

SAMUEL HARTLIB AND
UNIVERSAL
REFORMATION

Studies in intellectual communication

EDITED BY

MARK GREENGRASS, UNIVERSITY OF SHEFFIELD
MICHAEL LESLIE, RHODES COLLEGE, TENNESSEE
AND TIMOTHY RAYLOR, CARLETON COLLEGE, MINNESOTA



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Introduction

Mark Greengrass, Michael Leslie and Timothy Raylor

It is easier to find a labyrinth, then a guiding path; and truth is ready to glide away, while the eyes are bewitched.¹

On 6 July 1992 over a hundred and twenty individuals from fourteen countries made their way to Sheffield to attend a conference entitled 'Peace, Unification, and Prosperity: the Advancement of Learning in the Seventeenth Century'. Historians of science and medicine, specialists in the history of education and in English literature, experts in ecclesiastical history, the history of language and many other disciplines met and sampled some of the seventy-two papers presented in the course of the conference. Together they visited new worlds, entered new intellectual domains and discovered new *epocha*. There were challenging communications on natural history, the history of nature, order, disorder and the First Chaos, and much more besides. John Milton, Robert Boyle, Comenius and other well-known figures appeared in a different light. The less familiar, such as Benjamin Worsley, became more significant. The atmosphere was one of rich interdisciplinarity, a sense of discovery and the advancement of learning. It would have warmed the heart of the person who had been (albeit at a distance of 300 years) responsible for its happening and who was, as it were, the honoured guest at the conference table: Samuel Hartlib.

Samuel Hartlib (c.1600–1662) is a figure who was more or less forgotten within a generation of his death. And yet in his own time he was famous across Europe and well known in the emerging colonies of North America. His energetic interventions lent him influence in a wide variety of areas – from national and international politics, through the reform of disciplines as disparate as

¹ Comenius, *A reformation of schooles, designed in two excellent treatises* (1642; repr. Menston, 1969), 18.

education, chemistry and horticulture, through the promotion of technological development in, for instance, optics and military engineering, to public health and plantation policy. He was also valued by his contemporaries as a source of inspiration and information on matters such as medicine and the immortality of the soul.

As Kevin Dunn points out in his chapter in this volume, Hartlib neatly fits the modern critical notion of an 'author-function' in that, despite the fact that his name appears on the title pages of books and pamphlets, he was not himself the author of any significant published work.² Neither can he be associated with any of the great intellectual discoveries of the seventeenth century which gave impetus to the development of modern science. In the terms conventionally used to determine significance, then, and in the period of Milton, Boyle, Descartes and Comenius, Hartlib has been easy to overlook. But if we emancipate ourselves from the restrictions of our own structures – structures that derive in no small measure from the creation of canons of significant texts and authors in the fifty years following Hartlib's death – it becomes obvious why he was accorded such high status by his contemporaries.

The document epitomizing those things that render Hartlib significant is his *Ephemerides* (much cited in the following chapters), his diary of information received during his most active years as one of the key intellectual brokers of seventeenth-century Europe. To read the *Ephemerides* is to become part of the world of Hartlib, his contacts, concerns, his eclecticism. The phrase 'the Hartlib circle' is sometimes used in this volume not for reasons of intellectual laziness but precisely because that is demonstrably what there was, and the *Ephemerides* constitutes part of the proof. There was, that is to say, a range of individuals for whom Hartlib formed an important point of intersection. As well as affording a unity to a disparate group of scholars, projectors, politicians, educators and scientists, his activities offered unity to their disparate concerns: intellectual, social and technological. What makes the discussions within the Hartlib circle so important, therefore, is the commonality of their concerns, the sureness of their identification of the issues needing to be addressed, and the tenacity with which they were able to concentrate on them.

