Pleasure, Honor, And Profit: Samuel Hartlib In His Papers 1620-1662

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ABSTRACT

Discovered in 1933 after having been hidden from the academic world for 271 years, the Hartlib Papers have been called the greatest 17th century research revelation of the 20th century. Yet 81 years later the author and collector of the papers remains a mystery and the content of the papers have been little appreciated. Who was this auctor prudens and what do his voluminous papers have to say about his time? This thesis argues that Hartlib is a critical link in a long chain of scholars who formed and shaped the development of science. An evolution which began with Roger Bacon, more fully developed into a new epistemology with Francis Bacon, is passed on by Hartlib to others who were founding members of the Royal Society. This new system of understanding, then known as experimentalism, is the empirical method which impacted the entire spectrum of modern academic disciplines.

INDEX WORDS: Education, Empiricism, England, Epistemology, Puritans, Science
DEDICATION

I offer this dedication to my wife Brandi Simpson Miller who was working on her own thesis while helping me with mine. I met Brandi at Georgia State in graduate history. She and I were taking a class together in World History with Dr. Carolyn Biltoft when we were assigned to work on a presentation together. This led to weekly meetings which were to allow us to compose the presentation. The conversations, always over good coffee, led to our personal lives and that led to me inviting her to join me for our first “date”, the Halloween Tour of Atlanta’s Oakland Cemetery. The next week we had dinner at Pitty Pat’s Porch, Atlanta’s oldest restaurant. The third week we attended GSU night at the Georgia Aquarium. Not long afterward, we ate at the Prime Meridian and I proposed on the roof of the Georgian Terrace Hotel overlooking the lights of downtown Atlanta, looking south toward the GSU campus. She graciously accepted and we were married November 9, 2012 at Atlanta’s St. Luke’s Episcopal Church. My work was delayed when I accompanied her to Ghana during the summer of 2014. I happily assisted her in interviewing farmers, transporters, grocers, grandmothers, and market women about the food of Ghana. We made several new friends there and found the Ghanaian people to be warm, hospitable, and accommodating. We produced a documentary on food and nationalism in Ghana and then I returned to finish the work on my own thesis. She took time to read it carefully and offer her professional comments. For her help and because I love her, this thesis is hers.
ACKNOWLEDGEMENTS

Dr. Nick Wilding has been the best advisor any graduate student could hope for. Taking a look at the Hartlib Papers was originally his idea when I couldn’t decide what to study for my thesis. After having taken his methods class at Georgia State, I began to look to him more than anyone else for guidance and direction. He has been patiently generous with my development. He has been professional and kind in his criticism so for his willingness to share his wisdom I am grateful. I also thank Dr. Jacob Selwood for his seriousness in the work and his uncompromising commitment to historical accuracy, early modern context, and unquestionably accurate Chicago style. Dr. Alex Cummings was a member of my exam committee and enthusiastically participated even though some said he was a strange choice for someone majoring in early modern England. I consider this scholar of twentieth century communications technology a kind and gracious friend. Even though I was a simple MA student at a state university in a foreign country, Dr. Mark Greengrass and Dr. Thomas Leng, professors at the University of Sheffield, were kind to take time out of their busy schedules to respond to my questions about the Hartlib Papers, explain their own comments about Hartlib to me personally, and offer their advice in how to approach the collection and avoid some obvious false conclusions. Ms. Mary Sackett, Special Collection Metadata Specialist of the Special Collections Staff at the Western Bank Library of the University of Sheffield, deserves grateful mention for helpfully answering my several questions over time about the Hartlib Papers, especially in regard to the numbering system used to individualize them on the shelf and in the online database. Finally, I appreciate the encouragement of GSU Professor Dennis Gainty, my close colleagues Brett Carter and Bryan Terry, and those I met in several historical conferences who listened to the multiple evolutions of this project across the country from Louisiana to Virginia.
TEXTUAL NOTE AND NOTE ON DATES

In quotations, editorial insertions from the editors of the Hartlib Papers Project have been placed in italics within square brackets. In quotations from manuscripts conventional abbreviations and contractions are silently expanded. Other expansions are placed within square brackets. No revisions or deletions have been made to quotes from manuscripts except when an ellipses is used to omit an internal part of the quote which is not relevant to the point. Quotes are given in their original language and translated separately as required. All translations are those of the author unless otherwise indicated.

All quotations from the Bible are taken, as indicated in the notes, from the 1611 King James Translation since this version was available to Samuel Hartlib and reflects his early seventeenth century vocabulary. The copy used is a word-for-word reprint of the first edition of the Authorized Version.

In 1582, Pope Gregory XIII introduced a new calendar, the Gregorian calendar or New Style, in place of the existing Julian calendar or Old Style. From October 15, 1582 the Gregorian calendar was ten days in advance of the Julian. By the time of Samuel Hartlib, the new calendar was in force throughout most of the continental Europe but it did not come into use in England until 1752. In this thesis, therefore, events and letters in England are dated in accordance with the Old Style and events and correspondence in Europe in the New Style. Both dates are generally given for correspondence between Europe and England in accordance with contemporary seventeenth-century practice. All years are treated as beginning on January 1.

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APPENDIX
1 INTRODUCTION

Between 1630 and 1660, as printing censorship eased in London and Puritanism was growing in power and influence, twenty two works were published and dedicated to the English Parliament by a man named Samuel Hartlib. These included the *A Reformation of Schools* by Jan Amos Comenius in 1642, *Of Education* by John Milton in 1644, and *Engines of Motion* by Cressy Dymock in 1651. In all he published at least sixty five different books. Who was this Hartlib? What was he? Was he a publisher only? Eighty one years after the discovery of his enormous archive of personal papers, how is he still such an obscure figure and why has so little been written about him? What was his contribution to and where does he fit in the history of science?

All of the seventeenth century founding fathers of modern science knew Hartlib, most corresponded with him, many spoke highly of him to others. These men represent disciplines as diverse as anatomy, astronomy, chemistry, biology, physics, mechanics, agriculture, education, politics, and theology. Hartlib worked with others on projects to develop air pumps, calculators, copy machines, engines of motion, microscopes, telescopes, seed machines, and siege engines among others. These are significant names, fields, and ideas. Milton said Hartlib’s correspondents were “some of the highest authority among us.” These visionary projects foreshadowed great inventions of the future, yet there were more; more names, more ideas, more to this invisible publisher. That being true, who was this man and why is he relevant to the history of science?

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Hartlib’s friend Robert Boyle who worked with him regarding English plantation schemes became a board member of the East India Company and a founding member of the Royal Society. Many, including Governor John Winthrop of Connecticut, called Hartlib “the Great Intelligencer of Europe.” Milton said that he was, “... a person sent hither by some good providence from a far country to be the occasion and the incitement of great good to this island.” During his life he met several times with Oliver Cromwell and John Pym, speaker of the House of Commons. He spoke to parliament on the issue of education reform more than once. How was an immigrant son of a merchant who held no university degree able to achieve this level of influence? Who was Hartlib to Cromwell and Pym and how can their understanding of him inform modern scholars of his identity and why he should matter to understanding the larger history of the seventeenth century?

Because a complete historiography of the works primarily about Hartlib has not been published, it is helpful to list some of those works here. Seventy-two years after his death, there are few, brief and indirect statements of Hartlib in the William Petty entry in Peter Bayle’s *General Dictionary* as expanded by Thomas Birch in 1734. One of the two principle editors of this version was John Peter Bernard, later admitted to the Royal Society for this work. In 1768 Hartlib was mentioned for the second time in Sir Egerton Brydges eight volume *Tracts on Practical Agriculture and Gardening*. If he was significant, why were there not works about him and why did Brydges choose to write about him in his *Tracts*? Hartlib’s name drops from use within the first ten years after his death in 1662. This may have happened because he was

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strongly identified, fairly or not, with the Puritans who fell from power in the Restoration of 1660. Even though many of his correspondents continued working in the Restoration, they were remembering him only in private due to political reasons. Some of them wrote about him in their journals or memoirs compiled late in life. Many of these only came to light in the eighteenth and, even nineteenth century before the discovery of the Papers, initially grew interested in the name because of its association with topics such as agriculture. This is the reason Brydges picked him up in 1768. With his name not being promoted publicly, as soon as his correspondents passed away, his name disappeared completely from the public record. Mark Greengrass has said that if it had not been for the English Civil War, Hartlib would not have been significant at all. While this may or may not be true, it can also be said that if it had not been for the Restoration, there having been an English Civil War, he would have been remembered. Because of Brydges, Hartlib was briefly mentioned in the 1797, third edition, of the Encyclopaedia Britannica under the entry on agriculture.

In 1832, after another 64 years, Hartlib was briefly mentioned in Alexander Chalmers’ Biographical Dictionary. Chalmers made no mention of Hartlib Papers. Note that Hartlib was not mentioned in the earlier versions of Chalmers’ Dictionary even the one published after 1768. Robert Vaughn mentioned Hartlib indirectly in 1838 in his Protectorate of Oliver Cromwell because of his letters to John Pell between 1656 and 1658. In 1854 Hartlib is given three pages in John Donaldson’s eight volume Agricultural Biography because, again, of his writings regarding agriculture. The information in the biography Donaldson gave is identical,
though slightly confused, to what is given by Hartlib in his letter to John Worthington in 1660, indicating he must have accessed that manuscript.\footnote{John Donaldson. *Agricultural Biography: Containing a Notice of the Life and Writing of the British Authors on Agriculture from the Earliest Date in 1480 to the Present Time.* (London, 1854), p. 21.} Donald identified him as “the propounder of an agricultural college” and that “He assisted in establishing the embryo of the Royal Society,” but then he also concluded, “The time of his death is unknown.” The same year the name appears in Daniel Benham’s *A Sketch of the Life of J. A. Comenius*. This is typical for works before the discovery of the Papers. Most of the references to Hartlib before 1947 are in the works about his associates such as Comenius, Dury, Milton, or Pell; Rev. Henry John Todd’s *Life of Milton* (1809)\footnote{Henry John Todd. *Some Account of the Life and Writings of John Milton.* (London: Law and Gilbert, 1809), p. 7, 191.} or S. S. Laurie’s *John Amos Comenius: Bishop of the Moravians* (1904).\footnote{S. S. Laurie. *John Amos Comenius: Bishop of the Moravians.* (Cambridge: Cambridge University Press, 1904).} Many of these works were out of print by the twentieth century and were only known because of the reference to them in the surviving dictionary by Chalmers or the book by Henry Dircks.

Still without knowledge of the Papers, Dircks published, at the request of London University and the Commissioner of Patents Bennet Woodcroft in 1865, *A Biographical Memoir of Samuel Hartlib* based on the few references to him in the works of others such as Evelyn, Milton, and Brydges. This was the first publication primarily about Hartlib, finally coming two hundred and three years after his death. Dircks confessed his surprise at finding Hartlib to be “a man universally respected during the period in which he flourished”, known for “spreading knowledge”, and “doing good.”\footnote{Henry Dircks. *A Biographical Memoir of Samuel Hartlib, Milton’s Familiar Friend.* (London: John Russell Smith, 1865), p. v.} Dircks concluded that Hartlib must have been a significant person in the seventeenth century, but without the Papers, he struggled to tell the reader how and
why. He wrote, “the life of a man like Samuel Hartlib has many rare claims on human intelligence, sympathy, and respect,” but he failed to actually list the claims.  

After the turn of the century in 1905 John William Adamson included Hartlib as one the largest characters in his *Pioneers of Modern Education in the Seventeenth Century: 1600-1700*. The work is quite significant since the study of education was thought, at the time of Adamson’s book, to be a recent development. Adamson proved, as with so many of the subjects relevant to Hartlib, that many topics, including science and all that it may include, dates earlier than was commonly considered by an uninformed modern conventional wisdom. Furthermore, Adamson’s book has been given several subsequent printings, a reflection of its ongoing relevancy to modern educational theory even after the discovery of the Papers. Without knowledge of the Papers, he wrote twenty years before their discovery in the preface:

> While much of the story gathers about the thought and activity of Comenius, there were also educational pioneers in England now forgotten, or, if not forgotten, remembered by reason of achievements in other fields. To these, and especially to Samuel Hartlib, a name which should be honoured by all friends of education, some of the following chapters are devoted.

Adamson then wrote about Hartlib and pansophia, *Macaria*, The Office of Public Address, and other topics important in the study of Hartlib. Adamson assures the student that Hartlib would have been remembered even if the Papers had not been discovered.

In 1920 the fortunes for Hartlib’s memory began to change once and for all when Professor George Turnbull, then teaching literature at the University of Liverpool, published his own biography of Hartlib, this first one still without knowledge of the Papers, because of Adamson’s book and his own interest in education history. Having assembled all that was

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15 Dircks, p. x.
known of Hartlib at the time, Turnbull’s initial offering turned out to be no more than a pamphlet. Turnbull, meanwhile, became a professor of education at the University of Sheffield in Sheffield, England and there received the call in 1933 from a London solicitor who offered the Hartlib Papers to him. From his study of the Papers, Turnbull published a second Hartlib work in 1947, this one titled Hartlib, Dury, and Comenius which turned out to be almost five hundred pages. Here he suggested, for the first time, a direct connection between Hartlib and the Royal Society when, quoting Christopher Wren, used the word Ingeniosi and then explained in a footnote that this was the term Hartlib used in the Papers to describe the men who met at Gresham College and who were incorporated into the Society in 1662. Turnbull was the first to explain the importance of the papers by highlighting the new material he found contained in the collection. He was able to write a more detailed biography of Hartlib, Dury, and Comenius from the new details he found in the papers. He was, however, quick to point out, “not only do they not settle all these problems and answer all these questions, but also they raise new problems and suggest new questions.” He did not immediately identify those problems and questions.

Thirteen years later Professor of History Hugh R. Trevor-Roper (1914-2003) published his account Three Foreigners about the same three Baconian educational reformers after personally meeting with Turnbull in 1959. Trevor-Roper said, of the meeting, he was shown “six crates of papers and Turnbull’s transcription of Hartlib’s diary.”

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19 Turnbull, Samuel Hartlib, p. 33.
20 Ibid., p. vi.
however, draws more from a study by William Vincent than Turnbull’s book. In his book, Trevor-Roper wrote, “How appropriate that the tireless prophet and formulator of such reform disappeared from the historical record after his death until the mid-nineteenth century and that his massive archive should have lain hidden till our own time.”²³ Trevor-Roper argued that Hartlib must be understood within a broader intellectual tradition and the context of the violence in Europe during the 1620s.

After Turnbull died in 1961, his widow gave the Hartlib Papers to Sheffield in 1963. According to the librarian, she had threatened to burn them.²⁴ Placement of the papers in the Western Bank Library opened access to others and, as a result, several new works about Hartlib, informed by the Papers, have appeared. With papers now searchable online, information from the collection is now informing the studies of Hartlib’s correspondents and hundreds of topics from the seventeenth century. The Papers are proving Hartlib to be the auctor prudens of the seventeenth century, the indispensable link in the history of the empirical method.²⁵ This Latin term, which may be translated “wise or prudent counselor”, “founder”, or “agent”, is a more accurate description of his identity than any of those previously suggested. Most historians have referred to him as a “polymath”, “intelligencer”, or “correspondent” but these are all inadequate for communicating a clear and accurate definition of his person. A polymath is a person whose expertise spans a range of academic disciplines and Hartlib certainly did that. However, the term is used so frequently for a great number of persons from Leonardo da Vinci to Omar Khayyám that Hartlib requires something more unique. He was indeed a counselor, one of the founders of the empirical method, an agent of scientific change, an exhorter of others, a writer, editor, publisher, and a broker of ideas. No other term properly accounts for all these roles. Auctor

²³ Trevor-Roper, Counter-Reformation, p. 227.
²⁴ Greengrass, The Philosophers, p. 3.
²⁵ Auctor prudens is a term coined by the author to better define Hartlib.
*prudens* is unique, original and is an appropriate title for this unusual man, given in the academic language of his time.

Because his Papers were salvaged and protected, the politics of the Restoration were not able to bury him forever. “I am risen again this day as it were from my grave,” Hartlib wrote, describing a physical recovery in 1658 from complications related to the kidney stones he endured so frequently. The Papers have, perhaps most importantly, proved that his ideas were never lost. His work was well known even without his name attached. Thomas Leng has warned against “overstating the extent to which Hartlib has been a neglected figure” but then stated, “Ever since Webster’s work in the 1970s Hartlib has been pretty well known to historians of science.” It is thus difficult to overstate the extent to which Hartlib has been a neglected figure before the 1970s and how knowledge of him is still limited outside of those historians of science. This thesis argues that Hartlib’s impact went well beyond the history of science.

Information about Hartlib from the Papers thus continued to be revealed in several works of various genre including *The Intellectual Origins of the English Revolution* (1965), *God’s Englishman* (1972), and in *The World Turned Upside Down* (1972) by Christopher Hill. Altogether, Hill published twenty books between 1940 and 1996, almost all of them about seventeenth century England. Hill, as different as any historian could be as compared to Trevor-Roper, was no less interested in Hartlib and the Papers. As a Marxist historian, Hill was interested in the economics and religion of the revolutionary period. “Hartlib for two decades popularized in England a programme of social, economic, religious and educational reform

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which influenced men of the caliber of Boyle and Perry,” Hill wrote. More importantly, in *The Intellectual Origins of the English Revolution*, initially a lecture, Hill concluded the Comenians (Hartlib, Dury, and Comenius), together with Gresham College, must be seen as the active agents which brought “together the group which later formed the Royal Society”. Though his treatment was limited to a ten page section, Hill was the first to clearly define Hartlib’s impact on the 1670s, the decade immediately after his death in 1662, and why he is important to a proper understanding of the seventeenth century.

Allen G. Debus pushes back the effective start date for the discipline of chemistry, a core scientific discipline, in *Science and Education in Seventeenth Century: The Webster-Ward Debate* (1970) in which he argues that the search for new learning based on chemistry reached its peak in the middle decades of the seventeenth century. In the middle of making this argument Debus wrote, “Samuel Hartlib dedicated to Parliament his tract on the ideal kingdom of Macaria” and then connects Hartlib through his themes of educational reform and utopia to his contentions about the origin and growth of chemistry as a discipline. Debus also wrote an article on the subject for *Ambix* entitled “The Correspondence of a XVII ‘Chymicall Gentleman’: Sir Cheney Culpeper and the Chemical Interests of the Hartlib Circle.”

Also in 1970 Charles Webster wrote *Samuel Hartlib and the Advancement of Learning* and in 1975 *The Great Instauration*. Besides arguing for a pluralism of traditions in seventeenth century natural philosophy, and taking Protestant eschatology seriously, Webster demonstrated that Hill’s “distinction between the experimental scientist and Baconians on the one hand and the practitioners and guardians of alchemical, astrological, neo-Platonic and natural magic traditions

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on the other would not stand up to sustained investigation.” Webster thus agreed with Hill’s conclusion about Hartlib’s identity but disagreed with his method. Greengrass wrote that *The Great Instauration* remains the definitive work on Hartlib to the present time, and further, “The most sustained and substantial investigation and interpretation of Hartlib’s papers.” The completeness of *The Great Instauration* was so definitive, the challenge for anyone writing about Hartlib after 1975 is to distinguish himself from Webster.

Three years before a Hartlib conference at Sheffield, the Hartlib Papers Project sponsored a lecture in 1989 to highlight its recently launched initiative, one of three sponsored in turn by the British Academy. Greengrass, one of the project directors, invited Trevor-Roper, then 75 years old, to revisit his earlier article “Three Foreigners”. The speaker reviewed his article in light of Webster’s book and argued for a greater European context to English history by emphasizing a larger Calvinist influence to explain Hartlib and his correspondents. He remained reluctant to connect Hartlib’s circle, which he referred to as the “country party” to the Royal Society.

The Project sponsored conference at Sheffield was “Peace, Unification, and Prosperity: the Advancement of Learning in the Seventeenth Century” though the center point of the conference was Hartlib. This meeting attracted over 120 participants from fourteen countries. Seventy-two papers were presented, eighteen of which, chosen by the editors, were included in the subsequently printed anthology. In 1993 Greengrass published an article about the papers in *History Today* previewing what came more fully the following year in the anthology edited by himself and co-project directors Michael Leslie and Timothy Raylor.

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As a direct result of this heightened awareness, with widespread interest in Hartlib and the Papers growing, in 1995 the Hartlib Papers were published digitally in a set of two CD-ROMs and sold for $4,995 each by University Microfilms, now ProQuest LLC, and then an expanded CD-ROM collection, at about half the original price, by Humanities Research Council in 2002. Both of these publications were ground breaking but impact was limited due to the cost. Only four universities, for example, in the United States, chose to purchase the Hartlib Papers on CD-ROM. Thus, while the publication was visionary, this step did little to open access to the collection.

Finally, in 2013 the first of the Hartlib papers appeared online in their chronological order and linked to Early Modern Letters Online, a site sponsored by Cultures of Knowledge, the Bodleian Libraries, The Andrew W. Mellon Foundation, and Oxford University. The papers are also searchable through the Humanities Research Institute (HRI) as sponsored by The British Academy, The Leverhulme Trust, and The University of Sheffield. This latter website makes available for free what was previously sold on the CD-ROMs. The process continues as the directors of the Hartlib Papers Project are, as of the date of this thesis, preparing full introductory and background information to more fully interpret the manuscripts. Already, images appear on the EMLO site and the papers are beginning to inspire a rewriting of intellectual history in the seventeenth century.

From the Hartlib Papers, scholars are learning that Hartlib was the center point of a network of scholars far larger than anyone previously imagined.34 The information in the Papers has raised more questions than the original sixty eight, now seventy-one, bundles have

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answered. According to each scholar who has taken an in-depth look at the Papers, these questions are “entirely new questions”. Clearly the identity and significance of Hartlib must be reevaluated in light of the Papers. While Turnbull, Trevor-Roper, Hill, Webster, and Greengrass have begun this reevaluation there is obviously much to be done regarding Hartlib and his papers. Hartlib may be the most significant individual in the tectonic epistemological shift from medieval scholasticism to early modern empiricism. Michael Hunter has pointed out that, “[John] Aubrey was evidently fascinated by Hartlib’s practical scientific programme which could be seen as the successor to Bacon’s.” How do you get from Francis Bacon to The Royal Society without Hartlib? Without benefit of the discovery of the Hartlib Papers, The Reverend Professor Fowler, writing in the 1885 *Dictionary of National Biography*, inadvertently cast a shadow on the legacy of Hartlib and improperly influenced the opinion of much research in a way that lingers even after the papers have come to light. Fowler referred to Francis Bacon as a prophet of science, but in science, like in the Old Testament, there are Major Prophets and there are Minor Prophets. Hartlib deserves his place in the pantheon of the Major Prophets, the founding fathers of the empirical method. This was not corrected in the reprint of the *DNB* or in the 2004 *Oxford Dictionary of National Biography*. If Francis Bacon is Moses then Hartlib is Joshua. If the former is the English Socrates, then the latter is the English Plato. He requires recognition as the indispensable seventeenth century link between Francis Bacon and Isaac Newton.

