the Interregnum centred on the desire to experience the light of God internally through annihilating individuality, an exercise which paradoxically elevated the self as the medium for spiritual awakening.⁴ Worsley's letters at this time became increasingly concerned with 'registering the changing spiritual state of the self' in this manner.⁵ To Hartlib, he described his realisation that 'I am as dyrt, contemptible, neyther having in my selfe nor being able to discern any thing of goodness'.⁶ God, and not man, was the source of all good and therefore his guide: 'And pray what is Dyrt he should thinke himselfe so good & so great, as to take upon him to iudge, what designes are fitt to be promoted in the world: & at what times & by what meanes?'

The Lord alone was 'the fountaine of good', and those great men brought to power by the Civil War were like the bubbles produced by running water, ephemeral and soon to be replaced by others, a transience which men were unable to accept: 'God brings forth this excellency by this man & we are afraid, o he will dye or he will abuse it, & neglect it! Cannot he bring forth another Bubble, as big as he'.⁷ Thus Worsley based his theology on human powerlessness, but not in a fatalistic sense: purging oneself of human pride was the necessary preparation to becoming an appropriate vessel for Godly perfection, and 'God will never make any man Eminently Instrumentall for him, until he hath shewed him the uselessnesse of himselfe & of all other creatures'. Worsley's spiritual condition was therefore that of waiting on the Lord:

⁴ N. Smith, *Perfection Proclaimed: Language and Literature in English Radical Religion 1640-1660* (Oxford: Clarendon Press, 1989).

⁵ *Ibid.*, p. 229.

⁶ Letter, Worsley to Hartlib, 31 October 1654. HP 42/1/3B.

⁷ *Ibid.*, HP 42/1/4A.

He hath richly given me the nether springs, but it is the upper springs I wayte also for. He hath shewed me how large, & how bountifull he can be. But it doth not yet appeare to me wherfore he hath done all this, or wherein, or what time, or how farre he will make use of me, now if it be fitt for me, to wayte his selfe. ... Are not those things that we specially receive from *the* Lord to be specially disposed of by him?⁸

There was no comfort in this state. At this time, in late 1654, Worsley's personal and public life were in flux, as he had seen his control of the Irish land survey cruelly snatched away by Petty, and had suffered something of an intellectual humbling at the hands of Clodius. Politically, too, this was an uncertain period, and Worsley had little confidence about what role God had designed for him in these affairs. He would spend much of the rest of the decade thus waiting.

An even more unorthodox spiritual influence than Worsley's Baptist associates arrived in Ireland during the mid-1650's, namely the Quakers.⁹ Worsley was known to at least one of these, John Perrot, who was based in Ireland from 1655-7 before leaving on a mission to convert the Sultan of Turkey, and whilst he failed to get that far, he did reach Rome where he turned his attention to the Pope, only to be imprisoned as a lunatic.¹⁰ On the way, Perrot had written to his 'Deare Friend' Worsley, explaining his progress and asking that he provide assistance to his ship-captain; his salutation to Worsley was characteristically Quaker, 'Reaching the seed in thee'.¹¹ Perrot was spurred on by a personal revelation in which the Lord had chosen him as his 'sharpe instrument to thresh upon the mountains of turkye'.¹² Worsley sent a copy of this

⁸ Ibid., HP 42/1/4A-B.

⁹ Barnard, *Cromwellian Ireland*, pp. 109-112.

¹⁰ N. Smith, "Exporting Enthusiasm: John Perrot and the Quaker epic", in *Literature and the English Civil War*, ed. T. Healy & J. Sawday (Cambridge: Cambridge U.P., 1990) pp. 248-264.

¹¹ Letter, John Perrot to Worsley, 10 September 1657. HP 26/28/2A.

¹² Copy of Perrot's prophecy. HP 26/28/4A.

prophecy to Hartlib, along with Perrot's letter and an expanded account of his journey, in his own hand.¹³ Thus it is likely that Worsley was personally supporting the Quaker's venture, and this conclusion is strengthened by his accompanying note, signed 'one who is willing to serve *the* meanest for Christs sake'.¹⁴ Worsley apparently accepted the reality of Perrot's prophecy, which had 'hardly beene given to any stranger yett', whilst he looked forward to 'that day *which* many see not though it be nigh ... when *the* Mountaines are throwne downe and *the* valleys exalted'. Perrot sought to make himself the Lord's vehicle, writing to Worsley 'not at a distance, but in the Truth of god, in his power & measure thou mayest feele my presence!'.¹⁵ Such sentiments collapsed the division between man and God, who spoke through him, and this was theologically dangerous territory even within the relatively tolerant Hartlib circle.¹⁶ One Hartlibian whom Worsley counted as a like-minded spirit departed from him when it came to the Quakers; having heard of the imprisonment of several of them in Rome, John Beale noted how he had 'very diligently enquired into the depth of their wayes, & doe apparently find *them* to bee the depthes of Satan. For they are filled with the gall of bitternes, & are ... given to rayling & reviling'.¹⁷

Whilst he never claimed membership of any particular sect, Worsley probably counted himself a fellow traveller of groups like the Quakers, and his spiritual explorations were part of the explosion of radical religion of the 1640's and '50's. This was marked by revelation, prophecy and mystical illumination, all of which would manifest themselves in Worsley's private correspondence, and yet these letters were

¹³ Account of Perrot's journey, in Worsley's hand. HP 26/28/3.

¹⁴ Note from Worsley to Hartlib concerning Perrot. HP 26/28/5A.

¹⁵ Letter, John Perrot to Worsley, 10 September 1657. HP 26/28/1A.

¹⁶ By 1659, Hartlib himself was expressing concern about the threat posed by the 'sword of the Quakers'. Letter, Hartlib to John Worthington, 20 July 1659. Printed in *The Diary and Correspondence of Dr. John Worthington*, ed. J. Crossley, Vol. I (Chetham Society Vol. XIII: Manchester, 1847) p. 143.

¹⁷ Letter, Beale to Hartlib, 6 August 1658. HP 51/4B.

also written in context of a milieu that valued a 'plain style' in religion and philosophy, and which was at the forefront of promoting the new science in England.¹⁸ Rather than turn his back on his scientific pursuits, these became absorbed into Worsley's 'theosophy', a hybrid of 'reason' and revelation involving the study of Scripture and nature alike.