It is worth emphasizing that the overarching concern with unity – *pansophia*, the unification of the Protestant churches, the intercon-

² See below, chap. 9.

nection of the physical sciences, and the interpenetration of the material and spiritual worlds – stands in remarkable contrast to the intellectual and practical experience of Hartlib and his collaborators. The increasing fragmentation of intellectual disciplines was accompanied by a more marked scientific and technical specialization. In addition, by 1650, many sections of European society had lived through violent change. Hartlib and Comenius were among many who had been displaced by the Thirty Years War. As with the construction of a version of the Renaissance by those fleeing from Nazi persecution in this century, a version characterized by the idealist philosophy of Neoplatonism and the supra-national community of humanist scholars, the fierce adherence of Comenius, Hartlib and others of their acquaintance to an idealistic, unified and international vision of knowledge was surely a response to the intense pressures they were under, both political and psychological. The significance of Hartlib and his circle lies as much in the ideological implications of their motives and strategies arising from this background as it does in any of the specific projects they undertook.

With the changed environment of the Restoration and a more stable political climate in Europe after 1660, these ideological concerns faded or were transformed and Hartlib's significance became less apparent. His rediscovery is thus largely a twentieth-century phenomenon. In many respects his re-emergence is, as this volume seeks to demonstrate, still under way. This work brings together a small selection of revised papers given at the conference in 1992 in order to illustrate the main lines of that rediscovery. In an ideal world, perhaps, its proceedings would have been published in their entirety. But such unmanageable volumes fail to capture the exhilaration of the conference moment. Moreover they lack a sense of direction and coherence – more 'a labyrinth than a guiding path'. Instead, therefore, we have chosen to present a series of case-studies, each exemplifying work in progress in and around the world of Samuel Hartlib. It is these studies that are gradually reshaping our understanding of the intellectual landscape of the mid-seventeenth century. Although far from the pansophy of Hartlib's and Comenius' aspirations, being neither inclusive nor comprehensive, the volume is at least based on a perception of the organic advancement of learning of which they would have approved. It moves outwards from logic and right method to the three Books of 'the revealed Word', 'Man' and 'Nature'. To pursue Comenius'

extraordinary metaphors, the volume is intended to be more like a 'perpetuall mover' or a 'living tree, with living roots, and living fruits of all the Arts, and Sciences' rather than 'a pile of wood, very neatly laid in order, with great care and diligence'.³ The editors are acutely aware that the choices which have been made in selecting these eighteen papers from the original conference presentations imply arbitrary exclusion, and truth can glide away when trying to understand an eclectic figure such as Samuel Hartlib in a deliberately foreshortened perspective. With the various perspectives of the papers presented in this volume in mind, therefore, this introduction surveys the main contours of this emerging landscape.

The rediscovery of Samuel Hartlib in this century began with the publication in 1920 of a pamphlet by a young lecturer in education at the University of Liverpool, George Turnbull.⁴ Turnbull was a classicist by training, a philosopher by inclination, and an able linguist. He had been lucky to survive the trenches around St Julien in 1917, where he was very seriously wounded. His interest in the history of German education in the seventeenth century took him to the published volumes of the *Monumenta Germaniae pedagogica*, generally ignored in England at the time; it was here, in the Comenian volumes published by Kvačala, that he first discovered Hartlib.⁵ His pamphlet was a thorough biographical account, based mainly on printed sources, which rectified many errors in the *DNB* entry on Hartlib.

There matters might have rested had he not been alerted to the existence of a trunk full of manuscript papers in a solicitor's office in London in 1933. Arranged, so he recalled later, in sixty-eight tied-up bundles in a wooden chest, of indeterminate origins, these were evidently the surviving papers of Samuel Hartlib which, as Turnbull's pamphlet had indicated, had last been heard of in early 1667.⁶ After Hartlib's death in penury in March 1662 they had been purchased by William, Viscount Brereton and transported to his country seat in Cheshire. It was there that Dr John Worthington

³ Comenius, *A reformation of schooles*, 24.

⁴ G. H. Turnbull, *Samuel Hartlib. A sketch of his life and his relations to J. A. Comenius* (Oxford, 1920).

⁵ J. Kvačala, *Die pädagogische Reform des Comenius in Deutschland bis zum Ausgange des 17. Jahrhunderts*, 2 vols. (Berlin, 1903-4).