The discussion among historians of the seventeenth century regarding the term “science” and “scientist” requires any study of this period to define the word or avoid it altogether. The Latin word *scientia* appears in scholarly writing as early as the mid-fourteenth century to mean “knowledge” or “understanding.” Francis Bacon wrote, “Nam et ipsa scientia potestas est,” to say, “And thus knowledge itself is power.” Also relevant is the Greek word *ἐπίστημη* (episteme) which is a compound word of *ἐπί* (epi), the preposition “on”, and *ἰστημί* (istemi), a verb meaning “to make”, “to stand”, or “to set”. Together this word, from the Greek, is understood to mean “understanding” and “knowledge” like the word *scientia* in Latin. The root also means “that which causes trust and faith” or “that which is believed” as expressed in the noun *πίστις* (pistis). Thus the English word *epistemology* means the study of that understanding or knowledge which is believed. Monasticism, scholasticism, and empiricism are different methods of knowing, epistemologies. What is known is science. Science is what is known, but, as relates to Hartlib, not just any knowledge. For Hartlib, science was that method which led to the knowledge which would open the door of instauration. Science to Hartlib was empiricism instead of scholasticism. He believed human reason was unreliable due to the Fall and the only “science” which could be trusted was that which was gathered from personal observation and further which could be duplicated in the presence of others. Yet he was cautious of trusting even the human senses because they too were tainted by the Fall. His answer was to back up personal observation with objective mechanical instruments such as scales, rulers, and optical lenses. A scholastic would have concluded that all birds fly, for example, by reasoning that birds have wings and creatures with wings fly. Hartlib would have insisted upon going into the field and forest to actually look at birds and making notations of those who could fly. Until he found a

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bird which couldn’t fly, he too might conclude that all birds fly but he would have understood this conclusion as a tentative hypothesis rather than an absolute conclusion until every bird could be observed. He knew that word too as it appears at least twenty-one times in the Papers. In 1641 he wrote, “To elaborat an Hubnerian Platforme of a Christian Commonwealth and a true Church strictly according to Christ or Scripture-Institution. This would bee the a new principle or Hypothesis and the only remaining means to persuade to Moderation in my concept.”

Science, that which was believed and tested through objective and provable observation to become what was known and proven, was how he and others would reverse the curse of the Garden and restore the dominion of men over nature for the benefit of worldwide humanity. This Hartlibian science, of course, thus impacted many fields of research and experimentation, several academic disciplines, and multiple occupational vocations. Science was the knowledge and the process.

The scholars of the seventeenth century may have used the word “science” interchangeably with experimental or natural philosophy but clearly they were using it accurately as they understood it and as defined above. Understood in this way, the roots of modern science go back to their time and beyond. This also explains why the revolutionary nature of the “Scientific Revolution” has recently been deconstructed by historians of science such as Steven Shapin. Therefore, because of this meaning of the word and because the word was used frequently in the Papers, use of it in any history of the seventeenth century is completely appropriate despite the false distinction attempted by some who would distinguish seventeenth century experimentalism with nineteenth century science. The only distinction is one of refinement and evolution. Too many of those who insist on dating the birth of science in the nineteenth century are those who

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are troubled by the connection of science to religion and who would separate the material and spiritual worlds.

On the other hand, Shapin argued that the difference is between amateur science, when individuals were motivated to conduct investigations out of a personal interest, and professional science for which scientists are paid. While he acknowledged that the Greeks pursued knowledge as a virtue, he limits science, as understand today, to “fairly recent times,” or “before the twentieth century.” Further, speaking to the issue of separating the spiritual and the material, he added in the same interview, “First, there is secularization: if Nature is no longer God’s Book, then [scientists] who study it are no longer made virtuous through that study.” This is the interpretation expressed earlier in Science Incarnate in which Shapin wrote in the introduction with Christopher Lawrence, “It should be understood that in our late modern culture science counts as Truth, and how science is interpreted counts as a story about Truth. There is no present-day body of culture that competes with science in any significant way for the mantle of Truth.” Deborah Harkness, while acknowledging the changes in the discipline known as science from the early modern period until today, chooses to embrace the word “science” when writing of knowledge in the seventeenth century since it was used by early modern authors themselves. She likewise chooses not to use “scientist” since she was not able to find that word used by early modern authors. There is, however, little difference between words which are used such as “experimentalist” and “scientist” unless, with Shapin, one is an amateur and one is paid.

With that in mind, is the science necessarily more reliable if it is produced by one who is paid as opposed to an amateur?

For examples of the idea and use of the word in the Hartlib Papers, in a letter written by Benjamin Wolsey in 1648 and from the Papers, Hartlib read, “For humane knowledge I honour only that which is immediately deduced from, or built upon Reall, & certayne Experiments; & those so many, as to make an infallible universal; seing according to the Schooles science is not of particulars.” Cressy Dymock wrote in his proposition for a college of husbandry at Fulham as part of the requirements to be placed upon prospective students, “Hee must giue att his entrance -50£ for the encouragement of engenuity in the practice of experiments for the obteyning of yet more perfection in this excellent & allmost infinite science.” Finally Hartlib himself, outlining classification of species in empirical method, wrote, “If that which is taken for a Genus doeth not admit that, which the thing wherof it is said to bee a Genus doeth admit, then it is no Genus to it. Therfore Science is no Genus to Vertue, because Vertue cannot bee misused but Science can.” Altogether, 172 different manuscripts in the Papers use the word science, scientia in Latin, or wissenschaft in German to refer to that which was believed to be true.

While the Hartlib Papers help historians of the early modern period to understand science, they also define Hartlib himself. Like the papers, he was “missing” for almost four hundred years. Like his college, he and his papers were invisible. Because so much of what can be known of Hartlib depends on his papers, to understand the man it is important to understand the

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papers. Without the papers, Hartlib’s influence on the events of the seventeenth century, is hard to see and difficult to describe. Without the papers Hartlib would forever be the educational reformer identified for us in Adamson. With the papers, as Greengrass wrote, Hartlib’s influence, albeit indirect, “was actually quite large.”

2.1 The Lost Papers

The Hartlib Papers at the University of Sheffield amount to 25,000 manuscripts in 71 different bundles yet these are not all of Samuel Hartlib’s original collection. Other Hartlibian documents are found only in the British Library among the Sloane Manuscripts and several are found among the collections of other individuals such as Comenius and Boyle. Almost all of the Hartlib Papers to Hartlib from Petty are in the Osborn Collection of the Beinecke Library at Yale University. The number of papers in the Sheffield collection from each year consistently increase over the lifetime of Hartlib, reaching the peak of 265 in 1659, just three years before his death. There are many more addressed to Hartlib than from him; fully 3,234 of them list him as recipient. Of those found, John Dury wrote to him 550 times, more than twice as many as any other Hartlib correspondent. There are 5,000 items, 20,000 folios accounted for.

Because the history of the how the papers were preserved has been made clearer in recent years, only a short account of their survival and discovery is necessary. After his death, Hartlib’s large collection of over 25,000 manuscripts which remained were quietly purchased by his friend, English Royalist Politician William, Viscount Brereton the third baron Brereton (1631-1680), and taken to the Brereton Cheshire estate, Brereton Hall. Lord Brereton, a

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47 Mark Greengrass, e-mail message to the author, October 19, 2014.
49 See Appendix, figure 1.
mathematician who had been tutored by Pell, was another founding member of the Royal Society. William was succeeded by two sons but, after they died childless in 1722, the six hundred year old title of Brereton became extinct.

At Brereton, the papers were organized and tied into bundles in 1667 by Worthington, who went to Cheshire in 1666 to be the Brereton household chaplain. The papers were mostly letters, but there were also copies of printed and unprinted pamphlets and books along with Hartlib’s personal journal.\(^{51}\) Worthington wrote that he “put them into order.”\(^{52}\) When finished, Worthington stored them in two trunks and placed them in a closet. Greengrass indicated they were sold by Brereton after Worthington had put them in order.\(^{53}\) No one seems to know who bought them or where they were for the following 271 years. Turnbull retrieved them from Birch, Cullimore and Company of Chester, solicitors for the Delamere family who are also of Chester, twenty miles west of Brereton House. Little is known about the Delameres in relation to the Papers but coincidentally there was a Delamer House which survived until just before World War II when the last George Wilbraham tore it down. The year 1933 is just before World War II and may explain why the papers surfaced when they did. More research needs to be done to trace the papers in Chester. There are no Delamer’s mentioned in the history of the Wilbrahams who owned the Delamere House.\(^{54}\)

Some of Hartlib’s papers are still missing. Some of these were lost, according to Hartlib, to accidents in his home in 1661 and 1662 before his death. The first incident seems to have been caused by Hartlib’s secretary who “suffered distraction or embezzlement” and the second

\(^{52}\) Ibid., p. 5.
by a fire in Hartlib’s study which may have also been the fault of a secretary.\textsuperscript{55} Hartlib wrote, “afflicted in mind by reason of that lamentable fire that broke out in my study.”\textsuperscript{56} There is no way of knowing how many papers were lost in this fire. The papers Brereton bought, therefore, can only be those which remained in Hartlib’s possession at his death. The papers Turnbull found are only those which survived the 271 years of storage during which more of them may have been lost.

Many of the Papers were intentionally taken out of the collection while they were under Worthington’s care. Turnbull explained that only one of Brereton’s letters remains in the Hartlib Papers. Brereton’s books were sold in 1697 and there is no reference to Hartlib in the catalogue. Interested parties were given the opportunity by Worthington to take papers out of the Hartlib collection before those papers were sold.\textsuperscript{57} “Seth Ward gave Worthington permission to leave amongst Hartlib’s papers, or to burn, or to bring to him, the letters which he had written to Hartlib; and there is not one of them in the box.”\textsuperscript{58} What happened? Did he burn them or take them to Ward? Others are obviously missing such as all of those letters to and from Nathaniel Ingelo and Milton. Greengrass wrote that he believes most of the dispersals made were “innocent” but allows that some were “probably designed to manipulate the historical record.”\textsuperscript{59}

\section*{2.2 The Invisible Man}

Hartlib is said to be an invisible man because he disappeared from academic and popular consciousness for most of three hundred years. He also maintains a mysterious quality because

\textsuperscript{55} Turnbull, \textit{Hartlib, Dury and Comenius}, p. v.
\textsuperscript{57} Greengrass, \textit{Universal Reformation}, p. 7.
\textsuperscript{58} Turnbull, \textit{Hartlib, Dury and Comenius}, p. v.
\textsuperscript{59} Greengrass, \textit{Universal Reformation}, p. 8.
so many historians of the seventeenth century disagree about who and what he was. He was not a scholar in the traditional sense. He does not appear to have earned a university degree, he held no paid position in the academy, church, or government, and he never published a systematic body of knowledge. On the other hand, he was educated, founded a school, and was considered an authority by those who had a degree, held positions in the church and government, and who published systematic bodies of knowledge. To bring this invisible man into view, it is important to understand his context; cultural, political, religious, and social, and his person. In the 25,000 manuscripts, Hartlib often used the words “I am” in front of verbs, adverbs, and adjectives but never did he use that sentence in front of a noun. The only time that syntax occurs, it is found in a 1637 letter Hartlib quoted from Thomas Twisse to Joseph Mede.

2.2.1 Context

Feeling the effects of the Renaissance, early modern England, particularly the seventeenth century with its Puritan admiration of education became a beehive of activity in all the scholastic academic disciplines, for all ages, and for both sexes. The Stuart Kingdom proved to be an excellent incubator for the growth of education, empiricism and the empirical method.

A necessary prerequisite to a reformation of educational theory in the seventeenth century was a reformation of the dominant epistemological theory. This first assault arose in the thirteenth century with Roger Bacon but empiricism, knowledge by observation rather than human logic, began to seriously challenge the dominant philosophy with Francis Bacon and Rene Descartes. Francis Bacon advanced the challenge of his collateral ancestor and established the new philosophy in England. As Descartes was founding a new school of thought in France, Galileo was focusing on mechanics and measurements in Italy, and William Harvey was laying the foundation of modern medicine across town, Francis Bacon was defining his theory of how
science should be done. This was not, as Shapin points out, self-evident to these early practitioners. 60 Shapin, by highlighting the role of non-academic scientists in the twentieth century, reflects the argument of Harkness who detailed the rise of empiricism from among the working class artisans of London in the early modern period. 61

Hartlib made an early and easy migration to England just as the work of these scientists was ending. The oldest document in the Hartlib papers is a letter from Richard Pernham at Elbing to Hartlib at Brieg in 1620. 62 Although there are later documents referring to earlier events in the life of Hartlib, Pernham’s letter is, at this time, the earliest known mention of someone named Samuel Hartlib. Based on Hartlib’s own comments about himself in his letters to others, George H. Turnbull had “no doubt that Samuel Hartlib was born at Elbing.” 63 He was thus known as a German even though his father was Lithuanian and his mother was English. Perhaps this maternal lineage helps explain how he was easily assimilated into an English society when, as Greengrass noted, “prospects for a foreigner were limited.” 64 Yet, to what extent was Hartlib perceived as a foreigner in seventeenth century London? Because of his mother and as evidenced from his own writing, particularly his choosing to write his personal journal Ephemerides in English, he must have been fluent in English. It may have been his first language. He was familiar with English culture, he embraced Puritan theology before arriving in England, he came to England as Puritan political power was growing, his maternal grandfather was a deputy with The English Company, his aunt, the wife of Sir Edward Savage, had been a

61 Harkness, p. 79.
63 Turnbull, Hartlib, Dury and Comenius, p. 11.
Matron of Honor to Henrietta Maria, and he married an English woman in an English church. There was, according to Robert Iliffe, “a generally tolerant attitude to protestant immigrants arriving from Europe.”65 The likelihood of Hartlib, with all his English connections, being rejected just because he had been born in Prussia and had a Germanic-sounding name, seems incredibly remote even in the most xenophobic times. Iliffe went on to describe how Protestant immigrants from Europe were “increasingly dominant” in the London trades of “glassmaking, goldsmithing, interior decorating and textiles.” Greengrass nevertheless maintained:

The prospects for a foreigner were limited. If it had not been for the Civil War and disruptions which it provoked I doubt if Hartlib would have got very far. His career in the 1630s was not meteoric in any sense of the word. He failed as a schoolmaster in Chichester. He moved to London and seems to have drifted. His publication of Comenius’ prospectus (without the author’s permission) was a bit of a high-risk strategy. But he was fortunate in hitching his wagon to some of the movers and shakers of the English Civil War, and that transformed his fortunes.66

One should not assume Hartlib encountered tension due to his place of birth because of conditions which developed after the restoration, particularly those experienced by Oldenburg who was briefly incarcerated in 1667. Having encountered such tension, Oldenburg worked with Thomas Sprat, both of them secretaries of the Royal Society, to insure that foreigners were welcome among the members. Sprat agreed even though he had been an advocate for keeping experimental philosophy specifically English. Iliffe explained that the Society became “an intellectual haven for strangers, a place where individuals from all nations might converse civilly without fear of their conversation descending into nationalist or personal abuse.”67 Iliffe has argued that conditions for foreigners changed as the perception of continentals changed after the time of Hartlib’s death among those early members of the Society. “The diaries and letters of

66 Greengrass, e-mail message to author, October 19, 2014.
these young men show a tension in their dealings with foreigners,” he wrote. Iliffe found “an arrogant and xenophobic denunciation of many aspects of foreign society” in the diaries of society members after 1662 which are not found among any English authors relevant to Hartlib before 1662. “Englishmen also prided themselves on respecting and embracing foreigners with similar dispositions to themselves,” he wrote about an attitude that existed both before and after Hartlib’s death. Hartlib possessed English dispositions. As stated, he shared their faith, genealogy, language, and the politics which reigned in his time. It may be argued, because of the Restoration and his having learned English later in life, Oldenburg shared only one of these. The two men did, however, trade more than three dozen letters before Hartlib’s death and Oldenburg’s migration as the two men faced slightly different levels of tension together. Their letters and, indeed, the Hartlib Papers in general may not say much about “foreigners”, they do speak of “strangers.” How these strangers were perceived, received, and treated changed over time.

Even though Hartlib never referred to himself as an Englishman and gave no indication that he thought of himself in those terms, he seems to have been comfortable in London living among the English and there is no evidence from the Papers he felt any negative effects of whatever forms of xenophobia which may have risen against him during his lifetime. Iliffe argues that the Hartlib journal shows there were “no international boundaries” to prevent the free movement of Hartlib and his associates. “Movement between countries was routine for many members of his circle,” he wrote. In his letters he was hopeful, often confident, and almost always glad but through the entire Civil War he never gave any indication of being afraid for the safety of his person, his family, or his work. In fact, while others fled the country in the 1630s,

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68 Ibid., p. 24.
69 Ibid., p. 27.
70 Iliffe, “Hartlib’s World,” p. 103.
he gave no hint in his Papers that he ever even remotely considered leaving London just as he
held confidently firm through the Restoration. He was afraid that he would not complete the task
he felt God had given him, that certain scholars might believe his critics who discounted his
efforts, that his Latin wasn’t good enough to clearly communicate his thoughts, that valuable
books would be lost, or that he would never be free of his kidney stones, but he was never afraid
of being singled out in London because he was a foreigner.

Perhaps his own sentiments are most clearly seen in a draft copy of a letter he wrote to
Walter Strickland in the mid 1650s. In thanking Strickland for “the unexpected favor received
from your hands by the last post,” Hartlib included:

As for your sollicitude to give mee those many intimations in <for>
communicating our [publick afaires?] to forrainers j cannot but take in very good Part yet
Sir though j bee a stranger and [<deletion>] [no?] [illeg. altered word] in this [Kingd]
<Country> let it not seeme boldness <or [arrogance?] if j dare assure you with great
certainty that <as> (my [heart?] [deletion] <hath beene truly> naturalised as long as j
have had breathing in this aire) [<deletion>] j cannot but continue by the grace of God to
bee (so j am presented of late by order to the Honourable Houses) [illeg. word] and <to
bee very> affectionat in promoting and advancing of all Publick designes for the general
good of the Church and State <So j cannot but continue by the grace of God to bee as
active then ever in forwarding the Ecclesiastical and Political Happines of both
notwithstanding the feare which etc <concerned>> But j have more <and better
[grounds?] to alledge for myself if I[altered from it] had time or if it were needful. 71

Hartlib did serve as an intermediary between Protestant immigrants from Europe and
England, however, as he was a popular point of contact for those who came in the years after he
was established in London. “Hartlib was a magnet for foreign visitors,” Iliffe wrote. 72 These
men ranged from religious refugees exiled by the ongoing conflict on the continent to inventors.
Many of these appear in the Papers, especially in the journal but also in the letters. Martin
Grundman, an immigrant parish priest, for example, at Llandyssil, Montgomery Parish in Powys

71 Samuel Hartlib. Draft Letter, Hartlib To Walter Strickland, 6 January [1654/5?]. From The University of
December 18, 2014).
County of Wales, asked for Hartlib’s help in a letter of 1660. The Papers include a petition from the approximately sixty parishioners which defended their pastor by stating:

> And although he is a stranger and forraine as to his nativitie; yet (praised be God who sent him among vs) we know his voice, and understand his langvage, and he hath so gone before vs in purity of life and doctrine, as we have delighted to follow him, and we feare that the voice of an other, may be more strange to vs and lesse beneficiall to our Souls. 

Hartlib failed as a schoolmaster at Chichester because he was young and inexperienced, not because he was a foreigner. Several children who had been verbally committed to him by their parents never actually enrolled at Chichester. Of the problems at the school in his letters, Hartlib only indicates the end of his residence there by writing:

> Mr Speed (to omit his reasons) counsels mee to give vp my house-keeping for the present; in the end of this quarter. For hee wishes mee to remoue againe to London & there to liue retiredly in 2 or 3 chambers, that so j may bee the better able to prosecute all good occasions which the Lord may open for any settled maintenance for mee & mine. For my vrgent debts here <they> gaue mee no other comfort but that j should pawne away all my Bookes & houshold stuffe. Mr Speed tries all the meanes hee can deuice to preuent these inconueniences; being hartily grieued at their strange backwardnes.

Having chosen to include the “reasons”, it appears they were financial reasons based on the debts to which Hartlib referred rather than his place of nativity. It must be allowed the financial reasons, caused by a lack of kept commitments to enroll children, were indirectly caused by a xenophobic prejudice on the part of the parents of prospective students.

Hartlib was reluctant to talk about himself, including his origins, because of his Puritan humility which compelled him to strive for invisibility, not because he was trying to hide the fact that he was a Lithuanian raised and educated in Polish Prussia. For example, he recalled a German proverb about humility in his journal in 1648, more than twenty years after his

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He used national and ethnic designations such as Englishman, French, German, Italian, Russian, Spanish, or Swiss to identify a person in a time when so many people had similar names. He never used them to promote or discredit anyone. Even when he seems to speak despairingly of another culture, it can be argued he was simply being factual as he saw the facts. For example, as he responded in his journal to a report he had received from a correspondent, he wrote, “The Turks care little for History. That which is passed 100 years agoe they thinke appertaines nothing vnto them, and for present Historys, because wee cannot bee acquainted with the secret Instructions and Councils they count them to bee of little worth.” This type of assessment was not an effort to discredit Turks but a subjective description of their culture. He did not say it was wrong to not care for history. He meant it was different from the normal care for history he had known.

These identifiers occur often but Hartlib and his correspondents appear much more concerned with any person’s religious affiliation whether Papist or Protestant rather than their race or place or origin. In his journal he wrote, “Mr Barrow a plodding laborious man not quick witted much versed in Euclid and Appolonius but no better then an Atheist or for any Religion Socinian Arminian etc.” This use of “Arminian” refers to the anti-Calvinists who followed the teachings of Jacobus Arminius. Thus while his most harsh criticisms were reserved for uncooperative academics, here he is expressing his disapproval of those who chose to follow what were, in his opinion, the false doctrine of Arminius. He was always careful to criticize

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clergy of any sect such as when he wrote of those ministers who were “abusing” the teaching of fasting, “they may wrong.”

With Dury immersed in a lifetime of Protestant reconciliation efforts, neither Hartlib nor his associates were likely to focus on the differences among various Protestant denominations and sects. In this way he found certain success. “Under the Commonwealth and Protectorate, Hartlib was a respected figure,” wrote Greengrass, and “He had influence in high places.” He and his correspondents were not “soft-headed, amateurish or incompetent utilitarians.” Hartlib was respected by his adversaries because he was well spoken, he was persuasive in his rational, passionate, yet humble personality. He was consistent because he was so firmly rooted in his religious beliefs. He often challenged his opponents but he always respected their person. He was prayerful in his writings but he was never accused of being inadequate about his faith by any Protestant.