Sectarians such as Perrot frequently voiced their divine conversations in the form of prophecies, merging God and the spirit in moments of supernatural inspiration, dreams which were 'genuine intimations of the proximity of the divine'.¹⁹ Worsley's attitude to prophecy is shown in his commentary on *Lux in tenebris*, the collection of prophecies compiled by Comenius, which Hartlib sent him in early 1658.²⁰ Although these visions were 'sweetmeates', Worsley was not wholly credulous of their truth: those of Nikolaus Drabik (Drabicius), for example, were 'dreames rather than visions', and 'Ordinary & naturall'.²¹ However, Worsley also explained that he did not see the gift of prophecy as ceasing with the age of the apostles. Prophecy was present in all ages, and its ultimate object was to explicate the 'person mystery office Kingdome or Gospell of Christ', the great prophet himself and the 'Alpha & Omega of *the* whole'. Worsley accepted that there might be more specific prophecies relating to 'privatt or perticular Providences' such as Christopher Kotter's prediction of the restoration of Frederick V to Bohemia in *Lux in Tenebris*.²² But ultimately Scripture was the 'compleat hystory', and Worsley would 'despise & Reiect any Vision, dreame Exstasy Revelation or prophesy, that would pretend to shew vs another way or mystery of God'.

¹⁸ For the former, Smith, *Perfection Proclaimed*, passim.

¹⁹ *Ibid.*, p. 102.

²⁰ On the contents of this book, F. Yates, *The Rosicrucian Enlightenment*, (London & New York: Routledge, 1972) pp. 203-8.

²¹ Letter, Worsley to Hartlib, 20 January 1658. HP 33/2/12A.

²² Yates, *Rosicrucian Enlightenment*, pp. 203-4.

Perrot-like revelations had their place in illuminating Scripture, but they were merely ‘*the very small and young dawns, The thyn scattering Prodromi ... In comparison of that great spirit of glory ... that he is about to powre down vpon his church*’.²³

One reason to suspect that apparent prophecies may in fact be dreams was because of the fallibility of the mind and senses of fallen man. The concern of pedagogical reformers such as Alsted and Comenius was to build a method which would guide the mind from out of this labyrinth.²⁴ Worsley was well aware of the obstacles to gaining certain knowledge, hazardous ‘Rockes’ including ‘bare opinion’, and ‘Prevalency & Authority of Custome’.²⁵ The fall of man had shattered the divine image of God, and left him in a condition of metaphysical uncertainty:

How will he be more certaine, That he is thereby neerer *the truth*: or that *the Roote of what* he so firmly & constantly beleeves rests not in some species of Melancholy: in some abtruse Web of metaphysicall subtilty or vnintelligible curiosity. In *the height or strength of an Active powerfull, perswasion & fancy*. In a permanent dreame or in *the shop & wombe of his owne single Imagination & notion or in the dreames & Imaginations of others that are eqvally as mad as he*.²⁶

The post-Reformation aspiration to transcend the corruptions of Papal ‘custom’ and directly access God’s message had left no recognized arbiter in spiritual affairs, which might lead to scepticism that man could ever rise above his fallen senses and reach God. But just as he had affirmed that God would rescue the pious man from his unworthiness and make him instrumental, Worsley proclaimed that with God’s help truth would overcome doubt:

²³ Letter, Worsley to Hartlib, 20 January 1658. HP 33/2/12B.

²⁴ D. Čapková, “Comenius and his ideals: escape from the labyrinth”, in *SHUR*, pp. 75-91.

²⁵ Letter, Worsley to Hartlib, 14 October 1657. HP 42/1/7B.

²⁶ *Ibid.*

For I affirme positively that there is a multitude of Truth, yea which is more *that* Truth is much larger then error. For error is but finite, weake, inconstant, temporary, & *the* production only of sleepe & of *the* night. Truth is infinite, powerful, strong, constant, before all time, & *the* production of necessity vnity light.²⁷

Referring perhaps to philosophers like Descartes who sought to deduce their own existence and that of God from first principles, Worsley affirmed that ‘a man may be more certaine of Truth then some are now of their owne beings, & that they are not Beasts rather then men’.

For the means to access this truth, Worsley turned to a fusion of reason and the divine reminiscent of Comenius’ *Pansophy*.²⁸ Advocating the holistic study of all disciplines, whether they were history, law, and divinity, or physics, chemistry, and astrology, Worsley warned that ‘he that will study Chymistry also & thinke to compleate *himself* in knowledge thereby shall be allwayes in a labyrinth, & a thick wood without being able to institute a series of any experiments rationally sollidly & certainly’.²⁹ By contrast, Worsley aimed at becoming a ‘vniversall Scholler’, hoping like Alsted to overcome the fragmented self through ‘a reformation of the individual, conceived as the restoration of the image of divine perfection to each of the human faculties through an encyclopaedic education’.³⁰ Worsley increasingly interpreted alchemy in this light, its goal being to ‘lead vs to a certaine not imaginary knowledge of simplicity homogeniety clarity, purity, Perfection & *the* solitary & yet distinct waies of nature’.³¹ Above all, true knowledge rested on seeing ‘harmony, Image & resemblance’ between the ‘lawes, course, & motions’ of nature, and ‘*the* lawes, mysteryes, Revelations, & discoveryes of things spirituall’. Only by this combination of human and

²⁷ Ibid., HP 42/1/8A.

²⁸ See Popkin, *Third Force in Seventeenth-Century Thought*, pp. 104-5.

²⁹ Ibid., HP 42/1/7A.

³⁰ Hotson, *Johann Heinrich Alsted*, p. 273.

³¹ Letter, [Worsley?] to [Hartlib?], 28 July 1658. HP 15/8/19A. Although the author of this letter is not noted on Hartlib’s extract, comparison with the following quote strongly suggests that it was Worsley.

divine learning could man 'see one face, viz. Constancy, simplicity, Identity, Homogeniety, Vnity'.³²

Seventeenth-century intellectuals were preoccupied with presenting ways to affirm certain knowledge of God in the face of scepticism or atheism, and Worsley's solution was to invoke 'Truth' in an almost mystical sense, based on faith alone, but God's presence could also be discerned in Scripture, in Creation, and in the rational soul implanted in man. As a divine faculty, reason was a vehicle through which to access holy truths and was thus not necessarily incompatible with revelation. However, Worsley was suspicious of those philosophers who sought to elevate human reason above its place, 'the right Reasoned man, the Atheist the formall Professor the luke warme ignorant hypocrite', who rejected revelation.³³ Reason clearly had its limits:

And therefore though I disdain nothing *that* is Right & solid Reason, though I know or believe nothing nor can doe in Naturalls but vpon a very strict & severe scrutiny & exploration of Reason. Though I know noe man can have any thing in reality & truth *that* is not consistent with *the* highest reason. Yet as I doe make a vast distinction between *the* power of Reason & *the* Gifts (graces, goodnesse wisdome) & influence of God soe I doe much more putt a price vpon his Gifts in any man then vpon *the* consideration of his Reason & Parts.³⁴

Knowledge without piety was empty, but together they could lead to a greater understanding of God, and Worsley was willing to enlist the ideas of the new science to this task.