⁶ *Sheffield University Gazette*, 1947.

had providentially come upon them and put them in some semblance of order:

And though my latter years have had something of the pilgrim state, yet I have had cause to acknowledge some merciful designs of providence therein. At my late being in Cheshire I met with two trunks full of Mr. Hartlib's papers, which my Lord Brereton purchased. I thought they had been put in order, but finding it otherwise, I took them out, bestrewed a great chamber with them, [and] put them into order in several bundles . . .⁷

It was most, though apparently not all, of these bundles that Turnbull found in 1933.

Of Brereton's involvement with Hartlib and his associates, more might be written. The Breretons of Brereton were one of a clutch of twenty-five or so major land-owning gentry families of Cheshire which constituted the cheese and salt baronetage of the Vale Royal.⁸ The baronetcy was a speculative Jacobean Irish creation and the family remained inactively royalist through the Civil War.⁹ William Brereton, the family heir, was tutored (thanks to the material assistance of an indulgent maternal grandfather, Sir George Goring, earl of Norwich) by John Pell, then mathematics professor to the prince of Orange at Breda.¹⁰ Back in London in 1653, Brereton's name appears often in Hartlib's *Ephemerides*. Becoming a virtuoso was as good a way as any for a royalist to keep out of trouble, and Brereton's scientific interests rapidly became kaleidoscopic in Hartlib's varied cultural environment. Through Pell's tuition he already had a reputation as an able algebraist and mathematician. He also became a skilled musician and composer, developed a more than passing interest in the representation of language, dabbled with chemistry and became intoxicated by the possibilities of cider.¹¹

⁷ Worthington, II, 230.

⁸ G. P. Higgins, 'Landownership, political authority and social status in Shropshire and Cheshire, 1500-1700', *Journal of West Midlands Studies*, 2 (1978), 444; M. D. G. Wanklyn, 'County government and society in Cheshire, 1590-1640' (MA thesis, University of Liverpool, 1973).

⁹ His grandfather, Sir William Brereton, was created Baron Brereton of Leighlin, County Carlow on 11 May 1624. The parliamentary cause in Cheshire was led by Brereton's very distant kinsman, Sir William Brereton of Handforth, a military commander who proved able to muster and deploy his resources far more effectively than Sir Thomas Aston, his royalist counterpart. By the middle of 1644, only Chester remained under royalist control in the county and the Breretons of Brereton lay low throughout.

¹⁰ Worthington, I, 212; BL Add MS 4278, fol. 104v (5/15 March 1651) records his being in the company of Sir Charles Cavendish and Hobbes.

¹¹ His musical abilities were noted by John Aubrey. He was directed by Mr ('Captain') Cooke, who had been in the service of the bishop of Lincoln and taught 'after the Italian

Overall he was an enthusiast for acquiring interesting bits of information and pursuing the experimental method.¹² He corresponded with, among others, Nicolaus Mercator, John Winthrop junior and John Beale.¹³ In the pages of Sprat's *History of the Royal Society* he is prominently presented as one of its apolitical but pro-royalist progenitors, conveniently congruent to the author's picture of its origins.¹⁴ Of Brereton's interest in the new experimental method, however, there is no doubt; he was a frequent attendee at its meetings and a member of both the Georgical and Mechanical Committees until his retirement to Cheshire in 1669.¹⁵ His purchase of Hartlib's papers confirms his reputation as not merely 'a lover of philosophy, but rather . . . the lover of philosophers'.¹⁶

After his father's death in 1664, Brereton inherited both the family title and its debts. The latter were not inconsiderable. In March 1661, his father had petitioned the Crown to grant him the rent of the customs of North Wales and Chester, claiming that his faithful services to the royalist cause had so ruined his estates that 'without your Majesty's present assistance he and his numerous

mode' (HP 28/2/55A; 29/5/2A). Cooke's interests in experimental apiculture were duly fed through to Hartlib by Brereton (29/54/21A). His language interests are revealed in letters from Beale to Hartlib: 51/15A-16B (Beale to Hartlib, 10 September 1658); 67/22 (Beale to Hartlib, 2 December 1661). For his chemistry, see 16/11/41A (Friedrich Kretschmar to Hartlib, 16/26 April 1660). For his interests in cider and ale experimentation, see HP 52/137A; 64/13A; 29/4/28A.