At the beginning of the seventeenth century science was in its infancy at best but, due to the work of Francis Bacon, was beginning to emerge as an epistemology a modern student of science would recognize. The confusion persists in as much as the “scientists” were continuing to struggle against the inclusion of alchemy as a serious pursuit worthy of academic attention. Serious researchers were still referring to the Elixir of Life and the Philosopher’s Stone. Galileo had proposed the motion of the earth but scholars were still more likely to see God’s divine judgment in natural disasters, for example, than the empirical explanation which was increasingly understood over time. Hartlib himself was committed to the interpenetration of the material and spiritual worlds. He wrote approvingly of a Mr. Butler who, in his opinion, who

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stepped up to the better way, “Butler being taken prisoner he learnt the Alcahest the
Philosopher's stone and that which exceeds it his own Medecin in Afrieca where they are
common.”^{80} Or closer to home, “Dr Whicheot hath a Copie of the Proposals and Advices How
to Reforme the University of Cambridge from the abuses of Superstition etc.”^{81} Hartlib was
deeplby religious but he wasn’t superstitious.

London was the undisputed capital of early modern England in every way. By 1600
London was the second-largest city in Europe with a population of over 200,000, four times its
size just one hundred years earlier.^{82} It was a good place for a communications hub to be
established. It was also a good place for an immigrant. Hartlib’s migration was easy with so
many French, Dutch, Italian, Portuguese, and Spanish residents already there. With a healthy
foreign population, London was also a good place for an empirical culture to grow as
demonstrated by both Harkness and Jacob Selwood in his work *Diversity and Difference in Early
Modern London*.^{83}

Hartlib arrived in London at the end of the reign of James I, at least by October 15, 1621
when he received a letter in that city from Henry Roesler at Frankfurt on the Odor.^{84} This letter
proves that Roesler had reason to believe Hartlib was there by the time he addressed his letter. It
is possible there were earlier letters which were discarded before Hartlib began constructing his
archive or were lost among those destroyed by the fire late in his life but this one has survived
and should be sufficient for all editors to agree on the “no later than” date of Hartlib’s residence

in London. In this letter, Roesler affectionately describes Hartlib as *prudenti* or wise, even though he addresses him *adolescenti*, and concedes that London is the best place for him to satisfy his inexhaustible desire for *legendi et audiendi* or reading and hearing. As an adolescent immigrant, Roesler is indicating Hartlib was unusually inquisitive. He was most likely taking classes at Cambridge by the time James I died in 1625 and his son Charles I came to the throne. Hartlib received another letter in London August 24, 1624 but he received the next one in Cambridge on January 20, 1626. This chronology allows him to have been in London over four years before moving to Cambridge.

Protestants in both England and Germany agreed that Martin Luther had done great work. As Howard Hotson pointed out, “disentangling the central problem of individual salvation from the complex machinery of scholastic theology, canon law and ecclesiastical politics.” Yet these same Protestants felt the Reformation had stalled in the middle of the sixteenth century and needed to be completed with a reformation of worship and further to a reformation of life. Thus the Puritans were among those who complained the English Reformation had not gone far enough. Hartlib called attention to points in which Puritans had decided Luther was wrong. As early as 1635 he wrote, perhaps repeating a quote he heard from someone else, “Suecanus was before Arminius. Melanchton did the greatest hurt by the errors which hee had about

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Prædestination, as Luther about the Sacrament.”

Hartlib also wrote suggesting that the Lutherans of his time weren’t following Luther but had drifted toward Arminianism, among other things, making the prospect of Protestant unity all the more difficult and demonstrating the case for further reform of the church. He entered, “If Lutherans were but as formerly following Luther and his Tenents the matter of reconciliation were easy but now they are intangled with Arminianisme Vniversality of the death of Christ etc. the matter will bee very difficult.”

The Puritan reformers called for, and first earned their name as a derogatory slight. They wanted purity in the church, purity of worship, purity of life, purity of doctrine, and purity of church government. This purity, they held was to be a pure reflection of a literal interpretation of Scripture where it spoke to these issues. The problem arose when purity was interpreted in various ways by various Protestant theologians whose interpretations led to an increasing fragmentation of the English church. The number of Protestant sects was growing and included everything from the mildly to severely radical as compared to English orthodoxy of Thomas Cromwell and Thomas Cranmer and as defined in the Book of Common Prayer 1559. In criticizing the Church of England, the Puritans were themselves criticized by the sects attempting to move the Reformation even further from Catholicism than the position of Calvinism. Hartlib recorded his thoughts in his journal, “To elaborat an Hubnerian Platforme of a Christian Commonwealth and a true Church strictly according to Christ or Scripture-Institution. This

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would bee the a new principle or Hypothesis and the only remaining means to persuade to
Moderation in my concept.”

Hartlib, like all Puritan scholars of the seventeenth century, was equally influenced by the
theology of John Calvin and the works of Francis Bacon. Hartlib described the power of
Calvin’s influence among the Puritans when he wrote:

   Castalio is an author full of excellent notions and likest to Acontius of any. But
   because hee is branded by Calvin as an heretike thencefore hee is so little regarded. If the
   truths which hee hase were delivered by some other Man against whom there was not
   such a prejudice they would bee accounted most singular things.

   Calvin had fled from France to Switzerland but from there provoked a second
Reformation in Germany and England which continued to win converts through the Thirty Years
War. Dury’s self-appointed mission was to forge a reconciliation of these Calvinist Protestants
with the Lutheran Protestants. The differences were sharp and made their mark on the broader
views of Hartlib. Unlike Luther, Calvin unified church and state in Geneva, establishing a
theocracy and setting an example for others such as the Puritans who saw themselves attempting
something similar in the English Civil War or in the Massachusetts Bay Colony.

   More than Calvin influenced Hartlib’s theological beliefs, Francis Bacon informed his
scientific method. In his letters and journals, Hartlib made reference to Francis Bacon more than
one hundred times, far more than Calvin. At Cambridge, Lord Verulam, as Francis Bacon was
known to Hartlib, only twelve years old when he matriculated to Trinity College in 1573,
encountered scholasticism and voiced his disagreements with this philosophy of Aristotle.
According to William Rawley, Francis Bacon’s chaplain, as quoted by Lisa Jardine and Alan

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Steward, this was not so much “for the worthlessness of the author, but for the unfruitfulness of
the way [method]; being a philosophy (as his lordship used to say) only strong for disputations
and contentions, but barren of the production of works for the benefit of the life of man.” He
studied law, was elected to Parliament, and took several different high positions in the
government under Elizabeth I and James I. Francis Bacon was compelled theologically to
defend the Protestant faith against Catholicism. He pursued his passion to philosophically define
a new epistemology. The magna auctor for Hartlib then was also a Puritan with many interests;
law, philosophy, politics, and theology among others. Francis Bacon died, while Hartlib was at
Cambridge, in 1626 from bronchitis after having caught a chill while collecting snow in order to
stuff a fowl and test the effect of the cold on the flesh of the dead bird. At Cambridge, Hartlib
and relatives of Francis Bacon were inspired by his theories and visions, agreed with his
philosophical objections and desires for a new epistemology, and began to consider his
philosophy which was based on objective truth and encouraged works to the benefit of the lives
of men. Hartlib, approximately forty years younger, sought to make the teaching of Francis
Bacon comprehensible in the next generation; to expound the principles of practical knowledge
in a way that future generations could act upon them. Francis Bacon regretted not devoting his
life to science only but it was Hartlib who attempted to do just that; to extend the life of the
visionary philosopher and to be the Francis Bacon that Francis Bacon wanted to be; to be the
auctor prudens. Hartlib refused, for example, to chain himself to the oar of political service as
Francis Bacon had done and therefore, exhibiting his passion for his work, often declined to take
a permanent full-time position in the government or in a university in spite of his pressing
financial needs.

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93 Lisa Jardine and Alan Stewart. Hostage to Fortune: The Troubled Life of Francis Bacon. (New York: Hill an
94 Gardiner, p. 348.
Francis Bacon’s own inspiration may have first come from his mother, Lady Ann Bacon, the second daughter of Sir Anthony Cooke, who was said to have read Latin, Greek, Italian, and French “as her native tongue.” Lady Bacon was also known for her Puritanism. Plays and masques, for example, were “abominations” to her. Before she married she was reported to have translated some sermons by Rev. Bernardino Ochino on the doctrine of justification by faith into English. This Italian minister was raised Catholic, converted to Protestantism, and spent a few years in England before the rise of Queen Mary. In 1564 Ann Bacon also translated and published, with permission from the author, Bishop John Jewel’s Latin Apologie of the Church of England. Ann’s work was reprinted in 1600. Yet it is as a correspondent that Lady Ann is most well-known. While most of her letters, filled with long quotations in Greek and Latin, were addressed to her sons Francis Bacon and his brother Anthony, she had her own circle of correspondents.

Francis was also exposed to and influenced by his distant collateral ancestor, Roger Bacon who stood in opposition to the academics of his time and purposely avoided popularity when praise was given. Yet Francis Bacon does not seem to be as aware of contemporaries Harvey, Kepler, or Galileo as he may have wanted to be. Carlo Ginzburg notwithstanding, Britain was indeed an island, intellectually isolated and insular. All of these were fighting similar battles and in them he should have found much comfort. Their approach was very much unlike Hartlib who established an active correspondence relationship with every relevant contemporary educator, philosopher, reformer, scientist, and theologian he could find. Although there are no letters in the Hartlib Papers between him and Rene Descartes, the French contemporary does appear in the letters of Hartlib correspondents and there is at least one copy

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of a letter from Descartes to Henry More preserved in the Papers from 1649. Francis Bacon considered himself common in conversations and written correspondence and he longed “to retire from the practice of law, and to devote himself to philosophy.” Like Hartlib, Francis Bacon was interested in promoting husbandry, relief of the poor, Irish plantation, and union with Scotland. Unlike Hartlib, as a member of parliament and as Lord Keeper, Francis Bacon was able to sponsor and vote for legislation to see his ideas funded and implemented. Unfortunately for the immigrant, Francis Bacon was backed by a Bacon family inheritance and titles while the merchant’s son had neither. Fortunately for Hartlib, Francis Bacon was dismissed involuntarily from government service prematurely and was thus forced to retire at last to the writing desk before his death. In this way, before the end of his life, he was able to complete most of the works that were so inspiring to Hartlib such as *Advancement and Proficience of Learning Divine and Human, Novum Organum Scientiarum, The New Atlantis*, and his greatest though unfinished work *Instauratio Magna* to complete his vision of reformed philosophy for the following generation.

Despite his titles, connections, completed books, and “desire to benefit mankind by a science founded on observation and experiment,” the Viscount St. Albans was unable to secure immediate acceptance of his philosophical ideas. Harkness wrote this was because he was confined to the realm of politics. Samuel Rawson Gardiner argued this was because he had a tendency to “under-estimate the difficulty of the task.” He further held that Francis Bacon’s administrative successes were the reasons for his epistemological failure; the government he improved proved to be useless to the implementation of his ideas. That even if he had been

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97 Gardiner, p. 332.
98 Harkness, p. 252.
successful in reforming English pedagogical methods and actually building the government department he had envisioned as The Jewel House, the “officialism” he would have organized would have smothered scientific inquiry.\(^9\) Old school scholastics in the early seventeenth century argued that Francis Bacon’ empiricism was too mechanical, it neglected the use of hypothesis, and that his inductive reasoning did not correspond to actual scientific investigation.\(^1\) Hartlib disagreed with these critics and argued that more mechanics was exactly what epistemological theory needed, that hypotheses were not neglected in experimentalism, and that inductive reasoning did correspond to authentic scientific investigation. They were divided by their definition of science. Hartlib therefore resolved to finish the difficult task which Francis Bacon had started. As an immigrant with no official obligations, Hartlib was able to dedicate himself completely to the goal.

Throughout the Hartlib Papers is found a variety of references to more members of the Bacon family than Roger and Lord Verulam. Letters provide new information about Francis Bacon’s brother Anthony, and Sir Edmund Bacon and Nathaniel Bacon, two nephews of Francis Bacon, Hartlib correspondents, enthusiastic Puritans, and all Cambridge graduates. The papers reveal a greater collective involvement of the Bacon family in the growth of Puritanism as well as the development and institutionalization of experimentalism as a modern empirical method. In this work the value of an active and widely encompassing correspondence becomes clear from the Papers and other collections. Anthony himself produced sixteen volumes of correspondence preserved in the Lambeth Palace Library and the British Museum.\(^1\) Edmund was less well known in the political community but while corresponding with the *auctor prudens* he was

\(^9\) Gardiner, p. 344.
\(^10\) Fowler, p. 356.
actually conducting experiments on his Suffolk farm such as his trials in bee keeping and reporting his results to Hartlib. Nathaniel, on the other hand, was a Puritan Member of Parliament who wrote several tracts in defense of Protestantism, similar to his more famous uncle, and who attempted to assist Hartlib from inside the government. Francis Bacon was an inspiration to Hartlib but other Bacons were correspondents with Hartlib who they must have believed was the best man to complete the vision of their famous brother and uncle.

By the time Hartlib was in London permanently, the three hundred year old Renaissance was coming to a close, the Reformation was over one hundred years old, the Thirty Years War had been going for ten, the Puritans had founded Salem, Massachusetts, William Harvey published *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus* in Frankfurt, and Oliver Cromwell appeared in parliament for the first time. Each of these events had profound impact on Hartlib and must be considered as indispensable context for understanding his papers.

By the time the first sounds of an English Civil War were heard, Hartlib had been settled in London for at least fourteen years. By that time he had already attempted to start a brick and mortar college at Chichester and had been writing about an invisible college for ten years. Laud was archbishop when Comenius came to England upon Hartlib’s invitation in 1641 and the Hartlib run of writing and printing was well underway.

2.2.2 A Brief Hartlib Biography

Because the biography of Hartlib is in need of being updated in light of the papers and subsequent discoveries of information, such as the more complete history of the English Company in the Baltic which better explains Hartlib and his work, it is helpful to give a brief summary of his personal life here. Turnbull gave the best early biography but his account is now sixty seven years old and does not account for recent scholarship. Greengrass in the new *Oxford*
Dictionary of National Biography wrote an excellent, current, but brief biography which was limited to barely 3,000 words, concentrated on Hartlib’s career. As many words are needed to expand on important details overlooked by both accounts regarding the beginning and the end of Hartlib’s life, also relevant to understanding his work.

John Evelyn wrote that Hartlib identified himself Lithuanian even though he was so often called a German by others.\(^{102}\) Elbing has since been German and Polish. The actual date of his birth is unknown but it must have been after the ascension of James I in England because that event allowed Hartlib’s grandfather, a Deputy of The English Company who “brought” that company to Elbing, thus his mother to be in Elbing.\(^{103}\) If this is true and he was an *adolescenti* in 1621 as Roesler indicated, it is less likely he could have been born before 1604 or later than 1607. *Adolescenti*, the dative, masculine, singular of the participle *adolescens* means he was “growing up”, “maturing”, “increasing”, and “augmenting.” He was young. The *Oxford Latin Desk Dictionary* lists *adolesco*, the verb, and defines it “to grow up.”\(^{104}\) Based on these definitions, the narrative above, and the Papers, it is impossible that he was born before the revival of the English Company in Elbing and his grandfather’s arrival there in 1604 or after 1607 which would have negated the *adolescenti* descriptor.\(^{105}\) All of this to say he must have been no more than 17 years old, perhaps as young as 14, when he first came to London and thus not yet 60 when he died. This is important in understanding his arrival in London and the four years which elapsed before he appeared at Cambridge. It further speaks to the explanation for

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his failure at Chichester. Further research in the records at Elbing could most likely clear this up and possibly supply a more precise date.

Hartlib never gave his birthdate or made reference to his age. He wrote little about himself, never naming his parents even though he identified their ethnicities and his father’s merchant occupation.\textsuperscript{106} He confessed being “upraided” for neglecting his “pedigree”. He may have done so because of his father’s occupation. He reminded Worthington that though merchants may do well financially, trade was considered a “derogatory” vocation to German nobility. He may have been afraid the English nobility were of the same opinion. This seems obvious when he stressed “my Father was a Merchant, but no ordinary one.” Hartlib himself said he preferred studying “my heavenly birth.” In this letter to Worthington, which the recipient had requested on the occasion of daughter Nan Hartlib’s wedding to John Roth, Hartlib indicates that he came from a wealthy and respectable family saying his “family was of a very auncient extraction in the german empire, that his Lithuanian father worked for the King of Poland, and built a dye-works after he had moved to Elbing.”\textsuperscript{107} His father was married twice before being wed to his mother, two women of nobility. Because this was his third marriage and her first, it is possible to imagine he was much older than she. There is no reason not to trust this letter though the reader is left wishing he had said more about himself and his origins.

He referred to a solid pedigree on both sides of this family. His English grandfather had three daughters. Hartlib’s aunts married nobles. His mother’s oldest sister had been married to the London Lord Mayor Clarke’s son, to Sir Richard Smith, and then to Edward Savage. This sister had a daughter, Hartlib’s first cousin, who married Sir Anthony Erbes, a Member of


Parliament. The younger sister married a Mr. Peake who had inherited an estate and who was still living when Hartlib wrote Worthington in 1660. All of this to demonstrate Hartlib had solid English connections and, though he was reluctant to speak of it during most of his life, wealthy relatives even if he himself struggled financially later in life.

Several letters in the Papers prove Hartlib was first educated at Brieg of Silesia in southwestern Poland. He matriculated to the University of Künkigsberg in 1614 even though he may have been younger than Francis Bacon was when he arrived at Cambridge.

Hartlib may have emigrated from Prussia with his mother because of his age and difference in the ages of his parents. It’s possible his mother chose to move back to England, her home country, when Hartlib’s father died. This cannot be proven since, other than the one letter to Worthington, Hartlib never spoke of his parents. Even though he once referred to Boyle in a letter to Worthington as “my brother”, to Boyle’s brother in a letter to Boyle as “my brother”, and to Beale’s wife as “my sister” in a letter to Beale, his reference to “my brother George” in a letter to Dury is probably about his actual biological brother. He wrote, “From my Brother George j receiued [a letter] from Berlin where Dr Bergius liues. with Dr Crellius & [Mencolius?] very Orthodoxal Preachers.”

Otherwise he says nothing of his immediate family making it difficult to understand his familial context in the time of his transition to England.

Hartlib lived in London 1621-1624 before he was at Cambridge 1625-1627. He seems to have been at the university until he married in 1628. Thus he settled in London because of the advantages the location offered to his work, it was where he had lived before, it was the home of his wife’s family, he had contacts there both personally and professionally, and the war in Europe did not end until long after he had established himself. There are few indications of his...

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feeling about living in London or what his opinion of the city may have been. He seems to assume his presence there but in withholding his opinion about a new optical device for lighting city streets of which he had heard of from Comenius, he wrote to Winthrop:

When I have seen what it really performs for enlightening whole streetes, galleries or any other roomes aswell in breadth as in lengt I hope I shall be mindfull of giving you a fuller account of it, for it hath been one of my owne usefull desideratas finding in winter time a dimness and darkness in the stretes of London, Galleries of Whitehall, in the publick meeting houses and other congregations &c notwithstanding the many lanthorns and great number of candles.109

Based on the papers and as stated, Hartlib was in London by the date of the second oldest document in the collection which was October 15, 1621.110 Hartlib received another letter in London on August 24, 1624 but from July 1625 until January 1626 he appears to be at Cambridge based on four letters sent by him from there to Valentin Reusner in Gdansk, who he addressed as “patron”, and Matthias Pasor, as well as one letter from Pasor to Hartlib. It is not clear who Reusner was since he cannot possibly be the painter of the same name who died in 1725. There is no definitive proof that Hartlib was an officially enrolled student, in the normal sense of the word, as his name has not been found on the matriculation lists of that university. However, there are, if in fact he did not matriculate, many reasons for him to have been there as an unofficial student or in other capacities and his opportunity to meet those who were faculty or students is no less diminished. A quick search of the Cambridge letters, all of them in Latin, has

110 This manuscript is actually undated as to the year and there is a contradiction between the EMLO site which has it as stated here and the HRI Online site which gives a date of 1637 with a question mark. If the latter date is correct it would allow for Hartlib not to be in London until the letter of 1624. It would also make him older when he came to London and be greater proof that he immigrated alone. See the EMLO dating at http://emlo.bodleian.ox.ac.uk/forms/advanced?col_cat=Hartlib%2C+Samuel and the HRI Online dating at http://www.hrionline.ac.uk/hartlib/browse.jsp?id=49%2F33%2F1a-2b to see the critical contradiction. (accessed December 18, 2014).
revealed what appears to be a commonplace list included in the letter to his patron. It would make sense that he would feel it appropriate to demonstrate to Reusner what he was learning. He wrote, “Commendo Tibi Eruditionem quam hominum stultitia jam dudum damnauit ostracism,” to say that he was learning despite the fact that formal training had long been condemned as folly by some. The notes are organized on the page as columns under several headings which include Economics, History, Philosophy, Physics, Poetry, and sermon notes, all subjects a student might have taken. In the sections he wrote the names of topics or descriptive phrases with corresponding page numbers. Under philosophy is “*An hoc mundi seculo praestet discere philos. practicam quam Theoretic.* p. 378. et 920,” and “*It. Aristot.* System. p. 752.” Under history there are notes referring to Caesar being legitimately killed, Belgium signing a peace treaty with Spain, and an attack on Turkey. Time did not permit attempting to locate the books to which these page numbers refer and it would most likely require a trip to Cambridge since these books are quite likely out of print. Included is a list of ten Bible references relating to a variety of theological topics including the Divinity of Christ, the Suffering of Christ, and the Holiness of God. Hartlib indicated a heavy interest in the Book of *Galatians* which is particularly known as a book about God’s grace and Christian liberty. Finally, and perhaps most significantly, is the entry he made on page six of these notes about the “*Lapsus primorum parentum.* 653.” which is the Fall.

Twice he wrote, later in life, “When I was at the University of Cambridge many years ago.” Letters were sent through Cambridge to him and others were sent to persons at Cambridge through him. He mentioned the school over 150 times in letters and his journal,

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noting changes in faculty and even incidents of weather when it was unusual. This seems to be an intense interest for someone who had never been a student there. Hartlib even wrote to Boyle in 1658 that the vice-chancellor of Cambridge had been to visit him about whether they should “lay the foundation of a mathematical professorship in that university.” Greengrass concluded, “Hartlib certainly pursued studies at Cambridge.” It may be one day someone will find him on a matriculation list or a diploma settling this issue once and for all.

This period at Cambridge impacted his intellectual development since so many of his correspondents throughout his life had direct or indirect ties to Cambridge as students, faculty, or both. They were contacts because of their shared time at the university but, more importantly, Cambridge was known as a friendly institution to empirical ideas and obviously attracted like-minded individuals to a place where lasting friendships were established. The period may have ended for Hartlib because he completed his course of study after two years or his studies may have been interrupted by a family emergency which caused him to return to Elbing during February and March 1628 where two letters arrived addressed to him from Johann Fridwald. This is also the time of his January 1628 marriage. Of course, the possibility also remains that Fridwald may not have been aware that Hartlib had left Prussia in the first place. Either way, Hartlib was in London by May 1, 1628 at which time he had begun his permanent settlement in England. The only breaks thereafter were the stint in Chichester and a quick two month trip out of London to avoid a plague outbreak in the city.