In the late 1650's, Worsley became increasingly preoccupied with explaining the nature of the spirit. These 'Principles' began with the assumption that living things each contained within them a series of three 'centres', evoking the Neoplatonic macro-

³² Letter, Worsley to Hartlib, 14 October 1657. HP 42/1/7A-B.

³³ Letter, Worsley to Hartlib, 20 January 1658. HP 33/2/12B.

³⁴ Letter, Worsley to William Potter, 7 April 1658. HP 39/2/62B.

microcosm.³⁵ However, this equally echoed the scholastic understanding of the soul, which was divided into three sets of 'faculties': vegetative faculties possessed by all living things, including growth and reproduction; emotional faculties, providing for sensation and motion, and shared by humans and animals; and finally, confined to humans alone, the intellectual faculties which 'made humans capable of grasping genuine universals and also of reflecting on themselves and their own mental operations', the rational mind.³⁶

Worsley adopted a similar hierarchy of the spirit, although he included non-living objects in his discussion, perhaps to show the universal connections between all of matter. Worsley's basic unifying principle shared by all bodies was not a set of faculties, but a 'Magicall Centre', which explained how 'the earth though moveable both annually & diurnally yet standeth with a perpetuall respect in its poles to one constant certaine poynt in *the Heavens*'.³⁷ Thus the earth followed a fixed orbit, and equally every terrestrial body contained 'a Center struck: *which is the Center of Gravity to it, which Centre doth as constantly move paralell to the Centre of the earth*'. The physical observations of the new science suggested that all bodies were connected by the force of gravity, although in this pre-Newtonian age Worsley interpreted this as a 'magical' correspondence joining all things. The second 'centre', found only in living ('or rather progressively moving') beings combined the motions of respiration and circulation of the blood. The constant beating of the heart and 'coveting of Respiration' were necessary for life itself, and Worsley interpreted them as 'paralel with *the Light*',

³⁵ Letter, Worsley to Hartlib, 8 September 1658. HP 62/10/1A.

³⁶ D. Garber, 'Soul and Mind: Life and Thought in the Seventeenth Century', in *The Cambridge History of Seventeenth-Century Philosophy*, Vol. 1, ed. D. Garber and M. Ayers (Cambridge: Cambridge UP, 1998) p. 760.

³⁷ Letter, Worsley to Hartlib, 8 September 1658. HP 62/10/1A.

by which he appears to have meant an external life-force circulated around the body in blood.³⁸ Although he did not overtly say so, this could clearly be identified with the 'philosophical salt', *sal nitrum*.

These centres were distinct, but parallel. This was also true of the third centre in man, 'struck through his spirit or intellectual part (which is that that makes him capable of personality)'.³⁹ Just as gravity and respiration connected the individual to the cosmos, the spirit itself relied on a communion with the external world. Worsley demonstrated this by noting that 'noe Body Spirit or Soull ... can stand or be one moment of time solitary, or by its selfe; but *that* all things both are in Consortship, & made in a dependance with, & upon some other things'. Just as the heart beat 'constantly in a Communion with ayre light or Anima Mundi', unable to move itself, the human spirit could not bear solitude, but constantly demanded 'a communion of its kinde & with its nature and kinds'.⁴⁰ Human sociability therefore demonstrated that the soul was incapable of self-motion, but required external stimulation.

In his preface to *The Advocate*, Worsley had presented human society as corrupted by pride and custom, but his understanding of the spirit offered the hope of transcending this state. The spiritual centre in man gave him personality, and as such was the location of his desires for credit, power and esteem, and ultimately acquisitiveness and lust. However, man could attain spiritual perfection through self-realisation, by considering 'what Spirit he entertaines into the bosome of him, to dwell and live & abide in him'.⁴¹ The soul existed in different degrees of perfection, and it was necessary to 'separate *the* darkness from *the* light & to make *the* evening & *the*

³⁸ *Ibid.*

³⁹ *Ibid.*, HP 62/10/1B.

⁴⁰ *Ibid.*, HP 62/10/2A.

⁴¹ *Ibid.*, HP 62/10/2B.

morning the first Day', an inner resurrection or reformation of the self. Corrupt society could be transcended by a communion of the spirits, uniting those 'that are reduced to a singleness of *the* truth & of *the* Light':

Blessed are they whose centre union & rest is constantly in & with their true roote & head. And blessed are they to whom the Lord hath & shall give a true & spiritual knowledg & discerning of these things & of *the* great incomprehensible Mysteries *that* attend *them/* & are contained in *them/* & to whom all this visible Worlds Power is nothing./⁴²

Here, Worsley discussed not only religion, but psychology, the metaphysical status of man within Creation, and the nature of the true Church, as a spiritual union. However, Worsley was reluctant to give his wholehearted support to those Hermetic or mystical authors he veered towards, for example Jacob Böhme, who equally relied on mystical descriptions of the correspondence of the spirit and Creation, but whom Worsley claimed to have little use for. The writings of Ramon Lull were 'darke, as full of Sophistication & corruptions', and Paracelsus whilst commendable as a 'cleare & Rationall man', was 'intoxicated now & then partly with *the* sight of his owne knowledge'.⁴³ In the case of alchemy, '*the* knowledge of *that* great secret doth correct the wildenesse of *the* Imagination & depends only upon *the* sobriety of Truth'.⁴⁴ Like the Cambridge Neoplatonists, Worsley was concerned to refute materialistic assumptions: by suggesting that living things could not move themselves, he introduced a divine force as the final cause of movement in physical bodies, although in a less intellectually contrived way than More's 'Hylarchic Principle'.⁴⁵ Wary of materialism,

⁴² Ibid.

⁴³ The comments on Böhme, Lull and Paracelsus, as well as many other alchemical authors, are in Worsley's letter to Hartlib of 14 February 1656. HP 42/1/5-6. On Böhme and the sects, Smith, *Perfection Proclaimed*, pp. 185-225. Worsley's library catalogue listed no less than 9 works by Böhme however, all published in English in the 1640's and '50's.

⁴⁴ Letter, [Worsley?] to [Hartlib?], 28 July 1658. HP 15/8/19A.

⁴⁵ On the 'Hylarchic Principle', an incorporeal spirit which animated nature, representing the direct hand of God, A.R. Hall, *Henry More. Magic, Religion and Experiment* (Oxford: Blackwell, 1990) pp. 114-118.

Worsley was nevertheless convinced that it was only necessary to proclaim the divine to demonstrate His true presence, which did not require proof. Instead, Worsley's spirituality was intended principally to illuminate the inward struggle by which man could overcome his fallen and fragmented state, and attain perfection.