¹² It was Brereton who told Hartlib about an indelible ink-block from the Indies (HP 29/5/7A), that Hobbes was writing a treatise on necessity and free will in 1655 (29/5/5B), and about the new French musical instrument, the *angélique* (29/5/7B). He experimented with ways to make colours fast (29/5/11B) and with coffee ('A cuphye-house or a Turkish - as it were - Ale-house is erected neere the Old Exchange. It is a Turkish-kind of drink made of water and some berry or Turkish-beane. The keeper of that shop or sellar of that drink gets 30. or 40. shill[ing]s a day. It is somewhat hot and vnpleasant but a good after relish and caused some breaking of wind in abundance' - 29/4/29B). Later, on the death of his father in 1664, he conducted a scientific investigation of the family myth that, on the death of a Brereton, débris rose to the surface of a local pond, and found it to be groundless.

¹³ E.g. HP 51/97 (Beale to Brereton, 18 March 1659); 7/7/1A (Hartlib to Winthrop, 16 March 1660) and 32/1/7B (Winthrop to Hartlib); 56/1/31 (Nicolaus Mercator to Hartlib, 10 November 1655), 56/1/65 and 56/1/101 etc. Brereton would later nominate Winthrop to his fellowship of the Royal Society.

¹⁴ Thomas Sprat, *History of the Royal Society* (London, 1667), 57 etc.

¹⁵ Michael Hunter, *The Royal Society and its fellows 1660-1700. The morphology of an early scientific institution* (London, 1982), 36; Michael Hunter, *Establishing the new science* (Woodbridge, 1989) 98, 100, 106.

¹⁶ The epistle dedicatory to Viscount Brereton of *Bentivoglio and Urania*, a romance by Dr Nathaniel Ingelo, cited in Worthington, 1, 213.

family cannot possibly subsist'.¹⁷ The fact was, however, that Brereton had done little to assist his present Majesty when it had counted.¹⁸ In the 1659 royalist rising in Cheshire, he had been absent while other Cheshire families, such as the Booths of Dunham Massey and the Cholmondeleys of Vale Royal, had risked their necks. Their fortunes prospered in the 1660s while those of the Breretons languished.¹⁹ Worthington, who had been enticed to Cheshire in 1666 by the prospects of being a household chaplain to Brereton with occasional preaching duties at Holmes Chapel (Chapel Hulme), soon realized that Brereton's financial embarrassment meant that he could not deliver what he had promised.²⁰ Brereton sold what ecclesiastical advowsons he had and, in 1668, parted with the jewel in the crown, his three-quarter share of the barony of Malpas.²¹ It is highly likely, therefore, that, quite soon after Worthington had put the papers in order, Brereton sold them on again. From their surviving condition, however, it is clear that little or nothing was done with or to them in the intervening centuries and that they have been little disturbed.

What Turnbull found in 1933, however, was far from the totality of Hartlib's papers. Much had doubtless already disappeared in a fire which engulfed his study before his death in 1662.²² Others were almost certainly abstracted by Worthington during his visit in 1667. The letters between Worthington and Hartlib were inevitably removed (to be copied later as part of Worthington's own manu-

¹⁷ Bodleian Library, Clarendon State Papers, vol. 74, fol. 265. His request was turned down but he was granted £500 by the Council of State the following May (Cheshire Record Office, DCN/c/787).

¹⁸ As Anthony Wood remarked, when Viscount Brereton's brother George was preferred in Oxford, the family had 'never suffered anything for the king's cause' (*The life and times of Anthony Wood*, ed. Andrew Clark, 5 vols. (Oxford, 1891-1900), 1, 348).

¹⁹ P. J. Challinor, 'The structure of politics in Cheshire, 1660-1715' (Ph.D. thesis, the Polytechnic, Wolverhampton, 1978), chap. 1.

²⁰ Worthington, II, 228 (Worthington to Mrs Foxcroft, 1670-1: 'I found he had not got through those difficulties he was encumbered with, nor was like to do it so soon as he promised himself. And so I saw that there was estate little enough for his necessary occasions and his family').