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114 Greengrass, e-mail message to the author, October 19, 2014.
Hartlib married Marie Burmingham at the St. Dionis Backchurch January 20, 1628.\textsuperscript{115} The event is significant for establishing a chronology for Hartlib’s location during this period and for strengthening the case for his acceptance into English society. His stay in Cambridge ends at the date of the wedding and unless Hartlib went on honeymoon to Elbing, or Fridwald, writing from Kalingrad, was mistaken in addressing letters on February 10 and March 8, 1628 to him there, he was in London after that day. From that time, letters arriving and departing the Hartlib home steadily increased.\textsuperscript{116} Hartlib and his wife raised at least four children. Four names are known from the Papers: Samuel Jr., John, Mary, and Nan. He worked from home, maintaining a study there, and remained in London until his letters abruptly stopped in 1662. These letters were addressed to him living at the newly established Duke’s Place neighborhood or Christchurch Lane in the Aldgate Ward, on the old Roman wall of the northeast corner of the one square mile. These were different names used by different correspondents for the same location which is less than one mile north of the Tower and also from the St. Dionis church, Langbourn Ward where the Hartlibs were married. Incidentally, the church burned in the London fire of 1666, four years after Hartlib’s death, but was rebuilt by Hartlib’s friend and Royal Society President Christopher Wren. This area of London in 1628 was a peaceful though busy part of the city with very little crime as compared to other wards of the capital.\textsuperscript{117} Hartlib and his family also lived at Angel Court, Charing Cross 1650-1658 until Marie died and then he moved to his son Samuel Jr.’s house in the Axe Yard, Westminster for the remainder of his life.\textsuperscript{118} As is apparent from the graph,\textsuperscript{119} at no time after 1632 did the number of letters in the


\textsuperscript{116} See Appendix, fig. 2.


\textsuperscript{118} Turnbull, \textit{Hartlib, Dury, and Comenius}, p. 20.
Papers fall below 81 per year but they did increase dramatically after he moved to Angel Court, reaching a total of 265 in 1658.

As early as 1653, though likely not quite fifty years old, Hartlib began to complain in letters and his journal about kidney stones. He was quite aware as to what they were and spoke of their passage as well as the pain he experienced. Others suggested various cures including fox blood applied to the penis, eating radishes with honey for a period of days, birch wine, or raspberries. The subject never disappeared from his letters. Kidney stones are most commonly caused by diet and not drinking enough water. They are a crystallized calcium build up in the kidneys which must be expelled through the urine. Passing a kidney stone is a very painful process comparable to birth pains. Boyle and Harvey are among several of Hartlib’s contemporaries to have struggled with kidney stones most of their lives. Hartlib had kidney stones frequently and he had many. In 1658 he wrote to Pell, “Though j voided yesterday ten stones (five or 6. pretty big ones) and this day 3. great ones yet y am able God be thanked to continue my writing respects.”

The cause of his death is not known. In the last three months of his life letters came from those who had been his closest friends and most active correspondents; Beale, Comenius, Dury, Morian, and Worthington. Almost all of their letters contain ominous notes as if they knew his passing would not be long delayed. On January 9 Dury wrote to him for the last time, “I am not a little afflicted at the disappointment of the hopes which wee hadde, that by the medicament which was sent you, your health might bee restored; but I hope you are no nouice in the schoole

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119 See Appendix, fig. 2.
The last known writing from Hartlib, his journal entries end in 1660, was two letters written by him on Valentine’s Day to Worthington. Although the bulk of these letters demonstrates he was still very much engaged in the work, his mind still sharp, but concerning his health it is found in the first letter:

I cannot find one that is properly cured of the stone. That boy, indeed, had a stone in pene, which was drawn out by a surgeon, and drawn forth by this medicament, but the boy had no stone consumed in the bladder . . . And again: concerning one that should have found out a means to cut the stone out of the kidneys, I enquired here of two special Doctors, but they know of no such thing.122

Other than signing this letter, the last words Hartlib wrote, of those found in the Papers, were, “I desire to live and die,”123 reminiscent of the Apostle Paul who, in a similar moment wrote, “For I am in a strait betwixt two, hauing a desire to depart, & to bee with Christ, which is farre better.”124

Comenius wrote the last letter received on February 24, saying:

My Patron, who is now tarrying at The Hague on account of the illness and death of his mother-in-law (but I had written to him at that place), sends you 20 Imperials (50 Dutch guilders) to which I am adding half as many again in respect of a promise made elsewhere; and it is my understanding that Mr. Serrurier, also a true friend of yours, is adding as many again. May God prosper these crumbs in the meantime.125

He mentioned his own mortality at the end of the correspondence by writing:

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I may write no more as I must return to my bed. The end of my seventieth year is
drawing near, on the 28th. March: I think that I am being reminded of my mortality every
time that some bodily illness knocks at my door. But may God's will be done! It is not for
this life that we fix our hopes in Christ. Farewell, and put your trust in that eternal
Saviour of his people.\textsuperscript{126}

These are the last words Hartlib read according to the Papers. Comenius, however, not
knowing Hartlib had died, wrote to him again on March 10, the same day. There was no way he
could have known and it is not known how long it took for him to receive the news. In the letter
which must have arrived days after the funeral, he spoke of a letter from Hartlib on February 12
which is not found but in which Hartlib had shared a “premonition” with his Moravian friend.
Thus in the letter, Comenius wrote:

My dear friend, how is it at present with your soul? I shall hope that God will be
more merciful to us than that your last letter to me, on 12th. February, should be the last
you would write, and that your premonition may not be proved right in the event. I am,
however, troubled as long as there is no further news from you, or about you. For two
weeks so far now nothing has come from any of your people. As I am unaware, then, of
what is happening, I have nothing in particular to write to you.\textsuperscript{127}

It is assumed the 100 guilders received from Comenius were helpful to Hartlib’s children who
buried him March 12 in the church yard of St. Martin-in-the-Fields where the Hartlibs had begun
attending in 1650 when they moved to Angel Court, where Nicholas Hardy was still in his first
year as rector, where Boyle would be laid to rest twenty nine years later, and where four years
earlier the \textit{auctor prudens} had lain his wife.\textsuperscript{128} These graves are not presently visible as they
were apparently covered by the renovation of this Anglican Church in 1726. Thus the grave of
the invisible man has disappeared.

\textsuperscript{126} Ibid.
\textsuperscript{127} Jan Amos Comenius. \textit{Letter, Comenius To Hartlib, English Translation Of Original Latin Original, March 10,
1662}. From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. www.hrionline.ac.uk/hartlib/
2.2.3 The Legacy of Hartlib

Even though Hartlib had passed away, it is also clear from the letters of his last year that his work would continue; that his correspondents would keep their commitments to him in promoting the empirical method. Drury wrote January 9, 1662 communicating plans:

I wish I may bee so usefull to you, as to meet with the Earle of Hoenloe when I come to the further parts of Germanie: if the Lord giue me the opportunitie I hope to improoue the utmost of my interest in him & use other meanes by such freinds of mine as may haue an interest in him to moue him to doe you right; if I could at this distance doe you any other seruice then to pray for you, I would lay it to heart.129

Hartlib, in his last letter was still telling Worthington of new papers and books that were forthcoming:

I am glad Mr. Patrick's paper of illustrious providences is at last come to your hands. Dr. More's book will be always very welcome to one that professeth himself so exactly obliged to so worthy a gentleman. Caleb Morley's design will not be lost, if it please God to spare a little longer Mr. Beal's ingenious and industrious life. He will go near to give you a particular account of the Mnemonical work that he so long travelled with.130

During his lifetime, Hartlib spent most of his energy corresponding, writing, and publishing the works of others. Dircks said he became the “universal correspondent.”131 There are letters in the Papers from over 400 different writers. Evelyn called him “Master of innumerable Curiosities, & very communicative.”132 So highly regarded by such great names in his lifetime, it seems unbelievable that his name fell into obscurity almost immediately after his death.

131 Dircks, A Biographical Memoir, p. vi.
Hartlib was a key broker of scientific material in the modern sense of the word. He collected, redistributed, copied, and printed correspondence as scholars wrote down their thoughts. He attempted to keep all interested persons fully informed not only when discoveries or inventions were made but when hypotheses and theories were formulated. Yet as Don Wayne has argued, the term broker was a pejorative title in early modern England. It was used to refer to “pirate printers and plagiarizers.” In the time before copyright protection, a broker was someone who violated an author’s rights because the term was also used for the “violation or sale of a woman’s body.” Whether or not Hartlib always had permission to publish everything he sent to be printed, he never profited from selling those publications and his intention was never to steal someone else’s ideas or credibility. In the sixteenth and seventeenth sense of the word, Hartlib was not a broker no more than he was simply a printer, editor, intelligencer, or polymath. He was the auctor prudens of the mid seventeenth century.

Hartlib believed that because knowledge was a gift from God to be used in the service of all people, scholars should give themselves to the public good and therefore receive little if any personal enrichment for their inventions or books. He seems to have formed this opinion as early as during the time he was at Cambridge, attempted to make it part of the curriculum at Chichester, and urged it upon all of his correspondents in the invisible college. His Puritan friends such as Beale, Culpeper, and Worsley agreed with him that scholars ought to willingly surrender any proprietorial rights to their knowledge for the good of others. Not everyone agreed with this part of his vision, finding it difficult to accept Hartlib’s admonition. There were

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136 Greengrass, *Universal Reformation*, p. 11.
debates, some appearing in the papers. Some such as non-Puritans Evelyn and Petty disagreed strongly.\textsuperscript{137} In his own defense, Hartlib explained to Worthington at the end of his life that he had done as he preferred, “studying more to this very day to be useful to God’s creatures, and serviceable to his church, then to be rich or honourable.” Hartlib, as evidence of his integrity on this subject lived in poverty most of his life as he attempted to live out this conviction.\textsuperscript{138} He rarely, however, voiced his financial condition to others. He did not complain about his poverty to his correspondents even though they consistently wrote of their concern to him. He did share with Boyle in a rare passage that his stipend had been cancelled by the Restoration government.

In 1659, at the end of a long letter about many aspects of their work together, he wrote:

I am constrained to supply my own necessities, into which I am also reduced by the present change, my pensions of two hundred pounds a year being founded upon his highness’s and council’s orders, and privy seals, now utterly made null. Last our Lady-day I should have received seventy-five pounds out of the exchequer; but it being delayed till this change of government, there is no hope to get one penny of it.\textsuperscript{139} Letters arrived from correspondents complaining of their own debts, some subtly implying he send help and others asking more explicitly. He never received more than the £300 annual stipend from Parliament and most of his money went to grants he awarded to researchers who presented promising ideas.\textsuperscript{140} He wrote to Worthington that he annually spent between three and £400.\textsuperscript{141} He subsisted on unsolicited gifts of charity. Not all the gifts came from wealthy nobles, however, and not all gifts from nobility were large. Sir Thomas Roe sent him £5 to buy wood.

\textsuperscript{137} Ibid.
for the winter in 1639, the next year Lord Clanricarde of Ireland sent £5, and Culpeper sent him £6 in 1647. Of course there were many others from correspondents, ministers, nobility, politicians, and some were larger. He received £20 from his father-in-law in 1641.  

Over the course of his lifetime, many of his closest friends made proposals of ideas to him for securing a regular income which, in attempting to appeal to him, would allow him to invest more in the advancement of his empirical goals. His cousin suggested obtaining a parsonage in 1630. Robert Wood attempted to secure an Ulster plantation for Hartlib in 1659 which, he said, would produce £20 per year. Dury tried to convince him to become the librarian at Oxford in 1646 which could have been worth as much as £200 per year. Thomas Gilson vowed to have him elected provost of Oriel College, Oxford if Hartlib were agreeable. He was not. From the Papers he does not seem to have been agreeable to any of these proposals in spite of his financial needs. His focus was too strong to allow himself to be buried in the responsibilities of any full-time employment. Greengrass confirmed, “He never sought a place in the professions.”

Nothing is known of Hartlib’s physical appearance. The image of his physical presence remains a mystery because he never consented to sit for a portrait even though there is one of his wife, probably done before their marriage. About 150 the correspondents spoke of Hartlib’s character traits, describing him as a “good man”, “more noble”, “my greatest encouragement”, or his health, but they never described anything relating to his physical appearance.

By the time Hartlib died in 1662, the Puritan experiment in government was over and a restoration of the monarchy had placed Charles II on the English throne. Greengrass argues that this political reversal doomed Hartlib’s vision and insured he would be forgotten within a

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143 Greengrass, e-mail message to the author, October 19, 2014.
generation of his death. Greengrass has Hartlib falling in prominence along with Puritan political power. “He was parodied as a ‘fanatick’,” he wrote, in plays. Irreversible empirical progress had been made, however, and others such as Oldenburg kept up the pressure for further philosophical change applied after Hartlib’s death. Even though Dorothy Dury had written Hartlib, “you are the greater rownd head,” in 1645, her husband was able to write in 1655, “you are not forgotten.” Trevor-Roper might have written how appropriate that the tireless prophet and formulator of such reform disappeared from the historical record just as the monarchy was restored to power.

While it is unreasonable to think that Aristotle, Augustine, or Aquinas might have disappeared from the curriculum of the late seventeenth century, events had been set in motion by Hartlib which would not be undone. The end of Puritanism as a ruling political ideology was over in England but the emphasis on practical knowledge was deeply rooted by 1660 in the English public schools and would spread through the empire to all parts of the world. Beale, Oldenburg, and other members of the Royal Society who had been Hartlib correspondents made sure there was no going back to medieval scholasticism or antiquated metaphysics in the modern world. Hartlib’s invisible college, so well represented by Gresham College, was more accurately uncovered by royal charter as the Royal Society, founded by Hartlib’s correspondents including Christopher Wren, Robert Boyle, John Wilkins, Robert Moray, and William Brouncker. Thus Hartlib may not have had, as Greengrass argues, “direct” influence on the formation of the Royal Society, his indirect influence is overwhelming though underestimated because of other unfair, misleading, and politically motivated statements made about him. A quick glance at the earliest membership lists support Webster’s argument that it was a badly posed question from the

145 Ibid.
time it was first asked whether or not Hartlib influenced the founding of the Society. The active nucleus of the Society was Puritan in its formation and it was the Invisible College at its core. This is not discounted because the society gradually evolved over the next twenty years as more non-Hartlibian members were added. The Society was, in the earliest days, completely influenced by Puritan ideas identical to those held by Hartlib and his correspondents who became members, none more prominent than Boyle, Evelyn, Hooke, Oldenburg, Petty, Wallis, Winthrop, and Wren; all active members between 1660 and 1663.¹⁴⁷

Most historians are content to see the connection between the Royal Society and the Invisible College, but a few want to further connect the Society through the College to the Rosicrucians who may also be responsible for the English Lodge of Freemasonry. At least Moray and Wren were members of both the Society and the Lodge. Moray was the first man initiated on English soil to the Lodge and Wren was master of the first London Lodge.¹⁴⁸ Moray was the primary point of contact between the early Society and the King. The Rosicrucians had been a secret society founded by Christian Rosenkreuz in late medieval Germany which had grown popular across Europe between 1607 and 1616. They claimed to possess secret information relating to science and religion which they traced back to the Moors. Even though they peaked in popularity during the Rosicrucian Enlightenment, perhaps 1622 in Paris, some see a subsequent connection into the Royal Society and/or Masonic Lodge. “There would be no great difficulty with this interesting idea,” argued Tobias Churton, “were it not for the traditional resistance of British historians of science to attribute anything in the genesis of modern science

to the inspiration or example of ‘occult mentalities.’” On the other hand, even Martin made
the claim that the Society was influenced by the rules used in Lodge meetings.

Whereas Hartlib maintained contact with researchers by correspondence, the Royal Society
insured that scholars would assemble weekly at Gresham College to share ideas, witness one
another’s experiments repeated in the presence of peers, and give some formal academic
credibility to those unpaid scientists who may not have been employed by a university. Hartlib
may have been buried in the cemetery of St. Martin-in-the-Fields, but his ideas were still alive in
the work of scholars whenever they turned over a leaf, dug into the ground, measured the wind,
drilled for a core sample, looked through a lens, or put two new pieces together in the cause of
empirical research. His name may have been dropped from the vocabulary of late seventeenth
century conversations but his spirit was present whenever scientists came together for
conversation, demonstration, and observation. The true history of the Royal Society goes back at
least to the 1640s, according to the society’s own history, but the proper date may be earlier to
1630 when Hartlib first began to create an informal academic community or invisible college.
Hartlib called it the “college of experience”; one which eventually came be chartered by the
king. It took the interregnum to produce the invisible college but it took the restoration to
transform the invisible college into the Royal Society.

In 1878 Robert Charles Winthrop, president of the Massachusetts Historical Society, based
on his study of two letters in the collections of the society between Hartlib and Connecticut
Governor John Winthrop the younger, speaking to the society, reported that Hartlib “is said to
have been the founder of the London Club, or Invisible College of Natural Philosophers, from

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150 Martin, p. 246.
151 Debus, Science and Education, p. 34.
which the Royal Society originated.” Interestingly enough, in the first of these two letters, the one preserved in the Hartlib Papers, Hartlib asked for cranberries from New England.\textsuperscript{152} In the second letter, preserved in the Massachusetts Society, Hartlib wrote, “I heartily thank you again for y’ barrel of Cramburies wch was very safely delivered to mee.”\textsuperscript{153} Thus he was also able to refer to his personal friend, Theodore Haak, and Oldenburg as “Two of them, if not all three of them, were among the earliest members of the Royal Society” and the correspondence as between “Hartlib, Haak, Oldenburg, and others of the founders of the Royal Society.”\textsuperscript{154} No, Hartlib’s name is not listed among the founders of the Royal Society or even its members but based on his papers, his correspondence, and the correspondence of others about him and the society, it is increasingly strange why he was not there in at least some honorary capacity. He may have been too ill by 1660, only two years before his death, to attend the meetings but that would be no reason for his friends to have failed in recognizing him in some limited capacity. His presence has, nonetheless, been felt in thoughts they voiced without naming his name and his influence was evident from the beginning in the course which was taken. In the same letter to the governor, dating from September 3, 1661, Hartlib added, “My affliction of the Stone and Ulcer are very grievous (to say nothing of other miseries, wch by reason of the times are very heavily fal’n vpon your tormented Servant).” As early as 1658 Oldenburg had written to Hartlib to say, “I wish from my heart, the voiding of these stones have removed the cause of yr disease.”\textsuperscript{155}

\textsuperscript{153} Winthrop, Correspondence, p. 4.
\textsuperscript{154} \textit{ibid}, p. 1.
\textsuperscript{155} A. Rupert Hall and Marie Boas Hall, eds. and trans. \textit{The Correspondence of Henry Oldenburg}. (Madison: The University of Wisconsin Press, 1965), p. 158.
Hartlib was the *auctor prudens* of his time because he was the principal wise man who most caused the increase in knowledge in seventeenth century England. He was the uncredited originator of the ideas which found completion in the minds and hands of others. In a time when the rules of citation were only beginning to emerge, he was the catalyst of reactions credited to his correspondents in the fields of agriculture, architecture, chemistry, education, government, horticulture, linguistics, math, medicine, physics, theology, and others.\textsuperscript{156} The true founder of the Royal Society, albeit indirectly, Hartlib provided a revived seventeenth century agency to the fragile yet emerging growth of modern science by encouraging those who would be scientists to conduct their many experiments from behind a curtain. Even though his name does not appear as an alumni of Cambridge and as his 1630 experiment at Chichester lasted less than two years, the invisible man founded an invisible college, composed of hundreds of like-minded empiricists and assisted by the invisible hand of Francis Bacon that provided a mechanical and practical curriculum which found success in schools around the world and has lasted longer than Hartlib himself, especially after the Restoration, might ever have imagined. Thus the term *auctor prudens* can also mean wise seller or vendor. Hartlib was indeed a merchant. He was selling a new philosophy of epistemological reform free of charge. He was vending inspiration, ideas, and a vision of the future; sold willingly without a maker’s mark.\textsuperscript{157}

3 A NEW EPISTEMOLOGICAL METHOD: EMPIRICISM IN THE PAPERS

3.1 Baconianism: The Science of Empiricism

Under scholasticism there was monasticism. Before the university was the center of knowledge there was the monastery.\textsuperscript{158} As an epistemology, monastic scholasticism was

\textsuperscript{156} Greengrass, *Universal Reformation*, p. 2.
\textsuperscript{157} Greengrass, *Universal Reformation*, p. 2.
passive. The monks of the early middle ages were forbidden to question the sources or their superiors. They were taught to obliterate their individual will. The Rule of St. Benedict forbade ordinary monks from responding to what was read as they sat quietly in the daily readings of the Bible. These readings were always in Latin, and were usually of the early church fathers such as Ambrose, Jerome, Augustine, Gregory or a few others who been approved for such readings.

When the monks wrote, they wrote to help others understand the authorized texts as they were traditionally interpreted by officially approved interpreters. Whereas the intellectual center of the early middle ages was the monastery, the intellectual center of the late middle ages was the university. In the university a new epistemological method called scholasticism challenged this academic approach as well-known scholastics such as Peter Abelard and Thomas Aquinas began to review the classical writer such as and compare them with the authorized texts of the church such as the Bible. Sometimes accused of heresy, the scholastics questioned the authorized texts and used the power of their human reason to attempt a reconciliation between Christian writers and pre-Christian “pagans”. They were accused, especially at first, by church authorities of giving pagan authors authority which was to have been reserved for authorized Christian sources and of introducing “dangerous” ideas into the minds of otherwise protected students.

Francis Bacon and Samuel Hartlib went beyond the scholastics to change the dominate epistemology once again. Webster argued that Hartlib’s significance lies in hisdistinctively different approach to natural philosophy and his alternative pattern for the organization of intellectual activity. In the former he made it less scholastic and more empirical. In the latter he reorganized and redefined the disciplines of knowledge and he, along with his correspondents, described and promoted a new educational theory. According to McNeely and Wolverton, this also moved the center of knowledge from the university to the libraries, including the personal
libraries of independent scholars such as Hartlib.\(^{159}\) This was part of the evidence that Europe had moved from the Middle Ages to the Early Modern Period and its Republic of Letters. Webster wrote, “It is impossible to avoid noticing that the discoveries which now constitute such an important element in our scientific outlook, and which are basic to our general education, occurred at a time of general intellectual readjustment.”\(^{160}\) Hartlib wrote, “Mr Goodin <of Cambridge> is somewhat too Scholastic.”\(^{161}\) By this Hartlib meant that Goodin was holding on to the old, less profitable methods and was one of those obstructing intellectual progress.

Hartlib friend and correspondent Comenius is considered to be the father of modern education because he reformed the way teachers taught and the understanding of how students learn. Similar to the monastic critics of scholasticism, Comenius objected to teaching the classics because they were “pagan” and because he believed the study of classical authors would turn students’ minds away from God. The same opinion is found in the Papers as held by Hartlib and his empirical associates, including John Dury. Even Winstanley, who R. M. Ogilvie describes as “an extreme representative of the working class” wrote, “It is profitable for the Commonwealth that children be trained up in trades and some bodily employment as well as in learning languages and the histories of former times.”\(^{162}\) None of these men thought of going back to classic monasticism even though they stepped back from the pagan authors. They were determined to find a new way forward, a way which would produce reliable knowledge. They assumed this knowledge would naturally be compatible with Scripture since, in their opinion, the same God who made the universe also wrote the Book.