The search for divine perfection linked the sects of revolutionary England with the 'second reformation' of Alsted and Comenius, who hoped to see the *imago Dei* restored to its original state, an internal reformation resembling a spiritual battle within the self. The fall of man, the divine sacrifice, the workings of grace and the resurrection could all take place within the individual, as could the millennial kingdom itself: 'as there are many Mansions prepared for us./ Soe perhap it is noe less true *that* there are many Mansions in us'.⁴⁶ This was the context in which Worsley wrote his letter to Robert Boyle in early 1659, claiming that death itself could be defeated.

Worsley's theosophy culminated in a spiritual communion, an alternative sociability which transcended the corrupt human world. In this light, Worsley's letter to Boyle appears as an attempt to reach him not just intellectually, but spiritually. We may speculate at how the famously scrupulous Boyle reacted to this approach.

In fact Worsley seems to have been aware of the religious objections his argument may provoke, and was at pains to demonstrate that it was not incompatible with Scripture's account of the origins of mortality in the fall of man. The author of this punishment, he explained, was not God, but the Devil, whose power was to 'alter the whole frame & Oeconomy of this our outward & humourall substance' and corrupt the

⁴⁶ Letter, Worsley to Hartlib, 8 September 1658. HP 62/10/2B.

body.⁴⁷ Physically, Satan wielded a power over the air, which brought corruption and death, 'by Rarefaction & Coagulation'- the same atmospheric 'motions' which Worsley had considered in his 'Physico-Astrological Letter'. However, more important was the spiritual power with which the Devil was able to bring about spiritual death. Though physical mortality was introduced with Adam and Eve, the death of the spirit was repeated within each individual life thereafter, in the form of a struggle between light and darkness. Man had fallen from 'Paradyse & became changed in *the* very nature, Powers, principles & Operations of his life'.⁴⁸ However, this did not 'extingvish that spirit in man that hath life in its roote', although darkness covered 'the face of this great & wide & indefinite Deepe ... soule, minde, or spirit'. Recalling his discussion of the three 'centres' in man, Worsley described how the intellectual spirit was degenerated, unable to know even itself, indistinguishable from that of other creatures:

The alpenetrating, Insanguinall indimensionall indissipable spirit of man not being able to oppose or resist in the meane time this inevitable motion or rotation of the spirit of the world together with the Periods & aspects of it upon her flesh nor yet able to defend this her wedded (Physikall & organically) consort as not being recovered out of that state of weaknes & emasculatenes into *which* she is necessarily throwne by being subject to the Rule & light of the spirit of the world & of the flesh & to the light ...⁴⁹

If we recall that Worsley had described the intellectual centre in man as being in balance with the other centres, of gravity and respiration, here he seems to be suggesting that this attachment to the 'world spirit' was the cause of mortality. This was true both physically and spiritually, as man's fall into darkness had kindled 'a lust in the spirit of man to a union with the spirit of the world & with the outward light glory & splendor of

⁴⁷ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 60/2/2B.

⁴⁸ *Ibid.*, HP 42/1/32A.

⁴⁹ *Ibid.*, HP 60/2/2B.

it'.⁵⁰ But this spirit was 'fraile, brittle changeable & subject to all manner of motion & alteration', and man's lust to be united with it led to that 'constancy fixednes imortalitie (all *which* were & really are at the birth of every man hid in the roote of this his spirit) being utterly lost'.

However, it was possible for the spirit to overcome this darkness, just as there was plentiful evidence for the possibility of advancement in all human affairs. In learning, there was a clear difference between 'The science of a Schooleman, of a Caballist of an Vniversall Schollar with *that* of a Ideot or common Clowne'.⁵¹ The history of human societies, too, showed that although many nations were in darkness, progress was possible through '*the* severall Arts Invented, The multitudes of Lawes enacted & *the* subtilty of *that* Policy & Government among men'. But the real victory of light over darkness would come from within. Worsley assumed '*that* though all men come into *the* world alike darke, yet all men live not in *the* world so alike, some having raised & angelicall spirits while others are but Brutish & sottish'. Such elevation was a product of knowledge, acquired through 'labour, search, study & Travell', and God had 'afforded meanes for *the* improving, encouraging, & advantaging of him in his spirit & knowledge'.⁵² Most importantly, God had promised 'to give wisdome, & to give his spirit to them that shall aske it'. Examination of Scripture showed that this promise was of 'light & knowledge' without limitation, offering escape 'out of *the* bondage, power, darknesse or naturall blindnesse of flesh & our sense by *the* light, power spirit wisdome of God'.

⁵⁰ Ibid., HP 60/2/3A.

⁵¹ Ibid., HP 42/1/32B.

⁵² Ibid., HP 42/1/33A.

Whilst man's spirit, deceived by Satan, lusted for union with the world, it shared the condition of mutability and corruption of earthly objects, and the consequence was death. Therefore the only way to overcome death was to dissolve 'the lynk of lust or of unrighteousnes & sin in the roote of it *which* is the appetite'.⁵³ Fortunately, the spiritual power of Satan paled before that of God, and with his help the human spirit could be 'recovered into their true originall & pristine light':

As a state of darkenesse therefore is a state of weakenesse, so a State of light is a State of power. As a state of darkenesse & sense & brutishnesse is a necessary & inevitable state of corruption & death, & cannot as wee acknowledge possibly be otherwise; so a state of light & exercise of power according to *the* spirit is a state of a life, or a state above *the* Power Reach or comprehension of death...⁵⁴

Although death could literally be banished, Worsley did not anticipate this as resting on spiritual reflection alone. Ultimately, the causes of death were 'partly Physicall partly mysticall or Theosophicall'.⁵⁵ Man had to labour to achieve wisdom and enlightenment, through self-illumination and the study of nature, and Worsley's mention of 'the healing Water of an incorruptible fountain' reminds us of his scientific search for energy, that 'spermatical' liquid produced by nature to nourish all things. Divine and natural could never really be distinguished, however: the spirit was described naturalistically, and the study of nature would have divine ramifications.

What is striking about this letter is the ease with which Worsley moved from discussing a programme of Baconian medicinal reform which, one imagines, would have been welcomed by the soon-to-be founder member of the Royal Society, to a mysticism more to John Perrot's taste. No record of Boyle's response survives, but

⁵³ Ibid., HP 60/2/3B.

⁵⁴ Ibid., HP 42/1/33B.