²¹ *Notitia cestriensis, or historical notices of the diocese of Chester*, ed. F. R. Raines, Chetham Society (Manchester, 1845), VIII 248; he retained only the advowson to Brereton itself. Malpas was sold to Sir William Drake of Shardeloes, Devon for £9,493. The other quarter share was owned by the Cholmondeley family. In 1673, his contribution to the militia was reduced from 'the finding of three horses, men and arms' to 'one horse with man and arms' because of his indigence - BL Add MS 36,922, fol. 35.

²² Turnbull, *Samuel Hartlib*, 72.

script collection); those between Seth Ward and Hartlib probably disappeared at the same time.²³ Of the items specifically mentioned by Worthington, at least one is no longer intact in the collection.²⁴ Other items appear to have come through the hands of Hans Sloane into the British Library. One whole bundle from the papers was dispersed from the collection and purchased for the Osborn Collection of the Beinecke Library at Yale University in 1957.²⁵ This left a collection of about 5,000 items, or over 20,000 folios.

No doubt some of the dispersals were innocent, but others were probably designed to manipulate the historical record. As Michael Hunter reminded the conference (with reference to the tamperings of the Boyle papers, especially by the scholar and dissenting minister, Henry Miles, in the eighteenth century), historians of ideas are more vulnerable than they often realize to the bias that may be imposed on their interpretation by such activities.²⁶

What happened after this discovery in 1933 is common knowledge and quickly told. Turnbull brought the collection to Sheffield where he had been professor of education since 1922. Almost single-handedly, and despite substantial responsibilities as a senior professor in a provincial university, he began to inventory it and to transcribe some of the most significant documents it contained, including Hartlib's still unpublished diary, the *Ephemerides. Hartlib, Dury and Comenius*, published in 1947, was (as its sub-title suggested) merely the first fruits of this effort, the 'gleanings', a book whose subject matter endlessly overflows its biographical framework.

A larger perspective was needed, and one was offered in a lumines-

²³ Worthington offered to remove them on his behalf; Seth Ward replied that 'they were carelessly and perfunctorily written . . . so that it will be to my advantage to suppress them. However, sir, I leave them wholly to your disposal, either to bring them to me, when I may have the happiness to see you, or to burn them, or leave them among the rest' (Worthington, II, 226).

²⁴ In a letter to Dr Evans of 25 February 1666/7, Worthington commented: 'I have here met (among Mr. Hartlib's papers, in my Lord Breton's study) with two epistles of Grotius to Crellius.' Only a fragment of the second Grotius epistle now survives in the collection (HP 11/4/1-4).

²⁵ Information kindly supplied by Nicholas Muellner, assistant curator of the Osborn Collection. There is no doubt that these came originally from the Hartlib collection. They consist mainly of holograph letters from Petty to Hartlib, none of which exists among the papers in Sheffield. One of the Petty letters in the Yale bundle is endorsed in the same hand that endorses other bundles in the Sheffield Hartlib Papers: 'Petty Mixt Letters & Papers of no great value [it] at I know of.'

²⁶ Michael Hunter, "'Not suited to the genius of the present age": historical interpretation and the problems of archival transmission'.

scent essay by H. R. Trevor-Roper (Lord Dacre), originally published in 1960.²⁷ Hartlib, Dury and Comenius, he argued, had to be understood within a broader intellectual tradition, and in the context of the maelstrom of Europe in the 1620s, experiencing the full fracturing force of the Reformation. It was in this light that their utopian dreams, visions of social transformation and millenarian fulfilment could be properly understood and their particular contribution to the 'English Revolution' justly appreciated. By the time Lord Dacre was preparing his article, though, Turnbull had retired from his chair at Sheffield to Prestatyn, taking Hartlib's papers with him. He died in 1961 and some say that his widow had thought of putting Hartlib's papers on the bonfire afterwards. At all events they were returned to Sheffield University in the boot of the librarian's car in May 1963, and they have remained in the University's library ever since.