\(^{159}\) McNeely and Wolverton, pp. 119-159.
\(^{160}\) Webster, *The Great Instauration*, p. xiii.
A study of the empirical method must begin with the work of Roger Bacon, also known as Friar Bacon in the Papers. A study of Hartlib and his papers must also begin with Roger Bacon because he is the earliest empirical authority cited by Hartlib and because use of him further connects Hartlib to Cambridge where the friar was well known and studied as a reliable source. Roger Bacon questioned scholasticism almost as soon as it had gained its hegemony over monasticism. Brian Clegg has argued that Roger Bacon is the first true scientist.\textsuperscript{163} This view was not common in the early seventeenth century. The Cambridge empiricists’ fascination with him is unique. Roger Bacon himself was a Franciscan monk and a scholastic, but he was also an English philosopher who studied nature with an empirical approach. Inspired by Aristotle and Aquinas, he studied subjects forbidden to academics of his time. He called for theological reform three hundred years before the Protestant Reformation. He studied the Bible in the original languages of Hebrew and Greek. He valued experience over authority and he wrote about optics, gunpowder, and the calendar. He is the first clearly identifiable empiricist because he was the first to argue that truth should be based upon only that which can be experienced through the human senses, that which can be observed, and which can be measured with artificial, objective instruments. Roger Bacon understood that truth could not be known through reason because, in light of the Fall, the human mind was flawed. If the mind was flawed, he concluded, then any truth produced by human logic alone would be inherently false.

For these reasons, Hartlib was interested in Roger Bacon and his work. The friar appears several times in the Papers. Hartlib wrote, “Lord Prin got out of Sir Iohn Heydon's sold Books a MS. of Friar Bacon the transcription of which cost him 8. thousand lb. besides the diagram's which are draw’n most cunningly by his owne hands. Hee lent it to Mr Selden but wishes it might

bee published.”

Then seven years later, “Promised to send MS. Friar Bacon from Dr Iones in Ireland.”

In four tracts and letters the friar is positively identified as Roger Bacon.

Hartlib seems to have drawn his greatest and most immediate inspiration to embrace factual knowledge, however, from Francis Bacon, also known as Lord Verulam and a collateral descendant of the friar. Francis Bacon appears to have studied Roger’s work as well and may be the reason Hartlib knew about the older Bacon philosopher. His *idola mentis humanae*, for example, correspond perfectly to Roger Bacon’s *offendicula*. These are the two men’s four fundamental obstacles of “proper science”, which to them was an unreliable search for truth. In each man’s own words, the obstacles to proper science were unworthy authority, custom, vulgar opinion, and concealment of ignorance. Francis Bacon developed Roger’s simple theories into much more elaborate proposals for a more fully developed empirical method. In his relative he was able to see the beginning of the challenge of empiricism against and over scholasticism while in Francis Bacon, Hartlib and still other of Francis’ relatives were able to see the effective end of the challenge and, in fact, a complete shift to the new epistemology. Francis Bacon looked beyond even the library to the laboratory as he described his Jewel or Solomon’s House where experiments would take place free of the obstacles to proper science. Francis Bacon biographer Markku Peltonen wrote, “His plan for scientific reform played a central role in the birth of the new science.” Hartlib wrote, “Mr Bushels Mineral Overtures a sheete in 4to.

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166 Fowler, p. 354.

where hee desires assistance that hee may erect Salomons-house Bushel. Mineral. described by the Lord Verulam.”¹⁶⁸

Francis Bacon was a government administrator, not a cleric, but he was, like his ancestor, an English philosopher who studied nature with an empirical approach. Francis Bacon was not a social outsider who had not profited from the structures and institutions of his time and yet he argued for epistemological reform. He valued experience over human reason and he wrote several surviving works in which he detailed what Hartlib and the others inherited and expanded. In 1640 Hartlib shared with two correspondents, “In my last I intimated that I had received the Secrecy of a certaine Description of such an invention that may deservedly bee but amongst the number of those which my Lord Verulam observes to have made soe great an impression vpon the World.”¹⁶⁹

Bacon was not completely dismissive of those monastics and scholastics who had come before. In the Novum Organum Scientiarum he wrote, “. . . the honor and reverence due to the ancients remains untouched and undiminished.”¹⁷⁰ Yet he also wrote, “. . . reason had suffered at the hands of the ancients, especially Plato and Aristotle.”¹⁷¹ They valued “contemplation” over action and, according to Bacon, this was their great fault. He proposed “to establish progressive stages of certainty,” based on active observation instead of contemplation¹⁷² Bacon believed the unassisted intellect in reasoning was no different than the bare hand in mechanical work. Just as the hand required tools, he argued the mind required rules to keep it from drifting into false

¹⁷² Bacon, The New Organon, p. 2.
conclusions. Like Francis Bacon, Hartlib believed the principal object of proper science was to determine causes. What caused a seed to grow, for example, or the rain to fall? He knew the answer was that God did it but he wanted to see how God did it. Because nature is unified as the creation of God, Hartlib reasoned there ought to logically be a unity in science which could be mechanically measured with objective instruments to protect against even the deficiency of this same reasoning. Nature, to both Francis Bacon and Hartlib is continuous and orderly and, as such, observations of natural things ought naturally to produce consistent results, thus revealing the causes of the actions or processes in question. “He who best knows the ways of nature,” Francis Bacon wrote, “also best knows her deviations.” Without using the term, they were describing natural history as a punctuated equilibrium. They both believed in the supreme importance of experiment and observation for understanding this state of nature. They believed that nature was waiting to reveal God’s secrets which, they also believed, God was not trying to hide. In fact, He was calling men to conduct these investigations that He might reveal His perfect knowledge, the same knowledge of Adam in the Garden, to the world. Both Francis Bacon and Hartlib called scholars to escape enslaving authorities which kept them from a study of facts and immerse themselves into an unrestricted investigation of the natural world. Both believed that for a scientific scholar to know any particular science well, he must necessarily be generally acquainted with all knowledge. They thought of the disciplines as branches of a single tree, a Tree of Knowledge. Many have ascribed the title Father of Science to Francis Bacon while others have been critical of this designation. Some of the critics want to argue that Lord Verulam cannot possibility be the Father of Science because modern science arose in the eighteenth century. Others want to look back to a time before Francis Bacon to someone else.

173 Fowler, p. 354.
perhaps to Roger Bacon. If historians of science are going to deconstruct the revolutionary nature of the Scientific Revolution then they ought rather to talk about the Fathers of Science than attempt to bestow such a title on one person or to date the beginning of science to one century. It is more likely that science grew over hundreds of years by incremental steps, moved forward by a succession of curious explorers, researchers, and inventors; each building on another. The Bible said, “And out of y ground the LORD God formed euery beast of the field, and euery foule of the aire, and brought them vnto Adam, to see what he would call them: and whatsoever Adam called euery liuing creature, that was the name thereof.”175 Although Fowler felt Francis Bacon to be more deserving of the title than anyone else, he also concluded, “[Francis Bacon] rang the bell which called the other wits together.”176 First among those “wits” was Hartlib.

Harkness contends that Hartlib had “no firsthand knowledge of [Francis] Bacon or the vernacular world of London science to which [Bacon] was responding” but this cannot be true.177 Hartlib was in England five years before Francis Bacon died and both were present in London and Cambridge at the same time. With as much of Francis Bacon as we see in Hartlib, as well-known as Lord Verulam was, and as many times as the name appears in the Papers, there is a very good chance the two men met in person. As passionate as Hartlib was for Francis Bacon’s ideas, Hartlib would have sought him out. The lack of letters to or from Francis Bacon in the Hartlib papers prove nothing in this regard since, as Turnbull recounted and noted earlier, several people were given a chance to take papers from the Hartlib bundles by Worthington before the manuscripts were stored. As he points out, there are no letters to or from Milton either but it is inconceivable that Hartlib and Milton never met. There are also only ten surviving letters in the

176 Fowler, p. 359.
Papers dating to the time before Francis Bacon’s death. This too could explain why there are no letters between these two men. Furthermore, it is also not known if a Bacon letter was among those which burned in Hartlib’s fire.

To Harkness’ second claim, Hartlib lived in London for forty one years. How does this author imagine he had no first-hand knowledge of the vernacular world of London science? He was immersed in London and science his entire life. He was criticized by scholastic scholars for mingling with mechanics. Hartlib knew the craftsmen, shop keepers, and farmers of London from 1621 until 1662. Iliffe confirmed, “The shops of craftsmen were important places for gleaning information.”

Hartlib wrote several times in his journal indicating bits of information learned from his barber. He was a frequent visitor at the London instrument making shops, the Debtford dockyard, Rotherhithe glass-house, and the Küffler dye-works where he was friends with the owner. Several members of the Küffler family appear in the Papers. It is possible Hartlib was as close to this business because a dye-works was the business his father had established in Elbing. Based on the Papers, the dye-works was closed for a short time because of the Civil War but reopened when the Küfflers returned to London when “the troubles” were over. In an undated memo on new inventions, Hartlib gives a very interesting and lengthy description of a portable oven which Dr. John Küffler had invented for use on the battlefield.

Hartlib also refers to Abraham Küffler and Dr. Küffler’s nephew, a Mr. Hill. In 1658 he wrote to Boyle:

My son commends very much young Kuffler unto me as a very inventive wit. He doth now make exactly the stopples of glass, to stop bottles withal instead of corks; which I

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suppose may prove a very special kind of accommodation for preserving of wine, ale, and all other kind of liquors.\textsuperscript{181}

From his letters, he was obviously visiting vernaculars regularly to observe their work, ask questions, learn their techniques, and hear their explanations for why and how they conducted their work in a certain way. Hartlib learned much from the “mechanics” of London. A better question may be as to why the mechanics took time from their work to spend time answering Hartlib’s questions which must have been abundant.

3.2 Puritanism: The Theology of Empiricism

Hartlib, like Francis Bacon and many of his correspondents, was a Puritan. These English Calvinists resurrected a widespread interest in learning. The Puritans were a well-defined social group. They reacted to the violence of the 1620s, including the first years of the Thirty Years War, and they became more united during the oppression of the 1630s. Instead of dispersing them, this persecution of Archbishop Laud only strengthened them. Things were not going well at Gresham College, however, where the monarchy demanded that professors turn over copies of their lectures to the government.\textsuperscript{182} This may have been the stimulus that prompted secret meetings of groups of Puritan empiricists which began to meet in 1631 and came to be known as an Invisible College. It is no coincidence that Hartlib returned that same year to London from Chichester although, as Webster argues, he had no knowledge of the meetings in the early days as Haak began to assemble a one of several groups.\textsuperscript{183} Haak found John Wilkins and Christopher Merrett at Oxford. His friends William Oughtred and Pell introduced him to John Wallis, Samuel Foster, and Charles Scarburgh. Wallis knew Francis Glisson at Cambridge. Some groups met in homes, one group met in the home of Boyle’s sister.

\textsuperscript{182} Webster, The Great Instauration, p. 52.
\textsuperscript{183} Webster The Great Instauration, p. 55.
Some met in shops or taverns. Webster identified a 1645 group, which was meeting well before that year, and some see a Boyle group separate from all these, including the one meeting at his sister’s house. With so many, there were likely other groups that have not been identified. There were as many academic sects as there were splits in the Protestant churches of England. Eventually common interests worked to unify some of these groups into the Invisible College. Common academic, political, and theological ideologies drew scholars, ministers, and politicians together. Enthusiasm for Baconian natural history and an anti-authoritarian attitude in both natural philosophy and medicine were two of their core values. A web of connections was formed to the empirical and Puritan advantage. The Invisible College was supported by invisible patrons, wealthy sympathizers who did not, especially at first, want their financial support of empirical causes known publicly. Webster identified that these included Boyle’s brother Baron Broghill, Sir John Temple, Sir Robert King, Sir William and Richard Parsons, Sir Charles Coote, and Sir John Clotworthy. Many of those scholars in the college who lived in London met weekly but the Hartlib Circle included scientists all across Europe. Including these required frequent correspondence. After Puritan political success in the 1640s, the group was more secure and were more public in their meetings and work, somewhat evidenced by Hartlib’s Office of Address, especially while it was a prominently promoted idea between 1646 and 1647. Eventually, with a Puritan government firmly in control, they were meeting at Gresham once again, also the first home of the Royal Society in 1660.

Since disfavor of the monarch, however, in the 1630s, the aggressiveness of Archbishop Laud in persecuting separatists and dissenters, the emergence of a powerful Arminian army, and dominant Church of England had not killed them the Puritan empiricists grew stronger in their
boldness and their unity grew more complete. Even if they disagreed on lesser issues which will be discussed, important to all of them were the doctrines of mutual assistance, free communication, and covenant responsibility each of which are readily apparent in Hartlib and his correspondents. Most of Hartlib’s correspondents were Protestants; Calvinists and Lutherans. All of them were Christians. Hartlib and his correspondents assumed several Puritan presuppositions, some distinguishing them from Anglicans and Catholics which included the literal interpretation of the Scriptures and a strong belief in the depravity of the human soul as a result of the Fall. Hartlib and his correspondents differed with Catholics in the authority of church tradition, doctrines of sacraments, and transubstantiation. Luther had articulated sola Scriptura by which all Protestants believed the Bible to be the only reliable source of God’s revelation to man, complete, inerrant, and infallible. Hartlib and his correspondents differed with Arminian Protestants in the doctrines of human depravity, election, the extent of the atonement, the role of grace in salvation, and the security of the believer. Calvinists held, for example, that a Christian, once saved, could never lose their salvation whereas Arminians believed the commission of serious and ongoing sin could return a believer to an unregenerate state. Whether that person could then become a Christian for a second time was debated among Arminians but was, obviously, a moot point for Calvinists. This is powerfully relevant since the Bible came to occupy a position of such unparalleled authority for Hartlib and his correspondents. Scott Mandelbrote and Jim Bennett have detailed how the stories in the Bible of the Garden of Eden, Noah’s Ark, the Tower of Babel, and the Temple of Solomon had profound impact on the beliefs and practices of almost all Christians of the Early Modern period, especially for Puritans in seventeenth century England, most especially for Puritan empiricists.

184 Webster *The Great Instauration*, p. 43.
such as Francis Bacon and Hartlib who were seeking instauration.\textsuperscript{186} Both wanted to restore
Garden knowledge, Francis Bacon borrowed the title Temple of Solomon for his laboratory, and
Hartlib worked with others to reverse the curse of the Tower of Babel. Mandelbrote and Bennett
wrote:

As metaphors of knowledge, the four stories gave information about both the acquisition
and the ideal state of human understanding. But they also issued warnings about the necessary
difference between human and divine knowledge and suggested ways by which knowledge
might be married to piety and wisdom in order to achieve an improvement in the condition of
mankind.

Finally, as the more present violence of the early 1640s arrived and many of Hartlib’s
friends scattered, he held firm in London. Since Comenius, Dury, Hübner, and Pell were so
disillusioned with the turn of events, all leaving London for “safer” locations, it is remarkable
how little, as evidenced in the Papers, Hartlib was affected by the physical violence of the Civil
War. Not unaware, he referred to it in his journal by writing, “these dangerous times et
Persecutions.”\textsuperscript{187} Ever a millennialist, Dury wrote twice in 1640 of the “present troubles” and
was most interested to explain them by synthesizing them with eschatological prophecies from
the Bible. Hartlib wrote to Worsley in 1649, “He can Alleadge no hardnesse, or Iniury. His
Comission present Government being determined, & expyring with the death of the late
King.”\textsuperscript{188} Having used such a mild description, Worsley would not have known the king had
been executed if he had not heard of it from others. That’s not much for a period which included
the persecutions of Laud, the Thirty Years War, tens of thousands dead, incalculable property

\textsuperscript{186} Scott Mandelbrote and Jim Bennett. \textit{The Garden, the Ark, the Tower, the Temple.} (Oxford: Bodleian Library,
\textsuperscript{187} Samuel Hartlib. \textit{Ephemerides 1634 Part 5, Hartlib, 1634 (Late)}. From The University of Sheffield, \textit{The Hartlib
\textsuperscript{188} Samuel Hartlib. \textit{Copy Letter, Benjamin Worsley To Walter Strickland, In Worsley’S Hand, undated [Aug/Sept
1649]}. From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. http://www.hrionline.ac.uk/hartlib/
damage, the execution of a monarch, and the establishment of a new form of government. Clearly Hartlib was not interrupted or distracted by the physical violence of the wars in England.

In contrast, by the 1650s many of those men who had fled were returning England along with a new wave of immigrants from the continent such as Joachim Polemann, Johann Hartprecht, Peter Staehl, and most importantly Oldenburg from Bremen who became a tutor to Lady Ranelagh’s son. Hartlib correspondents weren’t all academics, after the wars they were found in civil service, the military, and foreign service as well. John Sadler was appointed Master of Magdalene College at Cambridge, for example, and Gerard Boate was an army medic in Ireland.

Hartlib’s vision, as a Puritan activist for epistemological change, was to discover original knowledge, things known to Adam before the Fall, by investigating the natural world and unlocking the truths of God to restore that which was lost because of Adam’s sin. Hartlib, like all of the Puritan scientists were particularly inspired by the Scripture, “But thou, O Daniel, shut vp the words, and seale the booke euen to the time of the ende: many shall runne to and fro, and knowledge shall bee increased.”¹¹⁸⁹ This restoration of original knowledge was called the Great Instauration by Francis Bacon, pansophia by Comenius, and implies that modern science was developed by committed Christians who saw no division between the material and spiritual worlds. Hartlib believed the instauration was imminent and might possibly occur within his lifetime. He looked back to the discoveries of gunpowder, printing, and navigation and saw rapid movement toward a return to man’s dominion over nature. In his own time he saw all of the ideas which appear in his Papers, being introduced, developed, and some materialized in final forms. The greatest threats to instauration success were not war, famine, disease, or pestilence but division among Christians and moral depravity in a man.

Hartlib would have agreed that the Bible was not primarily a science textbook but where it spoke of science, He held it to be reliable and true. He was interested in those verses of Scripture which touched on God’s creation including passages of agriculture, climate, or natural disaster. At times he appears to focus on material things to the exclusion of spiritual things but, as he explained, this was because spiritual things could not be observed by the bodily senses or measured by mechanical instruments. This, and this is one of his most important distinctions, did not mean he did not believe in spiritual things, that spiritual things weren’t relevant, or that he thought the material and spiritual worlds should be separated. Hartlib focused on material things within an assumed spiritual context. Believing in spiritual things did not corrupt his empirical method. He felt it gave him direction and purpose. He encouraged others to make accurate observations, to be exact in measurements, and report material discoveries as they were that experiments be observable and repeatable. In the context of explaining this in his notes, he wrote, “To confirme darke or doubtful places wih other more cleere. Wherin the Rules of the Analogy of faith must bee put in practise to confirme spiritual thins with spiritual thins.”

Hartlib and his correspondents maintained the interpenetration of the spiritual and material worlds. Dury explained the false contradiction best in a long quote from his dedication to Boate’s tract on Ireland’s Natural History which is well worth repeating:

Cabinets of Nature are opened, and the effects therof discovered, more fully to us, that to former Ages, seem in like mannter to prepare a plainer Address unto the right use thereof for us than our forefathers have had: which will be effectuall to the manifestation of Gods Wisdome, Power, and Goodness, when the great promises shall be accomplished, that the Earth shall be filled with the knowledge of the Lord, as the waters cover the sea, & that we shall be taught of God, from the least to the greatest: [In margin: Isa. 1:9. Heb. 8:11?] and although the Father hath reserved in his own hand the times and seasons, wherein these promises are to be fulfilled, yet as by the dawning of the day we can know that the Sun is neer rising, so by the breaking of yoakes & the breaking forth of the means of more perfect knowledge, both in Natural and

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Spiritual things, wee may see the drawing neer of the promises, which will in their own times
Constitute the day of Salvation unto all the Earth, wherein all flesh shall see the glory of the
Lord together. [In margin: Isa. 40.5.]\textsuperscript{191}

This argument for defending the union of the material and spiritual in the empirical method
as well as the priority of the empirical methods over the scholastic has been made to a limited
degree in books such as The Fall of Man and the Foundations of Science by Peter Harrison and
Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life by Shapin and Simon
Schaffer. The latter work beautifully illustrates the debate between the opposing epistemological
systems as Thomas Hobbes represented the older and Robert Boyle represented the new. The
choice was to believe truth is found best through the logic of human reason alone or through
unbiased human observation subjected to mechanical instruments. A dilemma was expressed in
the question, “If man originally transgressed and fell owing to his pursuit of knowledge, how
could it be possible for him again to seek knowledge, without falling from grace”?\textsuperscript{192} The Puritan
answer to the question was that “investigations conducted into secondary causes, and with
utilitarian ends in mind, would incur no risk of transgression, but instead glorify God, and restore
man’s dominion over nature.”\textsuperscript{193} Thus the scientific debate was a theological conflict. There
was no separating the material and spiritual worlds in the empirical method. “One of the most
common complaints,” Harrison argues, “to scholastic philosophy was that it was pagan.”\textsuperscript{194}
Hobbes was never invited to join the Royal Society, for example, whereas Boyle was elected
president. Hobbes was not excluded simply because of his scholasticism or even his royalist
politics, it was because of his religion. Hobbes was an atheist. Yet, as Richard Tuck points out,

\textsuperscript{191} John Dury. John Dury’s Dedication To Printed Tract, ‘Irelands Natural History’, Gerard Boate, 1652. From The
(accessed October 22, 2014).
\textsuperscript{192} Webster, The Great Instauration, p. 22.
\textsuperscript{193} Ibid.
\textsuperscript{194} Harrison, p. 10.
Hobbes was a “Christian atheist”, one more comparable to Hugo Grotius in his theology.\textsuperscript{195} It demonstrates, however, that a believing scholastic was to be preferred in the fellowship of empirical scholars than an empiricist who separated the material and spiritual worlds too drastically. “Seventeenth-century natural philosophy could not readily be divorced from its theological roots.”\textsuperscript{196}

Hartlib could not have imagined in the seventeenth century that his ideas of the experimental method, with its interpenetration of the material and spiritual worlds, would ultimately be challenged. Yet he was himself a challenger. Just as the Reformation challenged the source of church authority and provoked an ecclesiastical revolution, Hartlib and his associates challenged the sources of intellectual authority and campaigned for an equally significant epistemological revolution. Hartlib was personally concerned with the progress of the Thirty Years War even as he waged his own forty year war against the “cardinals” of Oxford. Dury, an Englishman, worked hard on the continent for a unification of Protestants as Hartlib, a continental, worked equally hard on the island for a unification of scholars. For Hartlib, the success of both efforts was vitally important to the success of the ultimate mission. Shapin and Schaffer have emphasized the importance of Dury in properly understanding this period.\textsuperscript{197}

\textbf{3.3 Practical Curriculum: The Method of Empiricism}

Hartlib was critical in his Papers of traditional faculty in traditional universities. Oxford was mentioned most often. Yet traditional universities were everywhere. Almost all of the empirical universities, other than Wadham or Gresham College, which had no students and offered no classes, were invisible, meaning they were found in the correspondence of empirical

\textsuperscript{196} Greengrass, \textit{Universal Reformation}, p. 10.
researchers rather than in a particular location with brick and mortar buildings. Hartlib wasn’t opposed to a visible school but he urged faculty to humble themselves, get out of the classroom, and start shadowing farmers, questioning the mechanics, and listening to tradesmen. The traveller in Macaria urges the scholar, “Come let us goe into the fields.” Hartlib criticized the sophisticated academics for their pride and their only talking to each other. He was thus in turn criticized for ignoring class divisions and rubbing shoulders with the common mechanics and for suggesting that doctors of philosophy could learn anything from illiterate smiths, farmers, and makers. Hartlib countered that the doctors needed to come down from their ivory towers and consider how much they could learn from men educated by their vernacular experience, men who daily worked in nature, smelted and shaped metals, produced food from the ground, and combined natural materials to produce useful machines. Hartlib felt that a man would have to get his hands literally dirty if he truly intended to learn something useful. He and Hooke unceasingly argued that the mechanics knew most about the secrets of God in nature because of their proximity to the source of knowledge. The several essays in *Making Knowledge in Early Modern Europe* have demonstrated well the relationship between production and knowledge in Hartlib’s period. The contributors, particularly Scott Black who wrote about the late seventeenth century in England, argues that knowledge began with the hand of the mechanic rather than being disseminated from the mouth of the one expert. Black confirms Hartlib’s method of gathering and establishing knowledge by collaboration, communication, and debate. These

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198 A *Description of the Famous Kingdome of Macaria; Shewing its Excellent Government*: wherein The Inhabitants live in great Prosperity, Health, and Happiness; the King obeyed, the Nobles honoured; and all good men respected, Vice punished, and verture rewarded. An Example to other Nations. In a Dialogue between a Schollar and a Traveller. London, 1641.


mechanics were the true scientists, according to Hartlib, working in the laboratories of their shops. Hartlib learned from them and reported their “secrets” to his correspondents who he believed could benefit from this knowledge. Others among Hartlib’s correspondents argued that literacy was actually very high among the mechanics of London and some suggested students bypass the traditional university altogether and get the best education on a farm or in a workshop.