⁵⁵ Ibid., HP 60/2/4A.

although he may have found its sentiments theologically suspect, we should note that in spite of his religious 'scrupulosity' Boyle was relatively open to unorthodox opinions and influences, and was not so rigid a defender of Anglican orthodoxy as is sometimes suggested.⁵⁶ But there was undoubtedly a gulf between him and Worsley: at this point, the latter's spiritualism was at his zenith, and this would continue into 1659 when the breakdown of the Protectorate shattered the uneasy stability of the previous five years, creating a political vacuum which rival groups competed to fill. But whereas previously Worsley had questioned whether God's plan for England was clear, by now he was much more convinced that great changes were afoot, and his days of waiting appeared at last to be over.

Man liberated from death would return to his pre-lapsarian state, a reformation of the individual which might be the basis of the reformation of the world. However, we have seen that Worsley's sceptical attitude to politics existed uneasily with any utopian pretensions, making him aware that the civil sword could threaten individual conscience, rendering the Puritan's alliance of magistracy and ministry problematic.⁵⁷ Cromwellian rule seemed to prove that such an alliance entailed persecution, and Worsley was sympathetic to the most persecuted of the sects, Quakers and Socinians.⁵⁸ We do not know if Worsley yet followed his patron Sir Henry Vane in calling for the

⁵⁶ For Boyle's attitude to religious unorthodoxy, see M. Hunter, "How Boyle Became a Scientist", in *Robert Boyle (1627-91) Scrupulosity and Science*, pp. 51-7.

⁵⁷ For the problems faced by the Puritans in power, W. Lamont, *Godly Rule. Politics and Religion 1603-60* (London: Macmillan, 1969) pp. 106-143; J. Spurr, *English Puritanism 1603-1689* (London & Basingstoke: Macmillan, 1998) pp. 114-130; D. Hirst, "The Failure of Godly Rule in the English Republic", *Past and Present*, 132 (1991) pp. 33-66; C. Durston, "Puritan Rule and the Failure of Cultural Revolution, 1645-1660", in *The Culture of English Puritanism, 1560-1700*, ed. C. Durston & J. Eales (London & Basingstoke: Macmillan, 1996) pp. 210-233.

⁵⁸ B. Worden, "Toleration and the Cromwellian Protectorate", in *Studies in Church History 21. Persecution and Toleration*, ed. W.J. Sheils (Oxford: Blackwell, 1984) pp. 199-233.

separation of church and state, but he did question whether civil authorities could suitably follow spiritual goals. In June 1655 Hartlib's German correspondent, the scholar Georg Horne, had written a letter calling for Protestants to unite against the Papacy in a Holy War, 'While the English Fleet rides master vpon the Mediterranean Sea'.⁵⁹ Worsley's response is telling:

For *the* Subiect of Dr. H. Letter, I doe a little stagger at, as not well vnderstanding *the* Composition of a Christiano Political War, not being as yet thoroughly convinced, that *the* way which *the* Lord has in his purpose determined for *the* subversion of Antichrist, is by a slaughter made of *the* Papists, or by an Oecumenical Council & Confoederation of all *the* Protestants & their Princes. Yea I thinke, such Discourses to savor much more of Notion, & of a retired contemplative Speculation, then of a solid & sound judgment, even about *the* nature of Humane Actions.⁶⁰

History showed 'the Vanity of such an Vndertaking', and the nation was 'in the darke, concerning the Councils of God'. In this state of transcendent doubt, Worsley counselled caution over 'such great & specious Ends', and advised 'following, rather then running, before the Voice of God in Providence'. This attitude upset John Dury, who had been advocating Protestant unity for his whole adult life, often calling for a war against the Papacy. He tersely advised that Worsley ('who has a good facultie of ripping vp deceitull & Politicall subtill practises of cunning men') devote his 'sharpe witte' to attacking the Pope rather than his fellow Protestants, by which 'hee would serve God & the Commoncause at home, more advantagiously then I believe hee hath hitherto done in any of the employments'.⁶¹ Dury was evidently aware that he and Worsley were diverging in their attitudes to the Protectorate.

⁵⁹ Letter, Horne to Hartlib, 16 June 1655. HP 1/3/1A.

⁶⁰ Letter, [Worsley] to [Hartlib], 1 August 1655. HP 1/3/1B.

⁶¹ Letter, Dury to Hartlib, 25 August 1655. HP 1/3/3A-B.

However, for most of the decade Worsley equivocated over opposing a regime which many saw as a betrayal of the 'good old cause'. He admired John Beale as a model of political impartiality, observing that 'those Persons are most successful in bringing forth of Generall good, ... are faithfull in the opportunities they have, though they seeme but small', in comparison with those who 'allwayes quarrell with the present seasons & times'.⁶² For most of the decade he was content to receive a state salary, but over 1658 Worsley became irrevocably alienated from the regime. His frustration centred around an attempt to finance Hartlib's old project of an Office of Address with the proceeds of Irish lands, which William Petty opposed.⁶³ This plan was launched in late 1656, during Worsley's extended visit to England, with William Rand's brother James fronting a petition to Cromwell on 25 December.⁶⁴ The committee appointed to consider this reported favourably, suggesting that the backers should be allowed to purchase £10-12,000 worth of debentures to finance the venture, subject to approval from the Lord Deputy and Council in Ireland.⁶⁵ Worsley was clearly organising the project behind the scenes in conjunction with Samuel Hartlib junior, supported by allies like Boyle; by December 1657 he claimed to have 'a considerable stock assigned by the donors', and things looked hopeful in January 1658 when the proposals were presented to the Irish authorities.⁶⁶ But, in February he was warning that 'our affaire here is yet doubtfull'.⁶⁷ Worsley was soon complaining about his letters being opened under

⁶² Letter, [Worsley] to Hartlib, c. April 1657. HP 8/22/1A.

⁶³ The best account is Barnard, *Cromwellian Ireland*, pp. 229-234.

⁶⁴ Petition to Cromwell on the Office of Address, 25 December 1656. HP 47/4/1. William and James' father, a physician also called James, had been an investor in the Irish adventure; his son James inherited his share in 1654. *CSPI, Adventurers*, p. 102.

⁶⁵ Committee report. HP 47/4/6.

⁶⁶ Letter, Worsley to Samuel Hartlib jnr, 23/27 January 1658. HP: Royal Society MS Boyle Letters 7.3, fol. 1v; Letter, Worsley to Samuel Hartlib jnr, 29 December 1657, included in letter, Hartlib to Boyle, 7 January 1658. Printed in Boyle: *Correspondence*, Vol. 1, p. 248.

⁶⁷ Letter, Worsley to Hartlib, 10 February 1658. HP 47/3/1A.