The most sustained and substantial investigation and interpretation of Hartlib's papers before 1987 was, however, undertaken by Charles Webster, who began his research with Turnbull's successor as professor of education in Sheffield, W. H. G. Armytage. Charles Webster's *The great instauration* (1975) is an astonishing achievement, and the bedrock on which all subsequent studies of the world of Samuel Hartlib must build. His background and perspective was that of a historian of science reacting against the then rather dominant teleology of what constituted 'modern science'. This tended to see its origins in the Royal Society, the Restoration and the tradition of continental science established by 'highly able, professionally skilled and tough-minded men like Galileo, Kepler and Descartes'.²⁸ By contrast, Webster used the richness of Hartlib's papers to confirm many of the (then) much debated suppositions of the sociologist Robert Merton and, to some degree, those of the historian Christopher Hill.²⁹ English science 'benefited from the catalytic influence of the revolutionary intellectual and political situation' of the English Revolution.³⁰ This was demonstrated by the 'spectacu-

²⁷ H. R. Trevor-Roper, 'Three foreigners and the philosophy of the English Revolution', *Encounter*, 14 (Feb. 1960), 3-20; substantially expanded and revised in *Religion, the Reformation and social change* (London, 1967), chap. 5.

²⁸ A. R. Hall, 'Science, technology and Utopia in the seventeenth century', in *Science and society 1600-1900*, ed. P. Mathias (Cambridge, 1972), 44-5, cited Webster, 493.

²⁹ R. K. Merton, *Science, technology and society in seventeenth-century England* (New York, 1970); C. Hill, *Intellectual origins of the English Revolution* (Oxford, 1965).

³⁰ Webster, 487.

lar increase in scientific book production' during the 'Puritan Revolution'. The 'image of the dramatic success of the Royal Society' which was fostered by Sprat, Evelyn, Glanvill, Cowley and others unjustly minimized the Society's links with the preceding period of political upheaval. The roots of Restoration science could not be disentangled from the preceding 'Puritan' intellectual traditions. Seventeenth-century natural philosophy could not readily be divorced from either its theological roots or from its potentially utilitarian benefits. The terms 'scientist', 'technician' and 'utilitarian' were bound to be arbitrary and anachronistic if used as exclusive labels to describe individuals in the seventeenth century. Hartlib and his associates were not 'soft-headed, amateurish or incompetent' utilitarians and there was no universally applicable dividing line of conviction, status, background or interest to apply to individuals such as Wilkins, Boyle, Petty, Oldenburg, Beale or Culpeper, whose involvement with Hartlib had provided, at a critical point in their lives, an evident unity of interest and purpose.

What, then, was the significance of England's 'Puritan' intellectual traditions? Webster's central proposition was twofold. They had provided, firstly, a distinctively different approach to natural philosophy and, secondly, an alternative pattern for the organization of intellectual activity. A different attitude to natural philosophy was not merely the result of a general Calvinist asceticism. This was what Merton, following the general propositions of Troeltsch and Weber, had sought to demonstrate. There was also the impact of the particular 'eschatological perspective of the Puritans' which was 'significantly different from that of many other protestant groups'.³¹ 'The Puritans genuinely thought that each step in the conquest of nature represented a move towards the millennial condition, and that each extension of the power of parliament reflected the special providential status of their nation.' Their 'ambitious aims and unflagging zeal . . . to exploit the natural environment for the health and wealth of mankind, were sustained by an enduring expectation of intellectual and social progress. This idea of progress was religious in motivation, but it had the capacity to develop a largely secular expression.'³²

The 'Puritan initiative for the organization of intellectual activity' was 'of the utmost importance for the growth of the English

³¹ *Ibid.*, 506.

³² *Ibid.*, 506-7.

scientific movement'. It was based on a 'Puritan' ideal of the effective deployment of vocational talent and the conviction that individual reward should be accompanied by the communication of knowledge to others. Hence 'Hartlib's tremendous network of communication became the main component in the mechanism for the exchange of information among Puritan investigators of technical and scientific problems'. Although Hartlib's schemes for an Office of Address never had any formal or official basis, it nevertheless became recognized as the nerve centre for scientific correspondency and communication in Commonwealth England.³³ 'Puritans' such as Culpeper, Beale, Worsley and Hartlib himself willingly sacrificed their proprietorial rights to their scientific knowledge, whereas 'a non-Puritan such as Evelyn, or an ambitious entrepreneur like Petty, found it extremely difficult to accept this obligation to undertake the completely uninhibited release of his scientific secrets'.³⁴ So although the English Revolution as a political and ecclesiastical manifestation collapsed completely in 1660 the 'Puritan Great Instauration' had an enduring effect, even if it did not live up to the great expectations that many had entertained of it.