Hartlib was heavily invested in educational reform. Webster wrote, “from poor school to university . . . a reorganization of the curricula, new pedagogical methods . . . new textbooks with an explicit psychological foundation.” Hartlib envisioned in the introduction to Dymock’s *An Essay for Advancement of Husbandry-Learning*, “It is nothing but the narrowness of our Spirits that makes us miserable; for if our hearts were enlarged beyond our selves, and opened to lay hold of the Advantages which God doth offer, whereby we may become jointly serviceable unto one another in Publicke Concernments . . . discord among men could be ended, including religious division.”\(^{201}\)

Hartlib’s ideas for reforming education were influenced by Comenius, Dury, and Milton. In the Renaissance as a new educational program was emerging, Comenius was the most influential seventeenth century reformer of educational theory on the continent. With Hartlib, he labored to refocus pedagogy onto practical information rather than reasoned theories. Comenius wrote, “No one doubts that those who are stupid need instruction that they may shake off their natural dullness. But in reality those who are clever need it far more, since an active mind if not occupied with useful things, will busy itself with what is useless, curious and pernicious.”\(^{202}\)

According to Milton biographer Barbara Lewalski, “Milton shared with Hartlib and Comenius the belief that a reformed commonwealth requires educational reform.” Milton, who

\(^{201}\) Greengrass, *Universal Reformation*, p. 18.

\(^{202}\) Ogilvie, *Latin and Greek*, p. 38.
served as secretary of foreign affairs to Cromwell and who made great use of Hartlib, Dury, Comenius, and even Oldenburg in his government service, along with Hartlib, endorsed the use of public funds to establish and maintain a public school system which would place a school in every English town to increase “learning and civility.” Each school would accommodate approximately 150 students between the ages of 12 and 21. Milton agreed with Hartlib and Comenius that the curriculum should be replaced with a Baconian emphasis on useful knowledge. Hartlib promoted the development of a new language to be used by these schools and researchers worldwide to share knowledge across language barriers. Milton suggested all students be required to learn Greek, Latin, and Italian and that all prospective ministers be further required to master Hebrew, Chaldean, and Syriac. His eloquently expressed views were still being repeated in Locke’s 1693 *Thoughts on Education*. Comenius added the subjects he wanted to be taught, even though he advocated printing textbooks in local languages, Latin, Greek, astronomy, music, mineralogy, botany, biology, geography, history, and morals. In advertising his own empirical academy, Balthazar Gerbier included a heavy concentration of languages to be taught alongside history. He wrote:

> The Languages which shall bee taught in them are Vitz. Latin, Italian, French, Spanish German, and Low Dutch, and jointly with the said Languages the knowledge of all usefull histories, both Anæient and Moderne, and of the constitution and Gouvernement of all famous forraigne States.

Grouped as language, science, fine arts, and social studies, this emerging curriculum, considering all of these reformers, is not far off from what would become common in twentieth century schools for if one includes math as a science, as Hartlib did, it is identical.

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3.4 Instauration: The Goal of Empiricism

Finally, Hartlib and the growing epistemology of empiricism were also influenced by Thomas More’s 1516 *Utopia*. The millennial kingdom was the purpose of all the empirical work. The Garden of Eden was a utopia, Bacon had written about the utopia of Bensalem, and the great instauration would recreate this heaven on earth. Hartlib’s vision of utopia was described in *Macaria*, the best-known manifesto of his circle. He was not thinking about setting up a single utopian village or kingdom, he intended, by bringing about the instauration, to create a utopia of the entire world. From his Papers one can quickly see he not only meant Holland, Sweden, and France but also Africa, America, and Asia as there are multiple references to each. Whether *Macaria* was written by Hartlib, more likely Gabriel Plattes as some contend, or someone else these were clearly Hartlib’s views. He printed this book and he often repeated its passages and ideas in his letters. Though many scholastics saw time as circular and while it has become popular in the modern age to view time as linear, Hartlib and his correspondents held a millennial or apocalyptic view of time, one in which the world was moving through time toward an imminent judgment or second coming of Christ. He believed utopia was attainable and was, in fact, required to bring about the literal return of Christ. The millennium would be initiated, according to Hartlib, through proper experimental method; through focusing on practical knowledge and employing the lessons learned to potentially utilitarian benefits. To Hartlib, then, conditions for humanity were going to consistently improve as science progressed forward until the millennium was initiated. This idea was motivated by both his theological views and his empirical philosophy. “Each step in the conquest of nature represented a move

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towards the millennial condition.”206 Most of his correspondents agreed with him.

Massachusetts Minister Cotton Mather, with whom Hartlib was so fascinated, was a strong post-millennialist. Many in this school of eschatology saw the decrease of the Catholic Church’s power a clear sign of the nearness of the millennium, a restoration of Israel which would include all true Christians. Among Hartlib’s critics were those pre-millennialists such as the Anabaptists who said conditions were getting worse, not better. They pointed to wars, the plague, and corruption among men as proof of their view. Ironically, the great reformers Luther and Calvin, otherwise heroes among the Puritans, held to an Augustinian view of the millennium which was to argue against any millennium.

Though the limitations of this current project do not allow for a full exploration of Hartlib’s views in the papers regarding millenarianism or utopia, as well as the related topics of empire and just war theory, this is a connection and an area of research which promises new and interesting insights from further study of the Hartlib Papers with implications impacting the understanding of the history of science. Greengrass has said, “In many respects [Hartlib’s] re-emergence is still under way,” and “I’m sure that there is more work to be done on Hartlib.”207 There are multiple topics which are yet to have been investigated by anyone including technology transfer in different geographical regions or a more complete study of individual disciplines in the Papers. There is enough in the collection about agriculture, chemistry, distillation, drainage, horticulture, metallurgy, milling, and mining for a book to be done regarding each, at least a conference paper or thesis.

Those who corresponded with Hartlib continued to push epistemological reform well after 1662. Boyle kept beating the empirical drum until 1691 when they finally lay his body next

206 Greengrass, Universal Reformation, p. 10.
207 Greengrass, Mark, e-mail message to the author, February 12, 2013.
to Hartlib’s. Oldenburg was soon prominently present. He was “enmeshed” in the circle by 1656 corresponding with both Hartlib and Boyle. The acquaintance with Hartlib and overlap of their careers lasted for at least six years. A theologian, diplomat, and philosopher, Oldenburg became the first official secretary of the Royal Society. A son-in-law of Dury whose letters appear in the Hartlib Papers, he is the link, having created his own large network of correspondents primarily by assuming Hartlib’s position after 1662, between Hartlib and those who came later such as Isaac Newton and John Locke. He was a German “like Hartlib”, according to Connecticut Governor John Winthrop. Oldenburg was known for creating the modern scientific journal and the practice of peer review by sending scientific papers to the leading authorities in the relevant research field for review before sending them for publication. He chose science over theology as his life’s work because of the influence of Hartlib and Boyle as reflected in his correspondence. Oldenburg died in 1677 but by that time Isaac Newton was thirty four years old. Newton lived another five decades.

3.5 Correspondence: The Means of Empiricism

Hartlib was communicating an innumerable number of ideas. In a work such as this one, it is impossible to explore or even list all of the topics or all of the correspondents which appear in the Papers; especially those which were discussed casually or only once by Hartlib or his correspondents. Many of these were fanciful curiosities while many others are shadows of useful inventions which were coming. In recording his meeting with Hartlib, John Evelyn mentioned “Castles which they set for ornament on their stoves in Germanie which are furnished with small ordinance of silver on the battlements, out of which they discharge excellent Perfumes about the rooms, charging them with a little Powder to set them on fire & disperse the

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208 Hall and Hall, Henry Oldenburg, p. xxxv.
209 Winthrop, Correspondence.
210 Hall and Hall, Henry Oldenburg, p. xxxv.
smoke” and “of an Inke that would give a dozen Copies, moist Sheetes of Paper being pressed on it, & remaine perfect.”

Hartlib attempted to connect as many scholars as possible. The traveler in Macaria asks, “Doe you know any man that hath any secrets, or good experiments? I will give him gold for them, or others as good in exchange.” This is how Hartlib wished himself to be. He positioned himself as the relay point, a headquarters of information collection, organization, interpretation, duplication, dissemination, and preservation. He happened to be in London but that was a good location for geographical, political, theological, and correspondence reasons. He introduced many scholars to others doing research. He spoke of promising experimenters to benefactors who had the ability to fund research. He was quick to welcome like-minded strangers into his circle. He preached it, he wrote about it, he sent copies to the government. He was an empirical evangelist calling scholars to faith in experimental science. He said he would organize a conference to put men together who had new ideas to make the world a better place. “If I could change all the minds in England as easily as I suppose I shall change yours . . .,” he wrote. This is what he tried to do.

Unity is one of the most important themes in attempting to understand Hartlib’s reason for communicating. Just as Dury spent his life attempting to forge a unity of Protestant denominations, Hartlib longed for unity across the disciplines, breaking down intellectual, social, and technological divisions between scholars, projectors, politicians, educators, and scientists. As Greengrass has pointed out, “What makes the discussions within the Hartlib circle so important is the commonality of their concerns.” One of his greatest concerns, however, was preserving and promoting unity, unity among Protestants, unity among scholars, and all

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211 Bédoyère, John Evelyn, p. 108.
213 Greengrass, Universal Reformation, p. 2.
assuming the union of the material and spiritual worlds. Some believe the divisions in the church would be healed in the millennium. Others such as Hartlib and Dury believed the divisions must be healed first in order to instigate the millennium. As Webster pointed out, it was a common saying among the Puritans, “in unum universi, in unum Corpus, in unum Spiritum, unum Sensum, qui vere audint Christiani.”

Correspondence was at the heart of Hartlib’s purpose for the Office of Public Address, especially in the half he called The Office of Communications. In the proposal he wrote:

Entertainement to an Agent to find out Men of Parts and Abilities, to tender their several proposals for the Advancement of Learning to the Feoffies, <Trustees>, and Keep Correspondence with such of them as reside in remote and forraigne places, and soliciting of all other businesses subordinate thereunto.

This is what Hartlib was doing but here is his attempt to institutionalize the communications method which he felt was so important. It’s what had created his circle and it was the path to the goal of unity in the work toward universal knowledge. Correspondence was the means by which correspondents assured each other that they were still included, that they were connected. In a world in which there was no better way to communicate over distance, a letter helped scholars feel connected, that they were included in a continental conversation. Conversely, the lack of a letter or some unexplained absence of mail left a scientist despondent and worried about their relationship with others. John Hall is typical of many examples in the Papers, writing to Hartlib that having received no communication left him feeling “vnspeakable griefe.” How much of that was exaggerated rhetoric and how much of it was genuine concern? Hall went on to claim he was unable to work because he was so unhappy about not having heard from Hartlib.

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214 Webster, *The Great Instauration*, p. 18.
Although Robert Child was in Dublin, he asked for a “Certayne & Constant Correspondence”\textsuperscript{217} from the center of the circle, because it wasn’t just Hartlib he wanted to hear from. Hall, Child, and many others knew that a letter from Hartlib would link them to everyone else in the invisible college. It was a commonwealth of letters. Joseph Avery wrote in 1641 that his happiness was dependent upon correspondence from Hartlib.\textsuperscript{218} It is difficult for a modern student to understand the importance of a letter in the seventeenth century. In a world with no internet, telephone, television, radio, or even telegraph, a letter was the only way someone could receive news from a distance except for the reception of a traveler who arrived in person. A letter was information but it was also a reminder that a person was important to the one who took the time to put a pen in ink a write words specifically created for the particular person to whom the letter was addressed. Correspondence represented a relationship such as Dury sought to establish with Alexander Henderson when he wrote in 1644, “But because I conceaved that it might bee of Vse to lay a ground of[H alters] good and brotherly Correspondence between yowe <H: you> & the leading men of these partes.”\textsuperscript{219}

3.6 Linguistics: The Language of Empiricism

Whereas Hartlib’s vision was to collect and redistribute as much experimental information as possible, language was always a problem for him and his correspondents. Rhodri Lewis has described how a movement began with Francis Bacon, passed through Hartlib, and was carried forward by the Royal Society.\textsuperscript{220} Lewis dedicated the forty pages of his second


chapter to “Hartlibian Beginnings” to detail the importance of Hartlib to the movement between the time of Francis Bacon and the Royal Society. Lewis argued that the movement reached its peak in 1668 with John Wilkin’s *An Essay Towards a Real Character and a Philosophical Language*. In the best interpretation of this one world language movement’s historical significance, he has also detailed the interpenetration of linguistics and the theological beliefs of the movement’s proponents; within the political context of their time. “This movement sought to remedy the increasingly apparent failings of natural language,” he wrote, “through the invention of a new philosophical means of communication.”

There are letters in the Hartlib Papers to and from Amsterdam, Hamburg, London, Paris, Zurich, and others. Attempting to overcome the language barrier, these letters were necessarily written in English, French, German, and Latin. The latter came nearest to being a universal academic language in Europe but Hartlib clearly felt Latin was inadequate and there needed to be a better language for scientist to use. Lewis included the decline of Latin in the seventeenth century as one of six reasons for the beginning of this common language movement. Others included the impact of printing, the interpretations of the humanist school, especially on the Bible with its Tower of Babel, the growth of vernacular languages, an increasing interest in natural philosophy, and knowledge of the Americas. Ogilvie recognized that Hartlib and his associates agitated “wishing to liberate schools from the tyranny of Greek and Latin.” They were not satisfied with the inadequate education students were receiving under the old system in the study of language. “They sought to improve the education not by abolishing the traditional studies but by realigning them in two main directions,” Ogilvie wrote, “towards the practical and

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221 Lewis, p. 2.
222 Ibid.
the moral.” In the letters Hartlib and his correspondents discuss the advantages and disadvantages of twelve different languages both in letters and his journals. Since there was no consensus, a new, perfect for empirical research and correspondence, and universal form of communication was needed.

Hartlib was not the first or last to attempt devising such a language. He was one visionary scholar in a lineage of those who saw the utility of having one universal language, such as Francis Bacon, John Webster the dramatist, or John Johnson who abandoned the idea in 1640. A contemporary of Hartlib, a member of the Royal Society, and one who insisted upon his “mechanic” status in his printed works, Francis Lodwick published works in the field of universal language. Like Hartlib, this fellow London resident was an obscure figure who left behind a mass of manuscript writings. Only one of Hartlib’s letters to Lodwick and none from Lodwick to Hartlib appears among the papers but, as Felicity Henderson and William Poole explain, “[Lodwick] did little to disseminate these manuscripts, preferring instead to keep his essays and observations in his private library.” He published only his linguistic work. He did not publish anything else original.

Hartlib could not resist Lodwick despite the latter’s reservations about dissemination and publication. Hartlib three times noted in his journal information he learned from Lodwick’s Common Writing in the period immediately following its release in 1647. Hartlib learned of a more accurate clock, a study of venomous creatures, and a better lantern from Lodwick but his primary interest in him was for his work in linguistics. In 1648, Dury wrote to Hartlib, “I pray send to Mr Ludowick or when yow meet with him this

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224 Ibid.
226 Henderson and Poole, On Language, p. x.
228 Henderson and Poole, Francis Lodwick, p. x.
M. Scr. which I think is prettie ingeniously invented but not practicable.”

It is safe to say, both Hartlib and Lodwick living in London, must have communicated in person far more than in writing because of the references and because Lodwick also knew Hooke and Haak who was his chess partner.

What was this language to have been and how was it going to be structured? Lewis confirmed that “from the beginning” there was “very little agreement to what form” the language would take. Some like Lodwick experimented with sign-language, Petty recommended use of shorthand, and some wanted to use Chinese characters, but Hartlib wanted to implement a language with letters that would have a greater application than Chinese. In his journal he wrote:

Vtinam in hoc genere aliquis existeret qui scribendi rationem a Chinensibus acceptam ad Europæos transferret! Eorum nempe characteribus quæ Scribuntur ab omnibus cujuscunque gentis ac linguae populis, qui eam scribendi rationem norunt, legi possunt atque intelligi. Hac ratione Chinensium Imperator discrepatium quamvis Linguarum subsidis quos habet predicta tamen eodem scripta charactere mittit, quæ opus non habent vt in diversas Linguas transfundantur. Iidem enim Characteres res eadem apud omnes significant. Quo eodem modo Gentes quantumvis diversæ sua invicem sensa per univsersum orbem communicare possent si hoc artificium innotesceret et commune omnibus per orbem sparsis hominibus fieret.

In this passage, almost a direct quote of Bacon who was referring to Trigault, he expressed his desire for a language as simple as Hieroglyphics in ancient Egypt or as common to the world as Chinese was to the people of that country. He marveled at the number of people who could equally understand the emperor without need of translation. He wanted a language which would be universum orbem or “common to all men scattered over the earth.”

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231 Lewis, p. 3.

Lodwick’s book attracted a good deal of attention from notable scholars, including John Hall at Cambridge and Boyle who thought it would go a long way in restoring what had been lost at the Tower of Babel. This was critical, as argued by Mandelbrote, because the story of the tower was a warning to those scholars working toward instauration. They read the story and understood that pride had again led to a loss of dominion over nature. By confusing the languages, God had frustrated the ambitions of not only tower building but of those who would pursue knowledge. This is why any attempt to overcome the language barrier must have been coupled with a sense of humility. That said, if the curse at the Tower was the multiplication of languages, the solution was the consolidation or unification of languages. Beyond the achievement of one language, the perfect language of Adam, scholars would be best equipped for understanding the natural world as God had made it and be able to share it with all other interested persons. The one language movement was an effort to reverse the curse. Hall was enthusiastic. Boyle felt the application of Lodwick’s proposal was more practical than philosophical.

In 1658, Hartlib, always interested in linguistics, wrote to Pell regarding a newly printed lexicon by Thomas Cokayne (1587-1638):

There is come forth a Greek-English lexicon, containing the derivations and various significations of all the words in the Greek Testament, with a complete index, in Greek and English, annexed thereunto; whereunto is added a praxis, or an explanation, of the twentieth chapter of Romans, and the Greek dialects contained in the Greek Testament. By T.C., late of C. C. C. in Oxford. London: printed and to be sold by Ludowick Lloyd, near the Castle, in Cornhill, 1658, in great octavo, about [p. 455] five shillings price; the words in ordine alphabetico; so that there is still a better place left for the lexicon (Greek and English) of your own contrivance, which hath been, and is still, so passionately desired, and will be yet of more universal use.

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233 Mandelbrote, p. 6.
234 Henderson and Poole, On Language, p. 25.
Even in the twentieth century Charles Bliss sought to develop a common language for the world. While these efforts to reproduce the language of Adam proved unsuccessful, the need for a common language remains in the modern world even as the number of spoken languages continues to grow smaller. English, due to the impact of the empire, is perhaps the closest language to what Hartlib and others imagined, yet clearly even this language falls short of the seventeenth century requirements. Hundreds of translation headsets in the United Nations and the obstacle of translation to modern printers profoundly illustrate the problem with which Hartlib struggled. He discussed with Joseph Webbe about “the role of language in empirical learning.” Micahel Hunter argued that Hartlib sought to improve the flow of information by establishing the Office of Address which Hunter claimed was modeled by Hartlib after an earlier French experiment under Cardinal Richelieu.

According to Lewis there are two opinions among modern scholars about the proper context of the early modern one language movement. Some place it in the steam of legitimate scientific history and point out its connections with credible scholars such as Francis Bacon. Others want to dismiss it as a part of the movement which was interested in mystical concepts such as alchemy. Which opinion one choses to hold will impact that same student’s opinion of Hartlib and his academic credibility.

3.7 The Debate about Secrecy

To understand the debate in the Hartlib Circle regarding secrecy it is necessary to understand the trades community of the mid-seventeenth century which was going through radical change as guilds were declining in power because of urbanization, a growing diversity and specialization of trades, and the increasingly technical aspect of new products. Guilds arose

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236 Webster, Samuel Hartlib, p. 18.
237 Hunter, Science and Society, p. 49.
in the medieval centuries from a need to insure fair competition among the trades which were basic, simple vocations before the sixteenth century such as blacksmiths, cobblers, or tailors, for example. Karel Davids confirmed, “Evidence for intentional concealment of craft knowledge before the High Middle Ages is exceedingly sparse.”

Very strict rules were created in the High Middle Ages to insure equal opportunity to artisans as well as standard quality of goods. There was no unfair advantages allowed, however, which might have come from working extra hours, having a secret tool or technique, or advertising which is no critical in the modern capitalistic economy. Rules seem silly to modern students. They included a rule against a mechanic sneezing as a potential buyer walked by their shop because doing so might be a way for a tradesman to unfairly draw attention to his products. Cobblers were directed to strike the nail in the sole of the shoe three times, no more and no less, to insure that no one was making better or worse shoes than any other cobbler. The rules were enforced by visits of guild authorities to the shops of guild members. These inspections could be regularly scheduled or unpredictably random. These rules, however, along with patents, were created to protect those who stood to profit from secrecy and were sanctioned and enforced by the government. This protection was provided for “material objects and inventions” even before it was extended to publishers of books.