Petty's orders, and feared that Petty would take over the proposal for his own ends.⁶⁸ To avoid this Worsley turned to Dury, pleading that he personally stood to lose up to £800 if the plans did not go ahead.⁶⁹ But by June it was clear that the regime had no intention of offering support, the design having been 'privatly & by an unknowne hand obstructed'.⁷⁰

As well as his personal antipathy to Worsley, Petty appears to have seen the revived Office of Address as a potential vehicle for Henry Cromwell's opponents.⁷¹ Indeed, Colonel Sankey had some involvement, but despite this it is unlikely that there were any politically sinister motives in a venture supported by a moderate like Boyle.⁷² However, Petty's suspicion encouraged Worsley to close ranks, stating that the venture had to be managed 'entirely among our selves, who understand the aimes, hearts, lives, ends, principles & Spirits one of another', naming Hartlib, Dury, Boyle, Sadler, and Beale as trustees.⁷³ Worsley was becoming ever more disillusioned with a regime which allowed someone like Petty to prosper at his expense, encouraging him to belatedly discover individual liberties against state power: 'If the state have a mind to set up such an Institution, let them doe it of their owne, & dispose it to their owne Ministers', he asserted, but 'If other men are willing to lay a foundation of so much good, let not the

⁶⁸ Letter, Worsley to Hartlib, 23 February 1658. HP 47/3/1A; Letter, Worsley to Hartlib, 26 May 1658. HP 47/3/1B.

⁶⁹ Letter, Worsley to Dury, 26 May 1658. HP 33/2/9.

⁷⁰ Letter, Worsley to Hartlib, 9 June 1658. HP 47/4/3B.

⁷¹ Petty later noted (with tongue-in-cheek) the various means used to attack him in the late 1650's: 'Emissaries sent forth to all quarters from whence the least light was hoped; Letters dispatcht into all Corners of the Nation; a formal Office of Address erected...'. *Reflections upon some persons and things in Ireland*, p. 124

⁷² Letter, Worsley to Samuel Hartlib jnr, 23/27 January 1658. HP: Royal Society MS Boyle Letters 7.3, fol. 1v. Letter, Worsley to Samuel Hartlib jnr, 29 December 1657, included in letter, Hartlib to Boyle, 7 January 1658. Printed in Boyle: *Correspondence*, Vol. 1, p. 248. The subscribers to this venture apparently included Dr Thomas Clarges and Colonel Arthur Hill, certainly no radicals: see *DNB*.

⁷³ Letter, Worsley to Hartlib, 26 May 1658. HP 47/3/2A.

State hinder them by interposing among them; For in these things every man is free...'.⁷⁴

Worsley's political disillusion, his paranoia about Petty, and his religious mysticism, converged in 1658. He became increasingly concerned to ensure the support of his Hartlibian allies. In rather exaggerated terms, Worsley offered himself to Hartlib 'as a sonne to be disposed of by you', promising to serve his wishes in the (increasingly probable) event of Hartlib's demise.⁷⁵ Such elevated piety was also prominent in Worsley's surviving correspondence with a newer acquaintance, the projector William Potter. Rather than taking an interest in his banking or engineering projects, Worsley took to offering Potter some rather pompous words of fatherly advice.⁷⁶ He cautioned Potter to recognise that his talents were 'from the Lord alone', and that '*the lesse you are knowne to men (expecially to those who only have the spirit of the world:) the lesse subject you will be to be deceived by them*'.⁷⁷

In the light of his spiritual principles, personal relationships began to hold an elevated significance to Worsley. In his letter on the causes of death, he hinted at the existence of a spiritual elect who would be used by God in his war against the Devil: 'That as he hath had his Venefici whom he hath instructed in this his art of poysoning incantation & sorcery soe the Lord & his Helias is about & will have their schoole of Candidati who shall instruct the world to avoid the snares of the Devill'.⁷⁸ By 1659 Worsley was quite attached to the prophecy of Elias Artista, whom Paracelsus had predicted would come forth to illuminate the world.⁷⁹ Worsley assured the ailing Hartlib

⁷⁴ Ibid.

⁷⁵ Letter, Worsley to Hartlib, 6 January 1658. HP 33/2/7A.

⁷⁶ Letter, Worsley to Potter, 7 April 1658. HP 39/2/62-3.

⁷⁷ Letters, Worsley to Potter, 20 January 1658 & 17 November 1658. HP 33/2/10, 26/33/6.

⁷⁸ Letter, [Worsley] to [Boyle], c. late 1658-early 1659. HP 60/2/4A.

⁷⁹ See Young, *Faith, Medical Alchemy and Natural Philosophy*, pp. 236-7.

that ‘The Devill hath but a litle while & he Rageth’, before ‘the greate Elias & his ministry which is suddainly to suprise part of *the* world; Soe when he & his schoole fellowes of children are truly embodied in one society together, Satans power will never ... deceive *the* world’.⁸⁰ Furthermore, Worsley claimed to have become ‘acquainted with some that are really (at this present) of *the* said schoole of the said Elias Artist *the* greate’. Perhaps such hopes were behind an apparent attempt to make contact with the son of the English mystical writer and promoter of the Rosicrucians, Robert Fludd, mentioned in Beale’s letters to Hartlib in late 1658.⁸¹ Beale longed to know Worsley’s opinion of ‘De adeptis, et R.C’, but was himself wary of delving into magic, believing that Fludd had been ‘iustly blameable for publishing soe much of those curious arts, which are dangerous & prohibited’.⁸²

Although we can only speculate about whom Worsley meant by the ‘candidati’, he was more open about naming those oppressors who would be vanquished in the coming ‘separation ... betwene the wheate & *the* chaffe’.⁸³ Following the failure of the Office of Address project, Worsley’s outpourings against Petty became ever more apocalyptic, as he warned that the Lord would bring his enemy ‘if not to a timely & great Remorse, then to an eminent ruine. For it is no small stayne, Pride – crime & guilt that his soule hath contracted’.⁸⁴ Soon Worsley’s apocalyptic anger would spread from Petty to the regime he served, as it began to unravel following the death of Oliver Cromwell.

⁸⁰ Letter, Worsley to Hartlib, 4 February 1659. HP 33/2/16A.

⁸¹ Letter, Beale to Hartlib, 7 December 1658. HP 51/39-40. See also M. Stubbs, “John Beale, Philosophical Gardener of Herefordshire, Part 1. Prelude to the Royal Society (1608-1663)”, *Annals of Science*, 39 (1982) p. 482.

⁸² Letter, Beale to Hartlib, 14 December 1658. HP 51/41. Letter, Beale to Hartlib, 21 December 1658. HP 51/52.

⁸³ Letter, Worsley to Hartlib, 20 January 1658. HP 33/2/12B.

⁸⁴ Letter, Worsley to Hartlib, 14 July 1658. HP 47/3/4A-B.