At the time of its publication, *The great instauration* was warmly received. It was five years before a significant, if rather negative, critique of its views emerged.³⁵ This recognized that Webster had identified 'one strain of thought relevant to scientific endeavor in the mid-seventeenth century as utilitarian, pansophic, and inspired by providentialism and millenarianism'. It accepted that this fed into a particular brand of activity which focused on utilitarian reform endeavours, particularly of an educational disposition. But labelling this as 'Puritan' was neither illuminating nor explanatory. 'For this congeries of attitudes was shared by a wide range of English Protestants, to many of whom Webster could apply the term Puritan only at the expense of his thesis.'³⁶ The intellectual traditions that Webster isolated as peculiarly influencing puritan scientists – millenarianism, providentialism, utilitarianism, rational empiricism – were the common property of Protestants of all persuasions.³⁷ The

³³ *Ibid.*, 511. ³⁴ *Ibid.*

³⁵ Lotte Mulligan, 'Puritans and English science: a critique of Webster', *Isis*, 71 (1980), 456–69.

³⁶ *Ibid.*, 457.

³⁷ It is, however, as misleading to classify modern historians of science as rigidly committed to a prescriptive pattern for the past as it is to categorize in a rigid fashion seventeenth-century intellectual patterns of thought. Webster himself has argued for the complexity of

desire to stress the continuities before and after the Restoration, to show how the puritan traditions played an important role in shaping and institutionalizing the English scientific community, was itself a problematic teleology. Oster's detailed study of Boyle's millenarianism in this volume neatly exemplifies the problem.³⁸ Boyle's eschatological musings were common currency among Protestants of all persuasions. He was very sceptical of accepting more precise millennial speculations at their face value, aware of their damaging effects 'upon less tutored minds'; even if, in the confines of his study, he may have allowed his mind to wander towards such matters, this did not sustain his natural philosophy or commitment to the advancement of learning.

Increasingly, too, the emphasis of scholarly investigation amongst historians of science has been towards establishing the particular baroque distinctiveness of Restoration science, its institutional fabric and assemblage of intellectual assumptions.³⁹ By means of a detailed prosopographical study of the early fellows of the Royal Society and linked studies of the Society's early activities in relation to a wider world of virtuoso interest, Michael Hunter has recovered that environment and placed it in its particular context. Individuals such as Brereton could both be captivated by the aspirations and excitement of the world of Samuel Hartlib in the 1650s and then have a fragmentary and discontinuous relationship with it thereafter. The inevitably selective nature of the human memory enabled individuals to screen out what had seemed important at the time of the Commonwealth to the advancement of learning and to remember only what they chose to remember. 'Master of Innumerable Curiosities' is how John Evelyn recalled Samuel Hartlib, writing up his diary in the 1680s and reliving their encounter in early December 1655.⁴⁰ According to Hartlib's contemporaneous account, however, Evelyn had been keen to see his revolutionary bee-hive, designs of which had been illustrated in Hartlib's most

events in the mid-seventeenth century, 'pleading for nuance rather than rigid categorization of groups' – see Harold J. Cook, 'Charles Webster on Puritanism and science', in *Puritanism and the rise of modern science*, ed. I. Bernard Cohen (New Brunswick and London, 1990), 265–300, esp. 267ff.

³⁸ See below, chap. 6.

³⁹ This is evident from the excellent review essays of recent published work in Michael Hunter, *Science and society in Restoration England* (Cambridge, 1981), 198–219 and *Establishing the new science, the experience of the early Royal Society* (Woodbridge, 1989), 356–68.

⁴⁰ *The diary of John Evelyn*, ed. E. S. de Beer (London, 1959), 364. Samuel Hartlib's *Ephemerides* provides the precise date of 1 December (HP 29/5/54A).