No printing monopoly, perhaps, as famous or as profitable as that given by James I to Robert Barker making him the only printer of the Bible in English for all of England in 1611. Yet it was the authors of books on mining and metallurgy who first consistently advocated that knowledge should be recorded in written form and not merely transmitted orally. The rise of making knowledge public by printing is thus directly related to

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239 Davids, p. 342.
the deterioration of the power of guilds. Literacy became more important for knowing craft
secrets than membership in a guild.

Guilds, however, persisted because they had served a purpose at the beginning of the early
modern period. They gave the buyer a certain assurance of quality in the goods purchased and
they provided certain financial protections to guild members who were guaranteed support if
they were to be so injured that they were unable to continue working. They also provided for a
guild member’s family after the death of a member, even assisting with the costs of the burial.
Incidentally these same benefits were adopted by the early modern masonic lodges and preserved
by masons until today.

As the early modern period progressed, the power of the guilds began to decline. This
decline has been best documented by Pamela Long. In several of her writings she has also
argued for pushing the date of the beginning of the secrecy vs. openness debate back to the
advent of the guilds, opposing those who have held that this debate began with the invention of
the printing press, John Locke’s defense of private property, or the Statute of Anne. A great part
of the value of guilds and thus their power rested in the keeping of trade secrets. Some like
Hartlib, arguing for openness, wanted to expose these secrets for the benefit of mankind and
guilds were initially resistant. Preventing the publication of trade secrets, however, was similar
to stopping the ocean tide and guilds wisely sought to survive by shifting their focus to quality
assurance and fair competition. Even these goals were not enough to protect guilds in the
eighteenth century but that was well after the scope of the Hartlib Papers. In that period
immediately after Hartlib, even the granting of exclusive contracts to instrument makers by the
Royal Society turned out to be bad news for traditional guilds. The Society famously attempted

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241 Pamela O. Long. “The Openness of Knowledge: An Ideal and Its Context in 16th-Century Writings on Mining
to publish a History of Trades in order to collect and disseminate information but failed as membership shifted between philosophies of openness.\textsuperscript{242}

The debate in the Hartlib Circle was not so much about whether or not to expose trade secrets, Hartlib argued with his correspondents about whether or not a scientist should be allowed to protect the secret of his idea or invention for the sake of personal credit or profit. Yet the streams are intertwined since scientists depended on the production of scientific instruments and the instrument trades depended on the work of the scientist. The two are as interdependent as the invention of printing and the scientific revolution itself. Hartlib wanted full disclosure from everyone for the benefit of all without regard for who got the credit or who made money. Others opposed him because it was their credibility or their financial potential which was at stake. Some argued that it was easy to take the high moral ground when it was not your own livelihood at stake.

Scholars outside the Hartlib Circle tended to argue for secrecy because, as William Eamon has argued, they wanted to distinguish themselves “clearly from the unlettered multitude.”\textsuperscript{243} Eamon explained how this motivation was so unlike the mechanics who were moved by pure economics. Scholars inside the Circle adopted a new Baconian openness in the seventeenth century even though, as stated, the position long predated Bacon himself. Dissemination of craft secrets came to be seen as the path to instauration. Secrecy, including monopolies and patents, was seen as a hindrance to innovation. Hartlib sought to create incentives to innovation and openness, to attract new inventors, new knowledge, and new skills.

Hundreds of letters, of course, in the Hartlib Papers address topics related to the appropriate methodology for the proper execution of science. The papers reveal that Hartlib discussed and even debated in text with Johann Moriaen, Culpeper, and Beale, among others, about topics such as experimentation, preservation of discoveries, and communications with other academics. They debated the purpose of communication. While all could easily see the value of sharing information to encourage more research, many were fearful that open communication would compromise the integrity of the researcher; that sharing one’s progress might allow others to steal the profits or credit for one’s success. One of the most divisive issues for Hartlib with his correspondents was the issue of secrecy which was necessarily related to whether a true scientist should be allowed to profit from his work. At least 43 letters in the Hartlib Papers address this issue. Hartlib wanted to eliminate secrecy altogether and see scholars share discoveries freely because his vision was to avoid redundancy in research and speed the alleviation of suffering in the world by pushing advancement in science. In Macaria, information passed free of charge and was unrestricted by the customs house. Hartlib argued that profit and credit were not appropriate motivations for a scientist committed to the drive toward the great instauration and that the progress waiting to be made more than justified any immediate or imaginary risks on the part of his opponents in this discussion. An ordered disposition of knowledge was the way toward the truth of Christ.

On the other hand, several of his closest associates disagreed with him, arguing that scientists were likely to discover more if they were driven by the incentive of profit and that they might choose not to work at all if there were no financial benefits to be gained. Some pointed out that profits from the work could thus

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244 Webster, Samuel Hartlib, pp. 5-6.
fuel further research. Dury felt that it was impolite to enquire too closely in another man’s affairs and urged Hartlib to not require those who disagreed with his openness to reveal their secrets against their wishes.\(^{246}\) Later, Oldenburg had similar concerns, according to Iliffe, and was at times in need of reassurance from others as to the integrity of information which was shared.\(^{247}\) Further, the topic of secrecy was debated in the context of secrecy in communications such as the security of correspondence in the Early Modern period when so many different methods and persons were employed in the delivery of letters and packages. Filippo De Vivo has written to explain the different forms of communication in the period from political gossip in barbershops and pharmacies to official publications.\(^{248}\) Although Filippo was writing primarily about Early Modern Venice, Hartlib spoke often of those things he learned from his barber in London. For example, he noted in his journal more than once information about a sponge which he had learned from the man who cut his hair in the 1650s.\(^{249}\) He knew a Mr. Rushworth who was both a barber and a surgeon. This man who had made a medication for palsy out of pineapples “feares nothing but that hee will cure People too suddenly.”\(^{250}\) Then, curiously, from a Mr. Schlezer, who may have been the barber, Hartlib wrote:

> There is a Smegma Tonsorium as j may so call it, or a kind of soape very common in Italy wherby the haire is taken from the face armholes or any other parts of the Body without any rasors sizers or shavings. Only by washing any the parts done with soape with warme Water. And it may bee done as finely and as little or much as one pleased.\(^{251}\)


\(^{247}\) Iliffe, “Foreign Bodies,” p. 35.


Some of the correspondents used the word *secrets* as a synonym for ideas, projects, or proposals when they felt they had discovered these things in the possession of someone they felt might be hiding them for either some patron’s security or one’s own future profit. Dury was concerned about the security of the Protestant churches when he wrote of military technology secrets:

> There is a French man who hath an Engin of warre & many other rare secrets usefull for warre by sea & land, which hee is willing to employ to the King of Swedens seruice; but for want of meanes to transport himself thither; hee is like to take some other course, & to bee entertained either by the French Ambassadour or by some agent for the Spaniard; & so will prooue a most dangerous instrument against the protestant Churches, & bee a great advantage to the common ennemies of them, if hee cannot bee supplyed & supported to with meanes to bee conveiged safely thither.\textsuperscript{252}

In this case revealing the secrets could save Protestant lives but the circumstance might have been reversed to mean that secrets kept could protect Protestants. Some letters to or about the work of Parliament touch on the need for secrecy in English national security.\textsuperscript{253} This possibility wasn’t enough for Hartlib to change his stance on the issue as it applied to knowledge and communications between scholars. He never wavered from a position advocating complete openness of information. Beale demonstrates the position:

> I doe very much applaud Mr Austins proposalls: & doe accompt the experiments most excellent. But my other engagemen\textsuperscript{t} tempt mee to diversions. Neither doe I hold any of thiese kinds of secrets vpon any other termes then to communique them wherever I find they may bee serviceable to our owne Countrey, or to humane kind.\textsuperscript{254}

Dury did not advocate secrecy only in technology but also in protecting innocent parties in sensitive situations such as in the dissolution of an estate. As he recommended secrecy as he shared with Brereton about the execution of “a knight of this” county’s will. He was apparently


attempting to protect the honor of “a Lady that was famous in the chiefe places of England for her constant & long continued Devotion” but who had spoken at the reading in such a way as to melt the heart of the most unconcerned atheist.\textsuperscript{255} Even speaking with such reservation in a private correspondence, Dury said he was still concerned that he had spoken too freely. Clearly Dury saw the value of secrecy in technology and in protecting the character of persons because both of these were the private affairs of another man.

Hartlib and several of his correspondents who advocated openness made the point that certain occupations and their relationship to the public required persons occupying those positions to be open with their knowledge. These included ministers and medical doctors in particular. “Mr Pye being Reverend & worthy persone, & a Minister of the Gospell Hee cannot withhold from you a healing secrete, being also importun'd in the name & for the goodwill of him, that dwellt in the bush, & did not consume it,” one wrote in 1659.\textsuperscript{256}

As London grew to become the largest city in Europe after Hartlib’s death and guilds dramatically declined in their power to maintain craft secrecy, Hartlib’s position of openness advanced in the surviving members of his correspondence and the work of the Royal Society. Despite the ongoing granting of patents and the growth of copyright laws, openness dominated secrecy in education, innovation, communication, and collaboration among scientists and scholars alike as governments sought balance between the need to protect the private property of individuals and the need of corporate society to know.


3.8 Preservation of Progress

Hundreds did choose to write and share. These ultimately determined there was more to be gained by being open, especially within the circle of corresponding empirical scholars. Hartlib, then, was not content to simply pass this information along. With a desire to preserve knowledge, he made copies of as much as possible before sending it out. When material was important to several correspondents, it was copied as a manuscript or printed in book form to be sent out in a mass communication to those who requested it or to whom Hartlib thought would find it useful, with or without the permission of the author and with or without payment from the recipient. With the help of secretaries, Hartlib attempted to make copies of his own letters sent to others. There are at least 234 examples of these dating from 1625 to 1661 beginning with Hartlib’s letter to his patron at Gdansk, which is found in a booklet, and, most likely from Hartlib, ending with his letter to Dorothy Dury. This latter document contains Hartlib’s report to her of his ill health and his request for information from her about the possibility of help coming to him from the Earl of Anglesey. It is the last outgoing letter found among the papers. There are later letters from Hartlib to Worthington but these are from Worthington’s papers and were not among those papers Hartlib preserved for himself. The original copies of these letters are found at Cambridge. It didn’t take long for these documents to become large stacks of papers written in multiple languages. Since Hartlib understood English, German, and Latin, few of these documents needed to be translated but they did need to be organized and preserved for his

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Turnbull, who organized these many surviving papers in the twentieth century, felt that Hartlib’s handwriting was poor, “in places illegible”, that his Latin was poor, and his English “involved”, making the task of organizing the manuscripts for preservation and access very difficult. Based on the descriptions given by Worthington and Turnbull, whatever archival system Hartlib had constructed must have been lost as the papers were shuffled in several movements after his death.

3.8.1 Catalogs

Ann Blair has written *Too Much To Know: Managing Scholarly Information before the Modern Age* in which she addresses the problem Early Modern scholars like Hartlib faced with how to manage and store the great quantities of information they collected. Blair, having written her book in 2010, mentions Hartlib, among many others, six times as one who collected and organized thousands of documents. Patricia Coughlan also examined Hartlib’s need to organize large amounts of information. She wrote, “The idea of a tabulation of information is a further step towards executing the impulse to order the natural and social phenomena of the universe according to rational principles, to control and organize one’s apprehension of, and manner of living in, the natural world.”

The Hartlib Papers refer to a “catalog” 239 times as Hartlib and his correspondents struggled to organize their letters and referred to the collections of others. Without the benefit of computers or even file cabinets, these catalogs usually ended up being some system of bundling

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with labels and corresponding indices. Almost all of the Hartlib papers show Hartlib’s handwriting as he labeled each letter with the topics he wanted to remember as those discussed in that particular letter. He made similar topical notations beneath each journal entry. This was part of his method of indexing and indicates some form of cataloging was in place. Occasionally the journal entry and the topic notation are indifferent languages such as in 1634 when Hartlib was using both English and Latin.²⁶³

Hartlib wanted catalogs of the libraries of others when the resource was too large to secure a copy of the entire collection. He was, however, willing to give catalogs as often as he asked for them and his correspondents were well aware this resource availability. Laurence Sarson placed an order in 1644, “you should much oblige me by accommodateing me with a catalogue of them,”²⁶⁴ referring to some Hebrew books left at Hartlib’s house by a certain Mr. Rittangle.

Within the context of an Agency of Learning, as marked in his journal, Hartlib wrote, “To cause the Catalogues <of the bookes> which are brought ex Italia, Gallia Hispania here diligently to bee printed.”²⁶⁵ He often asked for catalogs of various persons’ personal libraries. Of one he wrote, “Tucker very studious public-hearted hase a great library.”²⁶⁶ In some instances this allowed him to purchase these same libraries, knowing the content, when he heard the owner has passed away. Hartlib saw the value of catalogs since they opened hidden works and gave access to others who might have found them useful. Catalogs were small, handy

inventories of large collections and Hartlib sought to construct, duplicate, and distribute as many as possible to his circle of correspondents.

3.8.2 Printing

Some scholars still consider Hartlib to be little more than a seventeenth century publisher, but as made clear in this thesis he wore many hats and in printing he was more of an editor than a printer. He used printing as a primary method of disseminating and preserving information. Communication supported by printing was his great strategy to achieve his great goal. Several primary documents are marked with his name as author, many more show him as the publisher. These were printed by several different local London printers with whom Hartlib seems to be well acquainted. These printers were also part of the London vernacular scientific community with which Hartlib socialized and knew first hand. Furthermore, he apparently paid for having works printed at his own expense even when he was obviously suffering greater financial difficulties than either the original writer or the printer. Several letters to him from personal friends in the Papers encouraged him to remember the livelihood of his wife and children as he was being so generous in the work with his limited personal funds. He admitted to Worthington that he had often paid for the “entertainment” of others “unknown to my wife.”

Hartlib was generous to a fault when the spending was targeted toward the cause, funding scholarships and, with the knowledge of his wife, supporting many needy people, be they scholars, administrators, ministers, relatives, or orphans, with room and board. Adam Speed was supported in Hartlib’s house. Winthrop rebuked Hartlib for having supported Gabriel Plattes for “weeks” in his later years since this had caused hardship in Hartlib’s home. Dr. Henry Alting gave thanks to Hartlib for housing the only son of Mr. Renyer’s widow in his house. Dury

267 Webster, Samuel Hartlib, p. 39.
stayed with him several times when in London, Comenius stayed there 1641-1642 when he visited England, and J. F. Schlezer, ambassador of the Elector of Brandenburg to Cromwell, stayed there in 1655. These are only a few examples from the Papers of people he supported. This is the hardship Hartlib placed on himself with his generosity in printing. Yet, in his defense, most of the money passing through his hands was given by wealthy donors for the purpose of funding research and printing. He was consciously not trying to store up treasures on earth. Winthrop encouraged him to consider his eternal reward, “having cast much bread upon the waters.” Greengrass has written that Hartlib passed along a total of £1,400 pounds, an average salary for only four and one half years at the time, during the five years between 1637 and 1641.

During this same period, Hartlib received a patent from the Prince Elector Charles Ludwig, Elector of Bavaria and Prince Palatine of the Rhine, son of the Queen of Bohemia and the nephew of English King Charles I. The patent, presented to him personally by Ludwig who was in England during April 1637, enrolled Hartlib as a minister of the Palatinate in consideration for his “services to the exiles from the Palatinate and his reputation among great men.” Unfortunately for Hartlib, this honor was ceremonial and meant nothing to his income.

Despite his financial struggle, Hartlib never stopped publishing books at his own expense during his lifetime, most often working with Printer Richard Wodenothe who sold the books from his shop and then gave the profits back to Hartlib. Hartlib worked with Wodenothe to

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269 Turnbull, *Hartlib, Dury, and Comenius*, p. 3.
introduce greater editorial techniques to improve the quality of their publications. They attempted to standardize punctuation, for example, orthography, and capitalization. On the other hand Hartlib’s impatience with the delivery of letters, especially those going to and coming from the continent, drove him to publish some works without the authors’ permission. While some of Hartlib’s correspondents were also close friends and most likely would not have objected, trusting his judgment, it was a risky practice in light of the debate in the Hartlib circle about proprietary rights and secrecy. There is no evidence Hartlib published a work after being told not to print by an author. Though the idea of copyright was forming in the seventeenth century, standards were much less clear than would be the case even in the eighteenth century. Even so, “The ethics of copying have vexed people since the early days of the printing press.”

It was the proliferation of printing technology that moved Europeans in the sixteenth century to consider “modern ideas of ownership” in regard to the content of texts.

Adrian Johns explained how the word “copy” meant two things before the seventeenth century, what modern persons might call the “original” as opposed to the “duplicate”. He gave the example of the King James Bible to illustrate how stationers fought over the right to print. Hartlib and others wrestled with these ideas of ownership in the seventeenth century, aiding in developing a sense of property and ownership of both texts and inventions. As Johns notes, eventually this led to copy “rights.” Elizabeth Eisenstein explained how this process liberated the stationers and printers from guild protection yet how it simultaneously raised new issues in the field of monopoly and piracy.

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plagiarism and copyright did not exist for the minstrel. It was only after printing that they began to hold significance for the author.”

Johns further argued that this increasingly made the “copy-owning bookseller” the motor of printing rather than the author, publisher, or printer. Arguing for minimal rights to copy, and despite the fact that he wrote, published, and sold books, Hartlib gives evidence that he thought of himself more of a communicator than any of these other roles which would have profited from greater rights to copy. This is thus further evidence that he put the demands of the instauration, as he understood them to be the greater good of all humanity, ahead of his own personal needs. He consistently kept the long term goal foremost to the exclusion of any immediate and/or personal benefits. All of this speaks further of his personality and character as a committed Puritan empiricist.

From the Papers, Wodenothe and other London printers seem to have acted as agents for Hartlib. Hartlib made books available free of charge when he thought giving a copy to a promising scholar was worthwhile to the greater cause. He made publications and duplications available in this way regardless of culture, politics, religion, or location. He communicated across “boundaries of language, territory, discipline, class, and dogma.” He truly had a big picture in view even as his closest friends reminded him of his personal life, particularly the financial needs of his family. Perhaps because of Hartlib’s generosity, Wodenothe’s products did not sell as well as they both needed and while Hartlib struggled to provide for his family, Wodenothe wrote to him about the possibility of his going bankrupt. Unfortunately for Wodenothe, Hartlib had no interest in owning knowledge and he was opposed to copyright.

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278 Johns, p. 105.
279 Shapin and Schaffer, *Leviathan*, p. 300.
280 Greengrass, *Universal Reformation*, p. 16.
protection, even for his own works and not because he wanted to profit from the work of others.\textsuperscript{282}

Milton countered that every author should have his work protected not just in life but after his death. Over forty years before Locke wrote his \textit{Second Treatise of Government}, Milton asserted in 1649 that the right to property derives from a man’s labor and that a text can be owned. The seventeenth century understood a person could own a copy of a text but Milton was arguing for ownership of the text itself.\textsuperscript{283} He didn’t specify how long after death this protection should extend. Hartlib wrote that he would support up to fifteen years of protection for an author or stationer but that he would prefer it be only five and that it only existed during the life of the author. He wrote, “A great injury that stationers have copies for ever. It should suffice they should enjoy them for 5. 10. 15 years. Otherwise they never reprint them and by this means many good books are suppressed or perish altogether.”\textsuperscript{284} He felt the same way about patent protection for inventors. According to Greengrass, Hartlib felt these were “all shades of the Old Adam.” No copyright act was passed until well after Hartlib had died.

\subsection*{3.8.3 Archives}

While nothing resembling a modern copyright law existed in the seventeenth century, most early modern states, companies, and some families had archives after the eleventh century. Large collections, according to Blair, date to the fifteenth century.\textsuperscript{285} While the effectiveness, organization, and sustainability of those archives varied, the idea, pushed by great need, was growing in the correspondence of Hartlib. Libraries, like monasteries before, stored books and manuscripts but Hartlib wasn’t satisfied because, with no adequate indexing catalog, works

\begin{thebibliography}{99}
\bibitem{283} Kevin Dunn. \textit{Milton Among the Monopolists}, p. 177.
\bibitem{285} Blair, p. 67.
\end{thebibliography}
placed into a library were as good as lost, in his opinion, to anyone who might have wanted to use them. As described by Blair, Hartlib must have believed filing without a finder’s guide was discarding and “discarding facilitates forgetting.” He desperately wanted to remember everything and that included remember where he, others, and libraries of all sorts put things. The problem was clearly stated in an anonymous “Remonstration on Typography” which could easily have been written by Hartlib said, “as divers libraries both publick & private in this Nation can sufficiently testifie, in manie of such books of great value lye as it were buried & as to the use that might be made of them are lost for want of being published.” As Hartlib and his correspondents discussed various ideas to preserve animals, crops, drinks, grass, wood, and other commodities, they also wrestled with how to preserve their papers, which included copies they had made of others’ papers. This was no attempt to insure one’s personal legacy, Hartlib was burdened with a mission to be sure nothing known would ever be lost and necessitate redundant research in the future. While the papers rest safely today in the climate controlled storage areas of modern libraries, they were incredibly preserved by Brereton and Worthington for 271 years in no more than a trunk placed in a closet of a personal residence. Before that, the lack of proper protection caused the loss of an unknown number of papers in Hartlib’s own home and others taken out of the collection when offered to persons involved by Worthington.

Although it is difficult to reconstruct Hartlib’s personal filing system, his notations on letters and in his diary are an indication that he felt a concern for archiving and retrieving information. As Iliffe has shown, these references in the margins are evidence of Hartlib’s process of arranging the data he received into specific headings. The notations point to the

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286 Blair, p. 66.
existence of some form of index though no such document has yet been found. The current
digitizing of the Hartlib Papers along with the other Hartlib related papers from other collections,
however, making them fully searchable, is obviously the ultimate access for which Hartlib
eyarned.