Worsley's pronouncements in those dramatic months were his most directly millenarian, and he was even confident enough to date the coming of the Lord to 1666, before which time 'Rotennesse and Corruption shall perpetually follow all *the* Councells plots, and designes of evill men' into oblivion.⁸⁵ His hopes were pinned on Sir Henry Vane, who was frequently accused of seeking to introduce a dictatorship of the saints who would lead the way to the millennium.⁸⁶ But there is a disparity between Vane's evocation of the rule of the regenerate, and his simultaneous advocacy of liberty of conscience and the separation of church and state. It appears that Worsley, who also 'privileged the spirit' in his politics, reconciled these positions by positing the role of the godly as destroying spiritual oppression, and creating the conditions where religious liberty would thrive.⁸⁷ Certainly his theosophy relied on the pursuit of divine enlightenment free from any civil intrusion:

And indeed so thinke *that* Darckenesse, Wickednesse, Oppression, evill, vnrightes lyes, falsehood, covetousnesse, Death, payne, misery, wayling, lamentation, Bondage, cruelty, deformity, disquiett and trouble: shall all of them have an end; shall all of them have an end together; And *that the* end of them all is really et truly already at hand. And to thinke, *that* after they are dead, they shall never rise againe to reigne any more for ever et ever, and to thinke, wee shall see the fullfilling of these things in part even our selves in these our dayes, I say all are no small Considerations to arme vs both with Patience et with Courage.⁸⁸

Before this utopian state could commence, however, it was necessarily to overthrow corrupt government, and for Worsley this was symbolised by William Petty, who was by then undertaking the survey of the adventurers' lands.⁸⁹ Henry Cromwell's

⁸⁵ Letter, Worsley to Lady ?, 20 April 1659. HP 33/2/1A.

⁸⁶ D. Parnham, "Politics Spun out of Theology and Prophecy: Sir Henry Vane on the Spiritual Environment of Public Power", *History of Political Thought*, Vol. XXII, No. 1 (Spring 2001) pp. 53-83.

⁸⁷ *Ibid.*, p. 83.

⁸⁸ Letter, Worsley to Lady ?, 20 April 1659. HP 33/2/13A-B.

⁸⁹ See Chapter 4, above.

enemies launched a concerted attempt to turn the adventurers against Petty throughout 1658, probably with Worsley's assistance.⁹⁰ Although Petty eventually succeeded in gaining the adventurers' backing for his re-survey, some of the mud thrown at him had undoubtedly stuck.⁹¹ In December, Petty received news of 'a strange libell issued against him at Dublyn, with news of a great endeavour there to undoe him'.⁹² This alleged that Petty had defrauded the army of thousands of pounds; the warning that in the forthcoming parliament 'he will receive his fatall stroake', was ominously prescient.⁹³ Henry Cromwell was soon pressured to investigate, forming a committee of 7 officers including both Petty's ally Anthony Morgan, and his Baptist enemies Richard Lawrence and Sankey.⁹⁴ Accusations rumbled on over the winter, before the focus of attack switched back to London where Sankey formally charged Petty with corruption in Richard Cromwell's parliament, in March 1659.⁹⁵ Petty replied with a powerful speech on 21 April, but a day later the assembly was dissolved.⁹⁶

Petty believed that 'his professed enemy' Worsley was supplying ammunition for Sankey's charges, and this appears to have been the case.⁹⁷ Worsley had been laying low on his estate in Queen's County over the winter, but was called to Dublin by Sankey in the spring; a letter written in April reveals that he was expecting to leave for London imminently.⁹⁸ In the same letter, Worsley thanked the recipient (perhaps Lady Ranelagh) for sending '*that* Character of our truly Worthy et honorable frind Sir Harry

⁹⁰ Worsley's involvement is hinted at by the fact that the initial attack on Petty's reputation, dated 12 May 1658, was directed to his former colleague on the Council of Trade, Alderman John Fowke. Petty alleged that he faced numerous libels when he visited London to negotiate with the adventurers at Grocers' Hall, in May 1658. Petty, *History of the Cromwellian Survey*, pp. 228-232.

⁹¹ *Ibid.*, pp. 232-252.

⁹² *Ibid.*, p. 257.

⁹³ *Ibid.*, p. 262.

⁹⁴ *Ibid.*, p. 267.

⁹⁵ *Ibid.*, pp. 289-292.

⁹⁶ *Ibid.*, pp. 292-296.

⁹⁷ *Ibid.*, p. 291; Petty, *Reflections upon some persons and things in Ireland*, pp. 76-7.

⁹⁸ Letter, Worsley to Lady ?, 20 April 1659. HP 33/2/14A.

vane, to whom I lately writt by Col Sankey’, and the suggestion that the main leader of republican opposition to the Protectorate in England was in contact with one of Henry Cromwell’s most intransigent opponents on the eve of the collapse of the regime, hints at a widespread conspiracy.⁹⁹ Petty later described his impeachment as motivated by ‘Reason of State’: by pulling him down, his enemies sought ‘to pull down the Government it self’, a plot of ‘the Sectarian party’.¹⁰⁰ Meanwhile Fleetwood and the more radical wing of the army had been moving closer to the Protectorate’s opponents since early 1659, culminating in the recall of the Rump Parliament and the forced retirement of Richard Cromwell in May.¹⁰¹ Henry Cromwell acquiesced with this in July, and so the political reasons for Sankey’s pursuit of Petty disappeared.¹⁰² Nevertheless Sankey continued to harry his enemy, presenting parliament with his charges on 12 July, by which time Petty had lost all his public offices.¹⁰³ Petty responded by beginning his counterattack in print, although it was not until the Restoration that he felt safe enough to unleash his ruthless wit, with Worsley, Sancho Panza to Sankey’s Don Quixote, bearing much of the brunt.¹⁰⁴ Hartlib must have wondered at what had become of two of his former protégés.¹⁰⁵

‘If Sir *Hierome* and *Worsly* both, should happen to cumber the Upper Bench, like *Minos* and *Radamanth*, upon my case’, Petty wrote with the safety of hindsight in 1660, ‘I should be terribly afraid of what so much conceited ignorance and intoxicating

⁹⁹ *Ibid.*, HP 33/2/13A.

¹⁰⁰ Petty, *Reflections upon some persons and things in Ireland*, pp. 57, 85-7.

¹⁰¹ R. Hutton, *The Restoration. A Political and Religious History of England and Wales 1658-1667* (Oxford: Oxford U.P., 1985) pp. 35-30.

¹⁰² *Ibid.*, p. 41; Petty, *History of the Cromwellian Survey*, p. 301.

¹⁰³ Petty, *History of the Cromwellian Survey*, pp. 302-306.

¹⁰⁴ [W. Petty], *A Brief of Proceedings between Sr. Hierome Sankey and Dr. William Petty* (London, 1659); Petty, *Reflections upon some persons and things in Ireland*, p. 82.

¹⁰⁵ Hartlib was certainly aware of the conflict between Worsley and Petty: his papers contain a copy of Sankey’s articles of impeachment against the latter. HP 55/12/1-2.

pride might bring upon mee'.¹⁰⁶ By then, he could confidently predict that 'no Revolution that can come; will advance that *Multiloquious* pair', but this was far from the case in the previous year, when Worsley could afford to hope that greater changes were afoot. The coming 'Kingdome of *the* Lord', he explained in April 1659, 'shall not bee year and nay/ (as now while wee are all in Confusion et Babell) but yea et amen, *that* it shall be clearenesse et certainty to consider', bringing 'unity', 'Concord', and most of all 'peace' to the divided saints.¹⁰⁷ Thus Worsley could hope that soon 'every year shall be a new spring': little could he have known then that the republic was about to enter its dark winter.

Worsley arrived in London in late May.¹⁰⁸ The parliament recalled earlier in the month, led by a new Council of State including Vane and Fleetwood, had immediately set about purging the most untrustworthy Cromwellians from positions of influence, particularly in the army.¹⁰⁹ Worsley was one of those who benefited at their expense, and on 8 July he was nominated by parliament's committee of safety as Commissary-General of Musters for Ireland.¹¹⁰ The following month, the regime faced its first overt challenge, Sir George Booth's rebellion in Cheshire; Sankey, now the most senior officer in the Irish army, led a regiment to mop up the remnants of the rising at Chirk Castle in late August.¹¹¹ Concerned at this sign of resurgent royalism, the army radicals

¹⁰⁶ Petty, *Reflections upon some persons and things in Ireland*, p. 59.

¹⁰⁷ Letter, Worsley to Lady ?, 20 April 1659. HP 33/2/13B.

¹⁰⁸ His arrival is mentioned in a letter from Hartlib to Boyle, 31 May 1659. Printed in Boyle: *Correspondence*, Vol. 1, p. 357.

¹⁰⁹ Hutton, *The Restoration*, p. 45.

¹¹⁰ *CSPD, 1659-1660*, p. 13; A. Clarke, *Prelude to Restoration in Ireland. The end of the commonwealth, 1659-60* (Cambridge: Cambridge U.P., 1999) pp. 56-66.

¹¹¹ Clarke, *Prelude to Restoration in Ireland*, p. 73.

became increasingly keen to assert themselves to parliament, most visibly with the menacing Derby petition of 22 September. Sankey was one of three officers who drafted this document, and the resulting confrontation led to Lambert's dissolution of the Rump on 13 October, and the formation of yet another government two weeks later.¹¹² There is little evidence of Worsley's activities at the time, and Hartlib complained that he had stopped visiting him. Hartlib also reported that Worsley had been heard to say that 'if the parliament had sat four days longer, his head would have gone off', suggesting that he was involved in the army's machinations.¹¹³ Both Vane and Sankey participated in the army-backed regime that succeeded the Rump, and so there is no surprise to find that Worsley was also involved.¹¹⁴ In an attempt to organise support for the regime, a general council of the army was summoned, and Worsley was elected to represent the Irish regiment of Colonel Brayfield, on 7 December, although this was in fact too late for him to attend the meeting.¹¹⁵ Thus he remained in London, where in any case potentially more profitable opportunities were arising.

Just before its dissolution, parliament had opened up John Thurloe's farm of the Post Office, on 11 October 1659.¹¹⁶ As well as being highly lucrative, this post formed an important part of Thurloe's intelligence network, and so its control was politically important. Apparently Worsley took over Thurloe's farm on 25 December.¹¹⁷ Some years later in a petition to Charles II, he claimed to have contracted to hold the farm for

¹¹² *Ibid.*, pp. 87-8.

¹¹³ This comment was apparently made by Worsley to the Swedish ambassador, Lord Friesendorf, and was noted in a letter, Hartlib to Boyle, 22 October 1659. Printed in Boyle: *Correspondence*, Vol. 1, p. 378.

¹¹⁴ Hutton, *The Restoration*, p. 72.

¹¹⁵ Clarke, *Prelude to Restoration in Ireland*, pp. 104-7.

¹¹⁶ J.W.M. Stone (ed.) *The Inland Posts (1392-1672). A Documentary Calendar of Historical Documents with Appendixes* (London: Christie's-Robson Lowe, 1987) p. 121.

¹¹⁷ *Ibid.* On 23 December Worsley purchased the Great Seal from Sir Archibald Johnston of Warriston, on behalf of Fleetwood. *The Diary of Sir Archibald Johnston of Wariston, Vol. III. 1655-60*, ed. J. Oglivie (Edinburgh: Scottish Historical Society, 1940) pp. 161, 164.

7 years at £20,000 per year rent, £6,000 more than Thurloe had paid, for which he was still owed £1,600.¹¹⁸ He also claimed to have advanced the revenue of the office by £6,000, but Worsley can have had little time to make any real changes given the turbulent political situation. Since the army's dissolution of parliament, the republican cause had been fragmenting, and Monck was already beginning his march from Scotland. Thus there was little opposition when parliament returned at the end of December, expelling Vane and his regime.¹¹⁹ Meanwhile, parliament ordered the Council of State to take the office of postmaster into its own hands, on 7 January, and call its holders to account.¹²⁰ Worsley's petition later complained that he had been expelled from the Post Office, 'contrary to your Majesty's declarations & intended Clemency ... by the violence of Soldiers'.¹²¹ However, it is unlikely that he managed to hold onto the Office until the Restoration, for on 21 January the Council of State issued a warrant for his arrest, and although his conformity was certified soon after, as an associate of the by-now discredited Vane Worsley was clearly out of favour.¹²² By then news had arrived of the taking of Dublin castle by forces loyal to parliament, and Worsley had been singled out as one of six particularly dangerous radicals, in a pamphlet justifying the action.¹²³ In March 1660, parliament dissolved itself; the next month, a new one met, and by May the Stuart monarchy was restored. The English Commonwealth had collapsed, leaving Worsley in the wilderness.

¹¹⁸ PRO SP 29/142, part 2, fol. 150. The petition is undated, but is calendared under 1665. *CSPD 1665-1666*, p. 168.

¹¹⁹ Hutton, *The Restoration*, pp. 80-85.

¹²⁰ Stone (ed.) *The Inland Posts*, p. 121.

¹²¹ PRO SP 29/142, part 2, fol. 150r.

¹²² *CSPD, 1659-1660*, pp. 568, 322.

¹²³ J. Bridge, E. Warren, A. Warren, *A Perfect Narrative of the Grounds & Reasons moving Some Officers of the Army in Ireland to the Securing of the Castle of Dublin for the Parliament* (London, January 23 1660) p. 4.