The founding of the Royal Society in 1660 created the opportunity to actively save
papers, pamphlets, and books relevant to the growth of science. While this collection never
housed the Hartlib Papers, the library established by Oldenburg for the society began to preserve
the papers of others, beginning with the papers of Oldenburg himself. The first book was
presented to the society in 1661 while Hartlib was still living. This history is well documented
by the historians of the society including Thomas Sprat in 1667, Thomas Birch in 1756, and
Charles Richard Weld 1848. As stated some of the Hartlib Papers are found in the British
Library as part of the Hans Sloane Manuscripts. These were apparently collected by Sloane and
then presented to The British Museum upon his death as it was being established in 1753 and
then transferred with so many other documents to the British Library when it was founded in

Hartlib was critical of libraries, both public and private. They were doing an acceptable
job as an archive but were failing in access. The idea of a private library which was not shared
with others was offensive to Hartlib’s sense of openness. Libraries by definition were to be
public libraries according to Hartlib. For example, Rand’s level of access without a catalogue
was Hartlib’s when Rand wrote:

For the present I have before me Herberts booke de Veritate, & could I attaine a
Catalogue of his library, which he charges his heires to preserve entire: I should reape
some considerable fruit from that booke, which I conceive well worth the [paines? MS
torn] of an abler spirit then mine to search into.289

Hartlib’s answer, in his time before the chartering of the Society, was to create a national scientific archive/library in his Office of Public Address which would collect and preserve books and manuscripts, storing them according to a master catalog which would make them easily accessible to researchers.\footnote{Samuel Hartlib. \textit{Copy Memo In Scribal Hand B, Profits Presented To The Kingdom, undated.} From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. http://www.hrionline.ac.uk/hartlib/view?file=main/53B_32 (accessed October 25, 2014).} Hartlib made notes in his journal about the possibilities of the public library in “Paul’s Church”, Bishop Ussher’s Library, or some other being used as a foundation for the library in the Office of Public Address.\footnote{Samuel Hartlib. \textit{Notes On London University, Hartlib, undated.} From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. http://www.hrionline.ac.uk/hartlib/view?file=main/47A_09_16 (accessed October 26, 2014).}

It is not clear how much Dury meant by “Such a library & MS might be fitted to bee joyned to your library of Gresham Colledge of London.”\footnote{John Dury. \textit{Copy Letters In Hand ?, [John Dury] To [Hartlib], August 13 And September 13,1639.} From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. http://www.hrionline.ac.uk/hartlib/view?file=main/9A_01_090 (accessed October 25, 2014).} Dury had met a couple who had a large library but no children and were looking for “some Colledge of learned men” to which to leave their collection”. Since the Office of Public Address was not established he seems to be questioning Hartlib as to what he should tell them so the valuable books and manuscripts were not lost. Did he say “your library of Gresham Colledge” in a general collective sense since Hartlib was also in London or did he have a closer relationship with the Gresham library? Living in a house as small as he had, and having as many books as he must have had, is it possible Dury meant that Hartlib’s library was housed at the college? In 1648 on Christmas Eve, Robert Child described the Cambridge library as “pretty well [filled? MS torn] with Bookes,” yet even this archive was not as accessible as Hartlib and his correspondents needed it to be.\footnote{Robert Child. \textit{Copy Letter In Scribal Hand B, Robert Child To Hartlib, December 24, 1648.} From The University of Sheffield, \textit{The Hartlib Papers 1620-1662}. http://www.hrionline.ac.uk/hartlib/view?file=main/39A_02_005 (accessed October 25, 2014).}

Hartlib had several other opportunities to establish a proper library. In 1655 he wrote:
The 2. of January came the first time to my house the Minister in Kent and one that should be Master of a College. Hee desired the foundation of a Mechanical schoole and acquainted mee with the whole designe of founding a College of Sciences with several schooles and a library a worke-house in Durham.  

Hartlib did not record his response next to this Ephemerides entry but interestingly in 1658 he records a new type of oatmeal coming from Durham College. While efforts to start a college at Durham in 1657 are documented, and Hartlib never lived in Durham, the current university there only traces its history to 1832. This same history records that Oxford and Cambridge were instrumental in blocking the seventeenth century effort to start a new degree awarding institution in Durham. The Papers give the impression the college was organized and well on its way during the late 1650s. As early as 1656, as one of several manuscripts referencing the college, Hartlib was given thanks for having sent information:

I thanke you for your information about Durham College, which I find turnes thus farr to my advantage here already, that having acquainted some here therewith they thereupon expressed a greater esteeme for me & more unwillingnesse to part with me then otherwise I could have expected.

In the same letter Wood indicated that the Bishop of Armagh’s library had been purchased and was being “brought over” for the library at the new college in Dublin. About the same time, a man in Manchester donated his library to the town and a tradesman gave £1,000 to increase it.  

As described earlier, Hartlib was offered the librarian’s job at Oxford in 1652 when the librarian was “very sick, & it is thought like to dy” but chose to decline. One might think that would have been the perfect position for Hartlib but he had a higher purpose of which the permanent

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full-time librarian’s post would have kept him. Competing desires may have caused him to hesitate in making the decision but ultimately his correspondence responsibilities were greater than his desire to establish one proper library.

4 APPLICATION IN THE DISCIPLINES FROM THE PAPERS

For a large part of his life, Hartlib’s vision to formalize empirical epistemology was to create an Office of Address, first mentioned in the papers in 1646. His ambitious attempt to start his own school at Chichester had failed in 1630. He clearly felt disconnected being in Chichester. He was young and inexperienced having left Cambridge and having been married less than two years before making this ambitious attempt. He returned to the capital long before classes at Chichester actually ended even when his absence almost certainly guaranteed the institution’s failure. Thus he promoted the Invisible College from London for about fifteen years but then longed to make it visible as the Office of Public Address. This Office was meant to be a public institution. It was to serve as a center for international correspondence and to direct the efforts of like-minded scientists. The Office was never formalized and existed only in Hartlib’s study but was nonetheless “recognized as the nerve center for scientific correspondence and communication in Commonwealth England.”

These are the activities to which Hartlib had dedicated himself so he must have been attempting to institutionalize his work to ensure that it lived beyond his years. Dircks wrote in the dedication of his Hartlib biography, “What Samuel Hartlib attempted for the advancement of Society in a religious and moral point of view, in the seventeenth century, by the establishment of suitable institutions . . . have carried to a successful issue at this present time.”

298 Greengrass, *Universal Reformation*, p. 11.
Hartlib explained to his correspondents that the Office, if approved and funded by Parliament, would consist of two offices: the Office of Accommodations and the Office of Communications. The former, according to Hartlib would serve as a labor exchange while the latter would maintain registers of information. Neither half looked like a traditional college. One looks like a national research laboratory and the other looks like a national library. Hartlib wrote out a long, detailed description of these offices and the topic was discussed in a multitude of letters found among the Hartlib Papers. Hartlib discusses and debates funding, salaries, staff, and other aspects with John Sadler, Dury, Worsley, Boyle, Gerard Boate, and Culpeper as if a ribbon cutting was only days away. The latter appears to have been the most critical of the idea, especially in the beginning, because he had serious doubts about the possibility of the Office being able to secure state support. In the end, though Parliament considered the idea, he was right, especially after the Restoration.

Webster suggested this “College of Reformation” was inspired by “the Parisian Bureau d’adresse of Theophraste Renaudot,” but it may have also been inspired by Francis Bacon’s Jewel House or Salomon’s House. This was an imaginary location where all manner of scientific research takes place under the guidance and administration of one wise leader and at the hands “of thirty-six collectors, experimenters, compilers, editors, inventors, testers, and interpreters” who were supported by “servants and attendants, men and women.” Apparently neither man felt Cambridge could fulfill that role because it was bound by too much tradition, that it was already too large, and that it was hindered by having too many competing purposes. Gresham College was doing an excellent job in presenting free public lectures on empirical topics but it was limited in size and purpose for what Francis Bacon or Hartlib wanted to create. Ultimately

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300 Webster, *The Great Instauration*, p. 68.
the Jewell House never escaped the mind of Francis Bacon and the Office of Address never moved past an appropriation of Parliament. The Royal Society, however, was charted and received funding to become the most visible part, however pale a reflection, of what Francis Bacon or Hartlib had envisioned. It was not a slight to Hartlib, when the society named Francis Bacon as their “founding father”.

The Office of Public Address is worth understanding because it was an expression of what Hartlib was personally doing with the help of a few secretaries in his home. Adamson wrote, before the discovery of the Papers, “Though his various plans for a State Intelligence Department did not secure official support, Samuel Hartlib was in his own person just such an Office of Public Address as his project defined.”

Though the institution he intended to be funded by Parliament would have been an elaborate organization with a large staff and accommodating physical buildings, Hartlib was already functioning as an informal job placement service, spiritual counseling center, a guest house, and book exchange for his many correspondents. The two major divisions of his office were to be an expansion of these functions to include a patent office by which Hartlib meant to offer writers and inventors some protection without unnecessarily restricting information, a hospital, a proper public library, and a commodities exchange which may have looked like a modern farmer’s cooperative. The multiple functions of the Office were logically divided between “Outward Things” and “Inward Things” as Hartlib visualized that division. Thus the employment agency fell under the Office of Accommodations and the Office of Communications would have included the public library and be the division Hartlib planned to personally direct. Notice that he placed himself as one of two assistants to an overall administrator rather than naming himself as the wise leader.

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Telling are the three subdivisions of the Office of Communications: Religion, Learning, and Ingenuities, in that order. Dury was to lead the first subdivision, the second would further the empirical method, and the third would materialize the College of Experience from *Macaria*.

The program description for the Office of Communications clearly maintained the interpenetration of the material and spiritual worlds. The Office of Communications would have been a national agency for research and development in science and technology.\(^{304}\) Overall, the Office would have been a clearing house of information, exactly what Hartlib was already doing in his home office on a small scale for his circle of correspondents. The establishment of this office with public funding from Parliament would have made Hartlib’s work permanent, benefiting the empirical crusade toward instauration, literally, until Jesus comes. Planning for the office to survive his own death, Hartlib provided in his proposal for an overall executive and the two agents to be appointed by Parliament and for the executive to be accountable to a Board of Trustees who would also adopt an annual budget. The proposal was written in detail and several names were identified for offices down to the fourth level of the organization. In 1649 Dury, not Hartlib, presented it to Parliament. It was never approved by the English legislature, even though it was said that Cromwell himself was fascinated with the idea of an office for foreign correspondence. The members of Parliament were interested but never voted to approve the plan. Hartlib nonetheless received a two hundred percent increase to his stipend from the government in appreciation for the work he was doing. This allotment, thereafter £300 per year, was little consolation to the visionary Hartlib who wanted the Office of Public Address.

Separating educational reforms in Hartlib’s works from other topics is difficult since almost every Hartlib initiative, project, or accomplishment connects in some way to his goal of fundamentally changing the way people learn. The various fields of Hartlib’s intellectual

\(^{304}\) Webster, *The Great Instauration*, p. 70.
activity are interrelated. No subject rose more prominently in the Papers than educational reform. Hartlib and Comenius intended to change how students learned, where they learned, what they learned, and when they learned because he had discovered why students learn. He believed, for example, that students should study Plutarch, not as a work of literature which would teach a young scholar to express himself, the traditional purpose for studying the classics, but as a source of information on the practical subject of education. Hartlib, therefore, made little attempt to change who students studied because the historical author was irrelevant. As Ogilvie argued, “Ancient authors were to be supplemented but not replaced by modern vernacular works where such works existed.”

So even though competent textbooks existed in most disciplines by 1660, there were too many useful lessons in the classical works for there to be any discussion of discontinuing their use in the public schools or universities.

5 CONCLUSION

The immediate legacies of Hartlib are his papers and the Royal Society which member and society historian Thomas Sprat wrote was formed to regain “the knowledge that Adam had once possessed.” The fact that Sprat does not mention Hartlib is explained by Webster who argued, “his lack of concern for the early history, his ignorance of the events, or his positive desire to suppress an account of events which might attract attention to the puritan and pansophic associations of the early Society.”

If it had been his choice to make, Hartlib would have chosen to have his name hidden in favor of the advancement of an experimental method striving toward instauration. It was his personality to give without promise of reward in return. It was his practice, like Boyle, to give the credit to God. Hartlib’s place, however, in the Society’s history is being made clearer in part because of the Papers. Hartlib’s archive has

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305 Ogilvie, Latin and Greek, p. 38.
306 Webster, The Great Instauration, p. 54.
caused historians such as Webster and Greengrass to reconsider Sprat and Wallis’ history. They are also reevaluating comments made by Boyle regarding the Oxford pamphlet “The Beginning of the Royal Society”. Which, even though it was discredited by one so central to the founding of the Society, was nonetheless presented to a Society delegation as the official history of the Society in 1960. The ultimate mark of Hartlib may yet be his contribution to the growth of modern science. His papers allow us to make some more specific and concrete conclusions about an invisible man and the world in which he lived.

The Hartlib Papers are a huge resource for understanding the seventeenth century in England and the development of science in the Early Modern Period. In the bundles of manuscripts now in the library at the University of Sheffield, there is more than enough information yet unexplored to write several books and make hundreds of conclusions about Hartlib, science, faith, the Puritans, and seventeenth century epistemological reform. Only a few conclusions can be made here from what has been said in this thesis.

First, evidence in the Hartlib Papers proves the scientific revolution has roots in the thirteenth century. Many have concluded that modern science began in the eighteenth or nineteenth century, certainly no earlier, but Hartlib was clearly discussing in the seventeenth century an experimental science with controlled experiments, documented and repeatable results. Empiricism to Hartlib was learning by doing, by experience. It was learning “in person”, touching, hearing, seeing rather than the unrestricted thinking of scholasticism. Empiricism was personal and direct rather than listening to the hearsay of someone else. This process was described by Culpepper in a 1656 letter to Hartlib regarding tests done with gunpowder. In the letter, he demonstrates how that which was read in John Bate’s book was not credible until he and his neighbors had repeated the process for themselves. He wrote, having
said, “I will not bind myself empirically, about the empirical process in language Hartlib understood:

John Bate in his booke of the misteries of arte & nature, fol: 261: proposes the makinge of salt peter, by the meshinge of quick quick lime with warme water, & then vaporinge awaye the water by the same; This proposition (being suche as my some neyghbors of myne, & haue tryed & fownde to be true) hathe lately caused me, to firste to reste assured that the excellency of lime (the richeste composte (ordinarily altered knowne) quantity for quantity) consistes in the saltepeeter that is in it; in the seconde place, to make a practicall & diligente searche & obseruation, what quantity of saltepeeter a loade of lime will yelde, which beinge fownde will (I am confidente) not proue, not above 1/20 parte of the loade, & I am as confidente that this 1/20 parte beinge improued accordinge to the Parisian expermente mentioned in your Legacy printed in the yeere 55: fol. 110: will (at leaste) equall your Germans Receipte; & yf the clevells <well chosen &> (soe steeped) could be sowed at a fittinge & juste distance & depthe, it wowlde (I [letter deleted] verily beleue) occasion our beginning to singe the 67: [word deleted] Psalme; & (as I once tolde you) wownde the Diuell with his owne Engine of gunpowder. And this is the beste answere I can for the presente give you, but shall be glad to learne of others.\(^{307}\)

Yet Hartlib himself looks back to Roger Bacon in the thirteenth century as the first researcher to approach challenges with the “modern” methods. Hartlib describes Roger Bacon as one who challenged the hegemonic scholasticism of his time and passed this spirit down to his relative Francis Bacon from whom Hartlib drew so much inspiration. Evidence in the Hartlib Papers thus proves that the Bacon Family, including Nathaniel and Edmund, were collectively involved in the development and institutionalization of science. Evidence in the Papers further prove that Hartlib himself is a critical link in a long chain of scholars who carried the biggest torch of empiricism through the seventeenth century from Francis Bacon to Oldenburg and others such as Newton. For Hartlib, epistemological change, was much bigger than nationalism.

Secondly, evidence in the Hartlib Papers revives the idea that empirical science is a Puritan educational reform. Not the political Puritan reform of the interregnum but the Puritan educational reform which was part of the shift from medieval scholasticism to early modern empiricism. The Papers demonstrate that it was wrong for revisionists to have minimized the Puritanism in the history of science. While the epistemological changes of the seventeenth century may not have been scientific revolution, they were part of a larger ongoing process. While Puritanism may not be the only cause of these changes, the Papers suggest the Merton Thesis is not as deficient as recent Catholic historians of science have suggested. Hartlib and his associates were scientists and they were Puritans. They were among the leading scientists of the seventeenth century. They were the leading scientists of seventeenth century England. They may have been equally comfortable working politically with an Anglican or Catholic monarch out of necessity but their theological writings indicate deeply held Puritan theological beliefs. These early scientists believed the Bible literally and looked to the Scriptures for both direction and inspiration. They believed in an active and personal God. They respected and maintained a personal morality which, for them, included a strict observance of charity, frugality, honesty and other common Puritan disciplines.\footnote{Ogilvie, \textit{Latin and Greek}, p. 37.} They expected a genuine Christianity to be more than lip service or casual support of the local church. They respected purity of church government, purity of worship with its focus on Biblical preaching, and purity of a personal life.

Third, evidence in the Hartlib Papers proves that most of the Puritan scholars, especially Hartlib and his associates, had ties to Cambridge University, either directly or indirectly. Whether this was coincidental or, more likely, this institution had developed an empirical friendly reputation, opposed, especially, to scholastic friendly Oxford, in early modern England which is yet to be properly understood, the reason for this concentration is a topic to be fully
researched. Hartlib was almost certainly a student there even though his name is not found on
the matriculation lists. “Twice,” Turnbull wrote, “Hartlib speaks of ‘when I was at the
University of Cambridge many years ago.””309 At Cambridge he either met Francis Bacon or
was introduced to his philosophy by others. He met professors and students who became
lifelong correspondents. Cambridge is the link which explains the relationships between Hartlib,
the Bacons, Beale, Johannes Bergius, Thomas Gataker, Walter Welles, and many others. Hartlib
wrote three letters from Cambridge in 1625310 and a fourth in 1626.311 Walter Welles wrote to
Hartlib from Cambridge in 1630.312 The papers and all other evidence indicates Hartlib was at
Cambridge from July 1625 until January 1626 but nothing currently proves he wasn’t there as
early as August 1624 and as late as January 1628. While his role there remains a mystery due to
the matriculation lists, his presence and the contacts he made are certain. Most powerful is the
influence he absorbed from empiricists converting him to the faith of experimentalism.

Even as the philosophical changes of the Puritan Revolution had tremendous impact on
the work of Hartlib, fourth, evidence in the Papers prove the actual physical violence of the
English Civil Wars had a remarkably minimal effect on Hartlib and the growth of science during
the seventeenth century. While the king, the protector, and parliament appear in the writings of
Hartlib many times, the papers prove he was far more concerned with the Reformation,
particularly Dury’s effort to find reconciliation between Protestants, and the Thirty Years War
than he was with the events or the outcome of the English Civil Wars. Living in London, he was
well informed of political and military events but at no time did the war prevent him from

310 Samuel Hartlib. Booklet “Liber Exercitiorum Logorum”, Part 1, In Latin, undated. From the University of
October 16, 2014).
311 Ibid.
312 Walter Welles. Letter, Walter Welles to Hartlib, September 13, 1630. From the University of Sheffield, The
16,2014).
working as he needed. He spoke to Parliament several times and lobbied both branches of
government for financial support of his ideas, but he never complained about the physical events
of the wars in England. He is positive toward the Puritan cause and clearly from the expression
of his opinions, he was in agreement with many Puritan ideas, but he also gives the impression
he was so committed to his work and that he would have been equally content working in a
monarchy or republic. Hartlib knew Oliver Cromwell and introduced others to him but he
nonetheless worked seamlessly from the reign of James I in 1621 when he first appears in
England until the reign of Charles II in 1662 when he died.

Finally, the Hartlib Papers prove several facts about Hartlib himself. Hartlib, a
Lithuanian born in Polish Prussia, was an outsider from the continent who became a leader
among the English scholars. Having an English mother may have given him a better opportunity
than some other continental scholars received. Whether he spoke with an accent, for example, is
debatable because he may have learned English from his mother as his first language. The force
of his personality may never be properly understood but must be allowed since the depth of his
influence with powerful figures is so difficult to explain without it. As when John Evelyn wrote
of his visit with Hartlib in 1655, he referred to him as “honest and learned”, calling him “a
Publique Spirited, and ingeniously person, who had propagated many Usefull things & Arts.”[313]
Hartlib himself claimed to Worthington in a rare moment at the end of his life, “noblemen,
Patrons, and children of honourable parents which have begged of me to suffer them to live with
me at my table” and “acquainted with the best of Archbishops, bishops, Earles, vicounts, barons,
knights, Esquires, Gentlemen, Ministers, Professors of both Universities, Merchants, and all

sorts of learned or in any kind usefull men."314 Having said this, in light of how he had lived and described himself for the previous thirty years, he seems reminiscient of the Apostle Paul who so often described himself as the chief of all sinners but who, when responding to the criticism of a critical and rebellious Corinthian church wrote, “I am become a foole in glorying, ye haue compelled me. For I ought to haue beene commended of you; for in nothing am I behind the very chiefest Apostles, though I be nothing.”315 Or to the Philippians in defense of the criticism he was suffering from those who came from Jerusalem to discredit him:

I might also haue confidence in the flesh. If any other man thinketh that hee hath whereof hee might trust in the flesh, I more: Circumcised the eight day, of the stocke of Israel, of the tribe of Benjamin, an Hebrew of the Hebrewes, as touching the Law, a Pharise: Concerning zeale, persecuting the Church: touching the righteousnesse which is in the Law, blamelesse.316

So which great work did Hartlib write to win over esteemed scholars? Was his magic only in public speaking? Was he inspiring only in personal encounters? How did he achieve the high level of honor and credibility he enjoyed from the academic community in his lifetime but which was lost to subsequent generations of scholars? As Greengrass and others have pointed out, Hartlib “was not himself the author of any significant published work” and he is not the inventor of “any of the great intellectual discoveries of the seventeenth century.”317 There can be no doubt, however, that Hartlib did excel in the minds of men who did author significant work and discover great things. His influence was felt and acknowledged by those who were grateful to him in his time. Greengrass also acknowledged, “It becomes obvious why he was

317 Greengrass, Universal Reformation, p. 2.
accorded such high status by his contemporaries.” The effects of his work echo into the modern world through the books, discoveries, and inventions of others to those who are familiar with Hartlib and recognize him without seeing his name. Hartlib, especially now that the papers have been discovered and are beginning to be studied more completely, is critically important in understanding the history of science in the seventeenth century.

Hartlib was clearly a polymath. He was an intelligencer. These terms are allowed without dispute. He was universally well-liked and well-regarded. He was successful if not prosperous, a reformer in a time of radicalism and yet someone who was not persecuted in the midst of shifting political fortunes. He was influential yet he was forgotten. He is not an outlier, he is representative of his time even though he was exceptional in an age of great men, corresponding with scholars who discovered, invented, and perfected various pieces of the modern world. He may have been an eccentric to some but circumstances point to a powerful and persuasive personality which won the loyalty of archbishops, explorers, motivated mechanics, politicians, professors, and others, “all sorts of learned or in any kind usefull men” to political, social, theological, or educational reform. He represented both emerging and ongoing social forces of change. He is and will increasingly be known as the early modern auctor prudens.

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318 Ibid.
319 Greengrass, University Reformation, p. 2.
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Figure 1: sample document from the Hartlib Papers demonstrating Hartlib’s early modern script. In this particular example from November 1652, Hartlib explains in his own hand and with both German and English how silk worm experiments in London failed because of cold weather. He was hopeful the worms would do better in Virginia where the climate was more suitable to silk making.
Figure 2: This graph illustrates the number of dated documents in the Hartlib Papers corresponding to each year 1660-1662. Several letters are undated and are not included on this graph.